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Fintech and Financial Stability Potential Influence of FinTech on Financial Stability, Risks and Benefits

Abstract: Since the last global financial crisis supervisory mechanisms and regulations have become more stringent which have significantly improved resilience of banks therefore positively affecting financial stability. Apart from traditional financial institutions which have been supervised according to strict regulations and standards technological development in financial services commonly called FinTech have introduced new trends providing fast peer to peer lending which directly matches lenders and borrowers thus putting more pressure to policymakers and supervisors.

This paper presents potential implications of FinTech developments to financial stability, while explaining FinTech influence to market structure as well as benefits and risks of technologically driven financial innovations to financial stability.

The paper stresses out an importance of international cooperation of regulators in order to preserve financial stability in the recent world of technological changes and innovations. FinTech has changed consumers' expectations and preferences while increasing the number of users expecting fast and easily accessible services available on mobile phones and other electronic devices. The paper shows that new technology provides the space for expanding financial services but it also poses additional risks to financial system in terms of microfinancial and macrofinancial risks.

Key words: financial stability, FinTech, technological developments, financial innovations, market structure

JEL Classification: F61, F62, E58, E61, E62, G18, G15, F42, F58

1. Introduction

Technological innovations in financial services, called FinTech, have been developing rapidly. Financial Stability Board (FSB, n.d.) defines FinTech as technologically enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on financial markets, financial institutions and the provision of financial services. The framework of Financial Stability Board is targeted to the specific FinTech activities such as FinTech credits, digital currencies, robo-advisors, wholesale payments innovations, artificial intelligence and machine learning (FSB, 2017). A development of FinTech poses many regulatory challenges especially to emerging and developing economies whose regulators usually have limited resources and therefore technology–led innovations create additional pressure (UNSGSA-CCAF, 2019). The lack of data and information produce limitations to determining the influence and importance of FinTech implications to financial stability (FSB, 2017). Stressing out an importance of FinTech expansion to financial services the International Monetary Fund and the World Bank launched the Bali Fintech Agenda with the aim to foster international cooperation and help member states to harness benefits and opportunities of fast development in financial technology and mitigate potential risks (IMF, 2018). The Bali Fintech Agenda provides a useful framework for member countries to assess their policy options and adopt them to their own circumstances and priorities because FinTech is seen as having strong social and economic potential providing access to financial services where it is low (IMF, 2018). Distributed ledger technology (DLT) is usually mentioned in the context of FinTech, especially in regards to blockchain. However, there are different arguments. DLT, including blockchain technology, operating as a set of synchronized ledgers managed by one or more entities instead of operating on a single central ledger, is seen by many as having potential to disrupt payments and settlements and brings risks. On the other side, DLT is seen as the one with the ability to increase transparency and reduce complexity by decreasing traditional dependence on a central ledger managed by a trusted entity for holding and transferring funds (CPMI, 2017).

Development of financial services could contribute to macroeconomic stability by lowering constraints, resulting in faster economic growth, less poverty and lower income inequality but it also could be a source of instability (Weller & Zulfigar, 2013). As developing very fast FinTech could bring advantages but also pose potential risks to financial stability. In order to preserve financial stability and understand how it could be affected by FinTech activities international organizations and national bodies consider FinTech when assessing potential risks and developing regulatory frameworks. In that context the FSB has created Fi-

nancial Innovation Network which monitors at FinTech innovations from the perspective of financial stability (FSB, n.d.). European Banking Authority (EBA) monitors financial innovations and the impact of FinTech to institutions' business models in European Union (EU) according to its regulation which requires that EBA promotes sound, effective and consistent level of regulation while ensuring integrity, transparency and efficient functioning of financial markets (EBA, 2019).

First part of this article emphasizes the need for international cooperation on FinTech. There are ten areas identified by FSB (2017) where international and national bodies should draw attention when undertaking risk assessment and development of micro and macroprudential regulatory frameworks. Among them three are considered priority areas: the need to manage operational risk from third party service providers, mitigating cyber risk and monitoring macrofinancial risks (FSB, 2017). Second part of the article explains the connection between financial innovation and market structure. Although market structure mostly refers to its impact on competition it could influence financial stability (FSB, 2019a). FinTech could affect market structure through channels such as FinTech credits, BigTech companies and third parties' services. FinTech credits provide alternative sources of funding where borrowers communicate directly to lenders. Apart from FinTech firms whose primary businesses are in the sphere of financial technology the new entrants into financial service are also large technology companies called BigTechs that have already confirmed themselves in the world of internet technology which makes it easier for them to expand further to other fields such as financial service thus becoming strong competitors to other FinTech companies. Third part refers to risks and benefits of financial innovations to financial stability. In terms of benefits higher competition and diversity in lending, payments, insurance, trading and other financial service areas could contribute to increased efficiency, transparency, and resilience of the financial systems while at the same time higher competition could put pressure on the profitability of financial institutions (FSB, 2019a). Potential risks could be both microfinancial and macrofinancial. Microfinancial risks refer to credit risk, leverage, liquidity risk, maturity mismatch and operational risks, then cyber and legal risks. Macro-financial risks are unsustainable credit growth, pro-cyclicality, and incentives for great risk taking, contagion and systemic importance (FSB, 2017). Although financial inclusion is an objective on its own, the development of FinTech further has contributed to it. According to UNSGSA-CCAF (2019) since 2014 globally 515 million more adults have got access to the financial tools and services they need while since 2018 a surprising 3.8 billion people, accounting for almost 70 percent of all adults, are now financially included.

