



## Financial technology: the 150-year revolution

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### Introduction

Good evening, and thank you for inviting me to speak at this year's Euro Finance Week.

As many of you know, I was appointed Chairman of the Basel Committee earlier this year. Over the past few months, I have delivered a few speeches that provide an overview of the future path of the Committee, including a set of guiding principles to steer the work of the Committee.<sup>1</sup> These consist of the following:

- (i) Remembering the lessons of the past, including the profound impact of systemic banking crises.
- (ii) Proactively engaging with a wide range of stakeholders in a global and transparent manner.
- (iii) Focusing the work of the Committee on global financial stability issues.
- (iv) Adopting a forward-looking approach to our work.

I will focus my remarks today on this last principle by discussing the Committee's work on the growing role played by technology in finance, and its implications for banks and supervisors.

### Finance and technology: a brief history

The past few years have seen growing interest in technology-driven innovation in financial services (Graph 1). This interest in financial technology, or "fintech", is not driven solely by intellectual curiosity but is also backed by hard money: in 2018, total investment activity in fintech amounted to \$120 billion, spanning about 2,600 deals. Since 2014, there have been over 11,000 fintech investments totalling about \$380 billion (Graph 2). In parallel, we have also seen global technology firms increasing their foray into financial services. Collectively, the total volume of new credit provided by fintech and "big tech" in 2017 exceeded \$500 billion, a tenfold increase from 2014 (Graph 3).

Against that backdrop, it is perhaps not surprising to have seen fintech discussed at nearly every bank-related conference over the past few years, including this one! A number of observers have

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<sup>1</sup> See Hernández de Cos (2019a) for more on the guiding principles; and Hernández de Cos (2019b) for more on the Committee's evaluation work programme.



concluded that we are witnessing nothing short a paradigm shift in banking.<sup>2</sup> Indeed, technological innovation has the potential to affect a wide range of banking product sectors and market support services (Graph 4).

Yet finance and technology have a long and symbiotic relationship. Finance has always shaped technological developments. For example, the Industrial Revolution was facilitated by the provision of capital provided by financial intermediaries in the 18th and 19th centuries.<sup>3</sup> And technology has been used in finance for over 150 years. As Douglas Arner of the University of Hong Kong and his colleagues have catalogued, one can think of three waves of technological disruptions in finance.<sup>4</sup> The first wave of technology (“fintech 1.0”) was prompted by the completion of the first transatlantic telegraph cable in 1866 and saw finance gradually shift from analogue to digital. This was followed by a second wave of technological innovations in financial services, starting with the advent of the automated teller machine (ATM) in 1967 (“fintech 2.0”). Fast forward and we are now witnessing a third wave of increasing technological pervasiveness in finance, coupled with the emergence of new actors and channels for the provision of finance (“fintech 3.0”).

So, when put in a historical context, fintech is not necessarily a new phenomenon or an abrupt Kuhnian transformation.<sup>5</sup> What’s more, the recent burst of activity in the fintech space has inevitably raised questions about whether we have reached “peak fintech”, only for it to be followed by a steep trough of disillusionment as part of a hype cycle (Graph 5).<sup>6</sup> Some have asked whether we are spectators at an “innovation theatre” that “promotes the impression of innovation and the future value that it brings” with concrete tangible improvements.<sup>7</sup> And, more generally, regardless of the advancements made in technology, the role of human judgment is an essential element in banking and supervision.

Despite the growth in fintech activity over the past few years, the total amount of new credit provided by fintech and big tech companies is relatively small, standing at just 0.5% of total credit at the end of 2017 (Graph 3), although in certain jurisdictions fintech companies account for a much more significant share of banking services.

But even if there may be a degree of hype about fintech, there are at least three good reasons to believe that the recent technological developments may have a lasting effect on the banking sector. First, the current pace of innovation is faster than in previous decades, with the rate of adoption increasing commensurately.<sup>8</sup> The adoption of ATMs occurred over two decades, while internet banking and mobile banking have taken centre stage over progressively shorter intervals. Second, a generation of digital natives is growing up with a technological proficiency that is at the heart of fintech innovation. Indeed, one of the triggers of the recent fintech wave is precisely changing customer behaviour and demand for digital financial services. Third, fintech has been at the forefront in advances in financial inclusion, with large potential growth opportunities.

