

## FINANCIAL TECHNOLOGIES (FinTECH), INSTRUMENTS, MECHANISMS AND FINANCIAL PRODUCTS

**Otilia MANTA, PhD Lecturer**  
Athenaeum University, Bucharest, Romania  
otilia.manta@rgic.ro

„FinTech not only transforms the financial services industry but also enables financial inclusion and the opportunity to help more than 2 billion people around the world who today have no access to financial services.” - Henry Arslanian

**Abstract:** *The holistic approach to the phenomenon of expansion of financial innovations and current financial technologies, as abbreviated as FinTech, knows very specific elements and adapted to the global financial context. Moreover, this new funding instrument has mainly emerged from the need to streamline the funding system, a technology-based system, or to provide financial services tailored to the current needs of consumers (especially those in need of funding, this is also the real reason for the coupling of fintech to the financial inclusion of those excluded financially), as well as the design of new, reliable financial products that respond to the market. Our personal experience in integrated consulting for small farmers in Romania (over 15,000 small farms benefiting from our services) as well as the design of a unique microfinance model in the Romanian market, the microfinance model „Microfinance anTreprenor (MIT)” in 2017 with applicability in the Microfinance Micro-Enterprises (MSM) developed in the Romanian market and promoted the concept at European level through the European Microfinance Network (Brussels) under project ID 135486. The financial space is dual, presenting two often contradictory hypostases: the totality of entities, collection flows, on the one hand, and all entities, channels, stocks and placement flows, and in the current context of digital financial technologies, it is in the virtual space.*

**Keywords:** *financial technologies (fintech), financial inclusion and sustainable development*

**JEL Classification:** *G23, I22 si M21*

## **Introduction**

The advancement of financial technologies includes robotic financial transactions, payments made through non-cash encrypted platforms, crowdfunding financial platforms, financial advice, technical and robotic assistance through virtual space, and last but not least virtual coins so developed lately. „The value of FinTech’s global investment in 2015 increased by 75% to \$ 22.3 billion. Corporate, venture capital and private equity firms have invested more than 50 billion dollars in nearly 2,500 FinTech companies globally in 2010” (Karakas and Stamegna, 2018). However, financial technologies (FinTech), although rapidly growing in the virtual space, have positive stances in particular related to the rapidity of financial services (adapted and flexible) to the many financially excluded, but also to risks, such challenges be especially the data and consumer protection, the risk of increased financial volatility, and the alarming increase in cybercrime). Risks in particular attract the attention of financial services regulators, and at the level of the European Commission a The Financial Technology Task Force (FTTF), which together with the European Parliament’s Committee on Monetary Affairs (ECON) produced the report on FinTech published in January 2017. At the global level, G20, the Financial Stability Board (FSB) presented the report on FinTech in July 2017. Global and European concerns have been transposed into discussions/themes/conferences and regulatory initiatives at national level.

As a result of the extensive use of FinTech, the authorities dealing with financial services regulation may face a dilemma: one based on very clear but limited rules, regulatory frameworks clearly lay down the compliance obligations of institutions involved in financial technologies, but they are often costly from the perspective of a start-up society and could be an obstacle to innovation and job creation; the principle-based financial regulation is more flexible, but it could create some uncertainty about what is exactly expected from the point of view of the compliance of those using the services of Fintech institutions.

Figure 1 Representation of Financial Technologies (FinTech)



*Sursa: Karakas and Stamegna, 2018 (Financial technology (FinTech): Prospects and challenges for the EU, EPRS)*

***Definition of concepts according to Financial Technology (FinTech):***

*Prospects and challenges for EU, EPRS, Cemal Karakas, Carla Stamegna, 2018:*

**Blockchain:** a decentralised digital ledger of economic transactions that can be programmed to record financial transactions (and more) by allowing digital information to be distributed but not copied or changed. Data packages, ‘blocks’, are stored in a linear chain. This technology was originally devised for the digital currency Bitcoin, but today presents other potential uses.

**Crowdfunding:** the use of capital from several individuals (via social media and specialised websites) to finance a business project. It allows start-up companies to raise money without giving up control to venture capital investors. In return, it often offers investors the opportunity to acquire an equity position. Critics of crowdfunding argue that funds may, for instance, be used for different purposes than those initially disclosed, or that tax laws governing e-commerce are not clearly defined, e.g. in the case of cross-border funding.

**Distributed ledger:** a database that is consensually shared and synchronised across multiple sites, institutions or locations. It allows transactions to have public witnesses, making cyberattacks more difficult.

The participant at each node of the network can access the recordings shared. Changes or additions made to the ledger are copied to all participants.

**Peer-to-peer (P2P) lending:** a method of debt financing without the use of an official financial institution as an intermediary. It can also be described as ‘social lending’.

**Robo-advice:** covers a broad spectrum of services, but essentially involves replacing face-to face investment advice with online, automated guidance and execution. It does not involve actual robots, but rather relies on algorithms or online offerings to invest money. Potentially, robo-advice could deliver financial advice in a more cost-efficient way, making it affordable for a wider range of investors and reducing the financial advice gap.

**Robo-trading:** a form of automated stock trading. The best known kind of robo-trading is algorithmic trading, also referred to as algo-trading and black box trading, which is a trading system that utilises advanced and complex mathematical models and formulas to make high speed decisions and transactions in the financial markets. Algorithmic trading involves the use of computer programs and algorithms to determine trading strategies for optimal returns.

**Virtual currencies:** digital representations of value, issued by private developers and denominated in their own unit of account. They can be obtained, stored, accessed, and transacted electronically, and can be used for a variety of purposes, as long as the transacting parties agree to use them. The concept of virtual currencies covers a wider array, including internet coupons, airline miles, and crypto currencies such as Bitcoin.

The *process of globalization* inevitably leads to the reconsideration (conceptual reconstruction) of the paradigm of growth and economic development, and especially in financial technology (Fintech). The challenge, on the one hand, of the depletion and / or deterioration of resources (especially natural) and, on the other hand, of our optimization model - maximizing the objective functions of economic actors - is likely to require a radical change the options and the means by which we address this important activity of the individual and society: economic activity.

At the same time, it is obvious that economic activity can no longer be regarded in itself as a mode governed by a distinct rationality distinct from others, rationality based on a consistent and sufficient logic. Logic and economic rationality must accept, under the pressure of global problems, a permanent and fundamental communication with the other logic of individual

and social behavior (praxis). In addition, they must accept the possibility and desirability of re-evaluations, repositions, or even refunds, in light of the new paradigms of the economic process (including paradigms, for the time being, academic, such as the entropic model).

