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The Influence of Internal Contradictions in the US Economy on Global Financialization and the Expansion of Fictitious Capital

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ABSTRACT

The financialization genesis of the global economy centered in the United States is on the bifurcation point now – a fictive capital' expansion is damaging with the social capital regeneration mechanism disaster. The method of identifying and estimating the fictive capital' extension is absent for now. The fictive capital exists as a metaphor on the science papers but not as an institutional basis of the capital flows directions. The paper **aims** to update the configuration of the global financial system, its dependence on the performance of US corporations and banks; to identify the sources of vulnerability of world finance and global liquidity from the fictitious capital of American financial markets. The **methodology** is theoretical pattern' of financial capital movements and its real statistical market indicators comparison. The empirical base is statistical data about the financial flows and financial results especially about the US as a global financial center. Based on the **results** the authors have revealed an origin of fictive capital on the US bank sector by the justification for the conclusion of liquidity above the profitable as the purpose of financial operations. This conclusion is confirmed with the scale of off-balance sheet transactions of banks. Besides the regression between the prices of derivative' basis assets and stock indexes has been shown. Also, the market capitalization of American companies is not sensitive to change in market liquidity indicators. The authors **concluded** that global financialization is supported by significant internal contradictions in the US economy. The source of contradictions is the financial mechanism for withdrawing liquidity from the sphere of production and circulation into the sphere of financial markets. Capital investment using instruments of the US financial market entails the threat of losing their liquidity. Forecasting the dynamics of the global economy without taking into account the role of fictitious capital, which is emerging in the American financial markets, leads to global vulnerability and may cause the next financial crisis.

Keywords: financialization; fictitious capital; Federal Reserve System; off-balance sheet bank transactions; derivatives; capitalization; liquidity

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INTRODUCTION

The financialization of the world economy is recognized these days even by liberal-minded scientists as an institution of the destruction of the fundamental foundations of the reproduction model and sustainable economic growth. The declaration on the post-industrial phase of the development of capitalism is being replaced by an assessment of economic losses from the destruction of the material and production base of the world economy. Technological stagnation and lack of breakthrough technologies of the XXI century indicate a violation of the usual change of business cycles. It seems that all of the above is a consequence of financial expansion through the growth of fictitious capital.

The processes of inflation and the collapse of financial bubbles, the deliberate arrangement of financial pyramids, financial fraud, and manipulation are known in history and have been sufficiently studied in the literature (C. Kindleberger [1], J. Galbraith [2], G. Epstein [3], C. Perez [4], J. Stiglitz [5], C. Calomiris [6], M. Wolf [7], M. Lewis [8], R. Shiller [9], R. Batra [10], R. Brenner [11], D. Tobin [12], B. Eichengreen [13], J. Field [14], V.A. Mau [15], S.K. Dubinin [16] etc.). However, in the current state of the global financial system, there is a fundamentally new scale of misconceptions and the inequality they generate. The latter sees a rollback to the feudal formation with the only difference that this system had more prospects.

We believe that the lease models of enrichment characteristic of feudalism are now being replaced by battles over liquidity, which, if possible, should be removed from regulation. The essential difference is that the search for rent presupposes the presence of some rare resource, and the struggle for liquidity is based on fictitious capital.

The latter is quite often found in the writings of progressive economists and financiers, but more often as a metaphor or a speculative institution that unambiguously exists, but is elusive in the official statistics and is not determined by models of behavior and reactions to external factors.

Thus, the aim of this study is to update the configuration of the global financial system, its dependence on the performance of US corporations and banks, to identify the sources of vulnerability of world finance and global liquidity from the fictitious capital of US financial markets.

The theoretical significance of this study consists in updating the essential characteristics and patterns of the process of financialization of the world economy, as well as in identifying causal relationships leading to the formation and increase of fictitious capital in financial turnover, and indicators that allow directly or indirectly assessing such trends.

The practical significance of the work lies in identifying and quantifying indicators that indicate the expansion of fictitious capital moving into world finance through the activities of corporations and banks in the United States, which makes it possible to move away from the abstract idea of the presence of fictitious capital and financial bubbles of global liquidity to the formation of a methodology for its quantitative assessments when carrying out financial and economic calculations and justifying financial decisions at various levels.

MATERIALS AND METHODS

The research methodology is at the intersection of normative and positive methods of economic analysis, the main purpose of using statistical data on bank balances, volumes of government bonds, data on the financial performance of corporations and their market positions in identifying relationships that should not arise during the normal process of reproduction. However, in fact, they are present, and vice versa, in the rupture of the relationship between those indicators that should be linked by the logic of the normal reproductive process.

RESULTS AND DISCUSSION

Since financialization, as a rule, begins with the unwinding of the mechanism of financial leverage [17], banks should be the first object

Table 1

Share of government liabilities in central bank assets

Share of government liabilities in central bank assets, %	2014	2015	2016	2017	2018	2019
FRS	57.72	57.54	57.65	57.21	56.74	57.54
ECB	1.21	0.90	0.72	0.56	0.51	0.50
CB of Japan	83.41	84.83	86.15	84.52	86.32	83.98
CB of China	4.52	4.81	4.44	4.21	4.09	4.31

Source: Banks' Balance Sheets Data. URL: https://bankinglibrary.com/data/banks-balance-sheets-data/ (accessed on 14.11.2020).

of analysis. The way banks are issued generally depends on the asset structure of central banks. We summarize the available statistics.

To assess the role of governments in forming the basis for increasing fictitious capital, we consider the balance sheets of central banks (CB) and the share of government liabilities in their assets (*Table 1*).

Evaluation of emission channels through analysis of central bank balance sheets showed that China uses mainly international assets, the Federal Reserve System (FRS) uses approximately equal shares of Treasury bonds and buybacks of distressed assets from financial institutions, the European Central Bank (ECB) invests in financial bonds and non-financial institutions, mainly in euros, and the Central Bank of Japan, as the table shows, prefers emission to government liabilities. To update the results obtained, we will consider government borrowing from the other side — the balance sheets of central banks (*Table 2*).

Comparison of the tables reveals a contradiction: in the assets of the FRS and the Central Bank of Japan, the liabilities of the respective countries have a high share, however, among the holders of such bonds, central banks occupy a much more modest position. This means that the financial institutions of the United States and Japan are concentrating liquidity created in the financial markets by other players. And if the investments of the ECB and the People's Bank of China are aimed at financing the purchase of various assets, i.e. we can talk about the market (exchange) method of emission, then the specificity of the United States and Japan in creating such a market at the expense of their own obligations in order to attract liquidity.

We found that the balance sheet assets of the central banks of Japan and the United States are almost entirely composed of instruments that are likely to be refinanced in the future to prevent the financial collapse of the respective banking systems [6]. At the same time, the share of the dollar in international reserves is stable (*Table 3*).

The emission of the dollar, the main reserve currency, is carried out at the expense of:

a) state liabilities;

b) international reserves;

c) distressed assets purchased from financial institutions that are "too large to go bankrupt" [5].

When the Federal Reserve System was created, it was established that the dollar should be backed by government guarantees, gold backing, and the needs of trade. In this situation, as can be seen from the tables above, none of the listed conditions is met.

Table 2

Government liabilities deposited with central banks

Government liabilities deposited with central banks	2014	2015	2016	2017	2018	2019
FRS	14.30	13.40	12.94	12.07	10.45	10.34
ECB	0.22	0.20	0.21	0.20	0.19	0.18
CB of Japan	24.31	31.01	38.31	40.59	43.31	43.33
CB of China	0.01	0.01	0.01	0.01	0.00	0.00

Source: Banks' Balance Sheets Data. URL: https://bankinglibrary.com/data/banks-balance-sheets-data/ (accessed on 14.11.2020).

Table 3

Currency composition of global foreign exchange reserves

Year	U.S. dollar	Euro	Pound sterling	Japanese Yen	Swiss franc	Other currencies
2009	62.05	27.65	4.25	2.9	0.12	3.04
2010	62.14	25.71	3.93	3.66	0.13	4.43
2011	62.59	24.4	3.83	3.61	0.08	5.49
2012	61.47	24.05	4.04	4.09	0.21	3.26
2013	61.24	24.19	3.98	3.82	0.27	2.84
2014	63.34	21.9	3.79	3.79	0.27	3.14
2015	64.16	19.73	4.86	4.86	0.29	3.13
2016	63.96	19.74	4.42	4.42	0.17	3.41
2017	62.72	20.15	4.54	4.89	0.18	3.67
2018	61.69	20.68	4.43	5.2	0.15	4.37
2019	60.89	20.54	4.62	5.7	0.15	2.56

Source: Distribution of global currency reserves. URL: https://www.statista.com/statistics/233674/distribution-of-global-currency-reserves/#:~:text=The%20U.S.%20dollar%20was%20the,of%20global%20reserves%20that%20year (accessed on 14.11.2020).

In addition, we believe that the high share of dollar-denominated assets in the structure of international reserves actually means that US Treasury liabilities are not actually used by American banks to form risk-free assets. In support of this, the Treasury website contains data on foreign holders of US government debt: of the $ 24 trillion in government debt, the Fed has $ 2.4 trillion, in the hands of foreign private investors — $ 15 trillion in official