Given the faster pace of change resulting from technological innovation, the Committee is taking a proactive and forward-looking approach to assessing the potential impact of such developments on

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<sup>2</sup> See eg Gupta and Xia (2018).

<sup>3</sup> See Wilde (2019).

<sup>4</sup> Arner et al (2015).

<sup>5</sup> Kuhn (1962).

<sup>6</sup> See Blosch and Fenn (2018).

<sup>7</sup> See Turrin (2019).

<sup>8</sup> See Brynjolfsson and MacAfee (2014).



banks and supervisors. I will discuss three concrete areas of work by the Committee that touch on the nexus of finance and technology.

## Technology and banking

First, on fintech, the Committee conducted a comprehensive assessment of the risks and opportunities for banks and supervisors. The Committee published its analysis last year as part of a set of Sound Practices on the implications of fintech for banks and supervisors.<sup>9</sup> The report considers five stylised and non-mutually exclusive scenarios in which fintech could impact banks, with a particular focus on: (i) who manages the customer relationship or interface; and (ii) who provides the services and takes the risk (Graph 6). These comprise the following:

- **Scenario 1 – “Better bank”:** Incumbent banks digitise and modernise themselves to retain the customer relationship and core banking services, leveraging enabling technologies to change their current business models. For example, new technologies such as biometry, chatbots or artificial intelligence could help banks maintain a value added remote customer relationship. Banks could further innovate payment services and digitise the lending process through more efficient interfaces and processing tools.
- **Scenario 2 – “New bank”:** In this scenario, incumbents are unable to survive the wave of technology-enabled disruption, and are replaced by new technology-driven banks (eg “neo-banks”), with full-service “built-for-digital” banking platforms. We have seen examples of such banks around the world, such as Atom Bank in the United Kingdom, Bunq in the Netherlands, WeBank in China, and Varo Money in the United States.
- **Scenario 3 – “Distributed bank”:** A third scenario considers the possibility of financial services becoming increasingly modularised. Incumbents are able to carve out enough of a niche to survive, but other financial service providers “plug and play” on the digital customer interface. A large number of new businesses emerge to provide specialised financial services. For example, the adoption by consumers of mobile wallets developed by third-party technology companies, such as Android Pay, Apple Pay or Samsung Pay, is an example of the distributed bank scenario.
- **Scenario 4 – “Relegated bank”:** Incumbent banks become commoditised service providers, and cede the direct customer relationship to other financial service providers. Fintech and big tech companies use front-end customer platforms to offer a variety of financial services from a diverse group of providers. In contrast, banks would be relegated to providing only commoditised functions such as operational processes and risk management, while other service providers would own the customer relationship.
- **Scenario 5 – “Disintermediated bank”:** The final scenario would see incumbent banks becoming irrelevant because there is no longer a need for balance sheet intermediation, as customers interact directly with individual financial service providers. In this scenario, customers may have a more direct say in choosing the services and the provider, rather than sourcing such services through an intermediary bank. One example is peer-to-peer lending platforms, where individual customers can directly take on the role of the lender or the borrower.

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<sup>9</sup> BCBS (2018).



There are also further considerations regarding the potential impact of big tech on banks' business models. As noted by the Bank for International Settlements, the key features of big tech's business models are data analytics, network externalities and interwoven activities.<sup>10</sup> These three elements reinforce each other: network externalities beget more users and more value for users, which in turn allows big techs to generate more data, which helps enhance existing services and attract further users. In contrast, while large banks have many customers and offer a wide range of services, they have thus far not been as effective as big techs in harnessing the feedback loop between data, network externalities and interwoven activities. More broadly, the increasing growth of big tech could have a more profound impact on the industrial organisation of financial services. The financial hierarchy could be reversed, with banks relegated from being in the centre of the financial system to a subordinated player to payment services provided by big tech companies (Graph 7).<sup>11</sup>

While these are clearly hypothetical scenarios at this stage, it is important that banks and supervisors anticipate the risks and opportunities arising from financial technologies and innovation (Graph 8). Accordingly, the Committee has identified 10 key implications and considerations on the following supervisory issues:

- (1) The overarching need to ensure safety and soundness and high compliance standards without inhibiting beneficial innovation in the banking sector.
- (2) The key risks for banks related to fintech developments, including strategic/profitability risks and operational, cyber and compliance risks.
- (3) The implications for banks of the use of innovative enabling technologies.
- (4) The implications for banks of the growing use of third parties, via outsourcing and/or partnerships.
- (5) Cross-sectoral cooperation between bank supervisors and other relevant authorities.
- (6) International cooperation between bank supervisors.
- (7) The need to adapt the supervisory skill set.
- (8) Potential opportunities for supervisors to use innovative technologies ("suptech").
- (9) The relevance of existing regulatory frameworks for new innovative business models.
- (10) Key features of regulatory initiatives set up to facilitate fintech innovation.

