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FINANCIAL FUTURE AND FINANCIAL FUNDAMENTALS: ABOUT CONVERGENCE, BLOCKCHAIN, BIG DATA, AI

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Annotation: This monograph discusses the past, present and future state of the financial sector. Books by world-renowned scholars in the field of finance and scientific articles by professors also provide insights. You can also see the threats facing the financial sector and the solutions in this area. There is also a clear picture of Fintech, the future of finance. Some of the structures and technologies that form the basis of financial technologies, their history of origin, and future plans for them are outlined. In general, a comprehensive review of the financial sector has been provided.

Keywords: Fintech, know-how, ecosystem, financial services, payment services, PSD2, convergence, blockchain, big data, ai, DLT, neobank.

Financial technology (Fintech) is used to describe new technologies that seek to improve and automate the delivery and use of financial services. Essentially, fintech is used through the use of specialized software and algorithms used on computers and increasingly smartphones to help companies, business owners and consumers better manage their financial operations, processes and lives. Fintech is, in a word, a combination of "financial technology".

When Fintech emerged in the 21st century, the term was originally applied to the technologies used in the backyards of established financial institutions. However, since then there has been a shift to more consumer-oriented services and therefore a more consumer-oriented definition. Fintech currently covers a wide range of industries and sectors such as education, retail banking, fundraising and nonprofits and investment management.

Over the past decade, FinTech - widely described as the use of new technologies and innovations to compete in the financial institutions and intermediaries market - has disrupted the financial services sector in several ways.

First, new technologies have allowed existing financial service providers to offer a range of new services that eliminate intermediaries to make transactions more efficient and error-free. In this way, financial services are decentralized and leveled. Apparently, there is an increase called mobile banking, which allows customers to perform a wide range of online transactions. A network connection to financial services makes it easier to access all types of transactions, such as checking financial status, making payments, withdrawing and transferring funds. The "behind-the-scenes" activities of financial institutions have changed in a similar way. This includes, for example, the use of Big Data to provide more efficient services, but it also allows firms to use technology to manage legal risks more effectively.

The consequences of the financial crisis of 2008-2009 led to a wide range of new banking regulations. The impact of this additional regulatory burden has been

an increase in the use of technology to help banks comply with the new regulatory requirements. Sometimes referred to as Regtech, this involves the use of technology to comply with regulatory requirements. There are a number of areas of compliance and reporting, and technology can provide significant benefits, such as anti-money laundering requirements (e.g., knowing your customers 'requirements), risk data collection, and real-time transaction monitoring.

Second, FinTech has also helped create technology startups that offer an alternative source of financial services. In particular, "application-based" companies are emerging everywhere. They disrupt the operation of traditional banks, for example, by supporting a number of financial services, such as traditional banks, such as lending platforms in the market, crowdfunding platforms, insurance services, algorithm-based "robo-advisors". as well as blockchain-based crypto-currency and payment systems.

For millennial consumers, these alternative service providers ("challenge banks") are particularly attractive. Banks have traditionally failed to respond to the notion that banks are unreliable, profitable machines associated with a selfish and unstable version of capitalism. If traditional financial institutions do not meet these needs, Millennium consumers will simply switch to younger, new providers.

Finally, FinTech uses technology to improve access to financial services for traditionally excluded individuals, particularly in emerging economies. The reason for this change is the global proliferation of smartphones. The influx of smartphones is expanding rapidly around the world, with 6.1 billion users expected by 2020. Many startups are now taking advantage of these global opportunities to provide access to a variety of financial services (more precisely, credit) in African, South American and South markets. - East Asia. The range of services offered is expanding as the number of local startups increases.

The regulatory trilemma

Even the shortest surveys show that FinTech is disrupting all aspects of financial services. The FinTech revolution has taken a huge toll on participants in both groups, particularly current financial service providers and regulators and other policymakers.

Current executives face new and aggressive competition from young, fast startups that use digital technology to provide a smoother, more focused experience to customers. However, current executives are also facing competition from larger, well-established technology companies that see opportunities in the financial sector. Thus, the traditional silos between financial services companies, technology companies, and media and telecommunications companies have been broken, as the boundaries between financial services companies and other types of businesses have become blurred. This disruptive competition reveals imbalances in traditional business models and practices and has forced officials to innovate.

The arrival of these two groups of non-traditional participants in the financial services sector is a big part of the disruption for policymakers. Regulators and other policymakers are facing a variety of new challenges in developing and implementing a regulatory response to technological changes in financial services. Because technology has "eaten up the world," it creates many new business opportunities, but it also poses enormous challenges that require some form of government regulatory intervention. In a world where agility is important and "technology is faster than the law," governments are often sluggish and disconnected. This, of course, poses potential new risks for consumers of financial services, but also for the integrity of the entire financial system.

In a developed capitalist economy, the structural importance of financial services, particularly banks, has traditionally justified a high level of government intervention and regulation to ensure that banks and related entities do not take excessive risks. Historically, banks have been seen as a unique form of business. On the one hand, they must be managed privately for profit. However, on the other hand, they provide credit and this credit is very important for the health of the

economy. A complex regulatory system has emerged to manage this risk and balance these different goals. However, in the FinTech context, risks are often vague or unknown, outside of existing regulatory schemes, or both.

Guenter Teubner, a theorist of law who wrote in the 1980s, famously identified the "regulatory trilemma" faced by all regulators in the late capitalist era. Teubner points out that any regulatory intervention faces three different risks: the risk that the regulatory action will fail (i.e., the regulation will miss the goal or otherwise be ineffective); the risk of violating what you want to regulate, (i.e., the regulation removes any incentive to engage in a regulated activity); and the risk of violating the law (i.e., regulation violates the doctrinal integrity of the law and the legal system as a whole). The "trilemma" described by Teubner can be reshaped as a question: how can any regulatory intervention be effective, efficient, and legally consistent?

This seems to be a particularly pressing issue in the context of FinTech. It is important that any regulatory action be effective - that the interests of consumers and the integrity of the financial system as a whole are adequately protected. It is also important that regulation is not overly burdensome and "kills" innovations, leading to the outflow of startups and talent to other jurisdictions that offer a "friendly" regulatory environment. Regulatory competition is important in a global economy where transaction costs associated with relocating businesses have decreased. Finally, regulation should be in line with other features of the legal system and the existing capabilities, know-how and experience of regulators.

In developing responses to this regulatory trilemma in the context of FinTech, it must be acknowledged that public entities have a significant disadvantage of data (especially compared to FinTech companies and large technology companies) and lack the capacity, resources and experience to maintain it. with fast-moving actors dominating the sector. In the context of information and resource shortages, new and innovative approaches should be sought. This chapter describes several such approaches and various considerations expressing such

approaches. Regulation is important, but only through the application of new approaches can a regulatory environment be developed that ensures the responsible and safe application of financial innovations. Improper regulation can kill innovation and put the country in a significant economic disadvantage.