***Sustainable development*** (or growth) is a direct function of resources of the same category, ie sustainable resources, inclusive financial resources. The subject of this study is the research of a special resource, namely the financial technology (FinTech). Studying this resource from a sustainable development perspective will lead us to the proposal and the conceptual, methodological and technological development of what we will call a sustainable financial resource. For its part, the concept of a sustainable financial resource will generate some considerations about the sustainable sources of financial resources, including Fintech - our ultimate goal, on the other hand. As we develop more broadly at the right time, the financial sources for sustainable development are more sustainable financial sources for development. This is not just a game of words but an emphasis on an extremely important idea, namely the idea that points to the depth of the sustainability feature. Since, as will be demonstrated, the financial resource (and, as a consequence, the source of the FinTech resource) is one of the foundations of any economic process, it is natural that our attention goes to ensuring this foundation in terms of sustainability in order to be able to speak with some justification and confidence about sustainable economic processes (systems).

The ***methodology of the paper*** will have as direct instruments the collection of data and information from the literature and from the existing practice in public and private institutions, but especially scientific articles published on specialized research networks (Research Gate, Academia.edu, etc.), articles published in different journals, relevant books in the field of reference, legislation, analyzes and studies, official documents of various tax bodies, tax documents and interactive database of the Federal Banks and Central Branks, other relevant sources identified at the libraries: CCFM, Academia Romanian, INCE, IEN, BNR, National ad International Library, INS, etc. Moreover, in the methodology we will analyze the documents using the comparative, analytical, descriptive method, nonparticipative and participatory observation, the use of a set of informational sources, the collection of financial data in the established databases. Also, the paper will be based on annual reports, publications, consolidated statistical data provided

by the Federal Banks, the European Central Bank (ECB), the International Settlement Bank (BRI), World Bank, CGAP, CFI, the European Commission, OECD, published annually, data to be processed in order to be able to provide a general and analytical picture of the most important changes taking place in the globally - considered representative for the understanding of the phenomena studied.

In order to test digital technologies at national level, we analyzed the capacity of their financing at the balance sheet level of the Romanian companies active on 31 December 2017. Especially in the context of current reports (Nicolescu, 2018) when about 80% of respondents in the survey self-finance. From this result we can deduce that a large number of SMEs in Romania are financially excluded and therefore do not access loans from financial banking institutions, being thus potential direct beneficiaries of FinTech financial solutions.

Starting from the analytical and predictive capacity of the theoretical methodological tools of production functions, in the present research we used one of the most used forms, namely the Cobb-Douglas production function, formulated in 1928 by American economist Paul Douglas, along with mathematician Charles W. Cobb. We used this function in its homothetic form and in the non-embedded technical progress, pursuing analytical and predictive purposes regarding the contribution of capital and labor factors to economic growth.

The existing statistical information in Romania raises a series of problems regarding the availability of data necessary for calculating the Cobb-Douglas production function, especially for the capital production factor, with its usable variants - total fixed assets, fixed assets, gross investments - chronologically convenient as a number of observations or in a territorial profile. The greatest theoretical-methodological and practical interest in using the Cobb-Douglas production function at macroeconomic level is, in our opinion, the possibility to analyze the quality of Romania's economic growth, in terms of the ***intensity of the use of capital and labor factors***, as determinants for level and structure of production and GDP.

In the analysis we started from the known form of the Cobb-Douglas production function:

$$Y = A * K^{\alpha} * L^{\beta},$$

$$\text{with } \alpha, \beta > 0$$

where:

$Y$  - output;

$K$  - the capital production factor;

$L$  - the labor factor;

$A, \alpha, \beta$  - constant.

Parameters  $\alpha$  and  $\beta$  measure the proportion of total output that is generated by capital and labor. These two constants, in a certain sense, can also be assimilated to sui-generis elasticity coefficients.

If  $\alpha + \beta = 1$ , the production function has a constant return to scale; for example, doubling the consumption of each factor, production will double.

Constanta is not just a simple proportionality factor of economic significance that is more difficult to establish but can provide information on the full **efficiency of the factors of production**.

If the sum of exponents equals the unit ( $\alpha + \beta = 1$ ), the Cobb-Douglas production function is linearly homogeneous, indicating constant returns to scale. If  $\alpha + \beta > 1$ , the function expresses rising returns, and when  $\alpha + \beta < 1$ , the scale yields are decreasing.

The logarithmic transformation of the function  $Y = A * K^\alpha * L^\beta$  is frequently used in econometric analyzes, both for the estimation of the output function exponents and for the deepening of the analysis. Thus, by logging this function you get:

$$\ln Y = \ln A + \alpha \ln K + (1 - \alpha) \ln L$$

Note that, with a one-percent increase in capital or labor, production  $Y$  increases with only  $\alpha\%$  or  $(1 - \alpha)\%$ , i.e. by less than one percent, since  $\alpha < 1$ ; Instead, the increase by one percent of the total productivity factor (parameter  $A$ ) ensures the  $Y$  production also increases by 1%.

Economic decision makers should consider this specific growth potential when assessing the likely impact of different economic policy measures.

The available statistical data on the Romanian economy do not allow the establishment of appropriate chronological series to perform analyses based on the *Cobb-Douglas production function*, which has led us to use the cross-section analysis method. In the absence of chronological data series we have an interesting substitute for them, adopting the working hypothesis that each company integrates into a group with a similar technological process. Moreover, using the balance sheets of all active companies in the real economy, the results are representative and can effectively serve decision-makers.

**The Cobb-Douglas model**, in its variant based on cross-sectional analysis, it is less or not applied in Romania. The cross-sectional analysis was completed with the introduction of analytical elements in two main directions:

1. Determining the Cobb-Douglas model parameters based on the cross-over method for several years and comparing the results obtained for different years;
2. Using chronological series (with a sufficient number of terms) for labor and capital production factors as well as for output.

### Research results

Specifically, in order to estimate the parameters of the Cobb-Douglas production function for Romania's economy, the balance sheet data for the companies in some sub-branches of Romania's agriculture for the period 2008-2016 was used. In order to be conclusive, the sub-2016 have at least 200 active companies (**see appendix no. 1**).

To estimate the Cobb-Douglas function parameters, the following were used:

1. the turnover achieved;
2. the value of fixed net assets;
3. labor costs (including contributions and tax).

