BANK OF GREECE
EUROSYSTEM

Economic Bulletin
ISSN 1105 - 9729 (print)
ISSN 2654 - 1904 (online)

THE EVOLUTION OF FINANCIAL TECHNOLOGY (FINTECH)

Sofia Anyfantaki*
Economic Analysis and Research Department

1 INTRODUCTION

The term "financial technology" (or FinTech) refers to the application of technology for the provision of financial services. As a sector, FinTech refers to technology startups that are emerging to compete with traditional banking and financial market players, offering a number of services, from mobile payment solutions (see Section 2.1) and crowdfunding platforms (see Section 2.2) to online portfolio management and international money transfers. FinTech companies are attracting the interest of both financial services users and investment firms, which see them as the future of the financial sector.

The term FinTech can be traced back to the early 1990s and more specifically to a project initiated by Citigroup.[1] However, it was only in 2014 that the sector started to attract the increased attention of regulators, industry and consumers. Although FinTech is seen as a recent close cooperation of financial services and information technology, the linkage of these two sectors has a long history. In fact, financial and technological developments have been interconnected and mutually reinforcing over time.

The global financial crisis of 2008 was a turning point and one of the reasons that made FinTech a new norm. This change has brought about challenges both for regulators and market participants, mainly in terms of striking a balance between the potential benefits and risks of innovation. Increased activity raises questions like: What will the financial landscape be like after digitisation? What will be the role of traditional banks? Will FinTech companies expand in tandem with the banking sector or not? What are the new risks posed by these new synergies to financial services users?

Regulators are faced by a difficult task in finding the right balance that will at the same time allow incumbent firms to survive and newcomers to innovate, as hindering the entry of new firms would distort the market in favour of established firms. Thus, given the abovementioned challenges, regulators should follow some general principles in order to strike a balance.[2] First, they should keep a neutral stance towards technological developments. Rules should promote healthy competition among market players, irrespective of whether they offer traditional approaches or new technological solutions. Second, a harmonised, non-discriminatory set of rules should apply establishing a level playing field for all participants, with a view to averting market fragmentation and low competition. Finally, regulators should above all ensure the protection of users, as well of the financial system itself.

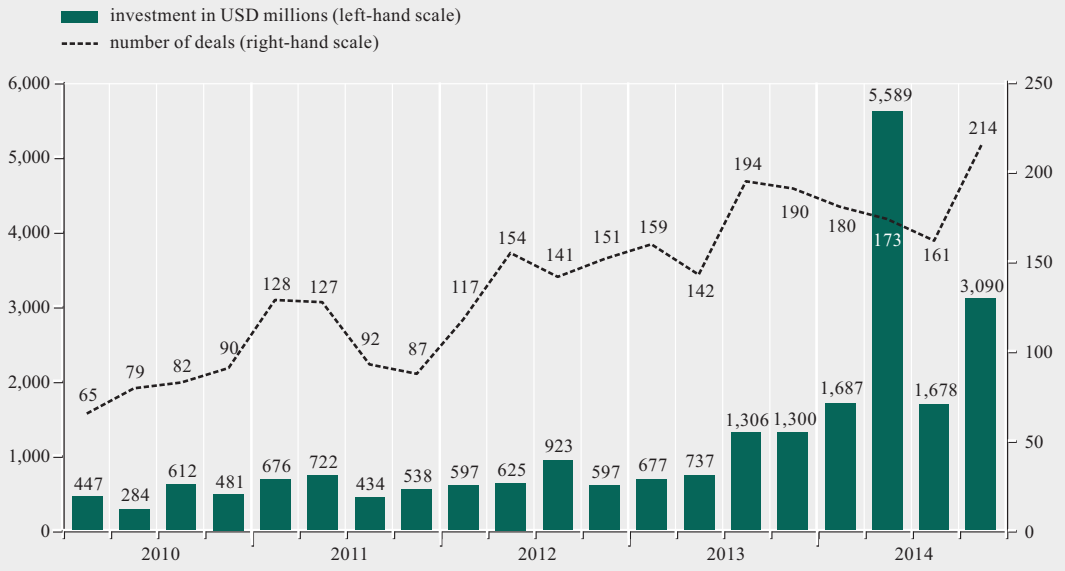
This article is structured as follows: Section 2 examines the drivers of the evolution of the FinTech sector. These include supply-side factors, related to the digital revolution, and demand-side factors, related to the emergence of new consumer patterns. A more detailed analysis is provided regarding the development of FinTech in payment services, lending and funding. Section 3 focuses on the role of banks with respect to FinTech, i.e. how big traditional players react and what alternative strategies they could adopt. Next, Section 4 explores the ensuing challenges for regulators, discusses different approaches to the protection of financial services users and outlines the existing regulatory framework of the European Union

* The author is grateful to Heather Gibson and Hiona Balfoussia for their very valuable guidance, comments and corrections. The author is also grateful to Konstantia Tzortsou, Panagiotis Droukas and Yannis Kanellopoulos for the fruitful discussion. The views expressed in this article are those of the author and do not necessarily reflect those of the Bank of Greece. The author is responsible for any errors or omisions.

1 FinTech is the initial name for the Financial Services Technology Consortium, a project initiated by Citicorp, former Citigroup. The Financial Services Technology Consortium (FSTC) started in 1993 to facilitate technological cooperation efforts in the sector of financial services.

2 See Darolles (2016).

Chart 1 Global investment in FinTech (2010-2014)



Source: BNY Mellon (2015).

(EU). In the last section, a brief overview of the landscape in Greece is provided.