2. Potential areas for international cooperation on FinTech

Financial institutions in the 21st century follow the path of technological development and adapt to new consumer requirements on the markets. Simultaneously they are supposed to keep soundness in providing their services. Therefore they already have invested significant financial and human resources in improvement of their IT security and data protection.

Christine Lagarde (2019), President of the European Central Bank and former Managing Director of the International Monetary Fund, explains that European Banking Supervision has performed a lot in strengthening capital buffers, reducing risks on banks' balance sheets while the stock of non-performing loans of significant banks has almost halved but a number of challenges nonetheless remain. In her speech Lagarde (2019) further explains that the share of non-bank financing flows to euro area firms has increased from around 30% before the crisis to more than 50% today which shows that FinTech firms now receive around a quarter of the financial service industry's venture and startup funding.

According to the words of Tao Zhang (2019), the IMF Deputy Managing Director, FinTech is expected to promote competition in the financial sector primarily in the aspects of payments clearing and settlement, and also to increase financial inclusion. However, Fintech also brings risks. Regulation and monitoring is still limited therefore data governance frameworks should be developed and modernized (Zhang, 2019). Fintech expansion raises a need for stronger international cooperation especially in terms of cyber security, anti-money laundering and combating of financing terrorism, the development of regulatory and supervisory frameworks, payment and securities settlement systems and cross-border payments. Although there are various differences among countries the IMF Bali Agenda brought together main issues for policymakers and the international community to consider when formulating their policies (Zhang, 2019).

Cybersecurity market expands extremely fast and attracts significant attention of companies regardless from fields of industry thus urging them to invest a lot in the data protection and building of strong cybersecurity systems. For the comparison, according to Morgan (2019) in 2004 global cybersecurity market was worth $3.5 billion while in 2017 it was worth more than $120 billion which shows that the cybersecurity market grew by thirty five times over 13 years. According to the forecast, global spending on cybersecurity products and services will exceed $1 trillion cumulatively over the five-year period from 2017 to 2021 (Morgan, 2019).

FSB (2017) identified ten potential areas where international bodies and national authorities should draw attention regarding FinTech when performing regular risk assessment and development of micro and macroprudential regulatory frameworks. Three of them are distinguished as priority areas and those are:

- *Managing operational risks from third-party service providers* - Authorities should determine the appropriateness of current oversight frameworks for important third-party providers e.g. data services and cloud computing, especially if financial institutions rely on the same third party providers. This could result into better global coordination among financial authorities and with non-traditional partners such as those in charge of safety and security of international technology (FSB, 2017).
- *Mitigating cyber risk* - Cyber-attacks happen often and therefore pose a significant difficulty toward mitigating cyber risk. Contingency planning, monitoring, information sharing, incorporating cyber security in the early stage of systems' design and development of financial and technological literacy could decrease potential for cyber incident that could affect financial stability FSB (2017). In regards to recognition and significance of this issue Stiroh (2019) stated that an advantage of considering cybersecurity is that there is not a motivation problem because there is no need to convince anyone that cybersecurity is a fundamental risk for financial firms, the financial system, and the broader economy. Fabris (2019) explained that cybercriminals express a high degree of inventiveness by creating every year new techniques and tactics designed to deceive potential victims while the biggest mistake made by individuals refers to their expectations that banks should protect them from these types of fraud because there are banks with high levels of protection which react immediately but there are also those with poor protection systems.
- *Macrofinancial risks monitoring* - Macrofinancial risks could emerge fast if left uncontrolled. Systemic problems could arise if there are risks of high concentration in some segments of market or in the case that funding flows on FinTech lending platforms become too big and unstable. Due to the lack of privately and officially disclosed data about FinTech the evaluations of implications of FinTech for financial stability are challenging. That is the reason more why authorities should consider ways to approach existing and new information about technologically driven financial innovations (FSB, 2017).

Besides above mentioned there are other seven issues that should be also taken into consideration (FSB, 2017). Those are the following:

- *Cross-border legal issues and regulatory arrangements* should be considered regarding cross-jurisdictional compatibility because of new trends on cross–border lending, trading and payment transaction.
- *Governance and disclosure frameworks for big data analytics* draw attention because today big data analytics are transformation drivers across industries. Especially due to complexity and opacity of some of them authorities experience difficulties to assess model robustness and potential risks.
- *Assessment of the regulatory perimeter and its update on a timely basis* refer to the necessity for regulators to respond quickly to new changes and innovations in the FinTech sphere.
- *Shared learning with a diverse set of private sector parties* provide authorities with opportunities to further improve communication and share experiences with private sector which could provide successful insights into new regulatory models.
- *Further developing open lines of communication across relevant authorities* could be intention of the latter in order to be better prepared in the atmosphere of FinTech growing importance.
- *Building staff capacity in new areas of required expertise* is important to ensure adequate and skilled human resources to cope with technologically driven financial innovations.
- *Alternative configurations of digital currencies* and their implications for monetary policy, financial stability and global monetary system by relevant authorities should be further studied (FSB, 2017). Cryptocurrency is based on the new type of asset, the unit of cryptocurrency itself, which is different from any other traditional form of money and it is not liability of any institution or individual. It does not have any institution behind it (Brainard, 2018). Cryptocurrency relies on distributed ledger technology with ownership records and transfer of ownership from one user to another one with very little information. For example, Bitcoin relies on blockchain technology which is run by anonymous computers around the world that are linked among each other through a ledger of anonymized transactions (Brainard, 2018). Emerging of new cryptocurrencies raised questions and research whether central banks should consider issuing their own versions, which should be more stable and reliable compared to other cryptocurrencies. With regards to internet issues and challenges that cryptocurrencies pose to investors and consumer protection and money laundering prevention, there are thoughts that central banks should issue their own digital currencies that would be more stable and reliable (Brainard, 2018). Still, there are various attitudes toward this issue. Jens Wiedmann (2019), President of the Deutsche Bundesbank, emphasized that an introduction of any central bank digital currency has to be care-

fully considered and he pointed to a potential threat to financial stability which could be very severe because central bank digital currency would be highly liquid and safe alternative for investors therefore generally flight to safety or bank run could happen more widely than in the past. According to Fabris (2019) digital money could affect a part of individuals to withdraw their money from banks causing a negative impact on liquidity. As a result, those banks could increase interest rates and thereby attract new depositors, which would further lead to increasing lending interest rates that would have a negative impact on employment, investment and economic growth. Particularly, banks that have a greater share of retail deposits can be at risk and banks could try to replace deposits with other forms of funding such as commercial paper, bonds and equity.

3. Links between Fintech and market structure

Financial technology can influence financial stability by changing the market structure in financial services. There are various benefits of financial innovations but also there are identified potential risks that should be taken into consideration. Financial innovations are changing consumer needs and preferences therefore producing potential threats and impact to traditional financial services. Key elements of market structure that should be considered are concentration, contestability and composition (FSB, 2017). *Concentration* refers to the extent to which the industry is dominated by a small number of big firms. A decrease in concentration is connected with the greater competition, which immediately provides more space for innovations, lower market powers of individual intermediaries and therefore lower prices. If technology lets new non-traditional service providers to compete with existing ones the concentration could be lower. *Contestability* is associated with the extent to which threat of new entrants lead to higher competition while reducing the pricing power of incumbents. *Composition* of service providers could change and result into higher portion of activities that are outside regulatory parameter because new entrants, due to technological developments, could better separate provisions of financial services from more traditional bank activities e.g. deposit taking (FSB, 2017).

3.1. Channels that could impact market structure

FinTech could impact market structure through different channels. Among them the most emphasized are FinTech credits, big tech companies and third parties' services.

3.1.1. FinTech credits

So far there is no internationally accepted definition of FinTech credits. Broadly, FinTech credit is defined as credit activity that is facilitated by electronic platforms where borrowers are directly matched with lenders (CGFS-FSB, 2017). FinTech credits offer alternative source of funding for business and consumers while having potential to improve access to credits for segments that are underserved (Claessens, Frost, Turner & Zhu, 2018). FinTech credits refer to entities such as "peer to peer (P2P) lenders" and "loan-based crowdfunders" which are synonymously used as the main category of FinTech credits and "marketplace lenders" which is a broader term that refers to lending financed to a greater extent from wholesale sources (CGFS-FSB, 2017). These electronic platforms can facilitate secured and unsecured lending, and non-loan debt funding, invoice funding. A development of bank-like service providers such as FinTech credits or payments could affect behavior of banks and markets. Development of financial technology allows a further unbundling of profitable services that are traditionally offered by banks and other financial institutions whose profitability could be endangered in the future (FSB, 2019b). As Claessens et al. (2018) explain although a volume of FinTech credits has increased rapidly recently their share still varies among countries whereas it is greater in jurisdictions with less stringent banking regulations. Expansion of FinTech credits also reflects economic development and financial market structure therefore the higher a country's income and the less competitive its banking system the FinTech activity is larger (Claessens et al., 2018). A significant portion of FinTech-facilitated credits in the financial system could pose both benefits and risks to financial stability. In that regards CGFS-FSB (2017) did a research assessing the potential for microfinancial benefits and risks of FinTech credits and its possible implications for financial stability in the case FinTech credits grow to the significant portion of overall credits. Accordingly, advantages of FinTech credits refer to alternative funding resources in economies and lower concentration of credits in traditional banks which can be useful to decrease idiosyncratic problems in banks if they exist. Among benefits there are also reduced cost, improved customer experience and financial inclusion (CGFS-FSB, 2017). Expansion of these credits could put more pressure to incumbent banks to become more efficient in terms of credit provisions. Unlike the latter, there are identified risks such as potential weakening of lending standards, greater procyclicality of credit provision and a potential to impact traditional financial institutions through revenue erosion or additional risk-taking. If an amount of FinTech credits increase to the significant amounts it may create systemic risk concerns (CGFS-FSB, 2017).

