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Digital Disruption in the Financial Services Industry: The Emergence of Fintech

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Abstract

Financial services, traditionally consisting of banking, asset management, lending, insurance, and payment systems, are facing a perfect storm brought on by technological innovation and shifting customer expectations. Such changes have exposed a gap in the financial services space between those who have access and those who do not. Traditional financial institutions have been hindered in pursuing strategies of financial inclusion to large underserved and underbanked populations. There is a major opportunity for financial technology companies to alter the competitive dynamics in an industry that has long been dominated by major banks and other large financial institutions. 'Fintech', as it is called, represents technology-enabled business models seeking innovation to drive more efficient process, use, and delivery of financial services to consumers (Mention, 2019). This paper explores the factors leading to the rise of fintech, its applications and the impacts it has had on the financial services industry in both the developed and developing worlds.

1. Introduction

Financial services, such as banking, insurance, and lending, have traditionally been resistant to change and slow to embrace digital transformation. Following the 2008 financial crisis, massive restructuring of regulatory requirements redirected financial institutions' resources towards compliance and risk management. As a result, innovation grinded to a halt and the entire financial services industry took a downturn, hurting consumer trust and confidence

in the system. While the system itself would stand, consumers became open to new ideas and offerings. Fintech companies were presented with a unique opportunity. Driven by digital transformation, they began to threaten the value chains of larger institutions by taking advantage of inefficiencies and inequalities in the financial system.

The rise in smart phones and internet access dramatically increased consumer connectivity and shifted expectations. Financial services have become, more personalized, timely, and user-friendly. Something as simple as sending an electronic peer-to-peer (P2P) payment was nearly impossible 12 years ago. Since then, emerging technologies have rapidly advanced the opportunity for agile companies to respond to shifting customer needs. Mobile devices, big data, cloud computing, artificial intelligence (AI), and blockchain technologies are enabling fintech firms to decentralize services, meet customer needs, and fill the gaps in the financial services market. For incumbent institutions, moving away from legacy information technology (IT) systems that are decades old requires significant overhauls at a huge price. The inability to keep up has allowed fintech offerings to flourish. Total investment activity in the fintech industry moved from $45.5 billion to $120.2 billion from 2014 to 2018 (KPMG, 2019).

The rapid growth in offerings presents unique solutions and challenges to consumers and regulators. Increased competition and access to financial products can contribute to more efficient commerce for consumers, yet the abundance of technology-driven financial business models naturally raise concerns over user security and privacy. While brick-and-mortar banks are able to provide physical security, vulnerabilities in digital finance present a dynamic threat not only to user's accounts but their personal information as well. Regulators must be constantly monitoring new entrants' products and business models to maintain legal standards, reporting requirements, and data privacy mandates.

Investment into start-up and established fintech business models continues to grow rapidly, with dozens of unicorn companies (start-ups valued over $1 billion) emerging across the globe. Fintech's estimated compound annual growth rate (CAGR) of 24.8% will bring the industry towards $310 billion in 2022 (Business Research Company, 2019). With the entire financial sector moving toward $26.5 trillion in 2022 (with a CAGR at 6%), fintech's valuation represents just over 1.1% of the global financial services market (Blaney, 2021).

Even though financial services are ubiquitous in the developed world, it is estimated that 25% of households in the United States are either unbanked or underbanked (Barry, 2019). In the developing world, geographic and socio-economic barriers make traditional financial services very difficult to access. As of 2018, nearly 2 billion adults worldwide were unbanked, two-thirds of whom own mobile phones that could access financial services (The World Bank, 2018). Early fintech start-ups targeting these underserved markets have seen major adoption by consumers. A 2019 Ernst & Young study marked the Global Fintech Adoption Index at 64% (87% in both China and India), with 96% of global consumers being aware of at least one fintech service (Ernst & Young, 2019). It is no longer a question of whether fintech will take hold but rather who will be the new winners and losers in the global financial service marketplace. The adoption of fintech is helping foster financial inclusion for all populations.

