

## ¿Contribuye la tecnología a la democratización financiera? La economía colaborativa y las *fintech* como catalizadoras del cambio

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**Resumen.** Este trabajo plantea que la irrupción en el ámbito de la actividad bancaria de nuevos actores como las denominadas compañías *fintech*, intensivas en el uso de tecnologías para la prestación de servicios financieros, muchas de ellas con soluciones disruptivas, están obligando a la banca tradicional a actualizar su modelo de negocio y a situar a los clientes verdaderamente en el centro de su actividad. La configuración de una nueva sociedad digital está cambiando los modelos de relación entre las empresas y los usuarios o consumidores. El desarrollo de la economía digital y de la economía colaborativa incide tanto en los procesos tecnológicos como en la forma de relación con los usuarios de los servicios financieros. Por ello, la experiencia de cliente resulta fundamental y en ello se han fundamentado las *fintech* y, también, comienzan a hacerlo las *bigtech*. Para analizar esta transformación digital de la banca se ha realizado un estudio con los principales 31 bancos comerciales europeos, tomando los datos correspondientes al período 2010-2017. Los resultados obtenidos, permiten apreciar, particularmente en los últimos años de la muestra, un progresivo impacto en la banca de la presión competitiva ejercida por las *fintech*, que se traduce en el inicio del replanteamiento de muchas áreas de actividad de la banca, para enfocarse más hacia el cliente e incorporar las tecnologías que han sabido aprovechar las *fintech*; todo lo cual está favoreciendo la democratización de los servicios financieros.

**Palabras clave:** Banca; Democratización financiera; Digitalización; Fintech; Bigtech.

**Claves Econlit:** G21; G34.

### [en] Does technology contribute to financial democratization? The collaborative economy and fintechs as catalysts for change

**Abstract.** This paper argues that emergence of new actors such as fintech companies in the banking sector, that use intensively new technologies for the provision of financial services -many of which with disruptive solutions- are forcing traditional banking to update its business model and to place customers at the center of its activity. The structure of a new digital society is changing the relationship models between companies and users/consumers. The development of the digital economy and the collaborative economy affects both the technological processes and the form of relationship with the users of financial services. Because the customer experience is fundamental it has become the focus of attention of the fintechs as well as of the bigtechs. To analyze this digital transformation of banking, a study was carried out of the 31 main European commercial banks, using data for 2010 to 2017. The results obtained - particularly for the last years of the period - allow us to appreciate the competitive pressure exerted by fintechs on banking, which leads to the beginning of a change in thinking in many areas of banking, towards a greater focus on clients and the incorporation of the technologies that fintechs have been implementing. This process as a whole favors the democratization of financial services.

**Keywords:** Banking; Financial democratization; Digitalization; Fintech; Bigtech.

**Summary.** 1. Introduction. 2. Financial democratization through the technological disintermediation of financial intermediation. 3. The impact of fintech and the collaborative financial economy in the banking sector. 4. Proposal of a model of analysis of the fintech effect on the change and democratization of banking financial services. 5. Conclusions. 6. References.

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## 1. Introduction

In recent years, new technologies have given rise to the so-called platform economy and, consequently, have enabled the most efficient interaction between consumers and service providers, including the financial ones.

Technological convergence, the product of the concurrent existence of diverse technologies, as well as the development of the Internet of Information, have now evolved to the Internet of Value (with DLT (distributed ledger technology) also known as blockchain technologies) now in a union of innovative systems of collaborative economy that is empowering individuals with tools threatening the classical models of intermediation, such as the classical banking model.

The boom of the fintech sector during the last five years is leading the biggest transformation in the financial industry, in terms of business models and ways of distribution and provision of financial services.

By increasing competition in the sector, due to the fall of many traditional entry barriers in banking, now accessible to fintechs and bigtechs (big technology companies), technology is driving an accelerated process of financial democratization for several reasons:

- because it allows for more efficient operating processes;
- because it allows for more efficient management of a massive amounts of customer data;
- because the access channels to financial products are available to all users.

Technology and its disruptive application in the financial market leads to an intensive digitization of banking (Fernández-Torres, et al., 2019). These favours users of financial services, who in some cases, are able to benefit from collaborative economy platforms, which is the case of crowdfunding in its different forms. In other cases, for being able to use comparators and better access systems to financial information. It should be noted that the new regulation requiring banks to open their data to third parties authorized by customers is also a form of deregulating of the sector (this is the case of the PSD2 regulation (payment service directive)).