3.1.2. BigTech companies

The entrance of big and well established technology firms, known as BigTechs, into financial sector could influence market structure and easily expand their business into the world of financial technology innovations. BigTechs are non-traditional institutions that have developed networks and have accumulated big data and some of them already have a foothold in financial services in some jurisdictions (FSB, 2019a). Therefore these already big firms entering financial market could put a pressure on the market and be strong competitors to traditional financial service providers offering lower cost or even free services (FSB, 2019a). Services they provide are credits, insurance, and wealth management. As stated in BIS (2019) annual report FinTech companies are created to operate primarily in financial services unlike BigTech firms which provide financial services as a part of much wider set of activities. BigTechs such as Amazon, Alibaba, Facebook and Google have grown rapidly in last decades. Although BigTech companies serve clients globally majority of their operations are located in Asia, Pacific and North America (BIS, 2019). Expansion of BigTechs into financial services has been largest in China, but also it has expanded on the fast track in emerging economies (EMEs), especially Southeast Asia, Latin America and East Africa (BIS, 2019). There are two types of BigTech payment platforms (BIS, 2019). First one refers to overlay systems where users rely on third-party infrastructures such as credit cards and retail payment systems used to process and settle payments. Examples are Google Pay and Pay Pal. These overlay systems are used more in developed economies such as United States where credit cards had been already in use when e-commerce such as Amazon and eBay came to the market. In the second type of BigTech payment platforms users are able to make payments that are processed and settled on a system proprietary to BigTechs such as AliPay and MPesa. These proprietary payments systems are more ubiquitous in the countries where the penetration of credit cards and other cashless means of payments are low as in China where a volume of BigTech payments services accounts for 16% of GDP (BIS, 2019).

Entries of BigTech firms to the financial systems introduce new risks. BigTech firms have potential to emerge very quickly in payment systems as systematically important financial institutions therefore becoming significant from the perspective of financial stability. Thus their impact goes beyond interests of their direct stakeholders having broader public interest (FSB, 2019a). The first financial services that BigTechs offered were payments in order to increase trust between buyers and sellers in e-commerce. For example Alipay or PayPal allow guaranteed settlement at delivery and/or reclaims by buyers and are fully integrated into e-commerce platforms (BIS, 2019). As stated in BIS report (2019) even though

payment platforms of BigTechs compete with those of banks they are still well dependent on banks. In that regards, users require bank account or credit or debit cards to transfer their money throughout the network, then BigTechs hold their money in regular bank accounts and they do not participate in regular interbank payment systems for the settlement in central bank money. However, financial innovations (FSB, 2019a) are developing very fast and technology firms are entering markets at fast speed which could be illustrated using an example of Alibaba' subsidiary Ant Financial established in 2014. Ant Financial expanded activities into wealth management on behalf of its e-commerce business and its payment platform Alipay creating Yu'e Bao which for five years has become the world largest money market fund with 170 million customers and whose asset volume amounted to $237 billion as of June 2018 (FSB, 2019a).

3.1.3. Third parties' services

Traditional financial institutions rely on third party providers for data provision, cloud services and physical connectivity. It is important to emphasize that systemic operational and cyber security risks can increase if systematically important institutions do not appropriately manage risks associated with third party providers (FSB, 2019a). Cloud computing is not a new technology but could be considered a new way of distributing computing services such as data storage, software processes to email handling that could improve security and resilience of financial institutions. Financial institutions could deploy different approaches, to build a private cloud, to use multiple cloud service providers or to use hybrid approach with a fraction of computing services coming from internal data sources with private on site cloud which could be scaled for critical computing needs to minimize risk while using multiple cloud vendors for other operations (FSB, 2019a).

3.2. Drivers of financial innovation

Technology enabled innovation development in the financial services resulted from convergence of drivers (FSB, 2017). In its framework FSB (2017) generally differentiates three drivers of financial innovation: evolving technology, changing financial regulation and shifting customer expectations and preferences. Firstly, drivers refer to technological development with regards to internet, big data, mobile technology and computing power. Secondly, changes in financial regulation refer to new regulatory and supervisory requirements and related changes in business incentives of incumbents and new entrants. Customer pref-

erences are considered the third driver and have altered due to the entrance of new players who are able to scale up faster in more effective ways than traditional institutions that are less technologically efficient (FSB, 2017). FSB (2019a) structures drivers of financial innovation more specifically according to supply and demand factors.

3.2.1. Factors on the supply side

Supply side factors that influence financial innovation and refer to technological developments are: application programming interfaces (APIs), mobile banking and smart phones and cloud computing (FSB, 2019a).

