



PGIM
India Mutual Fund

MEGATRENDS

RESHAPING SERVICES

The investment implications of technological disruption



WINTER 2021

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All investments involve risk,
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About PGIM

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* "30 market cycles" represents PFI's asset management expertise through PGIM, its affiliates and its predecessors.

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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.



David Hunt
President and Chief Executive Officer
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CHAPTER 3

HEALTHCARE

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HEALTHCARE: A NEW ERA OF VIRTUALIZATION AND PERSONALIZATION

While cutting-edge innovations in therapeutics such as gene editing and mRNA vaccines are revolutionizing medical treatments and pharmaceuticals, healthcare services – namely, the delivery and administration of care – remains one of the sectors with the lowest degree of technology utilization.²⁶ Yet, advances are being made to cater to a new generation of tech-savvy consumers who no longer accept the archaic medical systems of the past. This is leading to a major shift in how healthcare is delivered and administered globally. Three key themes are emerging for the healthcare system of the future.

Future State of Healthcare

Virtualization

Increasingly, healthcare is being pushed out of hospitals and into clinics and homes. While this trend was certainly advanced by the lockdowns and overloaded hospital systems during COVID-19, underlying digital technologies have enabled it for years before. The plethora of new telehealth platforms, for instance, now give patients access to urgent care or mental health advice services from the comfort of their homes. At its peak in April 2020, telemedicine was responsible for roughly 40% of all ambulatory visits in Australia and the US – and 77% in Canada.²⁷ While this usage has come down off its peak, it is likely to permanently remain far above pre-pandemic levels. These platforms are also being deployed to monitor chronic conditions as well as provide physical therapy.

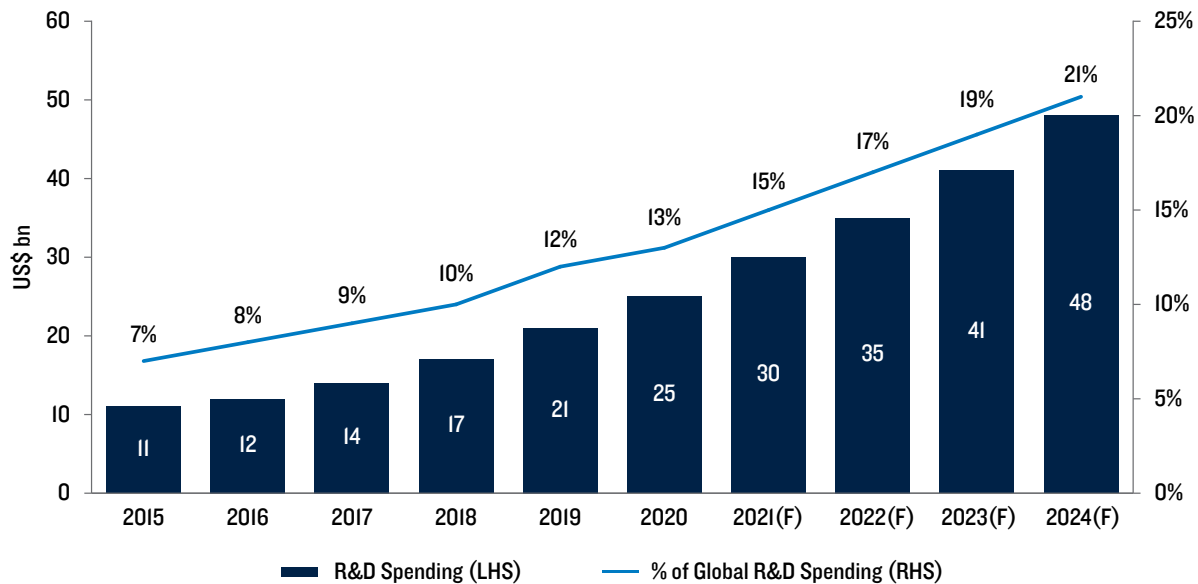
This trend towards lower-care settings has also been enabled by remote, internet-enabled monitoring devices, which give patients and their doctors continuous access to health metrics and data. These devices are now being used by more than 20 million patients in the US alone and have proven to significantly reduce hospital re-admission rates and increase patient satisfaction.²⁸