2 THE EMERGENCE OF FINTECH

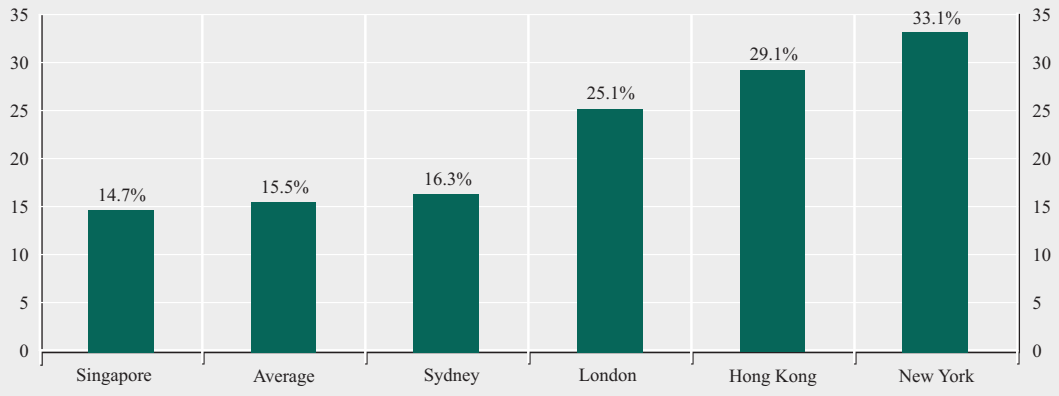
Once the global economy exited the crisis, it became clear that many customers, especially the younger generation, had lost their trust in banks. Apart from an increased mistrust of banks, young people have developed different consumer patterns from those of their elders. They have grown up being used to having access to personalised, tailor-made solutions, in stark contrast with the past "mass" approach of banks and other traditional financial institutions. Against this backdrop, if traditional players wish to attract profitable clients, they need to evolve and offer interactive solutions of the same level as those of their FinTech competitors.

This trend has been fuelled by a steady growth in global investment in the FinTech sector (see Chart 1), mainly by venture capital and private equity. Between 2013 and 2014, in only one year, FinTech investment almost tripled in the United States. London, San Francisco/Silicon Valley and New York have already emerged as major financial innovation hubs, while new hubs have followed suit around the world, namely Amsterdam, Paris, Berlin and Dublin, which are the main centres of the European FinTech ecosystem (see Chart 2).

These new opportunities have the strongest impact on emerging market economies, especially those with a rapidly increasing middle-income population. More specifically, there is now growing demand for financial services by people who previously had no access to the banking sector, as mobile device-based technology enables access to financial solutions without the need of physical banking infrastructure.

In developing countries, FinTech includes among other things the following features: (1) a young population with digital literacy and equipped with mobile devices; (2) a fast-growing middle class, with 60% of the world's middle class being identified in Asia by 2030; (3) inefficient financial markets, which allow for

Chart 2 FinTech hubs*



Source: EY FinTech Adoption Index.
* FinTech users as a percentage (%) of the digitally active population.

informal alternative solutions; (4) lack of physical banking infrastructure (1.2 billion people have no bank account); and (7) underregulated frameworks for data protection and competition. The above features are further fuelled by the interplay between a dynamic private sector that seeks to expand to the provision of financial services and a public sector that aspires after market reform in order to achieve economic growth.

In Asia and Africa, the recent growth of FinTech is primarily driven by economic development. Hong Kong and Singapore saw in less than a year the creation of three FinTech accelerators,[3] thus featuring the greatest concentration of FinTech accelerators worldwide. The emergence of FinTech in Asia is not unprecedented in the wake of the crisis, but it is rather the combination of a number of business and regulatory factors. More specifically, IT spending by traditional banks in Asia and Africa is lower than in Europe and the United States. This can be explained by a slightly less competitive market, which is still largely controlled and subject to distortions by state-owned banks. Public mistrust of the state-owned banking system (because of corruption and inefficiency) means that users are willing to adopt alternative solutions offered by non-banks. As a result, mobile financial services and mobile phone products are comparably more attractive.

Although Africa shares many common features with Asia-Pacific in terms of financial innovation development, the nature and the direction of the determinants of this sector are quite different in Africa. According to G20, almost 2.5 billion adults in the African continent (almost half of the working age population) have no access to the formal financial sector (see Table 1). In this context, telecommunication companies, instead of banks, have taken the lead in the development of FinTech in the region. Mobile money, which means basic payment and saving services whereby money is transferred electronically using a mobile device, although initiated in the Philippines, achieved its greatest success in Kenya and more recently in Tanzania.

2.1 PAYMENT SERVICES

The past five years have witnessed a number of novelties, which, by making a wide use of

3 Business development programmes for innovative firms that act as innovation "incubators", providing space, support (tailored training programmes, mentorship, networking, etc.) and every possible assistance to new researchers, entrepreneurs and startups, in order to develop new ideas and technology-driven solutions in the area of financial services.

Table 1 Commercial bank branches (per 100,000 adults)

Area	2004	2014
Euro area	33.6	28.0
East Asia and Pacific	13.9	10.8
Least developed countries	1.2	3.3
Sub-Saharan Africa	1.4	3.9
South Asia	7.2	8.9
Latin America and Caribbean	12.5	15.7
Middle East and North Africa	11.0	15.2

Source: The World Bank, http://data.worldbank.org/indicator/FB.CBK.BRCH.P5.

mobile devices and the internet, resulted in simpler payment solutions. Innovation comes in different forms, depending on the payments sector and the market. Such novelties include, for instance, digital wallets, mobile payments, contactless payments[4] and real-time payments.

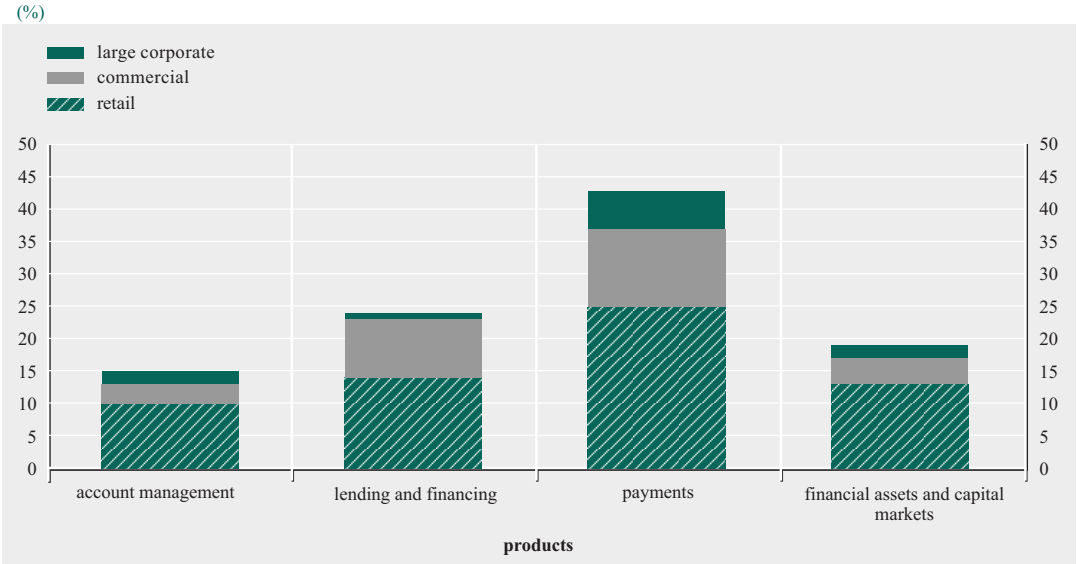
At the same time, over the past five years an increasing number of FinTech startups and non-bank payment providers have entered the payments industry (see Chart 3), taking advantage of an array of new technology conditions prevailing in the market and using alternative business models that could both disrupt and complement conventional payment practices. This new paradigm of non-bank payment provider has led to the emergence of FinTech startups (which seek to apply technological advances in payment services) as well as of incumbent firms in other non-payment industries (like Facebook and Apple).