- *Application programming interfaces (APIs)* are used for the purpose of communicating with each other and exchanging data directly without human inputs. APIs have already been in use for decades but recently they have been implemented more particularly as immediacy in payments. Jurisdictions around the world are developing frameworks for application of APIs. Number of APIs has increased over time from just one in 2005 to over 17,000 in 2017 (FSB, 2019a). EBA (2019) reports that numerous institutions in EU that offer their services through their own platforms have already used APIs and noted that with improvement in data sharing ecosystem could be more advanced to support development of innovative products and services to customers. Accordingly, institutions expect positive outcomes from their use of APIs (EBA, 2019). Although if not well securely managed use of APIs can lead to increased risks and market structure fragility (FSB, 2019a).
- *Mobile banking and smart phones* have recently featured consumers' daily lives in many jurisdictions. Availability of those services enlarged while at the same time increased consumers' expectations for convenience for many services including financial. Combined with APIs smart phones have built in operational systems for payments. Smart phones are considered platforms for third party developers to develop new products (FSB, 2019a). It is a trend that online consumers are becoming mobile consumers, with a strong preference for smartphones (EBA, 2019). There is a growth in the use of online services and a rising trend in ecommerce in EU with around 68% of EU internet users shopping online in 2017 (EBA, 2019). A number of clients who purchase products and services through mobile and online payments have increased. According to UNSGSA-CCAF (2019) the number of people globally who are connected to mobile phones surpassed 5 billion in 2017 while 3.7 billion refer to developing economies. UNSGSA-

CCAF (2019) show that there were more than 276 mobile money deployments in 90 countries with 47 having over 1 million active accounts and serving 191 million active users processing an average of $1 billion per day. The latter shows the impact of mobile phone usage and impact on financial inclusion as long as mobile money produces significant benefits for the unbanked and underbanked through lower fees, time savings and reductions in travel costs (UNSGSA-CCAF, 2019).

- *Cloud computing* is the practice of using a network of remote servers accessed over the Internet for the IT services' provision. There are many advantages of using cloud computing. Some of them are flexibility, economies of scale, operational and cost effectiveness. Financial institutions usually use clouds for managing customer relations, human resources and financial accounting. There are forecasts that by 2020 those institutions will use clouds for credit scoring, consumer payments and other financial services (FSB, 2019a). According to EBA(2019) numerous institutions in EU already use cloud computing for ICT infrastructure, data storage, hosting systems, processes and communication service while there are others assessing possibilities of moving into cloud and observing the market improvements in that regard. Also, some institutions consider very important the need to addressing regulatory risks arising from cloud computing such as uncertainty about selection of global cloud service providers. This is especially important for medium and small enterprises that seem to be weak in negotiating unrestricted audit and access rights with global cloud service providers (EBA, 2019).

On the supply side there are also factors referring to regulation and regulatory changes and those are: licensing and supervision regulation, competition aspects in financial regulation and other areas of competition.

- *Licensing and supervision regulation* frameworks' changes could influence emergence of new FinTech businesses. Since the 2008 crisis, regulatory and supervisory requirements have changed and developed. Basel Committee on Banking Supervision relevant authorities are comfortable with applicability of regulatory requirements to banking services provided by FinTech firms (FSB, 2019a). In regards to that many authorities have already started considering new regulations related to FinTech services. There are institutions e.g. EBA(2019) that according to its regulation is monitoring financial innovations and FinTech influence to financial institutions in EU in order to provide effective regulation and supervision and ensure transparent and efficient functioning of financial markets, preventing regulatory arbitrage and promoting equal competition.

- *Competition aspects in financial regulation* have changed since the financial crisis. Supervisors in many jurisdictions have been granted powers related to competition. Usually, ensuring contestability has become an explicit objective of policy. Jurisdictions are developing policies referring to competition promotion around open banking. An example of that is a regulation in European Union that was decided in 2015 as revised Payment Service Directive -PSD2 (FSB, 2019a). PSD has been applicable since January 2018 and provide legal foundation for developing a more integrated internal market in EU, which includes more efficient, easier and safer electronic payments with an intention to open EU market for new entrants which leads to more competition and better prices (EBA, 2019). PSD2 provides open access to certain types of customers' banking data for non-bank licensed providers of payment initiation services and account information services that are now allowed to get information with personal online banking accounts if customers explicitly allow so while banks are not entitled to deny their rights to access (FSB, 2019a). PSD2 should provide customers to open one app for one account and see the list of all their accounts including those with other banks, authorize licensed third parties to access a set of their payment related banking details without login details. Also, according to interchange fees regulation (IFR) that aims to improve competition by reducing interchange fees for card based payments while at the same time increasing transparency. Other jurisdictions also implemented regulation changes referring to enhancing competition (FSB, 2019a).
- *Other areas of competition*, besides regulation referring to enhancing competition, also merit significant attention of authorities (FSB, 2019a). Data protection could have implications to both degree of competition and contestability of markets and also the potential for firms to develop internationally. There are differences among jurisdictions thus cross-border application of different regimes could interfere with global business operations. There is a risk that firms which operate in restrictive data protection regimes are not allowed to operate in third parties' countries because of firms' inability to subject themselves to the regulations in third parties' countries. Another risk to financial stability caused by data protection refers to the possibility that the ability of third-country authorities to control foreign firms from operating in their jurisdictions could be hindered (FSB, 2019a). This situation could be mitigated in case there are data protection mechanisms which can guarantee that third party authorities have access to necessary personal data needed for supervising activities (FSB, 2019a).