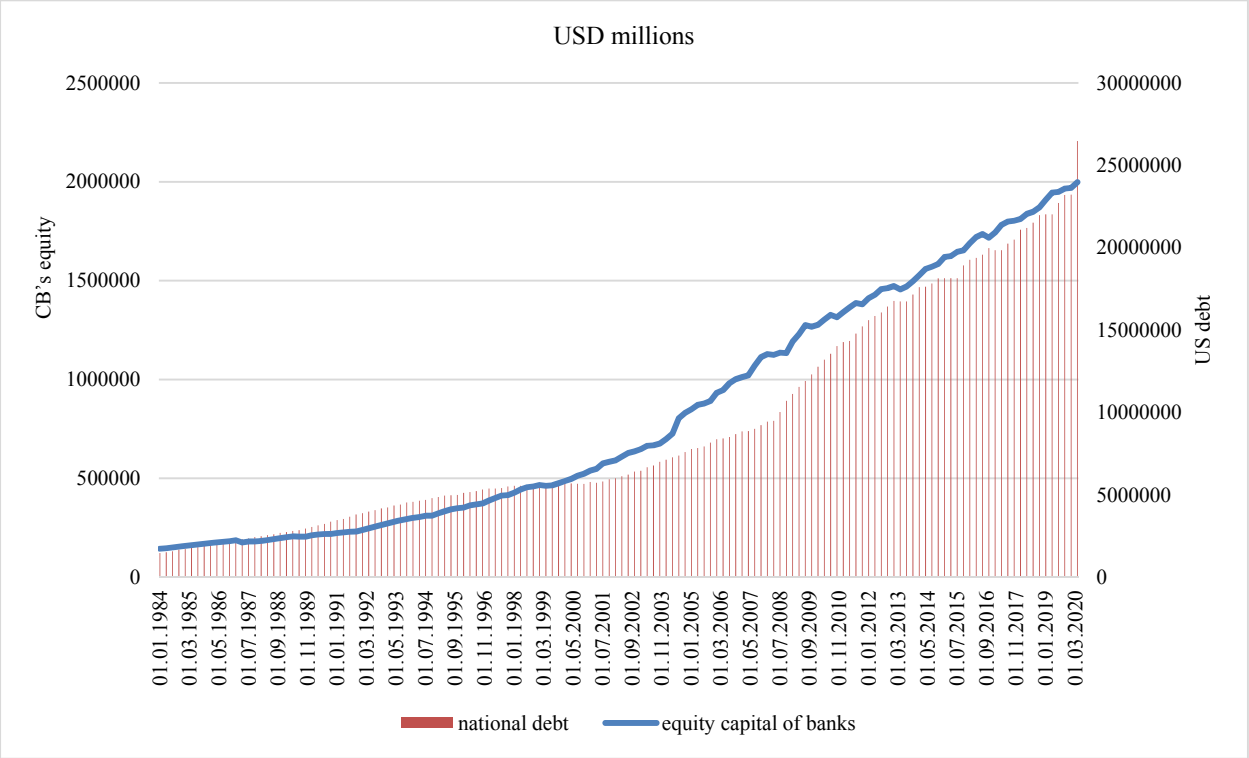

Fig. 1. **Dynamics of the US national debt and equity capital of banks**

Source: FRED Statistical data. URL: https://fred.stlouisfed.org (accessed on 14.11.2020).

reserves — about $ 6 trillion.[1] Thus, the national banking system practically does not contain the liabilities of its own government on the balance sheets, and this, in turn, means that in order to fill the lack of risk-free assets under the Basel III package, US commercial banks are forced to either increase Tier 1 capital or use synthetic assets with a high credit rating, notorious for being responsible for the 2007–2008 global financial crisis.

The preliminary conclusion is rather trivial. The emission of the dollar, to a greater extent than other reserve currencies, affects the formation of fictitious capital, since, firstly, the assets of the Fed's balance sheet can only be refinanced, but not reproduced, and secondly, the Treasury attracts liquidity. from third-party markets without any obligation or reference to appeal requirements.

However, the situation of the reckless behavior of the issuer of the world currency as a whole is also not new [1], and the activities of the Federal Reserve System and the US Treasury can be considered the first step towards the emergence of fictitious capital, but the scale of expansion cannot be fully explained by these reasons alone. The next step should be to consider the structure of assets and liabilities of commercial banks. It is interesting to compare the dynamics of the US government debt and the size of the equity capital of commercial banks (*Fig. 1*).

With similar growth rates, the equity capital of banks outpaced the growth rate of national debt until 2000, then the situation changed dramatically, and in 2014 the growth rate has balanced out. The similarity in growth rates is confirmed by the significant regression (*Fig. 2*).

We believe that the situation is easy to explain: as the national debt grows and demand for appropriate instruments from the global financial community grows, the dollar strengthens and confidence in dollar-denominated assets and the US financial market grows [17], which strengthens the

[1] U.S. Long-Term Securities Held by Foreign Residents. URL: https://ticdata.treasury.gov/Publish/slt2d.txt (accessed on 14.11.2020).

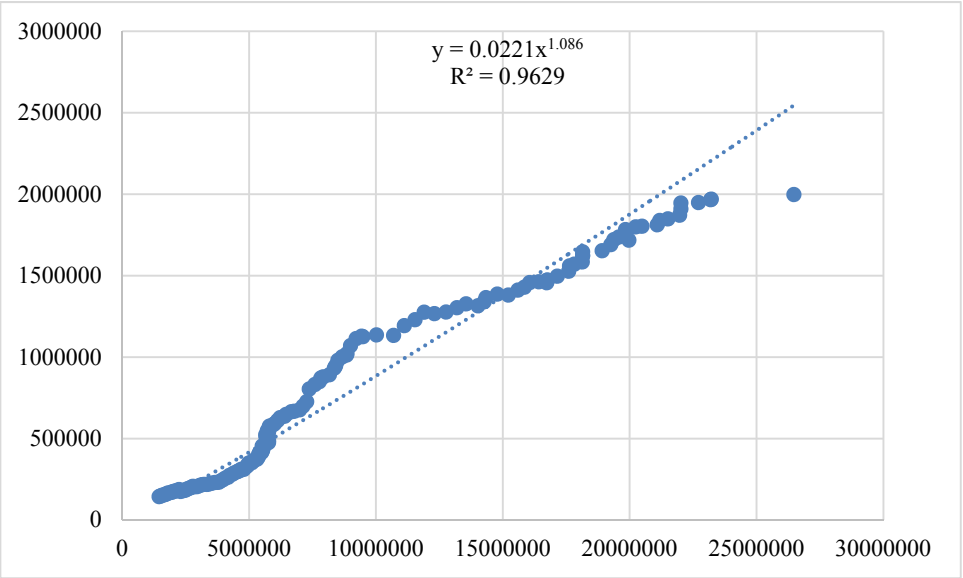

Fig 2. **Dependence of equity capital of commercial banks on the dynamics of the US national debt**

Source: FRED DATABASE. URL: https://fred.stlouisfed.org (accessed on 14.11.2020).

value of shares and the market valuation of the equity capital of commercial banks. In other words, *Fig. 1, 2* illustrate mutual transitions of fictitious capital between sectors of debt (in this case, national) instruments and stock market instruments. Further, according to the same scheme, fictitious capital moves into other segments of the financial market in order to fight for its liquidity.

However, back to bank accounts. The website https://fred.stlouisfed.org/categories/100 provides data on the dynamics (in terms of growth rates) of various aggregates of the US banking sector. We selected a sample of the main indicators to assess their interdependence. The calculations were carried out in several stages for different sample sizes: first, the values were estimated for the period from 1973, then from 2008, then from 2014. It is interesting to analyze the change in the values of the correlation coefficients when changing the analysis intervals (*Table 4*).

Comparison of these calculations made it possible to identify the directions of changes in the course of the investigated expansion of fictitious capital:

- while narrowing the analysis period from 1973 to 2008 revealed a negative mutual influence of bank deposits and mortgage loans, which is explained by the mortgage crisis and changes in the loan portfolio of banks [6]; positive mutual influence of the amount of deposits and net assets, which means the search for alternative sources of funding after the liquidity crisis; a decrease in the relationship between treasury bonds and total assets, which, taking into account the results of the analysis shown in *Fig. 2*, indicates the focus of Treasury instruments to support the stock market, rather than bank balance sheets;
- with a further limitation of the study period in 2014, the strengthening of the interdependence of all assessed parameters, except for mortgage loans and treasury securities on the balance sheets of banks, with cash on the balance sheets of banks is striking. In other words, any operations of commercial banks are not translated into changes in financial results but are aimed at forming the money supply. This is a chase for liquidity from the largest banking system in the world. If we associate this trend with the growth of the share of profit in income and the share of dividends in profit [18], then we get that banks become "collectors" of money for shareholders who receive an increase in prices for their instruments due to the Treasury's activities to increase global dependence on the dollar.

Table 4

Correlation coefficients between the balance sheet indicators of commercial banks

Correlation coefficients	Deposits	Total assets	Loan	Real estate loan	Treasury and agency securities	Net assets	Total liabilities
1973–2020							
Deposits	x						
Total assets	0.64582	x					
Credit	0.50097	0.746358	x				
Mortgage loans	0.21812	0.412757	0.668	x			
Investments in treasury securities	0.14693	0.161007	0.317	–0.00443	x		
Net assets	–0.1554	0.053858	0.088	0.101239	0.087563	x	
Aggregate liabilities	0.61941	0.802671	0.573	0.278149	0.066638	–0.52	x
Monetary assets	0.37574	0.53823	0.062	–0.11341	–0.01073	–0.11	0.520257
2008–2020							
	Deposits	**Total assets**	**Loan**	**Real estate loan**	**Treasury and agency securities**	**Net assets**	**Total liabilities**
Deposits	x						
Total assets	0.67273	x					
Credit	0.52319	0.675635	x				
Mortgage loans	0.04141	0.213481	0.648	x			
Investments in treasury securities	0.1357	0.050632	0.280	–0.04754	x		
Net assets	–0.0020	0.122747	0.003	0.030242	–0.03315	x	
Aggregate liabilities	0.64781	0.907093	0.643	0.185856	0.066779	–0.30	x
Monetary assets	0.35174	0.69656	0.123	–0.18688	–0.05529	–0.01	0.669157

Table 4 (continued)

2014–2020							
	Deposits	**Total assets**	**Loan**	**Real estate loan**	**Treasury and agency securities**	**Net assets**	**Total liabilities**
Deposits	x						
Total assets	0.8225	x					
Credit	0.6806	0.858847	x				
Mortgage loans	–0.0919	0.118101	0.323	x			
Investments in treasury securities	0.18731	0.154868	0.403	–0.09836	x		
Net assets	–0.05096	0.057981	0.105	0.090418	0.23393	x	
Aggregate liabilities	0.82764	0.991927	0.845	0.106903	0.127304	–0.07	x
Monetary assets	0.83174	0.942268	0.714	0.033468	–0.03484	–0.01	0.942387

Source: FRED balance sheets statistics. URL: https://fred.stlouisfed.org/categories/100 (accessed on 14.11.2020).

The lack of dependence between monetary assets and mortgage loans, as well as treasury obligations, seems to be a consequence of the fact that these instruments have their own well-functioning mechanisms for the formation of liquidity through independent circulation in the world financial markets.

To support this assumption, we consider the review of banking systems prepared by researchers from the World Bank and IMF.[2] In this report, the performance of banking systems in many countries is grouped according to various indicators. We consider a number of indicators of interest to us.

First of all, we pay attention to the dynamics of the return on assets in the banking sector (*Fig. 3*).

Attention is drawn to the dynamics of the return on assets of the US banking sector, which provoked the global financial crisis: after the passage of extremely low (but positive) values of profitability in 2008, rapid growth began, and by the end of the study period, the US banking system caught up with Canada and China, which did not show a decrease in 2008 in terms of the profitability of banks [19].

A slightly smoother trend is observed when analyzing the return on equity (*Fig. 4*).

According to the Orbis methodology, both profitability indicators are calculated in units of net profit, while in relation to the United States, it is known that total assets exceed the growth rates of banks' equity capital [20]. However, we see that after 2008, the return on equity grew more slowly than the return on assets. It is known that these indicators are interconnected by the effect of financial leverage, to identify the results of the influence of which we will

[2] Aslı Demirgüç-Kunt, Martin Čihák, Erik Feyen, Thorsten Beck, Ross Levine, The World Bank, Washington D.C., International Monetary Fund, Washington D.C., Cass Business School, University College London, United Kingdom, University of California at Berkeley, California.

