

**DIGITALIZATION OF UKRAINE FINANCIAL INSTITUTIONS
AS A PLEDGE OF EFFECTIVE CREDIT ALLOCATION****Lynenko A. V., Ishchenko I. R.***Zaporizhzhia National University
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Key words:

efficient credit allocation, government regulation, financial markets, segmentation of credit in banks' loan, artificial intelligence, blockchain technology.

The article includes provided point of view, considering an ability of Ukrainian economy to become stronger obtaining competitive positions in differentiated markets worldwide, implementing the synergistic digital approaches in its finance and public sectors. As a main purpose of investigation, was taken a problem of credit allocation efficiency on external and internal capital markets conducting potential and alternative key patterns of processes' development. However, historical experience of Ukrainian economy transformation attests that it might be reasonable to root advanced hi-tech into the entire economy regulation process, according to which efficient allocation of credit is to producing a chance of significant rocketing of Ukrainian macroeconomics dynamic indexes. Following an object of strictly based structure of the article, the main accents are placed on different macro statements. First of all, their static and dynamic analysis, and on the other hand, modelling probable alterations as a result of banking sector digital reshaping. Efficiency and necessity of government intervention into capital market are proven by contemporary situation modelling and probability grounded analysis of retrospective influence of actual state of economy. Macro rates such as commercial bank's loans portfolio structure, dynamic segmental banks to households lending, current banks' securities portfolios, BOP structure and dynamic GDP growth rates are considered. From advanced technologies side it is briefly described usage of artificial intelligence (AI) with basically-structured neural networks and the blockchain technology. Furthermore, it is examined some of relatively-new economical agents such as fin-tech start-ups and their influence onto competitive-level and essential tendencies of shaping the Ukrainian financial services market. Having used a complex analysis approach of the mentioned performances there was formed a way of discovering some logical chains of causal links of deceleration the entire Ukrainian economic reproduction. As a result of investigation and modelling it had been formed an idealistic model of Ukrainian capital market functional covering AI and blockchain implementation.

**ДІДЖИТАЛІЗАЦІЯ УКРАЇНСЬКИХ ФІНАНСОВИХ ІНСТИТУТІВ
ЯК ЗАПОРУКА ЕФЕКТИВНОГО РОЗПОДІЛУ КРЕДИТНИХ РЕСУРСІВ****Линенко А. В., Іщенко І. Р.***Запорізький національний університет
Україна, 69600, м. Запоріжжя, вул. Жуковського, 66***Ключові слова:**

ефективність розподілу кредитних ресурсів, державне регулювання, фінансовий ринок, сегментація кредитних пулів у портфелях банків, штучний інтелект, технологія блокчейн.

У статті обґрунтовано, що на сучасному етапі розвитку української економіки, за часів світової глобалізації, синергічне застосування інноваційних технологій у фінансовому й державному секторах дає Україні змогу здобути конкурентні позиції на диференційованих світових ринках. За основну мету дослідження взято проблему ефективності сучасного розподілу кредитних ресурсів, можливі альтернативні напрями ключового розвитку процесів на внутрішніх і зовнішніх ринках капіталу як потужних драйверів сучасної економіки. Проте досвід еволюційних процесів трансформації української економіки доводить, що через постійну генерацію внутрішніх і зовнішніх перешкод доцільно запроваджувати революційні та передові технології разом із загальними регулятивними підходами. Випереджаючий досвід розвинутих країн світу, спираючись на який, розподіл кредитних ресурсів дасть змогу значно поліпшити динамічні показники зростання економічного потенціалу України. Для простеження чіткої структури статті, акценти розташовано на сталих економічних показниках, по-перше, на їх статистичному й динамічному аналізі та, по-друге, на моделюванні можливих змін із застосуванням новітніх технологій у банківському секторі. Доведено ефективність і необхідність втручання держави в економіку шляхом регулювання та стимулювання процесів зростання, впровадження новітніх технологій. Розглянуто такі