The future beverage food ecosystem

One way to approach FinTech's regulation is to think about the desired end situation: what do we want the sector to look like in the future? What organizational structures can provide sustainable and responsible innovation, and based on this desired end result, what regulatory approach can facilitate and encourage such business?

Apparently, existing providers cannot ignore the breach. In the context of financial services, incumbent managers have faced an unprecedented combination of new pressures as a result of this shift. Most importantly, all of these distortions involve a certain amount of technology. These new challenges include developing more customer-friendly services to deepen relationships with existing customers to attract and retain more customers; review of distribution models and internal organization; responding to competition disrupted by "challenge" banks and new entrants to the market (start-ups, but also corporations from other sectors, the most obvious technology sector); restore trust with all stakeholders, especially customers; and new regulation, capital and security risk management. The important point here is that all of these challenges require dealing with digital technology. Technology makes it easier to provide better services and forms an important infrastructure for cost and risk management.

Thus, digital technology has now become the main engine of change in all aspects of financial services. Organizing for innovation is no longer voluntary.

Thus, digital technology has now become the main engine of change in all aspects of financial services. Organizing for innovation is no longer voluntary. So how can incumbent leaders respond to this new challenge? In another study, we

developed the argument that the world's most innovative companies responded to the unprecedented pressures and challenges of doing business in the digital age by reinventing themselves as more open, inclusive, and "smoother" ecosystems. The proposal is that the closed, hierarchical, modern company that has dominated the global economy for the past two centuries is poorly equipped to respond to the challenges required by the FinTech revolution. We are experiencing the beginning of the "end of the corporation," at least in companies that are organized as closed, hierarchical systems, and act as procedural bureaucracies.

The most popular theory for explaining that large corporations cannot innovate is Clayton Christensen's "Innovator's Dilemma". Christensen's argument is that over time, all organizations will inevitably develop habits and procedures for decision-making and resource allocation. In larger organizations - such as modern corporations - such systems are highly formalized. The result? Corporations are locked in resource allocation models that focus on decision-making and existing products and services. When they see something new - even if they feel strongly that it is disrupting their industry - they focus too much on existing products or services to adapt.

Thus, corporations have a tendency to see tunnels as they strive to satisfy their existing customers so that they do not feel how fast the world around them is changing. This was the basis of Christensen's basic concepts and the dilemma of the innovator. A corporation that was once innovative will often struggle to innovate next time. Corporations can be very good at their job, but it is this focused excellence that kills them. This is not to say that bureaucratic procedures are inherently flawed - they can be an effective mechanism for managing existing customers and managing complexity in a large, possibly transnational organization - but such practices encourage companies to continue what they did before. But maintaining the status quo leaves them open to being violated by more innovative competitors.

To address this dilemma, new ways of doing business have been developed and understanding the specifics of these alternative forms of business and thinking about how to develop a regulatory environment to facilitate these new ways of doing business has become an important task for all businesses, as well as policymakers. . So we no longer have to think in terms of traditional corporate structures. The boundaries of the company became more open. Traditional corporate organizations are changing their rigid roles, static procedures, closed divisions, and hierarchical relationships between different groups of stakeholders as companies adapt to the new operating environment.

The concept of a business "ecosystem" may be an alternative to understanding these changes in how firms organize themselves in the digital age. In short, such ecosystems combine the following features:

- Use the unique features of software technology (e.g., low marginal cost) to provide a powerful, friction-free experience to end users.
- Job roles and functions adopt a smoother, smoother, and more inclusive organizational style built around a network of unified, highly efficient, creative communities that are dynamically changing in response to the firm's changing business needs.
- Apply a more open, transparent approach to communication and information management based on new computer-mediated connections such as social networks.
- Introduce a new style of digital leadership aimed at creating an environment that facilitates creativity, rather than focusing on compliance control or legal risk management.
- The use of open collaboration by all stakeholders, especially with a few external partners, to meet the demand for continuous innovation in what we call collaboration for innovation.

In an era of highly competitive, technology-based markets, every company needs to think about reinventing itself as such an ecosystem. Such ecosystems are better positioned to provide the kind of innovation needed to succeed in a technology-based economy.

Collaboration for Innovation

An important option for existing service providers, especially for more conservative practices dealing with "internal innovations", is to be open with organizational partners (especially technology startups) to develop and revitalize their services. that the future of companies is determined by changes in technology, and that "learning" from technology startups often supports the most effective methods of management, especially when current executives do not have the technology to innovate effectively.

One way to achieve this is for officials to buy or invest in start-up companies, i.e. corporate venturing. The important point is that existing providers should be open to accessing knowledge and technology from the start-up firm they purchased. The goal of such acquisitions is not assimilation, as the startup is simply absorbed into a larger corporate identity. Instead, the goal of a more open style of collaboration is a dynamic relationship that emphasizes mutual learning opportunities.

It is in this sense that we can (as in the Financial Times) talk about existing providers who have "borrowed Start-up Genie's Magic". This differs from the previous method of corporate acquisition, in which assimilation is emphasized and any study is conceptually one-sided (i.e., from the corporate to the acquired person). An organization with an open, inclusive, and smooth ecosystem style can help large, established firms solve complex (and unprecedented) business problems by providing other types of financial services.

This new style of collaboration could be beneficial for financial institutions as they seek to respond to FinTech's disruptive call. For example, banks are already engaging in such partnerships for innovation, and this can be seen everywhere.

For example, many banks now have partnerships with FinTech. For example, J.P. Morgan Chase has partnered with OnDeck to offer quick approval and financing for small business loans. Another FinTech company provides supply chain finance to banks, including Barclays, through the Prime Revenue cloud platform. BBVA FinTech, Spain's second largest bank, has been actively involved in the acquisition. They became a major shareholder in the British startup Atom Bank and acquired Finn-based FinTech innovator Holby, which specializes in small business payments. The same can be understood when Visa buys Plaid. Many banks now see this type of FinTech partnership as a key mandate they need to develop in order to be relevant and competitive.

These changes have led some observers to talk about "a wonderful new era of FinTech collaboration" between current executives and more innovative startups. According to this view, banks need to become innovative FinTech consumers because they cannot provide such services on their own.

FinTech startups, on the other hand, often focus on a specific problem or issue in a narrow range and develop a specific solution. This creates a potential 'win-win' where large banks benefit from a unique new product or service developed by the startup and the startup can benefit from the existing bank's access, network and infrastructure.

However, for innovation to work effectively, such collaboration requires existing banks to reconsider existing practices. For example, they should strengthen their existing internal capacity assessment mechanisms, develop robust systems for evaluating potential partners, develop mutually

acceptable financial agreements, and provide sufficient testing capabilities to introduce new technologies (both initially on a small, experimental scale). should provide. and later, when a full-scale implementation is planned, on a larger scale).