3.2.2. Factors on demand side

Demand factors that could influence financial innovations refer to changed consumers' expectations and preferences. The latter was influenced by new technologies, usage of online shopping, real time transacting and user friendly financial services (FSB, 2019a). Expectations of customers have changed drastically because consumers now demand fast, easy, cheap and secure payments at any time and from anywhere while seeking for more options and choices (EBA, 2019). Institutions are moving toward "customer-centric" strategy in order to adopt and meet customer needs that serve as an important driver of business models (EBA, 2019). As Luburic (2018) states an understanding of the current and future needs of customers contributes to overall success because they are the best interpreters and followers of the mission and vision that organization could define.

Demographic changes are also considered demand driving factors especially because of the growing financial influence of digital natives and millennials. These young generations are more likely to use FinTech and especially FinTech credits that provide peer-to-peer lending which directly matches lenders and borrowers therefore increasing more social value and responsibility than traditional banks could provide (FSB, 2019a).

There are also economic development and convergence factors such as fast adoption of digital technology in some emerging markets and developing countries. In some countries e.g. Asia the rising supply of wealth and increased desire for greater returns in the face of law yields resulted in FinTech platforms having a larger investor base (FSB, 2019a). Therefore investors potentially could be more interested in taking FinTech loans to diversify their asset portfolios.

Mobile and web payment systems such as Alipay, Apple Pay, M-Pesa and PayPal provide end users to pay goods and services online using handhold devices while providing potential ability to lower transaction costs compared to those offered by traditional methods of payments (FSB, 2017). According to EBA (2019) the broader growth of FinTech resulted into substantial increase in the use of digital and mobile wallets, which are determined as one of the fastest-growing technology markets whereas it is estimated that digital wallets have added approximately USD 40 billion to global payments revenues in 2017.

4. Benefits and Risks of FinTech to Financial Stability

FinTech expansion could produce potential influence to financial stability, to either support or undermine it. In some situations there are overlaps and trade-offs between financial stability and other regulatory approaches in regards to consumer and investor protection, market integrity, competition and financial inclusion (FSB, 2017). Financial innovations and higher competition could support more efficient, convenient and lower-cost delivery of financial services (FSB, 2019a). On the other side if innovations lead to new imbalances or contagion channels they could endanger financial stability and create potential space for systemic risk (FSB, 2017).

4.1. Benefits of FinTech to Financial Stability

As described in FSB's report (2017) main benefits that technology-enabled innovations in financial services bring to financial stability are decentralization and diversification, efficiency and transparency.

- *Decentralization and diversification* have potential to lower the effects of financial shocks in some situation (FSB, 2017). Decentralization is generally seen in three broader forms: decision making, risk taking and record-keeping (FSB, 2019b). Diversified financial markets could contribute to reduce liquidity constraints compared to the situation with institutionally more concentrated markets therefore reducing solvency and liquidity risks (FSB, 2017). Decentralization may also affect operational risks thus if properly secured those systems could be more resilient to cyber risks compared to centralized systems especially in terms of record-keeping and service availability (FSB, 2019b). FinTech supports decentralization and diversification through various channels. Technological developments on lending such as big data processing and automation of loan originations led to lower barriers to entry. Robo-advice is another example where smaller companies can function at alongside bigger firms with less barriers and fixed costs (FSB, 2017). Generally, process of decentralization is less visible when it comes to strong network externalities such as payments and settlements. Theoretically, distributed ledger technology (DLT) in payments could reduce concentration. Although digital currencies such as Bitcoin and Litecoin are getting very popular the likelihood that private currencies could replace national currencies is low (FSB, 2017). Those who support DLT emphasize its capacity to transform financial services and markets by reducing complexity, developing speed of end-to-end process-

ing, facilitating quicker reconciliation and lowering the need for reconciliation through multiple record-keeping infrastructures. Using of multiple synchronized ledgers and multiple processing nodes provide DLT with the potential to decrease the risk from a single point-of-failure (CPMI, 2017).