A tangible proof of the potential market power of technology-driven financial service providers is PayPal. Today, the company has more than 100 million active accounts and processes a daily average of USD 315 million in payments. The use of prepaid cards also follows an upward trend. A report released in 2012 by MasterCard[5] projected that the market for the so-called e-money (cards pre-loaded with cash) would be worth around USD 822 billion by 2017. Furthermore, it should be noted that almost every bank account holder in the EU has a debit card and 40% of them also have a credit card. 34% of EU citizens already shop online and more than 50% have a smartphone, which allows them to access mobile payment. Some economy sectors —like the travel industry— perform most of their sales online. Finally, small and medium-sized enterprises (SMEs) are among the main beneficiaries of FinTech start-ups. They are willing to experiment with new tools that will have a material impact on their business activities. In fact, SMEs are the backbone of many economies (accounting for 80% of global economic activity).

First, what are the benefits of mobile payments? Due to the fact that mobile phones are all the more powerful and connected, the integration of payments into a mobile phone offers many potential advantages. The customer, using the computing and communication power of a mobile phone, may perform several other activities simultaneously. For instance, a consumer can compare retail prices, store the payment record using a financial management software, download a warranty or instructional video on how to use a product, etc.

4 Contactless payment allows consumers to pay for small purchases by simply tapping their card (or their mobile device) near the point-of-sale terminal, while the intervention of third parties or signature or PIN verification are typically not required.
5 2012 Global Prepaid Sizing Study, commissioned by MasterCard: A look at the potential for global prepaid growth by 2017.

Chart 3 Shares (per product and per customer segment) of FinTech in global banking revenue*



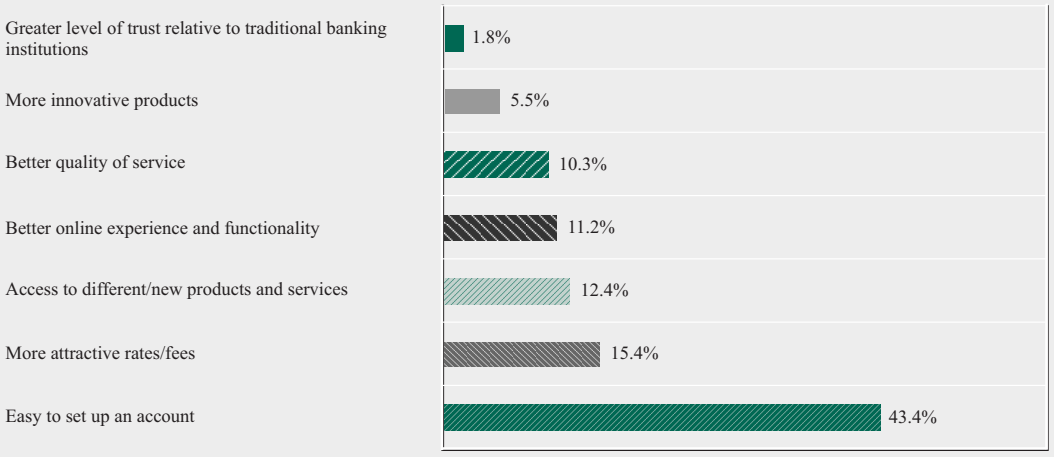
Source: McKinsey & Company, "Cutting through the noise around financial technology", February 2016.
* 350+ commercially well-known cases registered in the Panorama database of MacKinsey for 2015. Segments' share of global banking revenue as a percentage of total. "Commercial" comprises small and medium-sized enterprises and "Large corporate" comprises large corporations, public entities and non-banking financial institutions. Revenue share of "Account management" includes current/checking account deposit revenue. Revenue share of "Financial assets and capital markets" includes sales and trading, securities services, retail investment, asset management, etc.

The main common characteristics of payments innovations are: (1) simplicity (they allow customers to make payments in a single tap); (2) interoperability of IT systems (they are not restricted to a single payment method, as the digital wallet is linked to credit/debit cards or a bank account); and (3) supply of value-added services (customers, merchants and financial institutions interact more closely, which enables them to offer additional services such as offers, rebates and reward points).

These innovations have led to a shift away from cash towards electronic payments, as consumers now benefit from the use of payment cards even in small value transactions. Given that innovative solutions make use of the existing infrastructure, which has very low variable costs, the cost of electronic transactions is expected to fall as the volume of electronic payments increases. On the other hand, as a result of this shift towards electronic payments and hence the accumulation of more personal data, financial institutions, service providers and merchants will be better informed about their customers.

Furthermore, as transactions become all the more virtual and automated, an increasing number of payment processes will become invisible to end users, changing in this way both their needs and their consuming behaviour. In more detail, the successful deployment of digital wallets will free consumers from any limitations on the number of payment cards they can hold and use for their transactions. Conversely, customers may add multiple payment cards to digital wallets and choose a different card each time with a few additional clicks or in just one click. On their part, to ensure faster, simpler and more efficient payments, a growing number of merchants and payment solution providers will offer an automated or one-click check-out in electronic payments, in which consumers will have set a default card for all transactions unless a different payment method is selected. As a result of the above, card issuers will have to differentiate in order

Chart 4 Top seven reasons consumers are using FinTech*



Source: EY FinTech Adoption Index.
* Total responses: 1,485.

to compete for the default card, by providing e.g. rebates or loyalty points. Moreover, leveraging data in specific customer segments will become a key component of financial institutions' strategies to gain a dominant share in digital wallets.

