

# Digitalisation and banking: new risks and three scenarios for the European banking system of the future

**Thorsten Beck**

EUROPEAN UNIVERSITY INSTITUTE

**Antonio Sánchez Serrano**

EUROPEAN SYSTEMIC RISK BOARD

Thorsten Beck is Professor of Financial Stability and Director, Florence School of Banking and Finance (European University Institute). Antonio Sánchez Serrano is Senior Lead Financial Stability Expert at the Secretariat of the European Systemic Risk Board. The content of this article is based on the recent ASC report “[Will video kill the radio star? – Digitalisation and the future of banking](#)”. E-mail address for comments: [antonio\(dot\)sanchez\(at\)esrb\(dot\)europa\(dot\)eu](mailto:antonio(dot)sanchez(at)esrb(dot)europa(dot)eu).

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## Resumen

En este artículo se analiza el impacto de la digitalización en la estructura del sistema bancario europeo. La reciente ola de innovación financiera, basada en las oportunidades generadas por la digitalización en términos de nuevos productos y servicios, se ha originado principalmente fuera del sistema bancario tradicional. La forma que tengan los nuevos proveedores de servicios financieros (*fintech* y *bigtech*) de competir o colaborar con la banca tradicional podría afectar sustancialmente a la intermediación financiera. Como consecuencia, los riesgos financieros podrían desplazarse parcialmente del sector bancario, al tiempo que aumentaría la relevancia de los riesgos no financieros. Para poder definir mejor una estrategia de respuesta por parte de las autoridades, hemos considerado tres escenarios para el futuro sistema bancario europeo: i) la banca tradicional mantiene su dominio; ii) la banca tradicional reduce su presencia, y iii) se introducen las monedas digitales de bancos centrales en los pagos minoristas conforme a determinadas especificaciones.

**Palabras clave:** sistema bancario, digitalización, riesgo no financiero, innovación financiera, *fintech*, *bigtech*, riesgo sistémico.



## Abstract

This article discusses the impact of digitalisation on the structure of the European banking system. The recent wave of financial innovation, based on the opportunities created by digitalisation in terms of new products or new services, has come mostly from outside the incumbent banking system. How new financial service providers (fintechs and big techs) compete or cooperate with incumbent banks has the potential for substantial disruption in the provision of financial intermediation. As a result, financial risks may be partially shifted away from the banking sector, while non-financial risks increase their relevance. In order to better frame a policy response, we consider three scenarios for the future European banking system: (i) incumbent banks continue their dominance; (ii) incumbent banks retrench; and (iii) retail central bank digital currencies are introduced under certain specifications.

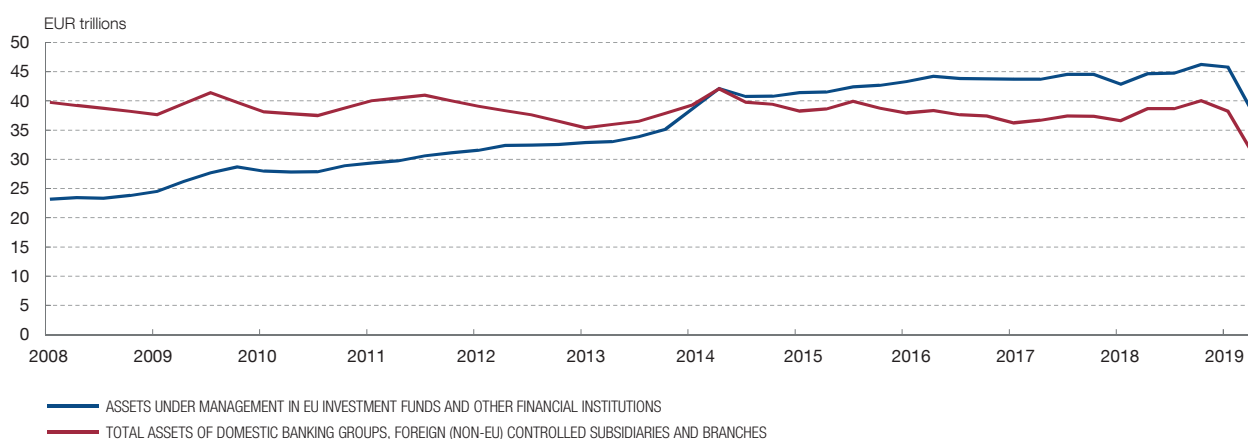
**Keywords:** banking, digitalisation, non-financial risk, financial innovation, fintech, big tech, systemic risk.

