

# Russian Population in the Modern Financial Market: From Digital "Divides" to Digital Profiles

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## ABSTRACT

Digital financial technologies are changing the role of the population in the functioning of the financial market, changing the quality of the availability of financial services, expanding the range of possible financial instruments, replacing physical interaction with a digital profile. This paper focuses on the analysis of the current situation of digitalization in the Russian financial market: by studying the relationships, the authors try to determine the readiness of the population for digital transformation of the market and the use of digital profiles. Correlation analysis of macroeconomic indicators of digital activity of Russian households, volumes of deposits and credits of individuals and per capita income is used. The links between indicators of digital activity of the population and the volume of deposits and credits of individuals, as well as per capita income, are statistically significant, direct and very high. An interesting discovery was the presence of negative links between the digital activity of the population and the share of the population with per capita money income, equivalent to the level of the subsistence minimum. Based on the results of the correlation analysis, the authors make a number of assumptions about the presence of "digital divide", their overcoming on the eve of the implementation of the national institute of the digital profile of an individual and the possible risks of using a digital profile for the population and financial organizations.

**Keywords:** digital activity, deposits, credits, per capita income, risks, correlation analysis

## 1. INTRODUCTION

The functional capabilities of digital technologies create a new platform for human financial activity: support for making credit and investment decisions, the availability of financial products and services and their personification through the processing and analysis of big data, new types of investment assets, resulting from blockchain technology, and much more. At the same time, the movement of increasing volumes of financial activity into the virtual space leads to a change in the format of interaction: from traditional Business-to-Customer to Peer-to-Peer interaction and even Digital Identity Individual - Digital Identity Legal Entity. Under these conditions, the study of the problems of changing the participation of the population in the modern financial market, undergoing a digital transformation, becomes especially relevant.

This paper focuses on the analysis of the current situation of digitalization in the Russian financial market: by studying the relationships, we try to determine the readiness of the population for the digital transformation of the market and the use of digital profiles.

### 1.1. Related Work

Modern research focuses on two interrelated areas: the influence of digital technologies on the financial sector, including the development of the fintech industry, and the

interaction of humans and digital technologies. First of all, the range of innovations, included in fintech should be noted, namely: virtual currencies as innovations in payment systems, p2p lending as an innovation in the credit market, blockchain-based smart contracts as a cross-sector innovation in the financial market [1]. Early studies noted the influence of electronic finance (online banking, online brokerage, etc., the predecessor of fintech) on the structure and competition in financial markets [2]. In modern works, digital financial technologies are considered as a challenge to the fundamental provisions of the theory of financial intermediation, as they exacerbate the need for the existence of financial institutions [3]. The widespread digitalization of production processes, products and services led to the fact, that the statements of companies about the digital transformation led to the growth of their return on equity [4]. At the same time, there is an opinion, and we tend to support it, that retail segments of the financial market are more susceptible to digitalization, those, where a person is a consumer of financial services. While corporate segments of the financial market adhere to traditional instruments and mechanisms.

Studies of human interaction with digital financial technologies show two options for such interaction. The first one includes situations, when the population's demand for digital financial technologies outruns their supply. For example, social networks are used as platforms for interaction between a bank and a client [5-6] or in making

financial decisions [7]. The second concerns the opposite situations, when the supply of digital financial services to the population outruns the demand for them. The “digital divide”, arising in these cases, is associated not only with different levels of availability of technical devices and the Internet, but also with the presence of the minimum required level of digital competencies across the population [8]. Moreover, the formation at the national level of the institution of a digital human profile, based on the development and recommendations of international organizations [9], implies the presence of a minimum level of formed digital competencies across the entire population.

### **1.2. Our Contribution**

This paper presents some improvements, based on the analysis of data on the digital activity of the Russian population and its links with the level of household income and operations in the financial market. On one hand, our study, unlike other works, is not based on a survey of respondents, but on the analysis of macroeconomic data (systematized by the authors). This allows to get a more objective picture of the involvement of the population in the digitalization of the financial market. On the other hand, the study is pioneering in many ways, as it is an attempt to understand how the availability of the Internet for the population and its use for ordering goods and services affect the indicators of the volume of deposits and credits, that are important for the economy in general and financial organizations in particular.