Personalization

Simple blood tests at an annual physical have been the basis of healthcare for decades. Today, new wearables and advances in genetic sequencing have led to the creation of a much more personalized kind of medical care. New smartwatches, bracelets and rings track heart rate, exercise levels and sleep patterns, providing patients and doctors with a broader perspective on well-being. Furthermore, the advances in low-cost genetic sequencing are empowering patients and doctors to make more personalized decisions about their healthcare. Direct-to-consumer (DTC) genetic testing kits from companies such as 23andMe, for example, started as a way for people to track their ancestral roots. Today they are becoming key inputs into healthcare decisions. US authorities allow 23andMe to test for genetic illnesses like Parkinson's, Alzheimer's, and celiac disease.²⁹ Armed with this type of genetic data, nearly 30% of consumers who undergo DTC genetic testing share their reports with healthcare providers.³⁰

Similarly, companies such as US-based Veritas Genetics give consumers the ability to map their entire genome on a smartphone app. The app then provides care recommendations for people predisposed to certain diseases.³¹ And with new gene therapies being used to address chronic health risks such as cardiovascular

Exhibit 6: China's pharmaceutical R&D spending is growing



Source: Jefferies, Frost & Sullivan.

disease, this form of personalized medicine is set to revolutionize healthcare. Additionally, personalized wellness programs like Vitality combine technology, data and incentives to inspire healthy habits and other positive changes in individuals.

Segmentation

There is no real possibility of a winner-take-all, global market for healthcare. Given the fragmented and inherently localized nature of the industry, it is simply not feasible. This is driven in large part by the vast differences in how healthcare is regulated, delivered and paid for from country to country.

Successful healthcare innovators are instead finding relevant niches to disrupt. Increasingly, firms are focusing on transforming a narrow segment of the healthcare market, often with great success. They are adept at creating individualized journeys for people. For example, apps such as Selfapy or Bluecall are being used to expand mental health services in Europe. Meanwhile, specialized apps that target patients with chronic illnesses such as diabetes (e.g., Omada Health in the US) and pulmonary diseases (e.g., COPD

Co-Pilot in Europe) have been clinically proven to improve patient outcomes.³² Given the unique challenges patients face based on their geographic location, individual lifestyle and health risks, the trend towards increased segmentation and specialization within healthcare is very likely to grow.

Increasingly, healthcare firms are focusing on transforming a narrow segment of the market.

Investment Implications

Emerging markets offer new opportunities and risks for biotech and pharmaceuticals

While the US is often considered the key market for healthcare innovation, burgeoning markets such as China and India offer excellent opportunities as

well.³³ China is a particularly intriguing market that presents growth opportunities for equity investors. It is the world's second-largest healthcare market and remains one of the fastest-growing ones globally, with growth rates three times that of the US (Exhibit 6).³⁴ With China's aging population and accelerating rate of diagnosis, the government has instituted various reforms to encourage innovation in the healthcare sector. Notably, the Chinese government has recently instituted a more formal reimbursement process and started paying for more novel drug treatments, creating commercial opportunities for both Chinese and foreign healthcare firms. In 2019, Chinese pharmaceutical companies filed over 200 requests for clinical trials, more than double the filings in 2014.³⁵ One result of the surge in drug research is Chinese authorities approving 12 novel drugs in 2019 – up from just two in 2015.³⁶ With the Chinese government still spending less than half of what the US government does as a share of GDP on healthcare, there is still significant growth potential in the sector.

One growing area for Chinese healthcare is oncology. With over 4.3 million new diagnoses annually, cancer is a rising challenge in China.³⁷ In response, China's market around oncology biotech and treatments has been growing at double-digit rates. Some of the