## 1 Introduction

Since the global financial and European sovereign debt crises, the European banking system has received increased attention from regulators and market participants. The global financial crisis led to an accumulation of non-performing loans in the balance sheet of European banks, which took years to address [see Council of the European Union (2017)]. Soon afterwards, the European sovereign debt crisis revealed the close links between banks and their sovereigns, and their potential to cause and amplify systemic risk [see European Systemic Risk Board (2015)]. In addition to it, a macroeconomic environment of low growth, low interest rates and low inflation has brought to the forefront existing vulnerabilities in the business model and the efficiency of European banks [see Committee on the Global Financial System (2018) and European Systemic Risk Board (2021)].

These developments have co-existed with the structural phenomenon of the high weight of banks in the EU financial system, usually referred as “overbanking”, which may lead to lower growth and higher systemic risk [see Pagano et al. (2014)]. Even if the EU banking sector has reduced the size of its balance sheet (see Chart 1) and a certain retrenchment of cross-border activities has also been observed since 2008 [see Portes et al. (2020)], the perception of an excessive reliance on banks for the provision of financial services in Europe remains. In parallel, assets under management of non-bank financial intermediaries have more than doubled between

Chart 1

**ASSETS UNDER MANAGEMENT OF INVESTMENT FUNDS AND TOTAL ASSETS OF EU BANKS**

**SOURCES:** European Systemic Risk Board and European Central Bank.

Notes: The blue line represents assets under management of EU investment funds and other financial institutions, as reported in the 2020 Non-Bank Financial Intermediation Risk Monitor [see European Systemic Risk Board (2020)]. Data on the size of the banking system are taken from Consolidated Banking Data, including domestic banking groups, stand-alone banks and foreign (non-EU) controlled subsidiaries and branches, irrespective of their accounting framework. Consolidated banking data have been reported quarterly only since 2015, so linear extrapolation has been used for values before that year. Both time series end in 2019 to keep a constant sample of EU countries.

2008 and 2019 (see Chart 1). While this increases risk sharing across the financial system,<sup>1</sup> it also implies that niches of banking business models that were seen as stable and secure for banks are currently facing increased competition from other non-bank financial institutions. In this regard, it is important to note that the capital markets union initiative launched by the European Commission in 2014 may also affect the future of the banking sector in the EU, as it aims to expand access to non-bank sources of funding.

The European banking system is also challenged by two societal changes going beyond the financial system: digitalisation and climate change. Starting by the latter, in recent years, society has gained a better understanding of the consequences of climate change for the planet. Climate change may also affect banks: for example, assets in their balance sheets (or assets of borrowers or bond issuers that financial institutions are exposed to) may become stranded and see large decreases in their prices [see also Financial Stability Board (2020)]. Moving to digitalisation, it affects the way banks produce and provide financial services to their customers, and it also brings new institutions into the production and provision of financial services.<sup>2</sup> If digitalisation breaks or substantially reduces the importance of physical proximity

1 Even if financial risks (credit risk, liquidity risks and others) may shift to areas with lighter regulation than the banking system.

2 Banks have been intensive users of IT systems for decades. In the US, the largest banks spend an average of 10 billion USD per year on IT. In Europe, the IT costs of 80% of European banks under the Single Supervisory Mechanism were above 3% of operating income in 2020. Hence, the need to incur into additional IT expenses due to digitalisation should not be perceived as disruptive per se.

between a bank and its customers, competition may drastically change, affecting incumbent banks and shaping the future structure of the banking market [see Vives and Ye (2021)]. Similarly, if digitalisation reduces the value of banks' data on customers compared with data that other potential financial service providers have available (such as big tech companies), this might reduce traditional banks' franchise value.

In addition to it, the COVID-19 pandemic has severely affected economic structures and its impact on the banking sector may touch the core business models and operations of banks. Furthermore, digital transformation in banking may have been accelerated by the pandemic. The combination of banks being forced to accelerate the digital transition with their important role in providing support to the economy during the most acute phase of the pandemic might have pushed some banks to accelerate and/or consolidate their transformation process.

Against this background, this article discusses the impact of digitalisation on incumbent banks' and how the EU banking sector may look like in 2030, drawing policy implications from it. The entry of fintechs and big techs in the business of financial intermediation has spurred a remarkable effort to assess how the banking sector can be affected in the long-term. Digitalisation has an immediate impact in terms of competition and contestability of banking services, requiring an adaptation of the traditional business model of banks [see, among others, Boot (2017) and Vives (2020)]. It affects the traditional bank business model because specialised new institutions can take away from banks activities that do not require a depositor base, such as payments, and digital platforms may diminish the intermediation role of banks in lending [see Stulz (2019) and Boot et al. (2021)]. While there seems to exist consensus on the change to existing banking business models triggered by digitalisation, the accurate picture of how the provision of banking services may look like in the future is still dominated by uncertainty [see Frost et al. (2019) and Cecchetti and Schoenholz (2020)].

