



PGIM
India Mutual Fund

MEGATRENDS

RESHAPING SERVICES

The investment implications of technological disruption



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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 5

PORTFOLIO IMPLICATIONS

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PORTFOLIO IMPLICATIONS

The current wave of technological change in the service sector raises critical issues for CIOs thinking of long-term implications *across* their entire portfolio, beyond the specific asset class and regional investment opportunities and risks discussed so far. We believe CIOs should evaluate four actions to capture the upside and mitigate the risks of disruptive technologies in the service sector.

I. Position the portfolio for service sector disruption – which will have a radically different trajectory than manufacturing and retail disruption

Disruption in manufacturing (Tesla, 3-D printing, iPhones) and retail (Amazon) became a significant headwind for – and at times made obsolete – a long tail of incumbents that were caught flat-footed as new entrants took market share and as intermediaries (e.g., shopping malls, wholesalers) became increasingly redundant.⁶⁰

While there will be new winners, disruption in services will actually *increase* the dominance of a small group of technology-forward incumbents rather than leave the trail of destruction seen in retail and manufacturing, for several reasons:

- Technological change in services has lagged manufacturing and retail, so service sector incumbents have seen the writing on the wall. They are acutely aware of the “adapt or die” imperative that tech innovation presents. Winning incumbents will not be complacent.
- Two of the largest service sectors – financial services and healthcare – are heavily regulated in most countries. This slows the pace of change given the power of industry lobbyists as well as the tendency for regulators to be gradualists, aiming to avoid binary disruptions. This has, for example, dampened the enthusiasm of North American tech giants from aggressively entering these

sectors compared to pursuing opportunities in less regulated parts of the economy (e.g., car-sharing).

- When it comes to services, distribution networks and access to customers are critical for successful firms. Disruptive tech firms have discovered gaining access to customers and counterparties has been much harder than anticipated. For example, early robo-advisors found it extremely difficult to access wealth management clients and distribution platforms. In healthcare, innovative biotech firms are unable to access the networks of doctors and hospitals they need. As a result, many cutting-edge tech firms opt to be acquired by incumbents rather than going it alone and challenging their dominance.

Consequently, the technology imperative will “barbell” the services sector. Those incumbents who embrace new technology and the new business models they present will successfully make the leap into the digital and cloud era – even as other legacy service companies are left behind. And the number of disruptive new entrants will be higher in those sectors where the regulatory and customer acquisition barriers to entry are less daunting, such as consumer and small business digital payments.

For CIOs assessing “obsolescence risk” in their services portfolio (i.e., identifying winners and losers among existing, established services companies) there are three characteristics to potentially consider. This is especially relevant for long duration investments such as private assets and long-maturity debt that are most vulnerable to obsolescence risk:

- **Incumbents with sufficient scale to fully leverage the current wave of new technologies.** The Goliaths will overpower the Davids. Service sector companies with the operating scale and revenue base to buy or build expensive next-generation technologies will triumph over smaller services companies that won't be able to make the critical minimum technology investments to succeed. Robo-advisors like Betterment are an example of potential disruptors in wealth management that lacked the distribution platform to build a sustainable business model themselves. Instead, large incumbent firms like Schwab in the US and Aion Bank in Belgium replicated or acquired digitally savvy customer platforms and leveraged them successfully.⁶¹ US freight trucking firm Old Dominion provides another example. It's not waiting to be disrupted by tech platforms tomorrow. Instead, it is utilizing telematics devices and AI to streamline freight operations and reduce risk today.
- **Incumbents willing to forego legacy systems to embrace disruptive technology early.** Forward-thinking incumbents are willing to move on from their legacy systems and embrace new technology before it disrupts their industry. Leaping to new technologies and writing off legacy systems can be a costly proposition, but it also may mean the difference between survival and extinction.