- *Efficiency* in operations contributes to stable business models of financial institutions and leads to overall efficiency improvements in the financial system and real economy (FSB, 2017). Robo-advice, RegTech or applications of technology that streamline back-office functions and other productivity enhancing technologies could strengthen business models of financial institutions. Lending platform provided by FinTech could further lower transaction costs and provide better capital allocation (FSB, 2017). EBA(2019) conducted a survey and came to the conclusion that institutions have significant expectations that number of customers will increase based on the benefits of FinTech such as lower prices, improved convenience and simplified experience. Also some institutions expect that overall costs could decrease or remain unchanged because FinTech solutions have potential to target more automation and efficiency in internal processes such as RegTech tools which may result in reduced costs (EBA, 2019). According to EY (2019) numerous organizations invest a substantial amount of time and money in the compliance space to safeguard against audit, regulatory and reputational risks and RegTech offers those financial institutions the opportunity to improve their regulatory environment through the application of technologies including report automation tools. These tools could support institutions to drive efficiency and sustainability in their regulatory compliance functions (EY, 2019).
- *Transparency* decreases asymmetry of information and enables more accurate risk assessments. Last financial crisis witnessed that more transparency would lead to less default probability and lower number of days of illiquidity. Securitization, known as financial innovation of recent decades, was considered a key source of problems that led to financial crisis in 2008 (FSB, 2017). The increasing weight of transparency supported by new technologies has expanded the amount of information central banks produce and communicate (Lehtimäki and Palmu, 2019). It is expected that e.g. RegTech[1] could provide improved transparency between market participants and regulators, drive standardization and continue delivering value to shareholders (EY, 2019).

[1] RegTech could be broadly defines as a subset of FinTech which uses innovative and integrated technology to facilitate the delivery of regulatory requirements more effectively and efficiently than existing capabilities (EY, 2019).

- *Access to financial services* influences the financial inclusion of households and businesses, including SMEs which further supports sustainable economic growth and provides diversification of investment risk exposure (FSB, 2017). Improvement in access to financial service across all of the economic functions is especially visible in the regions with unbanked population and with financial systems in early stages of development where very often cell phone ownership share equals or surpass the share of population with an access to bank account. Cell phone users have access to mobile banking which allows them to obtain credits and make purchases. For example, robo-advisors provide access to wealth management for people who do not have access to similar traditional asset management because of high fees or minimum investment thresholds (FSB, 2017).

4.2. Risks of FinTech to Financial Stability

Although FinTech creates benefits to financial stability it could potentially have an adverse systemic impact to the latter and could produce serious negative effects which could further endanger real economy. It is considered that FinTech could undermine financial stability through microfinancial and macrofinancial channels. Therefore FinTech could create micro and macrofinancial risks to financial stability (FSB, 2017).

4.2.1. Microfinancial risks

Microfinancial risks refer to those coming from single firms or sectors that are vulnerable to shocks. Those shocks could have a potential to trigger the situation which can cause systemic impacts to financial system. Microfinancial risks occur from financial and operational sources (FSB, 2017).

Financial sources refer to maturity mismatch, liquidity mismatch and leverage.

- *Maturity mismatch* happens when a loan is extended for the period longer than the period financing is related for, which further creates rollover risk. FinTech lending is considered the main FinTech activity referring to maturity mismatch (FSB, 2017).
- *Liquidity mismatch* occurs when assets and liabilities have different liquidity features that could create "run" risk and the need to quickly liquidate illiquid assets, so called fire sale. As an example holders of digital wallets tend to pull payments from bank accounts or credit card accounts. Those

that hold clients' money invest the funds in liquid assets. In regards to the latter most FinTech activities do not include client money holdings (FSB, 2017).

- Higher *leverage* occurs when there is a less equity available for absorbing losses materialized. Leverage is not typically connected to FinTech activities, but there are cases when it could occur. FinTech credit platforms could use their own balance sheets to fund loans therefore they could engage in leverage (FSB, 2017). Although there are factors that could decrease lending standards there is also a possibility to influence countries where credit standards are already deep thus FinTech credit provision could be procyclical and there is a potential for a pullback in credit to certain parts of economy because investors lose their confidence in the periods of stress (CGFS-FSB, 2017).

While on one side capital and liquidity promote financial resilience, on the other one strong governance and controls support operational resilience (Stiroh, 2019).

Operational sources of risks (FSB, 2017) are stemming from governance and process control, cyber risks, third-party reliance, legal risks and business risks of critical financial market infrastructure.

- *Less governance and process control* for some entities that provide financial services but are not included in regulatory and supervisory standards (or are less involved) could pose a significant risk to the financial system in the case those entities grow (FSB, 2017). A lack of an effective and strong governance structure and issues which refer to data integrity, immutability and privacy could further create basis for operational risks. Immutability, meaning that data in DLT could not be unilaterally changed once they are recorder, is a critical to the safety of arrangement because it refers to data integrity (CPMI, 2017). Cryptocurrencies that rely on DLT could raise significant investor and protection issues because the lack of strong governance and issues about applicable legal framework may make users vulnerable to mistake, thefts or security holes (Brainard, 2018).
- *Cyber risks* increase as more different institutions are connected. More technology and digital solutions provide greater number of access points that cyber hackers could target. Also there is possibility that as financial services develop they could help to increase competition and diversity in the financial system thus every possible cyber-attack could be less systematically important.
- *Reliance on third–parties* could pose systemic risks. FinTech activities could rely on third party services such as cloud computing which could

pose significant threats if they experienced operational difficulties. For example, FinTech credits and robo-advice could rely on other data providers that could be highly concentrated. There is a risk that third-party providers are not traditional banks instead they could be, for example, telecommunication companies.