Some technologies are especially useful in the area of financial analysis and planning. Thanks to the capacity to exploit information (e.g. big data), in depth analysis of the behaviour of users of financial services is possible. These technologies process huge amounts of information that can be easily exploited also by new competitors including the disruptive companies of the fintech sector and the large technology companies, known to be big data collectors. This has led to the new phrase used in this context: The "oil of the XXI century" (Chishti and Barberis, 2016).

From another point of view, the reputational loss of banking due to the financial crisis has helped the development of a "new species" in the demography of financial intermediation with new technological capabilities that make financial empowerment possible. In certain facets such as cryptocurrencies, disintermediation is highly relevant, and has become associated with concepts such as crypto-anarchism (May, 1992).

Therefore, the financial sector is facing the challenge of digital transformation and threat of new competitors that are beginning to overcome traditional barriers to entry (Akkizidis and Stagars, 2016). This is in favour of users/consumers.

A key element of the transformation is the search for the improvement of the customer experience and the transmission of greater transparency in financial transactions., in particular, as regards the origin and destination of the transferred funds. It must be taken into account that the rejection/acceptance of a user with the service was in the past known only to a close circle of friends or relatives. However, currently, social networks can strongly intensify the sharing of experiences, so that customer satisfaction occupies a primary position.

The concept of "platform economy" which has been recently coined reflects the technological transformation of society with its collaborative models and sharing as well as in direct systems of interrelation through digital platforms that share some principles of cooperative conception.

It also should be noted that the cooperative formula is already seen as a corporate system that can adapt well to the distributed models that, together with blockchain and other similar technologies, will soon spread also in the area of finance.

The arrival of new players in the fintech sector, as well as the well-known presence of large technology companies with financial activities (conceptualized as techfin) means that many of the functions of traditional bank intermediation have to be reconsidered.

For example, even in the sophisticated field of asset management, robotic or algorithmic management is opening new doors, thus raising uncertainties and concerns on the one hand, but also provides opportunities for competitive differentiation. The global banks are acquiring fintech companies or creating their own lines of business that have been carved out from the classical business lines. Other banks are signing strategic alliances for the development of new technologies, including blockchain applications. Practically all relevant entities are using big data for prediction systems, product management, customer analysis, etc... Artificial

intelligence and blockchain technology promise to be one of the engines of the global transformation of the banking industry.

From another point of view, the mentioned banking sector crisis and its transformation have led to the financial exclusion of growing share of the population without access to physical banks. This trend has intensified since 2015 and has become a genuine concern for certain social strata and especially for the elderly.

Hardly any empirical studies are available on the topic of fintech and its impact on the activity of traditional universal banks as a whole. Other scientific work examined the different fintech forms and their effects on the financial market (Schueffel, 2016). Even their structuring is currently still a trade-off among different perspectives (McKinsey, 2016). A growing common view could only be identified at the normative level as can be seen in the Discussion Paper on the EBA's approach to financial technology (2017) or in Dorfleitner & Hornuf (2016).

Most of the banks operating in the EEA have entered into agreements with fintechs in the financial years 2016 and 2017, based on the evaluation of the IFRS annual reports from 2010 to 2017. This movement was the first to be recognized by the French BNP in 2012.

This paper attempts to focus on the transformation process of the business models of banking services due to irruption of fintechs and bigtechs, specially focused on clients and customer experience. The focus is rather on the measurement of the disruptive nature of fintechs on the components of the value chain of traditional universal banks with clear effects in the democratization of financial services. The study focuses on the European universal banking market, where the banks at majority seem to share the same characteristics (Feng & Wang, 2018).

Banking as a Service (BaaS) is now the new concept for financial activity that also means financial democratization.

## **2. Financial democratization through the technological disintermediation of financial intermediation**

The empowerment that technology offers to citizens entails the need for a change in the relational model between financial entities and their users (Massanell, 2016).

The convalescence of the banking system after the deep economic-financial crisis has occurred in parallel to the digital transformation. In some areas of the banking sector there has been a Darwinian quasi-extinction that has favoured the development of new more adapted and agile species, such as companies in the fintech sector, or the discovery of new functions by very powerful species, such as big technology companies or bigtechs.

From another point of view, there has been a process of sociocultural change of the new digital society with the incorporation of new generations: the already active one of the millennials; and the most recent one of the centennials that have a different orientation in their means of relationship for the purposes of consumption, leisure, communication and, also, savings and investment.

If the banking relational model changes due to the incorporation of new technologies and also due to the change in the users' habits and customs, it is necessary to adapt the organization and redesign the traditional business model (Morris, 2006; Giesen, Riddleberger, Christensen and Bell, 2010) imposing a culture of open innovation that is oriented towards the design of a new value chain and a new model of digital relational banking closer to the users of financial services.

