



PGIM
India Mutual Fund

MEGATRENDS

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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President and Chief Executive Officer
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CHAPTER 2

FINANCIAL SERVICES

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CHAPTER 2

FINANCIAL SERVICES: THE FUTURE IS WEIGHTLESS

In many ways, traditional financial services firms in developed markets – including banking, payments, insurance, and wealth and asset management – are ripe for disruption. Many are buried under cumbersome legacy technology platforms and often reliant on high-fee transactions conducted exclusively in brick-and-mortar branches.

But will digital companies like Venmo, Alipay and Paytm be able to build brand recognition and tap into a global affluent clientele? Or will incumbents acquire existing fintech firms and their technology to modernize their businesses, or at least build giant moats around them? Or instead, will disruptors in financial services expand the accessible market for financial offerings, reaching customer segments that were previously underserved by banks and insurance companies?

We believe five technology trends across the key business lines in financial services will be particularly relevant:

- The rise of neobanks and fintech platforms
- AI and big data drive smart underwriting
- Unexpected winners of robo-advising
- The power of the private blockchain
- The transformative power of tokenization

The Future State of Financial Services

The rise of neobanks and fintech platforms

There are two interrelated trends that are reshaping banking and payments: the rise of neobanks and fintech payment platforms. The last few years have seen a global boom in neobanks – banks with no branches that only exist in the cloud and online. Neobanks like Nubank in Brazil, N26 in Europe, and Chime in the US have several distinct advantages over traditional banks.

First, they are held to a different set of regulatory standards. Traditional banks are subject to more

stringent capital and liquidity requirements and face tighter limits on interchange fees – the transaction fees they can charge merchants.¹⁸ Neobanks have been able to take advantage of this regulatory asymmetry. Second, neobanks are almost completely “weightless” and don’t have the physical overhead – namely, legacy mainframe systems and brick-and-mortar branches – of traditional banks.¹⁹ With no mainframes, branches or paper statements, their cost of customer acquisition and distribution is considerably lower. With much lower overhead and regulation, neobanks are expanding the consumer banking market and reaching previously disengaged and underbanked populations in ways not economically feasible for traditional banks. Third, neobanks are digitally savvy and often partner with other online platforms to embed their products right where the need for that financial solution arises – such as offering a credit card when customers make an online reservation at a hotel or overdraft protection when their balance drops precariously low. This kind of embedded finance is a key aspect of the fintech business model.

Point of sale (POS) payment platforms like Lightspeed and Square are essential for small businesses. These payment platforms may not have the same volume of transactions as traditional players, but they are highly disruptive. Digital payment platforms like Adyen process, validate and make payments for large enterprises like Nike and Netflix and are displacing commercial banks. By diverting a range of retail transactions away from banks and payment systems like Mastercard and Visa, these fintech platforms have clearly disrupted payments. With a growing number

of businesses making payments to their suppliers through these platforms, they have essentially created an expanding payment ecosystem that is independent of traditional incumbents.

These payment platforms are also increasingly embedding credit to service small businesses more effectively. They are leveraging their unique visibility into daily cash flow and inventory churn and are beginning to extend financing to small businesses for inventory and supply chain management either on their own or through their partners. In doing so, they can generate additional revenue streams from their current commercial clients.

This kind of small-scale credit has not been attractive to traditional banks, creating a significant financing gap for small businesses in the US (Exhibit 4). Through their use of embedded credit, fintechs have the potential to partially fill this financing gap.

But what about incumbent banks? Some are rapidly falling behind, while others are adapting to new technology and enhancing their efficiency and customer acquisition. Zelle is a digital payment app owned by a group of US banks that allows free payments between their accounts. Also, HSBC has leveraged cloud-native AI with Temenos and boosted its credit card customer acquisition rate.