2. Technology

Historically, technology has presented defining moments that dramatically altered the economic landscape and our perception of the future. Steam power, electricity, and computers, all drove sweeping revolutionary changes. As we move deeper into the 21st century, advances in technology are pushing us into the fourth industrial revolution (Moore, 2019). The 'Intelligence

Revolution' has been driven by artificial intelligence (AI), cloud computing, and big data, three complementary technologies that are dramatically shifting the way business is conducted (Marr, 2020).

Where corporate strategy once focused on products and markets, it is now focused on capabilities, or optimizing business processes into strategic capabilities to gain competitive advantage through cross-functional strategic investments (Stalk, et al., 1992). This is extremely relevant in the adoption of enabling technologies. Integrating mobile apps, cloud computing, and AI, for example, can serve customers at scale, draw useful insights from big data, and automate business processes to free up time for employees to focus on innovation and quality improvement. Technology and information sharing can offer efficiencies at every layer of the value chain.

2.1 Internet of Things

The 'Internet of Things' (IoT) has allowed companies to better connect with users and products, collecting valuable usage and performance data. Phones, watches, smart homes, and cars are examples of 'things' integrating internet capabilities to provide more personalized and customizable services. The ability to observe usage statistics to gain 'consumer intelligence' has far-reaching potential for customized offerings. 63% of insurance CEO's believe IoT technologies will be strategically important to their organization (PwC, 2020).

2.2 Mobile

The introduction of mobile devices has given society the ability to share information at an exponentially increasing pace. From 2G to 5G, mobile devices have gained SMS (short message service, or text messaging), internet access, video streaming, ultra HD, virtual reality/augmented reality, as well as access to smart homes and IoT. With the advent of 6G within the next decade,

we will see better resource management and increased speeds, optimized by AI (Arslanian and Fischer, 2019).

2.3 Artificial Intelligence

AI can best be defined as an "attempt at simulating human cognitive processes by machines, especially computer systems" that includes, "learning, reasoning, and self-correction" (El Namaki, 2020). It encompasses methods like machine learning (ML) and deep learning (DL), which learn from data, identify patterns and make decisions with minimal human intervention. ML focuses on simple A to B input to output. One example of ML known as 'clustering' helps sort through unstructured data. By classifying the data into groups companies can more easily analyze it to make better decisions, like grouping similar customers together to offer more relevant recommendations to them (Berman, 2021).

An example of a deep learning method would be the Artificial Neural Network (ANN), which takes in multiple inputs (i.e. micro and macro-economic data) and feeds them into different layers within the network. Each layer calculates output based on its algorithmic structure and sends it to the next layer. Other DL methods include convolutional neural networks (CNN) and recurrent neural networks (RNN). DL methods provide more insightful output to users by using more complex algorithms that weight inputs differently.
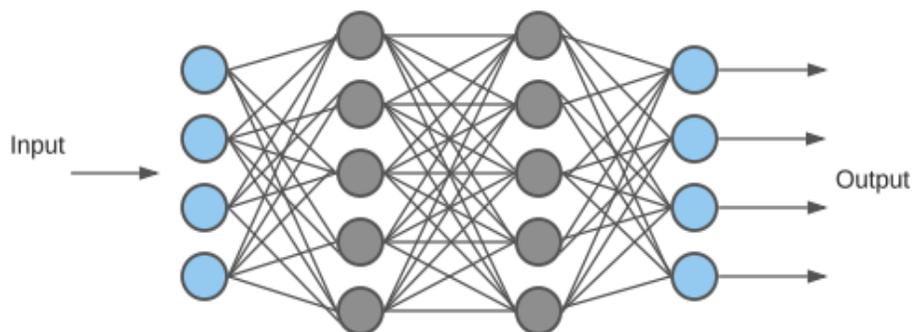

Fig 1. Data input into a neural network provides insightful output to users.