Building on these Sound Practices, the Committee is now conducting a set of "deep dive" thematic assessments on selected fintech issues. It will shortly publish a report on open banking and application programming interfaces (APIs).<sup>12</sup> Going forward, the Committee will assess the banking and supervisory implications related to: (i) the risk management challenges associated with the use of artificial intelligence and machine learning in financial services; (ii) banks' dependencies on unregulated third parties and the implications for outsourcing supervisory regimes; and (iii) supervisory challenges related to data governance and management as well as data security, portability and recovery.

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<sup>10</sup> BIS (2019).

<sup>11</sup> Brunnermeier et al (2019).

<sup>12</sup> BCBS (2019).



## Technology and operational resilience

The second area of work by the Committee on technology focuses on the risks for banks' operational resilience. The proliferation of innovative products and services may increase the complexity of financial service delivery, making it more difficult for banks to manage and control operational risk. Legacy bank IT systems may not be sufficiently adaptable, or banks' change management vis-à-vis such innovation may be inadequate. The greater use of third parties, either through outsourcing or other fintech partnerships, increases risks surrounding data security, privacy, money laundering and customer protection.

At the system-wide level, the rise of technology in finance could lead to more technological interdependencies among market players and infrastructures, which could cause an IT risk event to escalate into a systemic crisis, particularly where services are concentrated in one or a few dominant players.

And, regardless of which financial technology scenario prevails, cyber risk is likely to only grow in magnitude. New technologies and business models can increase cyber risk if controls do not keep pace with change. Heavier reliance on APIs, cloud computing and other new technologies facilitating increased interconnectivity with actors or sectors not subject to equivalent regulatory expectations could potentially make the banking system more vulnerable to cyber threats, and expose large volumes of sensitive data to potential breaches.

To that end, the Committee is reviewing and updating its existing principles and guidelines related to operational resilience to reflect and anticipate the risks associated with technological innovations. I expect that the Committee will be consulting on a revised set of principles next year.

## Technology and money

The third area of work by the Committee on technology and finance is on cryptoassets, a field which has been recently and amusingly described as "everything you don't understand about money combined with everything you don't understand about computers".<sup>13</sup> At this stage, cryptoassets remain small relative to overall assets in the global financial system, and banks currently have very limited direct exposures to them. Nevertheless, the Committee is of the view that the continued growth of cryptoasset trading platforms and new financial products related to cryptoassets have the potential to raise financial stability concerns and increase risks faced by banks.

While cryptoassets are at times referred to as "cryptocurrencies", the Committee believes that such assets do not reliably perform the standard functions of money and are unsafe to rely on as a medium of exchange or store of value. Cryptoassets are not legal tender, nor are they backed by any government or public authority.<sup>14</sup>

There have been more recent initiatives related to other types of cryptoassets. For example, some initiatives seek to reduce volatility by anchoring cryptoassets to a reference asset. These cryptoassets are sometimes referred to as "stablecoins", although the stability of such assets has yet to be tested in practice. The scope of stablecoin initiatives varies, with some focusing on intragroup or interbank payment systems,

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<sup>13</sup> *Last Week Tonight with John Oliver* (2018).

<sup>14</sup> In this regard, cryptoassets differ from central bank digital currencies; see CPMI-MC (2018).



while others seek to target a broader audience, including consumers globally. While many of these types of cryptoassets have yet to be operational, they have the potential to become systemically important.<sup>15</sup>

As part of its forward-looking approach to emerging risks, the Committee is conducting two initiatives on cryptoassets. First, the Committee will publish a discussion paper to seek the views of stakeholders on a wide range of issues related to the prudential treatment of banks' exposures to cryptoassets.

