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**MARKET STUDY ON THE IMPACT ON
COMPETITION OF TECHNOLOGICAL
INNOVATION IN THE FINANCIAL
SECTOR (FINTECH)**

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EXECUTIVE SUMMARY

The **financial sector is one of the most important sectors for any market economy**, especially from a qualitative point of view. As evidenced by economic history and particularly recent experience, the problems of the financial system spread throughout the economy and prevent it from functioning normally. **For regulation and competition authorities, the financial sector raises a specific interest** both for its **relevance for nascent and innovative small companies and projects** in the economy as a whole as well as for the presence of **market failures that justify public intervention**.

The **Fintech** phenomenon, defined as the **disruptive application of new technologies to the financial system**, is also of interest to regulatory and competition authorities, since it **affects the two previous issues**. On the one hand, the Fintech phenomenon has an **impact on the competitive conditions of the financial sector and therefore of the entire economy**. On the other hand, the Fintech ecosystem **can eventually correct certain market failures, making it necessary to reconsider** the reasons and forms of **public intervention**.

The **financial system is essential to** achieve **efficiency** and maximize the welfare in any economy, since it is responsible for the efficient allocation of one of the main production factors, namely, capital.

The exchanges and relationships between agents built in the financial sector rest vitally on trust and credit in the counterparty. However, **information asymmetries** plague the financial industry. In a dynamic and changing context, agents are forced to constantly gather new relevant information to adjust their expectations and correctly value financial products. The main conclusion reached is clear: **information is by far the most important input of the financial industry**. And **Fintech is nothing but a disruption in the more efficient exploitation of that information**.

Taking a very long-term view through the lens of competition, the history of the financial system is that of a constant challenge to the incumbent market agents by the new entrants. Indeed, leaving aside the insurance sector, a notable feature of the financial sector's evolution has been the progressive loss of weight of the banking sector, which initially monopolized credit (channeling of funds) and payment activities, in favor of new agents. The greatest erosion of this predominant position was the enduring process of disintermediation that led to the emergence of direct financing through stock markets. The advent of **Fintech may imply a new milestone** in this process of **diversification of financial activities**.

The **financial sector is also one of the most regulated sectors** in any developed country. The study also examines the financial regulation as a whole in order to identify

how **Fintech** could affect its roots, since it would **affect** the very same **market failures** put forward as **justification for public intervention** in the financial industry.

Financial regulation is analyzed through the prism of the **principles of competition and efficient economic regulation**. This **task** is all the more **necessary in the face of technological innovation and the emergence of new operators, services and business models** that would require **new regulatory approaches**.

The application of ICT to the financial sector is not new, but **digitization has accelerated in the last two decades**, in such a way that several **national monetary and financial authorities** are currently **reviewing their regulatory frameworks** to accommodate the new types of businesses and activities that derive from it. In addition, from a competition perspective, in recent years this process has been carried out in part by **new players** who, for the first time in decades, have **disputed the market to traditional financial institutions**.

Currently, "**FinTech**" in a broad sense refers to the **use of ICT to provide financial services** (Nicoletti, 2017). The success of the Fintech phenomenon (in a broad sense) is clearly the **better or more efficient satisfaction of financial needs**. Moreover, a series of factors that trigger the Fintech phenomenon can be found, factors which are widely cited and which in turn allow characterizing it, such as recent technological innovations in certain areas of ICT, the development of the collaborative economy and services on demand and even the distrust arising from the last global financial crisis. Likewise, the heavier regulation of the financial sector, partly in response to the global financial crisis, may have stimulated disruptive innovation with the entry of new agents who dispute the markets to incumbent institutions.

It is early to know the effects of Fintech on financial systems, but given the fundamentals of the financial industry, it is possible to glimpse some opportunities and challenges of the Fintech phenomenon in global terms from the perspective of the competition authority.

Among the **opportunities**, without renouncing the objectives of security and financial consumer protection, Fintech implies, firstly, a **process innovation** that can involve significant **efficiency gains**, especially seeking the **personalization or individualization of financial services**. Secondly, this better use of information can also represent a **product innovation**, since it can expand the production frontier by generating **new products or services** that were previously unavailable due to information problems. Thirdly, **new** (often small) **competitors** are **disputing markets to traditional financial institutions**, and contestability in some financial activities could lead to the remodeling of some sectors and even entities, such as the possibility of unbundling of the financial

institutions. Fourthly, Fintech can promote **financial inclusion, allowing greater access to finance for consumers and businesses, especially SMEs.**

However, the advent of **Fintech also poses** some important **challenges**. First, some of these new services are based on digital platforms (crowdfunding) and networks, which can grow to the point of acquiring **significant market power thanks to indirect network effects**. This requires a more thorough examination by the competition authorities. Secondly, in relation to the application of competition policy, Fintech raises relevant aspects for competition authorities on **access to information** ("facility"), the role played by **algorithms** and **Big Techs**, as well as the possibility to expand market power (leveraging). Thirdly, the **effect of increased competition on risk taking and the stability** of financial intermediaries (especially in the banking sector) remains a matter open to debate. Fourthly, given that Fintech is based on better exploitation of information, this could raise several questions about the possibility of **price discrimination and the extraction of consumer surpluses**. And, lastly, there are important **cybersecurity** concerns, since the expansion of Fintech could make a highly digitized financial sector more prone to cyber-attacks and cybercrime.

The Fintech phenomenon has different sectoral derivatives. The key to knowing if an activity falls within the **Fintech** ecosystem is whether it is a **substantial innovation**, with a **disruptive effect on the market and business models**, and not merely an incremental one, in the form of a simple increase in efficiency. Thus, electronic banking as such would not be included in the Fintech field, but so-called "**neobanks**" would do, as they change the relationship with the customer (using mobile applications and interoperability with other channels, such as social networks) and alter the cost structure (being able to focus on complementary activities or "specific niches" and being profitable without a large scale). Apart from the "neobanks", there are other sectoral innovations within Fintech:

- **Distributed Ledger Technologies** (DLTs) are a way to maintain and update a digital registry of transactions in a transparent manner, thanks to the validation of the participants or "nodes" of the network, whether centralized or decentralized. Its application to the financial markets (and beyond) is immediate, since they can contain all the relevant information of the transactions. Besides, they have application in the field of payments, with cryptocurrencies, and business financing, with ICOs (Initial Coin Offerings). These networks, especially decentralized ones, have a disruptive potential by reducing transaction costs in financial intermediation. Although there are also risks for competition in the market (concentration of power or concerted practices in certain nodes) and monitoring of regulatory compliance.

- In the **payment systems and services** disruptive innovations also arise with the entry of new agents such as digital wallets and providers other than traditional financial institutions. They offer the advantage of increasing competition and mobilizing more personalized or complementary services. Although they also pose challenges when defining a regulatory and antitrust response in certain issues, such as access to bank account data.
- In **asset advice and management**, there are numerous innovations: financial comparators, financial aggregators, networking and sentiment platforms in financial markets, social trading, electronic trading platforms and robo-advisors. Their advantages range from cost efficiency (which can encourage financial inclusion and access to these services) to disintermediation (which can correct conflicts of interest when separating activities) and the emergence of new services. Nonetheless, sometimes these tools can lead to the exacerbation of information imperfections.
- **Crowdfunding** implies a disintermediation in the financing of agents, either in the form of equity (ECF, equity crowdfunding) or loans (P2P lending). Apart from greater cost efficiency, other types of dynamic advantages are obtained, such as diversification, better use of information (both to value projects and to offer other services) or network externalities. However, there are also contexts where these imperfections in information can be amplified.
- **Insurtech** entails the application of disruptive innovations in the field of insurance, by disintermediating and enabling changes such as insurance between individuals or on demand (linked to specific transactions). Its advantages go beyond the efficiency in costs, because they allow a better use of information and a greater involvement of the consumer, apart from a disintermediation of the activity and the adoption of platform models. Nevertheless, there are also challenges for regulation, to ensure correct incentives and the solution of information asymmetries.

Although all these **Fintech innovations are not risk-free**, it is even more certain that they have a **huge positive potential** in the two aspects that the document intends to tackle (its impact on competition in the financial sector and the mitigation of market failures and hence the arguments and ways of public intervention), which leads to two fundamental conclusions:

- Fintech **promotes competition in the financial sector**, which has a positive impact not only on the financial sector but also on the economy as a whole. The entry of new competitors and new business models generates **greater efficiency** in the form of more affordable prices and better and more differentiated services. The financial activity is disintermediated and unbundled.

- Fintech can **mitigate certain market failures**, such as information asymmetries, which were argued as justification for public intervention in the form of financial regulation.

Thus, the document makes six **recommendations**, as a corollary to the above:

1. **Regulation should welcome the Fintech phenomenon** and adapt to it, given its positive impact on competition and efficiency, so that the phenomenon should not be stopped unless there are reasons of necessity and proportionality.
2. **The necessity and proportionality of the different regulatory requirements** for entering and exercising financial activities **must be re-evaluated**, based on the idea that Fintech can correct market failures.
3. **The regulation should focus on activities -not entities- and avoid reserves of activity as much as possible.** The Fintech ecosystem must have the maximum margin of action to take advantage of efficiencies. Market failures are linked to a specific activity and not generally to its form of organization.
4. **Take advantage of the Regtech phenomenon**, which allows the use of new technologies for regulatory compliance, **to reduce the burdens involved in the regulation and supervision activity.**
5. **Adopt a regulatory sandbox**, so that the most innovative business models can develop and its impact on the market can be assessed, instead of adopting a restrictive regulatory response in advance and definitively.
6. **Adopt open-banking & insurance initiatives** to ensure the application of principles of technological neutrality and non-discrimination where access to certain inputs can be made in reasonable terms.

1. INTRODUCTION

- 1.1. The financial sector is one of the most important ones for any market economy. The weight of finance and insurance on GDP¹ is 4% in Spain and 5% in the EU (falling from a level of almost 6% before the crisis). But the relevance is especially qualitative, since economic history has shown, particularly during the past years, that turmoil in financial markets spills over into other sectors and the general economy.
- 1.2. From the standpoint of regulation and competition authorities, the financial system is particularly relevant for two reasons:
 - On the one hand, payments, credit and insurance are inputs for other activities and especially critical for small, nascent and innovative business and projects. Therefore, an efficient and competitive outcome in the financial sector (providing affordable and high-quality services) would result in an enhanced competition in the whole economy.
 - On the other hand, the financial sector exhibits market failures (asymmetric information, externalities, public good characteristics and scale/scope/learning/network economies) and hence pure competition does not bring an optimal solution, potentially justifying public intervention. However, in order for that intervention to be efficient and welfare-enhancing it must be consistent with good regulation principles, notably necessity and proportionality.
- 1.3. Fintech, the disruptive application of new technologies to the financial sector, may yield remarkable advantages regarding the regulation of the financial system. As will be explained below, the application of these new technologies allows a better management of information, which is the key input of the financial industry. This leads to new efficiency gains thanks to the mitigation of information asymmetries, which will result in improved financing for businesses and households. In addition, given that these informational asymmetries are one of the main justifications for financial regulation, their mitigation would imply a reconsideration of this regulation.
- 1.4. Therefore, Fintech is also relevant for regulation and competition authorities, since it affects the two previous questions. First, how competition in the financial sector (and hence in the whole economy) is affected by new business models and technologies

¹ The subsector of financial services as such takes the lion's share, especially in Spain, since its weight was even above the EU average before the crisis. Insurance and pension funds and auxiliary activities are of a smaller size.

which shape the Fintech phenomenon. And second, how market failures might be (or not) addressed by some of the new business models behind Fintech, potentially affecting the motives for public intervention.

- 1.5. This document tries to tackle these two questions. It follows the way opened by some other regulation and competition authorities that have already analysed the phenomenon². In order to enrich the study, the CNMC has interacted with the main stakeholders in this sector, both regulators (the General Secretary of the Treasury and International Finance, the General Directorate of Insurance and Pension Funds, the Bank of Spain and the National Securities Market Commission) and undertakings, in order to hear their opinion and exchange views.
- 1.6. After this first introductory section, this document is organised as follows. Section 2 portrays the general characteristics of the financial sector, depicting the competitive process from an industrial organization approach, assessing potential market failures and assessing the regulatory approach. Section 3 addresses the Fintech phenomenon, trying to frame it into the previous toolbox, analysing its opportunities and challenges from the standpoint of competition and regulation. Section 4 delves into specific innovations of Fintech: distributed ledger technologies (DLTs), payments systems, asset management and advice, crowdfunding and insurance (insurtech). Section 5 contains the main conclusions, aiming to answer the two previous questions surrounding Fintech: its effects on competition and its impact on market failures and the rationale for regulation. Section 6 specifies some regulatory recommendations drawn from the previous analysis.

² The OECD (OECD, 2015) and competition authorities from Portugal (AdC, 2018), Netherlands (ACM, 2017), Canada (Canada Competition Bureau, 2017) and Mexico (COFECE, 2018). Within Spain, the Catalan Competition Authority has dealt with this issue, too (ACCO, 2017).

2. AN OVERVIEW OF THE FINANCIAL SYSTEM

- 2.1. In order to estimate the overall impact of Fintech on the financial system, it is necessary to start with the functioning of the financial sector through the lens of the theory of industrial organization. This allows to identify the fundamentals of the financial industry, the primitive economic factors that determine theoretically its economic performance. Considering that information is the most essential input of the financial activity, Fintech is but a breakthrough in capitalizing on information, hence its direct impact on the roots of the financial activity.
- 2.2. However, this analysis will solely focus on the pure or structural economic drivers of the financial industry, as opposed to its regulatory drivers, owing to several reasons. First, the economic fundamentals of the financial system represent the underlying structural factors that would explain the ideal functioning of financial systems practically anywhere and at any time, so this analysis would exhibit a wide-ranging application. A retrospective examination of financial systems shows that these fundamentals have proved permanent, regardless of the institutions and rules conceived to frame them (Merton, 1995). Second, given its novelty, the phenomenon of Fintech still lacks a sound economic exploration, as suggested by the International Monetary Fund (IMF, 2017). Third, this analysis may help to inform future legislative action regarding Fintech, in line with the Initial Considerations of the IMF (2017).
- 2.3. Accordingly, this analysis will restrict to the economic basics of the financial industry in order to identify the broad, structural effects of Fintech. Furthermore, it is not the aim of this analysis to be an exhaustive theoretical research but a guide of economic exploration about the effects of Fintech on the financial system. Thus, in the next sections the theoretical economic fundamentals of the financial industry will be laid out, starting with the economic analysis of the financial system and the major economic characteristics of financial services, and subsequently presenting the economic rationale for regulation in the financial sector so as to determine how the emergence of Fintech poses a challenge as well as an opportunity to boost the effectiveness of public intervention.

2.1. The financial sector: a brief industrial organisation approach

- 2.4. According to the definition of de Haan, Oosterloo and Schoenmaker (de Haan, Oosterloo, & Schoenmaker, 2015), the financial system comprises the set of financial intermediaries, financial markets and their relations regarding the flow of funds to and from economic agents (households, firms, public sector), as well as the financial

infrastructure (the set of institutions that enables the effective operation of financial intermediaries and financial markets, such as payment systems, credit information bureaus and collateral registries). The financial system is sometimes defined as the one that channels the funds from the agents with fund surplus to the agents with fund deficit, but this definition can be understood as incomplete, as it adapts well to the banking and securities sector, but it misrepresents the insurance segment.

- 2.5. A properly working financial system is essential to achieve efficiency and maximise welfare, since it is responsible for the efficient allocation of one of the primary production factors, i.e. capital, to the most productive investments. Not only does this efficient assignment involve the suitable transfer of funds among agents and over time, but also the transformation and management of risks inherent to this flow of funds, as risk is an unescapable feature of whatever financial activity.
- 2.6. Therefore, the financial system can be examined following an industrial organisation approach, that is to say, by inspecting its basic building blocks in a highly stylised fashion: i) the needs and the demand side of financial goods and services, ii) resources, “technology” and the supply side of financial goods and services, and iii) their interaction, either directly via markets or indirectly via financial intermediaries³.
- 2.7. On the demand side, there are three core needs directly met by the financial sector, which can be unveiled by progressively extending the framework of analysis:
 - I. In a purely static, perfect information context, economic agents need to make and receive payments that sustain their monetary (non-barter) transactions, thus they need a system of payments. As the European Central Bank (ECB) puts it, “the term “payment system” refers to the complete set of instruments, intermediaries, rules, procedures, processes and interbank funds transfer systems which facilitate the circulation of money in a country or currency area”. This circulation of money is essential as all transactions involve a payment (or “transfer of funds which discharges an obligation on the part of a payer vis-à-vis a payee”) in exchange for the delivery of goods, services or financial assets (ECB, 2010). This function is performed through the market infrastructure of the financial system, and as such, it exhibits the traditional economic features

³ According to Freixas and Rochet (Freixas & Rochet, 2008), a financial intermediary is “an economic agent who specializes in the activities of buying and selling (at the same time) financial claims”, but the present analysis will rely on a broader definition of intermediary by extending it beyond the “retailing” activities so as to include ancillary and related services such as rating and advisory activities.

of networks as natural monopolies (economies of scale and scope, network externalities);

- II. If the context is extended to a dynamic framework, but still ignoring uncertainty, agents may find that their income stream or path does not match their desired (optimising) consumption and investment paths. Hence, they need to draw upon capital markets to transfer incomes between different points of time, either lending (conveying income from the present to the future) or borrowing (conveying income from the future to the present). These activities correspond traditionally to both the credit market (typically indirect finance, through financial intermediaries such as banks) and the securities market (typically direct finance, but with a significant presence of intermediaries such as mutual funds);
- III. Finally, in a more realistic fashion, this dynamic framework can convincingly incorporate uncertainty⁴, as the “future” is always uncertain. Thus, every financial transaction involving future income is always subject to some degree of randomness. Furthermore, uncertainty entails that the mismatch motive for transferring income intertemporally intertwines with the risk motive, in order to either take or insure against future risks⁵. Apart from the ability of the credit and securities market to deal with risk and uncertainty, its presence gives rise to a new segment of the financial system specialised in protecting from risks of any kind: the insurance sector.

2.8. On the supply side of the financial industry, financial institutions can meet financial needs through a wide range of specific instruments and services: financial “goods” in general. It is worth noting one important remark about the actual distinction between financial needs and financial “goods”. Since the third depiction aforementioned is the closest to reality, those core needs usually overlap and they come up together. Moreover, actual financial “products” (instruments and services) can meet several of

⁴ According to the canonical, Knightian classification (Knight, 1921), the absence of certainty can be divided into situations of risk, when objective probabilities can be assigned to different random events, and situations of uncertainty, when such objective probabilities are not available. Notwithstanding, throughout this text both terms will be used interchangeably as their distinction will not affect the analysis.

⁵ The pervasiveness of the phenomenon of risk aversion makes people want to reduce their exposure to risk and take it only when the gamble is perceived as favourable.

them concurrently⁶. However, the important point is that these final needs are key when undertaking an economic analysis of the financial sector. Indeed, it is desirable, when analysing the financial sector, to go beyond “financial products” and their markets and take into account the basic economic needs that drive their demand and the economic factors that affect them.

2.9. Financial institutions can be roughly divided into financial markets and financial intermediaries. Their coexistence (why intermediaries are needed at all if agents can use markets directly) can be explained on the grounds of market frictions or imperfections, since financial intermediaries are but a private-sector solution (albeit not complete) to these frictions or imperfections (IMF, 2017). More precisely, their *raison d'être* is the efficient reduction of transaction costs (Benston & Smith, 1976), that is to say, the profitable mitigation of information and matching asymmetries between lenders and borrowers (Freixas & Rochet, 2008):

- As for information asymmetries, financial institutions (intermediaries and markets) specialise in collecting and analysing information about counterparties, as well as monitoring and screening them in order to minimise problems of adverse selection and moral hazard⁷.
- Matching asymmetries arise in three fundamental dimensions: size, maturity and risk. First, lending and borrowing needs tend to exhibit indivisibility or a “lumpy” nature, that is to say, they cannot be scaled down (or up⁸) at will. Financial intermediaries and markets can manage the match, either by pooling funds and then distributing them into different investments (financial intermediaries) or by dividing investments into portions or slices called securities (financial markets). Second, there may be also a chronological mismatch between the maturities (time horizon) of the various financial instruments offered and demanded by agents. In this case, financial intermediaries and markets can typically succeed in matching

⁶ Life insurance is a classic example, as it is a primarily insurance product that is often classified as a saving instrument.

⁷ Financial intermediaries constitute a private-sector solution to the market failure of asymmetric information, following the *delegated monitoring* approach of financial intermediation (Diamond, 1984). Nevertheless, this very same information asymmetry may arise too in the relationship between financial institutions and their clients, as the latter may lack relevant information about the former. This market failure constitutes one of the rationales for regulation of the financial sector (see below).

⁸ The impossibility to scale down large investments is possibly more problematic, since it entails a concentration of risk that most (small) lenders cannot afford.

different maturities, either through the banking and, to a lesser extent, insuring activity (financial intermediaries) or through marketable securities which need not be held until their maturity date (financial markets). Finally, lenders and borrowers may differ in the amount of risk incorporated to the transaction, so financial intermediaries and markets may adapt some risks of the borrowers to the preferences of the lenders by making use of some statistical regularities, such as the law of large numbers. Therefore, financial markets and intermediaries help to overcome matching asymmetries by transforming some financial claims into others with different characteristics.

- 2.10. Nonetheless, the emergence of financial intermediaries represents a new element in the chain value, which potentially increases the layers of informational asymmetries. Thus, the potential reduction of transactions costs delivered by financial intermediaries is at the cost of creating a new source of asymmetric information between intermediaries and their clients, which in turn justifies public intervention, namely financial regulation (Neave, 2009).
- 2.11. Like every economic activity, the financial industry combines some scarce resources or inputs to create some needed financial products or outputs. In this process, information is a key input. Indeed, the relationships built in the financial sector rely crucially on trust and confidence in the counterparty since most financial products⁹ are but a promise of or claim to future (and hence uncertain) payments, whose fulfilment depends considerably¹⁰ on the good faith of the liable party¹¹. Therefore, information asymmetries and opportunistic behaviour plague financial services and they exhibit a fiduciary nature (in a broad, non-legal sense). This fiduciary nature pushes agents to continuously seek new information to assess the correct value of

⁹ It is not the case of other services (i.e. financial advisory activities) covered by this analysis, though. However, this kind of financial services rely on trust, too.

