



# Transformation of Population Finances in Russia and Abroad in the Era of Digitalization and Industry 4.0

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**Abstract.** Purpose: The purpose of the article is to reveal the main manifestations of population finances transformation occurring under the digitalization influence and the Industry 4.0 onset.

Design/Methodology/Approach: The authors, relying on the essential characteristics of population finances identified earlier in their studies at three levels of the domestic economic system (nano-, micro- and macro- ones), determined and examined three main areas of population finances transformation in Russia. The methods applied involve historical and logical analytical methods, systems analysis, synthesis, induction, and deduction. The authors used the method of sociological surveys and expert opinion to study the digital and financial literacy level of Russians.

Findings: The first area of population finances transformation includes changes in the forms and sources of active and passive income. The second one is transformation of level and forms of financial products and services consumption by the population. The third one is actualization of society needs in improving digital and financial literacy. Under the digital technologies and Industry 4.0 influence, the economy and finances are changing at both the national and global levels. Active income of the population is changing due to labor market transformation and demand for professions, as well as the rapid growth of Internet entrepreneurship forms in the scientific and technological revolution fourth wave. Passive income of Russians does not change its form, but it acquires digital ones.

Originality/Value: The authors argue for the need to improve both financial and digital literacy of Russians as the electronic (digital) forms of consumption, savings, and investment are gaining more weight in the population finances, the possibility of overcoming country territorial borders for the personal investment of Russians is increasing, the digital financial fraud risks are growing, and the area and instruments of state control over the population cash flow are expanding.

**Keywords:** Household finances · Personal finances · Population finances · Digital economy · Transformation · Technological change · Financial service

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## 1 Introduction

There should be made an important digression: the population finance (personal finance, household finance) theory and methodology is currently underdeveloped both in Russia and abroad (Campbell 2006) as an independent branch of scientific knowledge. There is a terminological confusion and a lack of understanding of the nature, forms, elements, functions, and implementation of population finances. The authors voiced their position on the content of population finances, their functions, elemental composition, characteristics, measurement, and manifestation features at nano-, micro- and macro- levels of the domestic economic system, and other key methodological issues in their previous studies (Mytareva et al. 2014).

The Industry 4.0 digitalization and technologies are changing external and internal economic development factors, market entities functioning, and, of course, it changes the financial system worldwide, as well as its individual links: states, companies, financial organizations, the population itself.

It is generally recognized that the global and national financial systems have been rapidly changing since the end of the last century moving to an unlimited financial system under technology and innovation influence (unfettered financial system (Hendershott and Villani 1981)). Over time, differences between specialized financial intermediaries smooth out and disappear (banks, pawnshops, commissions, and others), new financial institutions and products emerge and develop, and the forms of financial products provision and consumption change (Internet banking, remote banking, electronic insurance policies, etc.). Moreover, physical accessibility of financial services and products for consumers is becoming less important in terms of the economy and finance digitalization, all participants' transaction costs in the financial system are being reduced, all transactions speed and operations transparency in the economy is increasing many times. The possibilities for controlling and monitoring each monetary unit and its owner develop, new financial digital fraud forms appear, as well as the technological tools for combating them and providing security of settlements, operations, transactions, information about them and all persons involved.

Understanding how digitalization affects the economy does not require a fundamentally new economic theory but requires a different emphasis, namely, which transaction costs are reduced and how much it happens (Goldfarb and Tucker 2017).

The authors highlighted three aspects illustrating the ongoing transformations in the population finances occurring under the influence of digitalization and the Industry 4.0 technological era advent. These aspects analysis also allows identifying future changes areas in the population finances, both positive and negative.

## 2 Materials and Methods

The research materials were analytical reports of the World Bank, NAFI, ExpertRA, Bank of Russia, PJSC Sberbank of Russia, OECD, and McKinsey.

The research methodology is presented by historical and logical analytical methods, systems analysis, synthesis, induction, and deduction. The authors used the method of

sociological surveys and expert opinion to study the digital and financial literacy level of Russians.