### **1.3. Paper Structure**

The rest of the paper is organized as follows. Section 2 introduces the materials and methods used in this paper. Section 3 presents results, based on the correlation analysis of indicators of digital activity of the population, the volume of deposits and credits, as well as the income of the population. Then, the findings are discussed in Section 4. Finally, Section 5 concludes the paper and presents direction for future research.

## **2. BACKGROUND**

The information and empirical basis of the study are the indicators of population participation in the digital financial market, published by the State University - Higher School of Economics in the statistical abstracts Indicators of the digital economy (2017-2020) and Indicators of the information society (2010-2017) [10]. Among the various indicators, presented in these abstracts, based on the criterion of “indicativeness of population participation in the digital financial market”, we selected the following indicators of the population’s digital activity:

a) Internet access in households (as a share in the total number of households) as a whole, without taking into account the characteristics of households, methods and devices of access - as an indicator, reflecting the general opportunities for the population to participate in the digital financial market;

b) The use of mobile phones to access the Internet (as a share in the total number of households) as a whole, without taking into account the characteristics of households - as an indicator, reflecting the opportunity of the population to use mobile applications of financial organizations, as well as to receive financial services online;

c) The use of the Internet for ordering goods and services (in the total population of 15-72 years) - as an indicator, reflecting the use of modern payment services by the population (in particular, the interrelations between sales and the use of contactless payment technology are empirically proven in [11]).

Data availability and time coverage reflect the intensive development of information technologies and their consistent implementation in the financial sector. Data on Internet access of households are available from 2006 to 2019. Whereas the indicator “use of mobile phones to access the Internet” began to be calculated in 2011, since before that, Internet access was made mainly from personal computers, and there were also technical limitations for Internet connections of mobile phones. The values of the indicator “the use of the Internet for ordering goods and services” have been regularly published since 2013 (and, accordingly, the time series, we are analyzing, covers 2013-2019), before this value of that indicator was given according to the survey results as a share in the total number of respondents, which makes them incomparable with the subsequent time series. Of greater interest could be the indicator “use of the Internet for banking operations, but it was calculated only in 2011 and 2012, based on the results of a survey of respondents. Thus, there are limitations on the time series of the analyzed indicators, which is reflected in the results of the study.

The methodological basis of the study is the method of correlation analysis. Despite the simplicity of this statistical method, we use it for two reasons: firstly, the primary analysis showed a linear nature of the dynamics of the indicators under consideration, which indicates the applicability of correlation analysis; secondly, the small number of observations, especially for the indicators “use of mobile phones to access the Internet” and “the use of the Internet for ordering goods and services” make it difficult to correctly use other, more complex statistical methods. Note, that in the absence of values of any indicators for some years, we used the well-known statistical approach of filling unknown values with sample statistics of the corresponding variable (mean, median, etc.).

We also consider it important to point out certain theoretical positions of our study. By the digital profile of an individual - a client of a financial institution, we mean the totality of all available digital information about a

client. The amount of information in a digital profile is regulated by its sufficiency for the following operations:

- Checking the correspondence between the digital profile and a real person (identification),
- Recognition of the client's digital profile by the information systems of the financial institution (authentication),
- Obtaining permission to the digital profile of the client to perform transactions (authorization).

Information in the digital profile of an individual can be classified according to various criteria. First of all, in terms of the availability of information in the digital profile of an individual, there can be private and public attributes. In terms of information variability, the attributes of the digital profile of an individual include:

- a) Biologically set constants (for example, date of birth, biometric characteristics);
- b) Attributes, set by the state (for example, nationality, passport data, taxpayer identification number, etc.);
- c) Personal attributes, changing during lifetime (for example, medical data, behavioral characteristics);
- d) Attributes, arising from interaction with external structures and, accordingly, subject to related changes (for example, mobile phone number, email address, social media accounts, bank accounts, etc.).