Second, the Committee is assessing the implications for banks and supervisors of a sudden increase in the role and use of cryptoassets, including stablecoins. For example, what role would banks play in a stablecoin ecosystem? What are the risks that such cryptoassets could pose to banks? Do supervisors have adequate resources to oversee such risks, and do the current supervisory frameworks enable them to conduct the necessary supervisory oversight? These important questions are being discussed among Committee members.

For example, in a world where private sector stablecoin initiatives, such as the proposal by the Libra Association, prevail, banks could play different and non-mutually exclusive roles.<sup>16</sup> Such roles could include: (i) the direct participation in the stablecoin ecosystem (for example, acting as custodians of assets that back the stablecoin, or managing those assets); (ii) the facilitation of the functioning of the ecosystem (for instance, by reselling the stablecoin); and/or; (iii) offering broader services to final users (for example, acting as digital wallet providers). Depending on their role, banks could be subject to a wide range of both financial risks (liquidity, market and credit risks) and non-financial risks (such as cybersecurity and data integrity or legal risks, among others). Separately, bank supervisors should consider whether supervisory frameworks and resources would enable them or other supervisory authorities to conduct the necessary supervisory oversight.

There are also broader questions about banks' business models. Consider, for example, the impact on banks' profitability and customer relationship base. The emergence of stablecoins as a source of instant payments will compete for commissions on payment transfers, which could dilute banks' fee-based revenue stream. And even if banks become active players within a stablecoin's ecosystem, they may find it difficult to adapt to the proliferation of innovative products and services offered by fintech and big tech companies. This corresponds to the "distributed bank" and "relegated bank" scenarios I outlined earlier.

## Conclusion

In conclusion, with Basel III now finalised, the Committee is increasingly focusing its attention on scanning the horizon and assessing emerging vulnerabilities and structural change in the banking system. The growing and evolving role of technology has the potential to further alter the financial landscape. We are carefully assessing the risks and opportunities of such developments for banks and supervisors, and will take any appropriate policy and/or supervisory measures to mitigate such risks, with a view to enhancing global financial stability.

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<sup>15</sup> See G7 Working Group on Stablecoins (2019).

<sup>16</sup> Libra Association (2019).



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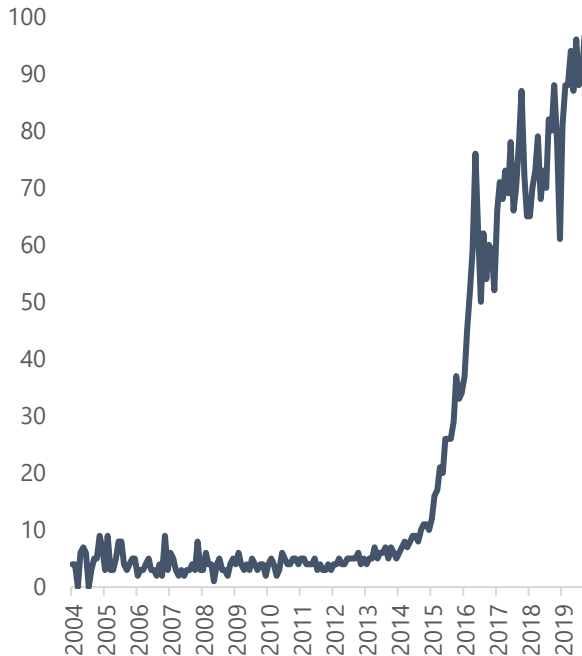
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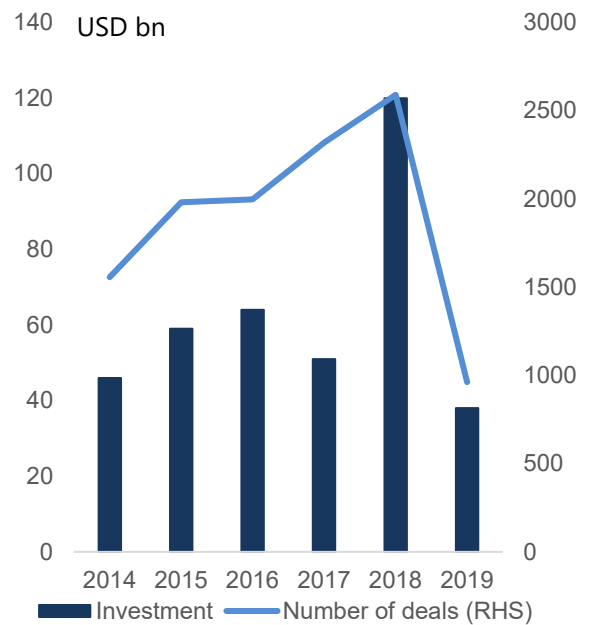
## Graphs