Data collected and manipulated by humans or machines (structured data) is straightforward to analyze with the use of relational databases. Unstructured, unfiltered, raw data however requires substantial resources to sort through without the help of AI. For example, consider all the free unstructured data available to companies on social media outlets, including text, audio, and images. The use of ML and DL can process this data and allow organizations to gauge consumer preferences and sentiments. Since the programs become more effective with more data, AI capabilities will only become more powerful as time moves on. Adoption of such technologies has become critical to keep up with the exponential increase of data captured worldwide.
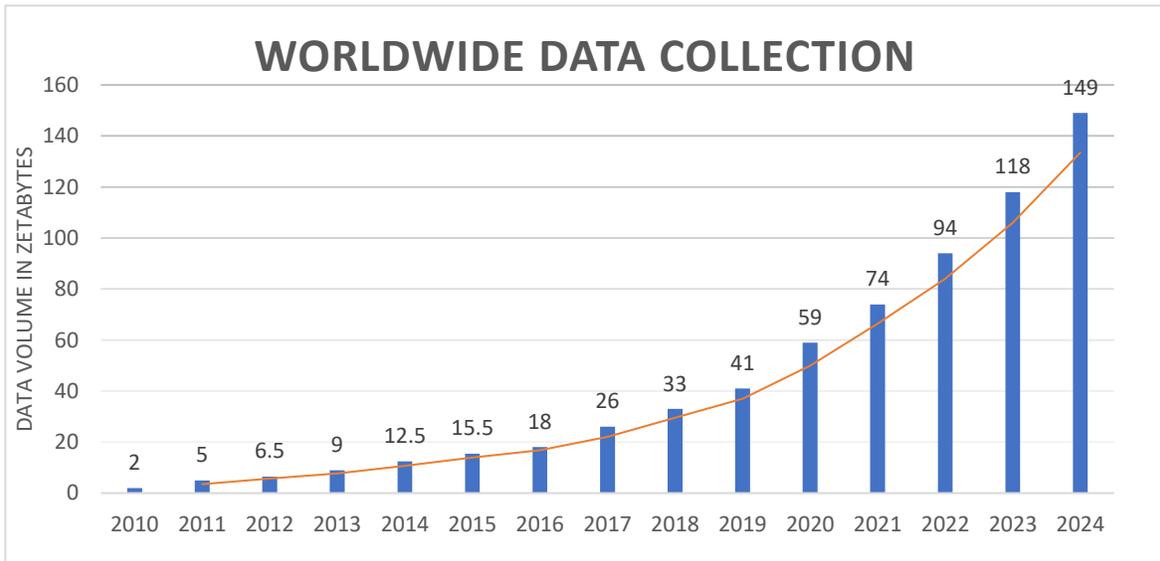

Fig 2. Volume of data/information created, captured, copied or consumed worldwide from 2010 to 2024.
https://www.statista.com/statistics/871513/worldwide-data-created/

2.4 Cloud

Increased computational power, data collection, and transfer speeds, combined with shrinking costs of storage, are contributing to the increased supply and demand of cloud computing. A revolutionary service, cloud computing offers organizations vast access to computing power. Huge collections of interconnected servers offer organizations flexibility in storage and bandwidth demands. By splitting up tasks between servers, data can be processed

and analyzed on a massive scale, making cloud services vital to the adoption of AI (Marr, 2020).

2.5 Distributed Ledger Technology

Blockchain takes advantage of a secure innovative payment system using distributed ledger technology (DLT). DLT has enabled virtual crypto currencies, without any backing of a central bank, to be distributed and traded among consumers. Transactions are stamped with the unique, encrypted keys of each participant along with other details of the transaction. Participants in blockchain systems self-police via collective agreement and verification of each transaction, removing the need for trusted third parties like public and private banks. Miners, as they are known, are rewarded for verifying each block by solving a complex mathematical problem, ensuring integrity and preventing double spending. Blockchain is considered a secure and hacker-proof approach to transferring P2P crypto assets (Fernandez-Vazquez et. al, 2019). The decentralized design has the potential to make financial intermediaries and hard currencies irrelevant.