¹⁰ It is true that there is a plethora of other economic activities in which trust between the parties becomes relevant, such as every intermediation activity and liberal professions. They all have one thing in common: they are sectors in which information asymmetries have relevant effects. That notwithstanding, financial services could be listed among the most information-sensitive activities, as information asymmetries are particularly severe in the sector owing to the high level of uncertainty.

¹¹ In effect, in the presence of a high level of exogenous uncertainty about the future outcome of the business, the liable parties could always (opportunistically) hide behind the “bad luck argument” as an excuse for poor performance, as the investor has limited information and is unable to distinguish exactly the role played by exogenous uncertainty in the outcome.

financial instruments and profit from it. Thus, it seems reasonable to say that the financial sector is probably the most information-intensive industry.

2.12. Despite the intangible nature of financial activity, financial institutions transform financial claims (instruments and securities) into others with different size, maturity and risk. Given the heterogeneity of activities undertaken by the financial industry, it would be impossible to specify uniquely the “technology” or way of combining scarce inputs (capital, labour, knowledge and especially information) in order to obtain different goods and services. However, some common characteristics of this “technology” may surface in certain features of the cost structure of financial firms. Indeed, this cost structure could exhibit economies of scale and scope, as well as dynamic economies (learning and reputation), the ultimate source of which would be the presence of transaction costs. This, in turn, could explain why this transformation activity is not entirely undertaken by lenders and borrowers themselves and, as a result, intermediaries are needed and many explanations for their existence have been put forward (Freixas & Rochet, 2008)¹².

- Economies of scope among different financial services can be explained by the portfolio theory (diversification over different financial instruments) and, perhaps more importantly, by information asymmetries (Freixas & Rochet, 2008). In effect, financial intermediaries specialise in gathering information about clients and this information can be used to offer different products, given the non-rivalry or public nature of the “information” input. Therefore, the origin of these economies of scope may lie in the conjunction of two market failures: asymmetric information and public goods.
- Economies of scale are usually related to statistical laws and regularities which enable the attainment of more efficient (i.e. less risky) outcomes through the increase in the scale (i.e. the pooling of funds). The main devices in this respect are the application of the law of large numbers (assuming independent and identically distributed random variables) and, in the face of indivisibilities of financial instruments, the exhaustion of diversification opportunities (portfolio theory). Economies of scale in the financial sector can be also associated to indivisibilities and public nature of some production factors, such as expertise and

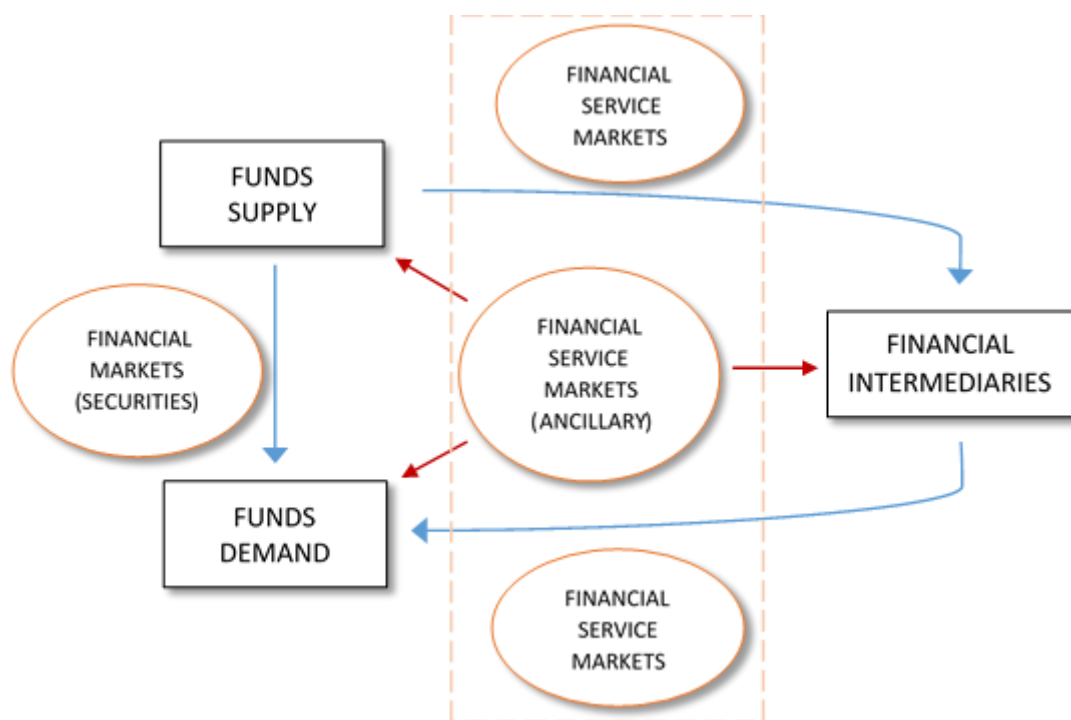
¹² Indeed, the presence of these economies of scale or scope renders this claim transformation too costly for small agents so a certain scale is needed to make it profitable. This minimum scale could be achieved by a coalition of agents, which underpins many theoretical approaches to financial intermediaries.

human capital devoted to risk management, screening and monitoring of clients, which translates into a fixed component of the total cost. Economies of scale may well derive from information asymmetries and the subsequent need to earn the trust of clients, too. Trust can be built to minimize adverse selection and moral hazard problems. Enjoying a reputation or “good name” helps to fight adverse selection problems by signalling through significant scale or big enough client portfolios. . That is to say, having a large portfolio of clients, among which there may be investors with high experience and knowledge, as well as carrying out transactions of significant amounts, generates confidence in the institution among new clients and investors. In addition, close contractual relationships with clients as in “relationship banking” (Freixas & Rochet, 2008), may ease moral hazard, and for this purpose a physical distribution network (offices) in banking used to be vital to monitor clients.

- Dynamic economies, which in the case of the financial sector may involve learning economies and reputation (by means of a previous successful record), all of them related to information (or the lack thereof). “Learning by doing” can be the outcome of the close, repeated interaction between financial agents that facilitates the discovery of new information about counterparties (the long-term relationships of “relationship banking” are an example). More importantly, as trust turns out to be crucial, agents need to build a reputation in order to reduce progressively present costs, as they would depend inversely on the “level” of trustworthiness accumulated in previous periods.

2.13. As previously stated, demand (borrowers) and supply (lenders) can interact either directly through financial markets or indirectly through financial intermediaries. The term “financial market” is used in this analysis to refer to direct finance between lenders and borrowers. Nonetheless, there are other markets in the financial system, which in this analysis will be labelled as “financial service markets”. They comprise all the markets that connect financial intermediaries with their clients¹³ in indirect finance (either borrowers or lenders), as well as those ancillary and related services that do not involve the transfer of funds but concern such transfers, like rating and financial advisory activities.

¹³ Financial intermediaries supplant direct financial markets but, as a new link in the value chain of channelling funds, they give rise to two new markets in both sides, i.e. one market between lenders and financial intermediaries and one market between financial intermediaries and borrowers.



Source: own elaboration

- 2.14. The object of trade in this interaction between lenders and borrowers through markets is what will be called financial instruments (which involve the creation of financial assets and liabilities¹⁴, that is to say, they involve a promise or claim of future payment) and financial services (which do not). A substantial part of the financial instruments or assets (and their corresponding liabilities) is often encapsulated in securities. This allows their subsequent exchange in the markets with third parties outside the original relationship (secondary markets). Their standardized and intangible nature (exacerbated through dematerialization of securities), alongside financial engineering and the extensive (and intensive) application of new technologies to the development of ubiquitous, non-physical and increasingly faster markets and exchange platforms, entail that these markets become almost “frictionless”. Indeed, financial markets tend to react very swiftly to news regarding the ability of the issuers to uphold the promise of future payments, thereby exhibiting

¹⁴ Every financial instrument has two sides or parties: the issuer or seller or the party who makes the promise of (and hence is obliged to honor) a future payment and for whom the financial instrument is a liability, and the investor or buyer or the party that owns the right to receive the future payment and for whom the financial instrument is an asset. It would be more accurate to use the term “financial instrument” but the term “financial asset”, albeit partial, is more frequently used.

an extreme sensitivity to information. As a result, prices in financial markets usually incorporate new pieces of information almost immediately and this fact helps to explain why financial markets tend to be characterised by great volatility.

- 2.15. On another note, financial services markets comprise an enormously heterogeneous group of activities. As they are normally the product of an intermediation activity (banking, insurance and intermediated activities in financial markets, such as investment firms and mutual funds), they tend to be tailor-made, non-standardized services, which reduces their possibility of exchange once created (although securitisation may overcome this restriction). The non-marketable nature of these services reduces the competitive tension but customized, differentiated nature of these services allows efficiency gains if they achieve a better adjustment to the individual needs of financial players.
- 2.16. Taking a long-term, retrospective approach, the history of the financial system is that of a relentless challenge of incumbent market players by new ones. In effect, leaving aside the insurance sector, a remarkable feature of the evolution of the financial sector has been the progressive loss of weight of the banking sector, which initially monopolized the credit (channelling of funds) and payments activities, in favour of new players. The greatest erosion of this prevailing position was the durable process of disintermediation that sparked the emergence of direct finance through securities markets. The advent of Fintech may involve another stage in this process of diversification of financial activities.
- 2.17. Economic literature has examined the effect of competition in the financial system. Given the complexities and the heavy regulation, this literature focuses mostly on the banking industry (Calomiris & Haber, 2014; Vives, 2016), which is subject to the most intense and restrictive financial regulation (in terms of competition). Following Vives (2016), from a theoretical perspective, competition may affect stability of individual banks through either side of the balance sheet¹⁵¹⁶. Unfortunately, these theoretical

¹⁵ "... [R]uns can happen independently of the level of competition but more competitive pressure worsens the coordination problem of investors/depositors. [...]. It is worth pointing out that the socially optimal probability of a crisis is positive in general because of its disciplining effect. Therefore, the preceding results do not imply that competitive pressure has to be minimized" (Vives, 2016).

¹⁶ "All in all, despite the complexity of the relationship between competition and risk taking it seems plausible to expect that, once a certain threshold is reached, an increase in the level of competition will tend to increase risk taking incentives and the probability of failure of banks. This tendency may be checked by reputational concerns, by the presence of private costs of failure of managers, or by appropriate regulation and supervision" (Vives, 2016).

approaches are based on incomplete or highly stylized accounts of the banking activity. Nonetheless, empirical evidence offers mixed results (Vives, 2016)¹⁷.

2.2. Regulation of the financial sector

- 2.18. As previously noted, the financial sector is one of the most regulated sectors in any developed country. This regulation obviously distorts private economic incentives to such an extent that the preceding analysis has a restricted (albeit relevant) application to the actual financial sector. In effect, the previous exploration would help to understand the main “points of impact” of Fintech on the foundations of financial activity from a theoretical perspective, although the absence of any regulation reduces its predictive power about the foreseeable effect of Fintech on the industry.
- 2.19. That notwithstanding, it could be useful to examine the financial regulation separately as well in an attempt to identify how Fintech could affect the roots of financial regulation, since it would affect the very market failures frequently put forward as rationale for public intervention in the financial industry. Indeed, public intervention in the financial sector comprises both the regulation (elaborating legislation) and supervision (monitoring) of financial agents and institutions. Like in other regulated sectors, this need for supervision comes precisely from a large, detailed volume of regulation. Three market failures can be tracked down (Goodhart, Hartmann, Llewellyn, Rojas-Suarez, & Weisbrod, 1998) as the theoretical justification for public intervention in the financial sector: asymmetric information, externalities and market power.

¹⁷ According to Vives (2016), “evidence points to the following:

- Liberalization increases the incidence of banking crises, but this tendency can be checked by a strong institutional environment and adequate regulation;
- There is an average positive association of market power but with bank-level stability with large country variation as well as some indications that an intermediate level of competition maximizes bank stability;
- There is a positive correlation between some measures of bank competition (e.g., ease of entry, openness to foreign entry) and systemic stability;
- The association between aggregate concentration measures and stability presents mixed results;
- Larger banks tend to be better diversified, but tend to assume higher risks;”

- Information asymmetries become ubiquitous as some agents (typically the issuers of financial claims) have private information that may be relevant to assess the value of financial instruments and services. This market failure constitutes the rationale for both prudential and conduct-of-business supervision;
- Under certain circumstances, some problems or difficulties in one financial market or agent may rapidly spread to other markets and agents (contagion), to such an extent that a sound financial institution may fail when another financial institution goes bankrupt, thereby revealing the existence of externalities (de Haan, Oosterloo, & Schoenmaker, 2015). The extent of these externalities can be large enough to compromise the financial stability of the whole financial system, which gives rise to systemic supervision;
- Some agents or institutions may exhibit substantial market power owing to entry barriers founded on structural (subadditive costs engendered by economies of scale and scope...), or strategic grounds. In some cases, the economic activity exhibits the features of natural monopoly (substantial economies of scale and scope and network externalities). The application of competition law aims to prevent prohibited strategic behaviours such as abusive exploitation of market power that diminish welfare.

2.20. Two important aspects are worth clarifying. First, the term “financial regulation” comprises only the specific legislation on the financial sector, either micro- (prudential and conduct-of-business supervision) or macro-policies (systemic supervision), which excludes competition policy, undertaken by competition authorities over all economic sectors without distinction. And second, this approach, albeit comprehensive, dispenses with the important chronological implementation of financial regulation. Indeed, the current massive corpus of financial legislation was not enacted all at once but it is the result of numerous additions of new rules (seeking to solve both structural and regulatory drawbacks) to the existing ones throughout recent history. A chronological approach could be useful to understand the actual determinant of each rule, which is enacted in response to a specific context or set of problems.

2.21. It is beyond the scope of this document to undertake here an exhaustive analysis of financial regulation. Instead, given the competition approach of this document, financial regulation will be analysed through the lens of competition and efficient economic regulation principles. That is to say, each category of financial regulation

should apply the principles of efficient economic regulation (chiefly, necessity and proportionality) in order to assess its impact in terms of competition. Consequently, this task is even more necessary in the face of technological innovation and the emergence of new agents, services and business models that may require new regulatory approaches.

- 2.22. Prudential (or microprudential) supervision tries to monitor the safety and soundness of a financial counterparty (that they are not taking “excessive” risks). Following the conception of prudential supervision as a process in stages by Lastra (2006)¹⁸, prudential supervision has the effect of reducing the number of competitors, both directly (through licenses and other entry barriers, for instance) and indirectly (owing to the restrictions on the activities and the whole regulatory burden and “red tape” of complying with the monitoring). In effect, prudential supervision is a tool to tackle the negative outcomes of information asymmetries, but this *ex ante* regulation may also reduce or forfeit the positive effect of competition that helps to boost the health and the adequate risk-taking of financial firms.
- 2.23. Conduct-of-business supervision aims to monitor the behaviour of financial agents, so it focuses on their activities and trade in markets. It comprises both the protection of retail customers¹⁹ and the promotion of fair and orderly markets²⁰. Indeed, the wave of financial liberalisation, which started in the late 1980s in Europe, endorsed the entry of new players, thereby leading to a wider choice of products and services at lower prices. Conduct-of-business supervision was initially formulated to ensure a fair treatment of retail customers in particular in these newly liberalised markets (De

¹⁸ These four stages are, paraphrasing De Haan *et al.* (2015):

1. The entry into the business: licensing, authorization, or chartering of financial institutions;
2. The on-going monitoring of the health of financial institutions and the financial system (such as the asset quality, capital adequacy, liquidity, management, internal controls, and earnings);
3. Sanctioning or imposition of penalties in case of non-compliance with the law, fraud, bad management, or other types of wrongdoing;
4. Crisis management, which includes last-resort lending, deposit insurance, and insolvency proceedings.

¹⁹ According to Llewellyn (1999), this protection includes several obligations of financial institutions vis-à-vis retail customers: a) mandatory information provision, b) objective and high-quality advice, and c) duty of care.

²⁰ Following De Haan *et al.* (2015), it comprises obligations about a) transparency of trading; b) prohibition of insider trading and market manipulation, and c) information requirements for issuers, including prospectus and financial reporting, and for shareholders.

Haan *et al.*, 2015). As some authors have pointed out, the inherent competitive risk of this task is paradoxically the opposite if financial regulators, when assuming this supervisory task on behalf of retail customers, disincentive market monitoring by clients (moral hazard). This way, an undue expansion of some industries could ensue.

- 2.24. Systemic (or macroprudential) supervision “focuses on the monitoring and assessment of systemic risk”, namely “the risk that an event will trigger a loss of economic value or confidence in a substantial part of the financial system, that is serious enough to have significant adverse effects on the real economy” (De Haan *et al.*, 2015). From a competition perspective, systemic risk is intimately related to the presence of so-called systemically important financial institutions (SIFIs) or “too-big-to-fail” (TBTF) institutions, which benefit from a *de facto* government guarantee that originates a moral hazard problem. Indeed, this implicit public guarantee could encourage these institutions to take excessive risks, knowing that the government will rescue them in case of difficulties. This also undermines market discipline as it discourages appropriate monitoring by investors and clients (Strahan, 2013).
- 2.25. Therefore, from the perspective of efficient economic regulation, the common denominator among the different categories of financial regulation is precisely the trade-off between stability and competition. On the one hand, the pursued safety and soundness of financial institutions (individually and as a whole) and, on the other hand, competition in financial markets, as competitive forces tend to be diminished or distorted as a result of financial regulation. In this respect, some experts have pointed out that financial regulation might bring about government failure²¹ (Vives, 2010; De Hann *et al.*, 2015) as surrendered gains from competition may not be offset by higher financial stability. Quoting Vives (2010): “Regulation can alleviate the competition-stability trade-off but the design of optimal regulation has to take into account the intensity of competition”.
- 2.26. Finally, it should be noted that, although it cannot be generalized a priori since this would depend on numerous factors, it is possible that a financial regulation that focuses on activities rather than on entities -a regulation strategy followed by some countries as financial products converge and the frontiers of traditional financial

²¹ A situation in which government intervention (of any kind) leads to a less efficient allocation of resources.

sectors blur- could diminish the competition-reducing bias (de Haan, Oosterloo, & Schoenmaker, 2015; IMF, 2017).

3. GLOBAL ANALYSIS OF FINTECH

- 3.1. The application of ICT to the financial sector is not new. The digital transformation of the financial industry started in the late 1960s with the installation of the first automatic teller machines (ATM) (Arner, Barberis, & Buckley, 2017) but it has accelerated in the last two decades, to such an extent that several national monetary and financial authorities are currently revising their regulatory frameworks to accommodate these new types of business. Furthermore, from a competition perspective, in recent years this process has been carried out partly by newcomers or new entrants that have disputed the market to traditional financial institutions for the first time in decades.

3.1. Definition, delimitation and characteristics of Fintech

- 3.2. The phenomenon of Fintech is a very diverse one. Originally, the term “Fintech” was coined to name a single project of Citicorp in the 1990s but it has since gained scope. Currently, “FinTech” in a broad sense refers to the use of ICT to deliver financial services (Nicoletti, 2017). However, the application of these technologies in this area is not new. The installation of the first ATMs at the end of the 1960s, as already mentioned, is a pioneering example (Arner, Barberis, & Buckley, 2017), although the process has accelerated in the last two decades. Likewise, it is convenient to clarify that the term Fintech actually covers alternative development paths for private actors, specifically FinTech in a restricted sense and its specular image, TechFin, without neglecting its application to financial regulation or supervision, RegTech.
- 3.3. More specifically, the broad concept of Fintech can be broken down into two distinct categories according to the strategy followed. On the one hand, Fintech in a narrow sense refers to both incumbent financial firms and new entrants in the financial sector that seek to address unmet needs or to improve the way some needs are currently met by leveraging new developments in ICT. On the other hand, Techfin refers to those companies that come from outside the financial sector, usually from the technology sector that develops ICT, and that extend their business to the financial sector²². That is to say, they take advantage of their access to customers’ data elsewhere to make use of it in the financial sector. Simply put, “a FinTech is a financial intermediary whilst a TechFin is data intermediary” (Zetsche, Buckley, Arner, & Barberis, 2017). Although this distinction can be relevant from the point of view of

²² They “start with technology and data and add financial services to their value-chain” (Zetsche, Buckley, Arner, & Barberis, 2017).

regulators and supervisors, since it is crucial to establish when a fintech or techfin is subject to financial regulation, in this analysis the term “Fintech” will be used in its broad definition.

- 3.4. Yet, the regulatory framework is also affected by this technological development, giving rise to “Regtech” or “the use of technology, particularly information technology [...], in the context of regulatory monitoring, reporting and compliance” (Arner, Barberis, & Buckley, 2017). It is worth noting that the application of ICT to regulation can be undertaken by regulated financial firms pursuing lower costs of complying with tougher regulation, as well as by regulators and supervisors pursuing a more efficient enforcement and monitoring of this more complex financial regulation. Therefore, Regtech encompasses both the private and public sector.
- 3.5. Clearly, the success of Fintech (in a broad sense) lies in the ability to meet financial needs more efficiently. There are several widely-cited triggering factors that can explain the emergence of Fintech and reveal their main features:
 - The recent rapid technological innovations in some areas of ICT, especially artificial intelligence (AI) and big data, distributed computing (such as distributed ledgers or Blockchain), cryptography and mobile access internet, with the characteristic of being “overlapping and mutually reinforcing” (IMF, 2017);
 - The growth of the sharing economy (services on demand), as these technological innovations have unveiled the existence of ample opportunities for the individualization of services, which can be extended to the financial sector;
 - The global financial crisis has contributed too, as the collapse of traditional financial channels, especially banking, in many economies and the public distrust have fuelled a search for new innovative ways of obtaining financial services.
- 3.6. The heavy regulation of the financial sector, tightened partly in response to the global financial crisis, may have ultimately spurred disruptive innovation and the entry of new players that dispute the market to incumbent financial firms. The lower level of potential competition due to regulatory barriers may have limited the capacity and even the need for regulated (incumbent) financial firms to innovate and adapt to changes in demand in the recent past. Up to this time, the phenomenon of Fintech posits interesting questions from the perspective of industrial organization and competition. New entrants (start-ups) are playing a prominent role. It is true that incumbent financial institutions are becoming more and more active in the

development of financial technologies, but it is a highly significant feature that outsiders are positioning themselves at the vanguard of the Fintech phenomenon. Furthermore, although some of these new entrants are big global companies (for instance, Amazon or Alibaba), many of them are relatively small start-ups operating in regional markets. This would reveal the absence of substantial entry barriers in some sectors, which would be logical as some of this business were hitherto non-existent. The entry of new agents could considerably change the current market structures as a result of the displacement, transformation and even disappearance of incumbent financial intermediaries, and even a radical restructuring of the financial industry as a whole cannot be ruled out (BIS, 2018).