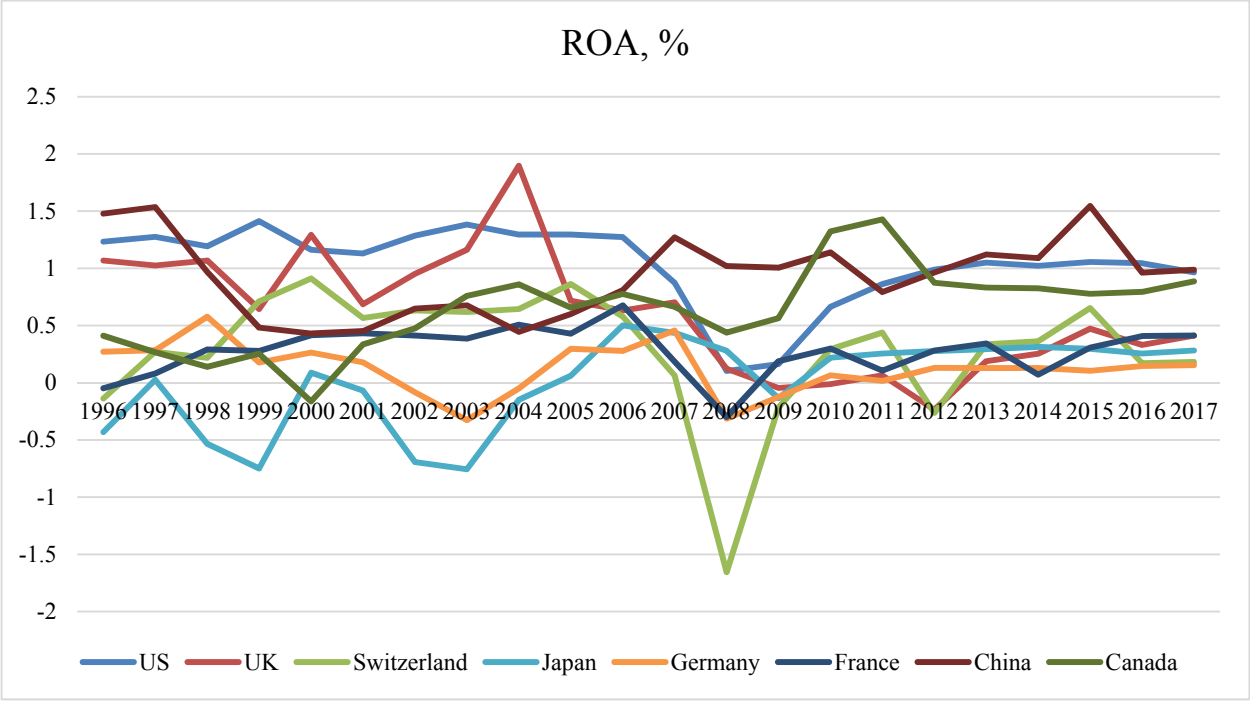

Fig. 3. **Dynamics of ROA**

Source: Global Financial Development Report 2019/2020. URL: https://issuu.com/world.bank.publications/docs/9781464809675 (accessed on 11.11.2020).

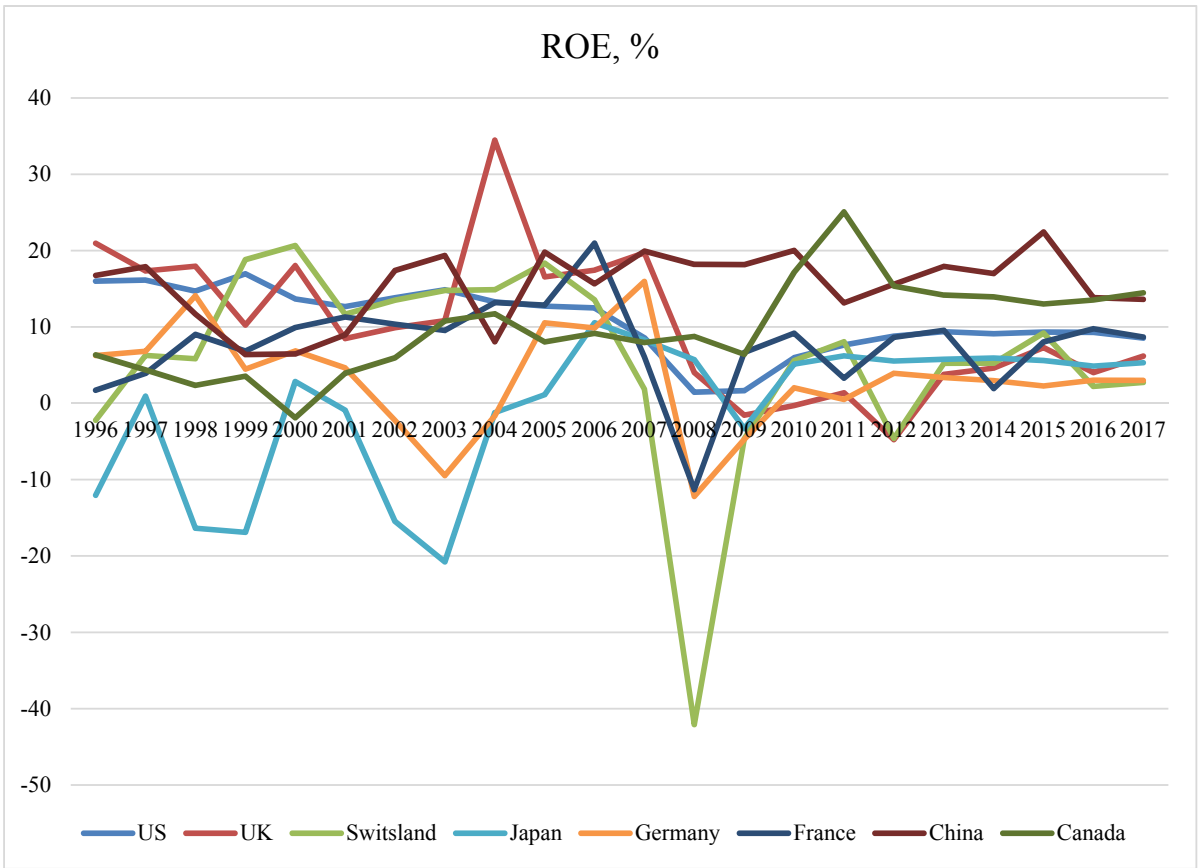

Fig. 4. **Dynamics of ROE**

Source: Global Financial Development Report 2019/2020. URL: https://issuu.com/world.bank.publications/docs/9781464809675 (accessed on 11.11.2020).

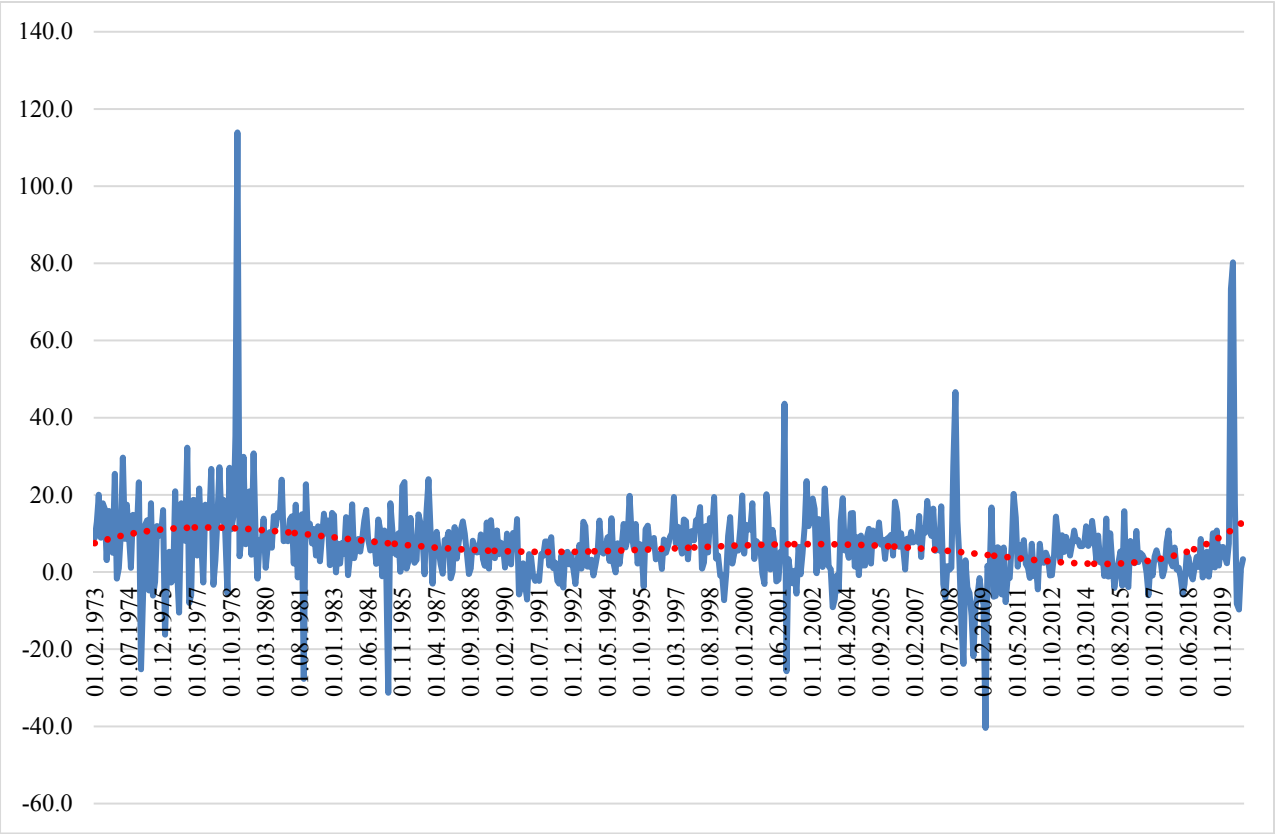

Fig. 5. **Dynamics of liabilities of the US banks**

Source: Global Financial Development Report 2019/2020. URL: https://issuu.com/world.bank.publications/docs/9781464809675 (accessed on 11.11.2020).

consider the dynamics of liquid liabilities in the US banking system (*Fig. 5*).

Indeed, in the period from 2008 to 2017, the dynamics of growth of banks' liabilities slightly slowed down, however, the main condition for the lag of the growth rate of the return on equity from the return on assets is that the market valuation of banks' equity capital is determined by the attractiveness of instruments denominated in dollars and external demand for treasury US bonds.