3. Applications

Innovators have leveraged opportunities presented by enabling technologies and the resulting shift in customer expectations. Various areas of financial services have experienced disruption as new entrants offer unique solutions. As a result, the industry is seeing more competition and lower costs for consumers.

3.1 Payments

Innovation in electronic payments has progressed from earlier payment cards to the transfer of crypto assets we see today. Streamlined mobile payments, integrated billing, and P2P domestic and foreign exchange (FX) payments are facilitating cashless economies. Global non-

cash transactions grew by 14% (the largest margin ever) in 2018-2019, to reach $708.5 billion in transactions, driven by "increasing smartphone use, booming e-commerce, digital wallet adoption, and mobile/QR-code payments innovations" (World Payments Report, 2019).

An exemplary fintech company taking advantage of these drivers is PayPal. PayPal processes nearly 27 million secure transactions a day. With the customer data collected and analyzed, PayPal is able to verify identities, limit transactions to two seconds, and perform thousands of risk checks per transaction, allowing them to achieve four key business goals in personalization, compliance, risk, and customer service (Dillon 2019). The delicate balance of speed, efficiency, and security for consumers has helped the company flourish.

Venmo, a subsidiary of PayPal, works in the P2P payment space and processed $159 billion in transactions in 2020, a 59% increase from 2019, with over 50 million users in the United States (Curry, 2021). The low-friction mobile app platform gives customers a simple onboarding experience and incorporates social media aspects into its functionality, making Venmo more attractive to younger consumers.

3.2 Lending

Moving lending online has allowed fintech companies to give consumers with little to no credit history access to loans, including small business, immigrants and residents in developing economies. Strategic capabilities designed around big data and AI have reduced time and costs to process loan applications, making fintech lenders, "more capable to price mortgage risk and price discriminate… by using other dimensions of data that traditional banks cannot access" (Vives, 2017). AI's ability to quickly scan and analyze financial documents can determine credit worthiness in seconds. The potential number of clients increased dramatically using consumer data to capture new customers over the internet. Some

organizations connect directly to customer information systems and accounting documents to

anticipate lending needs in real-time, including QuickBooks Capital, which provides

financing to QuickBooks customers (QuickBooks Capital, 2021). From 2013 to 2018, fintech

offerings captured an additional 33% (for a total of 38% market share) of the personal loan

market in the U.S. (Buchholz, 2019)

3.3 Asset Management

Long dominated by large institutions, asset management has not been available to

individuals in lower wealth brackets. Fees associated with trading, minimum balances and

difficulty executing trades have made it difficult to gain access. However, access to

brokerage accounts has skyrocketed through platforms like Robinhood, where opening a

brokerage account is done via smart phone, with commission-free trading and access to crypto

exchanges (Robinhood, 2021). Access to financial advice with emerging 'robo-advisors' is

becoming the next disruptor in the area of wealth management. AI-powered algorithms are

giving personalized financial advice to consumers through organizations like Wealthfront

(Wealthfront Corporation, 2021). Global assets under management of robo-advisors reached

$1.1 trillion in 2020, and is expected to grow at an annual rate of 25.6% (Welling, 2020).

3.4 Insurance

Fintech and insurance, also known as 'InsurTech', has further promoted a customizable

approach to consumer needs. Organizations such as Trōv are offering an agile, on-demand

approach reminiscent of 'Just-in-time' supply chain techniques (Timmons, 2019). Customers

can log on and insure their items, allowing them to pay only when their items are in use, rather

than for a fixed term. Companies are using Internet of Things (IoT) to further personalize

offerings to risk-averse clients. Life insurance companies like John Hancock are using data

captured from wearable technologies like the Apple Watch to reward customers for exercising (John Hancock Life Insurance Company, 2021). Car insurance companies are allowing users to install tracking devices which monitor driving habits and reward safe drivers. Customers are even able to send in claims via mobile devices with pictures and videos. AI powered systems (or 'Claims-Bots') are able to process these claims at record speeds, with the world record being held by Lemonade. A claim was received, and after running 18 anti-fraud algorithms, a claims-bot paid out $729 in just three seconds (Schreiber, 2019).