The use of a digital profile of an individual takes place within a certain system, in which, in addition to the individuals themselves, whose digital profiles are being circulated, there are also organizations, that provide certain attributes of the digital profile (for example, financial

organizations, mobile operators, medical organizations, government bodies, etc.), and organizations, using digital profile information. The interaction between organizations, that generate certain attributes of the digital profile of an individual, and organizations, that use a digital profile, can be described by a number of parameters, the main ones are:

- a) type of interaction (centralized/distributed);
- b) the number of organizations, using the digital profile (one / many);
- c) the nature of information transfer (only recognition of the client's digital profile / obtaining permission for the client's digital profile to perform transactions).

Financial institutions participate in the system of using a digital profile of an individual, both as organizations, that generate certain attributes (if the individual is their client) and as organizations, that use the attributes of a digital profile (usually at the stage of acceptance for service).

### 3. RESULTS

The results of the analysis of correlations between indicators, reflecting the population's opportunities to participate in the digital financial market, with the dynamics of the values of the volumes of retail deposits and credits are presented in Table 1.

**Table 1** Matrix of correlation coefficients of indicators of digital activity of the population with indicators of retail deposits and credits

Indicators	Individual deposits	Individual credits
Internet access in Russian households	0.94*	0.91*
the use of mobile phones to access the Internet	0.98*	0.92*
the use of the Internet for ordering goods and services	0.96*	0.89*

Note: \* means the significance of the indicator for the significance level of 0.05.

The data in Table 1 allow to draw the following conclusions. The links between indicators of digital activity of the population and the volume of deposits and credits from individuals are statistically significant, direct and very high. In the case of the link between the use of mobile phones for Internet access and the volume of deposits of individuals, there is a direct linear relation. The economic interpretation of such close links can be as follows. In Russia, it is legally allowed for banks to remotely open accounts (deposits), provide credits, and make remittances without the personal presence of the client, using the data, that form his digital profile. In these conditions, the more households have access to the Internet, including from a mobile device, the greater the volume of deposits, attracted in this way, and the greater the volume of credits, provided remotely. As for the third

indicator of the digital activity of the population, as a rule, people, who use the Internet for ordering goods and services also tend to receive banking services online. And thus, indirectly, an increase in the number of people, using the Internet for ordering goods and services, also contributes to the growth of the volume of deposits and credits.

Another important part of the study is to determine the interrelations between the indicators of digital activity of the population and the level of its income. Having determined the presence of positive close links between indicators of digital activity and indicators of retail deposits and credits (Table 1), as well as taking into account the existence of empirically confirmed links between the level of household income and their savings and credit activity [12], we assume, that there are correlations between indicators of digital activity of the population and the level of its income.

Table 2 shows the correlation coefficients of indicators, reflecting the population's opportunity to participate in the digital financial market, with the dynamics of the values of the per capita income of the Russian population, as well as indicators of the distribution of the population by their size. We took two polar groups: the share of the population with incomes up to 14,000 rubles, which is the

approximate border of the subsistence minimum; the share of the population with incomes over 100,000 rubles, which is the maximum income limit, noted by Rosstat. Data on the incomes of the Russian population were taken from the Rosstat databases, period 2013-2019.

**Table 2** Matrix of correlation coefficients of indicators of digital activity of the population with indicators of per capita income of the Russian population

Indicators	Per capita income of entire population	Share of population with per capita income up to 14,000 rubles	Share of population with per capita income over 100,000 rubles
Internet access in Russian households	0.95*	-0.97*	0.93*
the use of mobile phones to access the Internet	0.95*	-0.93*	0.96*
the use of the Internet for ordering goods and services	0.95*	-0.93*	0.96*

Note: \* means the significance of the indicator for the significance level of 0.05.