Netflix provides a useful illustration of a company cannibalizing its own legacy business – unlike Blockbuster. Netflix quickly adapted from shipping physical DVDs to streaming video online and has been able to leverage that first mover advantage. JPMorgan's experimenting with blockchain for clearing and settlement systems is another example of an incumbent aggressively embracing new tech paradigms despite its heavy investments in legacy systems.
- **Incumbents supplementing in-house development with strategic tech acquisitions.** Investing programmatically in technology startups (and sometimes more mature technology firms) allows firms to access the cutting-edge technology and human capital needed to transform their businesses. By participating at an early stage, incumbents can help shape the technology to best meet their needs and expand their offerings. Examples of this include ING Bank's partnership with small business lender Kabbage and medical device maker Philips' acquisition of BioTelemetry.⁶²

2. Make complementary investments in the technology infrastructure underpinning the next wave of service sector disruption

In addition to actively evaluating leaders, laggards and new entrants in individual service sectors, CIOs will also want their in-house investment teams and asset managers to identify the companies providing the backbone to the coming wave of disruption in services. This includes the companies that provide cloud computing, fiber optic networks, data centers, AI- and ML-powered toolkits, underlying technology

Table 5: Complementary Opportunities in Global Tech Infrastructure

Cloud computing	Public Equities examples: Alibaba, Microsoft, NTT, Amazon, Google
Data centers, especially hyperscale data centers (Exhibit I)	PE and Real Estate examples: Equinix and Digital Realty
Cybersecurity, including edge and cloud security	Public Debt and Leveraged Loans examples: Ping ID, Sentinel One, FireEye
Fiber optic network and telecom infrastructure for a cloud-enabled world	Private Equity examples: Firstlight Fiber, China Telecom, CityFibre Public Equities examples: American Tower, Cellnex, SBA Communications
Fiber optic component makers	Public Equities examples: Furukawa Electric, Huber+Suhner AG, Prysmian Group

platforms, and the related “pipes and plumbing” to integrate these technologies into the service sector ecosystem. We believe long-term active investors can find many attractive investment opportunities across multiple asset classes (Table 5).

3. Brace for regulatory backlash as it spills over into services

Regulatory uncertainty is common across many of the new technologies discussed earlier – though specific focus areas vary significantly by region and sector. Investors often overlook the unsettled regulatory environment in which today’s emerging tech firms operate. Recent examples of “techlash” in China, for example, caught many investors by surprise and knocked tens of billions of dollars from market valuations.⁶³

In financial services, neobanks and fintech payment platforms find loopholes to extend credit to consumers and small businesses without being subject to the same stringent capital and liquidity standards as mainstream banks. This regulatory asymmetry is a key element of their business strategy, but as the neobanks grow, some of their regulatory burden will become more like large commercial banks. It may no longer be economically viable for neobanks to target their main customer

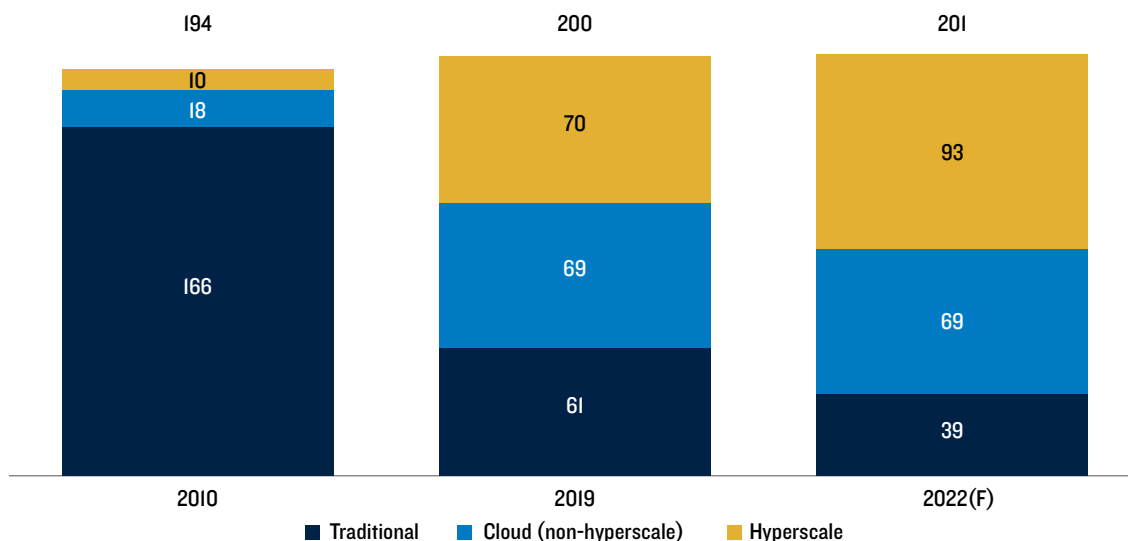
base – underbanked and disengaged consumers. Furthermore, regulators may justify a light touch on these players so long as they broaden access to financial services. But that tolerance is not assured going forward and can easily shift.