макроекономічні показники сучасного стану економіки, як структура кредитних портфелів банків, динамічні зміни сегментарного кредитування комерційними і державними банками домогосподарств, портфелі комерційних та державних банків у державних цінних паперах, структура платіжного балансу країни, показники динамічного зростання ВВП країни. Зважаючи на технологічні рішення, описано властивості й методи пристосування таких сучасних технологій, як технологія штучного інтелекту, із застосуванням елементарного рівня нейронних систем і технології блокчейн. Розглянуто вплив таких нових економічних агентів, як «fin-tech» компанії та стартапи, на рівень конкуренції й формування тенденцій українського ринку фінансових послуг. Комплексний аналіз наведених показників дав змогу простежити декілька логічних ланцюгів причинно-наслідкових зв'язків гальмування процесів економічного відтворення в Україні. Результатом аналізу та моделювання є ідеалістична модель функціонування ринку капіталу України із застосуванням технологій штучного інтелекту та блокчейну.

Statement of the problem

Since 2013, the GDP of Ukraine have not reached its peak of 183,3 billion US dollars [4], what have been caused by enormous amount of internal and external factors which are roughly influencing on deceleration the entire Ukrainian economic reproduction, turning Ukrainian overseas competitive positions less steady.

Trying to underline solely the basic economy issues of an government transformation processes, it might be reasonable to distinguish three main problems such as low diversity level of GDP allocation between different economic sectors, unsuited level of pure-supported demand, quite slightly rising households incomes and revenues in segments of micro and small business, total high level mistrust to the government and financial sector and uncertainty. Compilation of these indicators have been considered by John Maynard Keynes [2], John Stuart Mill and Joseph Alois Schumpeter [1], as key features of being in depression. It have become generally agreed trend of some of the resents years that weak annual economy growth is caused only by lack of sharply rising amounts of foreign direct or portfolio investments.

Nevertheless, paying an attention on fundamental theories of the Capitalism, it is possible to face a fact that the majority of necessarily needed recourses and subjects are already exist in Ukraine, namely, the government, the banks and the firms. Early of those, according to credit creation theory are «factories of a credit» [3], respectively having ability and the main object to allocate the credit among different economic agents and segments efficiently. The Government, in turn, being an efficient regulator of finance, commodities and labour is to ensure a versatility of diverse macroeconomics rates. Every mentioned subjects function for 29 years in Ukraine, herewith precisely due to inefficient synergy, Ukraine still have not been showing outstanding and rocketing increase paces in general annual growing fields of results. Evidences of mentioned above facts are low GDP-growth, external debt to GDP proportions, Budget deficit, negative balance of Current account of the balance of payments and significant number of different other demographic, social and policy affecting factors.

Analysis of recent studies and publications

Among the scientific investigations that cover a wide range of widely arguing themes as efficient credit allocation in different economies and systems, it is worth to mention significant work of Harvard University professor N. Georgy Makwin. Which describe fascinating theoretical and practical models of macroeconomics credit allocation in different systems and phases of economy cycles.

In general, it is widely agreed that to main and fundamental impact was made by John M. Keynes who explained different macro aspects and described some of predictable consequences depending on chosen patterns and approaches of capital markets functions [2].

Considering articles which completely describe modern probable approaches of markets governing and regulating processes using AI and blockchain technologies to would be properly to explore multiple and diverse practical opinions of Digital-implementations widely recognized consulting firms such as Deloitte, Mckinsey&Company and PwC analytical investigations [8].

Objectives of the article

The main purpose of an article is a proposing the model of the government, financial sector and firms of micro and small business segment efficient interaction, providing a model of rational credit allocation, considering lately as a main future driver of sharply rising amounts of goods and services release and consumption for internal markets simultaneously developing export total amounts. Discovered model exhibits the key way to maintain entire economics growth in regulative credit allocation among banks, corporate, medium, small and micro business segments, and the government and fin-tech start-ups. The model is to be based on theoretical macro and micro economics principles, supporting by regulative implementing hi-tech instruments such as AI and blockchain.