In this article, we approach the discussion from a financial stability perspective, but try to identify other relevant issues for, among others, microprudential supervision and consumer protection. Our contribution can be framed within two areas: the evolution of financial and non-financial risks in a financial system where fintechs and big techs are present, and the policy actions to be taken already now to address adverse developments under different scenarios for the banking system over the medium-term. The next section discusses briefly the main characteristics of the most recent wave of innovation in the financial system. Then, we identify the challenges for financial stability, with particular detail to the higher importance of non-financial risks. To address existing uncertainty about the ultimate impact of digitalisation in the banking system, we define three plausible scenarios for the European banking system in 2030, which we use as basis for discussing the appropriate macroprudential responses in the last section of this article.

## 2 Digitalisation and the recent wave of innovation

Innovation has been a constant feature of the financial sector in the last decades, leading to the development of new products (for example, derivatives), new technologies (such as credit scoring or automated teller machines, ATMs) and new financial institutions (like exchange traded funds, ETFs). The recent wave of innovation has been driven by advances in telecommunications and information technology and has significantly increased the capacity to process information and the ability to connect with economic agents.

There are three key specific technological advances in the current wave of financial innovation: (i) smart phone technology, the internet and application programming interfaces (APIs); (ii) artificial intelligence (AI) and big data technology; and (iii) distributed ledger technology (DLT) [see Allen et al. (2020), Martínez Resano (2021) and Beck et al. (2022)].

First, mobile phones (especially smart phones), the internet, and APIs have enabled quicker information exchanges, new delivery channels (away from traditional branch models), and better exploitation of economies of scale. This has allowed the entry of new payment service providers, such as mobile phone companies offering mobile money. Consumer credit and payment services are the main products marketed or distributed through digital platforms [see European Banking Authority (2021)]. Competition has also been affected by the internet, as, for example, customers can compare products and prices of different financial services across providers and certain platforms enable retail customers to shift deposits across banks as conditions change. APIs can also increase the interoperability and interconnectivity between systems and applications of different service providers, especially in the context of cross-border interactions.

Second, the information technology revolution, including the rise of cloud computing, has facilitated the creation, processing, and use of big data and applied statistics for measuring and managing financial risk [see Beck et al. (2022)]. These technologies should reduce loan origination costs and possibly minimise asymmetric information between borrowers and lenders, expanding the range of potential customers of banks and increasing the availability of credit supply. Some studies show that big data can be more useful in predicting default patterns than more traditional approaches, such as banks merely relying on credit registry data [see Jagtiani and Lemieux (2018), Frost et al. (2019), Björkegren and Grissen (2020)]. AI and big data may also be used in other relevant banking activities, such as fraud and cyber incident monitoring, anti-money laundering, and compliance checks, or by other financial institutions, such as insurance corporations and investment funds.<sup>3</sup>

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<sup>3</sup> For example, big data can be used for measuring underlying insurance risk more precisely, enabling more insurance contracts to be issued at lower costs, thus completing markets and expanding insurance markets both on the intensive and extensive margins. Besides, robo-advising leverages data provided by investors to construct and manage a tailored and appropriate investment portfolio for them.



Traditionally, banks have enjoyed an important informational advantage over other financial intermediaries, because they had access to proprietary data across different financial services. The introduction of big data could reduce or even remove this. Online non-financial service providers have access to a wealth of personal data, which could be used to assess more accurately a client's borrowing capacity and risk profile than with the use of traditional banking data.

The third technological advance is distributed ledger technology (DLT), which describes decentralised data architecture and cryptography and allows the keeping and sharing of records to be synchronised while ensuring their integrity through the use of consensus-based validation protocols. The most prominent DLT has been blockchain, which was introduced as a method of validating ownership of the cryptoasset bitcoin [see Nakamoto (2008)]. It is a decentralised distributed database that maintains a continuously growing list of records locked into a chain of hacking-proof 'blocks' [see Beck et al. (2022)]. Although cryptoassets have caught the attention of many investors, there has been a trend towards stablecoins, which are cryptoassets that are pegged to another asset (such as the US dollar) and whose value is guaranteed by holdings of sufficient reserves in these assets, similar in construction to a currency board. Following the increasing importance of private cryptoassets, central banks around the world have started exploring the value of central bank digital currencies for retail customers [see Bindseil et al. (2021)].

### 3 Challenges for financial stability

Digitalisation, in addition to enabling banks to work almost entirely through the internet and with a very limited number of branches, has resulted in the creation of new intermediaries such as peer-to-peer lending platforms and payment service providers. It has also allowed some non-financial corporations to enter the financial services markets, with mobile network organisations and big technological companies (such as Ant Financial, Amazon and Facebook) being prime examples. These new financial services providers can basically cooperate or compete with incumbent banks and such interaction can introduce substantial disruptions in the provision of financial services in Europe.<sup>4</sup> The new configuration of the financial system can also lead to a shift of financial risks across entities or to the emergence of new risks, some of which may not be adequately captured by the current regulatory framework.