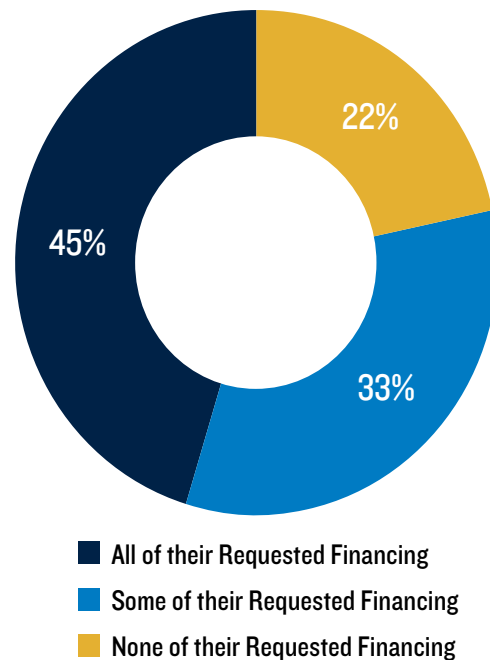
Insurance: AI and big data drive smart underwriting

Technology has powered a range of innovations in insurance as well. Perhaps the most striking is the ability of tech-forward insurers to harness the combined power of big (and often proprietary) data and AI to reinvent underwriting and claims management for the cloud era. This kind of data-centered service reduces the cost of underwriting new customers and managing claims and is a key element to achieving scale and profitability in an increasingly commoditized business.

Auto insurers like Root, for instance, are using telematics apps on drivers' mobile phones to record driving habits, offer discounts and adjudicate claims. Similarly, leading life insurers are now leveraging AI to underwrite policies, helping them achieve better operational efficiency. The results of a questionnaire – as well as widely available information (such as

Exhibit 4: Most small businesses in the US face a shortfall in financing

(% of small firms requesting financing, 2016-2020 average)



Source: Small Business Credit Survey: 2021 Report on Employer Firms, US Federal Reserve Banks, 2021.

driving records) – are used as an input into an AI-powered algorithm that determines underwriting and pricing. The algorithm leverages big data – namely, the proprietary database of millions of prior applicants – to come up with timely evaluations for underwriting and pricing that are supported by actual data. This eliminates the need for costly and cumbersome blood tests or medical exams in some cases and drives the cost of underwriting simple, small-scale policies lower.

The next evolution in life insurance is likely the increased use of data from wearables (e.g., Apple Watch, Fitbit, Garmin, Oura). By incorporating the steady stream of data from these devices, life insurers can move from static underwriting to a more iterative process where risk is constantly being re-evaluated. For example, customers with demonstrated and consistent healthy behaviors can be offered a rebate on their premiums.

Leading property and casualty (P&C) insurers are also employing cloud-enabled AI and big data to enhance their climate modeling and risk evaluation. With the likelihood of tipping points around climate

change, models need to be more predictive, rather than historically probabilistic – and these new technologies have allowed insurers to better predict the frequency of extreme weather events.

In addition to transforming underwriting and risk management, these technologies are reshaping claims management, both lowering the cost of claims and increasing the ease of use for customers. For example, Lemonade can settle an auto claim in seconds based on photographs from a cell phone rather than the costly, time-consuming process of sending insurance adjustors into the field. Going forward, the combination of “high tech and high touch” is likely to be a winning formula in life insurance. An omnichannel approach allows customers seeking claims to speak to a human while simplifying many of the documentation and validation steps along the way through automation.

P&C insurers are also applying cloud-based technology to their proprietary big data. Large firms like Chubb are using AI to glean relevant insight from their vast set of historical underwriting and claims data. They then use this insight to become smarter in setting terms and conditions of coverage and in managing claims when they do occur.

Wealth management: Unexpected winners from robo-advising

Conventional wisdom continues to hail robo-advisors as a revolution transforming wealth management the way ETFs transformed traditional asset management. In reality, robo-advisors don't incorporate true AI, machine learning or sophisticated asset allocation, instead relying on fairly standard asset allocation, streamlined rebalancing and excellent front-end digital interfaces. But without a solid source of customer acquisition, they have failed to threaten traditional wealth managers, let alone drive them into extinction.

