This is a section of doi:10.7551/mitpress/13673.001.0001

Global Fintech

Financial Innovation in the Connected World

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Citation:
Global Fintech: Financial Innovation in the Connected World
Edited by: David L. Shrier, Alex Pentland
DOI: 10.7551/mitpress/13673.001.0001
ISBN (electronic): 9780262369534
Publisher: The MIT Press
Published: 2022

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The MIT Press

7 DIGITAL BANKING MANIFESTO 2.0

Alex Lipton, David L. Shrier, and Alex Pentland

> Banks are trying to be cool and hip and build super cool digital front ends. . . . But it's like putting lipstick on a pig—ultimately it's still a pig and the new front end is still running into an awful digital back end.
>
> —Mark Mullen, chief executive of Atom, Durham, United Kingdom

7.1 INTRODUCTION

We wrote the original version of the Digital Banking Manifesto in 2016 when the economy as a whole, including the banking system, was on the mend after the fairly traumatic experiences of the global financial crisis (GFC). We are updating the manifesto amid an economic crisis of arguably more massive proportions ignited by the COVID-19 virus. The GFC was a wasted opportunity to reorganize the world financial ecosystem. If history has taught us anything, it's that the current crisis will likely fall into the same category. Already in the midst of the COVID-19 crisis, digital banking technology adoption is accelerating all over the globe.

Yet, reform is badly needed. In the past decade, too-big-to-fail banks became bigger rather than smaller, massively increasing their share of the banking business. For instance, J.P. Morgan has nearly twice as many assets now as it had at

the end of 2006 just before the onset of the crisis; over the same period, assets of China's four systemically essential banks more than tripled. Although better capitalized, banking institutions have become so complicated that it is tough to ascertain their stability and creditworthiness with certainty. Their balance sheets are opaque and have complexity risks that are not well understood by regulators, depositors, investors, or even internal management. This complexity can reach high levels and may become too big to manage.

Moreover, in periods when large-scale lending is necessary (as it is at the moment), banks are not relied on; instead, central banks change their usual lender-of-last-resort modus operandi and become buyer-of-last-resort instead.

The general public's frustration with the status quo manifests itself in many ways—in politics, in general discourse, and, most directly, in the incredible rise and more recent fall of bitcoin and other cryptocurrencies. However, not all is lost. The introduction of new technologies is unleashing competitive threats to the existing players and will reshape the entire financial ecosystem. In our estimation, the following areas will see the fiercest competition: (1) fractional-reserve banks versus narrow banks, (2) digital cash versus physical cash, (3) fiat currencies versus unpegged cryptocurrencies versus asset-backed cryptocurrencies, (4) centralized payment systems versus distributed payment systems, and (5) centralized identity versus decentralized identity.

We are entering a new era of innovation that will reshape consumers' relationships with their banks. To understand how banking will evolve in the digital age, we need to understand its basic premise. While reasonable people can disagree about nuances, at heart, the art of banking is one of skillful record keeping in the double-entry general ledger. At the micro level, banks can be thought of as dividend-producing machines seeking deposits and issuing loans. At the macro level, they are creators of credit money.[1]

The main determinants of banks' quality and reliability are the amount of capital and the level of liquidity (mostly central bank money and government paper) they keep. In general, a bank would like to maintain the right levels of both—if it has too little, it becomes fragile; if it has too much, it becomes unprofitable and hence unable to fulfill its purpose of paying dividends. Some of the loans issued by the bank will be repaid as expected, and some will default. In general, when loans are repaid, the bank's capital grows; and when they default, the bank's capital diminishes. If the bank's capital falls below a certain fraction of its risk-weighted assets, the bank defaults. This setting is the premise behind a fractional-reserve bank. However, in principle, one can build a bank with assets comprising solely marketable low-risk securities and central bank cash in the amount exceeding its deposit base. Short of operational failures, such a bank cannot default and is by far more resilient than its fractional-reserve brethren.

Banking as we know it originated in the High Middle Ages and blossomed during the Renaissance and the early modern period, mostly in the form of fractional-reserve banking firms, which were naturally prone to collapse. On occasion, legislative attempts to convert banking from fractional reserve to narrow style have been undertaken—for instance, in Venice and Amsterdam. Over time, banks became much narrower than they had been, or are today. During the nineteenth century, British and American commercial banks, pursuing their self-interests, followed the real bills doctrine (where they only issued currency fully backed by hard assets), and in harmony with that approach lent predominantly for short maturities. Bank loans financed mostly short-term working capital and trade credit, with maturities of two to three months, and were collateralized by the borrower's wealth or the goods in transit. After the creation of the Federal Reserve Bank in 1913, commercial banks drifted away from the real bills doctrine. They started to lend for much longer maturities and instituted

revolving lines of credit for some of their borrowers, thus sacrificing prudence and overemphasizing their maturity transformation ability. The Great Depression of 1929 showed the inability of the banks to meet their obligations successfully, which pushed the idea of a narrow bank to the fore.

The practical conversion of fractional-reserve banks into narrow banks did not occur in the 1940s, owing to enormous political pressure from fractional-reserve banks, not to mention a need to boost inflation in order to evaporate the war debt. However, the idea has stayed close to the surface. It gained considerable popularity during and after the savings and loan crisis of the 1980s and 1990s, and, not surprisingly, it became prevalent again during and after the GFC. We show below that technological developments make the creation of narrow banks an attractive and highly desirable possibility.