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4 The appearance of new financial intermediaries due to innovation is not a new phenomenon in financial history, as previous waves of innovation have also been characterised by the emergence of many new institutions and intermediaries over the centuries, often addressing new customer demands or regulatory constraints.

### 3.1 New competitors for incumbent banks

A typical classification of the new institutions that have entered the banking market following the recent wave of financial innovation defines them as fintechs or big techs. According to the Financial Stability Board, fintech is a “technologically enabled financial innovation that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services”. Fintech companies would thus be providers using such new processes and providing new services, disrupting traditional providers. Big techs, on the other hand, are defined as “large technology companies with extensive established customer networks” [see Financial Stability Board (2019a and 2019b)]. Google, Facebook, Apple, Amazon, Alibaba and Tencent would be examples of big techs.

Fintechs have shown impressive growth in the last years [see Martínez Resano (2021)]. They typically offer a specific financial service targeted at a specific clientele, which they perceive as under- or non-served by incumbent institutions. Even if they are individually of small size and mostly specialised in certain financial services, in aggregate, they cover a diverse group of financial services (see Chart 2). Although initially seen as competitors to incumbent banks, they are increasingly perceived as a complement to banks, with banks offering start-up fintech accelerator hubs and investing in or even acquiring fintechs. The different capacities of banks and fintechs to comply with a wide array of regulation (not only prudential regulation, but also anti-money laundering, data privacy and consumer protection) may be one explanation for this change in the perception of fintechs from competitors to complements.<sup>5</sup>

Big techs have potentially big advantages compared with banks and fintechs, as they combine all the technical capabilities of fintechs and the scale (financial capacity, existing customers) of large incumbent banks. These advantages of big techs vis-à-vis fintechs and banks can be captured by data analytics, network externalities and interwoven activities (called their “DNA”) [see Bank for International Settlements (2019)]. The value from participating on one side of a platform (for example, as a seller) increases with the number of participants on the other side of the platform (i.e., buyers). The increasing number of participants in the platform allows the Big tech to collect more data, which, once analysed, can improve the existing services and attract new users to the platform. In this process, big techs become dominant in their businesses and could be able to expand into new lines of business, such as the provision of financial services. Big techs can thus follow an envelopment strategy by moving from non-financial to financial services [see De la Mano and Padilla (2018) and Beck et al. (2022)].

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5 It is difficult to estimate of the costs of regulatory compliance for banks, but they are certainly not negligible, particularly for smaller institutions. An estimate for US banks sets the cost of compliance as 8% of non-interest expenses for small banks (total assets below USD 1 billion) and 3% for medium-sized banks (total assets between USD 1 billion and USD 10 billion) [see Dahl et al. (2016)].

Chart 2

**DISTRIBUTION OF FINTECH FIRMS IN THE EURO AREA BY CLUSTER OF ACTIVITY**



**SOURCE:** European Central Bank [see European Central Bank (2020)].

**NOTES:** Data are based on an ECB experimental collection. Clusters of activities as defined by the European Banking Authority [see European Banking Authority (2017)]. One entity is allocated to one cluster only.

One important aspect here is how incumbent banks could interact with fintechs and big techs, an area still dominated by uncertainty. In the case of big techs, they could decide to enter into the provision of financial services in cooperation with incumbent banks or through their own financial subsidiary. Through cooperation, the risk of disruption to the current structure of the banking system seems smaller, although banks may see a decrease in their profits as they would need to share at least part of their income with big techs. If big techs decide to enter the banking industry with their own subsidiaries, banks may react by increasing their risk appetite in order to defend their dominant position in the market. Initiating such a Red Queen Race could have detrimental effects for financial stability. Ultimately, the main issue would be whether the credit provided by fintechs and big techs would replace or complement bank credit. The policy implications would be quite different depending on which of the two possibilities prevails.

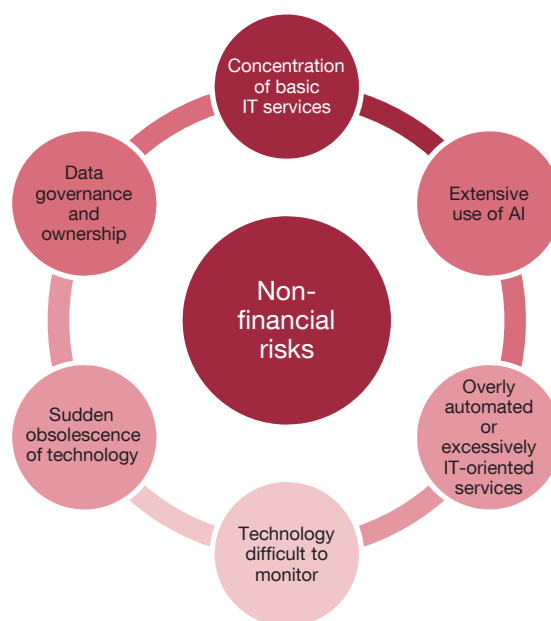
### 3.2 Financial risks and new non-financial risks

Before discussing policy implications from the entry of fintechs and big techs into banking activities, it is necessary to reflect on how they can affect existing and identified financial risk and lead to the rise of new non-financial risks.