The statistical analysis of the three data strings reveals a homogeneous distribution of the values of the statistical series terms, a conclusion validated by the values of the multiplication coefficients (**see annex no.2**).

Estimating the Cobb-Douglas production function parameters is typically done using the smallest square method.

For the 12 sub-ranges selected from the agriculture of Romania, the results can be found in appendix no.2.

Image of the evolution of the two parameters  $\alpha$  and  $\beta$  from the Cobb Douglas production function and is illustrated in the following graphs.

What is of particular interest is the results obtained from the application of the model and the conclusions of economic policy that can be deduced from the analysis of the parameters of the production function. In this respect, the preliminary conclusions that can be highlighted from the application of the Cobb-Douglas production function with two factors - labor and capital - for the romanian economy refer mainly to:

1. the labor factor has a significantly higher contribution than the capital in obtaining the total results (turnover);
2. the significant contribution of the labor force to the economic growth in the current stage of development of Romania, supports the positive economic evolutions of the last years;
3. natural population growth is negative in the last 20 years, and the migration process is significant for Romania, with integration into the EU structures. In this respect, in the future, there will be a significant problem for the firms in the analyzed sectors, in the direction of rising labor costs, as the rarity of this resource rises.

The alternative appears to be: investment in fixed assets that ensure a significant increase in labor productivity and technical provision of labour.

### **Relevance of the two parameters of the production function for Romania in agrozootechnical sector**

From the point of view of the strategy of sustainable development of the Romanian economy, the magnitude of these parameters offers elements of substantiation of the decision in support of the promotion of a high rate of gross fixed capital formation, under the conditions of their high efficiency.

The experience of countries with strong economic start-up and lasting performance in the economic growth process (e.g. Japan, China, Norway) recorded a high rate of gross fixed capital formation over long periods, but this rate was accompanied during the respective coefficient periods sensitively raised micro and macroeconomic efficiency. Practically, it means the accumulation of new generations of technological breakthrough, strongly marked by cutting-edge technologies and the IT impact.

The agricultural sectors representative of our model (which recorded in the balance sheets of each economic agent turnover, total assets and wage costs) and reflected in the graphs and annexes below are: Cultivation of cereals (excluding rice), leguminous plants and plants oilseeds; Cultivation of vegetables and melons, roots and tubers; Growing grapes; Cultivation of fruit, berries, strawberries, nuts and other fruit trees; Breeding of dairy cattle; Pig farming; Bird breeding; Activities in mixed farms (plant culture combined with livestock breeding); Ancillary activities for crop production; Forestry and other forestry activities; Forestry and Marine Aquaculture and in Sweet Waters (Manta and Dimitriu, 2018). This data-driven information can lead us

to sizing the Fintech services market in Romania. This model can be adapted to market sizing and other states, with a downward trend relative to active business indicators.

Starting from the clear and detailed analysis of the situation of the companies that are active in rural Romania, and in conjunction with the needs and opportunities in financing agriculture, we can state that the current financial instruments and mechanisms of digital financial technologies correspond to those in real need of financing, i.e. microfinance, thus contributing to financial and economic inclusion at national and implicit European level.

Banking rules and regulations often make for what financially, impossible to access credits / microcredits or other financial products needed to operate their business. Let us not forget that the process of financial inclusion is extremely important to the macroeconomic stability at the level of each state and has a direct impact on social programs. “Lack of official identification, guarantees and credit histories; difficulties with the execution of the contract; and the high cost of serving geographically dispersed customers is just a few of the innumerable obstacles to smallholders and formal financial inclusion. Incapacity to access official financial services affects the efficient operation of agricultural value chains, as producers may not be able to maximize yields, and buyers might try to ensure an adequate supply of agricultural products. Financial services do not only allow small investors to invest in their farms, they can help reduce liquidity constraints making it difficult for buyers to pay farmers on delivery and force small-land owners to sell their crops at lower prices in exchange for a payment faster “(CGAP, 2018).

Moreover, the applicability of financial innovations to the financing of agriculture using blockchain technology solutions appear to be particularly relevant for small non-bank farmers. The need to disseminate information between several parties - including between the public and the private sector, between competitors and between different industries - means that both transparency and shared control are important and direct features of financial pollinizers. The disintermediation tool can also help overcome barriers to agricultural and rural funding as business partnerships can be implemented when there is no third-party mediation that directly influences the small entrepreneur (Gheorghe, 2013). Last but not least, the use of these innovative technologies has a direct impact on verifying the identity of small owners, a particularly important aspect for each of the small entrepreneurs / small farmers and the identity of their business.

Also based on these new digital technologies, small farmer identification data, such as a birth certificate, can be written in the registry and signed with a client cryptographic “key pair” (consisting of a public and private key). “This helps to prove that the data belong to an individual holding the appropriate private key. In turn, this key pair can be used to prove customer identity when opening a financial account or performing a transaction. Such applications open the door to creating self-sovereign identities, in which individuals choose when and what data they want to share with other parties. However, while these technologies can help in authenticating, managing identity and controlling users, it is not enough as an independent solution to demonstrate identity. Indeed, a digital identity based on digital technologies still depends on a “reality” ID to which it is linked when it is created (Yaga et al., 2018). Therefore, the lack of formal identification may remain an obstacle in certain contexts.

In order to achieve the financial inclusion of many people in need, microfinance can be functionalized using tools and mechanisms that are tailored to the small farmer, and “collateralization of assets such as land, animals, cars, stored crops, or even payments to small owners for pledged or delivered products could allow small owners access to funding for inputs, working capital and post-harvest liquidity “(CGAP, 2018).

Current digital technology helps us to create microfinance programs for financially excluded, i.e. to create mechanisms for financial inclusion by creating digital records of these assets on a distributed (for example, land registers, movable property registers, deposit bills, invoices), financial service providers (Specialized Microfinance Enterprises) may be subject to collateral-based loans. The main features of this system are transparency (the ability of multiple parties to view assets on the registry); partial control (ability of competing financial institutions to use the electronic register) and disintermediation (ability to use smart contracts to automate transfer of ownership of assets in case of non-payment without VAT third party intervention), which would make the entire financing mechanism secured in terms of microcredit reimbursement.

Policing the phenomenon of financial inclusion is trustworthy actors that ensure the smooth operation of the funding mechanism and their role is essential - even in a system designed to operate without third party intermediation. The CGAP found that on average only 5.5% of the small owners of the six markets surveyed had a smart phone (Christen and Anderson, 2013).