With banks increasingly aware of the fact that FinTech and developments in payments strongly affect the future path of payment services, the payments industry is rapidly evolving, as traditional players and FinTech startups have established collaborative partnerships to make the best of both parties and to provide customers with optimal solutions. New technologies compromise the traditional role of banks in the payments landscape. Conventional payment solutions, such as credit and debit cards, have been the main interest income source for many banks. Such fee revenue is threatened by innovation, and banks may see their share in the payment services market decline, since the adoption of a digital wallet is as simple as the installation of an application in a smartphone. New, innovative banking products and services are only available digitally (e.g. digital wallets for mobile devices), user-friendly, tailor-made and readily available to users. Financial institutions' ability to partner with merchants will constitute a critical component of their strategies, either by offering merchants with special terms and conditions of use or by becoming the default card for e-commerce platforms.

2.2 LENDING AND FUNDING

In the post-crisis period, lower risk appetite among retail banks has significantly limited access to traditional bank lending. This mutual loss of trust created a lending gap, which means that a considerable part of borrowing needs is not adequately met by financial institutions. Furthermore, customer preferences in financial services are rapidly changing, which calls for increased transparency, effectiveness and control over savings and loans.

Over the same period, alternative peer-to-peer (P2P) lending platforms have emerged to fill gaps in the traditional lending model. Such platforms use alternative methods for assessing customers' creditworthiness (for example, files of sales history from eBay, social media data, etc.) and automated processes to offer loans to a broader base of customers, as well as a new class

of investment opportunities. P2P lending platforms are a new form of lending, without necessitating financial intermediation. Acting mainly as online stock markets, lenders offer an amount, which is usually shared among borrowers to achieve risk diversification, while borrowers pick the lowest interest rate, i.e. the lowest return among those offered by lenders.

Emerging alternative lending models pose competitive threats and create opportunities for financial institutions, which highlights the importance of close partnerships and synergies with a view to mutually sharing capabilities and learning from each other's lessons. In particular, P2P lending processes are flexible and automated, while P2P online platforms can process requests from investors and borrowers faster and more efficiently due to state-of-the-art infrastructure and absence of regulatory obligations. As a result, online platforms entail lower operating costs than traditional financial institutions. In view of rising customer demand for flexible, smart and tailored services, conventional financial institutions are upgrading their financial products, focusing on sophisticated or highly personalised products.

Typically, capital raising activities have been facilitated by specialised financial institutions, which on the back of their expertise are able to identify and support investment opportunities. In view of growing interest in startups and digitisation, a number of alternative funding (crowdfunding) platforms have been launched, thereby increasing access to capital raising activities and providing funding to a greater number of companies and projects, where potential funders meet project developers via an online platform.

Alternative funding platforms[6] provide an opportunity for businesses to interact directly with individual investors to widen their raising capital options. Crowdfunding serves as an alternative model to funding for projects and businesses that lack access to capital investment. It rests upon the active participation of internet users, who are invited to financially back a new project or business often in exchange for some sort of "reward" (e.g. rebates and small gifts), without the need of a financial intermediary. In recent years, "equity crowdfunding" has also emerged, under which backers receive equity shares of the company or buy part of the debt/lend money in return for a future premium.

Although these alternative funding platforms are not likely to replace the traditional funding ecosystem in the short or medium term, their growth could change the role of incumbent institutions. Against this backdrop, the public, investors and regulators have largely focused their attention on alternative financing mechanisms. However, FinTech goes beyond this narrow scope to include financing of technology itself (e.g. via venture capital, private equity, public offerings, etc.). In addition to the continued development of alternative financing mechanisms, FinTech is increasingly involved in areas such as robo-advisory services.[7] Robo-advisors are just one example of the way incumbent firms are innovating in order to recast their customer relationships and offer new banking approaches.

2.3 DIGITISATION

Digitisation is nothing new in the banking and financial sector. High-frequency trading and related arbitrage strategies are good examples of the impact that new technologies already have. The increased use of mobile phone devices and smartphones (in 2014, active mobile devices outnumbered humans on the planet) has placed digital services in the hands of consumers who previously could not be reached. Boasting access to cloud-based technology, smartphones enable digital services to be accessed by almost anyone, anywhere and anytime.

6 The most popular platforms globally are kickstarter.com and indiegogo.com, while groopio.com is the first Greek crowdfunding platform.

7 "Robo-advisors are a class of financial adviser that provide financial advice or investment management online with moderate to minimal human intervention", Wikipedia.

Besides, new technology has considerably improved storage of, access to and interpretation of data, resulting in significant benefits, yet also the need for greater data protection. For the banking industry, perhaps the biggest potential comes from "big data".[8] In recent years, thanks to the development of new technologies and applications —such as the widespread use of social media and smartphones— the volume and the format of data have changed drastically, and data analytical and management capabilities are impressive. Technology advancements have made it possible to effectively analyse and interpret vast, complex sets of data. This "smarter" data management allows banks to create more effective, client centric solutions that are more in line with customer needs.

For the largest part of the 20th century, payments meant the exchange of banknotes or checks. Even credit card transactions required the submission of receipts and supporting documents between banks. Nonetheless, digitisation in payment services has taken place very early, making it hard to imagine the digitisation of other industries without a previous digitisation of the payments industry (PayPal for instance). However, all these digital payment systems use a centralised network that requires users' trust in a central counterparty. In 2009, a whitepaper proposed the creation of a distributed ledger that facilitates transactions between parties without the need of an intermediary via a cryptographic process. Such a distributed payment peer-to-peer protocol is the Bitcoin network, with bitcoins as the digital currency of the ledger. Digital currencies belong to the class of cryptocurrencies, using cryptography to control the creation of additional units and to secure transactions. As transactions are made, changes in the ownership of cryptocurrencies are recorded in a public ledger which is known as the "blockchain".[9] Since 2009 a range of networks have been developed, built on the same underlying principles and concepts but employing different encryption technology or targetting on different usage.[10]

The outlook for digital currencies as a means of payment is unclear. Some consider that the key role of digital currencies will be cross-border capital transfers, which are priced quite highly by banks. Virtual currencies have attracted great attention from the media and policymakers, while central banks are closely monitoring this issue. Indeed, blockchain technology poses a number of challenges that have yet to be resolved. In particular, there is still considerable uncertainty in many markets surrounding the future regulatory framework for bitcoins, with regulatory authorities puzzling over whether digital currencies should be treated as a fiat currency (and thus as a foreign currency), as a commodity (and therefore as a good), as a form of money substitute (and therefore not officially recognised by governments) or as something completely new.