**Graph 1:** Online searches for “fintech”<sup>(a)</sup>



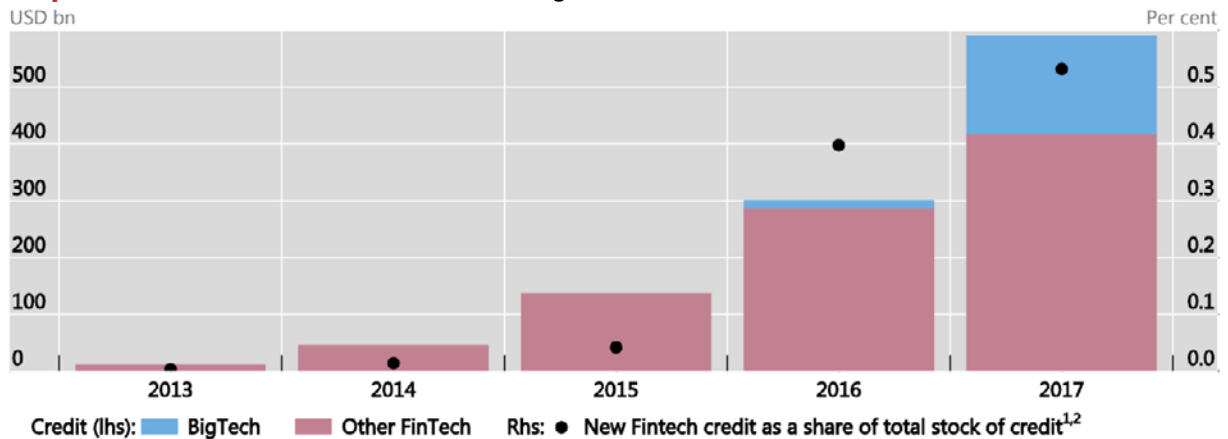
<sup>(a)</sup> Numbers represent global search interest on Google for the term “fintech” relative to the highest point in the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term. Sources: Google; Secretariat calculations.

**Graph 2:** Total investment activity in fintech<sup>(a)</sup>



<sup>(a)</sup> Includes venture capital, private equity and M&A-related investments in fintech; 2019 data up to 30 June. Source: KPMG (2019); Secretariat calculations.

**Graph 3:** Global volume of new fintech and big tech credit<sup>(a)</sup>



<sup>(a)</sup> The bars indicate annual global lending flows by big tech and other fin tech firms over 2013–17. Graph includes estimates.

<sup>1</sup> Total fintech credit is defined as the sum of the flow of big tech and other fintech credit. This is then divided by the stock of total credit to the private non-financial sector. <sup>2</sup> Calculated for countries for which data were available for 2013–17.

Source: Frost et al (2019).