3.2. Overall challenges and opportunities of Fintech

- 3.7. It is soon to ascertain the effects of Fintech on financial systems but given the fundamentals of the financial industry, it is possible to glimpse some opportunities and challenges of the phenomenon of Fintech from the perspective of the competition authority.
- 3.8. Among the opportunities, some are worth pointing out. First, Fintech entails a process innovation that can bring about significant efficiency gains, since by definition it can enhance the exploitation of the most important input in the financial industry: information. Indeed, this more efficient use of information will help reduce the information asymmetries that are the *raison d'être* and the source of profit of the financial industry. One particular strand of this process innovation comes from the “customer centricity” (Nicoletti, 2017), i.e. the customization or individualization of financial services in the wake of the sharing economy. As a result, Fintech may lead to better-served customers and hence to higher levels of welfare.
- 3.9. Second, this better use of information can represent a product innovation as well, since it can expand the production frontier by generating new products or services that were not previously available owing to severe information problems. In this respect, it is important to underline the fact that some of these new channels of financing are enabling the birth of many innovative, risky start-ups, for instance in cutting-edge ICT sectors (data). That is to say, these new possibilities of finance can be a market-based facilitation of entry in industries with significant spillovers in terms of higher economic growth and welfare for the whole economy. TechFins (especially Big Techs) play an important part, as they may be at advantage as product innovators in the financial sector. Indeed, they typically have access to relevant information

beyond the financial realm about clients, and they have accumulated the expertise exploiting this information, which can improve the financial assessment of clients.

- 3.10. Third, as a disruptive wave, new (often small) competitors are disputing the markets to traditional financial institutions. This hitherto unknown contestability can foster efficiency gains thanks to boosted market discipline. Indeed, contestability in some activities could lead to the reshaping of some businesses, such as the possibility of unbundling of financial institutions, especially banks, from the current gigantic (often too-big-to-fail), highly-integrated firms to smaller ones. In this respect, Fintech could help ease the problem of moral hazard of systemic institutions.
- 3.11. Fourth, Fintech can foster financial inclusion. In industrialised countries, small clients (low-to-medium-income households and SMEs) are not usually offered the whole range of financial services that big clients have at their disposal (Zetsche, Buckley, Arner, & Barberis, 2017) such as personal finance management, so the potential efficiency gains can extend the demand for financial services met. Furthermore, this can also be the case of developing countries that usually lack reliable financial markets, which tends to drag their economic development (Beck, 2012).
- 3.12. However, the advent of Fintech poses some major challenges. In the first place, from the perspective of competition, some of these new services are based on digital platforms (i.e. crowdfunding) and networks, which can grow to the point of acquiring significant market power thanks to complex effects, such as direct and chiefly indirect network effects. This requires closer look by competition authorities seeking to identify and prevent welfare-reducing anticompetitive conducts.
- 3.13. Second, regarding the enforcement of competition law, Fintech poses relevant questions for competition authorities about access to information (“facility”), the role played by algorithms and Big Techs and the possibility of extending market power (leveraging):
- The possibility that information about financial history and records could be regarded as an essential input or “essential facility” for the entry of new Fintech companies in some industries (i.e., banking) is an issue not without controversies²³, that should be analysed on a case-by-case basis and comply with

²³ One of the difficulties is that there may be situations in which several companies may be in possession of relevant information, which makes it difficult to establish the existence of a dominant position by a single operator.

the requirements determined by the EU legal doctrine to consider it as an "essential facility".

- Algorithms, although allowing a more efficient determination of prices, are currently being closely watched by competition authorities, as they could be enablers of collusive conducts²⁴. Despite being in an early stage of development, some scholars have already explored the possibility of algorithmic tacit collusion or conscious parallelism, especially with product homogeneity (no brand loyalty) in transparent, concentrated markets (Ezrachi & Stucke, 2016)²⁵.
- New entrants need not be small start-ups, but big Techfin companies (such as Big Techs) that may find it profitable to enter the financial industry, leaning on their experience in the management of big data. In cases in which these Techfin companies have significant market power, they could attempt to extend this power "downstream" to the financial sector.

3.14. Third, the effect of higher competition on financial intermediaries' (especially banks) risk-taking and stability remains an unresolved debate, so the presence of new actors disputing some markets adds to the convoluted picture of incentives. In any case, an optimal design of financial regulation must take into account the intensity of competition and the potential benefits and disciplinary mechanisms thereof (Vives, 2016).

3.15. Fourth, as Fintech is based on a better exploitation of information, this could raise several questions about the possibility of price discrimination and consumer surplus extraction. Nonetheless, it is not possible to determine a priori and with generality an unequivocal effect in terms of well-being of the discrimination strategies (OECD, 2016). Furthermore, if Fintech is subject to some degree of scrutiny thanks to greater communication between clients via social networks, this sort of practices could hardly go unnoticed among financial consumers, which could presumably penalize discriminators in terms of reputation and image.

3.16. Fifth, there are important cybersecurity concerns as the spread of Fintech might make a highly digitised financial sector more prone to cyberattacks and cybercrime. These concerns are giving rise to a new field of financial regulation, seeking to safeguard

²⁴ Decision of the Competition and Markets Authority, Online sale of posters and frames, case 50223.

²⁵ Faced with this, there is the possibility of algorithms that carry out purchasing decisions for consumers and that can act as a counterweight to the algorithms of companies (Gal & Elkin-Koren, 2017).

the integrity of the financial system (González-Paramo, 2017). This new strand of financial regulation, albeit essential for a digitalized industry, should take into account its potential impact on competition and also be based on the principles of necessity and proportionality.

4. A FOCUS ON SPECIFIC FINTECH INNOVATIONS

- 4.1. As has been already mentioned, the financial sector basic functions²⁶ are to (i) make and receive payments (ii) channel funds from savers to borrowers (including management and advice services) and (iii) manage risks. Therefore, we will scope out specific innovations in these areas:
- Distributed ledger technologies, which are a cross-cutting tool that can be applied to the whole financial sector in its three abovementioned functions (and also throughout the general economy).
 - Payments systems, which perform mostly the first of the three roles, although they can assume also the second, even if only partially, when they provide credit linked to transactions and payments.
 - Asset management and advice, which address the second and the third functions: channelling of funds and risk management.
 - Crowdfunding, which also contributes to the second and the third functions from the point of view of borrowers and savers.
 - Insurtech, which performs the third function.
- 4.2. Some exclude from the Fintech ecosystem those “incremental”, not substantial, innovations that merely introduce new technologies into the traditional way of doing business (McQuinn, Guo, & Castro, 2016), e.g. incumbents becoming better banks through mobile and online banking (BIS, 2018). These changes increase convenience for customers, boost productivity, reduce infrastructure costs, slash back-office expenses by automating or streamlining tasks, etc. However, as such, they do not disrupt business models substantially.
- 4.3. A further innovation would be neo-banks (BIS, 2018), newly created digital banks that do transform the way business is done in several ways, even if they keep the same basic functions of a traditional bank:

²⁶ As was described before, these functions are the result of the different frameworks of analysis (related to market imperfections). The payments function is needed even in a static and perfect information setting, to match needs and grease real and financial transactions. The channelling of funds is added once we consider a dynamic setting, when agents’ income stream does not match their needs. And management of risks is needed once uncertainty (imperfect information) is factored in.

- Neo-banks improve customer experience by relying on mobile apps and interoperability with other channels, like social media. This does not only improve convenience but also drives other changes like consumer engagement or the entry of non-financial actors (such as digital platforms).
 - Neo-banks do not need a given scale to be profitable. In contrast to overheads of incumbents (legacy infrastructure and physical branches), their fixed costs (like cloud computing, app design, big data and algorithm management) are more flexible. Therefore, neo-banks can focus on niches like consumer banking or small and nascent firms (in contrast to the one-stop shop model of big banks).
 - Another advantage is that fixed costs of neo-banks are not specific to the banking activity, so that they can be monetized elsewhere (an idea which also attracts non-financial actors). Actually, neobanks do not tend to fund their activity through interest income (as banks have traditionally done) but through fees and data monetization.
- 4.4. Therefore, the scope of this document is the disruption that actually transforms business models in financial markets, changing and improving substantially (not only incrementally) the way financial systems can address (one or more of) the abovementioned three functions. One common feature of these specific innovations is that they allow to unbundle the financial system by specializing in one or some activities competing with incumbent financial institutions which tended to absorb all of these functions with the argument of scope economies (IOSCO, 2017). This section will also address how each of these innovations deals with the ‘intermediate’ functions of the financial system: tackling information asymmetries, reducing transactions costs, etc.

4.1. Distributed ledger technologies

4.1.a. Definition and overview

- 4.5. Distributed ledger technologies (DLTs) are a way of keeping and updating a digital record of transactions in a transparent manner, thanks to validation by participants or “nodes” of the network. Therefore, the ledger has the form of chain, where new information is added in the form of digitally signed and validated (hashed) blocks. Its application to financial markets (and beyond) is straightforward, since these blocks can contain all the relevant information of transactions (McQuinn, Guo, & Castro, 2016): sellers, buyers, prices, amounts, time and date and other contract terms and

details (in the form of a time series of data and records in chronological order if needed).

- 4.6. DLTs rely on multiple technological advances, not only the distribution and growth of computing power but also innovations in the field of security (like identity protection and authentication through biometrics and data encryption and cryptography) and even the potential arising from the internet of things (Catalini & Gans, 2016).
- 4.7. There are two types of DLTs: permissioned and permissionless. The former only allow trusted counterparties, “full nodes”, to engage in validating and updating the digital record of transactions, while “lightweight nodes” have a passive role. The latter, like blockchain, do not impose any restriction on participants to become “full nodes”, so validation does not need a central counterparty (Deutsche Bundesbank, 2016).
- 4.8. Therefore, blockchain is a technology which allows keeping and updating a digital ledger of transactions in a shared and decentralized manner, accessible by multiple users and collectively controlled. Validation by participants or “nodes” of the network is done through a consensus mechanism (IOSCO, 2017). This marks a stark contrast with traditional ledgers, which are centralized and controlled by “notaries”, who regulate the validity of transactions and the access by designated users.
- 4.9. The most popular initial use of DLTs has been the deployment of digital/virtual currencies or cryptocurrencies. These are generally privately-issued digital representations of value using cryptographic means to validate transactions and regulate the creation of currency in a decentralized network, even if they can also be issued by a central authority (McQuinn, Guo, & Castro, 2016).
- 4.10. And one recent application of these technologies is the development of initial coin offerings (ICOs), with which firms (normally start-ups) can raise funding by creating and selling to the public their own digital currencies, normally in the form of tokens (Catalini & Gans, 2018). These tokens (Gurrea & Remolina, 2018) can serve as means of payment (payment tokens), to access goods or services provided by the firm or within the platform (utility tokens) or as a right to receive a share of future profits or interest payments (security tokens).

4.1.b. Advantages/Opportunities

- 4.11. Blockchain and innovations alike have the potential to slash transaction costs, by reducing back-office outlays and the need for intermediation services and turning real, monetary and financial flows more agile and less costly. Actually, the outreach

goes well beyond the financial sector, by facilitating direct business-to-business (B2B) transactions without intermediation (McQuinn, Guo, & Castro, 2016).

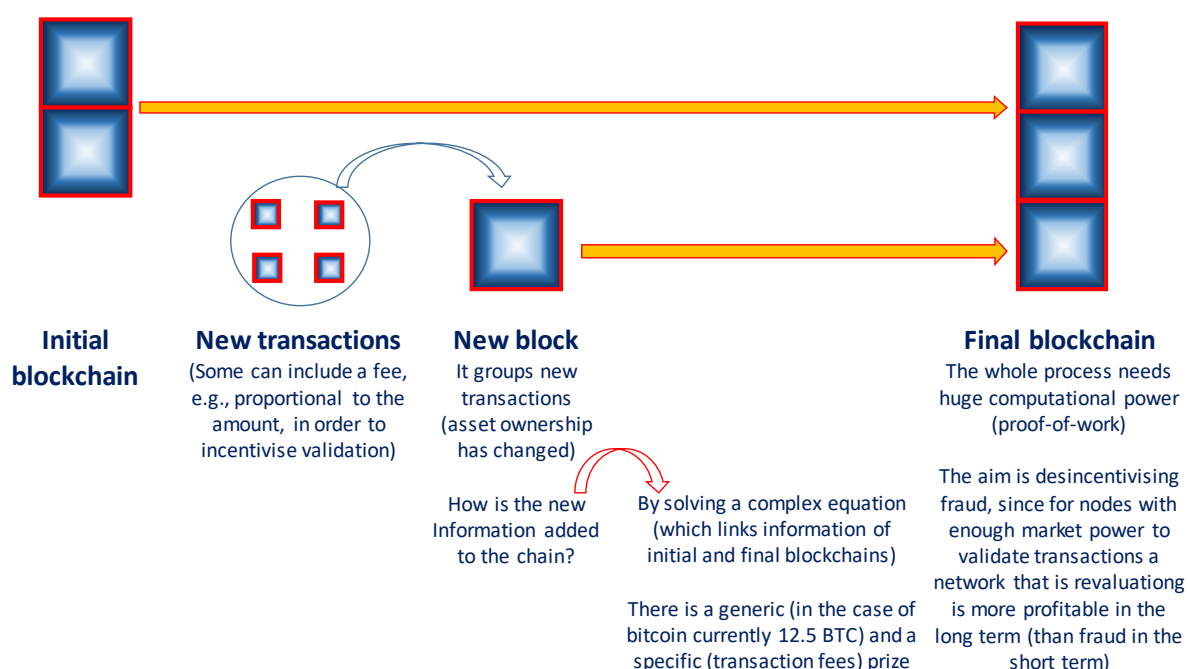
- 4.12. These technologies can be applied to most areas of financial markets, to track the ownership and keep a record of assets and liabilities and to settle payments (in equity, fixed-income, banking flows, loan syndication, OTC²⁷ derivatives, etc.). Therefore, they can foster competition and efficiency in all the activities to be examined in next sections (Deutsche Bundesbank, 2016): asset management, funding and especially payments, due to cryptocurrencies, and insurance, through smart contracts. Smart contracts can automate financial and real transactions depending on several contingencies (e.g. exchange rates, stock prices...) according to a pre-written logic (Catalini & Gans, 2016).
- 4.13. Moreover, these technologies can help firms in keeping corporate records and managing their financial decisions (like issuing equity and debt and paying dividends and coupons, even if not directly using ICOs as such). They can also reduce regulatory compliance and audit costs thanks to transparency and “traceability” of transactions (IOSCO, 2017), which is also an advantage for supervisors, whose oversight is eased (Catalini & Gans, 2016). And for that same reason, DLTs may also be convenient in the secure and agile maintenance of administrative and private databases and registers (like property records²⁸). This is especially patent in permissioned DLTs, which would be a way of keeping a legacy system with the same trusted nodes while increasing standardization, compatibility and efficiency.
- 4.14. Permissionless DLTs, like blockchain, are actually more disruptive. The verification and audit of transactions is embedded in the own marketplace (“sousveillance”), instead of enforced by an ad-hoc third party (“surveillance”). This is positive not only because of cost savings but also due to the mitigation of ex-post (moral hazard) conflicts of interest, since rules are set ex ante (Catalini & Gans, 2016). Intermediaries might still be necessary in some cases, for instance when there are conflicts about (the ex-ante vs the ex-post) quality due to information asymmetries. But financial instruments are relatively homogenous and standardized (reducing the potential for disputes on quality), and hence the potential of blockchain for financial markets.

²⁷ Over-the-counter, not organised.

²⁸ Property (despite being a real asset) can be very relevant in financial markets. Beyond the financial sector, this type of application of DLTs can be valuable to track the actual use of intellectual property rights.

- 4.15. Blockchain can precisely develop faster in areas which need it the most (Catalini & Gans, 2016). For instance, in markets where verification costs are high due to the lack of competitive pressures (with an intermediary that is not adding substantial value offering other services, like dispute resolution) or due to inefficient legacy regulation or infrastructure. Also in activities with market failures and information asymmetries, where blockchain can be very effective in building reputation. Network externalities, both direct and indirect, can bolster the deployment of the technology.
- 4.16. Another enticing feature of these innovations is the ability to mitigate hold-up problems in platforms (Arruñada & Garicano, 2018). When the network is centralized the “architect” or the “owner” may abuse its market power, since investment by nodes end up becoming specific to the platform, generating switching costs. Meanwhile, in permissionless DLTs the blockade ability of network members prevents market power and subsequent abuses thereof. But this comes at the cost of coordination problems, because changes need majority or unanimity, even if these can be addressed through economic incentives (like cryptocurrencies for “miners” who validate transactions or initial coin offerings).

The "miners" are those nodes that validate transactions and add information to the "consensus block" (the chain of blocks containing the information that the network considers valid) with the current status of the ownership of assets (i.e., who owns what assets and with how much value). In decentralized networks there are no a priori restrictions to assume the role of a validating node, but there are actually endogenous barriers: although in principle anyone can be a validating node, validation of transactions usually requires solving mathematical problems (which link the information of the initial blockchain to the final) through algorithms which need sizeable computational power. As an incentive, "miners" usually receive a prize in cryptocurrencies in the form of monetary base creation or a fee.



- 4.17. Some authors have pointed out that digital/virtual currencies as such have several advantages (McQuinn, Guo, & Castro, 2016). Firstly, they preserve anonymity and confidentiality, since they do not require personal identifying information. This is somehow paradoxical²⁹, because anonymity for individuals is achieved at the expense of making transactions public (Arruñada & Garicano, 2018), which would be traceable.
- 4.18. The combination of blockchain and cryptocurrencies is important (Catalini & Gans, 2016) because it yields a reduction in both costs of verification (through blockchain)

²⁹ Other authors (Böhme, Christin, Edelman, & Moore, 2015) say the transactions are « pseudonymous », half private (the actual identity, which can be preserved through fake pseudonyms) half public (since the user's public key is disclosed and the real identity could be inferred or tracked when converting digital currencies into other means of payment).

and costs of networking (thanks to currencies that ideally should be generally accepted as a medium of exchange/payment). The interaction of both effects triggers positive feedback loops thanks to scale and network economies (Catalini & Gans, 2016). The more users of a cryptocurrency, the higher the value of the token. This attracts not only other users but also “miners”, since the remuneration for validating transactions is more appealing. And the more “miners”, the more secure is validation, bringing more users in.

- 4.19. Needless to say, the adoption of digital currencies owes much to the reduction of intermediation costs, since they usually have small or no fees (McQuinn, Guo, & Castro, 2016). Or, sometimes, these fees for transactions take the form of coin offerings, which might be an increase in the monetary base or a remuneration from sellers/buyers trying to incentivise “miners” to prioritize the validation of their transactions.
- 4.20. So digital currencies have the potential to disrupt payment systems, fostering competition and increasing real and financial transactions (IMF, 2016), with a big potential in international trade finance (BIS, 2018). They increase the room for peer-to-peer (P2P) systems, including business-to-consumer (B2C), which are much more infrequent than consumer-to-business due to inherent complexities (like linking a bank account) which can be tackled through cryptocurrencies.
- 4.21. And, while digital currencies could improve payment systems, ICOs can expand the funding ecosystem by introducing a quick and flexible alternative, reducing barriers to entry for start-ups (Catalini & Gans, 2018). The way ICOs work (allocating tokens at an early stage with the expectation of an appreciation) may attract highly qualified investors as it happens with business angels and venture capitalists (Catalini & Gans, 2016). This yields two additional advantages (Catalini & Gans, 2018). Firstly, their valuation of the tokens can give the borrower an estimation of the firm’s potential. Secondly, this type of investors can provide qualitative insights and advice to overhaul the project.
- 4.22. And ICOs are a natural funding tool for business models that rely on blockchain to facilitate transactions, so that the token could be the actual medium of exchange in the platform. Tokens would include all the relevant aspects of transactions like reputation, which is critical in platforms. This aligns the incentives of the different types of agents (Catalini & Gans, 2018), since the token holders (the shareholders) are the first ones interested in the platform’s good performance. Not only because tokens can act as a security-type instrument (the return of which depends on capital

gains) but also because tokens may be exchanged for goods and services (the more so as their value increases).

- 4.23. ICOs, like DLTs in general, can ease the supervisory task of authorities thanks to transparency and real-time information (as was said before). This can potentially relieve the burden of ex ante regulation (Gurrea & Remolina, 2018).

4.1.c. Risks/Challenges

- 4.24. DLTs face different limitations depending on their type (Catalini & Gans, 2016). For instance, permissioned DLTs do not take much advantage of the abovementioned scale and network economies and therefore are not so meaningful regarding their impact on competition and efficiency. Meanwhile, permissionless DLTs are actually more disruptive but at the same time exhibit higher risks in terms of regulatory compliance and control. Therefore, anonymity and confidentiality can be a mixed blessing (McQuinn, Guo, & Castro, 2016), to the extent that fraudulent exchanges of information are facilitated and even automated through smart contracts (OECD, 2018). This can allow anticompetitive concerted practices (e.g. price collusion), both in financial markets (including the same cryptocurrencies and tokens) and in other sectors. Beyond the scope of competition, anonymity and confidentiality can also contribute to illicit exchange of assets and funds through cryptocurrencies in the form of money laundering and criminal funding.
- 4.25. And permissionless DLTs may also face coordination problems, because changes require majority or unanimity, leading to “tyranny of minority” problems. In order to promote the use of the network and investments in it, permissionless schemes (like some cryptocurrencies or ICOs) include some premia or fees to incentivize the nodes to validate transactions the faster the better (so that more “lightweight nodes” become “full nodes”). Experts estimate these fees for Bitcoin to be around 0.1% of the transaction value (Böhme, Christin, Edelman, & Moore, 2015), yet they may not be enough to ensure the optimal incentives to invest and coordinate (Arruñada & Garicano, 2018). And the existence of these fees implies that some intermediation costs may persist anyhow both in permissionless (through these extra fees on payment or validation services) and in permissioned technologies (where trusted counterparties normally levy small fees on their services).
- 4.26. There are also concerns related to the high computing power, energy usage and/or digital assets needed to validate transactions, creating a concentration of clout in a few “nodes”. Energy and computing power resources to validate the transaction are huge in most cryptocurrencies which rely on proof-of-work to compensate “miners”.