Potential disruptors in the space – like Betterment, Personal Capital, FutureAdvisor and Wealthfront – could not effectively leverage their early advantage. While they offered customers attractive digital interfaces, they lacked access to distribution networks and found it hard to scale up to a profitable business.

Instead, incumbent wealth management firms either acquired (e.g., BlackRock acquired FutureAdvisor, Empower acquired Personal Capital and JPMorgan

acquired Nutmeg) or built (e.g., Vanguard, Schwab) their own robo-advisors, targeting mass affluent customers, who couldn't be profitably served by their traditional wealth management arms, and younger customers, who are more accustomed to digital-first interactions. As a result, instead of being disrupted by robo-advising, wealth managers have successfully integrated the technological enhancements offered by challenger robo-advisor startups into their own businesses. Successful incumbents have used technology to streamline operations like portfolio construction and rebalancing, and create better digital interfaces for customers. Indeed, what began with the potential of a tumultuous revolution in wealth management fizzled out as tech-savvy incumbents captured all the innovative elements of the robo-advisor offering.

Embedded credit in the fintech ecosystem offers another compelling investment opportunity

The power of the private blockchain

At its very core, blockchain is a system for recording transactions in a database that collects information in groups, also known as “blocks.” Once a block is filled according to a predefined storage capacity, it is added onto the previous block, creating a chain of data known as a “blockchain.” Importantly, a blockchain can be categorized by whether it is open to the public or if it is only open to permissioned users (Table 3).

The best-known blockchain versions – those used for crypto-assets like Bitcoin and Ethereum – tend to be public. This type of blockchain was originally envisioned to eliminate intermediaries and remove the need for trust within transactions. While this architecture has created a range of investable assets, it has also led to concerns around anti-money laundering (AML) and environmental, social and governance (ESG) issues. These concerns, along with the uncertain regulatory environment around public blockchains, and the difficulty in scaling some of them, limit their attractiveness for institutional users.

Table 3: Public vs. private blockchain

	Public Blockchain	Private Blockchain
Features	<ul style="list-style-type: none"> Open access to join, read and write Participants remain anonymous 	<ul style="list-style-type: none"> Only permissioned participants can join, read and write Participants are easily identifiable
Scalability	<ul style="list-style-type: none"> Low 	<ul style="list-style-type: none"> High
Use Case	<ul style="list-style-type: none"> Public cryptocurrencies like Bitcoin and Ethereum Decentralized Finance (DeFi) and Non-Fungible Tokens (NFTs) 	<ul style="list-style-type: none"> Financial transactions between permissioned corporations and banks

Most applications of blockchain by financial institutions, however, are in the form of private (or permissioned) blockchains. While these still require central authorities or intermediaries to authenticate users, they can reduce transaction complexity, increase ease of authentication (e.g., property titles), enhance transparency and improve fraud controls for participating institutions. Private blockchains can also reduce transaction costs, as they eliminate many of the administrative expenses of record keeping and transaction reconciliation. Private blockchains tend to be more easily scalable and will likely have the largest impact on firms and investors in the near term.²⁰ For example, JPMorgan is using private, permissioned distributed ledger technology to facilitate near real-time money movement across the globe.*

The transformative power of tokenization

While it still faces significant hurdles today, the tokenization of financial assets has the potential to transform financial services, and is an area investors in the financial services space will want to monitor closely. In some ways analogous to securitization, tokenization essentially creates an immutable digital representation of a real-world asset which can then be settled and cleared on a distributed ledger and traded in whole or fractional parts. Tokenized financial and real assets recorded on a blockchain would disrupt virtually all aspects of investing – from back-office functions like clearing and settlement, to how assets are custodied, accounted for and serviced, to even how they are bought and sold. However, this use of blockchain

remains at a nascent stage and some significant challenges still need to be resolved.