Good bankers differ from bad ones by their ability to attract a large pool of reliable borrowers, so that default levels stay close to their expected values. (Some defaults are inevitable and are accounted for by charging interest.) At the same time, good bankers need to attract long-term depositors and serve them well so that depositors do not suddenly withdraw their deposits. If the latter were to happen, the bank could exhaust its liquid reserves and default through a different route. In principle, if its less liquid assets are sound, the central bank, which is called the lender of last resort for a reason, can come to the rescue and provide additional liquidity. It is clear from the above description that banking activity is mostly technological and mathematical. Hence, it is well suited to be digitized.

Yet, the prevalence of legacy systems and legacy culture inhibits banks from embracing innovation as much as they should, if they wish to survive and thrive in the digital economy of the twenty-first century. The root causes of banking malaise are not difficult to understand—traditional banks are far behind the latest technological breakthroughs; they

also have a weak handle on the risks on their books. While most industries, including retail, travel, communications, and mass media, have undergone revolutionary changes in their business models over the past thirty years or so, banking has remained static at its core, living on its past glories and ignoring the winds of change. Existing banks suffer from numerous drawbacks because competition among them is relatively weak.

Moreover, their customers are generally not happy with the level of customer service they receive. In addition, customers are at risk of losing their deposits (above and beyond the regulatory guaranteed minimum) should their bank default. Zero or negative deposit rates, which became prevalent in most developed countries in recent years, make keeping money in the bank both risky and unprofitable. Yet, at present, customers do not have viable alternatives. And there are whole strata of people and small and medium-size enterprises (SMEs), especially in developing countries, that are either underbanked or unbanked, since traditional banking methods are not flexible enough either to solve the "know your customer" (KYC) problem for them or to assess their creditworthiness.

7.2 CURRENT FINTECH TRENDS

Numerous fintech trends will shape the emerging banking landscape over the next few years. Fintech start-ups build their businesses based on banking application programming interfaces (APIs); partner with banks, which allows them to act as ersatz banks; differentiate themselves by offering an ever-expanding basket of retail banking products and services; and change their modus operandi from being unbundlers of banking services to becoming aggregators of these services. Large social-media-oriented platforms want to build or expand their fintech companies. Finally, large financial institutions want to develop their fintech capabilities so that they can compete

with both small but agile fintech start-ups and tech heavyweights. New digital-asset-centered banks will begin to appear.

The emergence of open banking legislative initiatives greatly facilitates these developments. Open banking is a reality in Europe, and it is gradually taking hold in the rest of the world as well. Relying on the new legislation, fintech companies can create plug-and-play APIs, which leverage open financial data. Previously, each bank held its own consumers' financial data, while at present, consumer financial data held by different financial institutions is callable via a single API. The ready availability of this data is creating new competition for the incumbents by allowing fintech companies to use such APIs as building blocks for their emerging business models.

Thanks to new developments in data technology and mobile telecommunications adoption, we see the potential rise of an unstoppable third wave of innovation in banking. We will outline the key features, benefits, and strategic imperative of the digital bank of the future (DBF).

To understand the opportunity that is promulgating this third wave, we explore the first two waves of digital innovation in banking.

7.3 FIRST-WAVE COMPANIES: DIGITAL INCREMENTALISTS

Digital technologies have been used in the banking industry for years. They have been added incrementally to existing operations, either as an overlay or as a minor extension. We term these the "incrementalists" or first-wave companies.

In the mid-1970s, Citi began experimenting with the automated teller machine (ATM). Former MIT chairman John Reed led the development of Citi's efforts in this area, revolutionizing retail banking. The story of the ATM is a landmark study in corporate innovation.[2] The concept was simple: deploy machines that could process transactions such as cash

withdrawals and check deposits. What was revolutionary was what followed. Banks historically had limited business hours, such as from 9:00 a.m. to 3:00 p.m., which was inconvenient for people who worked from 9:00 a.m. to 5:00 p.m. However, in the 1950s, most households in the United States had a single earner, and the stay-at-home wife was able to handle banking needs during the day. Mapping to a behavior change in society, as more and more women entered the workforce, the United States saw a rise in two-income households, and thus fewer people could take advantage of daytime banking services. Thanks to electronic banking, executives could see exactly when people used banking services. Evening use of ATMs surged. Banks in turn began extending their hours into the evening to accommodate the working professional. By 2014, there were 524,000 tellers in the United States, up from 484,000 in 1985.[3]

Online banking, likewise, was piloted in the 1980s by Citibank and Chemical Bank, through Minitel (France) and Prestel (United Kingdom), but didn't take off until the 1990s in conjunction with soaring internet usage. Simple browser-based tools gave consumers access to many principal banking transactions, such as money transfer, bank statements, and electronic bill payment. While the incumbent commercial banks initially were the purveyors of online banking, the rise of the internet also saw the appearance of the internet bank—most prominently NetBank in 1996.