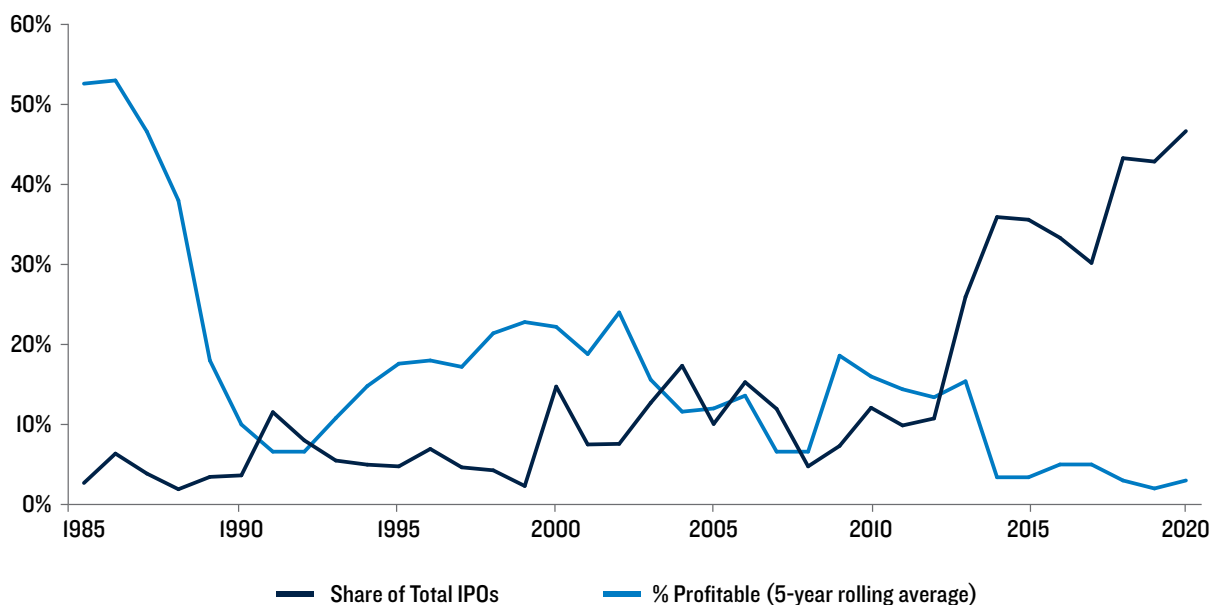
most promising treatments in the world come from Chinese firms like Innovent, I-Mab, BeiGene and Zai Lab, while companies such as Hygeia are providing innovative and targeted radiation therapy treatments to Chinese cancer patients.

Though the underlying fundamentals are strong in the Chinese healthcare sector, investors must remain aware of the unique risks as well. Specifically, issues around intellectual property and government policy remain prominent and can create headwinds for even established companies. For example, China's volume-based procurement program has led to an average 60% reduction in pricing for some generic pharmaceuticals and medical devices.³⁸ These risks are especially elevated for private equity and private debt investors, who are not afforded the same type of investor protections as those operating in public markets. It is crucial for investors to have extensive in-country knowledge and experience before entering the Chinese healthcare market.

Investing in small-cap US biotech firms requires active management

Biotech companies have been leading the charge towards more personalized medicine. Yet, with over

Exhibit 7: The share of biotech IPOs is increasing, but profitability is decreasing



Source: Jay Ritter, data as of June 21, 2021.

700 publicly listed biotech firms in the US alone and a rapidly evolving scientific landscape, investing in biotech stocks requires a thoughtful targeted investment approach (Exhibit 7). With such a large investment universe, it might seem that a passive index approach would be the best investment strategy. However, maintaining a nimble, dynamic approach to US biotech stocks is key. Given the inherent turbulence around early-stage biotech firms due to regulatory approvals, clinical trials and constantly changing scientific data, an index approach is likely to leave investors holding the bag when most of these firms inevitably fail. Instead, a thoughtfully curated, active investment approach that constantly monitors new developments and adjusts the portfolio accordingly is much more beneficial.

One notable development around biotech investing has been the changing landscape for clinical trials. Investors used to need solid phase II clinical trial results from hundreds of patients to even consider investing in a biotech firm. Yet, advances in our understanding of diseases and human genetics are allowing investors to make decisions based on the biomarkers of just one or two patients. Once again, the constantly evolving methodology around clinical trials demands an active investment approach in this area.

A thoughtfully curated, active investment approach that constantly monitors new developments in biotech firms and adjusts the portfolio accordingly is much more beneficial.

Care from an app, outside of the doctor's office

Health outcomes are often considered to be tied to the quality of care a patient receives from their doctors. Up until recently, the healthcare industry has ignored the significantly greater portion of time people spend *outside* of the clinic. There is now a

growing recognition that health outcomes are driven in large part by the countless number of small, everyday choices made outside of a doctor's office or hospital. Driven by this idea, many healthcare startups have begun offering platforms that help people make better behavioral choices for their health through personalized approaches. These platforms offer attractive investment opportunities for public and private equity investors.