New institutions operating with bank-like intermediation models would be exposed to the already identified known risks in banking (liquidity risk, credit risk, market risk, etc.), affecting, in turn, system-wide risk. As noted above, incumbent banks may take greater risks to compete with fintechs and big techs, increasing the overall level

Figure 1

**NON-FINANCIAL RISKS STEMMING FROM DIGITALISATION IN BANKING SERVICES**



SOURCE: Authors' elaboration.

of risk. While more competition could enhance stability over the long term, concentration (particularly with big techs) could result in new too-big-to-fail institutions, and a stronger focus on transaction-based intermediation could make the system more procyclical [see Beck et al. (2022)]. Furthermore, cooperation between big techs and incumbent banks might lengthen intermediation chains, moving them towards the originate-and-distribute model, which raises concerns about incentives and risk distribution [see Purnanandam (2011)].

In addition to financial risks, which are mainly covered by prudential regulation, digitalisation also poses significant non-financial risks, both to banks and to new service providers (i.e., fintech and big techs). Currently, non-financial risks are only indirectly captured by the prudential framework. The following paragraphs discuss some of these non-financial risks [see Figure 1 and also Beck et al. (2022)].

The first risk relates to the increased concentration of the provision of basic IT services, such as cloud computing, over a small number of providers [see Financial Stability Board (2019b)]. This risk is mainly affecting banks and fintechs, which are increasingly using the same small group of cloud service providers to build their IT infrastructures. As a result, in addition to the underlying IT risk stemming from the IT environment, these financial institutions may be gaining exposures to a small number of providers of IT services, which may even be located in countries outside their jurisdiction. Disruptions of one of these key IT service providers could adversely affect several banks and fintechs simultaneously.

The second risk stems from the extensive use of AI in finance [see Buckmann et al. (2021)]. AI algorithms are complex to understand by humans and they are not free of flaws. For instance, they may include subtle biases, inaccurate data and feedback loops whereby AI models jointly drive trends, similar to herding behaviour among investors.<sup>6</sup> As a result, AI algorithms may give the impression of delivering better outcomes than they are doing in reality. Financial institutions may therefore misprice financial services that rely heavily on AI algorithms, driven by a false sense of security. This is an area where supervisory authorities should build strong expertise coupled with methodologies for the supervision and control of these models.

Third, overly automated or excessively IT-oriented services may increase market fragility. While one of the main benefits of APIs is that they allow communication between different software applications, expanding the provision of financial services to underserved niches, they can also lead to risks of operational failure or vulnerability to cyberattacks. These risks can propagate quickly through the system, increasing market fragility. Furthermore, when APIs are combined with smart phones, there could be risks of introducing errors and undetected vulnerabilities with any new IT redeployment.

The fourth risk arises from trust in a technology that is difficult to monitor and prone to cyber crime. This risk affects banks when they use, for example, screen, web and data scraping to collect transactional data of economic agents to assess their credit worthiness, and is exacerbated when moving to unsupervised financial institutions offering financial services. In general, excessive reliance on IT and automatised systems, without human intervention, may offer new possibilities for cyber crime and money laundering, as it may be really difficult for supervisory authorities to follow money flows across jurisdictions. In view of this risk, microprudential and conduct authorities should focus on strong internal controls on Know Your Customer (KYC) procedures in all types of financial institutions offering financial services.

The fifth risk relates to the replacement of a central authority in control of a process by a leading technology that is subject to suddenly becoming obsolete. Although converting legacy to modern IT systems can eliminate latent vulnerabilities, even current leading technologies may become obsolete in the future (or even fail to respond to the new needs of economic agents), creating additional risks for financial institutions. In the particular case of payment systems, the structural risk from potential technological obsolescence is amplified by situations where users are principally placing their trust in technology rather than in the existence of a central authority that might be expected to stand behind the payment system in question and to which to recur in case of problems.

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<sup>6</sup> In the area of consumer protection, biases in AI algorithms could result in discrimination against certain groups of customers.