In addition, a sharp jump in banks' liabilities at the beginning of 2020 is noticeable, and about half of this growth is associated with an increase in the deposit base. The question arises: how did the pandemic and election uncertainty in the United States collectively affect the massive growth of the banks' resource base? We believe that the answers should again be sought in the activities of the regulator (*Fig. 6*).

The growth of liquidity in the banking system occurs at the expense of various bank funds placed by the FRS in order to provide preventive measures to maintain the liquidity of banks. It is interesting to note that, according to Forbes, "the Fed chose not banks, as usual, for its current quantitative easing operations, but the management companies BlakcRock and PIMKO" [21]. Thus, we are dealing with another superstructure of the fictitious capital pyramid.

The cited article contains data with reference to the Boston Consulting Group report, according to which the 10 largest asset management companies collectively own 35% of marketable assets in the United States, and the total inflow of funds is distributed among the 18 largest asset management companies. We believe that such a huge depersonalization of transactions in the financial market is also a sign of fictitious capital — capital that is not tied to specific assets, investors, countries and other

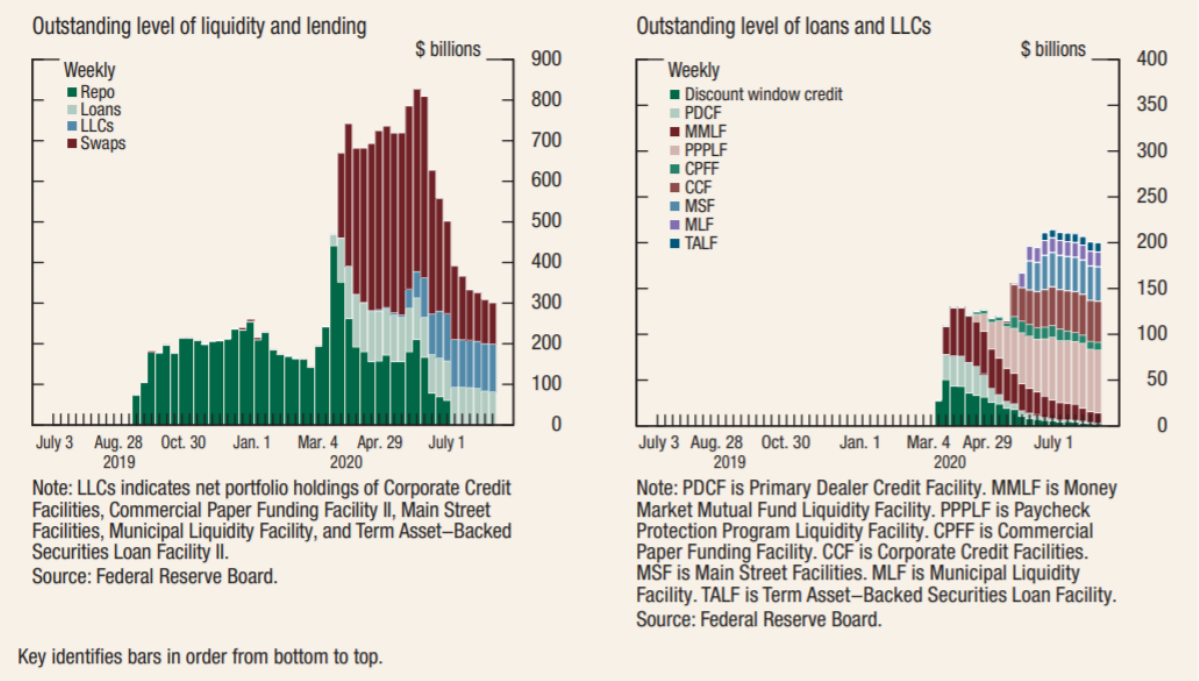

Fig. 6. **Federal Reserve's balance sheet report, August 2020**

Source: Balance sheet developments report. URL: https://www.federalreserve.gov/publications/files/balance_sheet_developments_report_202008.pdf.pdf (accessed on 11.11.2020).

Table 5

Balances on off-balance sheet transactions of US banks, billions of dollars

Instrument	2018	2019	Q2 2020
Unclaimed liabilities	7693.9	8003.8	8235.0
Credit derivatives	2078.1	1895.2	1545.4
Interest rate derivatives	128 173.9	125 078.3	132 102.0

Source: Off-balance sheet items Report. URL: https://www.federalreserve.gov/releases/efa/off-balance-sheet-items.pdf (accessed on 11.11.2020).

more or less tangible entities. It is clear that the subjectivity in the distribution of financial resources in such a system is questionable, since the impersonal "packaged" units of financial capital include an uncountable number of complexly structured elements [22], in which it is not possible to identify the directions of real financial resources.

In this context, we consider it necessary to analyze the available data on the volumes of off-balance-sheet transactions of banks (*Table 5*).

We get that more than 8 trillion US bank loans were transferred to off-balance-sheet accounts for their subsequent "packing" in secured bonds. This can also be a factor in the uneven dynamics of the profitability of assets and equity capital of banks [23]: if assets are systematically written off the balance sheet, it becomes somewhat easier to ensure the profitability of the remaining funds.

In addition, the estimated cost of derivative financial instruments of the US banks is about $ 133 trillion, and most of them are aimed

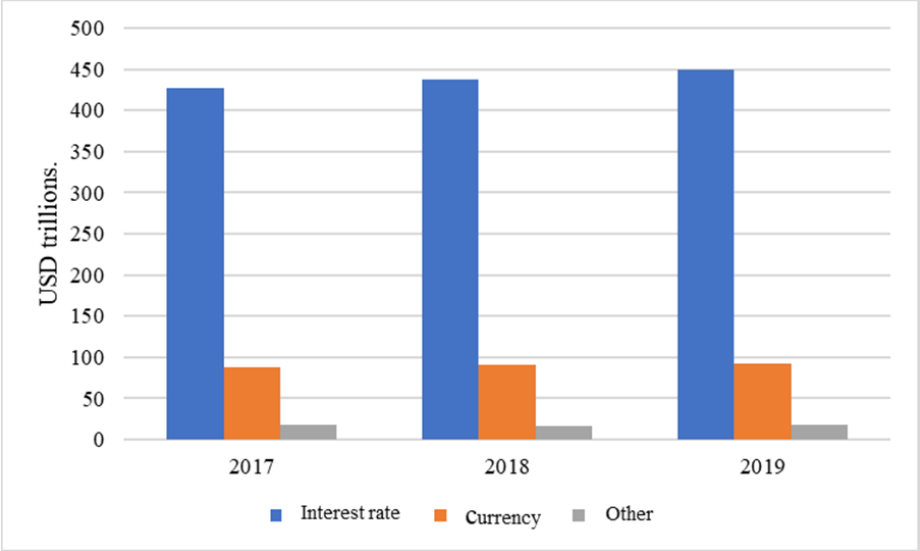

Fig. 7. **Underlying asset value under derivative contracts**

Source: BIS STAT EXPLORER. URL: https://stats.bis.org/statx/srs/tseries/OTC_DERIV/H:D:A:A:5J:A:5J:A:TO1:TO1:A:A:3:C?t=D5.1&p=20191&i=1.8&x=DER_TYPE.1.CL_OD_TYPE&o=s:line (accessed on 12.10.2020).

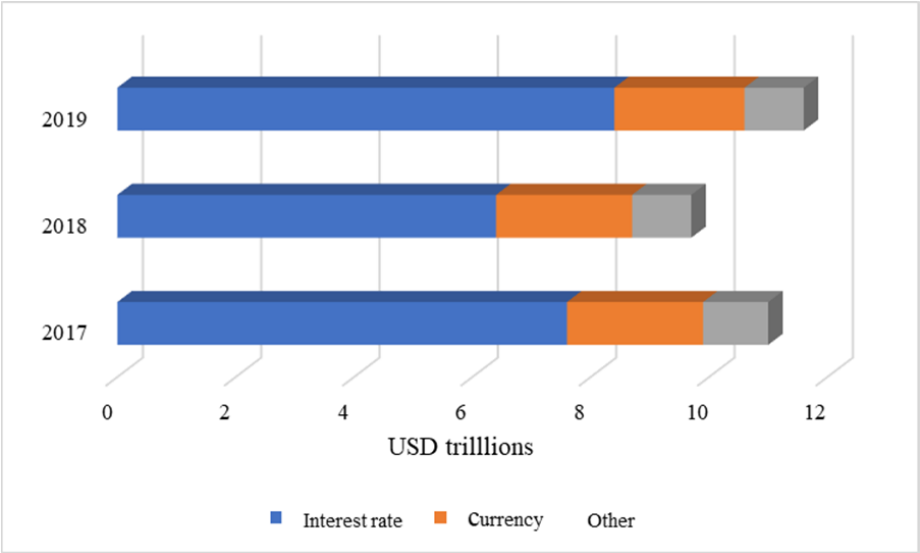

Fig. 8. **Market value of derivatives**

Source: BIS STAT EXPLORER. URL: https://stats.bis.org/statx/srs/tseries/OTC_DERIV/H:D:A:A:5J:A:5J:A:TO1:TO1:A:A:3:C?t=D5.1&p=20191&i=1.8&x=DER_TYPE.1.CL_OD_TYPE&o=s:line (accessed on 12.10.2020).

at speculating with interest rates, which is incomparable with the cost of interest-bearing liabilities, does not obey the logic of their formation and repayment, and, therefore, is fictitious.

For a more detailed information on the role of derivatives in the formation of fictitious capital, we turn to the report KEY TRENDS IN THE SIZE AND COMPOSITION OF OTC DERIVATIVES MARKETS IN THE SECOND HALF OF 2019,[3] which reflects the results of actions with derivatives. Data on the value

[3] KEY TRENDS IN THE SIZE AND COMPOSITION OF OTC DERIVATIVES MARKETS IN THE SECOND HALF OF 2019. URL: https://www.bis.org/publ/otc_hy2005.pdf (accessed on 12.10.2020).