In a parallel process caused by the economic crisis of 2008-2014, the reduction in the number of employees and the networks of banking offices has also created problems of "financial exclusion". Thus, for example, in 2017, about 48% of Spanish municipalities and 1.13 million citizens did not have access to a banking office (Maudos 2017a) and this also means deepening the "digital divide" of broad layers of the Spanish society; For this reason, banks must provide other means to maintain their relationship with their customers.

The idea that radical transformations require restarting processes or raising them in their entirety starts to make sense in many activities in the financial sector. Thus, the incipient but progressive use of blockchain technology will redefine financial intermediation and eliminate very established actors such as clearing houses, settlement systems, centralized management of orders and transactions, transfer systems, and even the own configuration of the currency and its future digitization by means of cryptoactives. It is an unprecedented transformation, due to the speed of change and its global dimension; a transformation that seems to be assimilated to the concept of deconstruction (Evans and Wurster, 1999).

The deconstruction of systems works as a creative process or open innovation (Chesbrough, 2003 and 2010) that reformulates the foundations of organizations to move from the traditional economy to the digital economy, placing technology at the centre of financial activity and turning their products and services into simple "commodities".

Users of financial services will be more volatile and less loyal, so no entity will be willing to stay behind in their adaptation to change. These customers demand, increasingly, a high quality of services, agility in operations and have a new economic culture, with different consumption habits and technological behaviour. All this will also imply an adequate balance between traditional financial processes and new processes, while it will be necessary to establish a transition system that will keep customers on track and add new clients so that the digital transformation process is sustainable.

On the other hand, we must take into account the impact that the so-called "open banking" will have as a consequence of the application of the European directive known as PSD2 or the second payment services directive, which, since the beginning of 2018, has required that banks establish computer systems (known as APIs Application Programming Interfaces) that enable access to customer data by other entities, as long as they are authorized by their clients, which has allowed the API economy term to be coined (Zachariadis and Ozcan, 2017).

In short, the changes taking place in the financial sector are numerous and very rapid and they are all acting as catalysts for a growing financial democratization.

### 3. The impact of fintech and the collaborative financial economy in the banking sector

The basic reference for this paper has been supported by published findings as analogies examining the impact of the internet on the classic business model of universal banks of the 1990s in the search for a quantitative model. In fact, Internet can be considered the most disruptive technology for the financial sector.

The current literature is then analyzed for articles that examine the effect of fintechs on the business models of credit institutions. Fintech's history is divided in three periods: Fintech 1.0 (1866-1967), Fintech 2.0 (1967-2008), Fintech 3.0 (2008 – now) as proposed by Douglas, Arner et al. (2015). Of particular interest to this article is the last (post-financial crisis) period when credit institutions begin to recognize the benefits of fintechs. According to the reference in the annual reports, this awareness matured over the last two years of the 2010–2017 period. The main focus of these publications written prior to the global financial crisis of 2008 are the determinants of internet usage and the performance of financial institutions.

Table. 1. Academic literature on the impact of the Internet as a disruptive technology in banking services

Authors	Time frame	Subjects of analyse's	Empirical approach	Key findings	WoS citation report 2007 – 2017
(Emilia Bonaccorsi di Patti et al. 2004)	1998-2001	average of 800 multichannel banks in Italy with focus on private households	multivariate analysis	- no significant consumer surplus	n/a
(Hernando, Nieto)	1994-2002	72 commercial banks operating in Spain	multivariate analysis	+higher profitability	664
(Ciciretti et al. 2009)	1993-2001	105 commercial banks operating in Italy	multivariate analysis	+positive correlation between internet adoption and profitability (ROA, ROE)	16
(DeYoung et al.)	1999-2000	performance of 5175 branching-only community banks in the US and internet adoption	bivariate analysis and multivariate analysis	+higher profitability of multichannel banks	209

Source: own elaboration.

All authors obtained positive correlations between the use of the internet and the performance of the examined banks. Unlike other authors, (Bonaccorsi di Patti et al., 2004) were unable to identify a positive correlation relative to Italian Universal Banks but despite that they recognized a complementarity between classic brick-and-mortar banks and the use of electronic delivery channels. All authors examined the relationship between the use of the internet and key performance indicators (KPIs) of the analyzed banks. These address the disruptive impact of fintechs on the traditional business models of banks and the consequent favorable effects on their clients.

The intrinsic complexity of "fintech" (a neologism originating from the words finance and technology) does not allow for a simple identification of a structure (Gomber et al., 2017). Fintechs are not only startups and technology developers. Recent scientific literature mentions fintech ecosystems consisting of fintech components such as government, credit institutions, and customers (Lee & Shin, 2018).