This is not always easy for practitioners, and there are skeptical voices about the appropriateness of such an approach. Huge cultural differences between practitioners and beginners lead some observers to conclude that it is difficult for existing banks to partner on innovation in this way. According to this line of thinking, external environmental issues are very important, consumer expectations are very high, and banks, as existing, do not have the internal capacity or resources to implement this new partnership. and organizing the ecosystem style.

Nevertheless, such doubts about the type of partnership shown here seem to contradict the approach of more and more officials in the sector. Given the tendency to "separate" banking activities, which we will discuss below, a partnership that is not less, but more, and "better" seems inevitable. Of course, this poses profound problems for existing financial service providers who are accustomed to working entirely "within themselves" using regulated internal procedures. And, of course, in an open ecosystem, such cooperation means a certain degree of control. However, the long-term benefits of such collaboration, know-how sharing, and co-creation justify any risk.

It is also difficult for existing financial service providers to see a better alternative than working as a more open and inclusive ecosystem. Apparently, this maximizes the opportunities for innovation for current leaders, and ensures that such innovations are "hard-wired" to the organization and its culture over time.

Re-imagining the role of government

The role of regulation in financial services and the traditional calculations of its justification focus on risk management. An important difference between financial service providers and other businesses is the regulatory environment in which they currently operate. In addition, the level of regulation is much higher for banks, especially after 2008. This complicates efforts to get some of FinTech's "magic from the devil" and may also require a change in approach by regulators, especially if the goal is to provide innovative services. products and services.

In the post-2008 regulatory environment for financial service providers, two considerations prevailed: first, providing a high level of protection for consumers, particularly retail customers, investors, and depositors (i.e., the microprudential aspect of regulation); second, financial security. sustainability by minimizing systemic risk (macro-prudential part of regulation). The financial crisis of 2008-2009 revealed shortcomings on both sides, and these failures led to an important process of regulatory reform and the introduction of strict regulatory requirements.

Moreover, the legacy of the 2008 crisis was a change in perceptions of innovation, at least on the part of regulators. Until 2008, innovations in financial products or services were generally accepted on favorable terms. This perception has led to a "light touch" approach to regulating innovation in financial services. However, as the crisis was largely due to such innovations (called "financial weapons of mass destruction"), the regulatory trend shifted in the opposite direction. Innovations were seen in a more negative light by politicians (excluding the public) who sought to prevent a repeat of the 2008-2010 disruptions.

Thus, the timing of FinTech's emergence proved to be very difficult for regulators. After 2008, regulators found themselves in an awkward position where they had to balance regulatory goals for consumer protection and systemic risk management with encouraging innovation. From the point of view of regulators, it is easy to conclude that FinTech creates micro- and macro-prudential risks or, at least, uncertainties, and it is very difficult to manage these uncertainties.

However, with the disappearance of memories of the recent financial crisis, the relationship between banks and regulators has entered a new phase. As discussed above, most financial institutions are already proactively managing regulatory risk through expanded compliance departments. Banks have better integrated the two goals of post-crisis regulation into their day-to-day operations, and as a result, the regulatory agenda has changed. Against the background of these changes, new approaches to regulation are now possible and expedient.

Open banking

One of the brightest examples of changes in normative thinking is the post-2016 UK experience. Traditionally, the five largest banks - Barclays, HSBC, Lloyds, Santander and the Royal Bank of Scotland - control more than 80 per cent of the retail current account market, producing almost identical products that have not changed in decades. suggested. People usually choose a bank when they enter the job market and stay with them for life. However, in August 2016, the UK Competition and Markets Authority ruled that the nine largest UK banks should allow licensed startups to have direct access to their data (see : www.openbanking.org.uk). Account holders had to agree, but if they did, all the information in their current bank accounts, such as utility bills, mortgage payments, etc. - could be made available to FinTech startups, who would later be able to do so. 'can use data. providing innovative new financial products and services.

To this end, Open Banking Limited, a non-profit organization, was established to develop application interfaces (APIs). These protocols automatically transfer data from one software to another. What potentially changes these APIs in the game is that they can retrieve current credentials and allow software developers to create new products that use that data in new ways.

A simple example might be an application that collects an individual's financial information from multiple sources - for example, from several different bank accounts, and allows that person to manage their financial affairs from a

single app on their phone. The ability to access data on multiple bank accounts may not immediately change the game. However, the idea behind Open Banking is that startups get data and develop innovative new services that no one has yet thought of. What is expected from the Open Banking movement is that innovative entrepreneurs will use this information to provide more innovation.

In 2015, the European Union introduced a similar package of financial services reform in Payment Services Directive 2 (PSD2), which will enter into force in late 2020. The goal of PSD2 was to develop a single European market in the banking sector by forcing Europe. banks to open their data through the API. PSD2 has created two new types of licensed facilities that can use this data for payments or other services. This has created a unique opportunity for non-banking organizations to initiate payments and provide account information services, which has increased competition and created more choice for consumers.

Security is provided by the introduction of Strong Customer Authentication (SCA) under PSD2, which requires customers to use two of the three mandatory authentication measures, called two-factor authentication (or 2FA), when accessing their payment accounts online. These SCA measures include: Knowledge, only the user knows (e.g. password or PIN); Ownership is something that belongs only to the user (e.g., token, code, or key); Identity is something the user "has" (e.g., fingerprint, biometric, or voice).

Other countries are following these trends towards open banking. For example, the Banking Law of Japan was amended in June 2018 to promote open banking. About 130 charter banks in Japan plan to open APIs by the end of 2020.

Existing banks were initially skeptical of these developments. For example, in March 2019, it was reported that just over 40% of European banks failed to meet the PSD2 deadline - banks had to provide a test environment to third-party providers. However, smart banks have recognized the value of working with FinTech firms to minimize business and regulatory risk in the new world of open banking, as described in the previous section. Thus, PSD2 is an important example

of how regulatory interventions can "stand up" to collaborate for innovation and create an open and inclusive ecosystem of future financial services.

Co-creation

An appropriate option, which is often preferred by FinTech companies themselves, is for the government to pay more attention to technological innovation in the development of the regulatory framework and the entities that drive its spread, i.e. technology companies. In other words, technology companies believe that in order to implement an innovation collaboration strategy, regulators need to become more active participants in the open ecosystems described above. But is this a sensible strategy? Or is it a matter of keeping the animals in charge of the zoo?

There is an opinion that governments should entrust companies with the task of developing regulatory policies appropriate to the digital age. Disruption has become one of the main problems for any business, markets are changing rapidly and new competitors are constantly taking the stage. In such an environment, business models need to be constantly evolving. As a result, companies need to take emerging technologies seriously in order to stay relevant. The impact of such an environment is that technology companies have more access to better information about the impact of technology. Increasingly, companies are better equipped than states to play a leading role in developing regulation.