3 THE ROLE OF BANKS

The financial crisis of 2008 led to a series of major upheavals in the banking and more broadly the financial sector. First, it became evident that the activities of large financial institutions generate systemic risk. This in turn led to the compilation of different metrics designed to quantify systemic risk. Bank financial regulation tightened (Basel III) and many financial institutions had to respond by, among other things, adjusting their IT development methods to the new regulatory framework. At the same time, banks had to confront not only an increasing number of competitors, but also

8 A 2012 definition by Gartner research company states that: "Big data is high-volume, high-velocity and/or high-variety information assets that demand cost-effective and innovative forms of information processing". The three "Vs", i.e. Volume, Velocity and Variety, are usually referred to in the literature as the key features of big data. Thus, the concept of big data is not merely about the size, the type or the source of data but rather reflects a number of processes that require enhanced insight.

9 In particular, when users spend digital currencies, the respective network records the transaction in a list called block. Every block is linked to the previous and the next one and thus a chain is created, i.e. the blockchain. In this way, the blockchain is essentially a public distributed ledger, since everyone on the network has a copy, allowing for security and transparency.

10 There are more than 500 different alternative digital currencies (altcoins). Most of them build up on the same framework provided by Bitcoin and die out shortly. Apart from Bitcoin, most popular distributed ledgers are Litecoin, Ripple and Namecoin.

a new type of competitor, which is largely seen as better placed to respond to changing market regulations and customer needs. This is about FinTech startups that can develop innovative products at a faster rate, showing a clear competitive advantage relative to the more traditional methods employed by banks.[11]

2015 was the year when it became clear that the Digital Revolution had finally hit the banking sector. Global investment in FinTech tripled to USD 12 billion between 2013 and 2014,[12] and the British Bankers' Association announced that mobile banking has become the preferred payment method for customers. The banking sector has a high IT spending-to-revenue ratio. However, between 2014 and 2015, total global investment increased by only 4.6%, with the bulk referring to system maintenance.

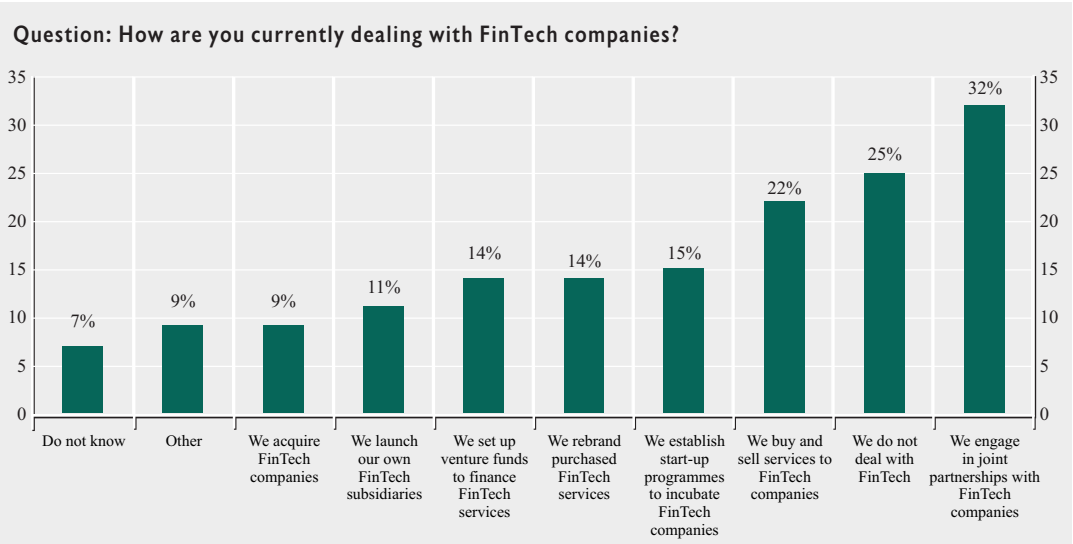
Historically, banks have been responsible for most financial innovations. The launch of credit cards in the 1950s and of ATMs in the 1970s revolutionised the way we access and pay for goods and services. The financial sector has continued to witness many remarkable innovations and technological advances, such as contactless technology, digital wallets and cryptocurrencies. However, nowadays innovation rarely comes from banks, but from small FinTechs. Despite their differences, both FinTechs and banks have a lot to gain from working together. FinTechs can benefit from the long history of banking operations and banks' institutional framework. On their part, banks can gain value added, either through synergies and partnerships with FinTechs or through the acquisition of their advanced technology offerings.

The European Banking Authority (EBA), the European Securities and Markets Authority (ESMA) and the European Insurance and Occupational Pensions Authority (EIOPA), in their joint report on risk and vulnerabilities in the EU financial system that was published in March 2016,[13] acknowledge that increasing proliferation of financial technology and of FinTechs, digitisation and rapid innovation characterise a changing financial sector, noting that technology advances may increasingly affect traditional providers of financial services and their revenues. The report states that FinTech's development can also provide opportunities, including wider access to financial services for customers at lower costs, increasing competition and efficiency, reduced systemic risk, as well as access to better and more customer-friendly products. On the other hand though, concerns are expressed as to the impacts on the banking sector. In more detail, it is argued that FinTech could affect banks' future profit generation capacity, promote the risk-taking behaviour of traditional financial institutions and increase operating risk as a result of outsourcing to FinTech in an effort to reduce operating costs. At the same time, the report expresses concerns that FinTech may give rise to additional risks, such as money laundering and reputational and integrity risks, as in the long run FinTech and digitisation could pose risks to financial stability and the orderly functioning of markets. Finally, the Board of Directors of the Euro Banking Association decided to create an open forum for banks, FinTechs and other stakeholders to exchange views and experience on the various issues related to the implementation of the New Payment Services Directive (PSD2) and the creation of an Open Banking environment.