FinTech, is a more and more used term by financial services users, that is companies using technology-based systems, either to offer them or to try to make the financial system more efficient. Initially, with regard to technology applied in previous versions of consumers and consumers established trade financial institutions. Today, „FinTech „s interpretation has expanded to include any technological innovation in the financial sector, including literacy and financial literacy innovations, retail banking, improved investment or offices (eg back - office functions). FinTech’s expression has also become synonymous with emerging financial services in the 21st century. In this context, FinTech covers a wide range of services and products such as cashless payments, peer-to-peer (P2P) credit platforms, robotic trade, robo-counseling, crowdfunding and virtual platforms, and is expected to will continue to expand in the coming years.” (Karakas and Stamegna, 2018).

In Europe, on the one hand, attention is paid to the potential contribution that FinTech could make to increase efficiency, strengthen financial integration and strengthen European Union institutions as a significant actor in global financial services; on the other hand, the need for clear, safe and effective regulation to support financial innovation, also protecting end-users, implicitly financial inclusion. Indeed, although there is more and more regulation in the field of financial services defined at European or international level, there are areas where Member States can choose to apply individualized or less stringent rules at national level (as an example we can mention crowdfunding and virtual coins). All this can lead either to environmental fragmentation impeding cross-border business expansion or a difference between financial operators, encouraging companies to obtain permits less restrictive jurisdictions to reduce regulatory burdens in service worldwide. It should also be noted that, in general, business FinTech models may not be within the regulations and licensing procedures Routine surveillance conducted by national regulators, as these rules are designed for financial services classical and by type of financial institutions (such as banks).

The interconnection of finance and technology is not a new phenomenon, it has begun since the 1860s, when the first transatlantic cable for telegraph was installed, the communications launched the first era of financial globalization, allowing for rapid transmission of financial information, ie transactions and payments throughout world. Moreover, technological progress, such as the telex, the introduction of credit cards, portable and ATM machines in the 1950s

and 60s, and the transition from analogue to digital in 1970, contributed to the speed of financial globalization (Gheorghe, 2012).

Increasing accessibility of the Internet to the Internet, introducing mobile phones, online banking and trading in the 1980s were still important financial innovations. In addition to these innovations, the global financial crisis of 2008-2009 has led to the establishment of the financial framework and the development of information technology as we know it today, and we had a direct impact on FinTech. Indeed, the post-crisis funding gap, increasing the distrust of clients (clients) in classical financial institutions and following RegTech regulations.

RegTech means „regulatory technology.” It was created to address regulatory challenges in the financial services sector following the emergence of innovative financial technologies. RegTech consists of a group of companies that use technology to help businesses comply with regulations effectively and inexpensively. Using technology to comply, due to the fact that regulation is well established but with a growing focus on data, which makes reporting consistent. Based on data processing, RegTech allows companies to integrate compliance requirements into business processes, improve corporate governance and management.

*FinTech today comprises five major areas, for which Arner et al. suggest the following topology:*

(1) Finance and investment such as alternative financing mechanisms, particularly crowdfunding and P2P lending, but also robo-advisory services;

(2) Operations and risk management to build up better compliance systems (i.e. RegTech);

(3) Payments and infrastructure, such as internet and mobile payment systems, and infrastructure for securities trading and settlement and for over-the-counter (OTC) derivatives trading;

(4) Data security and monetisation to enhance the efficiency and availability of financial services (through the use of ‘big data’), to better exploit the monetary value of data, and to tackle cybercrime and espionage;

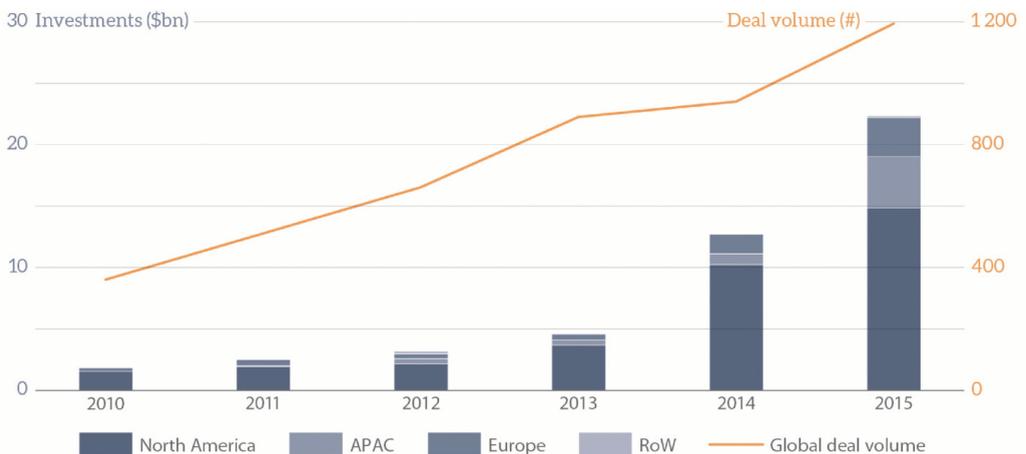
(5) Customer interface such as online and mobile financial services.

### **Economic prospects and challenges according to analysts, the value of global FinTech**

According to analysts, FinTech’s global investment in 2015 increased by 75% to \$ 22.3 billion. Corporations, venture capital firms and private equity

firms have invested more than \$ 50 billion in nearly 2,500 FinTech companies globally since 2010. This trend was driven by a relatively moderate increase in the FinTech sector in the United States (the world’s largest), which received \$ 4.5 billion in new funding (a 44% increase); a rapid growth of China’s FinTech sector, which grew by 445% to \$ 2 billion, as well as in India (\$ 1.65 billion), Germany (\$ 770 million) and Ireland (\$ 631 million US). In Europe, FinTech’s total investment doubled, rising by 120% between 2014 and 2015, with the number of transactions rising by more than 50%. In recent years, an increasing number of newly established businesses have raised capital directly instead of equity on peer-to-peer (P2P) loan platforms. P2P financial solutions for small businesses have seen significant growth, due to the fact that for many financial exclusions these financial services are the most affordable and provide real support for their sustainable development in the short, medium and long term.