Last but not least, an inadequate approach to data ownership and governance may create risks for consumer protection and financial stability. Incumbent banks have traditionally enjoyed a competitive advantage against other financial institutions as a result of the availability of customer data. The potential entry of new institutions with more up-to-date data capabilities into the financial system and developments in the field of “open data” may have repercussions on the supply of financial services [see He et al. (2020)] and create additional risks if existing structures of data governance and ownership are not timely updated. In the current regulatory framework, defined by the revised Payment Services Directive (PSD2) in the EU, banks are obliged to share customers’ data with authorised third party providers in digital form and free of charge. However, the General Data Protection Regulation (GDPR) requires third party providers, including big techs, to share these data only if it is technically feasible [see De la Mano and Padilla (2018)]. Maintaining this asymmetry in the sharing of customer data and, even more, sharing the data without the consent of the customer, may have negative implications for the quality of customer screening made by banks (as the data would be shared with direct competitors at no cost), and distort competition between incumbent banks and big techs, with material consequences for the level of non-financial risk in the system.<sup>7</sup>

## 4 Three scenarios for European banking in 2030

The ultimate contribution of financial and non-financial risks to the overall level of risk in the system depends on (i) the current state of the EU banking system,<sup>8</sup> and (ii) how incumbent banks interact with fintechs and big techs in the future, an area still dominated by uncertainty. As a way to address that uncertainty, we define three scenarios for the EU financial system in 2030, which could serve as basis for a discussion of the appropriate macroprudential policy response [see Beck et al. (2022)].

These scenarios do not cover every possible path of the European banking system over the next ten years, but they are relevant in their implications for the interaction between incumbent banks, and fintechs and big techs. Scenarios 1 and 2 are directly related to the five forward-looking scenarios for the banking system designed by the Basel Committee on Banking Supervision [see Basel Committee on Banking Supervision (2018)]. The third scenario introduces central bank digital currencies, as certain configurations could lead to a substantial structural change in the financial system.

Our first and second scenarios cannot occur simultaneously, while the third scenario could occur in combination with one of the other two. We do not define probabilities

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7 Alternatives to the current situation could be to enforce a symmetrical exchange of data between banks and big techs, to create separate “data warehouses” and to reinforce current data privacy regulation [see De la Mano and Padilla (2018)].

8 We provide the main features of the EU banking system in the introduction [see also Beck et al. (2022)].

to the different scenarios and – most importantly – their probability of occurrence is endogenous to regulatory responses that are still to be defined.

#### 4.1 Scenario 1: incumbent banks continue their dominance

Under this scenario, banks maintain their central role in money creation and financial intermediation and they aggressively respond to the competitive threat through technological adaptation, acquiring fintech companies, and lobbying. Fintechs are limited to service specific niche markets, while big techs offer payment services but, in general, do not have access to central bank clearance and payment systems.

Cooperation between incumbent banks and big techs may result in customers using big techs' platforms to choose among financial services provided. While this can increase competition, it can also result in misaligned incentives. In these partnerships between traditional banks and big techs for lending services, the former could mainly provide their balance sheet and big techs their data for screening and monitoring. At the extreme, this situation would lead to the scenario of “relegated banking” [see Basel Committee on Banking Supervision (2018)].<sup>9</sup> The cooperation between incumbent banks and big techs could evolve in a way that customers relationships shift from banks to big techs, leaving banks as mere providers of services in terms of financial products and risk management. They would maintain their dominant role in financial intermediation but turning their current relationship banking into a “commoditised” provision of financial services.

As a result of the increased cooperation between banks and big techs under this scenario, consumer protection will have to change its focus, as personal data will become more important for the provision of credit, insurance and other financial services. For instance, current regulations that force banks to share personal information but do not allow them to gain access to data that big tech companies have would need to be changed [see also De la Mano and Padilla (2018)].

In this scenario, there is a large change in the banking system, as new providers and new products are incorporated, but there is not a major disruption in the way financial services are provided. Financial risks will continue to be concentrated in the banking system, as well as in non-banking financial institutions linked to the banking system. However, the regulatory framework would need to adjust to the new financial environment. In addition to changes in consumer protection as mentioned above, non-financial risks will be located in a small number of IT service providers and will require a stronger regulatory focus on these institutions. Besides, regulatory responses will have to focus on the interlinkages and cooperation between banks, on the one side, and fintech and big tech companies, on the other.

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<sup>9</sup> Similar scenarios have been called “banking as a service” and “beyond banking” [see Martínez Resano (2021)].

## 4.2 Scenario 2: incumbent banks retrench

The second scenario is characterised by big techs offering financial services through regulated financial subsidiaries. Therefore, big techs capture the hard-data, transaction-based lending market and incumbent banks need to adjust by increasingly focusing on relationship-intensive services at the high end (investment banks) and low end (community banks) of the market. The banking system reduces its size and relative importance in the provision of financial services, especially because mid- and small-sized banks are no longer able to exploit scope economies.