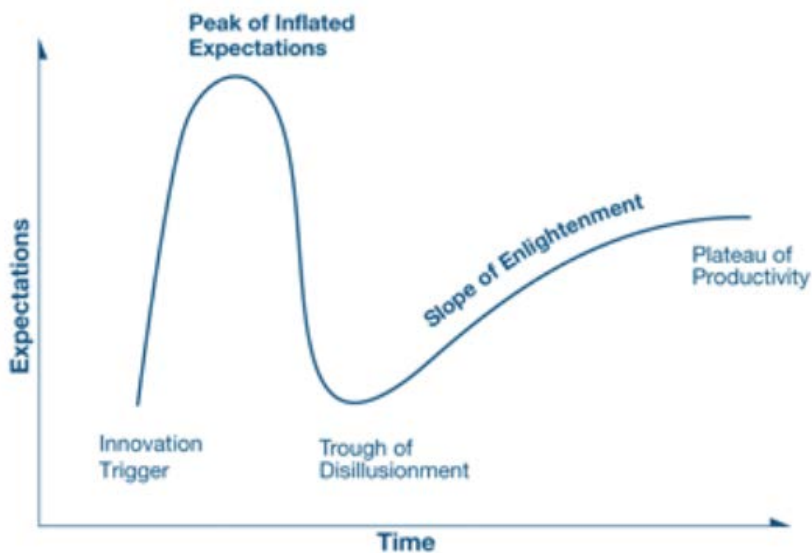


**Graph 4:** Sectors of innovative services in banking

Sectoral innovations			
Credit, deposit, and capital-raising services	Payments, clearing and settlement services		Investment management services
Crowdfunding	<b>Retail</b>	<b>Wholesale</b>	High-frequency trading
Lending marketplaces	Mobile wallets	Value transfer networks	Copy trading
Mobile banks	Peer-to-peer transfers	FX wholesale	E-trading
Credit scoring	Digital currencies	Digital exchange platforms	Robo-advice
Market support services	Portal and data aggregators		
	Ecosystems (infrastructure, open source, APIs)		
	Data applications (big data analysis, machine learning, predictive modelling)		
	Distributed ledger technology (blockchain, smart contracts)		
	Security (customer identification and authentication)		
	Cloud computing		
	Internet of things / mobile technology		
Artificial intelligence (bots, automation in finance, algorithms)			

Source: BCBS (2018)