3.5 Digital Banking

Perhaps the most important aspect of traditional financial services is the customer's relationship with a brick-and-mortar bank. The emergence of so called 'challenge banks', those embracing digital technology, are promoting a digital, data-driven banking experience. Revolut, a branchless challenger bank from the United Kingdom, offers its members access to deposit accounts, an international currency exchange, a cryptocurrency exchange, and worldwide P2P FX payments with zero fees, all via a smart phone app (Rovolut, 2021). Revolut reached 13 million users in 2020 and is currently applying for a bank charter in the state of California, which would allow the start-up to operate widely across the United States (Son, 2020).

4 **Impact**

With global connectivity and access to mobile phones continuing to rise, fintechs are proving crucial to financial access in developing countries. These services are making the goal of universal financial inclusion more and more obtainable, helping increase financial health and quality of life. Governments are legislating policies to encourage competition and growth of fintech offerings. According to the 2018 World Bank Findex report, digital government

payments in Europe and central Asia boosted digital accounts by 17% (The World Bank, 2018). According to the same report, digitizing all government payments in the region could reduce the number of unbanked adults by 20 million. In addition, similar policies in South Asia could provide accounts to 40 million unbanked adults, while in Sub-Saharan Africa, a whopping 95 million people receive cash payments for agriculture goods instead of using a bank account. While progress made in the fintech space is creating the opportunity for underbanked populations, government policy encouraging its adoption dramatically increases the potential to reach universal financial inclusion.

One of the most compelling fintech inclusion cases has been seen in Kenya. In 2006, only 14% of adult Kenyans owned bank accounts (Reuters, 2019). M-Pesa, a mobile money transfer and banking service, was introduced in 2007. Users can deposit, send, and withdrawal money via an e-wallet at one of over 40,000 agents across the country. Kenyans earning money in urban areas could now easily send instant money transfers to family in rural areas, allowing network effects to contribute greatly to their success (Barry, 2015). After their first-year accounts grew by 2652%, by 2014, 71% of the adult population had registered accounts with M-Pesa, processing $2.1 billion in transfers (Onsongo, 2019). M-Pesa's early alliance with regulators not only benefited M-Pesa's growth but also helped regulators work through a policy gap regarding these types of services. Similar adoption has been seen in Bangladesh, where 39% of the population are utilizing a mobile money service named bKash (Arslanian and Fischer, 2019).

In several developing countries families who rely on income from relatives traditionally are charged a substantial fee for transmitting remittances across borders and through a foreign exchange. According to the 2019 World Bank migration and remittance brief, $597 billion in

remittances will be sent in 2021 at a global average remittance service provider (RSP) cost of 6.51% (The World Bank, 2019). Simple math shows this would cost consumers almost $40 billion in fees. With the introduction of digital payments, remittance fees have decreased substantially over the last 8 years, with mobil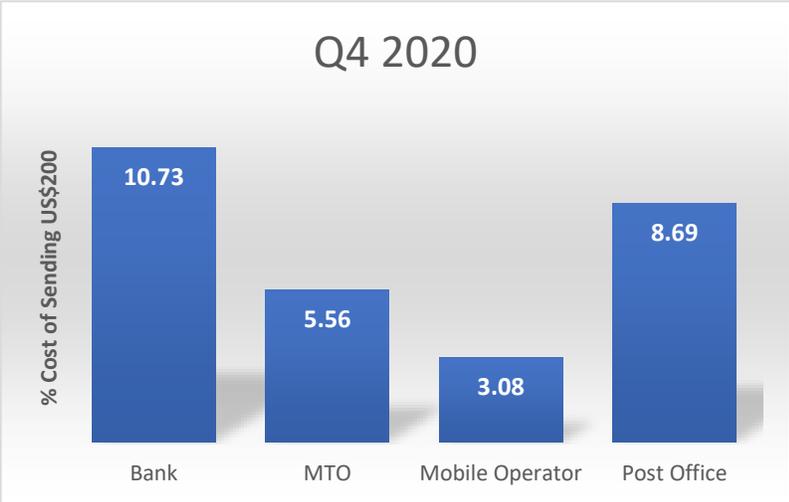e operators costing less than a third the price of traditional banks in Q4 2020, and almost half the price of money transfer operators (MTO) (see Fig. 3). Not only are these organizations helping further social equality, they are taking advantage of legitimate business opportunities and capturing huge market shares in underbanked