Banks maintain their reputation for reliable and secure transactions and invest in high regulatory standards, but they also recognise the importance of being at the forefront of innovation and seek to exploit the enormous potential offered by FinTech. This has led a large portion of banks to explore different approaches to leverage FinTech innovation (see Chart 5), including venture capital investments, accelerator/incubator programmes and

11 In the financial sector, FinTech firms have a comparative advantage, due to the technical debt that was accumulated by traditional players, notably banks. See Darolles (2016).
12 http://www.fintechinnovationlondon.net/media/730274/Accenture-The-Future-of-Fintech-and-Banking-digitallydisrupted-or-reima-.pdf.
13 *Joint Committee Report on Risks and Vulnerabilities in the EU Financial System*, https://esas-joint-committee.europe.eu.

Chart 5 Dealing with technology and innovation*



Source: PwC, The 19th Annual Global CEO Survey, 2016.
* According to a PwC survey of 176 CEOs from the Banking and Capital Markets sector in 62 countries.

close collaboration with the FinTech community. There are also several other initiatives such as the "hackathon-type" innovation programmes, with a limited impact on the internal performance of the sponsoring organisations.

According to a survey conducted by PricewaterhouseCoopers (PwC 2016a) on 176 CEOs from the Banking and Capital Markets sector in 62 countries, interviewed CEOs see customer relationship management systems (80% of respondents), data analytics (75%) and social media communication and engagement (56%) as the top three technologies that would generate the greatest returns in terms of customer engagement. The ability to analyse a larger volume of data with higher speed and more accurate predictions can ensure a faster, targeted and forward-looking response to customer demands and capital market developments. Chart 6 also shows that CEOs acknowledge the impact that customers have on their business strategy (for almost 90% of respondents, meeting customers' expectations is a top priority).

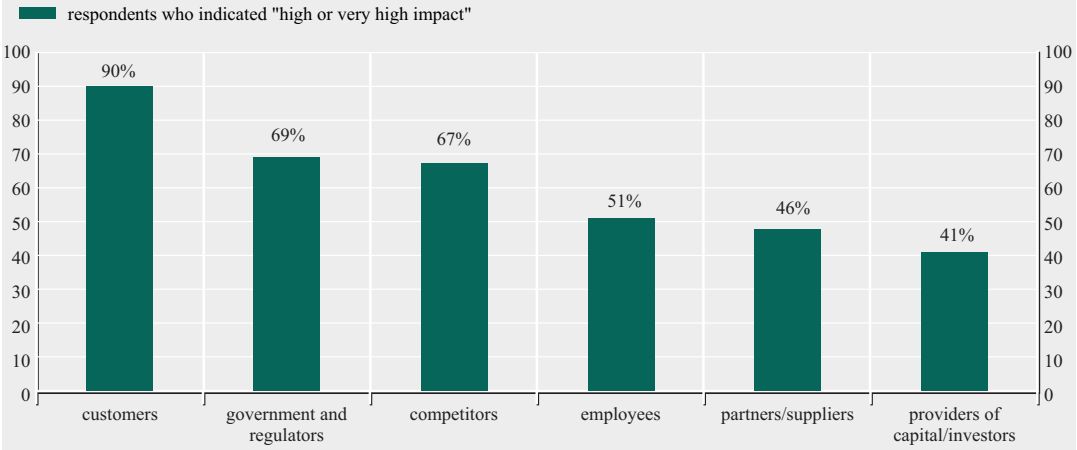
As the rate of change is accelerating, banks engage with the FinTech community in order to better understand future challenges and opportunities. Against this background, banks should continue (a) developing and publishing an internal "road map" outlining how to identify and respond to market threats and opportunities; (b) conducting ongoing research to keep abreast of FinTech-driven changes; (c) ensuring that key staff are educated on developments, threats and opportunities; (d) developing an innovation programme; and (e) optimising already available information and data.[14]

Experience from several European FinTechs has shown that FinTechs and banks can work together at different levels. Notwithstanding the level at which they engage in a partnership, both sides have potential valuable gains. FinTechs are technology-intensive companies that seek to test new technologies and explore what is technically feasible without being bound by rigorous legal frameworks. By implementing

14 See BNY Mellon (2015).

Chart 6 Determinants of corporate strategy*

Question: What impact do the following stakeholder groups have on your organisation's strategy?



Source: PwC, The 19th Annual Global CEO Survey, 2016.
* According to a PwC survey of 176 CEOs from the Banking and Capital Markets sector in 62 countries.

innovative approaches, they promote a large number of new ideas in a very flexible way. On the other hand, banks can add regulatory, legal and risk management expertise and can give FinTechs access to global payment systems as well as to their customer databases. Together, FinTechs and banks create an ecosystem that allows them to better respond to customer needs and bridge the gap between the services offered by traditional banks and those actually demanded by customers.

4 THE ROLE OF REGULATORS

In recent years, retail payments have seen significant technical innovations with a rapid growth in the number of electronic and mobile payments, as well as with the emergence of new types of payment services, which has challenged the framework under the Payment Services Directive (PSD).[15] Many innovative products or services fall entirely or in large part outside the scope of the PSD. At the same time, the EU market for card, internet and mobile payments remains fragmented along national borders and faces serious challenges that hinder its further development and halt the EU's growth momentum (different cost of payments for consumers and merchants, different technical infrastructures, lack of a common set of technical requirements among payment service providers, high interchange fees that translate into higher consumer prices).

In this context and in order to adapt the European payments market to the opportunities of the single market and to support the growth of the EU economy, the European Commission adopted a package of measures. The revised Payment Services Directive (PSD2)[16] introduces some new elements and significant improvements in the EU payments market. In particular, it aims to facilitate and render more secure the use of internet payment services by including within its scope the new payment initiation services. Such services operate between the merchant's and the consumer's bank, allowing for low-cost and efficient electronic payments without the use of a credit card. These service providers will now be sub-

15 Directive 2007/64/EC.
16 These measures become effective on 31 January 2018. Directive 2015/2366/EU.

ject to the same high regulatory and supervisory standards as the other payment institutions. At the same time, banks and other payment service providers should enhance online security by requesting strong customer authentication.