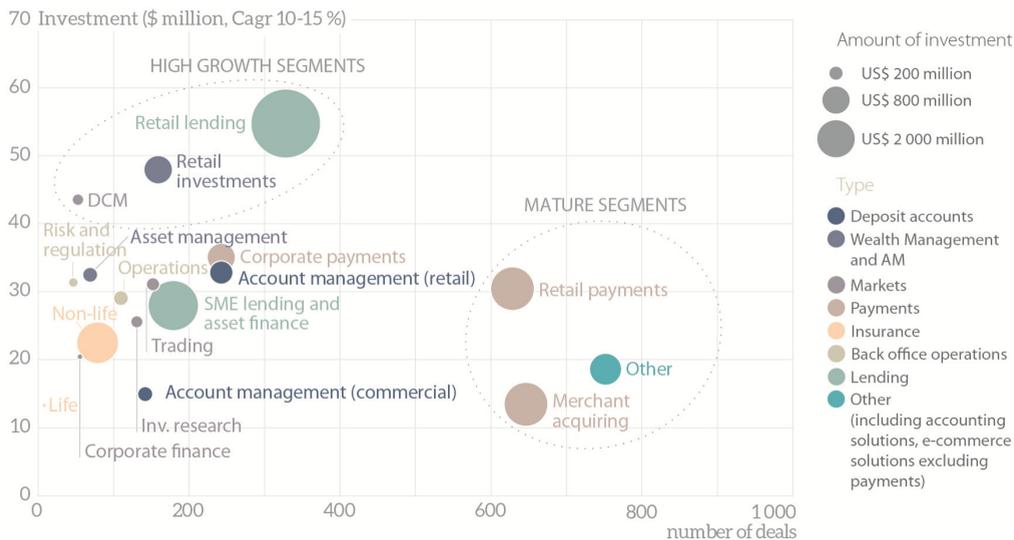
Chart no. 1. Global FinTech financing activity (2010-2015)



Source: Accenture, *Fintech and the evolving landscape: landing points for the industry*

In 2012, the number of P2P financial services operators rose from ten in 2010 to 11 in 2015, with annual growth of 61.8%. Moreover, there was a potential increase in channels including student loans and securitization of P2P credits. In 2020, industry revenue is projected to grow by 19.2% per annum to \$ 1.7 billion.

Figure 2. Global FinTech financing activity by product segment, 2010-2015



Source: Accenture, *Fintech and the evolving landscape: landing points for the industry*.

In Asia, which is expected to account for 60% of the middle class by 2030, the market is growing fast, with rapid growth in FinTech and P2P.4 Since the late 1970s, China has, for example, from a mono-banking model to more than 80 banks and over 2,000 financial platforms that offer P2P loans. Unfair financial and capital markets have created opportunities for innovative alternative financial services; more, and the lack of physical banking infrastructure and less stringent data protection, as well as competition contributed to these developments. Consolidating China’s position as one of FinTech’s most important nations is already confirmed globally today: by the first quarter of 2012, there were € 1,089 billion recorded in China’s third-party market and e-commerce market accounts.

As far as Europe is concerned, new technologies can also help to overcome barriers still hampering the full integration of financial market infrastructures, which is one of the factors on which capital market success depends. Possible benefits (DLTs) applied in the securities markets are listed in a consultative document of the European Securities and Markets Authority (ESMA). While consulting stakeholders on the potential benefits of DLTs, ESMA stresses the key risks associated with this FinTech technology and underlines that firms willing to use DLTs should be aware of the existing

regulatory framework at EU level (ESMA, 2015). The European Central Bank (ECB) also looks at possible DLT applications for post-trading activity. Recognizing at the same time the improvements that this technology could bring to different stages of the post-trading process, the ECB concludes, however, „Regardless of the technology used and the market actors involved, certain processes that feature in the post-trading securities market will still need to be carried out by institutions” (ECB, 2015).

In addition to their growing prospects, FinTech firms may pose threats to the profitability of traditional banks as a result of the opening of new financial markets and new financial options. The changes brought about by the digitization of financial markets, more FinTech firms provide services that have historically been the main business of commercial banks and a great source of earnings.

Moreover, by using remote control of financial services distribution channels, they have contributed to lowering the costs of accessing, distributing and managing financing sources (the costs borne by banks ,customers at the time of change), with a direct impact on banks’ oligopoly, as well as their profits. Banks are actively reacting to these challenges, either by trying to reproduce FinTech firms’ models (ie by setting up online lending platforms) or outsourcing some of their business processes to FinTech to take advantage of their greater efficiency.

### **FinTech financial technology regulations at EU level**

The Single European Act (1986) and the Maastricht Treaty (1992) established the framework for establishing a single market for financial services in the European Union and one an increasing number of directives and regulations on financial services.

However, no single general legislation covers all aspects of FinTech. FinTech companies that provide financial services (for example, loans, financial advice, insurance, payments) should comply with the same legislation as any other firm that offers this service. Therefore, depending on the activity carried out (for example, payment services, crowdfunding, etc.), different laws, such as Directive 2000/31 / EC (electronic commerce), Directive 2002/65 / EC (distance marketing of consumer financial services), Directive 2009/110 / EC (electronic money), Directive (EU) 2015/2366 services), etc.( Karakas and Stamegna, 2018). However, the Payment Services Directive (PSD) deserves a closer look. PSD I (2007/64 EC) was adopted in 2007, introduced more EU

competition in the EU payment market and established the legal basis of the Single European Payments Directive (SEPA).

While SEPA has managed to harmonize the card and the bank-bank payment card, mobile and online payments have remained fragmented. In July 2013, the European Commission announced a new financial regulation package including the updated Payment Services Directive (Directive (EU) 2015/2366), called the so-called PSD II, which repealed PSD I, and a proposal for a regulation on interchange fees for card payment transactions (Regulation (EU) 2015/751). Michel Barnier, The Commissioner for the Internal Market and Services, at that time, justified the new rules by, inter alia, in fact, that the fragmented rules of the EU payment industry create costs more than 1% of EU GDP or € 130 billion a year. According to Barnier, the implementation of PSD II could stimulate the European economy, as the proposal wants „Promote the digital single market, making Internet payments cheaper and safer, both for retailers and consumers. The proposed changes to interchange fees will remove an important barrier between national payment markets and ultimately end the unjustifiably high level of these charges.” PSD II entered into force on 12 January 2016. The deadline for implementation in national law is 13 January 2018. The new directive is designed to respond to the technological changes in the payment industry (Gheorghe, 2012). Its purpose is to make payments and money safer and less expensive transfers. At the same time, they are also addressing differences in the implementation of PSD I by Member States that are perceived as being distortion of competition.

Under PSD II, the definition of payment services was as well as the diversity of traditional payment service providers (PSP), such as banks and financial institutions have increased. Account information service (AISP) as well as providers of payment initiation services (GIS) (eg e-commerce payments) are all classified as third party service providers (PSCs) in PSD II.