This model is particularly promising for people managing chronic conditions such as diabetes, heart disease, rheumatoid arthritis or fibromyalgia. Livongo, for example, offers an app-based platform for diabetes management. Through a combination of connected glucose meters, real-time feedback, personalized health coaching and custom alerts, the app is helping patients effectively manage their diabetes.³⁹ Given the ability of these personalized out-of-clinic care providers to reduce healthcare costs, this trend will likely continue to thrive. Investors should consider venture capital funds that invest in these types of applications.

Specialized healthcare platforms provide VC and PE opportunities

The segmentation of the healthcare market has created new space for platforms that address specific needs such as women's healthcare or mental health. These platforms help patients navigate the complex healthcare system and offer holistic approaches for narrow healthcare segments. Increasingly, as healthcare systems transition from a fee-for-service model to an outcome-oriented, value-based care model, these platforms are especially attractive to employer-sponsored benefits programs in the US. A growing number of companies recognize these specialized health platforms can improve employee health outcomes and reduce insurance expenses, while leading to enhanced employee retention as well.

The women's health sector is one that has tremendous potential to grow. Shifts in cultural and societal norms as well as demographics are resulting in women having children later in life and being more open to discussing fertility, maternity and menopause. Cleo is a platform that offers personalized support for families

through individual coaching, programs for pregnancy risk screening and a benefits marketplace for services such as childcare, fertility, education and nutrition services. Maven, meanwhile, offers employees end-to-end family planning services ranging from fertility programs to adoption support to surrogacy programs. Both companies have proven to reduce overall family medical expenses and improve parents' return to work ratios following the birth of a child.⁴⁰ Investors with VC and PE allocations might want to look for funds that have exposure to these specialized employer-sponsored health platforms.

Medical devices as a service offer stable cash flows for debt investors

Medical devices are an important catalyst for change across the healthcare industry, especially as healthcare becomes more digitized. Increasingly they are serving as platforms for health monitoring services as well. Companies that are integrating software-driven services into their devices are particularly attractive to debt investors given the subscription-based cash flows stemming from these devices. BioTelemetry, a subsidiary of European device maker Philips, offers patients annual subscriptions for its cardiac home monitoring services, for example. While still a relatively small portion of total revenue, this service provides Philips with a substantially more stable source of revenue than pure equipment sales.

Furthermore, large US equipment makers such as Stryker, Zimmer and Medtronic have been able to

secure their market positions via acquisitions and regulatory barriers. In most countries, it is a long and expensive process to get medical devices approved by regulators. Even after approval, the fragmented nature of the healthcare system means it is very difficult to find distribution channels outside of the pre-established, relationship-based ones. As a result, incumbent medical device makers are fairly insulated from external disruption and can easily acquire new devices or software, given their scale and distribution network. These dynamics protecting their cash flows make the incumbent medical device makers attractive debt investments.

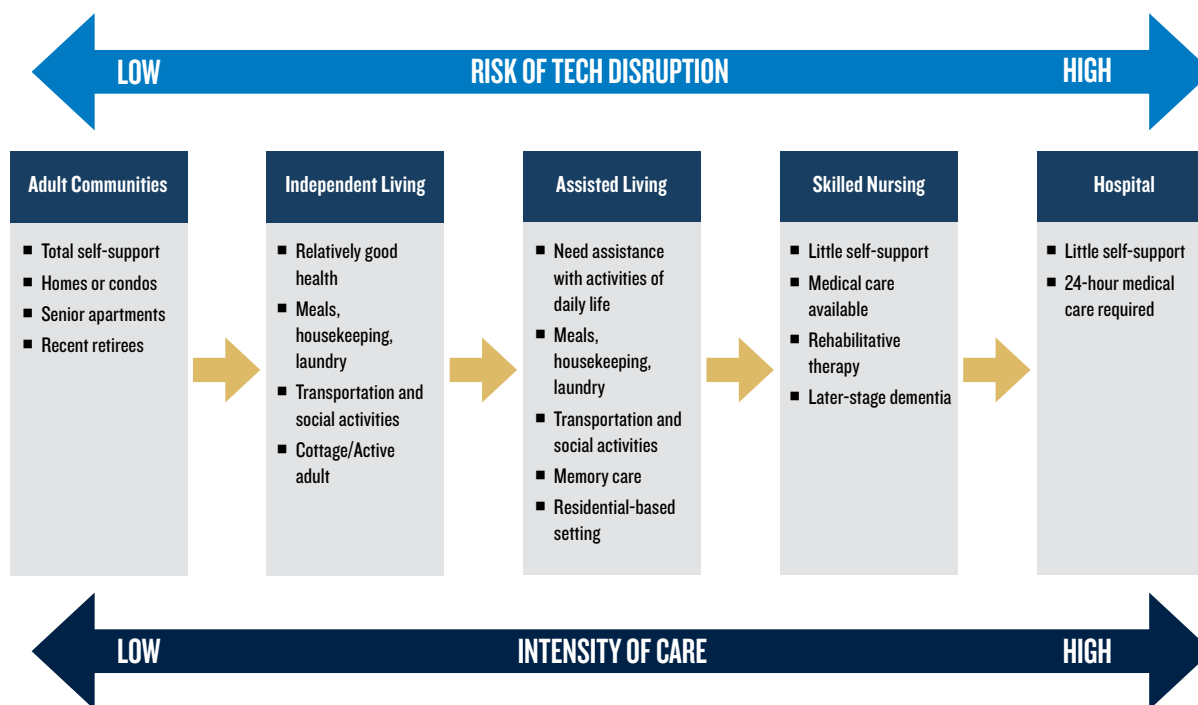
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Lab testing and diagnostics offer steady cash flows for debt investors