This is a way of making fraud less likely over time³⁰, since a bad actor would find it more difficult to alter a past block of transactions (Catalini & Gans, 2016). But this could act as a barrier to entry and increase market concentration among “miners” in charge of verification. In fact, “miners” usually form pools because validation is a costly activity with a lot of variance (a high price but with low probability). These can be a risk to competition, although at the same time it may be a way for smaller nodes to benefit from the system (Abadi & Brunnermeier, 2018). In addition to all these endogenous limitations of validation, it should still be taken into account that there is not perfect immunity to fraud, since a “51 percent attack” of the computational power can create operational and transaction risks (Böhme, Christin, Edelman, & Moore, 2015).

- 4.27. These risks are also related to the problem of scalability, i.e. the validation of more transactions per unit of time by accelerating clearing³¹ (Böhme, Christin, Edelman, & Moore, 2015). This is a competitive disadvantage compared to instant payments settlement systems and credit card networks, especially if we factor in the loyalty programs, discounts and cross-subsidies (to access other financial services more cheaply) associated with the use of credit cards (Catalini & Gans, 2016; McQuinn, Guo, & Castro, 2016). This is an issue especially for small transactions, since big transactions would tend to be prioritized if there are higher fees for “miners”.
- 4.28. Bottlenecks are also a risk for security, given that fraudsters could try to double-spend currencies during the validation window, taking advantage of the irreversibility of transactions (as happens in Bitcoin), which also increases transaction risk. That is why some cryptocurrencies (Böhme, Christin, Edelman, & Moore, 2015) prefer to reduce computing power (even if that means less ability to record big purchases) and hence settle transactions more quickly (adapting better to small amounts). But again this could reduce resilience, to both frauds and errors.
- 4.29. These shortcomings (especially of permissionless DLTs) in security, scalability and agility (which can be conflicting goals sometimes) may be due to the lack of incentives for the nodes to invest in the network, or to governance difficulties to reverse

³⁰ A straightforward alternative would be to use a « one person, one vote » rule to validate transactions, but this would lead fraudsters to create fake accounts. With the proof-of-work, fraudsters need to amass enough computing power to validate transactions and, once they have it, they have the incentives to use it the right way, validating transactions to earn fees or newly created tokens.

³¹ For instance, in Bitcoin one transaction is cleared once it has been added to the consensus blockchain. This happens once every 10 minutes, but the transaction can still be revised by a majority of « miners ». Therefore, experts say that one cannot be sure that the transaction is confirmed after one hour has gone by (Böhme, Christin, Edelman, & Moore, 2015).

fraudulent or incorrect transactions. Consequently, markets are too “shallow” (Böhme, Christin, Edelman, & Moore, 2015) and the value of tokens/currencies might be too volatile (McQuinn, Guo, & Castro, 2016). This adds market risks and makes it even more difficult to generate network effects through trust and scale, in a negative feedback loop. Volatility also raises concerns from the point of view of financial stability and consumer protection.

- 4.30. ICOs have also specific challenges to be factored in. Needless to say, they have a very high-risk profile (as any equity-type instrument for start-ups) and some warn about the risk of fraud (Catalini & Gans, 2018). Furthermore, transparency (which has some advantages quoted above) can be in some cases a threat to competition, since incumbents may monitor the performance of new entrants and eventually accumulate a decisive participation in them (keeping the identity anonymous so that control by authorities, e.g. competition agencies, is made more difficult).

4.1.d. Regulatory implications

- 4.31. Again, regulatory implications vary depending on the kind of DLT. Permissioned DLTs are centralized and sometimes they are an adaptation of existing infrastructure. Therefore, public authorities should seek ways to embrace and facilitate those changes. Permissionless DLTs are decentralized so the room for public authorities is more passive and consists in ensuring that their adoption is not impeded by regulatory or other obstacles. Anyhow, Competition Authorities must remain vigilant regarding the possible risks of both centralized and decentralized DLTs.
- 4.32. In any case, regulators should be cognizant of the potential of (both permissioned and permissionless) DLTs. For instance, DLTs can be a valid tool for assessing and checking compliance (in real-time) in many aspects of financial regulation like professional licensing or capital requirements. The “traceability” of transactions can also help to measure the contribution to public goods and externalities, like financial stability. All these might reduce to some extent the scope for strict ex ante regulation. DLTs may also have a role for dispute settlement, easing the job of regulators (Catalini & Gans, 2016).
- 4.33. An interesting advantage of permissionless DLTs is the positive impact on competition within markets where intermediaries hold a dominant position in custodial and certification services. Therefore, adopting blockchain-type technologies could be even considered as an antitrust remedy (Catalini & Gans, 2016; OECD, 2018).

- 4.34. Cryptocurrencies and ICOs have specific regulatory challenges (Gurrea & Remolina, 2018). The former may be tagged as an asset or as a currency. The latter can be considered as a commodity, to be exchanged for goods and services and therefore not relevant for financial regulators, or as a security (normally equity rather than debt), to fall under the scope of financial regulators.
- 4.35. This is relevant both for borrowers, to be aware of their regulatory regime, and for lenders, in order to assess what type of asset they are holding (which also has regulatory implications). Therefore, the soundest strategy is to follow a functional and case-by-case approach and classifying models depending on their specific characteristics.
- 4.36. In any case, all these are incipient technologies. Therefore, an appropriate response would be adopting a common principle in Fintech which is the “regulatory sandbox” (Canada Competition Bureau, 2017). In this case, it would consist of an exemption of regulatory requirements for certain projects (for instance, ICOs of a small size) in order to assess their impact on the market and adopt a more informed position on these innovations.

4.2. Payment systems

4.2.a. Definition and overview

- 4.37. Payment systems can be defined as the instruments, services, procedures and channels needed for economic agents to transfer funds in transactions that do not make use of cash (ACCO, 2017). The revolution in payment systems is perhaps the most remarkable feature of the Fintech phenomenon. And, at the same time, it may be the area with the most promising prospects because of the following factors (WEF, 2017; AFI, 2017):
- Technological revolutions that are affecting supply and demand. Within supply factors we find lower transaction costs, faster payment processing, and the possibility to expand services, all of these thanks to distributed ledger technologies (used by virtual currencies), big data analytics and cloud computing (McQuinn, Guo, & Castro, 2016). Within demand factors, we point out the ubiquitous connectivity driven by mobile internet and smartphones, allowing proximity and remote payments using different innovations like GPS, Bluetooth, security and identity tools, etc. Other coming technological shocks, such as the internet of things, are likely to transform the industry even further.

- Social changes that, in response to this technological progress, result in users' stronger preferences for convenience, immediacy, ubiquity and interoperability.
 - Economic developments, also driven by technological and social factors, such as the growth of e-commerce (and of m-commerce, from mobile devices, therein) and the relevance of digital platforms, which users trust to a point where they even link their banking details so that payments are more agile (and less visible). The development of the sharing economy is one evidence of these trends, with off-line transactions that many times involve online payments intermediated by platforms.
 - Regulatory changes, which, even if at a different pace depending on the jurisdiction, take into account technological developments, social demands and new economic forces in order to foster new alternatives for payment systems. Other supportive initiatives are those aimed at reducing the use of cash in transactions.
- 4.38. All these factors are attracting new Payment Services Providers (PSPs) to this industry (AFI, 2017; Deutsche Bundesbank, 2016): the main global technological corporations ("Big Techs") and other digital platforms, retail business, telecommunication firms and manufacturers, not only of smartphones but also of other (intensive in data generation) goods, given the potential arising from the internet of things. Traditional financial intermediaries in this area are being forced to adapt to this new competitive environment, devoting resources to improving and expanding services.
- 4.39. The Fintech revolution can disrupt the different alternatives to carry out payments, mainly transfers and credit and debit cards. The first innovation as such are "digital wallets" (DW), i.e. software and hardware tools which allow to store users' payment information (log-in information, personal details like the identity and the address, credit card or account details and passwords, signatures and certificates...) so that they can complete transactions (ensuring a secure and appropriate processing). DWs can act as an Online Wallet (OW) or as a Mobile Wallet (MW):
- Online Wallets (OWs) or Cloud Wallet are enabled for remote mobile payments without the need for physical presence or interaction of human beings (McQuinn, Guo, & Castro, 2016). Its growth is very much related to the explosion of e-commerce. When carrying out an online transaction, the two preferred alternatives are credit/debit cards and e-wallets (pre-paid instruments which are charged through a card or a bank account and other forms of e-money digitally stored),

although the weight of transfers is bound to increase thanks to the alternative providers analysed below (Trevijano, 2017).

- Mobile Wallets (MWs) are enabled for proximity payments using a mobile device and related apps and tools (McQuinn, Guo, & Castro, 2016), such as Quick Response (QR) codes, Near-Field Communication (NFC), Bluetooth Low Energy (BLE) or identity checking tools (such as finger print readers). MWs are proving even more disruptive (than OWs) to the financial industry, because they facilitate transactions and transfers of money, not only from business to consumers (B2C) but also from peer to peer (P2P, from business to business, B2B, and from consumer to consumer, C2C). The apps and tools linked to mobile payments also allow the expansion of services (beyond transferring money and performing transactions) to other banking services, identity checking and marketing-related activities (such as advertising and customised promotions). Especially since the introduction of Host Card Emulation (HCE), a new technology which allows to store the relevant payment information in the cloud (without requiring a specific hardware), so that card issuers (normally traditional banking institutions) directly provide apps to their users (including MWs and other banking services) without relying on device manufacturers (McQuinn, Guo, & Castro, 2016).

4.40. And the generalized rise of DWs and online/mobile payments also facilitates the flourishing of new Third Party Payment Service Providers (sometimes called TPPs) between consumers, who rely on traditional banks (Account Servicing Payment Service Provider, AS PSPs) to hold their accounts, and retailers, who are the ultimate payment service users (PSUs). TPPs, provided that they can access potential clients' financial information with their consent, can assume different functions (WEF, 2017; Martin, Giera, & Bendell, 2017):

- Payment Initiation Services (PIS), which help to facilitate and initiate a payment order (online) from users' bank accounts to merchants by accessing the information from AS PSPs (or by linking merchants directly to the customer's bank account). Therefore, a payment becomes a "push", on the payer initiative, rather than a "pull" action, where the payee/merchant claims the payment as it was the case in the traditional debit/credit card scheme (García & Hermida, 2017). Thus, merchants are aware of whether the funds are on their way, in order to eventually release the goods and services (Vezzoso, 2018).
- Account Information Services (AIS), which access, with the holder's permission, account information by the AS PSP operating without passwords. The collection

and consolidation of this information is useful both for the user, to improve the cognizance of his/her financial situation, and for firms, willing to offer financial and non-financial services (Vezzoso, 2018).

- 4.41. TPPs act as innovative financial intermediaries. For instance, Payment Initiation Service Providers (PISPs), without holding users' funds, can help to complete online transactions relying on identification, authentication and fund checking services³². Meanwhile, Account Information Service Providers (AISPs) have alternative uses and provide value added services (García & Hermida, 2017), both in financial markets (like crowdfunding, asset management and advice and insurance) and elsewhere (such as retail merchants that provide consumer lending and other services which depend on consumers' financial health).
- 4.42. Overall, these innovations³³ seem to generate gains for payment systems and for the financial sector more broadly, to be analysed in the next subsection.

4.2.b. Advantages/Opportunities

- 4.43. As has been stated, disruptions in payment systems exert competitive pressures on the intermediation between consumers and merchants (regarding traditional transactions of purchases of goods and services) and between peers (regarding money transfers in general). This bypassing of traditional intermediaries lowers transaction costs when completing (online) transactions and makes payments more efficient (in terms of money, time and convenience) without losing security (WEF, 2017).
- 4.44. Traditionally, relations between payments service users (consumers and retailers) and PSPs (banks and credit card companies) were deemed to be dominated by the latter. Network economies, combined with the fact that there is a limit to the number of cards which can be carried or used feasibly may lead to natural monopoly/oligopoly considerations (Canada Competition Bureau, 2017). Concerns of market power and lack of competition, together with the perceived high profitability of the payments sector (Trevijano, 2017), have ended in price caps for interchange fees set by

³² In the EU, the European Banking Authority has approved "Strong Customer Authentication & Secure Communication" to ensure that consumers are protected. These standards have to be in place by November 2018 (García & Hermida, 2017).

³³ Needless to say, another relevant innovation in the area of payments is the deployment of digital/virtual currencies (Deutsche Bundesbank, 2016), which were already analyzed in the specific section on DLTs.

regulation, which must respect principles of necessity and proportionality if they are implemented.

- 4.45. Current innovation means fewer limitations to the number of payment systems users can combine (Canada Competition Bureau, 2017). This is a paradigmatic procompetitive supply-side shock, with new entrants and upgraded technologies that compress costs, mark-ups and prices. This balances market power and is bound to mean better conditions for merchants and consumers. By reducing the costs incurred by payment service users (in terms of money, time and inconvenience), more transactions would be completed. Technological innovations, allowing ubiquitous payments and promoting financial inclusion (for instance, in rural areas or poor regions), enhance this procompetitive trend.
- 4.46. Cost minimization and better allocation of resources are the defining features of the rise in static efficiency. And competitive effects are also dynamic, i.e. there are better incentives for innovation, differentiation and value creation, driven by broadened consumer choice. A remarkable evidence is the option to expand banking and non-banking services and gather relevant customer data which can be monetized elsewhere (McQuinn, Guo, & Castro, 2016). New technologies, especially in proximity payments (like NFC, BLE or QR codes, which allow to pay using mobile wallets in smartphones) facilitate the use of personal information from social network profiles or geolocation.
- 4.47. With more data about transactions and users (Canada Competition Bureau, 2017), firms can improve not only back-office activities (inventory management, billing or accounting) but especially front-office: customer-oriented marketing, targeted advertising and promotions, rewards or loyalty discounts, etc. This substantially improves users' experience in terms of both convenience and customization, creating additional demand.
- 4.48. The fact that users may track their expenditure more conveniently and straightforwardly (Canada Competition Bureau, 2017) also brings about dynamic efficiencies. Consumers are likely to become more aware about their outlays and, empowered with better information, are likely to increase their sensitivity to price, asking for better value for money.
- 4.49. The wide range of possibilities attached to DWs, chiefly MWs, explain the entrance of non-financial competitors, such as digital platforms, retail business (through specific apps) and telecommunications firms (through direct carrier billing), which

now compete with incumbents like banking institutions (the traditional AS PSPs) and credit/debit card companies.

4.50. In a nutshell, there is higher competition in payments. But this is not merely a conventional supply-side shock with just more firms and lower mark-ups and transaction costs. It is a complete disruption of the payments systems in three ways (Trevijano, 2017):

- Incumbents now compete with companies specialized in the management and exploitation of data.
- Some new entrants come from other non-financial industries, meaning that they can offer payment services for free in order to take advantage of scope and network economies (to be analysed below) or just to accumulate data to be monetized (directly sold or used internally to improve services).
- Business models may change completely, evolving from a very intermediated sector to marketplaces. One difference between a conventional (*Coasian*) firm and a platform is that the latter allows a direct contact between the different sides of the market. Therefore, the disintermediation does not merely mean that there are less links in the value chain. It implies that, in an extreme and abstract situation, intermediaries could even disappear. Another difference between traditional firms and platforms is that the latter take advantage of network effects in multi-sided markets, adding value and bringing efficiencies relying on the interaction of these sides of the market.

4.51. And this revolution in payments transcends the financial system. It increases competition in the business to consumer (B2C) retail sector, since lower transaction costs allow small merchants to compete with big players. It also facilitates business to business (B2B) payments, which may be critical for Small and Medium Enterprises (SMEs) to engage in more competitive environments, like international trade, especially if we take into account the increased room for cross-border transactions (McQuinn, Guo, & Castro, 2016). Finally, by improving the potential for consumer to consumer (C2C), or peer to peer (P2P) payments, the procompetitive effects can reach other sectors, like sharing or reselling goods and engaging in personal and professional services, empowering “prosumers” and “micro-merchants”.

4.2.c. Risks/Challenges

- 4.52. In order for those advantages and opportunities to materialize, the access of Fintech companies to inputs seems crucial. One of these inputs is the core payments infrastructure. Traditionally, alternative PSPs, which are not deposit-taking institutions, have been able to access clearing and settlement services only indirectly, through other banks (Canada Competition Bureau, 2017). This may incentivise incumbents to impose unfair or discriminatory conditions to new Fintech entrants that are perceived as competitors.
- 4.53. Other critical input are users' data. Sometimes consumers may be unwilling to share account data with TPPs due to security and privacy concerns, as well as uncertainty and unfamiliarity with the process. And even when consumers give their permission, incumbents (traditional banks acting as AS PSPs) may lack incentives to guarantee that access on non-discriminatory, fair and reasonable terms, without surcharging TPPs excessive costs (Vezzoso, 2018).
- 4.54. In principle, banks owning big and high quality user data should have incentives to monetize those valuable assets by selling them to TPPs if the latter are to be considered downstream clients. The exchange would be mutually beneficial too if they see Fintech companies as providers of specialized services that are complementary to their upstream activity³⁴.
- 4.55. However, there is a potential theory of harm pointing to some incentives of incumbents to restrict the access to data, as a consequence of the high concentration in banking (Vezzoso, 2018; Canada Competition Bureau, 2017). Traditional banks (with few competitors) see Fintech firms more as rivals which cream-skim the market by capturing the high-margin segments, like payments, which have tended to be very profitable (Trevijano, 2017). Therefore, incumbents would have to resign themselves to keeping only the least profitable activities, like deposit taking. AS PSPs would have the incentives to restrict the access to data in order to ensure the feasibility of their one-stop shop model, where they assume a whole range of complementary services. This restriction of access could be unilateral, by a dominant firm, or plurilateral, through a collusive agreement³⁵ (like a horizontal coordination within a banking

³⁴ As we shall see below (when analyzing asset management and advice), that would be the case if the Fintech company willing to access the data is only an advice or a comparison website while asset management is kept within the bank.

³⁵ See the European Commission press release «Antitrust: Commission confirms unannounced inspections concerning access to bank account information by competing services» (October 6, 2017). And also the

association on technical standards to deny potential competitors access to data). One way of raising the restriction by AS PSPs would be by not guaranteeing interoperability with apps which access data.

4.56. This leads to mull over the applicability of the “essential facility” doctrine to cases where an AS PSP restricts the access of Fintech companies to an input (ACCO, 2017). According to EU jurisprudence, if there is a dominant position, this “refusal to deal/supply” might constitute an abuse in four circumstances are present³⁶ (Jones & Sufrin, 2014, pp. 513-526):

- The refusal is bound to eliminate downstream competition exerted by the companies (Fintech firms in our case) aiming to access the input (user data or payments systems).
- There is no objective justification for the refusal.
- The access must be indispensable to carry out the activity.
- There are no actual or potential substitutes for the input.

4.57. The application of this doctrine to payments sparks controversial debates. As far as payment systems are concerned, some experts consider the core infrastructure as an essential facility without the access to which firms cannot operate on a normal basis in financial markets (Jones & Sufrin, 2014, p. 523). As for the specific case of payment services, account user data with last movements do not seem to have apparent close substitutes for PISPs and AISPs (Vezzoso, 2018). This does not mean that all types of data are an essential input for all type of firms, since this indispensability and the existence of actual or potential substitutes must be assessed case by case³⁷.

Bundeskartellamt press release «Restriction of online payment services by German banking industry in violation of competition law» (July 5, 2016).

³⁶ See cases 6, 7/73 Istituto Chemioterapico Italiano SpA and Commercial Solvents Corporation v. Commission of the European Communities.

³⁷ As we shall see below (when analyzing asset management and advice), there are other cases of Fintechs offering other types of financial services where data from different sources (like social networks or search engines) might be considered substitutable.

- 4.58. Regardless of the application, or not, of competition policy to these issues, regulatory solutions can be conceived. The EU Payment Services Directive (PSD2³⁸) and other regulatory initiatives at the international level seek to regulate the way in which access to data must be safeguarded on reasonable and non-discriminatory terms (obviously, without prejudice to horizontal data protection regulations). But this raises enormous challenges, as we shall see below, since objective criteria have to be established to define who is responsible for possible problems of (lack of) interoperability.
- 4.59. There are other reasons why payment services are an area with potential competition concerns. The existence of scale economies (with low variable costs that give relative prominence to fixed costs) means that big entities may have a plus and that these sectors (like electronic money) will be prone to be concentrated on big firms. Scale economies can also be dynamic due to learning effects, so that established players have a cost advantage over new entrants.
- 4.60. Scope economies are of paramount importance in this area. Banks tend to assume many activities, implying that this strategy yields savings because several costs are common to different activities (human resources, training, technical infrastructure...). Banks also exploit demand complementarities and bundle payment services with other products. The flip side is the increased complexity of financial products and a less transparent pricing structure (CMA, 2016), with cross-subsidies between different groups of products. For instance, banks may subsidize payments (shielding away from competition) by offering low rates in deposits (an area where an entrant finds it difficult to enter, due to regulatory barriers or lack of trust by consumers).
- 4.61. However, the Fintech phenomenon is likely to change the dominance of the one-stop shop for banks. Niche competitors emerge and focus on one single area (normally the most profitable), reducing the room for implementing cross-subsidies. But, in order for that to occur, the access to data by Fintech companies is crucial.
- 4.62. Network economies are also relevant, especially cross-group or indirect effects. The more users (consumers) a payment system has, the more valuable it is for agents (merchants) to join it and the more trust it will generate, attracting again more users in a positive feedback loop. This leads to concentration dynamics and “winner-takes-it-all” effects, where potential competitors find it difficult to overcome the “chicken-

³⁸ Directive 2015/2366/EU of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC.

and-egg” trap. The analysis of payments from the standpoint of multi-sided markets has been a recurrent theme for Competition Agencies³⁹ (Patsa & Benmayor, 2017). And regulators have also intervened with caps on interchange fees and “honour all cards rules”, which distort competition among credit/debit card networks and could mean an additional cut in efficiency given interdependences in demand.