In addition, new digital technologies empower customers and employees of such companies in new ways. For such companies to survive, the voice of these stakeholders must be taken into account. For example, in many cases, employees are not satisfied with being "geared up" in a corporate machine, but want to be treated as active stakeholders. For example, in the context of the Gig Economy, such employees themselves have become entrepreneurs. They speak out or "come out" in a worse situation if they don't support the company's policies or actions. Proponents of this type of outsourcing see such stakeholders as an important test of

how technology companies behave and how they approach the development of the regulatory framework.

More importantly, however, consumers of technological products and services have become much more important, at least compared to the previous industrial stage of capitalism. In technology-based markets, consumers are no longer just consumers. They have become important stakeholders in the firm's ecosystem and its management. This serves the function of limiting the behavior of large firms. It is becoming increasingly dangerous for them to abuse their market power, as such abuse puts users at risk of moving to competitors and damaging the brand in the medium term and reducing the firm's wealth.

Such risks are especially important for companies that manage the platform as an important part of the business model (consider Amazon, Airbnb, Facebook, or Uber) because platforms link to network effects created by having as many users and their business as possible 'liq. users will be harmed if they leave the platform.

Of course, there are risks. Even if technology companies have good intentions, they may face difficulties in proposing effective regulatory schemes because their interests do not coincide within the company. Google's recent attempt to set up an ethics board to study developments in the field of artificial intelligence has failed.

So what is the role of government in the digital age? What better alternative would it be to hand over policy development and regulation to the private sector if the policy process and policy could be "captured" by established technology companies? The government still has an important role to play. However, the bureaucratic approach in policy development has taken its time. A new, more dynamic approach that meets the need for innovation needs to be implemented.

Policy experimentation

One of the options used in the context of FinTech regulation is to pay more attention to policy practices. Here, we are referring to more radical approaches that

focus on testing innovations in real conditions, rather than (traditional) consulting models that are offered to the market in response to policy and regulatory proposals. then gather information that the regulator can provide information about the design.

For example, in April 2016, the UK Financial Conduct Authority (FCA) introduced a "regulatory testing environment" that allows start-ups and established companies to develop and test new ideas, products and business models in the field. announced that FinTech. This model has proven to be very effective, especially in the Asian context where a number of countries have implemented similar schemes.

The goal of this testing environment is to create a "safe haven" where businesses can test innovative products, services, business models, and delivery mechanisms without having to deal with simple regulatory consequences. In practice, this means that the relevant rules and regulations have been suspended and do not apply to a particular firm. While using the sandbox, the regulator aims to promote innovation by reducing regulatory barriers to testing disruptive innovative technologies while ensuring that they do not adversely affect consumers. In return, regulators are given access to the most advanced data, thus closing the information asymmetries discussed above.

What makes the regulatory testing environment attractive is that such technology is open to discussion, control, and supervision as it leads to consequences that enter citizens 'daily lives. Thus, involving the public in regulatory discussions helps to create a better sense of legitimacy.

It can be said that the most important significant benefit for firms with a test environment is the relationships established with the regulator and their participation in the regulator's test environment gives them market confidence in customers and financiers.

Skeptics argue that regulatory sandboxes create a "two-tier" startup system in which those selected in the sandbox are given an unfair advantage over competitors, including current ones. Increasing reliability, as well as lighter regulatory requirements, can undoubtedly be beneficial. In addition, the question may arise as to whether regulators have the capacity to determine whether a business should be included in the sandbox scheme. Indeed, such feedback suggests that regulators will communicate and collaborate more openly with a wider group of startups operating in the FinTech industry. This can be achieved through more regulatory dialogue, such as "innovation centers" set up by the authorities, which allow firms to communicate with the authorities on issues related to FinTech and to obtain clarifications on licensing and regulatory requirements.

Normative sandboxes have been adopted or considered in many other jurisdictions, and data-driven regulatory design, in a broader sense, is an increasingly popular approach. As different countries compete to attract innovative startups, the issue of regulatory environment is becoming increasingly important. After all, the regulatory situation will be crucial for any firm in choosing its base. In a technology-based global economy, jurisdictions that cannot deal with new technologies and do not establish rules and regulations that are attractive to founding innovators are at risk of being left behind.

Thus, we also need to introduce ecosystem thinking into regulation, and companies, banks, startups and governments need to work with all stakeholders to promote innovation while ensuring that vital interests are protected. There is already some evidence of such a shift. Regulators acknowledge their information gaps, and more activities to close this gap are involved in training courses or hackathons. In addition, regulators are establishing new partnerships with private sector participants to understand and develop technologies. There is more to public-private partnerships to outsource legal work and create new technologies such as blockchain. Finally, the introduction of sandboxes and the recognition of

the importance of innovation raise awareness of the need for a different kind of approach.

Of course, national governments and other regulators need to set "smart" boundaries for risk that they are willing to accept in agreement with regulated entities. However, within these boundaries, they must allow and encourage freedom and innovation. This does not mean that everyone should be allowed free access within these limits. Instead, it is about building trust and maintaining trust among all participants through constant communication and information exchange, within carefully agreed boundaries. In this regard, all stakeholders affected and involved in new technologies need to gain their trust.

Thus, a community-led regulatory project is a version of policy practice. The decisive factor here is the changing context. In the context of the digital revolution and the new pressures it has created, there is a certain level of openness and visibility in both society as a whole and in developing ecosystems. Normative control scrutiny is about the new look created by digital technologies and the commitment of open ecosystems to adhering to the values of a free, open digital culture. If power testing requires visibility, transparency, and authenticity, then the key to ensuring that these values are maintained are infrastructure that facilitates speech, such as social media.

FINTECH FUNDAMENTALS: CONVERGENCE, BLOCKCHAIN, BIG DATE AND AI.

Technology supercycles are accelerating. Since 2015, the digital transformation of the financial services sector has attracted more than $ 500 billion in investment.1 The transformation that led to the disruption of the financial services industry was not driven by a single technology trend, but by several simultaneously and frequently combined. being increased.

The pace of technology-based change is growing bigger or bigger. It took nearly fifty years for landline telephony to capture 60 percent of the market. The use of social networks and tablets has reached this level in seven years. As networking helps new technologies to be mastered faster and faster, existing organizations such as traditional banks and asset management companies are threatened by competitors who support the technology. During the COVID 19 pandemic, some segments of financial services were digitized at a higher rate - for example, the use of digital payments instead of cash in 2020 doubled compared to the spring of 2019.

In this chapter, we discuss the effects of a number of technologies that cause seismic displacement in a traditional industry to mature over several years from each other.

Disruptive technologies

In recent years, technology clusters have reached new levels of utility and market adoption, creating new opportunities that are not possible with just one or two of the technologies they use. Mobile communications, artificial intelligence, big data analysis, and distributed notebooks are among the most popular, leading to structural changes in the financial services industry, which in turn is dynamic and wide at providing services to consumers and businesses globally. causes scattered displacements.