### 3 Results

#### 3.1 Transformation of Income Forms and Sources

Active forms of population income are known to consist of employees' remuneration and business entrepreneurs income. The scientific and industrial revolution transforms the labor market, as demand and enquiry for specialities and professions changes significantly (former professions disappear new ones appear). The McKinsey Global Institute (MGI) estimates that by 2040, up to 50% of all jobs in the world will be robotic and automated (Aptekman et al. 2017). However, new technologies replacing a person in routine processes open up new employment opportunities, as well as training and improving the efficiency of public services (World Development Report 2019). Maintaining the human capital leading role in economic development in the context of Industry 4.0 is possible in the form of social entrepreneurship universally supported by national governments as an attempt to counter the threats of Industry 4.0 commercialization (Deloitte 2018).

Globally, now 34% of the employed population work in their own business, 11% are engaged in family business, 52% are employees, 3% are employers (Earth Population 2019). According to 2014 data, 93% are employees, 1.3% are employers, and 5.4% are self-employed (private entrepreneurship) in Russia (Volovskaya and Plyusina 2016).

In the context of digitalization, traditional labor recruitment begins to compete with the remote Internet work possibilities: the number of freelancers and people working remotely has been growing. Since 2019 Russia has introduced an income tax on self-employed as an experiment.

Population entrepreneurial incomes are also being transformed. Electronic business is gaining more and more popularity: electronic commerce, Internet services, and so on. The volume of electronic commerce in Russia in 2018 reached 1,150 billion rubles (Online Commerce in Russia 2018), which exacerbated the problem of tax and state financial control over participants in e-business and consumer protection. The so-called "e-commerce tax" is widely introduced throughout the world (and in Russia in terms of VAT taxation).

Passive forms of household income include pensions, allowances, scholarships, investment income, bank interest on deposits, rental property income (most often real estate). Their receipt accepts a remote electronic format. So, at the beginning of 2019, more than 94% of accounts opened at credit organizations by individuals have remote access (Bank of Russia 2019). More than 40 million Russians use the State Services (Gosuslugi.ru) electronic service intended for state and municipal services consumption.

### 3.2 Transformation of Forms of Financial Products and Services Provision and Consumption

Under the influence of digitalization, new ways of providing and consuming financial services and products are emerging. They leads to even greater asymmetries between financially untutored and sophisticated households (naive and sophisticated households in Campbell terminology (Campbell 2006). Low education and income level of naive households makes all possible financial services and products unavailable for them (as a rule, they consume the simplest financial products such as bank deposits, consumer loans, and risky insurance products). Sophisticated households have financial ability to consume more complex financial products with greater benefits (securities investments in domestic and foreign markets in mutual investment funds, bank-managed mutual fund, ETF funds, derivative securities, cryptocurrency, real estate, startups, etc.). In fact, we are talking about the fact that low-educated and low-income groups of population (naive households) in financial relations often lose or receive fewer benefits and incomes, while highly educated and high-income groups (sophisticated households) benefit, because the loss of one is the gain of the other in a closed financial system. The Industry 4.0 digitalization and technologies strengthen the asymmetry between naive and financially sophisticated households, because they require not only high digital and financial literacy but also a high level of technological support (high-speed secure Internet, modern computer equipment and support, etc.).

Modern banks, insurance companies, managers, depositories, actuaries, pension investment funds, brokers, traders, exchanges, and other financial market participants are actively introducing Industry 4.0 technologies: artificial intelligence, blockchain, big data, etc. Most often, artificial intelligence is used by banks in credit scoring, in the field of debt collection, in marketing while creating individual offers to customers, less often in call centers (work automation through chat bots) and information protection services. Artificial intelligence is also effective in detecting fraudulent transactions. Less often Russian banks are counting on a significant result from the use of artificial intelligence in personnel management, monitoring the background information regarding the bank, and customers' remote identification.

Many world and domestic financial organizations see the wave of technological progress as an accelerator of their development and even a platform for significant diversification of their business in terms of going beyond the limits of production and selling only core products - to the production and sale of new technologies. In Russia PJSC Sberbank is "the regulated technology company" in Expert RA terminology (Artificial Intelligence in the Banking Sector 2018) positioning itself as a "technology company with a banking license" with the corresponding ecosystem (Artificial Intelligence in Banks 2018; Sberbank 2019). The experience of General Electric Company and large digital companies based on traditional corporations as Samsung, LG, Toyota, Sony, Toshiba, SoftBank, Alibaba, Huawei (Aptekman et al. 2017) is also noteworthy.