Under the new directive, payment service providers are subject to the same rules as other payment institutions. Against this background, some experts argue that PSD II will balance the field and that FinTech's start-ups could make a disproportionate use of traditional payment stakeholders.

They also think this could be an „essential change” towards creating an open banking system. However, there are criticisms of PSD II. Serge Darolles of the Banque de France notes that access to bank account information raises the question as to who should pay for the infrastructure needed for such interconnectivity. The most important issue is security, because sharing and using customer identification details increases the threat of cyber attacks. If a

payment service provider is hacked, it can unintentionally propagate the attack on all its customers' banks. Thus, banks require stricter security regulations for newcomers, and raise concerns about the authentication systems they use. Since PSD II has some technical issues, stakeholders are awaiting clarification from the European Banking Authority (EBA) on the processes and data structures of communication between the parties (in line with Article 98 of the PSD II).

### **Data and consumer protection**

Some experts argue that the current EU legislation on data protection, competition and consumer protection is clearly devoid of its definition of „big data”, creating a on the spot, to be addressed. Here, the European Supervisory Authority (EFA) on Financial Issues is currently assessing FinTech's specificity, namely the application of the General Data Protection Regulation (GDPR) and/or other general provisions to consumer protection rules. With regard to data protection (in the sense of „protection of personal data”), the current Legal Framework is established by Directive 95/46/ EC on the protection of individuals with disabilities in relation to the processing of personal data and the free movement of such data . This will be replaced by Regulation (EU) 2016/679 on the protection of the environment of individuals with regard to the processing of personal data and the free movement of persons such data (General Data Protection Regulation). While the regulation entered into force on 24 May 2016, it is applicable from 25 May 2018. Its implementation is a key priority for the Commission. The website of the Directorate-General for Justice and the Consumer Commission provides more information and a useful overview of EU data protection reform.

Globally, the International Consumer Protection Organization (FinCoNet) is working on emerging consumer risks in the field of payments, and has recently published an online and mobile payments report. The report focuses on how regulators and supervisors address emerging risks, especially security risks, and keep up with the pace of innovation. FinCoNet also provides a forum for supervisors to engage and learn from others about how best to meet their challenges. In this context, FinCoNet identified (i) the digitization of high-cost credits and (ii) the practices and tools needed to support risk-based surveillance in a digital age process as two of its priority themes for the period 2017-2018 (Brummer, 2014).

In most countries, a consumer protection framework that can rely on the internal market (national / national codes), regional (European) directives

or international standards (OECD / G20 Principles) is already in place. Even when such frames are present, the OECD / G20 high - level principles on financial consumer protection, developed by the G20/OECD Task Force on Financial Consumer Protection clearly sets the key to consumer protection. The G20/OECD Action Group has identified FinTech is one of the key areas for review.

**FinTech’s laws and challenges for regulators**

In general, there are two FinTech rules - based rules and rules basic principles. Rules-based rules create clear rules and processes, compliance obligations are clearly established, but this may limit the incentives for the supervised entity to do more because the obligations are perceived as sufficiently comprehensive. From a start-up perspective, this approach is often costly, as every rule and process needs to be identified and respected. Model-based principles are flexible, but could create a level of uncertainty as to what exactly compliance is expected to be.

Some experts argue that regulators should remain technologically neutral and concentrate on the outcome of technology.

Table 1. Regulations based on regulatory regimes

Rules-based regulatory regimes		Principles-based regulatory regimes	
Potential positives	Potential negatives	Potential positives	Potential negatives
Certainty and predictability, including with respect to future enforcement	'Check-box' forms of compliance that strategically evade the underlying purpose of the regulation	Executive-level management involvement in incorporating regulatory principles into business models	Uncertainty and the risk of unpredictable post hoc application or arbitrage
Clear communication of steps for compliance	High internal costs of compliance	Flexibility and innovation in the face of 'rapidly changing environments'	Concerns over fairness/bias in application
Ensures specific behaviour	Deterrence with respect to innovation	Speed in the regulatory process	Inadequate deterrence of specific problematic behaviour or activities
Uniform treatment of regulated entities	Frequent disconnect between the purpose of the regulation and the actual regulatory outcomes Obsolescence	The centrality of guidance and evolving norms/best practices	Over-reliance on current norms and practices

Source: (Brummer and Gorfine, 2014)

## Conclusion

As can be seen from the data of annex no.2, in most cases,  $\alpha + \beta < 1$  which means the existence of decreasing yields. Moreover, with a one-percent increase in net fixed assets or labor costs, turnover increases by a%, respectively b%, i.e. by less than one percent. Instead, the increase by one percent of the total productivity factor (parameter A) ensures the increase of the turnover by more than 1%. Economic decision makers should consider this specific growth potential when assessing the likely impact of different economic policy measures.

- From what we know, for the first time in Romania, the calculation of the Cobb-Douglas model at the level of the significant sub-sectors of Romania's agriculture provides conclusive results that check all the usual statistical tests.
- The most dramatic conclusion resulting from the application of the model refers to the particular importance of capital (the technological level of machinery and equipment) that needs to be granted for economic growth, given that labor is becoming a rare resource for Romania.
- The contribution of unprompted technical progress (management and institutional efficiency of the economy) is still a factor with a very modest contribution to output growth, which is a challenge for the smooth functioning of our market economy in the future.
- Finally, but not least, the Cobb-Douglas production function could be a very useful tool for substantiating decision-making at different levels of economic aggregation, combining the static and dynamic analysis of the factors of influence considered, based on the hypothesis constant or variable substitution elasticity; of our research shows that the main part of this substitution is the cost of labor, supported by a higher technical endowment.

From the point of view of the sustainability of agricultural production in Romania, in the medium and long term, there is the problem of rising labor shortages and deficit coverage by measures to increase the capital contribution to the turnover. Or, this entails building an appropriate strategy to provide sub-sectors of long-term interest (agricultural sub-sectors with eco-production, for example), responsibilities for making important investments in agriculture (private investment, state aid, co- financial mechanisms to provide support to trigger an appropriate investment process. Further, the strategy should be

implemented consistently, irrespective of electoral cycles, in the economic policy mix, given the strategic importance of agriculture.