This transition to a smaller banking system will create fragility risks due to the necessary deleveraging and market exit by some of the incumbent banks. At the same time, new sources of financial risks and challenges for macroprudential regulation emerge. First, retail depositors will have an increasing number of investment opportunities, some of which could be located outside the current scope of the financial safety net. Investor runs on financial institutions outside the regulatory perimeter could cause fragility, lead to disruption inside the regulatory perimeter and put pressure on authorities to expand the safety net on an ad-hoc basis. Second, the increasing role of big techs in the financial system could result in concentration and too-big-to-fail risk, as well as in transition risk, as one dominant platform firm could be replaced with another if, for example, its technology becomes suddenly obsolete. Third, a general move towards more hard and less soft information could make lending cycles even more pronounced and pose additional challenges for macroprudential policymakers.

Our second scenario leads to a structural change in the financial system. In it, financial risk is no longer concentrated on incumbent financial institutions but is distributed over a more diverse set of institutions. The existence of firewalls between the financial and non-financial parts of big tech and similar companies will become important. In terms of non-financial risks related to IT, they will play an even more important role. Like in the previous scenario, the concentrated provision of IT-related services could create additional interlinkages between banks and non-bank providers. Above all, the regulatory response to this scenario should have two critical areas: (i) the regulation of fintech and big techs, and (ii) the access to lender of last resort facilities and coverage by deposit insurance beyond incumbent banks.

## 4.3 Scenario 3: retail central bank digital currencies

The third scenario is designed on the premise that the issuance of retail central bank digital currencies, under certain intermediation models, results in a different structure of the financial system. There is intense ongoing work in the central bank community



on how to design central bank digital currencies and our scenario should be seen as very hypothetical. Actually, to be able to transform the provision of financial services, central bank digital currencies cannot be anonymous, have to be supplied elastically and must not be only available to residents of the issuing jurisdiction, as such a restriction would amount to capital controls.

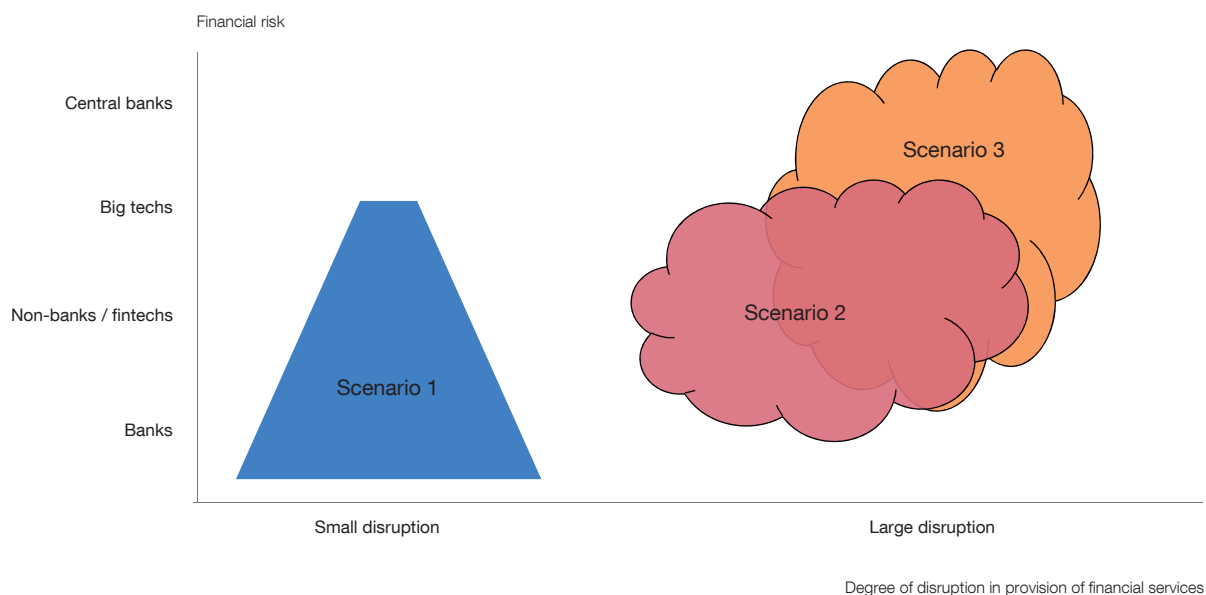
Regarding incumbent banks, our scenario should lead to higher funding costs and a more volatile funding base, as the traditionally stable retail deposit clientele switches, at least partially, to the digital currency issued by the central bank. Consequently, financial intermediation moves away from incumbent banks and the central bank now plays a central role in the financial system, as it has to allocate the funds attracted by the digital currency. As a result, the traditional banking system no longer plays the role of a stable anchor. Banks would have to rely more on wholesale funding and/or more expensive retail funding for loan origination, which in crisis times could result in (i) runs among other holders of short-term liabilities of incumbent banks, and (ii) a “crunch” in the bank’s lending capacity. This scenario could also be prone to major and sudden cross-border outflows from countries whose currency is no longer regarded as trustworthy. At the same time, other financial service providers (including fintechs and big techs) will be able to offer tailor-made and specialised services in areas such as lending, asset management, and risk management.