The introduction of Industry 4.0 technologies in the activities of financial organizations significantly reduces their costs that makes financial products and services more affordable for consumers. Savings in "processing counter transactions, product structuring, account management, auditing and financial control" can be up to 60–75% and 50% for the bank operating activities. According to the experts, it can be increased up

to 80% (due to reduction in staff involved in document management and payment processing) (Blockchain 2017). Nearly 29% of financial companies in the world are estimated to use robotic automation of processes (25% use technology for risk management, 21% for generating risk reports, 20% for regulatory reporting), 40% use big data and cognitive analytics, 25% use machine learning (Artificial Intelligence in Banks 2019). However, there is a risk of inefficient use of technology (Gorshkova et al. 2019).

The authors predict the financial activity boundaries erosion and its fusion with other areas and industries.

### 3.3 Actualization of Society Demand in Improving the Population Financial and Digital Literacy

The economy and finance digitalization raises the issue of compliance with personal financial security requirements. The increase in number and forms of digital fraud in the financial sector makes increasing the digital and financial literacy of Russians highly demanded.

The current level of financial literacy in Russia is average: according to OECD estimates, its index is 12.12 out of 21 (the 11th place). For comparison, it is 11 points in Italy, 9.6 points in Saudi Arabia, 14.9 points in France, 14.6 points in Canada (OECD 2017).

In 2017, every second inhabitant of the Earth was connected to the Internet. Russia ranks first in Europe and sixth in the world in the number of Internet users (Aptekman et al. 2017; And if without the Internet? 2017). In 2017, 75% of Russians used web Internet and 75% used mobile Internet (And if without the Internet 2017). Digital literacy of Russians as a set of knowledge and skills that are necessary for the safe and effective use of digital technologies and Internet resources, which includes digital consumption, competencies and security (Digital Literacy 2019), is measured by the regional public organization “Internet Technologies Center”. In 2018, its index amounted to 4.52 compared to 5.99 in 2017 (it decreased by almost 15%). According to the results of the 2018 digital literacy study of Russians conducted by NAFI Research Centre, Russians have low digital literacy (52 percentage points out of 100 possible), and only 26% of Russians have a high level of digital literacy. It is noteworthy that 55% do not consider it necessary to protect their personal data, 38% do not use updated antivirus software, 51% do not compare information from different sources, 36% of Russians tend to keep abreast of technological innovations, 58% are sure that modern technologies make life easier. However, 53% of Russians experience difficulties in mastering technological innovations (NAFI 2019).

## 4 Conclusion

Digital technologies and Industry 4.0 are transforming familiar way of life in economy and finance at the national and global level requiring all subjects of economic relations to actively adapt to new conditions of interaction. The study examined three main areas of population finance transformation under the Industry 4.0 influence. Analysis of changes in the active income of Russians revealed a high risk of labor income loss for

at least 40% of working Russians due to production and leading areas of intellectual work automation and robotization. Instead, there are growing opportunities for self-employed and freelance Russians in areas where interaction with consumers and employers occurs remotely using digital technology and the Internet. In terms of entrepreneurial income of Russians, the authors identified two aspects that actualize their influence in conditions of scientific and technological progress. On one hand, there is widespread replacement of traditional business with electronic forms (electronic commerce and digital entrepreneurship). Electronic entrepreneurship in digital sphere is becoming widely demanded due to lower transaction costs in comparison with traditional forms of entrepreneurship. On the other hand, special constructs of taxes and taxation are introduced in relation to electronic and digital entrepreneurship. It leads to an increase in the tax burden of electronic business owners. Passive income of Russians do not change their nature under the influence of Industry 4.0 and the digitalization of the economy. However, they acquire digital forms and they are based on the remote consumption of state and municipal services in electronic forms. At the same time, new opportunities for using and investing financial resources of Russians in the national and/or foreign economies are associated with an increased digital financial fraud risk. The problem of protection against digital financial fraud increase the relevance of digital and financial literacy high level of Russians in line with the problem of finding the most effective tools for retirement and insurance.

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