The review of recently published scientific literature showed that the authors did not deal with the economic impact of fintechs as a whole but rather with just one aspect, e.g. blockchain (Brühl, 2017), in great detail. Other authors focused on other issues, such as changing relationships with investors and customers via digitization (Palomo Zurdo et al., 2018).

However, one question still remains to be asked: How far and how successfully have the credit institutions advanced in their transformation process. A reliable EU-wide survey of fintechs is only in its infancy. Due to their size and legal form (eg. N26 GmbH, Kantox (LLC)), Fintechs' external reporting often only serves local requirements of the tax authorities, creditors and investors. External group reporting based on uniform legal norms (e.g. IAS / IFRS) such as those of the listed international universal banks is not yet available.

Current tendencies beyond fintechs are regtechs, a combination of both regulatory reporting and technology. Regtechs are understood to be a sub-set of fintechs focusing on technologies supporting the delivery of regulatory requirements in a more efficient way. The study of the economic impact of these companies is not the subject of this article although a higher degree of automation of regulatory reporting would have a strong and positive impact on the reporting efficiency of banks (Colaert, 2018) and their cost-income-ratio, as well as the protection of clients.

The original universal bank model can be compared with the new bank model undergoing the disruptive process inflicted by fintechs. It is interesting to examine the link between the banks and the fintechs about their business models (Bömer et al., 2018). The analysis leads to the identification of the dependent and independent variables.

To ensure the selection of a representative and largely homogenous population of research objects (Kothari, 2014), they had to fulfill 5 conditions:

1. (geography): headquarters in an EEA member state,
2. (regulatory significance): must be a G-SIB or D-SIB,
3. (ownership structure): listed on a stock exchange,
4. (language of financial reports): IAS/IFRS,
5. (availability of data): availability of historical time series.

Conditions 1 and 4 support a uniform economic and legal understanding of the research objects. Condition 2 points out the importance of the banks from the regulatory point of view. The shareholder structure (condition 3) involves the banks' pressure on the shareholder for quick adaptations to the environment to remain profitable. Simple unified and consistent data availability (condition 5) is a necessary condition for further quantitative analysis.

There needs to be taken into account some definitions: a business model is defined as *an abstract representation of an aspect of a firm's strategy* (Porter, 1996) or as an intention to explain how value is created (Zott & Amit, 2017); Value chain (practical implementation of a business model) is the term used to describe all stages of a work process, ultimately providing the customer with a product or service from conception to production. At the end of this process there is added value (surplus) both from the perspective of the buyer and the supplier (Porter, 1985); Disruption is a process in which an existing business model or an entire market is replaced or destroyed by rapidly growing innovation. A disruptive process is necessary for the development of a functioning market (Christensen, 1997); The value chains of traditional universal banks are already undergoing disruptive transformation (Gasser et al., 2017). Innovative digital technology helps market participants for the first time to digitally transfer values without intermediaries (e.g. by blockchain technology) (Catalini, 2017a); Universal banks are defined as credit institutions undertaking that take deposits or other repayable funds from the public and grant loans for their own accounts (Capital Requirement Regulation, Article 4). In addition, the business model of universal banks combines standard deposit-taking and lending with more sophisticated investment banking activities often across national borders (Nouy, 2015).

The term fintech means an innovative financial solution that is delivered by the application of existing new technology. Actually in this sense, the first commercial use of the telegraph in 1833 and the first transfer of financial information via the transatlantic cable in 1866 could be described as fintech (Arner et al., 2015).

However today, the roots of the term can be traced to the American consortium “Financial Services Technology Consortium” founded in 1993 by Citicorp, the predecessor of today’s Citigroup (Hochstein, 2015). In a narrower sense of the term, fintech is often used to describe the businesses providing such technology-enabled financial innovations. These fintech companies carve out, automate and rearrange parts of the value chain of traditional financial intermediaries (Lee et al., 2018). Fintechs tend to be start-ups, but that is not always the case (Collins, 2018). Established businesses might also be engaged in activities that count as fintech business.