- 4.63. Scale, learning, scope and network economies may increase concentration and risks of anticompetitive practices. As we have seen, Fintech may offset many of these forces, like scale and scope economies, and increase the possibilities for new entrants. Yet, Fintech is not totally immune to factors such as network effects and switching costs, implying that new entrants would find it difficult to overturn well established dominant positions (by traditional companies or even by Fintech companies with a consolidated position). For instance, even if MWs mean less limits to the number of payment systems users (both consumers and merchants) can combine (since there is no need to carry physical cards or to hold physical points of sale), switching costs may still prevent users from multi-homing because of search, learning or loyalty costs⁴⁰ (Canada Competition Bureau, 2017).
- 4.64. And Fintech as such may raise other challenges, which must be monitored by the relevant authorities, including competition agencies. Payments are an area where banks and credit-card companies have framed long-standing alliances. Now these alliances can reach other types of firms, as this service can be offered by big corporations, for instance, in telecommunications and retail. These are relatively concentrated sectors, where preponderant actors may reinforce their position.
- 4.65. The same happens with the entrance of BigTech companies. These have the potential to be competitive in offering payment services. And this may strengthen their market power in other areas, such as online advertising, due to scale, scope, network and learning economies linked to the monetization of big data.

4.2.d. Regulatory implications

- 4.66. In order to ensure competition “on the merits” between established and new players, emphasis has been given to an “Open Banking” approach, like in the EU payments

³⁹ Market definition in this context is especially challenging. In most cases at the European level, the Commission has tended to consider that MWs constitute a separate market from offline payment services, even if the question remains open due to rapid changes in markets and technology.

⁴⁰ Most users are not willing to have many apps, nor to learn how to use them.

services Directive (PSD2) and in other pieces of legislation⁴¹. This means that TPPs should be allowed to access the information about banking accounts (“access to the account”, XS2A), with the customers’ consent and only for the specific purpose(s) and with the specific outreach explicitly authorized by the customer (Vezzoso, 2018), abiding by data protection horizontal legislation. AS PSPs have to safeguard that right through APIs (Application Programming Interfaces), which ensure flexible interoperability with other apps and access to their data on a fair and non-discriminatory basis⁴² (AdC, 2018).

- 4.67. Technological neutrality and interoperability are necessary principles in implementing regulatory solutions⁴³ (Canada Competition Bureau, 2017; AdC, 2018), even if in some extreme cases (such as abuses of dominance or agreements between incumbents) competition agencies can act if access to data is unduly restricted. This technological neutrality is a way of applying the principle of data portability, which may be useful to increase competition in other areas of the economy as well⁴⁴ (Vezzoso, 2018).
- 4.68. In addition, even if Fintechs are more present in front-end payment services, the access to wholesale payment systems is relevant for end-to-end providers (ACM,

⁴¹ Like in the case of Mexico with its Fintech Law (Ley para Regular las Instituciones de Tecnología Financiera). Other jurisdictions are also planning to introduce this initiative (Australian Government, 2017).

⁴² Needless to say, allowing access does not mean free access, since banks can be compensated for the costs incurred to make that access possible in an efficient manner (ACM, 2017).

⁴³ This is already raising concerns regarding the use of screen scrapping techniques (by which a consumer agrees to allow a TPP to access the account data it needs through its own interface). Under the initial European Banking Authority (EBA) Regulatory Technical Standards (RTS), banks could choose to establish “common and secure open standards of communication” through the customer interface or through an adapted dedicated interface. This increased the risk of strategic behaviour by banks, which could hamper the information transferred through the dedicated interface to Fintech companies compared to the scenario of direct access through the customer interface. That is why the EBA, following a proposal by the European Commission, established a compulsory fallback solution in the form of user-facing interfaces for TPPs should the dedicated interface fail. National regulators (after consulting with the EBA) can exempt some banks from the fallback mechanisms if the dedicated interface complies with several requisites (Vezzoso, 2018).

In Spain, the Competition Authority (CNMC) closed a file (S/DC/0536/14) where an AISP company (Fintonic) issued a complaint against an incumbent (Caixabank) alleging that the XS2A was being denied. But CNMC ruled that denying the access in this case was not breaching the technological neutrality concerns since the technique used by the AISP (requesting passwords to its users) was not appropriate according to Spanish and EU regulatory standards.

⁴⁴ This is the case of digital platforms where reputation plays a key role and may prevent switching between platforms and multi-homing. However, the application of the principle of data portability must be discussed case-by-case, since in other activities the access to data is not a significant barrier to entry and data can be accessed or replicated through other innovative ways (Vezzoso, 2018).

2017). That is why some jurisdictions are allowing alternative PSPs, which are not deposit-taking institutions, to access payment systems directly⁴⁵ (by easing the requirements to be a direct clearer) or at least to ensure an indirect access (through another financial institution) according to proportionate, objective and non-discriminatory criteria (ACCO, 2017; Canada Competition Bureau, 2017; AdC, 2018; AEFI, 2017). Furthermore, some regulatory requirements are being relaxed when dealing with transfers and payments of a small scale.

- 4.69. Other pieces of regulation that may be revisited are “Honour all card” rules and “Interchange caps” (Canada Competition Bureau, 2017). These two measures were perceived as complementary. Since “Honour all card” rules might benefit the more expensive credit/debit card companies, caps on fees seemed to be necessary⁴⁶. To the extent that there are more alternatives for payment solutions, both regulations may lose rationale (WEF, 2017).
- 4.70. To sum up, this revolution in payments can be procompetitive by paving the way for new entrants, many of them not coming from the traditional financial sector. These new contexts and possibilities offered by new technologies are an opportunity to reassess unnecessary barriers, mainly those hindering new undertakings from accessing the market. Regulation must take all these possibilities offered and warranted by new technologies and social customs into account.

⁴⁵ For instance, allowing them to hold an account in the Central Bank. In United Kingdom non-bank payment providers have the possibility of opening an account in the Bank of England (the central bank) so that they can operate without the need to open an account in a credit institution, hence avoiding the dependence on the indirect access (Martin, Grier, & Bendell, 2017).

⁴⁶ In the EU, the Interchange Fee Regulation (IFR, Regulation (EU) 2015/751 of the European Parliament and of the Council of 29 April 2015 on interchange fees for card-based payment transactions) does not apply “honour all cards” rules, so merchants can choose which category of cards to accept instead. Meanwhile, interchange fees are capped at 0.2-0.3% of transaction value for debit and credit cards, respectively, and 0.1-0.2% for transactions lower than 20€ (WEF, 2017; AFI, 2017). PSD2 (in its Article 62) forbids no-steering policies, e.g. the practice by PSPs to prevent the payee from offering discounts or applying charges depending on the payment instrument. Nonetheless, charges cannot exceed the costs associated to the instrument and cannot be passed through in the case of interchange fees. And, actually, Member States can restrict the payee ability to impose charges, leaving only the possibility of discounts for steering purposes open.

4.3. Asset management and advice

4.3.a. Definition and overview

- 4.71. If payments have been shaken by the Fintech revolution, so has the industry of asset management and advice. This is the case both for passive agents (like brokers-dealers, who place orders in exchange for fees, sometimes providing some ancillary services as well, like information and research) and for more active ones (which actually manage investors' funds and engage in trading and distribution, acting like market makers and taking part in secondary markets).
- 4.72. There are many new and innovative business models under the sector of asset management within the Fintech ecosystem. All of them have similar underlying factors: the use of social media, the revolution of big data (much cheaper to access, collected, store, process and disseminate), the development of artificial intelligence and the emergence of digital platforms. But they combine them to a different extent and can be ranked according to the degree of control that final investors keep in the daily management of funds: financial comparison tools, financial aggregators, sentiment and networking platforms, social trading, electronic trading platforms and robo-advisory services (IOSCO, 2017).
- 4.73. Financial comparison tools are previous to the Fintech revolution and go well beyond its outreach (European Commission, 2016). They allow customers to compare different product and service providers, leading to their websites (since they cannot be bought directly through the comparison tool). They are usually called price comparison websites (PCWs) because they are very much focused on prices, but more precisely they should be named Digital Comparison Tools (DCTs), since they include characteristics beyond the price and they take the form not only of websites, but also apps and other software. The focus on price is due to the fact that they are very common in standardized services, like telecommunications and energy, where price is the main element of consumers' decision. In all these sectors, quantities purchased are relatively inelastic, sometimes because demand is actually induced by regulations, as happens with insurance. Therefore, comparison tools are present in finance, especially in common and traditional services, such as retail banking and deposits, mortgage advice and insurance. In these activities, price (interest rates on loans and deposits, insurance policies in terms of premium and coverage...) is the most relevant competition variable and is easy to understand for consumers. Comparison tools are starting to be used in more sophisticated activities, like

investment funds, even if its pricing is much more complex due to the different vehicles and fee structure (Canada Competition Bureau, 2017).

- 4.74. Financial aggregators and personal financial management (PFM) software and apps merge an investor's information from different sources (e.g. banking institutions) to exploit the data and offer related services. These services range from budget control (monitoring taxes, bills and spending habits) to portfolio management and advice (McQuinn, Guo, & Castro, 2016). Therefore, Account Information Services Providers (AISPs, mentioned in the area of payments) fall into this category, since they can use the information to provide services beyond the area of payments.
- 4.75. Sentiment and networking platforms use varied tools to conduct professional research on financial markets and hence provide advice, brokerage and management services. These tools include social media analytics to measure investor sentiment and social network platforms to exchange, share or even crowdsource ideas on financial markets (IOSCO, 2017).
- 4.76. Social trading (also called mirror or copy trading/investing) goes a step further and allows investors to follow a "leader" in their portfolio decisions (AEFI, 2017). Hence, these platforms use social network and sharing economy tools, mainly evaluation and reputation systems, to build trust.
- 4.77. Electronic and mobile trading platforms connect agents in information and transaction networks and eventually allow to execute orders and automate operations and record keeping (AEFI, 2017). They match orders in innovative ways, including real-time and flexible settlement and the use of distributing ledger technologies like blockchain (IOSCO, 2017; Deutsche Bundesbank, 2016). These are useful not only for savers/investors (especially those engaged in active strategies) but also for borrowers like corporations and financial institutions themselves.
- 4.78. Robo-advisory services ("robo-advisers") provide advice and portfolio management services based on artificial intelligence (Deutsche Bundesbank, 2016), be it fully automated or human-assisted. These platforms use the investors' profile to build and manage a portfolio consistent with their risk appetite and their investment goals. Platforms fees can be flat and/or proportional to the volume or profitability of the managed assets.

4.3.b. Advantages/Opportunities

- 4.79. All of the abovementioned developments share the fact that they foster both static and dynamic efficiency.

- 4.80. Static efficiency improves because, given the reduced need for a face-to-face interaction, these innovations lessen the input requirements (especially labour and physical offices) compared to the traditional advice supplied in person by investment professional in a bank branch (Canada Competition Bureau, 2017). These resources can be reallocated towards other more productive uses, reducing costs and expanding output.
- 4.81. Cost efficiencies are necessary in the financial sector (WEF, 2017) given the challenge to meet consumers' demand of high returns (*alpha*, "excess returns over the market") while keeping risk low (*beta*, "extra volatility compared to the market"). One way to balance these two goals (smart *beta*) is trading relatively safe instruments but very actively, aiming at earning extra returns (high *alpha*) containing risk (low *beta*). These innovations can facilitate this strategy relying on the use of big data, cloud computing and artificial intelligence. Thanks to the possibility of carrying out more transactions, many of these vehicles (like robo-advisers) tend to focus on low-cost and low-risk strategies (McQuinn, Guo, & Castro, 2016; AdC, 2018), like passive fund management⁴⁷ and exchange-traded funds (ETFs) and indexed funds.
- 4.82. The ability to get advice and management services at a lower cost (in particular for the low-risk segment), and with other advantages like the lack of minimum investment amounts, increases ("democratizes") financial inclusion and ensures that these products are available for all consumers (and not only high-income ones). Access also improves because the pricing structure is more transparent and consumers keep a better control and monitoring of investments (McQuinn, Guo, & Castro, 2016). This leads us to deal with dynamic issues.
- 4.83. Beyond static cost efficiencies, dynamic efficiency also goes up thanks to the correction of some market failures, mostly related to information asymmetries. The fragmentation of the value chain, with niche competitors specialized in asset management and others only in advice, may yield positive outcomes. Regulators praise the separation of investment consulting (IC) and fiduciary management (FM) because it helps to mitigate perverse incentives of managers to steer clients towards own products⁴⁸ (FCA, 2017; McQuinn, Guo, & Castro, 2016). Even incumbents might adapt to this situation by separating both areas (traditionally integrated). Therefore, potential conflicts of interest are somewhat prevented and better monitored without

⁴⁷ Robo-advisors with more active strategies are called quant advisors.

⁴⁸ Even if there are not perverse incentives (nor misbehaviour) by advisers, the latter may recommend their own products because of cognitive biases.

a regulatory solution (like vertical unbundling or separate accounting) which might take its toll on efficiency.

- 4.84. Apart from these general benefits, each innovation has other specific advantages. For instance, comparison websites offer the advantage of endowing consumers with more information, boosting competitive dynamics and disciplining financial institutions to offer better value for money. Financial aggregators and PFM tools, apart from the upgraded information, add the possibility to expand services and exploit scope economies with other activities.
- 4.85. Social trading and sentiment and networking platforms also address information failures. They use tools from digital platforms, like reputation mechanisms, to build trust and generate powerful network economies (Canada Competition Bureau, 2017). They also take advantage of big data to exploit learning economies (IOSCO, 2017).
- 4.86. As for electronic trading platforms, efficiencies go beyond the “low-hanging fruit” of cost savings and automation of routine tasks (McQuinn, Guo, & Castro, 2016). They also improve information, transparency and data, leading to further pricing efficiencies. Platforms gain scale and gather data, which can be monetized in other areas to further lower prices (WEF, 2017). Thanks to their enticing prices and automated and commoditized services, electronic platforms increase participation among both institutional and retail investors (especially those who pursue more active strategies), enhancing market size, depth and liquidity. This is paramount in fixed income markets which tended to be fragmented in segments where buyers used to enjoy “monopsony power”. Higher participation on the buyers’ side means more affordable and abundant funding for firms, spreading the procompetitive trends throughout the whole economy.
- 4.87. And, finally, robo-advice is the innovation which best represents the potential for increasing productivity by producing more output with less input (Canada Competition Bureau, 2017). It can be very efficient in terms of performance (due to learning economies attached to big data) and cost while offering a high degree of convenience, especially for passive (“set-and-forget”) investors.

4.3.c. Risks/Challenges

- 4.88. All these innovations share some general risks and challenges (IOSCO, 2017; Canada Competition Bureau, 2017).
- 4.89. In some cases, transparency and information may not improve adequately (McQuinn, Guo, & Castro, 2016). On the one hand, complexity of products and fees is still

common given the lack of understanding by consumers lacking the necessary financial literacy. On the other, some conflicts of interest could be unresolved, exacerbating principal-agency problems, since intermediaries without “skin in the game” lack incentives for an appropriate management (Deutsche Bundesbank, 2016).

- 4.90. And if transparency actually increases, it has to be born in mind that it could facilitate tacit collusion. This is a concern in standardized goods and services where price is the only element of competition and deviations from a concerted practice are easy to detect by participants in the agreement (Ivaldi, Jullien, Rey, Seabright, & Tirole, 2003). These features, like standardization, are present in financial markets.
- 4.91. Furthermore, switching costs and stickiness of consumers are still relevant. These affect both electronic platforms (WEF, 2017) and also more retail-oriented management and advice services (Canada Competition Bureau, 2017). Even if consumers are empowered (with more information, through PCWs, and control, through PFM) to choose among a wider range of unbundled management and advice services (Vezzoso, 2018), switching is still very low in the banking sector due to lock-in effects for bank account holders (CMA, 2016). Therefore, most users will tend to contract advice and management with their traditional entity and incumbents will keep their comparative advantage as one-stop shop.
- 4.92. Apart from these common challenges, each innovation raises specific concerns.
- 4.93. For instance, PCWs spark a thought-provoking debate in terms of their impact on competition (UK Regulators Network, 2016). Beyond (initial or periodical) fees charged to providers, pay-per-click/lead/sale⁴⁹ and monetization of data (CNMC, 2016), their funding options also include sponsored placement or advertising. This could lead the PCW to be incentivised to manipulate search results, potentially harming consumers. Nonetheless, there are two offsetting factors which would dissuade PCWs, if partially, from doing that. First, consumers can always change to a different PCW when they are not satisfied with the service, since in theory competition among PCWs is actually a “click away”. Second, the possibility of

⁴⁹ In-pay-per-click, the PCW charges the service provider a fee whenever a user clicks on its offer. In-pay-per-lead, the PCW charges the service provider a fee when it obtains information about the potential customer (beyond clicking on the offer, the user has to provide a *lead*, a relevant piece of information like the zip code or the social network profile). In-pay-per-sale, the PCW charges the service provider a fee when it sells the product or service to the user.

intervention with competition policy tools if that manipulation is behind an abuse of dominant position or an agreement between undertakings.

- 4.94. Other risks to competition arise from the use of most favoured nation (MFN) clauses by PCWs, which can be wide or narrow. Wide MFNs impose that the price quoted on the PCW will never be more expensive than the one on any other sale channel, including the provider's own website or other PCWs. Meanwhile, narrow MFNs imply that the price quoted on the PCW will never be more expensive than the one on the provider's website (therefore allowing for a cheaper price on other PCWs, in contrast with wide MFNs). Competition agencies have tended to forbid the former, since they inhibit competition among PCWs by eliminating the incentives to reduce their fees, and they end up reducing competition among the same services compared (UK Regulators Network, 2016).
- 4.95. As for financial aggregators and PFM tools, they also face the problem of accessing users' data, in some cases in an analogous way to the area of payments, abovementioned. Traditional banking institutions do not perceive Fintech companies as providers of specialized services complementary to their upstream activity or as clients to which they can sell data (in a mutually beneficial exchange). Instead, they consider them as competitors trying to capture the high-margin branches of business, like asset management and advice (and hence leaving aside deposit taking). Therefore, they have incentives to restrict the access to users' data, especially taking the concentration of the banking sector into account (Vezzoso, 2018).
- 4.96. The other innovations (sentiment and networking platforms, social trading and robo-advisors) may exacerbate some problems of financial markets such as herd behaviour, procyclicality and even vulnerability to the dissemination of false information (IOSCO, 2017; Deutsche Bundesbank, 2016). This, in itself, is a distortion in the competitive process, since market prices would no longer be an appropriate signal of efficiency. The potential harm to consumers and financial stability would justify the adoption of regulatory measures, but it is important to recall that these regulatory measures must respect principles of necessity and proportionality in order not to undermine efficiency.
- 4.97. And, finally, some of the challenges ahead for asset management and advice innovations have to do with the role of regulation, which is analysed in the next subsection.

4.3.d. Regulatory implications

- 4.98. The revolution in asset management and advice is paradigmatic of the Fintech phenomenon in two ways: the unbundling of financial services and the adoption of a platform model. These two trends have thought-provoking regulatory implications.
- 4.99. The unbundling of advisory services and management and financial products as such reduces the potential for conflicts of interest. Despite located at different places in the value chain, PCWs and robo-advising are an evidence of this trend and they help to empower the consumer with upgraded information and tools to make better decisions. This idea has to be taken into account when designing regulation.
- 4.100. In addition, unbundling means a more transparent pricing structure. This is positive from the standpoint of competition, since it reduces cross-subsidizing used as a barrier to entry, and regulation, given that it reduces the extent to which authorities have to monitor or regulate pricing policies. Yet, the inherent complexity of these products may still lead to some regulatory or supervisory intervention to ensure appropriate pricing policies consistent with consumer protection (Canada Competition Bureau, 2017). Financial education should also have a role.
- 4.101. The emergence of niche companies (in contrast with the one-stop shop traditional banking models) has other interesting implications. It underlines the relevance of a principle that applies to the whole Fintech phenomenon. Regulation ought to be based on the activity as such (and the market failures associated with it) and not on the type of entity nor on the business model (Canada Competition Bureau, 2017).
- 4.102. In order for this positive unbundling to happen, Fintech companies may need the access to data to offer these services at different phases of the value chain. Therefore, a greater progress towards technological neutrality and interoperability (through APIs coherent with X2A policies) is desirable, in a similar way to what was mentioned with payments.
- 4.103. Meanwhile, the adoption of platform schemes means that Fintech companies may have incentives to self-regulate in a context of network externalities among the different sides of the market. The problems of asymmetric information and perverse incentives in asset management and advice, even if not mitigated completely, are better handled by platforms.
- 4.104. One of the main challenges of these activities is the different degree of automation or human/users control. In some innovations it is not clear whether services providers should be considered asset-managers, brokers-dealers or mere advisers. Social

trading raises specific issues regarding the role of “leaders” (in terms of the requirement, or not, of licencing) since users tend to follow their decisions automatically, even if ultimately keeping control on their wealth and being directly responsible. These types of business models where investors have the ultimate control of their funds (since platforms only provide information and facilitate contact among agents) might be regulated more lightly than when there is an actual portfolio management by the firm (since in that case consumers actually lose the direct control of their funds).

- 4.105. Therefore, the revolution in asset management and advice yields many positive aspects: lower scope for conflicts of interest, higher information and transparency (especially in pricing) and the incentives to self-regulate in order to generate trust among users and, thereby, keep them on board. This means that the market may mitigate failures which are behind the regulation to safeguard consumer protection and financial stability (Vezzoso, 2018). And this is another inspiring concept that should apply generally to the whole Fintech ecosystem: regulation should be based on expected outcomes instead of imposing the means to achieve those desired outcomes, when those means are not the only way to attain those goals (Canada Competition Bureau, 2017).
- 4.106. Public intervention (in the form of prudential regulation, disclosure...) is only warranted when firms’ incentives and behaviour are not compatible with the general interest and when market failures, like information asymmetries and conflicts of interest, are not corrected (McQuinn, Guo, & Castro, 2016). Furthermore, suitability requirements may be needed to protect consumers in complex or risky products. But the tests used (like the KYP, know-your-product, and the KYC, know-your-client) should be technology and device-agnostic⁵⁰ (Canada Competition Bureau, 2017; AdC, 2018). And, as was mentioned above, financial education can increase consumers knowledge and awareness, empowering them to make sound decisions.
- 4.107. The revolution in asset management and advice places financial markets into new waters. However, it should be borne in mind that these innovations only take a small

⁵⁰ For instance, online questionnaires and text-based chats (or even chatbots) could be considered equivalent to assessments through conversations, meetings and phone calls. This is consistent with the EU legislation that allows electronic means to assess suitability (AdC, 2018): MiFID II (Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU) and its developing regulation (Commission Delegated Regulation (EU) 2017/565 of 25 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council as regards organizational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive).

share of financial markets. Therefore, taking into account these models' positive features (reduction of market failures and self-regulation), and with appropriate policies (financial education, suitability tests and prudential regulation), an optimal response might be adopting another general principle of Fintech which is the "regulatory sandbox" (Canada Competition Bureau, 2017). This means lighter prospectus disclosure and registration requirements for innovative models, at least for a given period of time and small projects. Thus, these projects can gain scale and their impact on the market can be assessed in order to adopt a definitive regulatory response.