As personalized medicine continues to grow, the testing and diagnostic equipment necessary for this transformation will also thrive. The proliferation of



Exhibit 8: Senior housing continuing care retirement communities



Source: PGIM Real Estate.

precision medicine and other biotech advances such as liquid biopsy, spatial genomics and proteomics provides enduring demand growth for equipment and materials like testing consumables, laboratory machines, assays and reagents. This market offers attractive investment opportunities for debt investors. In the US, firms like Thermo Fisher, Agilent, Illumina and Danaher are leaders. In Europe, Hoffmann-La Roche, bioMerieux and Qiagen are the large players in this space. Given their scale, distribution relationships and the regulatory barriers around their products, these large incumbents should be able to maintain their market position and acquire new, potentially disruptive, products. Debt issued by these firms can be attractive to fixed income investors.

Senior housing remains attractive for real estate investors

Aging developed market populations create a compelling source of demand for senior housing today and in the future. This is especially the case in the US where the senior population is poised to increase 45%

by 2030 – from 23 million in 2020 to 34 million – as the post-war baby-boomer generation reach their 80s.⁴¹ This category of real estate is also less correlated with the business cycle than other segments. While virtualized and personalized healthcare technologies such as remote monitoring and telehealth are allowing people to receive care at home, they do not herald the end of the investment opportunity in senior housing. In fact, professionally run senior housing facilities will likely be early adopters and have better access to health tech than most seniors would in their own home. These innovative technologies can offer better levels of care and also help streamline operations and improve profitability in a very operationally intensive business.

Senior housing facilities can be categorized along a spectrum of care. Low-care settings include adult communities and independent living. Options for high-care settings include assisted living and skilled nursing facilities and hospitals (Exhibit 8).

Technologies such as remote monitoring devices, telehealth solutions and smart-home appliances are making it easier for people to not only age outside

These innovative technologies can offer better levels of care and also help streamline operations and improve profitability in a very operationally intensive business.

of intensive care facilities, but also recover at home after acute injuries or medical procedures.⁴² Higher care settings like skilled nursing facilities will likely be exposed to tech disruption as fewer people require intensive care for long periods of time.

However, lower care settings that provide attractive lifestyle options are unlikely to see demand decline any time soon. This is driven by a few key factors. First, technology is allowing residents who might have

needed highly skilled nursing care in the past to be well cared for in less intensive care settings like assisted and independent living facilities. Second, assisted and independent living arrangements offer residents more than just medical care. There is a strong social element to these communities, which cannot be replicated by technology. Lastly, there is a strong human element to patient care, which is nearly impossible to replace with automation and robots.

Though the pandemic has given pause to recent growth in the industry, the long-term demographics driving demand for senior housing persist. While strong opportunities exist in the US, other markets with similar aging demographics like the UK, Japan and Australia should see more attractive opportunities as the sector matures there. Going forward, emerging markets may also present opportunities for investors as the retirement populations increase in Latin America and China with fewer familial caregivers.

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