Developed by Nikola Tesla and Guglielmo Marconi in the late 1800s, mobile technology has become an economic tool that has allowed developed economies, especially financial services, to catch up and, in some cases, overtake them. A World Bank study by the University of California, Berkeley, confirms that GDP penetration is more than 1 percent for every 10 percent of digital penetration in a given economy.

This digital connection has accelerated with the proliferation of mobile communication systems, as laying ground cable over long, hard-to-reach or

underdeveloped areas is no longer necessary, "jumping" the technology generation. In Africa, for example, nearly two hundred thousand Kenyans have been shown to get out of extreme poverty in eight years using the mobile money provider M-Pesa. China's popular mobile platform WeChat has more than 1 billion users (including 79 percent of the Chinese market including all its apps) and more than 50 percent of these users are engaged in financial services on the platform.

Artificial Intelligence Artificial intelligence (AI) has been advanced for thousands of years and has been developed on modern computers for decades. Recently, however, it has gained widespread and deep functional acceptance. Figure 1.1, adapted from an ad on the Oracle Big Data blog, shows how the various flavors of artificial intelligence have evolved over the past forty years.

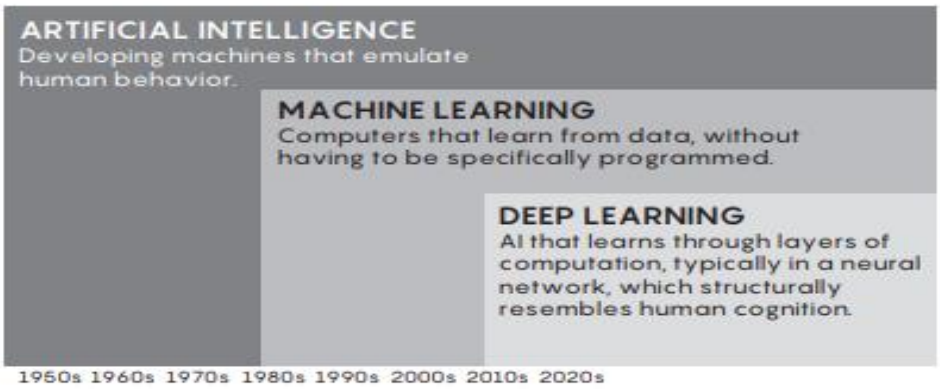

Figure 1.1

In chronology, note that experiments with AI expert systems have been conducted on digital computers since the 1950s. One famous example is ELIZA, a 1960s digital therapist by MIT scientist Joseph Weisenbaum, who often deceived people into thinking they were in contact with a real person. Recent work on in-depth research allows for better translation from speech to data, for example, available on Apple's Siri system.10 An important milestone in the evolution of AI applications was introduced by Google in 2015 to study computers was the release of the intended TensorFlow software library. power and neural networks are easily and widely available in an open source library.

Big Data Analysis With the advent of better artificial intelligence systems, we have seen the rise of big data analysis, which is now used in many fields and has profoundly changed the way we work, play and live. Samples can be obtained from all types of data streams, from day-to-day sales activities to physical activity of consumers in retail stores and beyond (allowing better sales forecasting across the system). Big data analysis can even be used to determine if company executives are lying or hiding the truth in revenue surveys. It can also be used to better manage cash liquidity systems, stabilize the economy, or restructure the workforce.

Distributed Notebooks In our 2016 book, The Boundaries of Financial Technology, we covered the evolution of network communications, culminating in a distributed ledger. Distributed notebook technology, or DLT (popularly known as blockchain), is itself a product of a number of technologies and methods developed decades ago, such as the Byzantine consensus and distributed computing. At the time of this writing, the nominal market capitalization of digital tokens enabled by the DLT has generated nearly $ 300 billion in value.

When we combine DLT, AI, big data analysis, and good mobile networks, we can increase efficiency and create new opportunities, as well as work that could affect millions of financial services employees, according to PricewaterhouseCoopers estimates. we create the perfect storm of rupture of the rins.

The convergence revolution

The convergence revolution opens up the possibility of finally resolving the gap in the coverage of financial services, with the result that 3.5 billion people worldwide are not fully served or serviced by the banking system. One of the interesting artifacts of this transformation is that it allows new participants to be offered services. If in the past the existing bank was concerned about non-bank financial companies, today the threat could come from a telecom provider or a digital platform company like Google, Amazon, Alibaba or Tencent.

This change is not just about technology. For decades, under the oligopoly, banks have become accustomed to the current mentality and customer service has suffered, leaving them vulnerable to “neo-banks”. They have it. "

The new wave of callers brings a completely different view of customers. We can see this in the Net Promoter Score (NPS). NPS is a standardized measure of customer satisfaction developed by Bain & Company and Satmetrix.15 It measures the likelihood that a customer will recommend your product or service to someone else. The scale works from −100 (everyone hates you) to +100 (everyone loves you). NPS -41 in Citi (yes, that's negative 41). The average for all financial services is around +18. Apple, which has recently been making consumer credit cards and payments in partnership with Goldman Sachs, has +47 NPS. Given these numbers, traditional banks should be concerned about encircling a platform where digital platform companies that are already integrated into people’s lives and show a sense of confidence and dependence can continue to expand their services until they invade other offerings (for example, in this case, those proposed by existing banking institutions).

But let’s not take fintech companies into account. The Transferwise cheap money transfer application is known to have an NPS of +76.18, and paid activities such as money transfers and credit cards are the basis of a bank's profitability - it is more profitable than an investment bank or other sector, resulting in a larger share. venture capital investments.

Thus, we see that the convergence revolution is creating competitors on the left and right wings of the traditional banking industry, while at the same time dismissing tens of thousands of employees through the use of technologies such as artificial intelligence. The layoffs may be due to global market activity, Brexit, poor trading performance or other factors, but they will be possible due to digital convergence.

Eric Brynjolfsson, a professor at the MIT Sloan School of Management, predicts a 50 percent or more change in the workforce, similar to the industrial

revolution of the 1800s, due to digital disruptive technologies such as artificial intelligence. That is, while artificial intelligence can destroy a large number of jobs, it will also create a lot of jobs in new industries. With the advent of robots, robot repairmen will appear. The position of "Interactive UX Designer" didn't exist thirty years ago, and thirty years later, there will no doubt be jobs like "Quantum Communication Specialist" and other titles.

Convergence creates financial opportunities and the opportunity to benefit from robust financial services for almost half of the world's population. This also leads to large-scale disruptions in traditional financial services. In this book, we explore a number of topics that explain how, why, and in what direction an industry can develop. One of the key unifying technologies is a distributed notebook called a blockchain. In the next section, we will examine this technology at a high level.