7.4 SECOND-WAVE COMPANIES: DIGITAL HYBRIDS

We term the second-wave companies, like NetBank, as "digital hybrids." Frequently taking advantage of front-end systems to better market to and connect with consumers, they remain shackled by legacy back- and middle-office infrastructure, risk modeling systems, and sometimes labor models. Often these

hybrid banks will have an incumbent bank as their back end. For example, Simple Bank, which was founded in 2009, introduced many innovations to streamline account management and costs but uses Bancorp as the back end. Other emergent hybrid banks, such as Fidor Bank (Germany), Atom Bank (United Kingdom), LHV Pank (Estonia), and DBS Digibank (Singapore), enjoy a purpose-built IT infrastructure that is 60–80 percent less expensive to build and 30–50 percent less costly to maintain than that of legacy banks. Head count is also considerably lower, about 10–15 percent of the levels of a traditional bank. However, these digital hybrids still use centralized databases, cloud-based storage, and primitive user data protocols. They represent a bridge solution between the Main Street bank of yesterday and the fully digital bank of the future.

7.5 THIRD-WAVE COMPANIES: DIGITAL NATIVES

A new set of technologies is emerging that facilitates close integration with consumers' lives. These technologies promise access to financial services for the 2.5 billion unbanked or underbanked consumers globally.[4] They also offer greater financial flexibility to the over 45 million SMEs around the world that are currently underbanked.[5]

DBFs will take advantage of these technologies and will be designed around the needs of digital natives—the fifty-and-under crowd who grew up with computers as a part of their daily lives. For the millennials, a mobile-first strategy will drive ease of access and rapid adoption through seamless integration with their lives.

Taking a breakthrough approach to data security, DBFs will eschew a central data repository, easily attacked, in favor of a secure, encrypted, distributed data system. Personal data stores permit not only better digital wallets but also greater security around personal biometric data, which is integral to the digital bank's security protocols.

The new technology paradigm prompts the question: What role do banks genuinely have in the new world? Have we reached the end of banks in the way we know them? Is it possible that fractional banking is on its last legs and the introduction of government-issued digital cash, which can be stored in a digital wallet outside the banking system, will put the final nail in its coffin?

We will now look at the essential requirements for a digital bank from three perspectives: customer, investor, and the bank itself.

7.6 KEY REQUIREMENTS FOR A DIGITAL BANK: CUSTOMER PERSPECTIVE

The consumer's view of the digital bank is shown in figure 7.1. At a minimum, on the retail side, the DBF should be able to offer the following:

1. *Holistic and customizable experience*. Provide a holistic, interactive, and intuitive overview of the customer's money and, more broadly, their financial life, including information on their current account and deposit balances, transactions, outstanding loans, recurring payments, pension contributions, and accumulation as well as securities accounts. Tailor its services for different customer segments such as small and informal merchants, mass affluent, youth market, international travelers, or low-income customers. Offer a trusted and relatively inexpensive source of credit for its customers.
2. *End-to-end digital*. Provide a holistic, fully digital experience for customers, including paperless application and passing of the KYC process. Also, provide an interactive and intuitive digital financial planner to organize customers' economic lives and optimize their resources: immediate cash flow requirements, savings (including tools for automatic

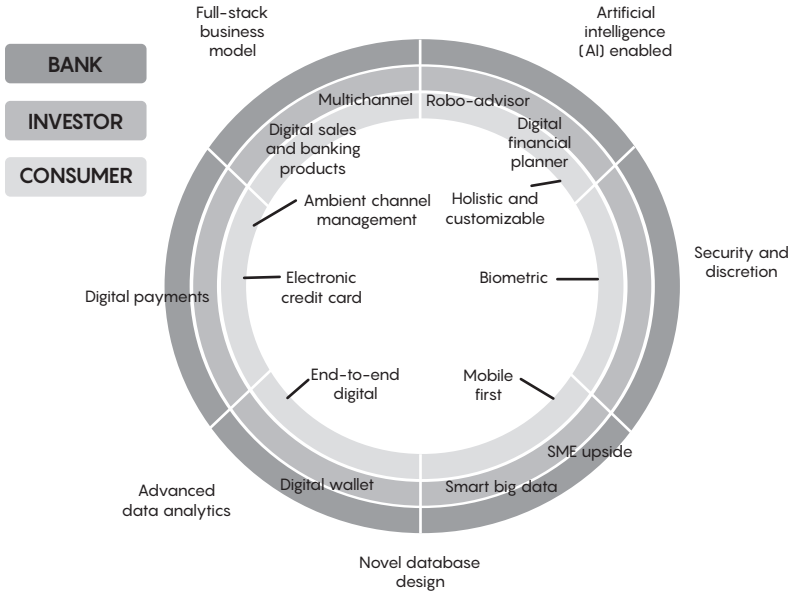

FIGURE 7.1
Consumer's view of the DBF.

savings), medical expenses, education, retirement (including robo-advisory with services previously available only to high-end investors), and investments, including tools for trading securities. Empower customers to electronically apply for a mortgage or loan. Offer competitive insurance contracts for home, liability, medical, and travel insurance, with credit checking procedures expanded to social media. Provide reporting documentation related to bank activity, including tax statements. Provide access to personal data store (PDS).

3. *Mobile first*. Enable natively driven mobile e-payment solutions, including domestic and international payments and remittances, automatic bill payments, and peer-to-peer (P2P) payments and money transfers. Rather than having mobile as an afterthought or an added capability, start with

mobile and build out from there—not just user experience but fundamental infrastructure and credit analytics.