Fig. 3 Average cost of sending $200 by RSP.
The World Bank, December 2020.

populations. Mobile finance has broken the geographic and socio-economic barriers to create a more efficient system for consumers.

In recent years, releases of comparable digital offerings have grown among incumbent financial institutions. Global IT investment is expected to rise by 6.6% in 2021 (Moore, 2020). A focus on collaboration has allowed over 90 banks in the U.S. to launch a P2P payment service called Zelle, which in 2018 processed $122 billion in payments, overtaking Venmo as the largest P2P service in the U.S. by doubling their transactions (Shevlin, 2019). Robo-advisor replicas like those originally released by Wealthfront have since been deployed by organizations like Vanguard and Charles Schwab, who now manage over $181 billion, more than nine times the assets of their top fintech competitors (Carey, 2020).

Major financial institutions have made significant investments into a wide range of fintech businesses. Goldman Sachs and Citi made a combined 62 "major fintech investments" from 2013 to 2017 (Arslanian and Fischer, 2019). Corporate venture capital funds are being set aside by institutions to invest in emerging fintechs and partnerships are being formed, offering solutions to problems of scalability and cost of capital.

5 Moving Forward

Regardless of how innovative a financial organization may be, it will always be as slow as the regulatory agencies overseeing its activities. This is especially the case for fintechs whose business models have only recently become possible due to enabling technologies. Not only do these organizations have to maintain reporting and internal control standards set by regulatory agencies, they also need to have the appropriate licenses to operate, which vary country to country and state to state.

The potential for emerging fintech business models to benefit consumers has not been missed by regulators, however. All over the world, agencies have set up departments responsible for encouraging two-way communication with fintech leaders to stay in compliance and encourage innovation. In several countries, regulatory 'sandboxes' have been set up to allow small scale testing of new fintech offerings. Within each geographical sandbox, leaders collaborate with regulators, reducing risk of sanctions and enhancing regulatory direction. As of this writing, 44 jurisdictions have set up regulatory sandboxes for over 120 fintech companies (CGAP, 2021).

In addition to sandboxes, the Office of the Comptroller of the Currency (OCC) in the U.S. has introduced the 'Special Purpose National Bank Charter – FinTech Charter', which

offers fintechs special conditions to operate as a bank so long as they can demonstrate their commitment to financial inclusion (Deloitte, 2018). Regulatory alliances and adoption of policies like these are crucial to continue promoting financial inclusion.

It is ironic that regulatory barriers, which are a perpetual headache for financial service providers, may be the easiest hurdle for many start-up fintech firms to overcome. While the growth and adoption of the sector has been exponential, scaling up to a significant enough user base to become profitable can be extremely difficult and the limits of network effects are exposed. Start-up costs and costs associated with acquiring new customers are difficult barriers to entry. On top of this, consumers typically value the financial security they find in the big bank brands.

The question remains whether incumbent institutions will ever face a big threat to their value chains. Academics have opened a conversation around the concept of 'techfin'. While fintech refers to financial companies using technology at the core of their business models, techfin refers to big technology companies offering financial services via their existing technological infrastructure. Examples of techfin success have shown that traditional institutions may face such a threat.