Two independent studies commissioned by the German Federal Ministry for Economic Affairs and Energy and the European Banking Authority came to the conclusion that the business models of the current fintech landscape can be segmented into the following 4 clusters (Dorfleitner, Hornuf 2016)

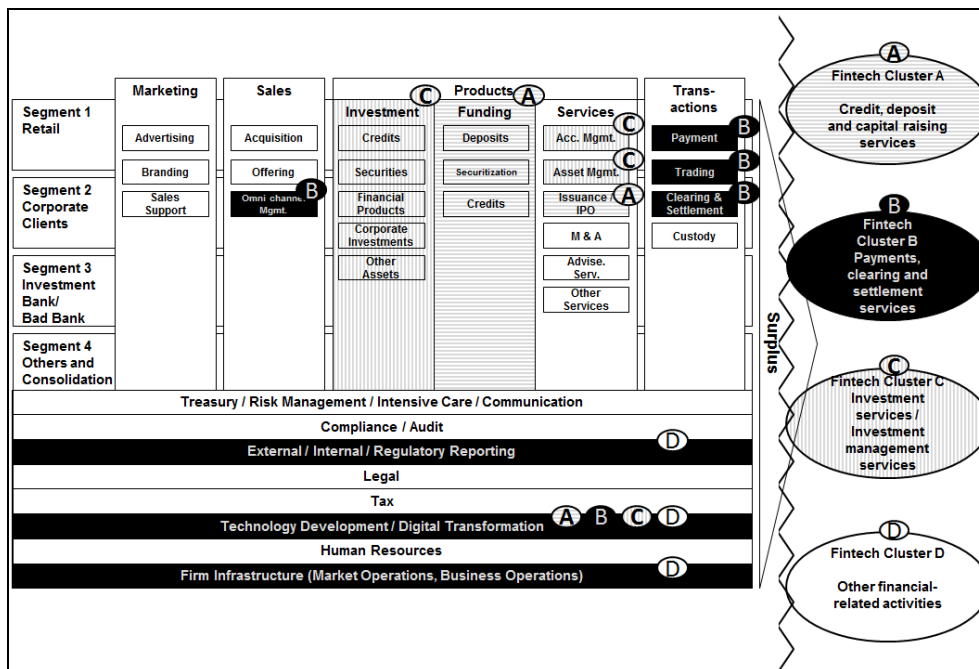
- A: Funding (credit, deposit and capital raising services)
- B: Payments (payments, clearing and settlement services)
- C: Investment (investment services/investment management services)
- D: Others (other financial-related activities).

The disruption of the business model of a classic universal banks is triggered by the fact that fintechs have previously occupied individual components of the banks’ value chain in a more customer-oriented and efficient manner (BCG Carsten Baumgärtner et al., 2018).

The following overview is intended to clarify the effect of the fintech clusters (A to D) on the banks’ value chain.

Central challenge for the universal banks’ business model is represented by the fintech cluster B. Among other things, this fintech cluster aims at the payment transactions of the banks (Cortina, et. al., 2018). As an entry-product they represent the most important communication interface to the customer and thus the basis for further products (Staykova & Damsgaard, 2015) . In addition, blockchain-based technologies are used, for example, to enable apart from cryptocurrencies with other applications (Catalini 2017b).

Figure. 1. Impact points of the fintechs in banking services for clients.



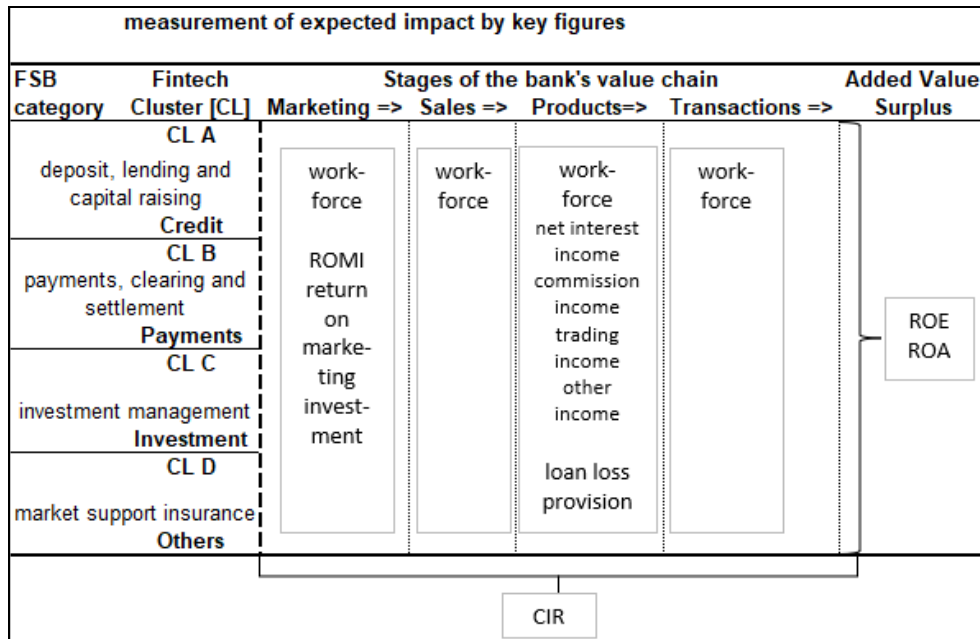
Source: Own elaboration

How can one measure the degree of change in the business model of universal banks under the constraint that gap free historical time series of financial data are available for exchange-traded universal banks, however hardly at all for fintechs (Demertzis et al. 2018)? For this reason, the approach of analyzing the mutual influence on the performance of the universal banks’ and fintechs’ populations could not be pursued any further. Nevertheless, how can one measure the disruptive nature of fintechs on classic business models and the effects on finance democratization?