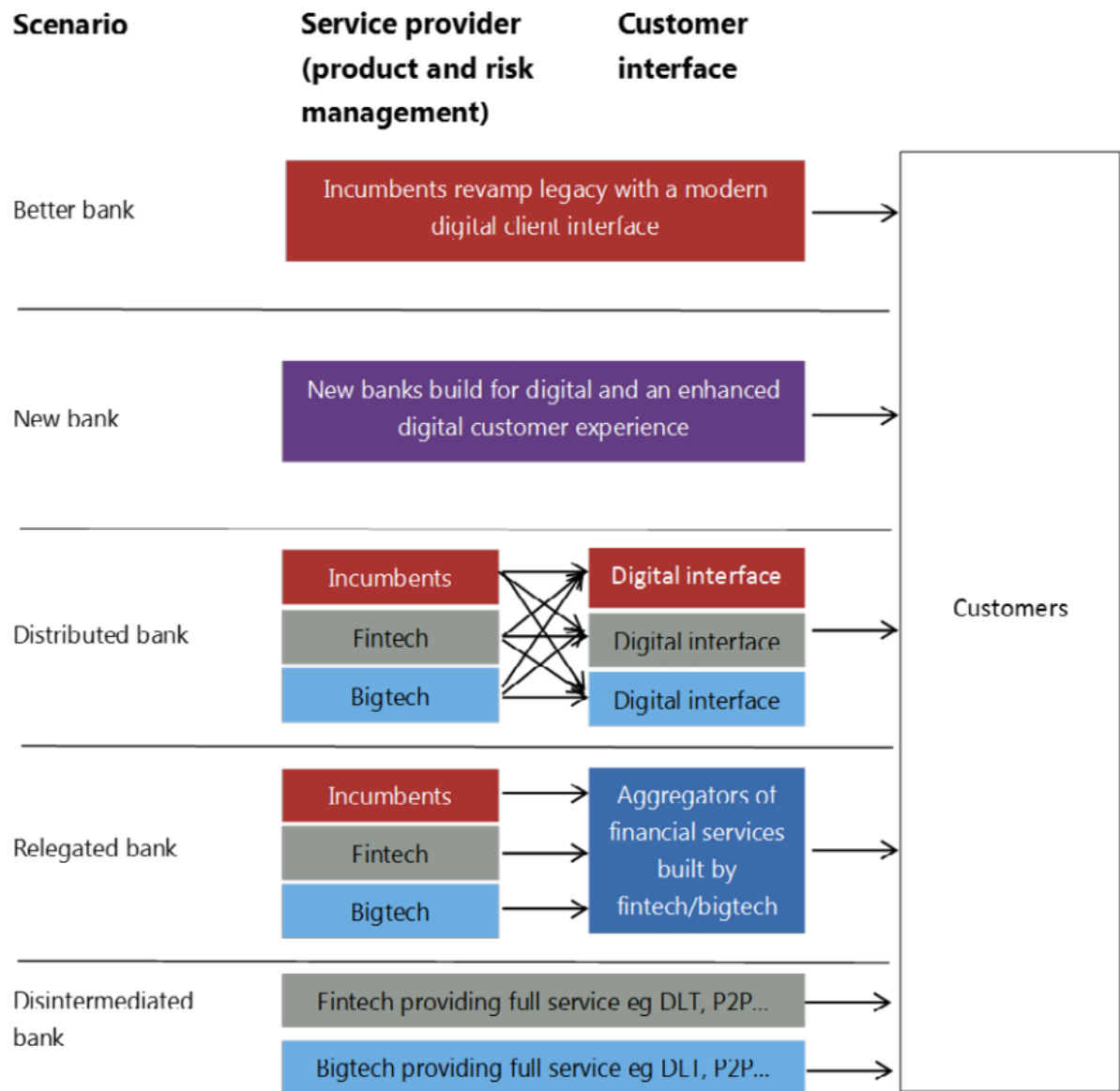
**Graph 5:** The hype cycle



Source: Blosch and Fenn (2018).



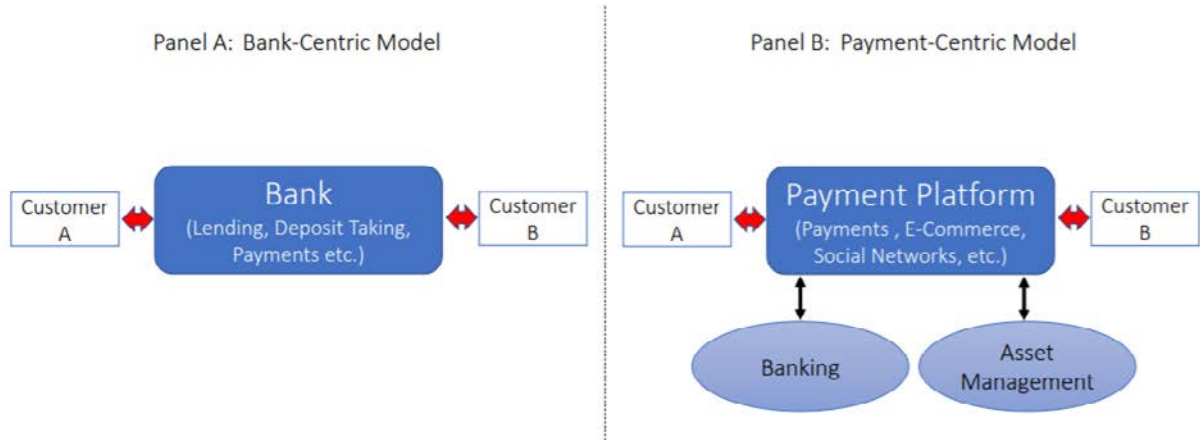
**Graph 6:** Stylised scenarios of impact of financial technology on banking



Source: BCBS (2018).



**Graph 7:** The inversion of the industrial organisation of financial services



Source: Brunnermeier et al (2019).

**Graph 8:** Risks and opportunities arising from financial technology and innovation

	Risks	Opportunities
Impact on consumer sector	<ul style="list-style-type: none"> <li>Data privacy</li> <li>Data security</li> <li>Discontinuity of banking services</li> <li>Inappropriate marketing practices</li> </ul>	<ul style="list-style-type: none"> <li>Financial inclusion</li> <li>Better and more tailored banking services</li> <li>Lower transaction costs and faster banking services</li> </ul>
Impact on banks and banking system	<ul style="list-style-type: none"> <li>Strategic and profitability risks</li> <li>Cyber-risk</li> <li>Increased interconnectedness between financial parties</li> <li>High operational risk – systemic</li> <li>High operational risk – idiosyncratic</li> <li>Third-party/vendor management risk</li> <li>Compliance risk including failure to protect consumers and data protection regulation</li> <li>Money laundering – terrorism financing risk</li> <li>Liquidity risk and volatility of bank funding sources</li> </ul>	<ul style="list-style-type: none"> <li>Improved and more efficient banking processes</li> <li>Innovative use of data for marketing and risk management purposes</li> <li>Potential positive impact on financial stability due to increased competition</li> <li>Regtech</li> </ul>