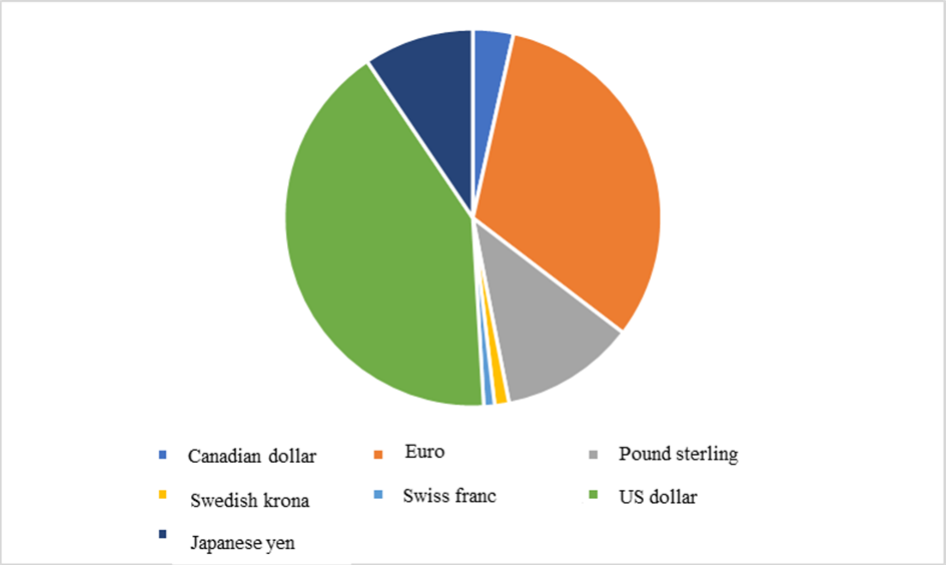

Fig. 9. **Key currencies of derivative contracts**

Source: BIS STAT EXPLORER. URL: https://stats.bis.org/statx/srs/tseries/OTC_DERIV/H:D:A:A:5J:A:5J:A:TO1:TO1:A:A:3:C?t=D5.1&p=20191&i=1.8&x=DER_TYPE.1.CL_OD_TYPE&o=s:line (accessed on 12.10.2020).

of underlying assets and the market value of derivative financial instruments are presented in *Fig. 7, 8*, respectively.

There is an opinion in the specialized press that the official statistics on derivatives are greatly underestimated (according to various estimates, from 40 to 100%), however, even using official data, it is easy to prove that instruments for the spread of fictitious capital are widely represented in the derivatives market [24]. Moreover, the 12 trillion market value of derivatives accounted for 13.7% of global GDP in 2019, and this amount actually accounted for transactions in derivative contracts, and, therefore, the demand for adequate liquidity was presented and removed from reproduction as financial instruments. and real capital. That is, if the value of the underlying asset will never be realized in the derivatives market, since it is just a matter of speculation and arbitrage, then the market value of the contracts themselves is involved in the transactions when they are entered into. Such a demand for liquidity cannot be satisfied without the use of debt financing [17], therefore the role of banks in financing the corresponding operations to create fictitious capital becomes even more noticeable.

It is also necessary to consider the currency structure of claims for derivative contracts (*Fig. 9*).

Slightly less than half of the claims on the relevant contracts are denominated in US dollars, which is undoubtedly an important factor in the demand for dollar liquidity.

However, we believe that the role of the derivatives market is not only and not so much in the formation of a pyramid of claims for non-existent foreign exchange and interest-bearing assets [25], and even not so much in inciting speculative races in financial markets. We believe that the derivatives market is a channel of fictitious capital due to changes in the pricing rules in the financial and commodity markets. In particular, derivatives for real goods practically do not respond to supply and demand in the markets of underlying assets, but on the contrary, prices of underlying assets are subject to dependence on exchange quotes in stock markets, since derivatives for goods are bought for diversification of financial portfolios. Thus, the prices of physical goods depend on stock indices. This trend can be traced in two ways: firstly, to track changes in world prices for various tradable goods relative to each other, and secondly, to assess the degree of influence of

Table 6

The results of the correlation analysis of the price dynamics of various product groups

Product	Corn	Iron ore	Bananas	Rubber	Coal	Aluminum	Palm oil	Soybeans	Rice	Coffee	Cotton	Nickel	Rapeseed oil	Sugar	Zinc	Wool	Price index: metals	Price index: energy	Price index: industrial production	Price index: APSP crude oil
Corn	x	1.00	0.98	0.72	0.41	0.49	0.71	0.87	0.74	0.54	0.54	0.75	0.78	0.58	–0.42	0.11	0.78	0.85	0.78	0.82
Iron ore	x	x	0.99	0.88	0.56	0.60	0.82	0.70	0.78	0.61	0.69	0.83	0.90	0.71	–0.21	0.27	0.97	0.74	0.96	0.72
Bananas	x	x	x	-0.39	-0.10	-0.11	–0.43	–0.60	–0.25	–0.38	–0.21	–0.29	–0.38	–0.55	0.51	0.20	–0.26	–0.56	–0.29	-0.51
Rubber	x	x	x	x	0.67	0.74	0.92	0.70	0.72	0.78	0.85	0.84	0.94	0.87	–0.16	0.39	0.91	0.70	0.94	0.65
Coal	x	x	x	x	x	0.85	0.58	0.36	0.42	0.46	0.71	0.57	0.66	0.56	0.36	0.84	0.68	0.60	0.70	0.57
Aluminum	x	x	x	x	x	x	0.65	0.39	0.45	0.62	0.78	0.76	0.68	0.57	0.39	0.72	0.77	0.60	0.79	0.57
Palm oil	x	x	x	x	x	x	x	0.75	0.72	0.79	0.75	0.80	0.91	0.89	–0.22	0.25	0.85	0.73	0.87	0.67
Soybeans	x	x	x	x	x	x	x	x	0.74	0.45	0.45	0.61	0.77	0.67	–0.37	0.05	0.70	0.84	0.71	0.82
Rice	x	x	x	x	x	x	x	x	x	0.48	0.40	0.64	0.82	0.62	–0.35	0.11	0.76	0.66	0.75	0.63
Coffee	x	x	x	x	x	x	x	x	x	x	0.71	0.78	0.70	0.79	–0.18	0.19	0.68	0.51	0.71	0.43
Cotton	x	x	x	x	x	x	x	x	x	x	x	0.78	0.74	0.68	0.08	0.52	0.78	0.53	0.82	0.49
Nickel	x	x	x	x	x	x	x	x	x	x	x	x	0.82	0.69	–0.09	0.29	0.91	0.72	0.92	0.70
Rapeseed oil	x	x	x	x	x	x	x	x	x	x	x	x	x	0.83	–0.24	0.36	0.92	0.77	0.93	0.73
Sugar	x	x	x	x	x	x	x	x	x	x	x	x	x	x	–0.22	0.23	0.73	0.63	0.76	0.57
Zinc	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0.56	–0.06	–0.21	–0.07	-0.18
Wool	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0.41	0.33	0.43	0.33
Price index: metals	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0.79	0.9968	0.77
Price index: energy	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0.80	0.99
Price index: industrial production	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0.77

Source: Global prices. URL: https://fred.stlouisfed.org (accessed on 11.11.2020).

Table 7

Top commodity derivatives in 2019

No.	Commodity derivative	Exchange	Volume, number of contracts	Underlying asset price	Open interest, end of 2019
1	Futures on Brent oil	Moscow Exchange	616,575,370	25,413,037	2,684,190
2	PTA futures	Zhengzhou Commodities Exchange	312,470,222	8,882,021	918,896
3	Iron Ore futures	Dalian Commodity Exchange	296,538,010	19,873,140	702,827
4	CRUDE OIL futures	CME Group	291,648,494	16,596,793	2,146,037
5	Soybean Meal futures	Dalian Commodity Exchange	272,869,691	7,603,012	2,925,246
6	Methanol futures	Zhengzhou Commodities Exchange	265,094,214	6,100,150	877,821
7	Brent Crude futures	ICE Futures Europe	221,329,190	10,490,953	2,594,785
8	Rapeseed meal futures	Zhengzhou Commodities Exchange**	138,085,360	3,201,333	329,954
9	Palm Olein futures	Dalian Commodity Exchange	135,504,196	7,129,820	888,380
10	CRUDEOILM futures	Multi Commodity Exchange of India	134,909,828	5,390,660	45

Source: The WFE's Derivatives Report 2019. URL: www.world-exchanges.org (accessed on 14.11.2020).

stock market indices on changes in commodity prices.

The initial data for the analysis were obtained at https://fred.stlouisfed.org, the analysis covers 10 years with a monthly breakdown. The results of the correlation analysis of prices for different product groups are presented in *Table 6*.

Insignificant values of pair correlation coefficients show products made of zinc and wool, for the "banana" category the correlation is negative, all other product groups and price indices demonstrate a tangible relationship in price dynamics. However, it is known from the course of economic theory that the factors of demand in different markets cannot be the same, and the level of inflation does not explain the dynamics of prices due to its gradual decline and uneven manifestation.

It is noteworthy that the highest correlation coefficients correspond to the following types of goods: wheat, iron ore, palm oil, soybeans, rapeseed oil, nickel, as well as by composite price indices. If we consider the report on the dynamics of exchange trading in derivatives for 2019, we can see that these commodity groups are the leaders in terms of trading volumes in exchange derivatives as underlying assets (*Table 7*).

Thus, prices for commodities traded on an exchange are determined not by the markets