4. *Foreign exchange services*. Deliver seamless and inexpensive foreign exchange services, including protection against exchange rate fluctuations, by providing multicurrency accounts. Potentially, a full range of instruments for hedging against foreign exchange risk, including forward contracts, spot contracts, swaps, and exchange-traded options, can be offered.
5. *Digital assets*. Offer efficient tokenization, handling, custody, and storage of digital assets.
6. *Biometrics technology*. Offer biometrics technology such as face and voice biometrics, already actively used at airports and international border controls, to customers as a way of logging in to their accounts. Behavioral biometrics, which is being developed at the moment, is a promising avenue for achieving an extra degree of protection.
7. *E-credit card*. Implement bank e-credit card based on customer preferences with preset limits and permitted transactions, consumption-related patterns, and a comprehensive digital wallet and PDS, which includes, at the minimum, electronic ID, e-card for secure online purchases, and tools to view, pay, organize, analyze, and archive e-bills and generate relevant tax documents.
8. *Access to P2P world*. Provide access to "crowd-everything," including P2P payment and lending opportunities.

7.7 KEY REQUIREMENTS FOR A DIGITAL BANK: INVESTOR PERSPECTIVE

A digital bank is an exciting investment opportunity and an inevitable business step because legacy banks are no longer able to adequately service their customers' needs in the digital age. Customer requirements simply cannot be met by traditional banks unable to catch up with the digital revolution.

With neither real estate overhead nor massive maintenance spending on legacy IT systems, digital banks expect to grow multibillion-dollar balance sheets in several years of operations with a fraction of full-time staff compared with traditional banks. For instance, Atom Bank in the United Kingdom intends to grow into a £5 billion balance sheet business in five years with just 340 full-time staff, while legacy bank Metro has that size balance sheet with 2,200 people. It is clear, however, that the majority of digital banks' personnel will be engineers and data scientists, although, as always, the role of sales and marketing should not be underestimated.

Monetization and capturing value are of paramount importance for investors. Compared with legacy banks, digital banks can generate value in numerous ways:

1. *Digital payments*. Digital payments form the core of monetization. They include mobile and online payments, both domestic and foreign, as well as mobile P2P interactions. Digital payments enable banks to boost fees and interest income and reach a broader set of customers with more diverse services; digital banks can process digital payments more cost effectively than incumbent banks can, allowing market share gains through competitive pricing and accessing the 2.5 billion unbanked and underbanked.
2. *Digital wallet*. Digital wallet is essential for digital commerce and ecosystems built on value-added services. In addition, it optimizes transaction costs for customers and funding costs for banking operations.
3. *Digital sales and banking products*. AI-assisted sales of banking products, such as deposits, loans, and mortgages, are conducted through direct channels, including social media. This is in line with shifting consumer preferences and behavior trends in e-commerce, mainly directed at Generation Y and tech-savvy customers.
4. *Multichanneling*. An integrated and seamless multichannel approach to sales increases the bank's share of customers'

wallet and boosts customer loyalty, thereby making a significant difference in customer adoption rates.

5. *Digital financial planner and robo-advisory*. An AI-based digital financial planner manages monthly income, recurring payments, savings, and investments, increasing the interaction between the digital bank and customers. The bank acts as a trusted shepherd defining customer life-cycle financial needs. This represents the logical continuation of the circle of trust between the digital bank and customers. In this model, customers rely on robo-advisory services to optimize investment portfolios based on individual goals and preferences, regularly adjust them and record incremental results, and properly allocate resources for each phase of the customer's voyage toward all things digital.
6. *Smart big data*. Advanced analytics allows the digital bank to transform its data into more personalized client service aimed at data monetization.
7. *SME emphasis*. AI- and big-data-based credit models enable risk-managed provisioning of credit access to SMEs, banking the 45 million underbanked SMEs globally. As of 2018, banks in Scandinavia, the United Kingdom, and Western Europe were forecast to have half or more of new inflow revenue coming from digital-related activities in most products, such as savings and term deposits, and bank services to SMEs.[6]

7.8 KEY REQUIREMENTS FOR A DIGITAL BANK: BANK PERSPECTIVE

> Banks are mired in the legacy of old IT systems that are bad. . . . Coutts introduced the first automated banking system in 1967. The joke is that they are still running on it today.
>
> —Anthony Thomson, founder, Atom Bank

Banks are not unique in their use of legacy systems. For instance, the US nuclear weapons force still relies on a 1970s-era computer system and 8-inch floppy disks.