The data in Table 2 confirm the existence of close links between indicators of digital activity of the population and the level of its income: both in general and by groups, depending on the level of income. An interesting result is the presence of negative links between the digital activity of the population and the share of the population with per capita money income of the population, approximately equal to the subsistence minimum. At the same time, this result follows the logic of the interrelation between indicators. Growth in per capita income creates more opportunities for purchasing and upgrading technical devices (including mobile phones), that provide Internet access. Therefore, the increase in the share of the population with per capita income up to 14 thousand rubles is accompanied by a decrease in indicators of digital activity of the population and vice versa. This proves, that, despite the fact, that digitalization is making financial services more available, the size of the population's income remains the main factor, affecting the availability of financial services.

**4. DISCUSSION**

The Russian financial market is characterized by a situation, when the supply of digital financial services to the population outruns the demand for them.

At the same time, the digital divide, associated with the availability of the Internet, technical means, can be considered overcome. According to [10], 76.9% of Russian households have access to the Internet in 2019

(66% of households use a mobile phone for this), compared to 17% in 2006.

A significant role in overcoming this divide could be played by a decrease in the share of households, whose per capita incomes were close to the subsistence minimum (from 34.6% in 2013 to 20.3% in 2019), since, as we found out, there is a feedback between the share of such households and indicators of digital activity of the population.

Taking into account the identified close links between the indicators of digital activity of the population and the volume of retail deposits and credits, it is important to overcome the digital divide, associated with the formation of digital competencies. The solution to this problem is even more exacerbated in the context of the formation of the institution of a digital profile of an individual at the national level, which implies the presence of a minimum level of formed digital competencies among the entire population.

At present, the digital data of individuals (in fact, constituting their digital profiles) are located in two-state centralized data storage systems:

1) USIA (Unified System of Identification and Authentication), which provides access to the attributes of the digital profile of an individual, stored in state information systems, set by the state and partly resulting from interaction with external structures;

2) UBS (Unified Biometric System), which provides access to the attributes of the digital profile of an individual, which are biologically set constants.

At the same time, individual financial institutions, primarily large Russian banks, are a kind of "agents" of the UBS, supplementing the UBS database based on the

obtaining and processing of biometric data from their clients.

The development of the institute of a digital profile of an individual client of a financial organization in Russia is planned in the direction of consolidating the legal foundation of its functioning, the development of the functionality of state information systems, which are its platform. This will allow to increase the availability of most financial services, reduce the number of cases of fraud, and generally reduce transaction costs for Russian financial institutions.

At the same time, it is important to understand the risks, associated with using a digital profile of an individual client of a financial institution. Depending on the subject, they can be as follows. For individuals, whose digital profile is used, these are 1) risks of violation of their rights and legitimate interests (for example, the right for “forgetfulness” of the data, reception of a copy of the data, informing about “leaks” and other rights); 2) the risks of using digital data on an individual for illegal purposes.

The risks of financial institutions can be divided into 4 groups, namely:

- 1) Risks when collecting biometrics, processing requests from individuals and their data, risks of remote identification procedures;
- 2) Legal and compliance risks, associated with potential violations of legislation on the protection of personal data;
- 3) Risks of fraud and data stealing;

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- 4) Operational risks, including risks of violation of the processes and procedures of internal control in the field of countering money laundering and terrorist financing. For state information systems (USIA and UBS), the key risks are cybersecurity risks. Actually, the separation of digital data into two information systems became one of the first solutions in the fight against cyber risks, since storing biometric data in depersonalized form without linking it to personal data provides additional guarantees for their protection.

## 5. CONCLUSION

The transformation of the financial market under the influence of digital financial technologies may be broader, than is expected. By now, it is obvious, that it addresses not only theoretical issues, issues of market structure, but also affects market participants. Digitalization activates two contrary processes of the emergence of new financial institutions and disintermediation. Digital financial technologies are changing the role of the population in the functioning of the financial market, changing the quality of the availability of financial services, expanding the range of possible financial instruments, replacing physical interaction with a digital profile.

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