First, the lack of clear regulatory, legal and tax guidelines around tokenized assets leads to compliance uncertainties. Second, while distributed ledger technology is already being employed by banks on a limited basis in their operations and in repo transactions, it needs to be further refined to work across other asset classes and at efficient scale under real-world conditions. Lastly, market participants, investors and regulators need to build trust in these new systems and adapt their internal processes to them.

If all (or most) financial assets were digitized and accounted for on distributed ledgers, it would drastically reduce frictional costs from transacting and servicing them. Tokenization could also significantly alter the landscape for private assets like infrastructure, real estate, and private equity. By digitizing the privately held shares of their portfolio companies, PE firms, for instance, could see a tremendous drop in transaction costs alongside a boost to liquidity and price discovery. Tokenizing could open more possibilities for fractional ownership of private and real assets. This would have front-office implications for portfolio construction and would widen the pool of potential investors by making these assets more accessible to smaller institutional investors.

Tokenization offers substantial benefits on the operational side as well. A fully digitized financial asset landscape would significantly reduce clearing and settlement costs. It could also eliminate title searches

* Distributed ledgers are digital systems for recording data and transactions across several locations or multiple parties to generate a single source of truth, eliminating the need for reconciliation and validation. The terms blockchain and distributed ledger are often used interchangeably by investors, but it's best to think of blockchain as one type of distributed ledger.

and valuation checks for real estate or mortgage transactions. While fully tokenized financial markets are a long way off, tokenization might even be able to automate dividend payments to shareholders and interest payments to bondholders and significantly reduce the cost of custody and servicing of assets.

Investment Implications

Global equity opportunities in the expanding fintech ecosystem

Neobanks present attractive opportunities for both public and private equity investors around the world. Their business model entails offering basic banking services to underbanked populations or those disengaged from traditional banks (for example, Millennial or Gen Z workers) and then upselling them other services like debit cards, credit cards and overdraft protection. By linking fees with services customers have explicitly opted in to, neobanks are able to overcome consumers' strong resistance to fees. This model has gained traction in most parts of the world: for example, Monzo and Starling in Europe, WeBank in Asia and Dave in the US. As a young customer base matures, it will have greater need for higher margin services. Emerging markets like India, Brazil and China tend to have larger unbanked populations and growth potential for this kind of business model.²¹

Looking forward, neobanks are beginning to evolve in one of two ways. Many are starting to take a highly segmented approach for broadly underbanked or disengaged communities. A neobank with a focus on a niche community or affinity group with common needs can customize marketing and services and deliver more efficient client acquisition – albeit in a narrow segment of the market. VC-funded neobanks in the US provide some good examples: Daylight and Superbia focus on the LGBTQ community, while NewBank in New York and Fair in Texas aim for local immigrant populations.

Alternatively, major retailers are beginning to explore their own neobanking services, leveraging their large customer base and distribution network to rapidly scale. Walmart soon plans to launch Hazel by Walmart, a fintech platform that offers customers

everything from credit cards to portfolio analysis to virtual currency transaction processing services.²²

Of course, neobanks present some significant risks for investors as well. Some of the regulatory advantages neobanks benefit from are due to their small size and are unlikely to be a permanent feature. Additionally, regulators in some countries are treating neobanks with a light touch because they serve underbanked populations and expand the market for financial services. However, this gentler treatment is by no means assured going forward. Finally, given their highly targeted and segmented customer base, their ability to continue acquiring new customers and scale up is limited.

Furthermore, with less regulatory oversight, it is possible neobanks are prone to greater operational and control risks. For example, UK authorities recently initiated investigations into anti-money laundering controls at Monzo, a prominent neobank.²³ Furthermore, many neobanks are so new they have not experienced a cyclical downturn and have, therefore, not proven their staying power through a full economic cycle.