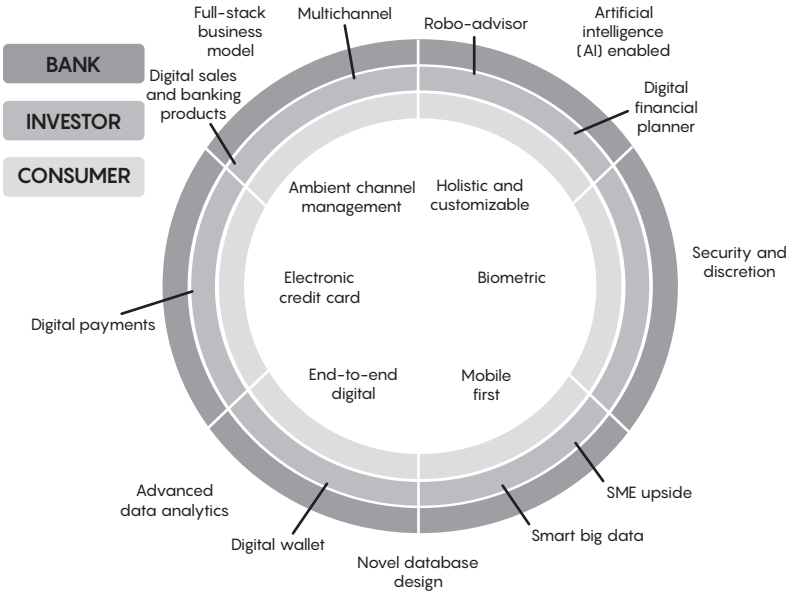

FIGURE 7.2
The investor's view of the DBF.

Note the investor's lens on the digital bank, as illustrated in figure 7.2. By its very nature, a digital bank has to be a cross between a fintech company and a bank. While a digital bank, similar to a conventional one, can be organized into five divisions (retail banking, private and business banking, analytics and IT, finance management and operations, and risk management), the relative importance of these departments is not the same. Moreover, the relationship map between various divisions is different in digital and legacy banking, with analytics and IT being the cornerstone of the digital banking edifice. In general, the success or failure of a bank is measurable by technologies and analytical methods adopted, such as the following:

1. *Novel IT infrastructure*. Building a digital bank from scratch enables creation of a flexible IT infrastructure, which

provides state-of-the-art risk management, helps optimize the bank's balance sheet to achieve a return on capital that is significantly higher than that of incumbents, and guarantees compliance with continually changing banking regulations in real time, which is achieved via building modern regulatory technology capabilities.

2. *Database design*. A digital bank's IT is based on state-of-the-art database technology, which can cope with the exponential growth in data, new internet technologies, and analysis methods. This technology uses a distributed ledger framework.
3. *Advanced-data analytics*. Since banks own abundant reserves of raw behavioral data, which can provide valuable insights into future customer choices, the value proposition offered by digital banking can be extended. Following the example of internet powerhouses such as Google, Amazon, Alibaba, and Facebook, the bank should consolidate data across deposits, consumer finance, and other transaction accounts for a unified view of customer activities. For instance, customers' in-store payments are far more accurate than conventional profile data (e.g., age, income, geography) in predicting their future financial activities and creditworthiness. Customers' geospatial mobility among stores provides further improvements. In addition, by using customer data, digital banks can create offerings ranging from payment solutions and information services, savings, and deposit-taking right through to online banking, advisory services, and simple financing. It is imperative to evaluate collected customer transactions in real time and connect them for prediction of future customer behavior using deep learning and other probabilistic algorithms. It is essential to build in safeguards of customer privacy per their preferences and legal requirements.
4. *AI*. Autonomous selection of the best methodology, when presented with arbitrary data, enables banks to adapt to novel information and dynamically build a full financial profile of their customers, including creditworthiness, debt

capacity, and risk appetite for financial planning. Additionally, AI can rapidly adapt to customer needs and present the best offers at the right time, changing dynamically as the customer evolves. A *smart bank* can more quickly capitalize on shifts in a customer's life cycle and help the customer achieve their financial goals.

5. *Full-stack business model*. The full-stack business model is crucial to the total client experience. This approach facilitates the bank's compliance with the regulatory framework, which enforces the prevention of money laundering and fraud and guarantees customers' protection. In general, intelligent fraud detection and remediation systems can function in a far more superior fashion than conventional methods.
6. *Security and discretion*. If implemented correctly, bulletproof security and customer protection offer digital banks a significant competitive advantage over other financial services providers. These features are embedded in a secure IT architecture from the onset and preclude both data misuse and data sales to third parties. They naturally include the implementation of new cryptographically secured distributed data management.[7]
7. *Distributed ledger*. Using the distributed ledger reduces financial transaction costs, improves the resilience of the system as a whole, and mitigates operational risks. Without a doubt, the distributed ledger will become intertwined with the operational procedures of a digital bank and its interactions with other digital, legacy, and central banks.

7.9 DIGITAL CUSTOMER SEGMENT

A digital bank must be able to attract enough customers to be viable in the long run. According to a recent consumer behavior survey, 43 percent of respondents would consider moving their money to an independent digital-only bank, 5 percent have already done so, and 52 percent are not ready yet (the

bank's view of the digital bank is shown in figure 7.3).[8] Digital banks have several natural constituencies in both developed and, especially, developing economies:[9]

1. *Professionals*. Consumers with at least an undergraduate college education.
2. *Middle classes*. Digitally educated middle-upper and mass-affluent professional and managerial consumers.
3. *Digital banking natives*. Gen Y (students and young professionals in their twenties and thirties) individuals, who are exceedingly digitally savvy. They will form the foundation of the customer base for the digital bank.
4. *SMEs*. SMEs that go mainstream using a digital banking platform designed for their needs, potentially banking 45 million underbanked or unbanked SMEs globally.[10]