Not only do Facebook and Google have a combined 3 billion monthly users, compared to 80 million customers for JP Morgan, they retain "frequent contact with their users, years of data to support the personalization of offerings, and, most importantly… significant user trust" (Arslanian and Fischer, 2019). WeChat, developed as a Chinese mobile messaging app owned by Tencent and launched in 2011, moved into the digital payments business and in 2019 processed more than a staggering 1 billion transactions per day in a market where digital

payments are worth over $16 trillion per year. WeChat is estimated to have over 900 million

monthly users and 1.2 billion accounts in total (Iqbal, 2021).

As margins become lower, future financial services are becoming less about collecting

fees from transactions and more about obtaining customer data, a commodity that is very

valuable to big tech. Companies like Tencent and Alibaba (owner of Alipay and MyBank) can

now leverage these commodities to execute targeted banking and lending solutions to consumers

in their markets.

6 Conclusion

Innovative businesses enabled by digital technology have taken advantage of a market

ripe for transformation. Start-ups have been able to contribute niche offerings within the

financial services space, better serving consumers. Individuals can take advantage of services

regardless of location or socio-economic background, overcoming a huge barrier to global

financial inclusion. With enabling technologies becoming cheaper, more advanced, and more

accessible, it is inevitable that the trend of financial inclusion will continue to progress.

With the technological and regulatory landscape changing so rapidly it's hard to

determine exactly what the future will look like. We have seen continued adoption of e-payment

methods, pushing countries towards cashless economies. The advent of COVID-19 and

normalization of contactless transactions have accelerated this transition. Sweden, Finland, the

UK, Australia, China, and South Korea are moving to become cashless in this decade (Global

Data, 2020). With Sweden poised to become the first totally cashless society, there has been

debate around whether the move is a good idea. While it can contribute to a reduction in crime,

challenges can occur if banks are unable to accept cash deposits or withdrawals. Contingences

must be in place in case of national emergencies, power failures or cybersecurity breaches (Savage, 2019). Certain risks are unprecedented and could be potentially disastrous. Further research is needed to determine how these risks could affect social and financial structures.

Fintech in the future could leverage AI, blockchain, and IoT technologies in distributed autonomous corporations, real-time auditing, machine to machine payment ecosystems, and online marketplaces where consumers can willingly sell verified personal data (Arslanian and Fischer 2019). As we become more of a data-driven society, these technologies could help remedy omnipresent concerns around data ownership. As customer data becomes more important to the business models of emerging fintech companies, concerns around the collection of such data may come into a public spotlight. Any future ruling preventing vast data collection could prevent these businesses from effectively carrying out their business models as they're designed.

Efficient business models will continuously allow fintechs to adapt to emerging technologies and changing customer needs. The question is whether regulatory agencies will be able to keep up. Even with the increased IT investment showing incumbents' movement towards the digital experience, legacy systems remain a huge obstacle to overcome. While they have had success imitating products, banks will most likely continue to lag fintech innovation driven by agile organizational designs and lean governance models. This limitation could force traditional financial companies to focus on partnering with or purchasing top fintech businesses to retain market share. The most disruptive potential could lie in the full-scale entry into financial services by large tech companies like Google, Apple, or Amazon (Vives, 2017). Licensing requirements could encourage start-ups to only offer services adjacent to the banking system, rather than incurring the costs associated with operating a chartered bank.

The amount of government resources dedicated to increasing innovation, competition, and access to basic services is likely to be a major factor in overcoming barriers to entry and helping promote financial inclusion. Fintech has the potential to operate as a gateway for every underbanked adult in the world. Gaining access to bank accounts, e-payments, credit and insurance are vital steps in lifting families out of poverty and increasing the quality of life, thus making fintech an extremely worthwhile prospect for the future.

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