Secure payment services are a prerequisite for the smooth functioning of the payment service market. Users should therefore be adequately protected against potential risks.[17] All online payment services should be secured by adopting technologies able to guarantee safe user authentication and to mitigate the risk of fraud. In order to allow for user-friendly and easy to access means of payment for low-risk payments, such as low value contactless payments at the point of sale, mobile or not, security requirement exemptions should be specified in regulatory technical standards. In this respect, the user should be able to rely on measures that protect the confidentiality and integrity of personalised security credentials (for example, by SMS or email).

Moreover, in recent years technological advances have given rise to the emergence of a range of complementary services, such as account information services where the user is able to have an overall view of its financial situation immediately and at any given moment.

The PSD2 also includes the above mentioned services in order to provide consumers with adequate protection for their payment and account data. Finally, payment initiation services enable the payment initiation service provider to provide comfort to a payee that the payment has been initiated in order to provide an incentive to the payee to release the goods or to deliver the service without undue delay. Since payment initiation services were not included in the PSD, this raised a number of legal issues, such as consumer protection, security and data protection. The new rules under the PSD2 therefore address these issues.

From a regulatory point of view, a change of attitude was warranted as to how FinTech products and services should be regulated. The digitisation of processes and services of financial institutions is a completely understandable market trend with regulatory implications and obligations related to the use of technology. On the other hand, tech startups enter the financial industry with little or no past regulatory experience. These companies tend to lack a culture of compliance regarding their obligations for customer protection in the provision of financial services. This is precisely where the current debate around FinTech regulation lies.

The objective of the new rules set by the PSD2 is to close the regulatory gaps, as well as to provide more legal clarity and ensure consistent application of the legislative framework across the EU. In particular, a level playing field is guaranteed for both incumbents and new market participants, enabling new means of payment to reach a broader market and ensuring a high level of consumer protection in the use of these payment services across the EU. This will improve the efficiency of the payment system as a whole and lead to more choice and more transparency of payment services, while strengthening the trust of consumers in a harmonised payments market.[18] Moreover, the Directive states that the definition of payment services should be "technologically neutral" and should allow for the development of new types of payment services, while ensuring equivalent operating conditions for both existing and new payment service providers.

The European Supervisory Authorities (comprising the ESMA, the EBA and the EIOPA) are monitoring the growing number of institutions offering automated services as well as the use of Distributed Ledger Technology (DLT). The EBA also encourages regulators to

17 Directive 2015/2366/EU: "Consumers should be protected against unfair and misleading practices...".

18 It should also be noted that low value payment instruments are an inexpensive and easy-to-use alternative for goods and services of low price and should thus not be overburdened. In order to enhance consumer confidence in a harmonised payments market, it is important that the payment services user is aware of the actual costs and charges.

closely monitor FinTech with a view to assessing potential risks to investor protection, e.g. information technology risk.

The banking and financial sector has undergone profound changes and regulators need to avoid two pitfalls. The first is overprotecting incumbents by erecting barriers to entry for newcomers. This would discourage financial innovation and hinder competition in the sector. Conversely, the second potential pitfall is choosing to act in favour of newcomers, by imposing on them less strict regulating rules than on incumbents. Thus, they should provide a level playing field to all participants, while at the same time fostering an innovative, secure and competitive financial market. In addition to the rules per se, authorities look in general at the incentives offered to market players and how these could make them change their behaviour. In this vein, FinTech needs a framework that will be both harmonised and dynamic and from which market players (e.g. institutional or newcomers) and regulators alike benefit. Regulators' objectives include: (a) financial stability, (b) prudential regulation, (c) fairness and (d) competition and market development.[19]

5 THE GREEK FINTECH LANDSCAPE

In Greece, since the imposition of capital controls and the subsequent shock, an increasing number of individuals and businesses, following the global trend, have resorted to electronic means of payment and banking. Restrictions on cash withdrawals, corporate transactions and capital transfers abroad have pushed many consumers and firms towards a broader use of electronic payment methods. On 26 September 2016, the European Central Bank (ECB) published the 2015 statistics on non-cash payments in the EU. On the basis of these statistics, in Greece the total number of non-cash payments, comprising cheques, card payments (excluding e-money payment transactions), credit transfers and direct debits, surged to 423 million in 2015.

In Greece, the most popular FinTech instrument is the e-wallet, which allows users to make payments and transfer amounts to third parties or to bank accounts. Apart from wallet-to-wallet transfers (without transaction fees), the e-wallet also enables the payment of utility and other bills, the transfer of amounts to a mobile contact or a business VAT identification number, as well as payments at a physical store without a POS terminal.

In the Greek market, banks as well offer electronic banking services through different communication channels, such as e-banking and mobile banking. Furthermore, banks have shown a keen interest in the provision of up-to-date electronic services and are active supporters of FinTech. A number of banks have launched the electronic wallet linked to a bank account or a debit/credit/prepaid card, which supports among other things contactless payments, transactions history, transfers of amounts to mobile or social media contacts without the need to know the bank account number of the recipient, one-click buying on electronic stores, payments of utility and other bills, rebates and reward points.

The competent authorities for the authorisation and prudential supervision of credit institutions, payment institutions and electronic money institutions[20] are the Bank of Greece and the ECB. In particular, the authorisation requirements and the supervision rules governing the operation of electronic money institutions are laid down in Law 3862/2010, Law 4021/2011,[21] and Bank of Greece Executive Committee Acts 33/19.12.2013 and 22/12.7.2013. Under Article 12(1) of Law

19 See Arner et al. (2015).

20 Under Article 10 (1) of Law 4021/2011, "electronic money" means "electronically, including magnetically, stored monetary value as represented by a claim on the issuer which is issued on receipt of funds for the purpose of making payment transactions .... and which is accepted by a natural or legal person other than the electronic money issuer".

21 Law 4021/2011 (Articles 9-30) transposes into Greek law the provisions of Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009 (OJ L267/10.10.2009) on the taking up, pursuit and prudential supervision of the business of electronic money institutions amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC.