Blockchain basics

The history of the blockchain, which we discuss in this chapter in terms of what it is and why it is interesting in terms of business and society, has been going on for decades. But first we will describe how blockchain computer systems are equivalent to a modest meal consumed by those who are unable to afford sausages, steaks (or, if vegetarian, other than Meat).

Sausage has a special place in the kitchen. Slightly gray, in the form of lozenges, consisting of one or more pieces of it, including fiberglass wall insulation, it is delicious with enough ketchup or horseradish or mustard, or perhaps three, the dry mixed residues requested for seasoning. . Unlike Haggis, the Scottish National Treasure, made from mutton pieces that no one wants to eat, can only be preserved when you put it in Scottish whiskey (when you read Robert Burns's poem "Appeal to Haggis") - a sausage. benefits from a food companion to be consumable.

Blockchain is like a technological sausage. This does not mean a database with special features that help solve certain problems and a new technology on its own. The individual components involved in creating a blockchain are how it receives new data, how it protects that data, and how that data is seen and made available. was a few years before its origin. , bitcoin blockchain. Like the meat scraps used to make sausages, these elements have been assembled into a blockchain that is of a new kind of importance due to both their composition and time. And to stretch the metaphor, properly seasoned it makes an elegant meal.

The financial form of blockchain, cryptocurrencies, has a market capitalization of about $ 250 billion at the time of writing; especially during the COVID-19 crisis, which proved the resilience of cryptocurrencies as common stock markets suffered. From January 1 to May 31, 2020, the Dow Jones Industrial Average fell 12 percent and the Financial Times 100 Index fell 20 percent, but the tokens sold generated 31 percent.

Blockchain has certain features such as immutability, distributed nature and consensus mechanism, which combine to create a digital assurance that the system will tell you the truth about your data. You don't have to rely on the guarantees of governments or banking institutions that did not trust anyone after the global financial crisis of 2008-2009. Instead, you can trust the technology.

What blockchain is

Blockchain is simply a database with interesting features that make it suitable for some applications that require trust and transparency. These include access to and sharing of financial systems, supply chain management, or even health information. Also known as a “distributed ledger” and noting what sets it apart from other types of databases, the blockchain provides a high level of assurance that your data has not been compromised by hackers or other malicious actors.

As described in detail in the Basic Blockchain, blockchain parts are born from a distributed computational movement. The concept was that when your computer was at rest, idle processor cycles were used for more than just running the screen saver that was once everywhere. Instead, in projects like SETI @ home, thousands of computers have failed to work on the incredible challenge of searching for extraterrestrial intelligence by analyzing radio telescope signals. It was a civic science, and it empowered the crowd to create a new mind; but it was also a programming hacker designed to solve a complex problem, for which the individual scientific laboratory lacked the resources to solve it and further manage it. In addition to the blockchain, we are seeing examples of bans on this distributed computational model today; It can be argued that the marginal computing industry, which is expected to reach $ 43 billion by 2027, was born as a result of a modest hack to find 24 small gray people.

Thus, the first important element of a blockchain is its distributed nature. Thousands of servers around the world are involved in computing the math that makes blockchain cryptographically secure. For this discussion, we will ignore other options for distributed notebooks, such as the R3 Corda. (The R3 Corda is not a technically pure blockchain, but a distributed notebook technology. To understand the difference, see https://www.r3.com/blockchain-101/.)

Space plays an important role in the history of blockchain. Another important component of how a blockchain works is how it decides how to receive new data into a database. The Byzantine consensus concept originated from SRI International to solve the problem of unreliable computers in space. As Douglas Adams writes, the universe is not only “big,” but it also contains a lot of radiation from sources like the sun, which doesn’t interact well with computer systems. A fault-tolerant model is required so that even if a single computer data is damaged as a result of radiation exposure, you can safely land your spacecraft.

As NASA designed and built America’s space fleet, it had to ensure that the computers on the ships were reliable. An elegant solution has been developed from

the experience of thinking about how to manage trust between a group of opposing generals in the ancient Byzantine Empire (correspondingly called the problem of Byzantine generals). The solution was to create a certain type of voting mechanism - even if you don't have to trust any generals, you can trust them to vote together. In the example of NASA, four identical computers were installed on the spacecraft, and three of them had to agree to confirm a certain confirmation. In the original blockchain mode, 51 percent of servers on a distributed network had to agree that something was real in order to be accepted as new information entered into the database.

This design means that a distributed network with a consensus mechanism for receiving new data means that the blockchain is cyber resistant. Unlike a centralized system, where a hacker who accesses a computer can change the data inside it with impunity, the blockchain requires the compromise of many different systems to enter new data. It is designed to withstand distributed attacks, which consist of a large-scale mobilization of computers attempting to invade the system from multiple points at once. The need for hacking-resistant information systems has increased in recent years, with cyber-hacking losses estimated to be $ 6 trillion by 2021.

Meanwhile, no one knows who Satoshi Nakamoto, the founder of the blockchain, is. "Who wrote Shakespeare's plays?" Like the question, it is of academic interest, but it doesn't matter today. Shakespeare also stole myths, customs, and structures from others in creating his masterpieces. We have Hamlet, we have bitcoin, so it doesn't matter functionally which hand authored the creation.

Another important component of blockchain durability is the use of Merkle trees. The basic premise is that as the blockchain grows, each new link in the chain is inextricably linked (and mathematically) with every link behind it. If, for example, your blockchain represents a financial book, you cannot change the

historical record (possibly for fraudulent purposes) without changing all the other records in the chain.

What blockchain is good for

A topical issue in the blockchain world is the identification of large-scale natural use cases. Areas like digital payments seem to be a natural use case, and others are exploring applications from aerospace to healthcare.

What limits the scale? Blockchain is a complex database. It typically uses multiple computer cycles to cryptographically protect the data load. While many things can be put on the blockchain, that doesn't mean they should be. In many cases, other forms of databases, such as a relational database (e.g., Oracle) or a large-scale unstructured database (e.g., Hadoop), are more suitable for data management, but blockchain technology some new iterations are historical constraints designed specifically to address this issue.

New technology is not an innovation unless it is applied to a scale problem. Hundreds of different uses have been put forward for blockchain. However, not all of them represent a large enough market opportunity or impact to justify investments in turning technology and technology infrastructure into a blockchain, and not all of them require a credible consensus that the blockchain provides. Over the last five years, there has been a lot of evidence of the concept to experiment with blockchain applications. What other useful apps are available besides Bitcoin blockchain?

Many believe that major financial systems will be rebuilt using blockchain. Active blockchain research and prototyping is underway in major trading markets such as Nasdaq, and the Suriname Stock Exchange has announced its intention to be the first in the world to sell blockchain-listed securities and serve the wider Latin American and Caribbean region. did. Unlike well-established "blockchain exchanges" that allow you to trade cryptocurrencies, Surinam actually wants to sell shares in its major companies). International payments and remittances,

traditionally domains of companies such as Western Union or SWIFT are being replaced by companies like Bitpesa and Ripple.