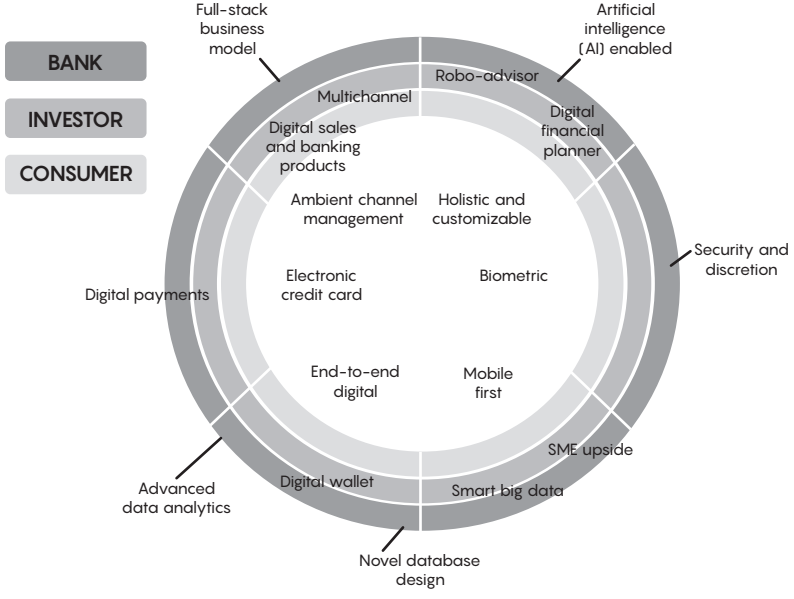

FIGURE 7.3
The bank's view of the DBF.

7.10 UNLEASHING DIGITAL CURRENCY

Digital banking of the future is unimaginable without using digital currency.[11] Currently, both central and private banks are actively pursuing the creation of digital currencies. Some considerations for this dimension can be summarized as follows:

1. *Nonbank digital currencies*. While the best-known digital currency is bitcoin, its low-transactions-per-second capacity makes it unsuitable for high-volume transactions. Thus, other digital currencies based on consensus achievable by means other than proof of work will be used in digital banking. One should not forget that bitcoin is not the first digital currency to emerge, nor will it be the last. Digital cash, invented by David Chaum more than thirty years ago, is likely to make a comeback at the next level of efficiency.
2. *Central bank digital currencies*. Several central banks are investigating whether a state-backed digital currency could reduce capital outflow, money laundering, and tax evasion and make economic activity more transparent and efficient. For instance, People's Bank of China, the Bank of England, and the Bank of Russia are all actively looking in this direction. In this scenario, the "free" (or inexpensive) deposits that commercial banks have been benefiting from will evaporate.
3. *Private bank digital currencies*. The idea of banks issuing currency by themselves is ancient, as dozens of banks in the United States were doing so in the nineteenth century. Advances in digitization have made this idea viable again. For example, the bank of Tokyo Mitsubishi UFJ (MUFJ) is developing its digital currency, MUFG coin, and the corresponding smartphone application prototype to authenticate digital tokens on a P2P platform. The bank expects to rein in financial transactional costs, including cheaper international remittances and money transfers. Moreover,

in the future, the bank might potentially issue its digital currency to customers.[12] Similar motivations are behind the development of the JPM coin.

4. *Stable coins*. While the term "stable coin" is self-explanatory to some extent, there is a need for a precise definition. The European Central Bank offers an attractive one: "[Stablecoin are defined as] digital units of value that are not a form of any specific currency (or basket thereof) but rely on a set of stabilization tools which are supposed to minimi[z]e fluctuations of their price in such currency(ies)."[13] These coins are a natural answer to the inherent volatility of non-bank digital currencies and can serve as a much-needed tokenized medium of exchange.[14]
5. *Trade coins*. Trade coins are a particular type of stable coins backed by assets. Such coins were envisaged by a team of MIT researchers in the Connection Science group in 2018.[15] The MIT Connection Science team proposed a practical mechanism combining novel technological breakthroughs with well-established hedging techniques for building an asset-backed transactional oriented cryptocurrency. They showed that in its mature state, the digital trade coin could serve as a much-needed counterpoint to fiat reserve currencies of today, which are routinely manipulated by central banks. Subsequently, the creators of Libra liberally used the main elements of the MIT design for their coin.[16]

7.11 NARROW BANK

Earlier we mentioned an attractive concept of a narrow bank,[17] and in this section we discuss it further. The main characteristic of a narrow bank is its assets mix, including solely marketable low-risk government securities and central bank cash in the amount exceeding its deposit base. By construction, such a bank can be affected only by operational failures.

State-of-the-art technology can minimize, but not eliminate, operational failures, thus providing a maximally safe payment system. As a result, deposits held at a narrow bank are functionally equivalent to currency, thus abolishing the need for deposit insurance with all its perverse effects on the system as a whole, including, but not limited to, the associated moral hazards.