The main material of the research

The issue of efficient credit allocation in internal Ukrainian financial markets have being developed with quite an ambiguous direction. Being based on the last report of financial stability by National Bank of Ukraine

[5], it is possible to identify three the most impetuous trends, such as: consumer lending increase; banks' investment portfolios in Government bonds expansion;

poor corporate loans, given to micro and small businesses dynamic growth.

Table 1 – Dynamic analysis of Ukrainian banks' credit allocation segments

Portfolio type	2016	2017	2018	2019	01 March 2020	Dynamic growth, %
Total banks' consumer loans portfolios, mln UAH	74527	103026	135459	168942	174094	234
Total banks' corporate loans for micro and small business portfolios, mln UAH	222714	223993	223810	239306	247737	111
Total banks' investment portfolios in Government bonds, mln UAH	255465	360804	374742	334268	344294	135

Source: calculated by the author according to the data [4; 5]

Thus, the dynamic analysis conducted in table 1 exhibit enormous paces of growth in consumer lending, very steadily raise of banks' portfolios in Government bonds and, in comparison just 11% expanding in their corporate

loans portfolios given to small and micro businesses segments. For better displaying the core of investigating issue, it is mapped on the lineal graph (Fig. 1), showing mention problems in dynamic.

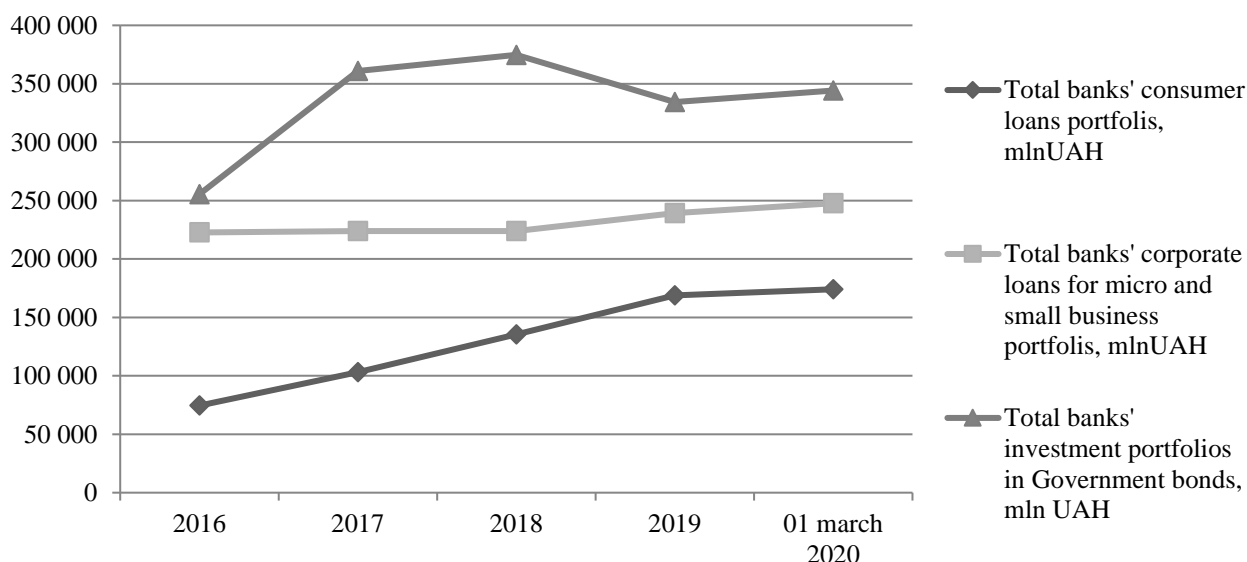


Fig. 1. Graphical dynamic analyses of main credit allocation directions

According to the National Bank of Ukraine late report [5], nowadays the majority of consumer loans given to individuals are short-termed and unsecured. Taking into account total lack of widely developed social loan programs, for instance, education loans or mortgages, it might be reasonable to face a conclusion that the consumer loans amount mentioned in the Table 1 in majority of cases is given for short-term consuming personal aims of Ukrainian citizens what steadily becoming a huge driver of entire demand macro-rates. Being based on social-survey results [4], it is clearly that the most followed by rising demand sectors of contemporary Ukraine economy are retail and tourist services (data was had been collected before COVID-19 spreads). Relying on microeconomics fundamental theory and «2nd Gossen principle» [1] which describes customer' constant rising desire of maximizing marginal utility by used goods and services, structure of Current account of the balance of payments in 2017-2019 years [4] and in parallel being agreed with lack some of an