Even technologies explicitly designed to operate outside the reach of monetary authorities – most notably bitcoin and the associated decentralized infrastructure and exchanges – raise numerous legal, ESG, and regulatory challenges that are increasingly being surfaced.

In China, it is unclear whether the regulatory pushback on payments platforms and ridesharing apps may fundamentally alter the way technology companies evolve and are financed. Additionally, the recent regulatory turbulence may impact how rapidly new technology is adopted by consumers and firms going forward.

With transportation, development of autonomous driving systems is dependent on ample testing in real-world conditions. Government rules and regulations around such testing can affect the timing around developing robust systems. Chinese authorities, for example, have been supportive of AV testing as they view it as a key technology for their economy. An accident during AV testing in Arizona, where an autonomous car struck and killed a pedestrian, led to

Exhibit II: Hyperscale Global Data Center Energy Demand (TWh)



Source: International Energy Agency, data accessed June 2021.

a suspension of testing even though an investigation showed the human passenger responsible for monitoring the car was at fault.⁶⁴

Investors will want to ensure technology-driven regulatory risks are explicitly captured in their investment framework when looking at services opportunities powered by new technologies. CIOs should have explicit discussions with their asset managers around investments in next-generation disruptive service providers to ensure the investment thesis isn't undermined by antitrust legislation, the extension of data privacy laws into current "grey" areas, or the updating of light or outdated regulations. And institutional investors making investments in-house will want to directly monitor both policymakers and the lobbying organizations representing various service sectors to understand how their investment will perform given the different regulatory scenarios.

Many cutting-edge tech firms opt to be acquired by incumbents rather than going it alone and challenging their dominance.

4. Proactively engage your board and senior leadership on next generation technologies

The implications of the current wave of new technologies in services are too far-reaching to leave technology just to the tech sector analysts or the back-office IT team. Technological change is no longer confined to the formal "IT" sector – it is disrupting key components of the services value chain. CIOs can enhance their team's understanding around technological disruption through a range of actions including:

- Engaging external asset managers in targeted sessions to learn how they monitor technology risks and opportunities across their security and asset selection process.
- Identify the metrics and key performance indicators that may be relevant for each asset

class in identifying winning incumbents that are successfully making the technology transition (e.g., seniority of chief data officer, number of data scientists, investment spend on new technologies, technology M&A activity levels).

- Convene in-house sector specialists across fixed income and equities – both public and private – to debate the impact of the current wave of new technologies (e.g., cloud, AI/ML, big data, distributed ledgers) on each of their current service sector holdings.
- Leverage their technology and middle/back-office vendor relationships to engage with the technology thought leaders at these firms (e.g., technology experts at their current key accounting, custody, administration, enterprise software, cloud, and other vendors).
- Arrange a virtual or physical off-site for board and senior investment leaders – for example, in Silicon Valley, Shanghai, Tel Aviv, Berlin or Bangalore. In this way, institutional investors can "mark to market" the current technology advances and their investment implications in a series of conversations with startups, venture capitalists and even the CTOs of forward-thinking incumbents.

The current wave of technological change has jumped from manufacturing and retail into the heart of the service sector. Big data and its analysis, machine learning and artificial intelligence, cloud computing and the immense processing power that comes with it will reshape global services. A few new firms will no doubt revolutionize some tired corners of the service sector. Meanwhile, some scaled tech-forward incumbents will increase their dominance and render the remaining legacy services players increasingly irrelevant. At PGIM, we believe long-term investors will want to be ahead of this transformational phase in the services industry by actively positioning their portfolios to capture the investment opportunities, and mitigate the risks, from this impending wave of technology-driven disruption in services.

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