- *Regulatory/legal risk* could develop more as FinTech activities expand while not covered by existing legislation and regulatory frameworks which calls for more national and international cooperation to regulate FinTechs (FSB, 2017). In that regards DLT brings operational risks in terms of proprietary rights and settlement finality which are supposed to be written clearly in the arrangement, thereby understood by participants and supported by applicable law (CPMI, 2017).
- *Business risk of critical Financial Market Infrastructure* could occur in the case those innovative payment and settlement services become too big thus general business losses have the potential to weaken the provision of critical services and interfere with recovery (FSB, 2017).

4.2.2. Macrofinancial risks

Financial innovations could have potential to overtime produce macrofinancial risks therefore endangering stability of entire financial system. The extent to which financial innovation could have impact and become a source of financial risk depends on the type of innovation and its potential to evolve over time. Macrofinancial risks refer to contagion, procyclicality, excess volatility and systemic importance (FSB, 2017).

- *Contagion* is an example of macrofinancial risk that could occur from different sources. Problems happened in a single institution or one sector could be transmitted to other institutions or sectors. Reputational contagion is one of potential concerns for FinTech especially when households interact with businesses. Large and unexpected losses occurred at one FinTech platform may further expand to entire sector creating potential for losses. Recently there is a tendency that firms intensify the use of automation and artificial intelligence therefore lacking human interference and supervision which could be risky and further may lead to contagion (FSB, 2017). Although DLT brings more transparency and effective risk management it is important to clearly understand how some possible automation tools are connected across financial system and whether there is a need for additional protection necessary to protect contagion (CPMI, 2017).

- *Procyclicality* is considered a potential macroeconomic risk because many FinTech activities may be prone to it. Procyclicality involves situations such as excess provision of credits by banks during upswings in the economy and the high level of deleveraging that happens during downturns in the economy when capital positions are endangered. On FinTech lending platforms interactions between investors and borrowers may possibly show greater fluctuations in sentiment than it would be the case with traditional intermediation of funds as unexpected increase in non-performing loans may lead to drying up of new funds (FSB, 2017). There is a potential that higher access to cheap debt and equity financing could enable some participants to underprice risks when competing to other incumbents which could be even worse by incentive problems and network effects and thus increase risk-taking. Also there is a risk that FinTech intermediaries have lower potential to adequately assess credit quality or preserving lending standards. Each of mentioned examples could raise procyclicality in the provision of those financial services and therefore when occur intensify shocks to the financial system (FSB, 2017).
- *Excess volatility* may be another source of risk that could produce macro effects. In their nature FinTech activities are fast therefore they are more likely to cause or exacerbate excess volatility in the system. Financial systems are prone to overreact to news, especially in the cases of homogeneity of business models or common exposures, which may produce effects such as solvency and liquidity problems in the financial system that could further harm functioning of asset and credit markets (FSB, 2017).
- *Systemic importance* is another potential macro risk or threat. In the world of FinTech it is very likely that highly connected entities emerge in the future, primarily in terms of market structure. Digital currencies and wallets may possibly displace traditional systems of payments. DLT has numerous possible applications, such as playing a central role in the clearing and settlements of securities thus in the future they could replace existing risks connected with custody banking and central counterparties (FSB, 2017). DLT could bring risks such as uncertainty about operational and security issues arising from technology, the lack of interoperability with existing processes and infrastructures (CPMI, 2017). There is a possibility that some other oligopolies and monopolies emerge in the process of collection and use of customer information (FSB, 2017).

5. Conclusion

Rapid developments of FinTech influenced financial markets and business models of traditional financial institutions. In order to follow current trends and to compete to their fast growing competition traditional financial institutions are adopting to changes in order to satisfy the needs on the market. Both supply and demand side factors could act as drivers of financial innovations. Customers, especially new generations, are looking for fast, easy approachable financial service that are accessible at anytime and anywhere. In regards to that, they are more likely to use electronic payments, mobile banking, FinTech credits or other DLT based products and services instead of using traditional financial services methods.

FinTech credits, BigTechs and third party providers are considered the main channels through which FinTech could influence market structure and therefore impact financial stability. FinTech credit could endanger financial stability in the case they become too big. So far, FinTech credits market is not that significant to have a potential to cause financial instability but its rising trend has to be closely monitored. Greater entry of BigTech companies to the world of financial services could make strong implications and potentially threaten activities of traditional financial services providers. BigTechs are relatively easily entering the new markets due to their strong technological developments and big data access.

FinTech brings opportunities and benefits to market players and customers but at the same time it also brings risks that have to be adequately assessed and managed. Technologically enabled financial innovations provide greater decentralization, wider diversification of products and services, then faster, transparent, efficient and broader access to financial services thereby contributing to financial inclusion. Unlike that, FinTech could pose threats to financial stability in terms of micro and macroeconomic risks. In that regards international and national bodies are taking FinTech into considerations when assessing potential risks and creating regulatory frameworks. International institutions such as the FSB, IMF and WB are calling for international cooperation among national and international institutions with the aim to address and reduce regulatory gaps, prevent occurrence of potential risks and mitigate the likelihood the risks develop posing systemic risks which could further jeopardize financial stability on local levels and potentially spread to the global level.

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