average customer qualities such as rationality and patriotism in purchasing and consumption fields, it is effectually to consider an assumption that a significant share of demand supported by consumer lending is strongly directed into imported goods and services consumption, being chiefly concentrated at retail sector of economy. At the same time, simplification of circumstances of loan obtaining by an average Ukrainian citizen, it's extremely paces and amounts acceleration and, on the other hand, low paces of households' real income increasing and lack of loans' positive social impact lead an economy to entire domestic households' debt rising, shrinking a long-term perspective of solvent pure demand. What eventually affects the social stratification and might lead to distinguished by John Keynes «labour unions function of inflation firm's expenses» [2]. Looking on a problem from the banking sector side, galloping rebalancing supply of credit recourse into consumer lending is actually caused by high margin level of interest

rates, short-term assets turnover ratios, high diversity and low risks portfolios. In short-term period these credit expanding forming positive macro-effect rocketing banks' and retail merchants profits respectively, in contrast, such model likely could reach mentioned above consequences, not being generally favouring households business activity and creating competitive and widely recognized goods, services and brands respectively.

In brief, taking into account given probable negative consequences it might be logical to assume that currently shaped market situation should be regulated, as far as possible. Being realistic it is understandable that strict and

fast credit relocation by NBU into real business spheres is not able to maintain supply, demand and households' revenues in short-terms on an appropriate level. It might be an existed financial institution which will be able to partly replace banks' share in consumption lending credit market. On 31 December 2019 there are 196 fin-tech start-ups being stable functioning [7].

Fig. 2 exhibits fin-tech companies segmentation depends on its business areas. Amount of digital banks and consumer lending companies actually reach a point of 22 companies showing significant annual growth and business horizons expansion [7].