The proliferation of cloud technology has also opened other channels for financing that were previously considered too small-scale to warrant interest from incumbent commercial banks. These new pathways create opportunities for venture capital investors. For example, online platforms like Pipe.com, Capchase and Clearco provide marketplaces for small businesses to monetize recurring revenue streams or account payables. Once again, these cloud-based fintech platforms target underbanked segments of the economy and expand the market for financial services.

Embedded credit in the fintech ecosystem offers another compelling investment opportunity in VC and PE. An example of this is the constellation of global companies that offer online consumers interest-free financing as they are completing their purchase, known as “pay-later” services. Firms like Afterpay in Australia, Affirm in the US and Klarna in Sweden pre-arrange a discount or fee with online sellers and get paid back for the full price by buyers in installments. In many cases, they are even partnering with major retailers to offer customers fully integrated pay-later plans – including Affirm's recent partnership with

Amazon. Installment payment schemes are quite common in many parts of the world and appeal to younger generations who may be wary of traditional credit cards. For example, pay-later already accounts for 23% of online transactions in Sweden and almost 20% in Germany.²⁴ Essentially, the “fee” for this POS financing is paid for by the seller. In this way, online retailers can provide customer financing through an intermediary embedded in the online purchase process.

Insurance firms that integrate advanced data analytics will succeed

With AI, big data and cloud computing enabling life insurers to automate large segments of the underwriting process, early movers will be able to capture market share, build scale and have more resilient businesses. Those property and casualty insurers who embrace cloud technology in their risk management and underwriting will be winners as well.

While sizable tech budgets are a common feature across the insurance industry, debt and equity investors should focus on a few key characteristics to determine how effectively insurers deploy cloud technology. First, access to a sizable pool of relevant data is a necessary element for leveraging the cloud. The proprietary databases of the largest life insurers, for instance, give them a head start in this respect. Second, having the right talent. A data science team that is experienced and has a record of accomplishment in their area is vital. Third, investors should assess the extent of AI-enabled underwriting within the organization and how well they do it. Examining the range of insurance underwriting that is linked to cloud-enabled algorithms as well as the throughput rate – that is, what percentage of their total new business is handled this way – can be useful indicators for how well an insurance firm leverages new technology.

Focus on targeted blockchain applications that solve specific problems today

Blockchain and distributed ledgers provide a range of early-stage opportunities for PE and VC investors. While there is considerable hype around blockchain as a broad-ranging transformative force across financial services, the ventures most likely to perform well

are those that apply this technology to solve specific problems. A good example of this is Figure, which is streamlining mortgage origination and securitization. With more than \$5 billion in mortgages underwritten, securitized, and serviced on its distributed ledger platform, there are efficiency and transparency gains for all players in the mortgage origination and securitization process. Figure recently merged with mortgage originator Homebridge to scale its platform.²⁵

For the most part, large commercial banks are not competing with neobanks for the same customer segments.