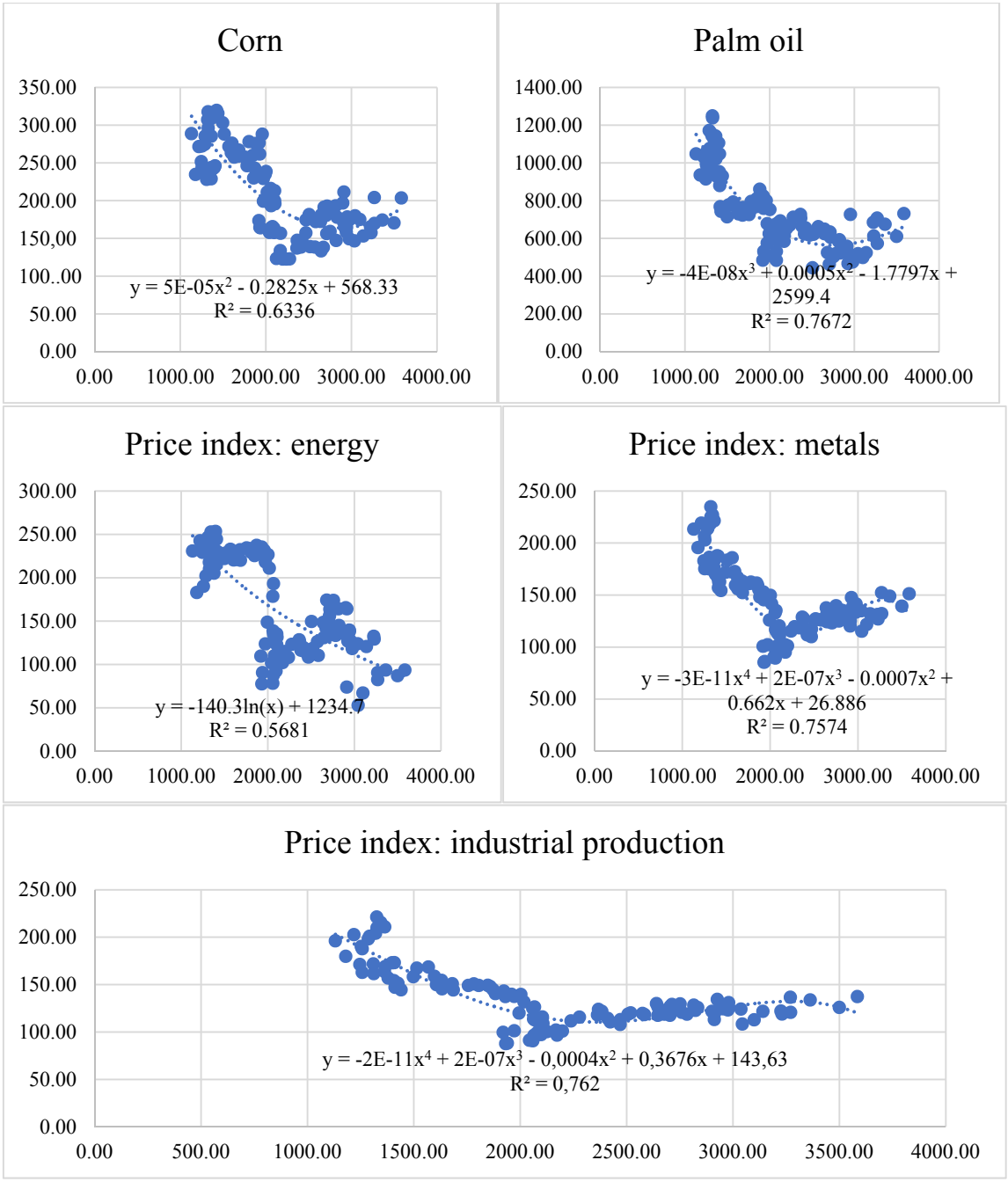

Fig. 10. **Regression on commodity prices and indices on the dynamics of the S&P 500**

Sources: Global prices. URL: https://fred.stlouisfed.org (accessed on 11.11.2020); S&P 500 Dynamic Participation Index. URL: https://www.spglobal.com/spdji/en/indices/strategy/sp-500-dynamic-participation-index/#overview (accessed on 11.11.2020).

of the respective commodities, but by general market trends. Then we need to show the connection to the stock market (*Fig. 10*).

All the figures presented make it possible to unambiguously identify the relationship between the studied values, however, the presence of a "turning point" on all charts is noteworthy: with the S&P index of 2000 points, the direction of the dependence changes. If before 2000 the dependence is strictly inverse, i.e. it seems that commodity markets are becoming an instrument for hedging the risk of changes in the value of shares and are more interesting to investors as a way to diversify the portfolio, then after the index reaches 2000 points, the direction changes, and the

connection becomes direct: an increase in stock prices leads to an increase in prices for goods. This can probably be explained by the speculative sentiment of investors and the inflation of financial bubbles in the markets of various assets. It is interesting to note, however, that the S&P is above 2,000 points in 2014, and we showed earlier that it has been precise since 2014 that banking in the United States has been fully dedicated to the struggle for liquidity. We believe that such a coincidence cannot be called accidental. If the key goal of banking operations is to maximize liquidity, then the real reasons for transactions cease to play any role, and all efforts to overheat the markets are aimed at obtaining a percentage of each exchange transaction when a financial bubble is inflated through credit financing. The condition for achieving the efficiency of using banking resources to inflate a financial bubble is the absolute universality of trading objects and the possibility of their multiple divisibility, regardless of the physical properties of the objects, which is fully achieved through the use of derivative financial instruments.

Meanwhile, it was noted above that the process of financialization by itself does not guarantee the presence of fictitious capital in the economy [26] and, although we have already indirectly proved the opposite, it is necessary to take into account the activities of companies in various sectors of the economy and identify elements of fictitious capital in the results of this activity. The analysis was carried out using the public database of A. Damodaran.[4] Used data on 95 different sectors of the US economy for the period 1999–2019 on 21 indicators of firms' performance. Such coverage is necessary to identify not specific trends, but the "general line" of the behavior of US firms in real and financial markets.

The purpose of this phase of the study is to identify changes in the patterns that channel the financial resources of firms. The results of the analysis of the dependences of the indicators are presented in *Table 8* (by year) and *9* (by industry).

We will give an interpretation of the obtained analysis results. *Table 8* shows how the structure of financial impulses changes over time and what financial decisions companies make. The conclusions are as follows:

The number of firms in the industry is not affected by the size of net profit and market capitalization (in *Table 8* the calculated values of the correlation coefficients for these ratios are close to 50%, with the exception of 2003). Moreover, there is a downward trend in the number of public companies due to the concentration of financial resources among the recognized leaders of various industries and the lack of the possibility of real competition with them in the financial markets due to the massive advantage in terms of market liquidity of financial instruments issued by market leaders [27].

The influence of the size of net cash flow on market capitalization is gradually weakening, which was also typical in the run-up to the 2007–2008 crisis. For example, in 2003–2004 the dynamics of the market capitalization of the flow was 90% in accordance with the dynamics of the net cash flow (NCF), while in the pre-crisis 2006 the correlation coefficient was 1%. Currently, the correlation coefficient for this ratio does not exceed 70%.

Net profit, on average, has a greater impact on market capitalization than net cash flow, which can be the result of poor investment policies or excessive dividend payments. The correlation coefficient in this pair of factors does not fluctuate as much as when comparing market capitalization to net cash flow. Partly, this may be due to the fact that net cash flow is a more objective financial indicator, being exempted from tax and accounting aspects of its formation. However, we believe that the after-tax profit distribution process is also a factor of the greater volatility of the dependence of capitalization on cash flow.

Net profit of companies does not correlate with the level of capital investments. For a given

[4] Damodaran Online. URL: http://people.stern.nyu.edu/adamodar/New_Home_Page/dataarchived.html (accessed on 19.10.2020).

pair of factors, none of the analysis periods gives a stable relationship (*Table 8*). Consequently, reinvestment of profits is not an important way of financing capital investments. The reason lies in leverage and excessive dividends, as well as share buybacks to maintain fictitious capitalization [17].

The relationship between dividends and the size of net profit is weakening, in other words, to support the demand for liquidity from investors, companies are looking for resources other than financial indicators. So, according to *Table 8*, if in 1999 88% of dividend payments could be attributed to the dynamics of net profit, then in 2019 — only 61%. As the impact of dividends on capitalization is also weakening, the reason for this is the buyback of shares.

Weighted average cost of capital according to *Table 8* has practically no effect on market capitalization, despite the fact that when conducting financial analysis, the weighted average cost of capital cannot but influence the discount rate (the discount rate considered when analyzing the time value of cash flows, as a rule, cannot be lower than the price of attracting financial resources. Since discounted cash flow is the basis for predicting the prices of financial instruments, including shares, there should be a negative relationship between capitalization and the weighted average cost of capital. The absence of such dependence can be the result of either incorrect estimation of discount rates by decision-makers, or the lack of influence of the price of raising capital on the dynamics of market capitalization.). Since in this case the standard deviation and beta of stock prices also do not have a significant impact on capitalization, we conclude that the liquidity risk of stocks is not considered when making an investment decision. The concept of accounting for liquidity risk [2], reflected, for example, in the Merton model, is based on the fact that market liquidity depends on the ratio between the market capitalization of a company and the size of its debt predicted by investors. When assessing the forecast capitalization considering the liquidity risk in accordance with this model, it is necessary to take into account the beta coefficient, the level of volatility of the share price, and the weighted average cost of capital. The lack of connection between capitalization and the listed parameters indicates either a violation of the basic principles of market fundamentalism or incorrect assessments of market participants. In any case, the concept of assessing liquidity risk does not work in practice, since the latter is viewed by financial speculators to a greater extent as a possibility of appropriating liquidity, rather than as a threat of portfolio losses.

An additional argument is that the equity ratio is not related to the cost of borrowed capital, which also contradicts the basic parameters for assessing solvency, which are used, by the way, by rating agencies and banks. We see that the ability to attract liquidity from the stock market does not depend either on liquidity risks (market) or on solvency indicators (balance sheet), i.e. in fact, activity in the financial markets exists in isolation from the results of the activities of firms, which clearly indicates the fictitiousness of the capitals serving this process.

The level of dividends is not related to economic added value, although dividends affect the weighted average cost of capital in the EVA formula, which clearly indicates the independence of the results of using investments and their ability to generate profit in the matter of paying dividends [22]. Economic value added indicates whether investors have a better way to allocate their assets, however, if investors are only interested in cash flow in the form of dividends, such conventions can be ignored.

There is a stable relationship between the size of capital investments, net working capital, and dividends, and the amount of borrowed funds. The exception is the pre-crisis years of financial bubble inflation (2005–2007) [7]. All other time intervals are characterized by a stable strong connection between indicators. In other words, borrowed funds are used to finance investments, are necessary to replenish working capital and

Table 8

Results of the analysis of the mutual influence of various indicators of the performance of companies in the United States (by year)

Correlation coefficients	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Number of firms by industry – net profit	0.434	0.234	0.206	0.164	0.987	0.391	0.439	0.402	0.065	0.393	–0.053	0.170	0.243	0.392	0.286	0.299	0.044	0.048	0.338	0.261	0.316
Number of firms by industry – market capitalization	0.598	0.591	0.561	0.531	0.994	0.605	0.608	0.590	0.498	0.465	0.550	0.590	0.532	0.558	0.448	0.461	0.497	0.514	0.529	0.511	0.495
Number of firms by industry – spread	0.516	0.407	0.327	0.325	0.151	0.312	0.295	0.334	0.368	0.364	0.227	0.276	0.383	0.387	0.231	0.330	0.318	0.025	0.221	0.119	0.079
Market capitalization – net cash flow	0.501	0.187	0.605	0.691	0.985	0.801	0.549	–0.109	0.080	0.272	0.495	0.504	0.679	0.942	0.220	0.411	0.373	0.481	0.759	0.622	0.688
Market capitalization – net profit	0.828	0.324	0.728	0.625	0.994	0.858	0.909	0.891	0.065	0.873	0.570	0.615	0.773	0.931	0.577	0.826	0.563	0.514	0.826	0.712	0.768
Net profit – capital investment	0.065	–0.169	–0.018	–0.018	–0.004	0.057	0.060	0.050	0.013	0.079	0.024	0.061	0.012	–0.020	–0.080	–0.132	–0.026	0.039	0.020	0.010	–0.067
Net profit – dividends	0.880	0.849	0.786	0.700	0.994	0.840	0.875	0.889	0.817	0.931	0.703	0.679	0.787	0.925	0.508	0.733	0.420	0.442	0.718	0.678	0.614
Net profit – net working capital	0.383	0.427	–0.073	–0.280	–0.901	0.145	–0.447	0.344	0.333	0.148	–0.135	0.203	–0.105	–0.437	0.070	0.234	0.122	0.219	0.089	–0.003	0.143
Market capitalization – book value of equity	0.796	0.821	0.684	0.778	0.998	0.881	0.904	0.937	0.850	0.820	0.846	0.858	0.853	0.853	0.728	0.752	0.706	0.781	0.723	0.665	0.621
Market capitalization – equity ratio	0.301	0.290	0.258	0.139	–0.003	0.074	n/a	n/a	n/a	0.193	0.117	0.071	0.075	0.037	0.217	0.117	0.206	0.130	0.152	0.267	0.306
Market capitalization – dividends	0.754	0.215	0.756	0.787	0.994	0.869	0.873	0.901	0.095	0.853	0.883	0.841	0.897	0.923	0.751	0.789	0.704	0.759	0.707	0.655	0.640
Market capitalization – weighted average cost of capital	0.381	0.229	0.216	0.077	0.003	0.131	n/a	n/a	n/a	0.077	–0.076	–0.066	–0.053	–0.061	–0.020	n/a	0.099	0.023	0.059	0.176	0.136