4.4. Crowdfunding

4.4.a. Definition and overview

- 4.108. Crowdfunding can be defined as the channelling of funds peer-to-peer (P2P) from a large pool of backers to a particular project or venture (normally of a relatively small size), usually through a digital platform and foregoing the need of face-to-face interactions (Wilson & Testoni, 2014; Schwienbacher & Larralde, 2012).
- 4.109. Crowdfunding was, in its inception, linked in a great extent to somewhat non-profit motives, such as funding from consumers in exchange of rewards⁵¹ and individuals' donations to political or development campaigns (where we could include microfinance and community shares⁵²). Nonetheless, after that initial stage, the profit-oriented segment of crowdfunding (crowdinvesting, which is the most important area for the purpose of this report) has gained relevance, much more for lending than for equity⁵³. Nowadays it is even spreading to other financial products such as property and real estate, debt issuance (fixed-income instruments) and invoice trading. And

⁵¹ Typically, the goods and services are delivered to consumers who finance the project pre-development, sometimes at a discount or with upgrades like first releases, limited editions or recognition in the credits (given their popularity in creative industries like films, music and videogames). But, even if reward-based crowdfunding implies advantages for fund providers, it may be tagged as non-profit because these consumers tend to value non-economic benefits such as the sense of belonging to a community (Belleflamme, Lambert, & Schwienbacher, 2014). Reward-based crowdfunding is also rooted in the marketing concept of crowdsourcing, whereby firms take advantage of the crowd to obtain ideas and feedback (Schwienbacher & Larralde, 2012).

⁵² Microfinance refers to small loans directed at agents and entrepreneurs subject to problems of financial inclusion (so, even if being debt-type, it can be tagged as non-profit given its social dimension). Community shares consists in equity-type participation in cooperative and community projects (Wardrop, Zhang, Rau, & Gray, 2015).

⁵³ See annex.

there are also hybrid models (McQuinn, Guo, & Castro, 2016) which combine non-profit and profit features (e.g. rewards for initial backers of a project and dividend payments to investors who have gone on funding the project).

4.4.b. Advantages and opportunities

4.110. Crowdfunding, i.e. P2P lending and equity crowdfunding (ECF), can be key to mobilize financial resources towards nascent, small and innovative firms, fostering efficiency and competition well beyond the financial sector. Each type of crowdfunding has its own relative comparative advantages.

4.111. P2P lending is proving much more important in quantitative terms hitherto⁵⁴. It has taken advantage of rather temporary factors such as the impairment of the traditional credit channel with the banking crisis or the low interest rates that have led savers to seek other alternatives. But its prospects are mostly grounded on permanent pluses vis-à-vis the traditional banking sector:

- It enjoys lower transactions costs in financial intermediation owing to the use of digital platforms instead of brick-and-mortar office networks.
- The use of information and data paves the way for customization or some analytics-based automation of key financial decisions, like the granting of credit for borrowers, rating of projects and advice or management services for investors (IMF, 2017; WEF, 2017). Therefore, decisions on whether (or not) credit should be granted are streamlined and, apparently, denial rates are reduced (McQuinn, Guo, & Castro, 2016).
- The two previous factors imply that even small loans can be profitable, since the overhead costs are low (in contrast to traditional banks where the process of analysing loans is relatively labour intensive), facilitating credit to SMEs (Canada Competition Bureau, 2017).
- Finally, the ability to pool projects and resources allows for greater diversification (Deutsche Bundesbank, 2016), an essential feature of a well-functioning financial market (IOSCO, 2017).

⁵⁴ See annex.

4.112. ECF takes advantage of these same drivers but has distinctive features. It corrects some of the failures associated with traditional equity finance, improving the risk-return trade-off and broadening the base of investors:

- Equity is associated with a higher risk-profile⁵⁵, but this might be mitigated through crowdfunding. The decentralized approach of ECF can make information flourish, so that traditional regulation (through minimum capital requirements, prospectus, information disclosure...) can be softened, since these requirements tend to be especially costly for nascent, small and innovative firms⁵⁶.
- The investor base is narrower in equity⁵⁷ (normally venture capitalists and business angels, who are highly qualified and wealthy enough to diversify their portfolio), but this may be changed thanks to crowdfunding, too. ECF, by relying on a better use of information and screening of projects (and by improving return-risk ratios), may reach a wider base of retail investors, allowing for customized and diversified investments. And, at the same time, ECF can increase the potential for these investors to provide qualitative advice to the project within the platform ecosystem (AdC, 2018).

4.113. And, beyond their specific features, P2P lending and ECF bring common gains to both lenders and borrowers (Agrawal, Catalini, & Goldfarb, 2013). As for the former, they get not only a higher return (since the lower costs imply a smaller wedge between interest charged on borrowers and the one paid to lenders) but also cheap or free ancillary services including diversification (which improves the risk-return profile). As for the latter, they are able to borrow cheaply and swiftly (due to the lower transaction costs) and from a wider (even international) base of investors beyond the traditional banking credit channel (instead of depending crucially on one or very few banking institutions). This is of utmost importance for risky but potentially profitable projects (for nascent, innovative and small and medium firms), so the procompetitive effects spread throughout the whole economy. Since there is no need of a face-to-

⁵⁵ Agents invest in a firm (normally at its early stages) in exchange for shares, which means a higher expected profitability but also more risk (IOSCO, 2017). Many projects do not yield positive returns and even the ones which do, will do so in a longer term. And the returns may not be in the form of dividends (if the firm faces difficulties in sustaining profits) but by sales of the firm's capital or by the revaluation of the shares, which depend on the expectation of future profits and on the existence of liquid secondary markets.

⁵⁶ Not only because of the direct outlays on some of these requirements but also because of the indirect costs of revealing information (which is a disadvantage for entrants and an advantage for incumbents).

⁵⁷ Because of the abovementioned features (higher risk profile, more imperfect and asymmetric information...).

face physical contact, firms are less geographically constrained and credit rationed, potentially engaging in more competitive (and also more profitable) environments like international trade.

- 4.114. So crowdfunding is an archetypal supply-side innovation in credit markets: lower costs, more competitive pressure, compressed mark-ups, reduced prices, higher quality (in this case in the form of customisation, diversification or ancillary services) and bigger quantity. Crowdfunding also exerts competitive pressures on other branches of the financial sector like payment systems. For instance, credit card companies used to charge high fees and interest rates to customers which use them as short-term financing (“revolvers”). Crowdfunding offers alternatives for those users to obtain funding, so this new competition compresses mark-ups of credit card companies to maintain those profitable customers (WEF, 2017).
- 4.115. This increase in the supply of credit is of paramount importance to address problems of rationing and to increase competition well beyond the financial sector (since credit is an input in all sectors and is critical for new entrants).
- 4.116. But there are other distinctive and not so archetypal features which make crowdfunding especially disruptive: the role of information and network effects. These make the efficiency gains not only static (i.e. a better allocation of resources), but also dynamic, in the form of better incentives (Deutsche Bundesbank, 2016).
- 4.117. Crowdfunding may be more effective than traditional business models at addressing information asymmetries in the financial sector (Deutsche Bundesbank, 2016). For instance, crowdfunding is relatively transparent in comparison with traditional credit markets. In the latter, relations tend to be one-to-one, so they are more opaque and other agents who are not directly involved do not know how the project is performing. In the former, agents know whether (and to what extent) a project has succeeded in raising the funds set as an objective. So a firm meeting its targets can mobilize additional funding not only within the crowdfunding platform but also through alternative means, such as banking credit, business angels or venture capital.
- 4.118. Crowdfunding platforms can also prevent adverse selection and moral hazard through a better use of information and data. They can add value by screening, scoring and rating projects, assessing borrowers’ reputation and recommending projects to investors according to their portfolio diversification and their risk profile. This leads to sounder decisions, by both lenders and borrowers.

- 4.119. This task of crowdfunding platforms is very much related to their second disruptive feature: network effects, typical of platforms (Canada Competition Bureau, 2017). Indirect network effects⁵⁸ are evident. Lenders prefer platforms with more borrowers so that they diversify their portfolio. And borrowers prefer platforms with more lenders, in order not to depend crucially on any of them and also because some lenders provide inputs other than credit, such as feedback or guidance on the project. This may trigger direct network effects⁵⁹, e.g. lenders may prefer platforms with more lenders: the scoring mechanisms would work better, sophisticated investors (whose decisions can be followed) are more likely to appear, etc.
- 4.120. The existence of network effects implies that crowdfunding platforms can generate efficiencies as financial intermediaries. They can leverage these network effects (together with scale, scope and learning economies linked to their comparative advantage in exploiting information and data) in order to provide some services and address market imperfections (such as information asymmetries or transaction costs). Lenders may value rating and scoring tools by platforms and automation and diversification of investment decisions (to save costs). Borrowers sometimes need financial and general advice regarding their project. Both borrowers and lenders can benefit from mechanisms to address risks of default (with funds set aside by the platform) or illiquidity (with secondary markets within the platform).
- 4.121. Furthermore, network effects create incentives for platforms to self-regulate. Bad risk management by one platform would discourage lenders to participate, which would lead borrowers to seek other alternatives. Finally, the platform would end up losing its portfolio and its revenue base. Consequently, it is in the platforms' own interest to keep both sides on board by ensuring a sound management of risk in its portfolio. That it is why some platforms adopt conducts like project screening, monitoring and assessment, as well as information disclosure. In order to build trust among investors, platforms can cover losses and defaults and even assume a small share in each project in order to have appropriate incentives ('skin in the game').

⁵⁸ Indirect network effects in multi-sided markets arise when the demand from one side depends positively on the number of agents on the other(s) side(s).

⁵⁹ Direct network effects arise when the demand from one side depends positively on the number of agents on the same side.

4.4.c. Risks/challenges

- 4.122. Crowdfunding also poses some risks and challenges (IOSCO, 2017). Information dynamics and network effects might be a mixed blessing in some cases.
- 4.123. Regarding information imperfections, some say that these are exacerbated (and not mitigated, as argued before) by crowdfunding. By engaging a wider range of projects (inherently riskier in the case of start-ups, for instance) and a massive crowd of investors (less sophisticated and professional), there may be higher risks of fraud, defaults (in P2P lending) or bankruptcies (in ECF) and general misperceptions (herd behaviour, booms of euphoria, sudden waves of illiquidity...).
- 4.124. One of the main causes of these risks is the likely exacerbation of moral hazard in a principal-agent relationship (Deutsche Bundesbank, 2016): given that investors are the ones pledging the funds, the platform is not bearing any risk of default. So the latter lacks incentives for a sound management and could be tempted to sell over-optimistic expectations on the projects so that the loan portfolio increases and its revenues arising from fees are maximized.
- 4.125. As in other financial markets, the problems are more acute when the financial intermediary, be it a bank or a platform, follows the “originate to distribute” model (Deutsche Bundesbank, 2016). This happens when the intermediary grants the credit but quickly passes it on to investors, i.e. the intermediary has “no skin in the game”. The intermediary would set looser credit standards than the ones applied for loans that remain within its own balance sheet. And investors may lack appropriate incentives to monitor risk, neither ex ante nor ex post, if their portfolio is relatively diversified.
- 4.126. Sometimes suboptimal decisions, such as herd behaviour, irrational exuberance and self-fulfilling expectations, are exacerbated by the difference between two alternative models of crowdfunding (Cumming, Leboeuf, & Schwienbacher, 2014): the All-or-Nothing (AON) vs. the Keep-it-All (KIA):
- Under the AON setting, the project only gets the funds if it reaches a given threshold so investors would not have to disburse the money if the initial objective is not met. Hence, AON projects are prone to these positive feedback loops: once they are above the target, they are likely to attract more investors (even from sources other than crowdfunding), since the project has excess funds and therefore more chances to be successful and profitable.

- Meanwhile, under KIA projects, borrowers are allowed to take the pledged funds even if they don't reach the initial goal. These are inherently riskier, since the borrower assumes the debt even when its project is underfinanced and less likely to be fruitful. So they normally bear a higher interest rate to attract investors and to overcome a possible negative feedback loop (agents would not participate unless other agents participate).

4.127. Other behavioural explanations for suboptimal equilibria include the fact that agents may be influenced by personal affiliations (and not by purely objective financial data), implying that the wisdom of the crowd would underperform individual qualified investors.

4.128. There are additional (and subtler) issues related to information and competition. Some crowdfunding platforms, especially the equity-type, provide a tool for incumbents to monitor and control the investment by actual or potential competitors. Incumbents can reach a decisive influence or even absorb the new business into their structure (as we saw can happen with ICOs). Besides, sometimes information disclosure (because of legal requirements or self-regulation) can affect critical elements of business strategies, which is an obstacle for new entrants aiming at displacing well-established dominant firms. The entrance of some BigTech companies in the alternative lending business (McQuinn, Guo, & Castro, 2016) should lead to monitor whether they can use this tool to prevent entry or to absorb potential competitors (since start-up technological firms are more likely to use this channel compared to traditional banking).

4.129. And, regarding network effects, it is important to recall that they may lead to concentration dynamics⁶⁰. This means potential endogenous barriers to entry in the form of chicken-and-egg and winner-takes-it-all dynamics, making it difficult for new and small platforms to generate trust and gain scale.

4.4.d. Regulatory implications

4.130. Framing an appropriate regulatory response to these new intermediaries is the main challenge for policy-makers in this area (WEF, 2017). As in most Fintech industries, crowdfunding platforms cover a very different range of services and hence raise many regulatory challenges. The traditional approach of financial watchdogs to

⁶⁰ For instance, in one of the first analyses of loan-based crowdfunding platforms (FCA, 2013), the first 5 were found to have 98.4% of the market in the UK (45.1% the 1st, 27.9% the 2nd, 16.1% the 3rd, 6.8% the 4th, 2.5% the 5th and 1.6% the rest).

regulate institutions, instead of activities, might not be well suited to cope with this phenomenon. But this challenge can be seen as an opportunity to revamp regulation so that it responds to market failures related to activities, regardless of the type of institution managing the service, in order to ensure neutrality and non-discrimination between different business models.

- 4.131. It is fair to say that crowdfunding platforms have specific shortcomings. For instance, most crowdlending platforms do not hold a banking licence so they cannot take deposits, meaning a riskier model of funding than traditional banking institutions which rely on deposit taking⁶¹. Meanwhile, most equity crowdfunding platforms have no liquid secondary markets and projects are inherently riskier due to their small size compared to those well-established stock markets. But sometimes this lack of secondary markets is due to the regulation itself⁶², which tends to consider crowdfunding strictly as a vehicle for P2P financing, without assuming other functions which could upgrade its role in financial intermediation (McQuinn, Guo, & Castro, 2016).
- 4.132. And there are other regulatory issues more difficult to tackle. For instance, in comparison with traditional financial intermediation, crowdfunding is more likely to engage agents (both borrowers and lenders) from different jurisdictions, so there could be cases where it may not be clear which legislation is to be applied or where conflicts may arise. International cooperation would be needed based on soft law and flexible bottom-up approaches.
- 4.133. But, at the same time, it is important to bear in mind the self-regulation incentives of platforms (due to network effects) and the way information failures can be corrected (even if partially). In order to reap these fruits, crowdfunding platforms must be allowed to act flexibly, so that they can take advantage of scope economies and provide value added services instead of being an agnostic marketplace which just puts sides in contact (McQuinn, Guo, & Castro, 2016). For instance, crowdfunding platforms may enjoy a comparative advantage in offering advisory and management services for investors, especially when they develop screening and scoring tools. In order to do that, data may be a relevant factor, so again the principles of neutrality and interoperability (through APIs coherent with X2A policies) must be taken into

⁶¹ Even those which might have a banking licence face difficulties to gain trust and receive depositors' savings.

⁶² This is the case of Spain, where crowdfunding platforms cannot create actual marketplaces for the exchange of financial instruments (AEFI, 2017), although they could provide information about the existence of marketplaces or platforms where peers interact (CNMV, 2018).

account (in a similar way to what was mentioned regarding payments and asset management and advice).

4.134. But one could argue that potential conflicts of interest justify restrictions on the range of activities crowdfunding platforms may participate in. An example of such a measure would be a ban on offering tailored advice or asset management⁶³. But this would reduce competitive pressures for incumbents, undermining efficiency and welfare. Therefore, less restrictive approaches might be more advisable, e.g. imposing objective and transparent criteria for that kind of services.

4.135. Should self-regulation incentives not work properly, a regulatory response may be warranted. This could include incentives for platforms to hold “skin in the game” by assuming a percentage of its portfolio⁶⁴ or make capital requirement proportional to outstanding loans.

4.136. Sometimes, the goal of investor protection makes use not only of prudential regulation, but also of limits to individual exposure. Sometimes, these restrictions only apply to non-qualified investors⁶⁵. Suitability requirements (through the abovementioned tests like the KYP, know-your-product, and the KYC, know-your-client), which (as was said in the previous section on asset management and advice) should be technology and device-agnostic⁶⁶ (Canada Competition Bureau, 2017), would be less intrusive than exposure limits.

4.137. Less clear is the rationale for limits on the size, the number or the type (AON vs KIA) of projects⁶⁷. Restrictions on project size do not seem to serve the purpose of

⁶³ As in Spain (AEFI, 2017), according to Article 52.2 of the Law 5/2015, of April 27th, on Promoting Business Finance, and also in Portugal (AdC, 2018).

⁶⁴ In Spain (AEFI, 2017), according to Articles 52.2 and 63 of the Law 5/2015, of April 27th, on Promoting Business Finance, crowdfunding platforms can grant some credit to their projects but following disclosure requirements and within certain limits (10% of each project). The platform cannot assure its projects that funds will be met in any case either. These restrictions seem to be directed at preventing conflicts of interest.

⁶⁵ In Spain, Article 82 of the Law 5/2015, of April 27th, on Promoting Business Finance, sets a limit per investor of €3,000 per project and €10,000 in total, but only for non-qualified investors (defined in Article 81 in terms of income or wealth, for people, or in terms of turnover and balance sheet, for firms). Other limits to non-qualified investors include the ban to use automated advice and management (Article 52.2.e), which limits their diversification potential (AEFI, 2017).

⁶⁶ Allowing not only traditional tools (like conversations, meetings or phone calls), but also more innovative ones (such as online questionnaires, text-based chats or even chatbots).

⁶⁷ In Spain (AEFI, 2017), according to Articles 68 and 69 of the Law 5/2015, of April 27th, on Promoting Business Finance, no more than €2 million per project, or €5 million if the project is for qualified investors exclusively, and no more than one project for each firm on the same platform.

consumer protection, given the abovementioned individual caps for (usually non-qualified) investors⁶⁸. And limits on the number of projects can be very harmful given the self-fulfilling dynamics that were alluded to when describing AON and KIA projects. The positive (negative) feedback loop that attracts the more (less) funds the closer (farther) a firm is from its goal suggest that a fragmentation of projects can be an optimal strategy (Agrawal, Catalini, & Goldfarb, 2013). Furthermore, firms should be allowed to self-select between AON or KIA projects, the latter being inherently riskier. But KIA projects should not be restricted, since a firm not meeting its initial goal can still carry out a profitable investment with the borrowed funds⁶⁹ (e.g. downsizing the project, compressing costs, raising capital through other sources, etc.).

- 4.138. The justification of these limits would be also dubious from the standpoint of financial stability, since crowdfunding is still a small segment of credit markets⁷⁰. Therefore, the principle of the “regulatory sandbox” applies again (Canada Competition Bureau, 2017), ensuring that capital, disclosure and registration requirements do not impede the development and the scope of crowdfunding platforms. Therefore, and at least during a given period of time, the impact of these innovations on the market can be analysed in order to define a final regulatory response (be it more friendly or more restrictive). If crowdfunding gains scale, scrutiny by supervisors could be intensified⁷¹ to check which type of ex ante regulation is needed. In this regard, limits on investors and projects should be carefully assessed, in terms of their toll on efficiency, to the extent that they hinder the exploitation of scale/scope/learning/network effects.

⁶⁸ For instance, a big project (e.g. bigger than €2 or €5 million) would not be risky for individual agents if its investor base is well diversified (so that each individual agents holds only a small exposure).

⁶⁹ In Spain, KIA projects are not allowed according to Article 69 of the Law 5/2015, of April 27th, on Promoting Business Finance (the project has to reach its goal or, only exceptionally, 90% of the funds). But, at the same time, AON projects face limits (Article 69.2), since they cannot raise more than 25% of its initial goal. The rationale of the measure is dubious because a firm exceeding its expectations can easily find a productive use for those additional funds (like improving the project). These restrictions are not consistent with other international experiences (AEFI, 2017).

⁷⁰ See annex.

⁷¹ For instance, including risk reporting to regulators (AdC, 2018), as banking entities do, so that risk is better measured (at firm, sector and global levels).

4.5. Insurtech

4.5.a. Definition and overview

- 4.139. The insurance sector is not alien to the Fintech revolution, since it can rely on the same technological drivers: automation, artificial intelligence, big data and mobile apps and connectivity (McQuinn, Guo, & Castro, 2016). Besides, some social changes behind the Fintech phenomenon, like the sharing economy and P2P exchanges, can be even more disruptive in insurance. Therefore, insurers can add value by using digital tools and technologies to automate processes and deepen their connection with customers, employees and intermediaries (Catlin, Hartman, Segev, & Tentis, 2015).
- 4.140. The most straightforward innovation is the application of new technologies (like information and communication tools) to the insurance market, yielding an improvement of customer service, productivity and efficiency. One could argue that (as with mobile and internet banking or neo-banks) this is merely an incremental effect, without actually transforming business models. However, this also triggers other changes, like consumer engagement or “customer centricity”. As was said above (in the general section on Fintech), consumer choice can be a driver of higher efficiency and welfare.
- 4.141. New technologies, together with consumer engagement, mean a disruption to business models in insurance in several ways (Wilson J. D., 2017):
- The first novelty is the application of price comparison websites (PCWs) and financial aggregators to insurance services. In fact, as was mentioned above, this is one of the areas where these tools have been most popular, since consumers are prone to switching. Although, again, it could be argued that this is just an incremental innovation, the engagement of some of these websites and apps in brokerage services suggests that they are actually disrupting, and competing with, the traditional insurance industry. For instance, PCWs and financial aggregators have an advantage over traditional companies when using big data and social network profiles to offer tailored services.
 - An even more significant development is the flourishing of peer-to-peer (P2P) insurance networks, sometimes relying on the blockchain technology and smart contracts. The disintermediation in the relation between insurers and customers reduces costs but also paves the way for greater customization and less capital-intensive risk management. Furthermore, a more direct contact between both

sides (using some tools such as social networks) can mitigate fraud and reduce risk premia (Wilson J. D., 2017).