This fact makes narrow banks ideal emitters of fiat-backed and asset-backed tokens. Indeed, the only way to keep a one-to-one parity between the fiat currency and digital tokens is to keep the exact amount of the fiat in escrow. However, one cannot put the requisite amount in a fractional-reserve bank and expect it to be safe at all times. Thus, one has to either use a narrow bank or open an account directly at the central bank. A central bank, while happy to accommodate licensed banking institutions and a small, select group of trusted nonbanking financial firms, such as central clearing counterparties, cannot and will not allow a broader range of corporate or individual participants (particularly if they wish to be anonymous) to have an account with them. There are several reasons for this, including, but not limited to, being unable to solve the KYC/AML (anti–money laundering) problem, not to mention potential political complications.

Narrow banks will be key ingredients of the financial ecosystem of the future. In the buildup to the GFC, banks simultaneously reduced their capital ratios and chose a progressively riskier asset mix in an effort to stay as leveraged as possible. However, after 2008, their group behavior changed dramatically, and banks became much narrower than before. At the same time, the Federal Reserve radically altered its modus operandi by massively expanding its balance sheet. Recent dramatic events caused by the COVID-19 pandemic accelerated the Federal Reserve transformation even further. We are observing exciting and somewhat perplexing developments: until the onset of the GFC, central banks were narrow banks,

and commercial banks were fractional-reserve banks; while after the crisis, the situation almost completely flipped.

A suitably designed narrow bank is a natural repository of funds for those who highly value their funds' stability (either by predilection, such as wealthy individuals and organizations, or by necessity, such as central clearing counterparties). Besides, the narrow bank, being a neutral custodian, can provide value-added services and be a beneficial source of digital identity.

If banking institutions all become narrow, then credit creation will be performed by lending affiliates and other lenders—for instance, mutual funds or hedge funds, which will become money creators of the future.

In fact, after the GFC, a considerable portion of the credit has been issued by nonbanks, while many banks keep massive excess reserves with central banks, thus becoming de facto more narrow and reducing their money-creation capacities. Incumbent fractional-reserve banks can become much more cost-efficient, agile, and stable by splitting themselves into transaction-oriented narrow banks and lending affiliates (fractional-reserve banks and narrow banks are compared in figure 7.4).

After this transformation, narrow banks can use technological advancements such as distributed ledgers technology and AI to provide excellent transactional banking services and compete with transactionally oriented fintech start-ups. At the same time, uninsured lending affiliates of narrow banks, unencumbered by the requirement to offer utility-like transactional services, can better serve the needs of the real economy by providing traditional as well as innovative credit financial products. Given that lending affiliates would not be able to draw cheap sources of funding in the form of deposits, they would have to maintain healthy capital cushions and choose the quality of assets that align with their risk appetite, thus attracting savings and other types of funding from investors.

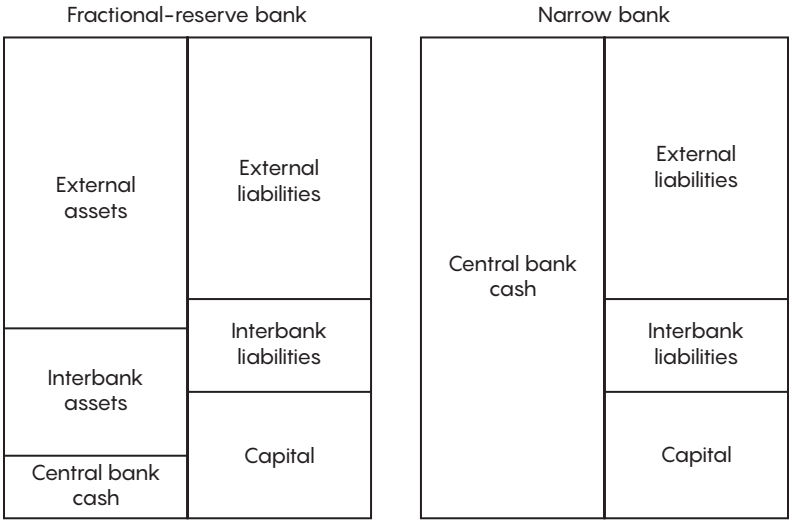

FIGURE 7.4
A fractional-reserve bank versus a narrow bank. The difference is in the choice of assets.

Lending affiliates would be naturally stratified depending on the level of their speculative activities, have skin in the game, and be open to scrutiny by their investors. Thus, splitting fractional-reserve banks into narrow banks and lending affiliates would increase the investment value of both enormous energy releases caused by nuclear fission.

7.12 SHAPING ECOSYSTEMS

It is natural to expect that a well-designed digital bank will become the cornerstone of a much bigger financial ecosystem—or even a set of interconnected ecosystems. As critical constituent parts of such an ecosystem, digital service providers can be thought of as insurers, brokers, wealth managers, robo-advisors, credit card issuers, cross-border payment providers,

currency exchanges, and P2P lenders. The ability of these companies to satisfy the financial needs of their clients will be significantly enhanced by their access to a broader financial system through the digital bank. At the same time, the bank will benefit by getting additional information about customers' demands and habits, thus closing the information feedback loop. It is necessary to provide customers with proper privacy safeguards.

Moreover, digital cash issued by the bank can serve as a lubricant allowing the wheels of commerce to spin faster and much more efficiently than is currently feasible. It is possible to imagine a DBF in the center of the internet of things, which can be thought of as the bank of things. For instance, if a bank's client informs him or her that the roof needs repairs, the bank can immediately recommend several contractors, organize bids, help the client choose the most suitable one, and arrange to finance it. Thus, in addition to financial businesses, a DBF can incorporate various nonfinancial actors into its ecosystem. All these developments will enhance the social utility of the bank and its appreciation by the public while at the same time increasing its profitability. Banks have to keep in mind that there is no time to lose, because the competition for their customers' digital wallets from current digital champions Google, Amazon, Facebook, and Alibaba will be fierce.