Financial health globally is an increasingly important phenomenon and has a direct impact on financial inclusion. Thanks to technological innovation, FinTech could bring banking services as close as possible to people as small entrepreneurs or small farmers, and as close as possible to their needs, contributing actively to the global financial inclusion of many non-bankers. At the international level, in April 2016, the G20 Financial Stability Board (FSB) began examining the potential risks that FinTech might pose to global financial stability. The FSB is currently conducting a mapping exercise focusing on the impact of digitization and FinTech on the banking sector and its possible implications for the banking sector, which is closely monitored. At the same time, there are attempts at the EU to collect the links between FinTech, information and data, and to explore how FinTech companies can tackle cross-border issues, such as taking over financial services and financial inclusion. In its first CMU status report, the Commission foresees a comprehensive assessment of European retail investment markets, including distribution channels and investment advice, in its CMU action plan by the end of 2018. The evaluation will there is a need to rely on expert input and take into account “whether retail investors can have access to products that are cost-effective and fair and whether the potential offered by the online services and other technologies that services have to offer (FinTech) are exploited The representatives of the European Commission have expressed their objective of understanding FinTech and its players better and assessing its impact on the banking and non-banking financial institutions sector and the financial services sector respectively of its current players.

## References

- Accenture. (2016). *Fintech and the evolving landscape: landing points for the industry*. Available at: [https://www.accenture.com/t20161011T031409Z\\_w\\_/us-en/\\_acnmedia/PDF-15/Accenture-Fintech-Evolving-Landscape.pdf](https://www.accenture.com/t20161011T031409Z_w_/us-en/_acnmedia/PDF-15/Accenture-Fintech-Evolving-Landscape.pdf).
- Brummer, C. and Gorfine, D. (2014). *FinTech: Building a 21st-Century Regulator's Toolkit*. Milken Institute – Center for Financial Markets.
- Christen, R. and Anderson, J. (2013). “Segmentation of Smallholder Households: Meeting the Range of Financial Needs in Agricultural Families. Focus Note 85. Washington, D.C.: CGAP, April. Available at: <http://www.cgap.org/>

- sites/default/files/Focus-Note-Segmentation-of-Smallholder-Households-April-2013.pdf.
- ESMA. (2014). *Press release, Investment-based crowdfunding needs EU-wide common approach*. European Securities and Markets Authority, ESMA/2014/1568, 18/12/2014.
- ESMA. (2015). *Automated Trading Guidelines: ESMA peer review among National Competent, Authorities*, ESMA/2015/592, 18 March 2015.
- European Central Bank. (2015). *Virtual currency schemes – a further analysis*, February 2015. Available at: <https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemesen.pdf>.
- European Commission. (2016). *Capital Markets Union: First Status Report*, SWD(2016) 147 final, Brussels, 25 April 2016. Available at: [https://ec.europa.eu/info/system/files/cmu-first-status-report\\_en.pdf](https://ec.europa.eu/info/system/files/cmu-first-status-report_en.pdf).
- Karakas, C. and Stamegna, C. (2018). *Financial technology (FinTech): Prospects and challenges for EU*. European Parliamentary Research Service (EPRS).
- Manta, O. and Dimitriu, M. (2018). *Impact of the using Cobb-Douglas production function to determine the structure of production factors and the sustainability of the agricultural sector in Romania*.
- Nicolescu, O. (2018). *Carta Albă a IMM-urilor din România, 2018*, ediția a XVI-a, Consiliul Național al Întreprinderilor Private Mici și Mijlocii din România (CNIPMMR).
- Radu, Gh. (2012). *Methods and techniques of social research*. Bucharest: ProUniversitaria Publishing House, ISBN 978-606-647-561-7.
- Radu, Gh. (2017). *General Sociology*. Bucharest: ProUniversitaria Publishing House, ISBN 978-606-26-0722-7.
- Yaga, D., Mell, P., Roby, N., and Scarfone K. (2018). "Blockchain Technology Overview." Draft NISTR 8202. Gaithersburg, Md.: National Institute of Science and Technology, U.S. Department of Commerce, January.

**Annex no.1****Number of firms in agriculture in 2008 - 2016****which meet the conditions for determining the Cobb-Douglas function**

No. crt.	Subsectors of agriculture	Period								
		2008	2009	2010	2011	2012	2013	2014	2015	2016
1	Cultivation of cereals (excluding rice), leguminous plants and oleaginous plants	3638	3603	3808	4071	4305	4556	4761	5222	5507
2	Cultivation of vegetables and melons, roots and tubers	274	280	304	350	381	378	367	391	435
3	Growing grapes	106	106	122	138	150	147	156	190	194
4	Growing fruit of berries, strawberries, nuts and other fruit trees	88	89	101	113	117	129	142	176	217
5	Breeding of dairy cattle	362	361	358	379	363	364	361	356	372
6	Pig breeding	158	203	236	274	296	272	291	293	294
7	Bird breeding	275	289	313	336	354	379	380	389	386
8	Activities in mixed farms (plant culture combined with livestock breeding)	536	552	557	591	619	627	649	681	716
9	Auxiliary activities for crop production	742	740	922	1197	1271	1265	1252	1230	1076
10	Forestry and other forestry activities	1232	1075	1022	1006	908	868	809	779	741
11	Forest exploitation	1228	1354	1447	1596	1689	1775	1828	1984	2041
12	Marine aquaculture and freshwater (321 + 322)	211	236	253	262	276	303	311	311	333
13	Total 1-12	8850	8888	9443	10313	10729	11063	11307	12002	12312
14	Total companies in agriculture	9835	9763	10297	11178	11594	11953	12242	13003	13399

*Source: own processing*

## Annex no.2

**Evolution of the parameters of the Cobb-Douglas function for some sub-sectors  
of Romanian agriculture in the period 2008-2016**