It should be noted that the government is taking action. Other governments have reacted negatively to Facebook's efforts to create a non-government digital currency and to link China's digital currency market to the creation of a digital RMB coin. are taking the digital currencies of the national and multinational central banks more seriously.

In addition to financial services, other domains promise: for example, supply chain management, where a network of interconnected market participants has confidence in the accuracy of the data and has false incentives must be. Eleanor Mitch, a former student at MIT Future Commerce, said two-and-a-half percent of aircraft replacement parts are counterfeit, endangering flight safety. “Donor patient consent” and better secure data management developed by companies like BurstIQ. Between 2021 and 2025, blockchain applications should see scale gain and acceptance in key corporate and government environments.

What blockchain could enable

If we go beyond the potential applications of blockchain, it will be interesting to explore what can happen with blockchain evolution. Taxes are automated, easing the time and cost burden of people and companies, reducing costs and friction for governments to work. Intellectual property rights for music or video domains can be managed automatically, with payments being made on a regular basis alongside consumption, which will likely allow for better protection of the rights of individual artists.

Blockchain’s distributed, unchanging, and transparent features can allow you to better manage every vote counted (and counted only once). Citizens ’confidence in the security and reliability of governance mechanisms could be increased. We can even allow for a broad-based plebiscite, which would allow direct democracy

in a way never seen since the time of ancient Athens (only this time women and poor people can vote).

Blockchain is still a mature technology. Its final evolution and most cases of use are yet to emerge, but should become clearer in the next few years. Basically, a blockchain database. But there's a bigger revolution around financial services than blockchain, and that's happening in the big data and AI world. The next section is devoted to this area.

Big data and ai fundamentals

What is "big data"? What distinguishes it from other data? When we talk about big data, we usually think that it has certain features that distinguish it from other types of data that do not require a complex set of methods and tools to process and understand. The characteristics of big data typically use the basic concepts of size, speed, and diversity.

Size: Large data, by definition, "large". A clear definition of 'big' is a moving goal as it continues to increase processing capacity and storage capacity. A few years ago, "big" data was terabytes. Then, petabytes. Now we are thinking about exabytes of data or 1018 bytes. One exabyte is equivalent to about 320 billion copies of the King James Bible.

Speed: Big data is fast changing data. The location of each resident of New York or Shanghai varies from minute to minute, as well as a high-volume data set. For every day in Brazil, individual credit card purchases are a fast-moving data set.

Diversity: High diversity is another measure of big data. Instead of repeating text or numbers of the same size that correspond to rows and columns, you can have a mixture of different unstructured data, such as video or free-form text.

The data provides the raw material for a specific type of AI known as machine learning. Speaking of AI, there are several different flavors. Artificial intelligence (AGI) is a machine that can think like a human and learn any new idea

or skill uncontrollably. We are, at least, many years away from the widely used AG - decades, according to some experts.

Other types of AI include the study of machines in which human knowledge is reduced to a set of discrete rules (if A, then B), expert systems and probability models iteratively self-improving. Systems such as Google search and voice software that allow you to call your bank and ask it a simple question (e.g., "What is my account balance?") Are built on machine learning algorithms. Machine learning is applied in many areas of institutional and retail financial services, from market forecasting to fraud prevention.

Part of Google's excellent performance for search is that its AI is trained in more than 1.2 trillion searches per year. This large amount of unstructured data has provided significant advantages for at least one particular Internet search application to create truly intelligent artificial intelligence (all of this information has helped Google with other applications, of course). Financial institutions also have significant advantages in creating new machine learning programs because they are able to use a wide range of data sets that are under their control or influence.

Big data and financial services

Lots of exabyte data (and soon more zettabytes, 1021 bytes) is being created by people who use credit cards, debit cards and mobile payment platforms like Apple Pay, Amazon Pay, Venmo and Alipay. These data streams are rich in information, including not only the location of the purchase transaction, but also the category of goods and services and the time of day and can show behavioral trends after total analysis.

The concept of using computers in the banking system has existed for a long time, but indeed the advent of ATMs in the 1960s and 1970s led to the application of information about consumer behavior from electronic devices in banking business strategy. For example, after installing Citi ATMs, people found that they

could withdraw money after work and on weekends, which is in contrast to the usual bank opening hours from 9:00 a.m. to 3:00 p.m. Data from the use of the ATM network has led Citi to increase branch hours and increase its business by using analytics. This, in turn, allowed Citi to communicate with its customers on other types of financial products, and the business grew rapidly due to its long history of operation, a practice that has spread rapidly in the traditional banking industry.

Mobile networks became widespread in the 1980s and 1990s. Over the next two decades, with the advent of high-speed data, we will see an explosion of information about people and their movements in and around cities, financial services. Africa is expected to have 600 million smartphones by 2025, and 35 with 1.2 billion mobile phone lines; even the least developed regions of the planet are now having some form of connection. With this connection comes the ability to understand human behavior and improve the delivery of financial services.

Institutional financial services have also benefited from meaningful innovations through the use of AI and big data. High frequency trading would not have been possible without sophisticated AI systems. Quantitatively managed investment firms such as Two Sigma, Renaissance Technologies and Bridgewater have brought huge returns to their investors by attracting armies of mathematicians and computer programmers to use big data analysis for the alpha generation.

Data quality

When we try to create quantitative models that interpret, analyze, or predict market price changes or individual consumer credit behavior, we rely on large data flows to support these models. When models are initially created, the basic assumption can be based on data, but the reality is usually very different.

The one large data set we were working on, which contained several terabytes of data, contained anonymous location information for mobile phone users. How fair. However, we did have some information, for example, that a man

was in the city for a minute, fifteen minutes later half a mile from the sea, and then suddenly returned to the city. Such a move would not be possible in the real world, at least not until we have commercial teleportation technology. Savvier creates interpolation and extrapolation systems to eliminate data gaps that may appear in the data to facilitate the development of data evaluation mechanisms and models to automate data quality assessment when data science groups are adopted.

Because AI systems are built and trained using big data, it is up to technology and business professionals to implement data quality verification and improvement processes so that the systems can respond better.

Social physics and unlocking potential

With the advent of widespread big data / analysis and improved AI systems, we have seen the emergence of new computational social sciences that offer many benefits to financial services. Social physics is a prime example of a new approach to understanding, predicting, and even changing human behavior on a scale. The basic idea is to use universal laws of human behavior, such as "long tails" in the distribution of behavioral variables, to explain data rather than attempting to model data using general-purpose models such as linear regression or neural networks.