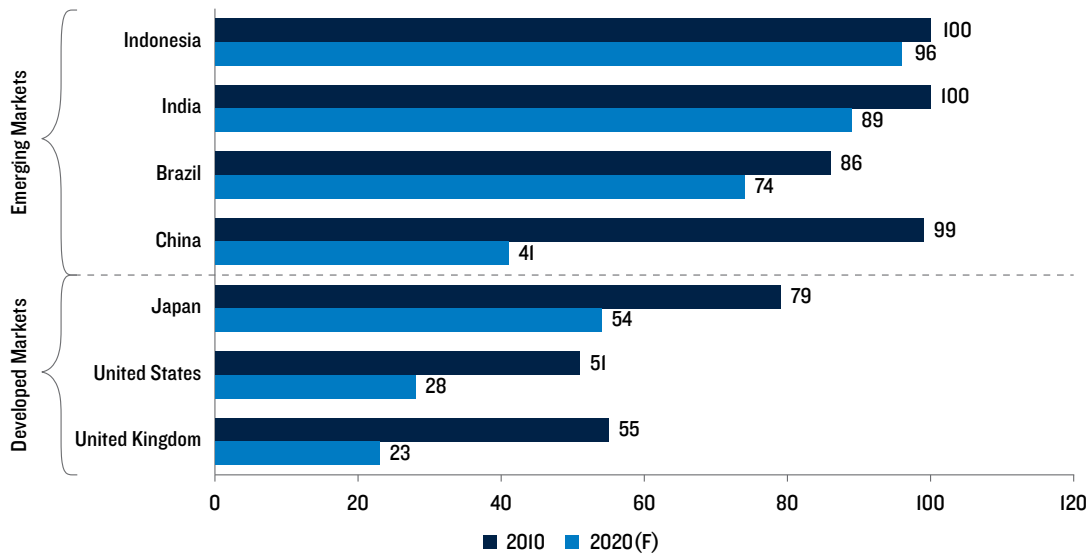
Incumbent banks leveraging new technology will thrive and widen their moats

Despite the growth of neobanks and payment platforms across the fintech ecosystem, “old-school” incumbent banks will not be easily displaced. Indeed, incumbent banks that leverage cutting-edge technology to streamline their operations or build new digital business lines may be especially attractive for debt investors.

For the most part, large commercial banks are not competing with neobanks for the same customer segments. Neobanks are making gains mostly among underbanked and disengaged customers that large incumbent banks are unable to profitably serve. Furthermore, lending to less-than-prime consumers and businesses comes with heavy capital charges for highly regulated incumbent banks and scrutiny from fair lending advocates. Consequently, in the US and Europe, large banks have mostly ceded this segment of the market. In the US, for example, large consumer banks like Citi, Bank of America and JPMorgan dominate the steadier prime consumer and business lending segments and are less likely to be directly impacted by neobanks.

Within the traditional banking sector, debt investors should focus on banks that invest most effectively in technology to reduce costs and increase efficiency.

Exhibit 5: Cash continues to dominate in most EMs, but this is evolving (Cash as a share of total payments volume)



Source: McKinsey & Company, "The 2020 McKinsey Global Payments Report," October 2020.

Key metrics like software depreciation rates and the frequency of tech write-downs are good ways to identify those banks that leverage technology to modernize operations effectively. In Europe, for example, BBVA and Banco Santander integrate technology into their operations very effectively. Additionally, debt investors should look for incumbent banks that are able to source technology-driven distribution opportunities to access new customer bases. ING Bank's partnership with small business lender Kabbage is one example.

Next generation payment systems allow tech-forward incumbents and select new entrants to thrive

Though digital payments are growing in both number and volume, incumbent payment systems still have room to grow. Visa and Mastercard are examples of incumbents that are embracing technology and shifting their services to meet a more digital world. Emerging markets are at a stage of their development where they are evolving away from cash payments – which still account for roughly 90% of payments in countries such as India and Mexico – and adopting other forms of payment (Exhibit 5). Mobile payment platforms enable EM consumers to leapfrog the plastic card phase of payment evolution and go from paper payments directly to digital. The recent proliferation

The proliferation of cloud technology has also opened other channels for financing that were previously considered too small-scale to warrant interest from incumbent commercial banks.

of mobile payment platforms like AliPay, WePay and MercadoPago has dampened growth opportunities for Mastercard and Visa in emerging markets, but there is still room for them to grow.

In developed markets, Mastercard and Visa are evolving right along with consumers who are ditching plastic cards in favor of contactless payments from mobile devices. They are also leveraging blockchain and tokenization themselves in business-to-business payments. For example, when a consumer books a hotel room through a travel website like Hotels.com, Mastercard will issue a one-time token to the hotel, which has all the instructions for digital payment from the website to the hotel when the consumer checks in. This eliminates the need to share personal data across platforms, significantly increasing customer data privacy.

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