No crt.	Subsectors of agriculture	variable	Period								
			2008	2009	2010	2011	2012	2013	2014	2015	2016
1	Cultivation of cereals (excluding rice), leguminous plants and oleaginous plants	A	3.503355	3.142805	3.910642	4.074577	4.123317	4.233467	4.351747	4.295940	4.070652
		$\alpha$	0.269352	0.272219	0.254042	0.282997	0.298516	0.309074	0.293882	0.253938	0.255526
		$\beta$	0.578863	0.602622	0.573380	0.544053	0.519323	0.497604	0.503639	0.546969	0.565031
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.766547	0.779036	0.760644	0.767691	0.771068	0.781150	0.778675	0.790400	0.799040
2	Cultivation of vegetables and melons, roots and tubers	A	2.436544	1.883064	2.450426	2.471397	2.750117	3.169149	2.430731	2.158436	3.320117
		$\alpha$	0.219743	0.256507	0.266858	0.285863	0.172113	0.186825	0.170336	0.154885	0.161084
		$\beta$	0.679135	0.685827	0.625878	0.600952	0.705980	0.656617	0.739084	0.785656	0.671591
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.700926	0.726046	0.656892	0.726003	0.695711	0.716214	0.720009	0.752571	0.742566
3	Growing grapes	A	2.392759	2.582836	3.502915	2.588047	1.190263	2.032747	1.562855	2.872166	2.151918
		$\alpha$	0.081389	0.044069	0.100635	0.140219	0.011801	0.191150	0.183983	0.122553	0.108900
		$\beta$	0.798604	0.827594	0.696108	0.714892	0.985731	0.707561	0.742807	0.717629	0.788263
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.736705	0.741183	0.760141	0.691066	0.702276	0.754673	0.799688	0.776608	0.819126
4	Growing fruit of berries, strawberries, nuts and other fruit trees	A	2.374139	2.978044	3.530354	3.865454	4.130157	4.649408	4.962325	3.289892	3.207984
		$\alpha$	0.113226	0.090040	0.339975	0.219003	0.083878	0.039245	0.084432	0.058040	0.083374
		$\beta$	0.782938	0.724150	0.404934	0.513990	0.642437	0.647724	0.550886	0.739158	0.709978
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.650478	0.666831	0.693044	0.705171	0.651256	0.595805	0.601513	0.609416	0.633171
5	Breeding of dairy cattle	A	3.331285	2.601502	3.669957	3.053176	2.888068	2.979584	2.026778	1.896132	1.851829
		$\alpha$	0.278963	0.304162	0.345343	0.254872	0.251597	0.222484	0.190816	0.233280	0.255339
		$\beta$	0.556815	0.578152	0.437362	0.611180	0.624408	0.653482	0.781474	0.734544	0.702822
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.766330	0.786609	0.751651	0.788743	0.790780	0.787557	0.822965	0.834312	0.804027
6	Pig breeding	A	1.519984	1.677368	2.407314	2.699576	2.398304	3.501806	2.680236	3.023193	2.528730
		$\alpha$	0.367902	0.486112	0.400810	0.219192	0.335196	0.303675	0.237418	0.302782	0.193244
		$\beta$	0.644210	0.503439	0.539659	0.750424	0.640379	0.599265	0.737615	0.625802	0.789763
		$\alpha + \beta$	>1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.827592	0.807704	0.797661	0.787018	0.759258	0.763128	0.773065	0.759161	0.804566
7	Bird breeding	A	3.047636	3.003382	3.364928	3.523115	2.279362	1.341092	2.405400	1.772141	1.931592
		$\alpha$	0.260984	0.135266	0.201215	0.186883	0.147702	0.126296	0.126173	0.052565	0.102308
		$\beta$	0.658638	0.813702	0.694707	0.705156	0.858114	0.948334	0.869768	0.999281	0.924289
		$\alpha + \beta$	<1	<1	<1	<1	>1	>1	<1	>1	>1
		R	0.855934	0.826673	0.828454	0.781087	0.821482	0.806556	0.831777	0.852176	0.869961

## Annex no.2 - continued –

**Evolution of the parameters of the Cobb-Douglas function for some sub-sectors  
of Romanian agriculture in the period 2008-2016**

Nr crt.	Subsectors of agriculture	Variable	Period								
			2008	2009	2010	2011	2012	2013	2014	2015	2016
8	Activities in mixed farms (plant culture combined with livestock breeding)	A	2.764225	1.728132	2.487053	2.285855	3.058836	2.187890	2.335240	1.882091	2.188075
		$\alpha$	0.218919	0.258754	0.272044	0.213373	0.242791	0.214695	0.271824	0.186147	0.253572
		$\beta$	0.674360	0.711472	0.636812	0.735580	0.633587	0.742126	0.662557	0.794955	0.686388
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.749751	0.799107	0.760161	0.745319	0.733464	0.750872	0.786138	0.783564	0.792130
9	Auxiliary activities for crop production	A	2.616150	2.363838	3.030756	4.803998	4.895449	4.284594	3.896002	3.475820	1.960113
		$\alpha$	0.380473	0.325464	0.197000	0.177316	0.150695	0.190080	0.192824	0.184818	0.233449
		$\beta$	0.501114	0.584058	0.660610	0.506703	0.528193	0.537568	0.571769	0.607348	0.700365
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.701209	0.720815	0.646643	0.522841	0.547120	0.550565	0.582812	0.581394	0.647573
10	Forestry and other forestry activities	A	3.645020	3.462687	3.895880	3.706681	3.833022	4.183467	3.744406	3.940362	3.755674
		$\alpha$	0.260118	0.232481	0.228278	0.193797	0.230976	0.191238	0.143722	0.117104	0.108523
		$\beta$	0.577677	0.610245	0.579115	0.636290	0.585539	0.600445	0.686290	0.692726	0.714351
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.776865	0.784756	0.752763	0.781790	0.773606	0.775863	0.806315	0.788355	0.829097
11	Forest exploitation	A	3.117888	3.044019	3.252671	3.463774	3.248451	3.102388	3.021757	2.980746	2.187519
		$\alpha$	0.246246	0.232286	0.244850	0.191510	0.182757	0.191501	0.149097	0.162104	0.158310
		$\beta$	0.650494	0.660365	0.644690	0.684926	0.710921	0.719811	0.771990	0.760624	0.825641
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.823749	0.785400	0.796665	0.805819	0.785454	0.789368	0.808820	0.804317	0.819590
12	Marine aquaculture and freshwater	A	3.216120	2.547377	3.028152	3.401658	3.648661	4.111378	4.161632	4.171734	3.129802
		$\alpha$	0.225283	0.061814	0.134544	0.242304	0.160370	0.077330	0.077797	0.055169	0.016612
		$\beta$	0.580602	0.796138	0.678487	0.521950	0.596114	0.627863	0.622543	0.669984	0.800460
		$\alpha + \beta$	<1	<1	<1	<1	<1	<1	<1	<1	<1
		R	0.723352	0.645095	0.702384	0.610778	0.656898	0.592372	0.532784	0.598716	0.692872

*Source: own processing*

A - proportionality factor;

$\alpha$  - the elasticity of the turnover figure relative to net fixed assets;

$\beta$  - the elasticity of the number of factions in relation to the workforce;

R - multiple correlation coefficient.