7.13 BEYOND BANKS

The unsatisfactory state of affairs with existing banks presents a unique opportunity to build a digital bank from scratch. Such a bank will fulfill its mission by utilizing the most advanced technologies, including cryptography and distributed ledger techniques, AI, big data, and deep learning. From the very beginning, it will be based on balance sheet optimization; deployment of digital, distributed ledger–inspired infrastructure; and comprehensive automation and digitization of the

middle and back office, as well as heightened security employing the most advanced cryptographic techniques throughout the entire organization. By design, this bank will be highly efficient, profitable, and agile. And its infrastructure will be flexible enough to handle both private digital currencies (such as bitcoin) and potential government-issued currencies (such as Britcoin). If so desired, this bank will be capable of issuing a digital currency by itself. The bank will liberally apply AI and big data analytics to create an unparalleled customer experience, automate personal and SME credit issuance, and improve risk management. By design, such a bank will be valued by investors, customers, and regulators alike.

And yet, by building such a bank, are we trapped in the old paradigm? If you look at WeChat or Sesame, you will see what is scaring the C-level of even leading-edge companies like Facebook and Google, to say nothing of the fright induced at leading telecommunications companies. Perhaps surprisingly, many legacy banks seem to be more sanguine. WeChat is redefining what financial services means in relation to the broader suite of consumer services with which individuals engage.

The key is to have customer-centric data across all areas of life, which is held in a standard format with standard APIs that work across the entire digital ecosystem and not just its financial services or products corner. (In this way, it is like a universal PDS, but customers don't own or manage the data; the PDS does.) Using this central, panoptic data, WeChat can integrate services from the range of life opportunities (e.g., entertainment, work, finance, family) seamlessly and consistently. This gives customers fully integrated payments, credit and banking, unbelievable advising capability, and amazing KYC/AML, all in a completely transparent form. Users just wander around online and in person, find exciting things, and buy, sell, and trade seamlessly. WeChat and Sesame are also integrating health, lifestyle, and employment services with money services and are doing so completely transparently, with no

separate apps or web pages. Consumers can just take care of those things that will help them live better lives. However, this is conditional on consumers' ability to secure credit as necessary. Given the somewhat uncertain and limited capacity of P2P networks to provide credit, digital banks have to come to the rescue.

A similar future is unfolding for SMEs: customers are shepherded to buy, and money-flow issues like credit, payments, and KYC/AML are almost nonexistent. WeChat reportedly reached over 1 million SMEs integrated into its services in the first few months of operations.

Is there a future that is effectively one where there is "no banking" versus "digital banking"? Instead of having digital banking as a discrete service, banking functions are just integrated invisibly everywhere. Several immediate challenges come to mind with this model:

1. *Money creation*. Because of the exclusive and unique role of banks in credit money creation, nonbank actors simply do not have the necessary capacity to satisfy the financial needs of their customers.
2. *Regulatory constraints*. There are numerous constraints around offering banking services that may be too limiting for companies in western Europe and the United States. If China begins to adopt more restrictive financial regulations to better protect consumers, these regulations will also create a less hospitable business environment for these kinds of services.
3. *Stock market pressure*. Will WeChat (or the next WeChat) want to take its high-flying tech stock market multiple and burden it with a financial services discount?[18] The more successful it becomes at financial services, the more acute this question becomes. However, if the financialization of a tech company is done in a deliberate and measured way, it can increase the shareholder value.

Despite these challenges, is there a model that we could call "invisible banking" that integrates into our daily lives without friction? The answer is yes and no—the legacy banking model will unquestionably disappear over time. Some believe that the integration of artificial intelligence into cryptocurrency could provide a pathway to this invisible banking future (DeFi, or decentralized finance); others believe that Big Tech, such as Amazon, Apple, or Ali Baba, will facilitate it and profit from it. Still, in the transition period, digital banks will have a role in daily life as transaction lubricants and enablers.

NOTES

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18. It is possible that both tech premium and financial discount are temporary in nature.

The MIT Press would like to thank the anonymous peer reviewers who provided comments on drafts of this book. The generous work of academic experts is essential for establishing the authority and quality of our publications. We acknowledge with gratitude the contributions of these otherwise uncredited readers.

This book was set in Stone Serif by Westchester Publishing Services, Danbury, CT.

Library of Congress Cataloging-in-Publication Data

Names: Shrier, David L., editor. | Pentland, Alex, 1952– editor.
Title: Global fintech : financial innovation in the connected world / edited by David L. Shrier and Alex Pentland.
Description: Cambridge, Massachusetts : The MIT Press, [2022] | Includes bibliographical references and index.
Identifiers: LCCN 2021030642 | ISBN 9780262543668 (paperback)
Subjects: LCSH: Financial services industry—Technological innovations. | Finance—Data processing.
Classification: LCC HG173 .G636 2022 | DDC 332.1—dc23
LC record available at https://lccn.loc.gov/2021030642