For example, traditional lending relies on linear regression models offered by credit bureaus, which require three years of information and suffer from the "credit trap" that you must have credit to obtain a loan, which deprives 3.5 billion people worldwide of meaningful participation. in financial services. With social physics, we can theoretically improve credit modeling and credit behavior forecasting by 30-50 percent compared to credit bureaus, and we can do this with monthly data instead of thirty-six months (after model training) .This is a great opportunity to address the issue of financial inclusion in developing countries where most credit files are thin or not a credit file at all.

New ways are emerging to ensure data security and make data useful. The traditional method of data analysis is to combine all the data in one warehouse, in a

data pool, and then perform the analysis on them. Although it is convenient for the data analyst and the data can be deeper when the data is combined and shared, copying and centralizing the data is also very cyber dangerous. The OPAL Project (www.OpalProject.org) says that instead of bringing the data into the code, you bring the code into the data.

OPAL data is left atomized, they are placed in various secure repositories, and carefully tested algorithms are sent to each repository. These algorithms can take concepts. For example, you may have telecommunications information, bank information, and health information stored in various warehouses. Without copying from the data (which can be illegal in many settlements and posing a security risk in all cases), the request can be sent to any database instead, and the software is combines concepts into coherent information.

The ability to not only predict a wide range of people's behavior through the use of big data / analysis, but also to influence reality, raises ethical and moral issues. The introduction of these types of touch platforms in itself poses significant ethical and moral risks. The most extreme example is the social credit rating in China, where behavioral data from mobile phones and other communication networks are used to determine people's eligibility for credit, housing, travel and other aspects of community participation. China has chosen to share individual freedom for social stability. To a lesser extent, such mutual agreements are also found in a number of Western democracies. For example, the United Kingdom, particularly London, has opted for high-level surveillance in exchange for increased security, installing a network of closed-circuit television cameras on the streets and in vehicles. Germany, on the other hand, went for more personal freedom and weakened the ability of security services to quickly search for bad actors. Each of these societies has developed a set of value feedback on data ethics.

Ethics of big data and ai

As with most disruptive innovations, there is a difference between what we can and cannot do with a particular technology. The splitting of the atom led to its

ability to destroy millions of people in an instant, as well as its ability to power the whole country with clean energy and cure cancer. Commercially viable steam engines allowed military organizations to quickly deploy troops to occupy the area and support these troops with appropriate logistics, and they created transcontinental freight networks to revitalize trade and integrate culture. Big data and artificial intelligence systems also have terrifying capabilities that are used to the detriment of society, and they have enormous utopian potential.

In all of these decisions, the governor is the human moral foundation. When AI programmers create a system, what system do they choose to create and what restrictions do they place on it? When business or government or individual users use this AI technology, what do they choose to use it for?

Professors Luciano Floridi and Joshua Coles offered a solid ethical basis for designing and implementing AI. In it, they map five key concepts from a meta-analysis of thinking on the subject across forty-two countries:

1. Kindness (AI should do something good for us)

2. Inadequacy (AI shouldn't hurt in the process of doing something good for us; having a robust data privacy system is an example of evil)

3.autonomy (people have to make basic decisions and regulate how autonomous the AI is)

4. justice and fairness

5. comprehensibility (AI should not be a black box; AI should tell us how to make a decision)

This work and other similar research help developers of AI systems to create parameters that can incorporate ethics through design instead of trying to reversely assess whether a particular AI meets certain ethical parameters.

Regulation

Simultaneously with the discussion of data and artificial intelligence ethics, personal data such as the General Data Protection Regulation in Europe (GDPR) and the California Consumer Privacy Act in the United States new rules begin to emerge. The EU is also considering special rules on the AI and its ethical application, in addition to the protections enshrined in the GDPR. Regulators are actively consulting with the private sector, academia, and public interest advocates to establish meaningful rules for the application of big data and AI to financial services.

The most enlightened companies have active efforts to regulate. Instead of waiting for a mandatory letter from the regulator as their first contact with the government, these organizations have teams set up to share plans with regulators, proactively understand and address concerns, and build capacity among government agencies to develop new technologies. A regulator with more information.

Unsolved problems

While big data analysis has done a number of miracles in the financial services industry, a number of complex challenges remain:

- Large amounts of data do not have to be quality data. For example, credit bureaus are very bad at managing data, protecting data, and providing more meaningful insights. Correcting errors in a personal credit file can be daunting, highlighting poor data management.
- Big data techniques can improve the bureau's credit scores by 50 percent or more, but the ongoing lobbying efforts and regulatory arrests make it difficult to fire existing players.
- The introduction of big data technology for credit raises new questions. For example, Goldman and Apple have experienced public relations chaos since the launch of the Apple Card, with some accusing its data assessment methods of deliberately discriminating against women. Transparency is

another challenge for the industry, as new algorithmic credit models cannot be explained.

- Conducting a "Know Your Customer" check for a new customer can cost the bank from $ 13 to $ 130. This legally binding inspection is an attempt by the bank not to do business with terrorists or other prohibited persons. The accelerating trend in spending means that a number of financial institutions are abandoning inclusive actions and leaving certain markets known as derisking. The World Bank has described the mockery as detrimental to economic development in developing countries.
- Identification lies at the heart of another unresolved issue in data analysis, namely the final beneficiary (UBO). When opening a business account, the financial institution must identify not only who has a direct signature on the account, but also senior individuals who may be financially interested in the account. On a global platform, especially in emerging markets with high growth rates, this is a daunting task even for financial institutions with the best resources.

The set of problems presented in this chapter represents only a small fraction of the areas of potential innovation and entrepreneurship that can help address the needs of the financial services industry, consumers and businesses more broadly. Now that we have established the basics of financial technology, we can begin to explore use cases, applications, policies, and social implications.

Conclusion

Government should play an important role in the development of future financial services ecosystems. Thus, they help build the confidence needed for such ecosystems to thrive. However, this means that everyone in government must

accept the "digital transition". Regulators and other policymakers need to think more about what technology means, what they can do for us, and how they can help us build a better future. Doing nothing or limiting innovation is a worse option. This goal of supporting innovation often means rejecting and replacing old, formalized methods such as hierarchies, legacy processes, and regulated procedures. Instead, the "digital transition" leads to loose connections and relationships, more flexible forms of organization and activity.

Thus, regulators need to re-examine what it means to interact, transact, and be visible in a digital environment. They need to create their own brand, and government officials need to learn to think like entrepreneurs. Being creative and innovative in this way ensures that the "digital transition" creates more opportunities for everyone than it destroys. This includes existing financial institutions and new FinTech firms that are innovating in the sector.

There is no going back. There are good reasons to believe that the impact of next-generation technologies, particularly developments in artificial intelligence and automation, will be more significant than we have experienced. It is clear that digital technologies will play a central role in future financial services, but for these innovations to be successful, the government needs to be more "technologically literate" and more committed to making everyone socially responsible for technology.

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