- Social brokering is a further step in Insurtech and consists in segmenting users in clusters in order to negotiate more favourable and/or tailored conditions. The revolution of data analytics and the internet of things (with information arising from connectivity of smartphones, cars, homes, appliances, wearable technology, etc.), which is key to car, property and health insurance, allows better monitoring and higher discrimination among consumers in terms of their risk (contingent on personal characteristics, on location, on the time or frequency of use, etc.).
- In a halfway point between P2P and social brokering, we find other innovations in the form of microinsurance (WEF, 2017) related to changes in lifestyles (like the sharing economy): pay-per-use, on-demand and object-specific insurance for small transactions, etc. Also the grouping of consumers themselves to pool risks and get a bigger scale in order to benefit from discounts (McQuinn, Guo, & Castro, 2016).

4.142. These innovations seem to offer promising opportunities to improve insurance markets, which are analysed below.

4.5.b. Advantages/Opportunities

4.143. As in most Fintech innovations, Insurtech means a supply-side innovation that yields procompetitive effects and improves consumer welfare and efficiency through higher entry, lower costs, compressed mark-ups and prices, wider choice, etc. Technological drivers, like automation, can reduce input needs (especially labour) and costs. This is attracting new market participants, which are realising the competitive advantage that this technology could bring to the design of new products and services with increased transparency, security and efficiency. Therefore, Insurtech is, again, both a process innovation (efficiency-improving) and a product innovation (choice-broadening).

4.144. These innovations are at hand for both new Insurtech companies and for incumbents, which, by expanding their range of products and services (product innovation), can increase their customer base and keep adapting to changing customer demands. And incumbents can improve and leverage their analytical capabilities (process innovation) by relying on new technologies (like artificial intelligence and big data) in these areas:

- Automated underwriting and claims processes, which deliver benefits to customers while reducing costs for firms.
- Streamlining of data collection and payments, which can provide better visibility and controls for underwriting.
- In general, better measurement of risks thanks to the use of big data and the internet of things (e.g. wearable technology and electronic patches, which provide real-time information relevant for health and automotive insurance). This can also help to customize products and make services more convenient.
- The aggregation and allocation of specific risks or losses (e.g. tail risks like catastrophes), which would allow for better monitoring, understanding, and transparency of exposure and claims processes.

4.145. But, again, there are other effects which are dynamic and hence can have an even more positive impact on welfare and efficiency. Competitive pressures arise from the disintermediation in the value chain, transforming business models. Manufacturers and platforms offer insurance attached to products or services and the flourishing of the prosumer blurs the lines between commercial and personal insurance, threatening the position of incumbents (WEF, 2017).

4.146. Changes in business models, especially P2P insurance networks, yield some advantages that have been already mentioned: customization, consumer engagement, grouping of agents, etc. All of these factors are very relevant in insurance.

4.147. For instance, the grouping of agents reduces the overhead costs through risk pooling and spreading. Consumers take advantage of lower prices, but companies also benefit from an easier risk transfer. Furthermore, the fact that agents form a group can reduce moral hazard and information asymmetries (McQuinn, Guo, & Castro, 2016). Consumers may monitor their own behaviour themselves and reputation within the group can introduce the right incentives to behave in a manner that reduces risk premia.

4.148. Consumer engagement is also key, not only because it improves satisfaction but also because companies can get better insights and information about agents' behaviour. This is critical in the internet of things, which is affecting domestic devices and wearable technology. Consumers can be offered discounts to use these devices in exchange for the valuable data they provide for insurance companies. This also

induces dynamic efficiency: since consumers know that their behaviour is monitored and this influences premia, they have the incentive to modify their conduct in order to mitigate risks (McQuinn, Guo, & Castro, 2016).

- 4.149. Therefore, Insurtech can disrupt all the stages of the industry's value chain: from risk measurement and product design, where it can provide a greater personalization and an improvement of the consumer experience, to distribution, through online platforms. Even the collection and resolution of claims, which is facilitated by systems in the cloud and blockchain technologies. The ultimate consequence is a more efficient sector (with an upgraded risk analysis) and more convenient for consumers (who benefit from a better access, be it directly or indirectly).
- 4.150. And (as was already mentioned in the section on DLTs) the combination of blockchain and the internet of things can create efficient smart contracts, disrupting insurance markets. A device can collect information from external sources (weather, information from financial markets like exchange rates or stock prices...) and it could thereby act as the trusted oracle, which could imply, or not, the execution of a contract.
- 4.151. Smart contracts and the use of DLTs can yield many efficiencies. Firstly, as in digitisation in general, they compress operating costs. Secondly, they accelerate the management of claims by stepping at third-party data and computer-coded rules of execution. Thirdly, Blockchain-type technologies could help to detect suspicious behaviour and improve risk assessments by storing past information about claims (Braun & Schreiber, 2017).
- 4.152. To sum up, Insurtech is a catalyst for business model innovations. Process innovations mean better decision-making and cost savings (from better data and automation) when managing risks and raising regulatory capital. Product innovations mean new services and revamped structures and distribution channels to improve connectivity with clients and intermediaries, mostly relying on digital tools (Catlin, Hartman, Segev, & Tentis, 2015; Dickinson, 2015).

4.5.c. Risks/Challenges

- 4.153. The former advantages have to be balanced against some limitations of Insurtech. Risk management is still a daunting challenge in insurance. Even if the abovementioned innovations, like automation and big data, seem to ease this task, there could be also mismeasurement and feedback loops (which lead to over-optimism and over-pessimism).

- 4.154. The use of big data has further limitations. With a better measurement of risks, it is obvious that premia would fall for some agents but would increase for some others (McQuinn, Guo, & Castro, 2016). It is fair to say that risk premia would increase precisely for the riskier agents, which is efficient both in static (a more optimal pricing structure, linking prices to costs) and dynamic (ensuring appropriate incentives) terms. But it is important to bear in mind that there might be winners and losers, unless the dynamic effects are so powerful that they lead agents to change their behaviour to an extent where overall risk is reduced.
- 4.155. And the use of big data will also face other constraints in the activity of social brokering. This practice of segmenting consumers may collide with some regulations that try to preserve equity and prevent discrimination based on personal circumstances. Companies try to infer these characteristics relying on other objective criteria. But, sometimes, it is difficult to prove whether a company is acting against those regulations on equity. And this points out, again, the trade-off between equity and efficiency considerations.
- 4.156. As in most financial services, the access to data is a key input to actually compete. That is why experts advocate for broadening “Open banking” initiatives to “Open banking and insurance”. The obstacle is that data are even more sensitive in insurance than in banking, since they include not only financial variables but also personal circumstances and human behaviour.
- 4.157. There are other barriers to entry in insurance, due to inherent complexities and costs imposed by a vast regulation which tries to tackle moral hazard and fraud incentives. Another challenge for new entrants is adverse selection (McQuinn, Guo, & Castro, 2016), since companies aiming to enter the market tend to absorb unserved consumers, which are generally riskier. Or when these companies assume a new service (creating a market), the activity is also more hazardous, since risks are not so well measured.
- 4.158. The claims of fraud, moral hazard and adverse selection would very likely lead incumbents to ask for a stringent regulation for new entrants. But, at the same time, there is the possibility that incumbents perceive Insurtech start-ups as facilitators, instead of competitors. Start-ups disrupt the distribution of new products while incumbents still have the comparative advantage of access to a wide customer base. This means a great potential for partnerships between incumbent players and new entrants, which competition authorities should monitor in concerted practices and in mergers and acquisitions.

4.5.d. Regulatory implications

- 4.159. The regulatory response to Insurtech must factor in the advantages brought by this phenomenon. For instance, several innovations may lead regulators to reconsider capital requirements given higher efficiencies and better risk management. New technologies (like artificial intelligence or automation) do not only save inputs and reduce overheads but also (thanks to big data, wearable technology and the internet of things) improve risk measurement and real-time monitoring. Smart contracts and DLTs can facilitate risk measurement and monitoring by keeping updated databases of consumers (and their characteristics and actions) and transactions. This reduces costs in insurance policies themselves and also in claims and dispute settlement.
- 4.160. There are also other changes, rather social or institutional than technological, that can also lead to reassess capital requirements. For instance, a more direct interaction between both sides and the grouping of consumers can also improve measurement and mitigate fraud and moral hazard, reducing risk premia. Furthermore, the development of micro-insurance means that a platform can insure many small transactions, pooling and spreading risks and facilitating risk transfer and modifying premia according to objective factors like time and date or frequency of use (AEFI, 2017).
- 4.161. As for the obligation to have a physical presence in the country, it could be reconsidered to allow a full development of the micro-insurance sector, where new undertakings can insure risks per use and on-demand, specific to the consumption of certain goods and services. These transactions usually take place in the global P2P networks.
- 4.162. In the same spirit, other prescriptions on internal organization and personnel qualification must take the streamlining of procedures brought about by new technologies into account.
- 4.163. Another barrier to entry and exercise is the access to data, which raises similar challenges to other areas of financial markets. Consumer data are also very relevant in insurance, but market power of incumbents as data owners might be lower than in payments. In insurance, those data sets can be replicated or estimated through other ways (e.g. competing in attention markets for these consumers or using social networks to infer behaviour). Nonetheless, the principles of technological neutrality, non-discrimination and interoperability are in general desirable too, broadening the spirit of “open banking” initiatives to “open banking and insurance”.

4.164. Finally, the public sector itself could lay the groundwork for the development of Insurtech, for instance, if it promotes online identification and the deployment of DLTs for its own databases (AEFI, 2017).

5. CONCLUSIONS

- 5.1. After a general analysis of Fintech and its specific innovations, the conclusions aspire to answer the two questions raised in the introduction: i) to what extent Fintech improves competition and efficiency and ii) how Fintech affects the role of regulation.

5.1. Fintech improves competition and efficiency

- 5.2. Fintech boosts competition in the different segments of the financial sector and in the system as a whole. Entrants and niche competitors (be they start-ups or firms coming from different sectors) can challenge the position of incumbents, compressing costs, prices and mark-ups and increasing choice and dynamic innovation.
- 5.3. Nonetheless, the procompetitive effect of Fintech should not be overplayed, since some innovations (like DLTs or robo-advising) are still incipient. Furthermore, there are some market failures and barriers to entry inherent to the financial sector. Due to information asymmetries and behavioural factors, some incumbents will still take advantage of physical presence and in-person interaction. Other endogenous barriers, like scale/scope/learning/network economies or the access to data (critical in payments and insurance) or other key inputs (like payments infrastructure), will lead new Fintech institutions to be “secondary banks or entities”. Many entrants will not have the potential to absorb a big part of the business, so they will not be able to cross-subsidize by taking advantage of scale/scope/learning/network economies. Therefore, niche competitors will be forced to always offer more competitive conditions, implying lower profitability. And they will have to overcome switching costs, which can be relevant in payments or in asset management and advice.
- 5.4. And Fintech as such (given some inherent features like the use of data and digital platforms), will also be subject to scale/scope/learning/network economies. These factors may lead to market power and concentration through chicken-and-egg and winner-takes-it-all dynamics.
- 5.5. But these market failures are not a reason to hinder the development of Fintech. On the contrary, all the more reason to ensure that actual or potential competitors can challenge a dominant position (e.g. imposing principles like technological neutrality and non-discrimination) and that regulation does not contribute to market power. Nonetheless, when dominance is abused and cannot be offset by market forces (through the counterbalance of demand or actual or potential competitors) or when there are anticompetitive agreements among undertakings, antitrust policies will be enforced.

- 5.6. More competition means a higher static efficiency and a better allocation of resources. Mark-ups and prices are compressed not only by entry and competitive pressures but also by the fact that Fintech is a process innovation which improves efficiency (e.g. using data in an upgraded manner, which is very important in insurance) and saves inputs (especially labour). Efficiency is even a more valid benchmark in finance than in other sectors, since it means a better return-risk ratio (as was said during the section on crowdfunding). In other words, it means a better contribution to the goals of the financial sector (managing payments, channelling funds from lenders to borrowers and providing insurance) while containing costs and, more importantly, risks to financial stability. In some subsectors, like Insurtech, the efficiency gains that are responsible for the risk reduction (through better risk pooling and spreading) cannot be dissociated from the new business models.
- 5.7. And Fintech is a product innovation as well that enables a wider range of goods and services for an empowered consumer. Consumer empowerment is also enhanced by an upgraded access to information, facilitated by innovations like comparison websites and financial aggregators. Information, customer centricity and choice are drivers of innovation and competition, improving dynamic efficiency.
- 5.8. Efficiency may also increase due to other more disruptive forces, chiefly the disintermediation and the reduction of transaction costs. Unbundling is especially positive in financial markets, because it reduces the potential for crossed subsidies and hence increases contestability in different segments of the financial sector (as was noted in the subsection of general opportunities linked to Fintech). Consumers take advantage of services now provided at competitive prices by niche companies. This exerts a competitive pressure on traditional banks, which have to offer separated services and transparent pricing structures in order to adapt to consumers' needs and demands (Vezzoso, 2018).
- 5.9. Disintermediation in the financial sector, against a theoretical backdrop, could lead to the disappearance of intermediaries in favour of a platform model where agents interact directly (WEF, 2017). This should increase competition, by reducing intermediation costs, and efficiency, by taking advantage of network effects. Although network effects must be monitored since they may have undesired costs on efficiency by increasing market power and concentration.
- 5.10. In any case, Fintech is very likely to increase competition and efficiency in the financial system, which is positive for the sector as such and for the economy as a whole. Cheaper and better services for consumers (in payments,

management/advice, credit and insurance) mean financial inclusion and more affordable products (which are very relevant in insurance, where demand is induced by regulation). And this is also relevant for firms, especially nascent and innovative ones, which use financial services as an input in other sectors. This has a positive impact on competition, efficiency and welfare.

- 5.11. Some argue that Fintech might worsen competition in other sectors, because firms with dominant positions in other activities, like retail trade or digital services, might reinforce this dominance thanks to the inclusion of Fintech in their range of activities by cross-subsidising services and gathering more consumers and/or data. But neither the theory nor the evidence are conclusive and specific circumstances should be assessed case by case. Competition agencies must remain vigilant for this process in order to avoid abusive or exclusionary practices.

5.2. Fintech may lead to rethink regulation by addressing market failures

- 5.12. Conventional wisdom in financial regulation tends to find four basic goals for public intervention (González-Paramo, 2017): efficiency, consumer protection, financial stability and integrity in the financial sector (like anti-money laundering or combating the financing of terrorism and crime in general, AML-CFT).
- 5.13. Leaving integrity aside, which is a non-economic objective, the remaining three aims are connected to the market failures mentioned in the subsection of financial sector regulation within the general overview of the system. Information asymmetries and other imperfections, like behavioural biases, are connected to consumer protection. Externalities and the characteristics of public goods (non-rivalry and non-excludability) are behind the financial stability motive. Meanwhile, the goal of efficiency tries to balance natural monopoly considerations (since scale/scope/learning/network economies imply that concentration of activity on less firms might yield cost savings) with welfare gains associated with competition (fighting against market power by promoting entry and access to key inputs on fair and non-discriminatory conditions).
- 5.14. It must be noted that the achievement of these goals can sometimes distort competition and generate inefficiencies if financial regulation does not comply with the principles of necessity and proportionality. Thus, regulation related to financial stability and consumer protection may have costs in terms of competition and efficiency (especially, in the case of reserves of activity, which, apart from raising

barriers to entry and exercise, may preclude firms from taking advantage of scale/scope/learning/network economies).

5.15. Fintech changes this paradigm in two ways.

- First, it reduces traditional market failures. Information asymmetries and financial stability concerns can be mitigated by more transparency and disclosure (in crowdfunding platforms) and by the prevention of conflicts of interest (e.g. separating advice and management services or through a better monitoring of risks in insurance so that moral hazard and adverse selection problems are contained). Better information and consumer engagement in financial markets can lead to higher financial education. As we will remark below, this reduces the scope for ex ante regulation, reducing the abovementioned costs on efficiency and competition.
- Second, it is a supply-side innovation that points out how competition may enhance efficiency. Therefore, natural monopoly conditions are less evident and regulation should be more conducive to allowing entry. Furthermore, competition and efficiency may be compatible with other legitimate goals of public intervention: consumer protection, financial stability and integrity. Therefore, Fintech is an opportunity to reduce some barriers to entry and exercise.

5.16. Another implication of Fintech is that the adoption of the platform model implies self-regulation incentives, given the presence of network effects. Intermediaries have to make sure that they get all sides on board, so they must generate trust by ensuring an appropriate level of quality, thus contributing to consumer protection and financial stability.

6. RECOMMENDATIONS

- 6.1. This last section comprises general recommendations regarding the Fintech phenomenon from the standpoint of competition and good regulation. They are general recommendations, as the implications for specific innovations have already been discussed.
- 6.2. The first two recommendations stem from the two previous conclusions
- Authorities should embrace Fintech, given its positive impact on competition and efficiency.
 - Authorities should re-examine the role of regulation, to the extent that Fintech addresses some market failures.
- 6.3. The other four recommendations are corollaries of the previous two, but they must be nevertheless highlighted in order to foster an effective development of Fintech.

6.1. Embrace Fintech (since Fintech improves competition and efficiency)

- 6.4. Fintech has the potential to be welfare-enhancing. It improves efficiency (from both a static and a dynamic point of view) because Fintech is a supply-side shock that increases entry and competition, but also because Fintech is an innovation as such, bringing down costs (process innovation) and broadening choice (product innovation). Therefore, regulators should embrace this phenomenon.
- 6.5. Furthermore, factors behind Fintech are structural and reflect positive and unstoppable social and technological trends. As a result, regulation and incumbents should adapt to this phenomenon.
- 6.6. Nonetheless, it is fair to say that financial markets and some Fintech innovations may be subject to market failures. In those cases, public intervention could be justified to improve market outcomes, e.g. through ex ante regulation and ex post supervision. But, in order for that intervention to be welfare-enhancing, the principles of good regulation must be respected, notably:
- **Necessity:** public intervention must be justified by a market failure or another overriding reason relating to the public interest.
 - **Proportionality:** public intervention must be commensurate with the risks it tries to mitigate (Canada Competition Bureau, 2017), so that no extra

burdens/restrictions/costs are imposed but the ones needed to tackle the market failure or the overriding reason relating to the public interest.

6.2. Reassess regulation (since Fintech addresses market failures)

- 6.7. As already said, the financial sector is vulnerable to market failures and Fintech is not immune to many of them. But the way Fintech disrupts business models implies the correction, if partial, of some market failures. This is the case of natural monopoly, thanks to cost reduction and eased entry; information asymmetries, through higher transparency and better incentives; and externalities and public good characteristics of financial stability, owing to an easier regulatory oversight.
- 6.8. Nonetheless, it is fair to say that, in other cases, market failures can be exacerbated by Fintech. This can happen with natural monopoly, due to the play of scale/scope/learning/network effects in some contexts like platforms or big data, or due to the ability of incumbents to control entrants by participating in ICOs and crowdfunding campaigns. Also, with information imperfections, since risk may increase (with new insurance activities), new conflicts of interest may appear (with opaque relations in the industry of management and advice) and anonymity could raise some challenges (allowing illicit exchange of information through DLTs). And, finally, externalities linked to financial stability can increase as well, since irrational exuberance and herd behaviour can take place in some environments (e.g. feedback loops in crowdfunding campaigns and in innovative management and advice, like social trading or robo-advising).
- 6.9. But in most cases Fintech's contribution to the solution of existing market failures is positive. This should lead to reassess many of the ex ante regulations that impose barriers to entry and exercise.
- 6.10. The first obstacle to entry is the requirement of physical presence in the country (headquarters, branches...) and prescriptions on internal organization (to prevent conflicts of interest and ensure qualified labour...). These provisions were enacted as a way to generate trust in financial entities and to ease financial supervision.
- 6.11. But Fintech is bound to change this setting in several ways:
- On the one hand, technology currently allows to perform many of these functions without physical presence or face-to-face interaction (AEFI, 2017), bringing down overheads associated with physical branches or headquarters and organizational costs. That is why it is crucial to reduce national segmentation in financial

regulation⁷². Other measures, like secure remote identification and DLTs, than can accompany these innovations, could be deployed or facilitated by the authorities (AEFI, 2017).