Table 8 (continued)

Correlation coefficients	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Market capitalization – standard deviation of market prices	0.251	0.276	0.224	0.055	0.050	–0.011	0.120	0.159	0.224	0.161	0.147	0.163	–0.030	0.223	0.011	0.001	0.039	–0.057	–0.066	0.095	0.109
Market capitalization – Beta	0.339	0.176	0.166	0.056	–0.005	0.127	0.100	0.104	0.036	–0.088	–0.169	–0.151	–0.159	–0.111	–0.146	–0.230	–0.113	–0.158	–0.077	0.001	–0.081
Equity ratio – capital investment	0.017	–0.025	–0.128	–0.280	–0.042	–0.176	n/a	n/a	n/a	–0.034	–0.036	–0.084	–0.037	–0.054	–0.115	–0.062	–0.142	–0.159	–0.162	–0.093	–0.081
Capital investment – EVA	0.754	0.183	–0.093	0.509	0.670	0.851	0.335	0.219	0.269	0.459	0.585	0.227	0.390	0.670	–0.245	n/a	–0.192	–0.057	–0.004	0.073	0.117
Depreciation – cost of debt	0.051	0.004	0.090	0.074	n/a	0.115	0.036	0.099	0.128	0.090	0.036	–0.056	0.003	0.045	–0.045	n/a	0.270	0.156	0.015	–0.078	0.025
Cost of debt – equity ratio	0.405	0.287	0.161	0.193	n/a	0.209	n/a	n/a	n/a	0.048	0.085	0.208	0.226	0.153	0.276	n/a	0.003	0.125	0.139	0.186	0.264
EVA – Beta	0.094	–0.078	–0.189	–0.188	–0.145	n/a	–0.115	–0.066	–0.028	0.028	–0.184	–0.292	–0.158	–0.108	0.116	n/a	0.074	0.066	0.158	0.234	0.141
EVA – dividends	0.626	0.319	0.189	0.255	0.733	#N/A	0.337	0.319	0.061	0.493	0.721	0.565	0.561	0.807	0.181	n/a	–0.032	–0.024	–0.039	–0.070	0.006
Capital investment – debt	0.422	0.390	0.601	0.472	0.964	0.411	0.218	0.219	0.149	0.193	0.255	0.239	0.186	0.183	0.082	0.083	0.076	0.106	0.105	0.110	0.119
Capital investment + net working capital + dividends – debt	0.969	0.713	0.980	0.953	0.985	0.902	0.334	0.266	0.180	0.567	0.963	0.954	0.964	0.964	0.973	0.956	0.951	0.934	0.919	0.903	0.899
Weighted average cost of capital – standard deviation of the market prices of a stock	0.640	0.749	0.763	0.786	0.506	0.120	0	0	0	0.462	0.504	0.562	0.148	0.411	0.718	0	0.443	0.553	0.599	0.495	0.430
Weighted average cost of capital – Beta	0.806	0.938	0.950	0.943	0.695	0.967	n/a	n/a	n/a	0.696	0.837	0.830	0.805	0.844	0.860	n/a	0.733	0.745	0.843	0.868	0.838

Source: Damodaran Online. URL: http://people.stern.nyu.edu/adamodar/New_Home_Page/dataarchived.html (accessed on 19.10.2020).

Table 9

Results of the analysis of the mutual influence of various indicators of the performance of companies in the United States (by industry – selectively)

Industry	Number of firms in the industry – net profit	Number of firms in the industry – market capitalization	Number of firms in the industry – spread	Market capitalization – net cash flow	Market capitalization –net profit	Market capitalization – book value of equity	Market capitalization –equity ratio	Market capitalization – dividends	Market capitalization – weighted average cost of capital	Market capitalization – standard deviation of market prices	Equity ratio – capital investments	Capital investments – EVA	Depreciation – cost of debt	Cost of debt – equity ratio	Eva –Beta	Eva – dividens	Capital investments – debt	Capital investments + net working capital + dividends – debt
Advertising	–0.07033	0.128241	0.171814	0.307086	–0.26548	0.368879	0.590194	0.370634	0.330382	–0.2928	–0.10316	–0.40057	–0.04753	0.011211	–0.28515	–0.21332	0.515824	–0.00926
Aerospace/ Defense	0.548737	0.586996	0.397509	0.372549	0.650408	0.811033	0.379787	0.466147	0.167956	0.419945	–0.2125	0.679233	–0.01524	0.282469	0.165569	0.242245	0.442937	0.266511
Air Transport	–0.24336	0.193749	–0.2041	0.087196	0.127214	0.008349	0.675161	0.500772	0.077721	–0.36291	–0.23395	0.03317	–0.20747	–0.57057	0.017565	–0.04769	0.831864	0.851195
Apparel	–0.02341	–0.09003	0.624351	0.179446	0.521668	0.767288	0.694944	0.843118	0.275507	–0.06498	0.100827	0.575059	–0.16781	0.021931	–0.40349	0.045452	0.857229	0.70108
Auto and Track	–0.7426	–0.63309	0.243515	0.863009	0.952922	0.992124	–0.61069	0.982442	–0.31149	–0.0644	–0.65588	0.353261	0.001761	0.319424	–0.15414	0.336544	0.999393	0.998879
Banks	0.882287	0.902418	–0.15035	0.994697	0.993477	0.99328	0.120653	0.993012	0.066395	–0.19153				0.019859				0.900709
Building Materials	0.060202	–0.21733	0.300387	–0.07763	–0.45136	0.075939	0.628124	–0.12086	0.254133	–0.06201	0.102405	0.212475	–0.05748	0.192844	–0.20765	–0.11838	0.680594	0.525532
Chemicals	–0.05052	–0.09409	0.692141	0.05942	0.775595	0.808748	0.428584	0.027205	–0.135	–0.08666	0.02466	0.528771	–0.1723	–0.15029	–0.33603	0.077721	0.258456	0.147921
Computers/ Peripherals	0.306374	0.171278	–0.30568	0.405832	0.64222	0.604893	0.615573	0.037925	0.114876	–0.3512	–0.15529	–0.41717	–0.1167	0.023811	–0.10571	0.061064	–0.33637	–0.29169
Electrical Equipment	–0.14146	0.129337	–0.02376	0.025126	–0.17473	0.476224	0.490304	–0.1531	0.027287	–0.1569	–0.58317	–0.0506	–0.2701	0.118252	–0.41506	–0.51553	0.160631	0.320687

Table 9 (continued)

Industry	Number of firms in the industry – net profit	Number of firms in the industry – market capitalization	Number of firms in the industry – spread	Market capitalization – net cash flow	Market capitalization –net profit	Market capitalization – book value of equity	Market capitalization –equity ratio	Market capitalization – dividends	Market capitalization – weighted average cost of capital	Market capitalization – standard deviation of market prices	Equity ratio – capital investments	Capital investments – EVA	Depreciation – cost of debt	Cost of debt – equity ratio	Eva –Beta	Eva – dividens	Capital investments – debt	Capital investments + net working capital + dividends – debt
Financial services	0.469795	0.325708	–0.47972	0.267	0.225289	0.19916	0.257398	0.410195	–0.05965	–0.25254	–0.58636	n/a	–0.61505	0.352012	n/a	n/a	0.882891	0.062402
Homebuild-ing	–0.61494	–0.00703	0.191454	0.089756	0.305148	0.753534	0.505384	–0.32392	0.123469	–0.03942	0.13545	0.161129	–0.05895	0.168107	–0.49463	–0.50351	0.629132	–0.32191
Internet	–0.05123	0.023354	0.251875	0.118706	0.181548	0.012906	0.473357	n/a	–0.18695	–0.06982	–0.10318	n/a	–0.07444	–0.0467	n/a	n/a	–0.70655	–0.4621
Machinery	0.122218	0.445231	–0.07311	0.521295	–0.08241	0.772487	0.215566	–0.05122	–0.21153	–0.31267	–0.41262	0.354419	–0.08217	–0.10476	0.074854	0.086554	0.510462	0.378482
Semicon-ductor Equipment	0.276343	0.407505	–0.15126	0.495549	0.469785	0.676411	0.555987	n/a	0.247913	–0.01168	–0.13814	0.006959	–0.20289	–0.17133	0.45505	n/a	0.213787	0.230355
Steel	–0.77068	0.464427	0.022314	–0.11501	–0.51038	0.698732	0.324391	0.20858	0.151237	–0.18915	–0.31349	0.198935	–0.2406	0.124839	–0.00132	0.069145	0.794808	0.379726
Telecommu-nication	0.445719	0.244915	0.317003	–0.07416	0.078647	0.719075	0.613053	0.076894	0.097796	–0.49623	–0.13133	0.418156	–0.05682	–0.51228	–0.0131	0.286088	0.942596	0.943481

Source: Damodaran Online. URL: http://people.stern.nyu.edu/adamodar/New_Home_Page/dataarchived.html (accessed on 19.10.2020).