One method is to analyze the financial changes in the business models of universal banks for which the external data are available. The hypothesis for this is based on the consideration that listed universal banks are subject to a high pressure to adapt to changes in the environment in order to be able to meet investors' yield expectations (positive price development and dividends). Changes in the business model must therefore positively influence the performance.

Figure 2 illustrates the relationship between fintechs, the links in the value chain, and the key figures used, which are modeled as dependent variables (Y), with exception of ROMI (Return on Marketing Investment). ROMI is mentioned in current literature (Asiedu 2016) but does not serve to study the overall model.

Figure. 2. Measurement of expected impact by key figures.



Source: Own elaboration

#### 4. Proposal of a model of analysis of the fintech effect on the change and democratization of banking financial services

Based on the above evaluation, both performance-specific and risk specific-ratios were selected with the intention to express the banks' business models. In relation with dependent variables of the model, among other things, they are expressed through the design of the 4 typical yield pillars: net interest income, commission income, trading income, other income (McKinsey, Poppensieker, Thomas et al., 2017). As performance is usually generated with the asset side (Gentry & Shen, 2010), indicators were selected so that reflect the asset side of the balance sheet and the income situation. Return on equity, on the contrary, reflects a part of the banks' funding in relation to income. Mixed indicators have been used, taking into account both the balance sheet and the income statement. The use of the cost-income ratio reflects the expectation that the income situation would be reduced by lower cost pressure and increased use of fintechs' optimization of the value chain. Among others, one of the strongest cost drivers is the current workforce (BCG Messenbock, 2017). This involves the fact that the analyzed banks continuously reduced full-time positions in the years of the study period (2010-2017) (around 300,000 in Europe). The trigger here could also be an increased use of new technologies by fintechs.

On the other hand, the explanatory variables have been chosen to represent a business model that is subject to a disruption process. Internal indicators can be influenced by the companies themselves. [FT] (Fintech adoption time) because it is up to the companies to adopt the new technologies (fintechs). Often a so-called incubator route is chosen, in which good ideas of the fintechs are identified and catalyzed, with the aim of integrating them into the existing value chain. The model uses a simple linear learning curve. An approach based on the beginnings of this branch of research -triggered by aircraft construction (Wright 1936)-. [BM] (Business model in sense of reinvestment rate), due to de fact that reinvestment rate expresses how much of the income after tax has been reinvested in the companies by themselves. Depending on the design of the national stock corporation laws, the management can, without the consent of the shareholders,



retain up to 50% of the earnings (eg. §58(2) German Stock Corporation Act). [NPL] (Non performing loans) because allocating the reinvested funds into the digital design of, for example, the core banking business, the NPLs would have to be reduced.

The external view of the listed companies is best expressed by the evolution of the stock price (Demirgüç-Kunt & Huizinga, 2013). [SP] (Share price) and eventually, the market is always right (Schredelseker, 2015). The price-to-book ratio was chosen as an indicator illustrating very well the interaction between a company's own view on share value based on external reporting figures and market acceptance. At a price-to-book ratio below 1, the market expresses that it does not believe in profitability (ie. the business model). If the price-to-book ratio is above 1, the market is still convinced by the performance of the company. There are only a few European bank stocks whose price-to-book ratio is above 1. [CDA] (Digital accessibility of the customer). This indicator is an attempt to account for changing customer behavior. Statistics on the digital development status of a country are provided by the European Commission<sup>3</sup>.

The more fintechs could unfold their disruptive character and the banks reacted through cooperation, the better the key performance indicators (KPIs) of the banks would have to develop over the observation period and vice versa. The more successful the transformation of banks' business models through digitization (e.g. through cooperation with fintechs), the better their performance and cost situation would have to be.

Hypothesis 1: The disruptive nature of fintechs on the business model is already high. Necessary changes have been made and this has a positive effect on the earnings and cost situation, as well, as customer experience.