- On the other hand, organizational conflicts of interest may be prevented by the unbundling of activities (e.g. separation between financial products as such and advisory services). This empowers the consumer with a wider choice and an upgraded information (and tools) to make better decisions (Vezzoso, 2018).
- 6.12. Another relevant barrier, which affects both entry and exercise, is the imposition of capital requirements. These must respect the proportionality principle and be commensurate with the risks associated with the activity (Canada Competition Bureau, 2017). Therefore, they must factor in the likelihood of Fintech innovations mitigating risks in some cases, or managing risks better (e.g. thanks to risks pooling and spreading in some Insurtech models, like P2P and micro insurance).
- 6.13. Information asymmetry and behavioural biases are one of the reasons argued to adopt consumer protection measures (e.g. limits to exposure). Traditional financial products have tended to be inherently complex (even the most common ones, like a bank account), because retail banks normally bundle different services (opening and maintenance, deposits, processing of transfers and debits, loans and overdraft credit, debit and credit cards and even asset management and advisory services). Therefore, the pricing structure has not been transparent (Vezzoso, 2018), being based on a scheme of crossed subsidies where some services are apparently cheap (like a subsidized debit or credit card) while others are apparently expensive (with low yields on deposits, or commissions on several services).
- 6.14. However, the unbundling and disintermediation of financial services leads to a more transparent pricing structure. As was said above, an empowered consumer (with more choice and more information) can make better decisions. So Fintech innovations may reduce the extent to which government intervention addresses consumer protection better than the market. Nonetheless, some accompanying measures, like financial education and financial inclusion, may be needed to ensure this empowerment of consumers (AdC, 2018).
- 6.15. One important idea to keep in mind is the adoption of the platform model by some Fintech business. These are subject to network economies and interdependence on

⁷² One of the milestones of the European Commission Fintech Action Plan is a proposal of Regulation for crowdfunding, so that platforms can enjoy a EU-wide passport.

demand, which are an intrinsic characteristic of multi-sided markets. Therefore, the own platform is the most interested in self-regulating in order to generate trust (because if it fails to generate trust on one side of the market, it will not attract other agents), contributing to financial stability and investor protection. This is very important in the areas of asset management and advice (chiefly in social trading) and funding (through crowdfunding and ICOs). These are ground-breaking innovations which explore uncharted waters and normally lead regulators to be very cautious. But self-regulation incentives can be powerful and ensure a positive contribution to efficiency (addressing market failures, e.g. internalizing externalities)

- 6.16. Therefore, regulation should only be enacted when market failures (mainly information asymmetries) are not corrected. In those cases, public intervention should try to incentivize a sound behaviour (prudential regulation, disclosure...) so that individual agents' behaviour is consistent with the general interest (McQuinn, Guo, & Castro, 2016).
- 6.17. This reconsideration of sectoral regulation should benefit both new entrants and incumbents. Established financial institutions are also part of the Fintech phenomenon to the extent that they can adopt new and disruptive business practices. However, they are affected by a vast amount of regulation, hindering their ability to adapt swiftly to these new trends. That is why regulation should be revised according to the abovementioned principles (necessity and proportionality) and to other ideas (which we develop below, like the functional approach). Furthermore, consistency between sectoral and horizontal regulation (in terms of security, data protection...) should also be ensured.

6.3. Regulate activities, not entities, and avoid reserves of activity

- 6.18. Within the backdrop of Fintech, it is advisable that financial regulation lays more emphasis on the activities developed rather than on the legal form of the entity carrying out each activity (IMF, 2017). This is partially connected with the technological neutrality principle. But it is especially linked to the abovementioned proportionality principle and the analysis of market failures.
- 6.19. Since market failures are related to activities (and not to entities), the approach of public intervention should be functional (Canada Competition Bureau, 2017). Regulation must be based on the function an entity carries out (and not on the type of entity). Furthermore, regulation must be based on principles or expected outcomes instead of prescribing strict rules on how to achieve those desired outcomes.

- 6.20. A consequence of these ideas is avoiding, wherever that is possible, reserves of activity that impede some entities to broaden the range of services they offer. Given the existence of scale/scope/learning/network economies (EBA, 2017), reserves of activity take a heavy toll on efficiency, especially if we take the rapid pace of innovation into account (COFECE, 2018). Therefore, reserves of activity should only be implemented when they are necessary, justified by a market failure or another overriding reason relating to the public interest, and proportionate.
- 6.21. These ideas (a functional approach to regulation and a reassessment of reserves of activity) are more relevant in more innovative activities, like new and disruptive models of asset management and advice and crowdfunding platforms willing to absorb roles other than mere P2P financing.

6.4. Use Regtech to reduce the burden of regulation

- 6.22. The regulatory response to Fintech must factor in the phenomenon of Regtech, which has two dimensions (McQuinn, Guo, & Castro, 2016):
- On the one hand, companies offering services of regulatory compliance (reporting, risk management, real-time risk-assessment tools, regulation gap analysis...) rely on new technologies. The fact that the financial industry is profusely regulated means that firms have to devote substantial resources to compliance, which is sometimes outsourced. The disruption driven by new technologies means more efficiency and new competitors offering regulatory compliance, bringing down costs for financial firms.
 - On the other hand, Regtech can buttress the supervisory task of authorities by using new technologies to modernize and streamline, and in some case automate, reporting and analytics. One evidence of this change in the regulatory and supervisory paradigm is the potential use of DLTs, thanks to the traceability of transactions (virtually in real time).
- 6.23. Therefore, regulators should take advantage of Regtech to change their approach in two ways, which can actually be applied beyond the financial sector (McQuinn, Guo, & Castro, 2016):
- Firstly, authorities should effectively adapt their supervisory framework to new technology, using open-source and interoperable platforms and machine-readable reporting data.

- Secondly, authorities should reassess (and eventually lower) the burden of ex ante regulation, given that ex post (and even real-time) monitoring and control are facilitated by new technologies. One example is an eased fraud detection through artificial intelligence. Although it is fair to say that, in some cases, Fintechs also poses specific risks (IMF, 2017), like a higher likelihood of cyberattacks (as was said above in the general section on Fintech).

6.5. Implement a regulatory sandbox regime

- 6.24. A common recommendation of previous analysis of Fintech is the adoption of a regulatory sandbox regime (ACCO, 2017; ACM, 2017; AEFI, 2017; AdC, 2018; COFECE, 2018; Canada Competition Bureau, 2017; EBA, 2017; AEB, 2018). This type of tool is a form of dynamic regulation. Its flexibility and adaptability make it appropriate for innovative markets. Therefore, it can be applied horizontally to the whole Fintech ecosystem⁷³.
- 6.25. A regulatory sandbox must be understood as the imposition of lighter, if any, licensing requirements for some types of business models, normally innovative and of a smaller scale, at least for an initial period of time (Canada Competition Bureau, 2017). Thus, regulators can monitor the evolution of these projects and their potential impact on the market in order to implement a final regulatory response. This final regulatory response must be consistent with the principles of good regulation (AdC, 2018). In other words, if during the sandbox regime regulators verify that market failures are successfully addressed by innovative business models, the definitive regulation, if any, has to be lighter than the current regime, featured by a profuse ex ante corpus of laws. Besides, the criteria of eligibility to take advantage of the sandbox regime must respect the principles of transparency and non-discrimination.
- 6.26. The idea of the sandbox is complemented in some analysis with the proposal of an innovation hub (AdC, 2018; ACCO, 2017; AEB, 2018). This would be a contact point between regulators and shareholders to exchange views on how the activities affected by the sandbox are evolving. Furthermore, regulator should create specialized units that can help Fintech firms cope with the legal issues. This would act as a “safe harbour” for Fintech firms (AEFI, 2017), which would have the legal certainty that their activities are compatible with existing regulations.

⁷³ One of the milestones of the European Commission Fintech Action Plan is the exchange of best practices about sandbox regimes at a EU level.

6.6. Open-banking & insurance: Technological neutrality & non-discrimination

- 6.27. Technological neutrality, interoperability and non-discrimination are also common principles emphasized by previous analysis of Fintech (ACCO, 2017; ACM, 2017; AEFI, 2017; AdC, 2018; COFECE, 2018; Canada Competition Bureau, 2017).
- 6.28. One application of these principles is the development of initiatives of “open banking and insurance”, where it is important that firms have access to key inputs (like some type of users’ financial data) on a fair and non-discriminatory basis (hence applying the principles of technological neutrality and interoperability, e.g. through APIs), fulfilling horizontal data protection regulation as well.
- 6.29. The access to data is relevant in some activities in the area of payments, especially third party providers (TPPs) which allow initiating payments. Open banking standards enacted in many jurisdictions⁷⁴ may lower banks’ control over users’ data, giving customers greater power over TPPs access to their accounts (WEF, 2017).
- 6.30. Data availability is also relevant in other areas of financial markets: asset management and advice (taking advantage of users’ data to customize recommendations), crowdfunding (using borrowers’ data to monitor risk and lender’s data to tailor investments) and insurance (where individual data are of paramount importance).
- 6.31. But the solution to the access to data is context specific, so policies granting ownership or rights over data cannot be generalized (Vezzoso, 2018). From the point of view of competition, the essential input doctrine warrants a case-by-case assessment, so the requirement to safeguard access is limited to situations where the refusal to allow that access by the dominant undertaking implies a cost to general welfare because of the elimination of competition.
- 6.32. And, also within the area of payments, there is a debate on whether the access to wholesale clearing and settlement services could be considered as a critical input. In any case, new Fintech firms must have the possibility, while respecting data protection regulations, to access these services directly or indirectly under fair and non-discriminatory conditions (ACCO, 2017; COFECE, 2018; Martin, Grier, & Bendell, 2017).

⁷⁴ With the PSD2 in the EU (also in the UK) and also in other jurisdictions like México (COFECE, 2018).

ANNEX 1. GLOSSARY

1. General definitions on the financial system

Financial system: the financial system comprises the set of financial intermediaries and markets and their relations regarding the flow of funds to and from economic agents (households, companies, public administrations), as well as the financial infrastructure (the set of institutions that allows the efficient functioning of financial intermediaries and markets, such as payment systems, credit information agencies and guarantee registers).

Financial product: it is the broadest term to refer to the object of exchanges in the financial system, composed of financial instruments and financial services.

Financial instrument: it is the term used to refer to any delivery of funds in exchange for the promise of future payment between agents, which creates a liability for the issuer (obligation to pay) and an asset for the recipient (right to collect) . This promise of payment may be conditional to various events, from the mere passage of time (term deposit) to a more uncertain event such as the performance of a company (shares) or the occurrence of a contingency (insurance); or it can be unconditional (current account). Financial instruments can be further divided into financial securities, when the asset/liability is transferable to third parties unrelated to the original transaction via securities markets (such as a stock), and financial assets not transferable to third parties (for example, a mortgage loan), unless they are subject to financial securitization.

Financial service: term used to refer to the services that certain financial intermediaries provide as ancillary to exchanges of financial instruments, such as financial advice or credit rating.

Financial or securities market: market in which financial securities (financial assets / liabilities susceptible of transmission) are traded, such as stock exchanges. They are the main channel of direct or disintermediated financing.

Financial services market: Market in which both non-transferable financial assets and services are exchanged. This is the set of markets between financial intermediaries and their customers, be them suppliers or claimants of funds (financial instruments markets) or claimants of auxiliary or related financial services (financial services markets).

Financial intermediary: Economic agent that specializes in the purchase and sale of financial products, with or without their transformation in terms of size, term and risk, as well as in the provision of auxiliary or ancillary financial services to these exchanges.

Prudential supervision: activity of monitoring the safety and soundness of financial agents, which seeks to address information asymmetries regarding “how good financial agents are” in terms of integrity, solvency, liquidity, risk management, etc.

Supervision of business conduct: activity of monitoring the good conduct of financial agents in their exchanges in the market. This supervision aims to mitigate informational asymmetries regarding “how well financial agents behave” in general and can be divided into protection of retail customers and promotion of fair and well-ordered markets.

Systemic supervision: activity of surveillance and evaluation of systemic risk or the “risk of an event provoking a loss of economic value or confidence in a substantial part of the financial system, which is serious enough to have adverse effects on the real economy”. In contrast with micro-supervisions (prudential and business conduct), that focus on individual agents, systemic supervision seeks to protect the stability of the financial system as a whole.

2. General definitions on Fintech

Fintech (broad definition): disruptive application of new developments in information and communication technologies (ICT) to the financial sector.

Fintech (narrow definition): disruptive application of new developments in ICT, by financial companies already installed and entrants in the financial sector, seeking to directly address unmet needs or improve the way in which some financial needs are currently met.

Techfin: disruptive application of new ICT developments by companies that come from outside of the financial sector, usually from the technology sector that develops these ICTs, and that extend their business from the ICT sector to the financial sector.

Regtech: disruptive application of new developments in ICT in the context of regulatory supervision, reporting and compliance with financial regulation. It includes both initiatives of regulated financial companies, which seek to apply ICT to the tasks of compliance with this financial regulation, and activities of the financial regulators themselves, which can optimize information on regulated entities through a more efficient supervision.

3. Definitions on Distributed Ledger Technologies

Distributed Ledger Technologies (DLTs): a way to maintain and update a digital registry of transactions in a transparent way, thanks to the validation of the participants or “nodes” of the network.

Digital/virtual currencies or cryptocurrencies: digital representations of value, privately issued using cryptographic means to validate transactions and regulate the generation of currency generally in a decentralized network (although they can also be issued by a central authority).

Miners: nodes that validate transactions and add the information to the "consensus block" with the current state of ownership of the assets.

Initial Coin Offerings (ICOs): tool with which companies can raise funds through the creation and sale of their own digital currencies to the public, usually in the form of tokens.

4. Definitions on payment services and systems

Payment systems: instruments, services, procedures and channels necessary to transfer funds in transactions carried out by economic agents that do not use cash.

Payment services: financial services that allow funds to be transferred in transactions carried out by economic agents that do not use cash.

Digital Wallets (DWs): software and hardware tools that allow users to store payment information in order to complete transactions

Online wallets (OWs) or in the "cloud" (Cloud Wallets): DWs enabled for remote mobile payments without the need for physical presence or direct interaction between agents.

Mobile Wallets (MWs): DWs enabled for proximity payments using a mobile device and applications and tools associated with it.

Payment Service Users (PSUs): End users of the payment service, consumers or merchants, that require the provision of a payment service

Third Party Providers (TPPs): new providers of payment services other than traditional banks and debit and credit card issuers.

Account Servicing Payment Service Providers (AS PSPs): Payment service providers that act as account managers, normally financial entities, and have to allow TPPs access to the account information of PSUs.

Payment initiation services (PIS): services that facilitate and initiate a payment order (online) from the users' bank account to the companies, by accessing the information of AS PSPs (or by linking the merchants' bank account with the consumers').

Providers of Payment Initiation Services (PISPs): companies that provide payment initiation services (PIS).

Account information services (AIS): access, with owner's authorization, to the AS PSP account information operating without passwords.

Account Information Service Providers (AISPs): companies that provide account information services (AIS).

Access to the account (XS2A): policies that refer to the access of TPPs to the information on bank accounts, with the consent of customers and only for the specific purposes and with the scope explicitly authorized by the client.

5. Definitions on asset management and advice

Price comparison websites (PCWs): websites which compare prices of different suppliers used in the financial sector and beyond. The term is used analogously to Digital Comparison Tools (DCTs), although the latter can be considered more accurate, since these do take forms other than a website (like mobile applications and other software) and do inform about characteristics other than price.

Financial aggregators and personal financial management (PFM): software tools that combine the information of agents from different sources (such as banking institutions) to exploit the data and offer related services (from the monitoring of the family budget to advice and portfolio management).

Networking and sentiment platforms: tools to develop professional research in financial markets and, relying on that, offer advisory, brokerage and management services.

Social trading (or mirror/copy trading/investment): it allows investors to follow a "leader" in their portfolio decisions

Electronic and mobile trading platforms: tools that connect agents in information and transaction networks in order to execute orders and automate operations and their accounting.

"Robo-advisors": advice and portfolio management based on artificial intelligence.

6. Definitions on crowdfunding

Crowdfunding: transfer and channeling of funds from a wide group of investors to a particular project or company, usually through a digital platform and without requiring direct face-to-face interaction.

Crowdfunding: for-profit crowdfunding, either through P2P lending (instruments that generate debt) or through equity crowdfunding (ECF, capital instruments that do not generate the obligation to pay any amount but the promise of future benefits).

Projects All-or-Nothing (AON): projects where the company that raises the funds does not receive any contribution if the goal previously set is not reached.

Projects Keep-it-All (KIA): projects where the company that raises the funds receives all the committed contributions, even if it does not reach the goal previously set.

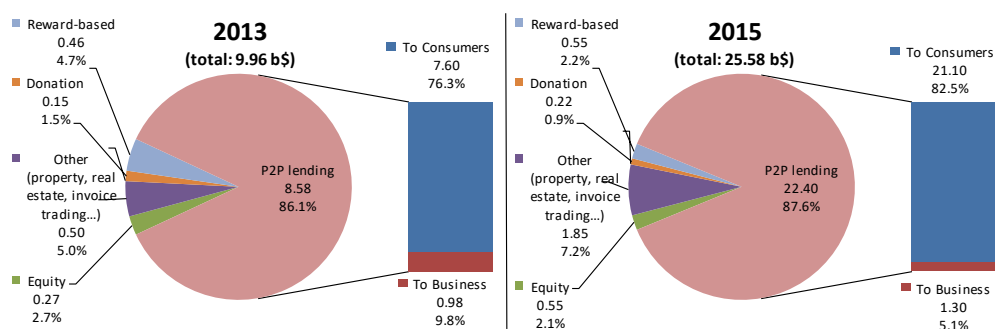
7. Definitions on Insurtech

Insurtech: use of disruptive tools in new business models to provide insurance services.

ANNEX 2. THE CROWDFUNDING MARKET IN THE US AND EUROPE

Figure 1 points out the huge relevance of P2P lending in the US, especially as far as consumer loans are concerned.

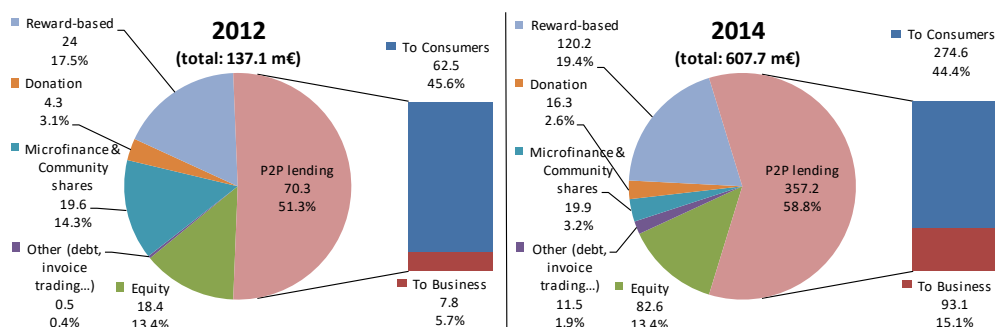
Figure 1. Volume (\$ billion) of crowdfunding in the United States



Source⁷⁵: (Ziegler, et al., 2017)

Figure 2 shows a much smaller but more diversified market for Europe, with a higher relative weight of equity crowdfunding, although P2P lending is the major branch as well, and it continues growing. Consumer loans take the lion's share again, although business credit is relatively more relevant than in the US and it is growing more rapidly.

Figure 2. Volume (€ million) of crowdfunding in Europe⁷⁶ (except UK⁷⁷)



Source: (Wardrop, Zhang, Rau, & Gray, 2015)

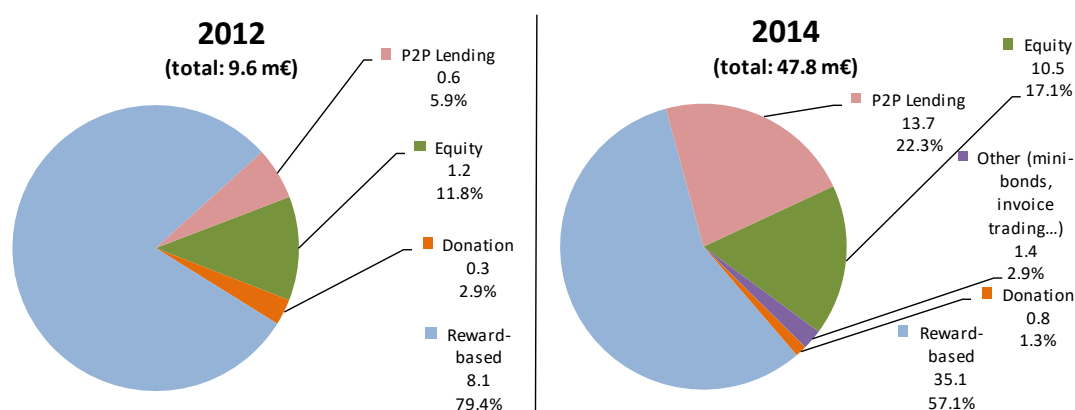
⁷⁵ The balance sheet lending (done by the platform instead of P2P) is not included in order to increase comparability with the European data.

⁷⁶ The study used to gauge the size of the crowdfunding market in Europe (Wardrop, Zhang, Rau, & Gray, 2015) covers 27 countries (Belgium, Bulgaria, Czech Republic, Denmark, Georgia, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Hungary, Netherlands, Austria, Poland, Portugal, Romania, Slovakia, Finland, Sweden, Iceland, Norway, Switzerland and Turkey).

⁷⁷ The UK crowdfunding market (Zhang, Baeck, Ziegler, Bone, & Garvey, 2016) is much bigger (3.2 billion pounds), even in absolute terms, than the rest of Europe (607.7 million euros). UK has a very high share of

4.165. Figure 3 shows that reward-based crowdfunding is the most important segment in Spain, although lending and equity-type instruments are growing.

Figure 3. Volume (€ million) of crowdfunding in Spain



Source: (Wardrop, Zhang, Rau, & Gray, 2015)

4.166. In any case, these estimates should be assessed with caution, since the statistical coverage of this phenomenon is poor (mostly based on surveys) and data vary from one source to another. Nevertheless, it is obvious that crowdfunding is still a very small part of the while financial system, according to Table 1⁷⁸.

Table 1. Estimates of the relative size of the crowdfunding market⁷⁹

		TOTAL	Crowdfunding	%Crowdfunding
United Kingdom (2015) (£ million)	Loans to households	1,609,752	909	0.0565%
	Loans to firms	971,932	1,490	0.1533%
	Firms' issued equity	2,487,229	332	0.0133%
Europe (2014) (€ million)	Loans to households	7,327,026	274.6	0.0037%
	Loans to firms	8,369,012	93.1	0.0011%
	Firms' issued equity	13,506,452	82.6	0.0006%
Spain (2014) (€ million)	Loans to households	748,208	13.7	0.0008%
	Loans to firms	940,464	10.5	0.0009%
	Firms' issued equity	1,147,717		

Source: Eurostat, UK Office for National Statistics and Zhang, Baeck, Ziegler, Bone, & Garvey (2016).

crowdinvesting (i.e. profit-oriented crowdfunding), mostly P2P lending (75%) but also equity (10.4%) and other instruments (11.1%), chief among which is invoice trading.

⁷⁸ These estimates are consistent with other countries like Canada, where crowdfunding (Can\$25 million) is thought to mean a 0.05% of total credit to SMEs (Can\$53 billion).

⁷⁹ Data for Europe refer to the 27 countries (Belgium, Bulgaria, Czech Republic, Denmark, Georgia, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Hungary, Netherlands, Austria, Poland, Portugal, Romania, Slovakia, Finland, Sweden, Iceland, Norway, Switzerland and Turkey) covered in the abovementioned study (Wardrop, Zhang, Rau, & Gray, 2015).

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