4021/2011, the Bank of Greece is responsible for the authorisation and prudential supervision of Electronic Money Institutions. In this capacity, the Bank of Greece issued Executive Committee Act 33/19.12.2013. In order to be granted authorisation, prospective electronic money institutions are required to hold initial capital of not less than EUR 350,000 (three hundred and fifty thousand). The above Law also sets out the capital requirements and the method of calculation of own funds requirements for electronic money institutions, and specifies the safeguarding requirements for funds received, the optional exemptions and the activities in which electronic money institutions are entitled to engage in addition to issuing electronic money, either in Greece or on a cross-border basis. In accordance with Article 25(1) of Law 4021/2011, issues concerning the provision of information, by electronic money institutions, to electronic money holders on their rights, as well as the review of complaints from electronic money holders do not fall under the competence of the Bank of Greece, but under that of the Secretariat General of Consumer Affairs.

In the context of providing information to interested parties, the Bank of Greece publishes online lists (register tables) of all credit or financial institutions authorised to provide banking services. According to the register tables, only one electronic money institution and nine payment institutions are operating in 2016. The tables also include those payment and electronic money institutions that have notified of their intention to provide services in Greece without establishment.[22]

6 CONCLUSIONS

As already mentioned in the introduction, financial sector and technology have long been intertwined concepts and these two sectors are mutually reinforcing. Although it is difficult to determine how and where this shift in financial services began, the global financial crisis of 2008 was undeniably a turning point, playing a key role in the emergence of the FinTech era.

FinTech covers digital innovations and technology-enabled business innovation models in the financial sector. Such innovations may disrupt existing structures in the industry, revolutionise the way existing businesses generate and distribute their products and services, and open new avenues for entrepreneurship. Examples of innovations that are central to FinTech today include mobile payment systems, new digital advisory and trading systems, peer-to-peer lending, equity crowdfunding, cryptocurrencies and blockchain.

Recent innovations might pose several challenges for incumbent providers of financial services. But they may also represent opportunities for the financial sector, including wider access for consumers to financial advice and services at a lower cost and increased competition and efficiency. The growing diversity of market participants and financial services offered can also reduce systemic risk and lead to better and more customer-friendly products. The financial sector has benefited more compared to other industries from the improvements in the information technology sector.

In the banking sector, FinTech could impact banks' future revenue-generating capacity, with a negative impact on capital adequacy due to loss of deposits. Financial institutions rely more heavily on non-interest income. FinTech companies are often able to offer more efficient services, while market entry barriers may be lower than for traditional financial service providers, as digitisation further facilitates their entry into the market.

Supervising authorities are closely monitoring the evolution of financial technology in order to fully understand developments in FinTech and innovation and be ready to respond effectively to a rapidly changing financial sector.

22 http://www.bankofgreece.gr/Pages/en/Supervision/SupervisedInstitutions/default.aspx.

This includes assessing potential risks to investor protection. Digitisation offers huge growth potential for the financial sector. However, it is important that the necessary regulatory changes do not stifle innovation and at the same time ensure the stability that this sector needs in order to meet customer expectations. The aim of the regulatory framework is to promote financial stability and access to services, while regulators aim to continue exploring policies that promote innovation and the entry of newcomers.

REFERENCES

Accenture (2016), "FinTech and the Evolving Landscape: Landing Points for the Industry", https://www.accenture.com/t20160427T053810__w__/us-en/_acnmedia/PDF-15/Accenture-Fintech-Evolving-Landscape.pdf#zoom=50.

Arner, D.W., J. Barberis and R.P. Buckley (2015), "The Evolution of FinTech: A New Post-Crisis Paradigm?", University of Hong Kong Faculty of Law Research Paper No. 2015/047; UNSW Law Research Paper No. 2016-62, http://ssrn.com/abstract=267655.

Bareisis, Z. and G. Lodge (2016), *Banks, Retailers, and Fintech: Reimagining Payments Relationships, Part One: The Bank Perspective*, Celent Report, Oliver Wyman Group, January.

BNY Mellon (2015), "Innovation in Payments: The Future is Fintech", https://www.bnymellon.com/_global-assets/pdf/our-thinking/innovation-in-payments-the-future-is-fintech.pdf.

Chishti, S. and J. Barberis (2016), *The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries*, Wiley.

Darolles, S. (2016), "The rise of fintechs and their regulation", Banque de France, *Financial Stability Review*, 20, 85-92.

EY (2015), "Who will Disrupt the Disruptors?", *The Journal of Financial Perspectives: FinTech*, Winter 2015.

EY (2016), EY FinTech Adoption Index.

Kim, Y., J. Choi, Y.-J. Park and J. Yeon (2016), "The adoption of mobile payment services for 'Fintech' ", *International Journal of Applied Engineering Research*, Vol. 11, No. 2, 1058-1061.

McKinsey & Company (2016), "Cutting through the noise around financial technology".

Micu, I. and A. Micu (2016), "Financial technology (Fintech) and its implementation on the Romanian non-banking capital market", *SEA-Practical Application in Finance*, Vol. 4, No. 2(11).

Philippon, T. (2016), "The FinTech opportunity", *NBER Working Paper Series*, No. 22476: http://www.nber.org/papers/w22476.

PwC (2016a), *19th Annual Global CEO Survey – Key findings in the banking and capital markets sector: Creating a platform for competitive regeneration*, PricewaterhouseCoopers LLP, February.

PwC (2016b), *Blurred lines: How FinTech is Shaping Financial Services, Global FinTech Report*, PricewaterhouseCoopers LLP, March.

Rysman, M. and S. Schuh (2016), "New innovation in payments", *NBER Working Paper Series*, No 22358: http://www.nber.org/papers/w22358.

Santander InnoVentures, Oliver Wyman and Anthemis Group (2015), "The Fintech 2.0 Paper: rebooting financial services", http://santanderinnoventures.com/wp-content/uploads/2015/06/The-Fintech-2-0-Paper.pdf.

Walker, A. (2014), "Banking without banks: exploring the disruptive effects of converging technologies that will shape the future of banking", *Journal of Securities Operations and Custody*, Vol. 7, No. 1(12), 69-80.