Hypothesis 2: Although the disruptive nature of fintechs on the business model is evident, the earnings and cost situation evolve sideways.

Hypothesis 3: The disruptive nature of fintechs on the business model is not yet apparent. Necessary changes may not have been addressed, the earnings and cost situation develop negatively, as well as the in satisfaction of clients.

The disruptive potential of the fintechs in this context is not understood in the sense of the destruction of classic universal banks that has already taken place, but in the sense of a positive transformation of the business model that has already taken place.

With this approach it can be identified the separate effects on performance caused by growing regulatory requirements, fintechs and changing customer behavior.

In relation with the sample used for this research, data come from Refinitiv (former Thomson Reuters Eikon) (key ratios, income, balance and segment) and market specific data have been collected from Bloomberg. The choice of the period, beginning of 2010 to the end of 2017, post subprime crisis to today, is justified by data availability and the search for relative calm before economic exogenous shocks (e.g. subprime with subsequent sovereign debt crisis). In addition, the external annual group reports (IFRS) from 2010 to 2017 have been screened for the key word fintech (248 IFRS group financial statements in total). The external financial reports could be used as a valid source because of its consistent language (IAS/IFRS) and the obligation of the auditors to sign the group financial reports. Concerning the customers' accessibility statistical data from the EU commission's homepage are added. The combined data set is an unbalanced panel observation of 31 banks over an eight years' period on a quarterly basis starting from the beginning of 2010. The data panel is unbalanced due to the fact that the banks did not start at the same time their digital transformation process. Thereafter, in 2017, the observed average fintech experience was one year.

The analysis of the 31 universal banks is based on 9 ratios reflecting the performance, the cost situation and the riskiness of the loans, the banks' core business. The 6 profitability ratios contain, besides ROE and ROA after taxes, the four pillars of the yield as a percentage of total assets (net interest income, loan loss provisions, net commission income, net trading income and other net incomes). The operational performance is expressed by the cost income ratio and the total revenue per employee and the riskiness by LLP (loan loss provisions). The more efficiently the core banking business (retail banking as bulk business) based on fintechs can work, the lower the LLP would have to be. For this study, performance in the wider sense is understood as a set of dependent variables that are regressed by a combination of independent variables reflecting the particular business model and its transformation.

The dependent variables are modeled by a set of 5 independent variables:

- [FT] as a dummy variable indicates the time from which the banks have announced their digitization,
- [BM] the reinvestment rate per total assets as a sign of the banks' will to transform,

<sup>3</sup> <https://ec.europa.eu/digital-single-market/en/policies/scoreboard> (as of 01/01/2019).



- [SP] the market opinion, a reliable value expressed by the price-to-book ratio,
- [NPL] the volume of non performing loans represents a view of the risk aspect,
- [CDA] the customers’ digital accessibility marked by the use of the internet for online banking.

To prepare the data for the multivariate regression analysis with Excel Anova (Roland Pfister et al., 2013), all X and Y variables were represented as percentages.

Appendix IV shows the result of examining the X variables’ multicollinearity by a simple correlation matrix. For this purpose, the average of all explanatory variables of all 31 banks was calculated. Most X variables show zero to low multicollinearity, one variable shows average multicollinearity and one variable medium to high multicollinearity. Thus, no limitation on the accuracy of the model can be seen at this point except in terms of the variable combination [FT] to [CDA]. Both are highly positively correlated with 0.75, which is due to the fact that the digital learning curves of the examined banks and the citizens of a country are rising at a similar rate. The average negative correlation of -0.52 between the variables [FT] and [NPL] could underline the fact that, as technology advances, the core business of banks is actually less risky. However, bank regulation also has a strong effect on this position [NPL] (CRR, CRD IV, Basle IV).

The multivariate regression analysis was chosen as a method to test the common linear relationship between multiple independent variables and one metric dependent variable. This analysis examines the impact of fintechs on the income and cost situation of the universal banks surveyed. The calculations are made out for the entire set of banks, all over all observation points in time. The aim is to identify possible relationships between the cooperation with fintechs and the banks’ overall performance. The following Box I shows the multivariate regression equation with 5 regressors used in this article.