The regulatory response to this hypothetical scenario would have to deal with both scaled-up central bank intermediation and a diverse set of financial service providers with riskier profiles and higher exposure to runs. While the central bank might create stability through its dominating role as money creator, its lending role might expand significantly, replacing a more decentralised, market-based process for the allocation of credit. Financial risks would then, at least partially, move from banks to the central bank. The points made in the second scenario on regulating fintechs and big techs, and on the access to last resort facilities and to deposit insurance schemes would also be relevant under this scenario.

Chart 3 represents schematically the degree of disruption in the provision of financial services implied by each scenario (x-axis), compared with the current structure of the financial system, and the sector bearing financial risks under each scenario (y-axis).

The first scenario would mainly be a continuation of the current situation, where banks are the main bearers of financial risks and are, consequently, tightly regulated and have access to the safety net. In the second and third scenarios, the distribution of financial risks among banks, non-banks, fintechs and big techs (plus central banks) changes (even if the precise allocation is still unclear) and banks no longer bear as much financial risk as nowadays.

**FINANCIAL RISKS AND DISRUPTION IN THE PROVISION OF FINANCIAL SERVICES IN OUR THREE SCENARIOS**



SOURCE: Authors' elaboration.

## 5 Policy conclusions

Before discussing concrete macroprudential actions that could be taken in order to ensure an efficient transition to the banking system of the future, it is important to note that developments in the financial system are endogenous to regulatory responses and adjustments, especially during periods of potentially disruptive transformations. So, the regulatory response to the current transformation of the financial system will also shape that transformation. Furthermore, the regulatory response will be a key driver of which of our three scenarios materialises.

Our proposed policy actions are intended to address both financial and non-financial risks. Some of them may apply to all three scenarios, while others would be more relevant only for one scenario.

First, the regulatory perimeter and the conditions to access the safety net would need to be expanded and/or adapted. In addition to existing non-bank financial institutions, the extension of the regulatory perimeter would be necessary to capture the banking activities of big techs as well as the growing role of fintechs. These institutions would ideally need a new prudential framework, which should also consider consumer protection, data governance and anti-money laundering. In our second and third scenario, access to the safety net should also be enabled for these institutions, which would play a more decisive role in financial intermediation and could otherwise increase the risk of runs.

Related to it, big techs should be required to pursue their financial intermediation activities through a subsidiary that falls within the regulatory perimeter. However, this policy measure may require large organisational changes and could reduce the appeal for big techs to enter into the provision of financial services, decreasing the probability of occurrence of our second scenario.

Second, global cooperation among supervisory authorities needs to be enhanced. Most fintechs and big techs operate on a global sale, with no permanent establishment in jurisdictions where they are present. To avoid undesired and untimely discussions among different jurisdictions during periods of financial stress, mechanisms for cross-border cooperation across prudential authorities should be defined *ex ante*.

Third, cooperation among supervisory authorities in different sectors will need to be enhanced. The extended use of non-financial institutions that are under the remit of non-financial regulators (such as telecom regulators) would require the establishment of a fluid dialogue between authorities in the same jurisdiction. For instance, regulatory approaches toward platform companies (i.e., big techs) should involve also financial sector regulators.

Fourth, regulatory and supervisory practices must be adjusted to the increased importance of digitalisation in the financial system. The current structure of financial regulation and supervision dates back to a period where digitalisation and non-financial risk were not as important as they are today and are expected to be in the future. A more accurate reflection of non-financial risks in the prudential framework of financial institutions and an adjustment in the skills of staff in regulatory and supervisory authorities would be two required actions to be taken in this regard.

Fifth, any decision on central bank digital currencies and the access of retail customers to them must be carefully balanced between efficiency gains and stability risks posed to the financial system. While over the short-term, central bank digital currencies can benefit customers and result in healthy competition among financial institutions, there could be large implications over the long-term for the structure and stability of the financial system, which should also be taken into account in the decision-making process of relevant authorities.

Sixth, last but not least, the framework for an orderly exit of incumbent banks and for capacity reduction should be strengthened. Our three scenarios have portrayed a challenging environment for European banks, with increased competition and narrower margins. Furthermore, in the second and third scenarios, there will be a large reduction in the role of banks in the provision of financial services. As a result, a process of reducing capacity and exiting the market can be expected to occur and could be facilitated by, among others, avoiding government support for unviable banks, facilitating mergers, easing barriers to market exit and liquidation, and completing the banking union.

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