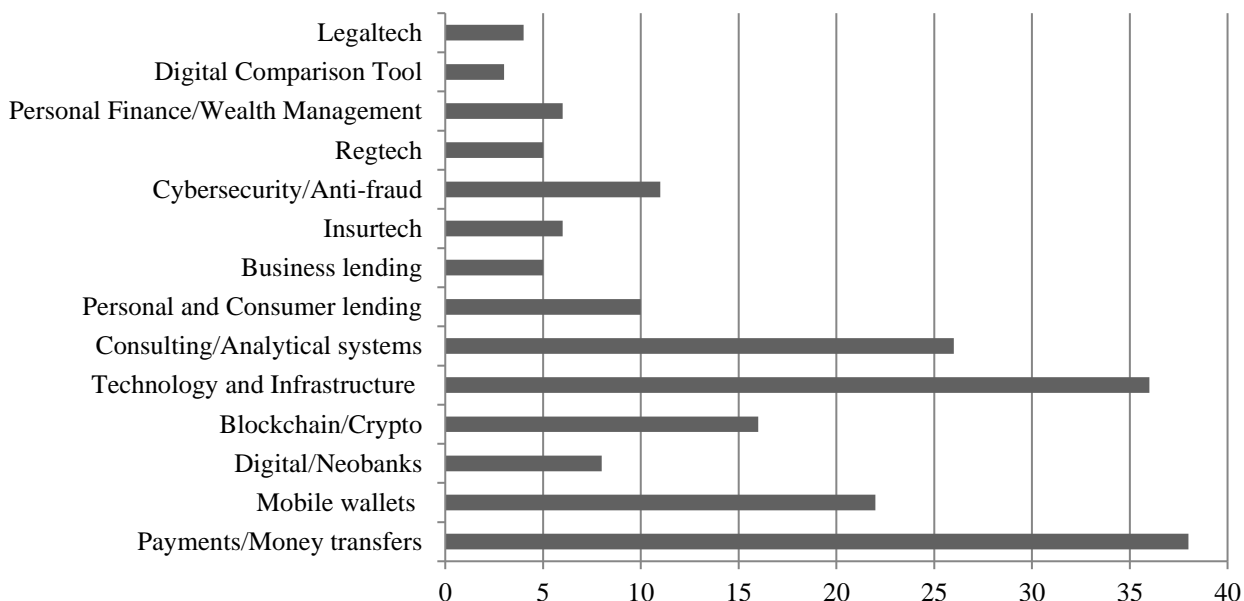


Fig. 2. Ukrainian fin-tech companies dividing by business segments, quantity

Having started in 2017, the fin-tech market have being shown reasonable differentiated growth, penetrating different segments of Ukrainian financial markets including consumer lending and micro businesses financing. 68% of start-ups analyzing loan applications using advance technologies such as Artificial Intelligence and blockchain [8]. AI is generally directed into debtor analyses immediately. Using simple neural networks patterns start-ups obtained a chance to run lending process more accurately, precisely and hedge their risks efficiently [6]. AI gives companies an ability to not only use huge databases, exploring its integral collocations, but at the same time, adopt processes for more short-periods decision making, what is positively affecting credit turnover ratios.[6] If the blockchain technology is considerable, it is a driving hi-tech based on equally of «info-blocks» technology which has an unique ability to maintain and structure complicated deals of lending fast and security [8]. Using blocks-developing infrastructure approach these tech-implementing may help to avoid some of bureaucracy affected processes in financial sector. The main effect of both technologies is based on improving securitization, risk management approaches and time limits per an average deal structuring. Agile and flexibility approaches give for mentioned companies an

opportunity to rival with banks in consumer lending markets [8].

Being lobbying and facing the legislation support by NBU, fin-tech companies are to become significantly influencing the market. In comparison, banks facing higher competition level will being bound to choose: become more agile and technological to continue conqueror for these market monopoly or to change the policy and allocate their assets into different market. Due to this reason, exactly at that moment efficient and rational step by step regulations of National Bank of Ukraine could move the entire economy forward, reshaping and strengthening banks' credit flows into micro and small businesses, including usage of advanced technologies introduced into loans structuring processes.

Conclusions

On the whole, there are few main problems existing in Ukraine credit allocation processes. Initially, weak dynamic growth of banks' loans portfolios in micro and small businesses segments what is being one of the factors of pure annual GDP growth rates. Secondly, last three years banks have significantly expanded their portfolios in Government bonds and Consumer lending markets. As it was proven by fundamental theoretical analysis, further expansion of lately factor may lead an economy to presumably frustration problems.

At the same time, data analysis have shown that necessity credit resources are already exist in Ukraine and with its effective allocation into real business economy sectors may lead it too fast and successful growth of micro and small business creating wide spectres of competitive national goods and services for internal consumption and its export-orientated competitive positions developing.

Shown analysis have proven that at present situation, regulator's interventions into capital markets competitive processes and legislation approaches is essential to efficient markets reshaping and reforming the credit allocation patterns. Motivating banks by different

reservations and taxation processes to redirect their credit into micro and small businesses financing, National Bank of Ukraine should introduce centrally modified and controlled technologies such as artificial intelligence and blockchain technology into the corporate lending sphere. Dividing both technologies into different segments of deal structuring, AI into firms' application secured analysis and blockchain to simplify legal-structuring and, in parallel, increase the quality of credibility rates and entire trust level. Precisely, complete digitalisation of credit allocation in different segments of economy, have a chance to become a main driver of total sustainable differential growth of Ukraine economy.

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