Table. 2. Applied regression equation

$$y_n = \alpha + \sum_{t=1}^{31} \beta_j FT_{i,t}^j + \sum_{t=1}^{31} \gamma_t BM_{i,t} + \sum_{t=1}^{31} \delta_t SP_{i,t} + \sum_{t=1}^{31} \theta_t NPL_{i,t} + \sum_{t=1}^{31} \omega_t CDA_{i,t} + \varepsilon_{i,t}$$

y dependent variables	x independent variables
profitability ratios	$\alpha$ regression constant
Pre Tax ROE	$\beta$ slope coefficient of characteristic FT
Pre Tax ROA	FT internal characteristic: fintech adoption time
Net interest income/Total assets	$\gamma$ slope coefficient of characteristic BM
Loan loss provisions/Total assets	BM internal characteristic: transformation of business model by reinvestment rate
Net commission income/Total assets	$\delta$ slope coefficient of characteristic SP
Net trading income/Total assets	SP external characteristic: share prices expressed by book-to-market-ratio
Other net income/Total assets	$\theta$ slope coefficient of characteristic NPL
operational performance ratios	NPL internal characteristic: A high degree of disruption by fintechs should enable a low NPL volume
Cost income ratio	$\omega$ slope coefficient of characteristic CDA
Total revenue/Employee	CDA external characteristic: customers’ digital accessibility
	$\varepsilon$ random disturbance term

The subscripts i and t are indexing banks and time in quarters. Source: Own elaboration

Excel Anova was used for its simple and almost intuitive use. Its reliability towards R or SPSS has been positively analyzed (Keeling, Pavur 2007).

The study is structured in such a way that 9 Y variables per each bank were modeled by the 5 X variables. The model was thus calculated 279 times, with a 95% confidence level (Shinmura 2015). The choice of the confidence level of 95% corresponds to prevailing literature opinion (Chatfield, Collins 2018). The model as a whole was expressed by the F-criterion whereby it was not accepted 78 times and 201 times accepted (see annex table II F-test for overall significance).

Table. 3. Conclusion on the hypothesis.

Hypothesis	Dis-ruption	Fintech experience time [FT]	Rein-vestment Rate [BM]	Price to book ratio [SP]	Non performing loans [NPL]	Customers' digital accessibility [CDA]
<b>H<sub>1</sub></b>	high	High	high	high	low	high
<b>H<sub>2</sub></b>	medium	Neutral	neutral	neutral	neutral	neutral
<b>H<sub>3</sub></b>	low	Low	low	low	high	low

Source: Own elaboration.

## 5. Conclusions

At the end of the Nineties, the popularization of the Internet and its arrival in households allowed for better access to financial information. On-line banking emerged and led to the reduction of costs of transformation and distribution of financial products and services while increasing competition among financial entities and allowing for greater negotiation margins for customers.

The technological revolution enhanced by the introduction of new disruptive technologies, provided an entry to new competitors based on financial platform systems. Many of these still followed the philosophy of collaborative economy for which more direct relationship and agility between:

- companies and investors (B2C)
- companies and other companies (B2B)
- specific users (C2C)

all together known as peer to peer (P2P) were typical features.

This growing interrelation between the users of financial services, boosted in the last ten years by the fintech solutions and, more recently, by the bigtech, is causing an unprecedented disintermediation that is beginning to threaten the traditional business model of banking and that has created the demand for innovation in its activity and improve the customer experience currently required by society. There are the foundations of the process of growing financial democratization. It forces us to rethink the traditional banking model under the new name of Bank as a Service (BaaS) in parallel to developments in other sectors of business such as transport, accommodation and even education. The growing disintermediation of business activities allowed by the new technologies resulted in the rapprochement between the users and the businesses and eventually leads to the growing democratization of many services including, as in our case, the financial services.

Other issues, such as the financial exclusion of many banks and their office networks caused by their withdrawal during the financial crisis, may become replaced by technological solutions, which will facilitate access and competition between financial entities and consequently improve the resulting conditions and prices for the users.

The analysis conducted in this investigation, leads to the conclusion, that from the economic point of view, the business models of some of the 31 universal banks surveyed already have been strongly affected by fintechs.

For the larger majority of these banks, a minor or medium impact on the business model is apparent. On the one hand, this may be due to the fact that the technologies used by fintechs are still quite young and partly unproven (Casey et al., 2018), on the other hand the influences of the low-interest phase and bank regulation compensate for the possibly positive effects of a fintech investment. An indicator of this could be

the seemingly low significance of the X variable [SP]. The market honors a good business model as a whole. Thus, from a market perspective, the return potential of universal banks does not seem to depend solely on the orientation towards digital processes. This aspect remains to be explored in further academic investigations.

Therefore, the process of financial disruption has already begun; it is generating important changes in the traditional model of banking. Both the bank and the new competitors, mainly fintechs, but soon also the bigtechs, are creating a new digital-based financial ecosystem that tends to democratize financial services for users.

Although, it may be too early to analyse the amplitude of the process with a trajectory of several years, the analysis carried out already shows this tendency and this may be the object of a more precise measurement in the immediate future.

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