Table 10

Results of the regression analysis of FDI outflows

Country, number of observations	R 2 multiple regression	Significance F	Internal corporate debt-to-GDP coefficient	P-value	Capitalization coefficient	P-value
Austria, 19	0.4424	0.00935	928.87	0.018	72	0.056
Belgium, 13	0.157	0.275	296.603	0.76	77.33	0.14
Luxembourg, 18	0.51206	0.0046	7.02	0.97	383.177	0.00149
Germany, 19	0.41076	0.01453	371.259	0.673	68.4455	0.0193
France, 19	0.077805	0.52309	292.2	0.7742	11.38961	0.5472
Netherlands, 19	0.01911	0.857	229.647	0.951	36.775	0.6
Switzerland, 27	0.47804	0.000408	443.781	0.58	39.527	0.027
UK, 30	0.2156	0.0377	90.32	0.87523	54.917	0.0197
USA, 30	0.4284	0.0005253	–4.345	0.204	4002.144	0.00098
Canada, 19	0.56077	0.00139	468.725	0.02386	0.000000014	0.15187
Japan, 30	0.68245	0.000000188	–1204.47	0.00272	28.6914	0.000086
China, 17	0.82295	0.0000055	996.17	0.14371	12.5455	0.0135
Hong Kong, 30	0.70616	0.00000007	204.782	0.273	14.55	0.0024

Sources: compiled by the authors on the basis of UNCTAD World Investment Report FDI inflows / outflows. URL: https://unctad.org/topic/investment/world-investment-report (accessed on 05.12.2020); World Bank Open Data URL: https://data.worldbank.org (accessed on 05.12.2020).

pay dividends, but all this has nothing to do with an increase in economic added value and an increase in market capitalization due to a stable cash flow. We see that balance sheet indicators (capital investments, working capital, payments on equity capital) are formed through loans, and this is one of the areas of corporate finance in the United States, and market indicators exist in isolation from this process and are characterized by own dynamics, regardless of indicators balance.

As a result, we find that financing of activities is carried out regardless of its performance through borrowed funds, but at the same time market capitalization is an independent tool for managing liquidity in financial markets, since its dynamics do not take into account the fundamental financial risks of issuers. In this case, firms become intermediaries, transferring momentum from banks to financial markets and transferring bank liquidity there, accumulating liabilities on balance sheets and inefficiency of fixed assets.

Table 9 allows us to detail the findings in terms of differences in the behavior of industries in the financial markets. When considering the data for the entire period of analysis, but with a grouping by industry, it can be seen that most industries actively use the debt financing method, the links between fundamental indicators are even less significant [22]. Stronger links between fundamentals by industry can

Table 11

Results of the regression analysis of FDI inflows

Country, number of observations	R 2 multiple regression	Significance F	Stock turnover coefficient	P-value	Trading volume coefficient	P-value
Austria, 30	0.2008	0.048	–4.49	0.58	314.1	0.014
Belgium, 13	0.3188	0.14663	–816.57	0.1	2292.98	0.064
Luxembourg, 18	0.00557	0.95899	–8709.57	0.844	5950.08	0.873
Germany, 30	0.48857	0.00012	–436.441	0.00248	1656.62	0.0000249
France, 25	0.1718	0.1256	–50.8788	0.75	246.247	0.1493
Netherlands, 25	0.57688	0.000078	–291.57	0.011	616.28	0.000029
Switzerland, 30	0.0447	0.539	–150	0.3437	111.7	0.303
UK, 19	0.504	0.003637	–79.92	0.885	1332.26	0.0168
USA, 29	0.6373	0.0000019	–905.7	0.014	1747.09	0.000073
Canada, 30	0.58289	0.0000075	63.1336	0.77	675.145	0.004218
Japan, 30	0.2521	0.01979	52.44	0.3527	39.898	0.49148
China, 17	0.45594	0.01411	320.667	0.05131	–133.354	0.444
Hong Kong, 30	0.6162	0.0000024	–550.658	0.0738	153.405	0.0000007

Sources: compiled by the authors on the basis of UNCTAD World Investment Report FDI inflows / outflows. URL: https://unctad.org/topic/investment/world-investment-report (accessed on 05.12.2020); World Bank Open Data URL: https://data.worldbank.org (accessed on 05.12.2020).

be seen in sectors such as banks, automotive, computers, electronics, and semiconductor manufacturing, chemicals, and the Internet and telecommunication.

The auto industry, an industry with a high share of US exports, clearly demonstrates exclusively debt financing and a negative relationship between the dynamics of the equity ratio and market capitalization. We have low balance sheet liquidity, financing of capital investments against the background of a decrease in the share of our own funds in the balance sheet, with an increase in capitalization and a priority export regime.

An analysis of the world economy in the context of financialization and the movement of liquidity flows is impossible without taking into account the dynamics of foreign direct investment. Since the purpose of this work is to assess the impact of globalization trends in financing on the formation of fictitious capital that obeys exclusively the laws of redistribution and violates the contours of reproduction of the world economy, we will conduct a regression analysis of the influence of financial market indicators on the dynamics of foreign direct investment [28].

To do this, we used a set of multiple linear regression tools (autoregression is not applicable due to the extremely limited amount of input data for analysis). The outgoing flows of foreign direct investment were analyzed in terms of the impact on them of the internal debt of resident companies and the dynamics

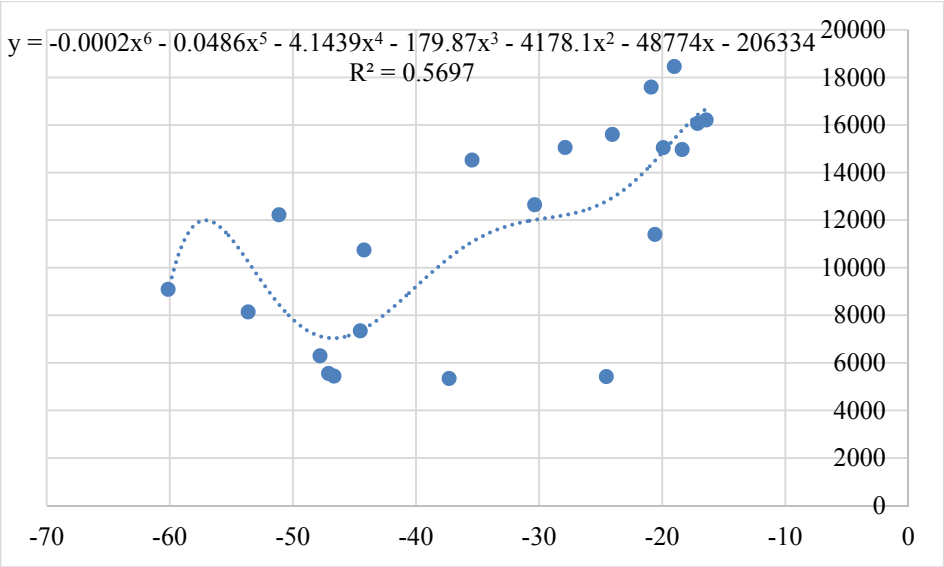

Fig. 11. **Dependence of global investment in fixed assets on the US international financial flows (% of GDP)**

Sources: Balance of payment analytical presentation by country. URL: https://data.imf.org/?sk=7A51304B-6426–40C 0–83DD-CA473CA1FD 52&sId=1542633711584 (accessed on 19.10.2020); Gross fixed capital formation data. URL: https://data.worldbank.org/indicator/NE.GDI.FTOT.CD (accessed on 19.10.2020).

of the market capitalization of national companies (in the original version, the analysis perimeter also included the share of income tax in company profits) to identify offshore flows, the share of finance in GDP, the share of services in GDP, and the share of financial services in the export of services, however, the listed indicators at the preliminary stage of the analysis did not show significant regressions). Incoming flows of foreign direct investment were tested for the dependence on the share turnover ratio in the domestic stock market and on the volume of stock trading in the domestic stock market in relation to the country's GDP (initially, the hypothesis of the influence of the share of industry in GDP on the dynamics of FDI was also tested, but the performance of the model was violated). The analysis period is 1990–2019 (for a number of countries, the range of analysis is already due to the lack of official data) the analysis was carried out on the basis of absolute values, as well as the growth rates of indicators to improve the quality of the models. The results of the regression analysis are presented in *Table 10, 11*.

The highlighted cells correspond to insignificant regressions or low significance of this or that factor, however, despite the presence of such values, often explained by the limitation of the sample size, we can talk about the presence of certain trends.

Firstly, for most of the countries under consideration, which are active players in the financial markets, there is a significant regression with a high proportion of the explanatory power of the influence of the factors under consideration on the flows of foreign direct investment. For example, 68.25% of outgoing foreign direct investment flows to Japan are explained by the mutual influence of debt and capitalization of the domestic market, and an increase in debt by 1% in relation to GDP explains a decrease in outgoing direct investment at the expense of $ 1204.47 million, and an increase in Japanese capitalization — to increase the outflow of FDI by $ 28.69 million. Another example, the inflow of FDI to Germany by 48.86% is explained by the dynamics of the domestic stock market and the acceleration of stock markets. Turnover by 1% leads to a decrease in FDI by $ 436.41 million, and an increase in trading volumes leads to an increase in FDI by $ 1,656.62 million.

Secondly, in *Table 11*, the attention to the prevalence of negative values in the column Coefficient of the factor "stock turnover" should be paid. This indicator can be obtained by dividing the volume of trading in shares by capitalization (no autocorrelation was found), while the dynamics of the trading volume has a positive, significant, in most cases, impact on the dynamics of the inflow of foreign direct investment. In addition, we note that the indicators used for the regression analysis of FDI inflows are also indicators of market depth in assessing its liquidity, which explains their choice. As a result, we find that the connecting link in the considered models is the capitalization of the domestic stock market, which is the main factor influencing the movement of FDI.

In the model of foreign direct investment inflow, the following logical relationship can be distinguished: when the turnover of trade in the stock market grows faster than market capitalization, the inflow of FDI slows down, and if there is a reverse trend, the inflow to this market accelerates. Capitalization, together with an increase in debt obligations (with the exception of the United States and Japan, where an increase in debt leads to a decrease in investment abroad) has a direct impact on the outflow of foreign direct investment by resident companies: the faster capitalization increases, the more intensive investment by residents abroad.

The lack of relationship between FDI and productivity in the recipient country, noted in the works of J. Stiglitz [5] and P. Krugman [29], D. Rodrik [30] and W. Easterly [31], enhances the negative impact of our findings. On average, half of the FDI inflow is associated with changes in the capitalization of national stock markets, and the growth in capitalization accelerates both the inflow and outflow of foreign direct investment. It is also interesting to note that international financial flows (from the point of view of the balance of payments as a whole), serving as the center of attraction for global finance, negatively affect the dynamics of investments in fixed assets. We consider the ratio of the level of financial capital attracted to the United States and the level of global investment in fixed assets (*Fig. 11*).

This conclusion, in our opinion, is indirect but obvious evidence of the presence of fictitious capital in the financial relations of the world economy in terms of the movement of foreign direct investment and explains a significant part of their total volume circulating between the centers of the world economy.

CONCLUSIONS

The process of financialization of the world economy today has become, firstly, difficult to analyze, and secondly, completely uncontrollable. The process of unmanageability of national economies is indicated, in particular, by the fact that, despite the change in the structure of GDP, only a few countries were able to briefly approach the dynamics of pre-crisis growth rates. The complexity and often the impossibility of establishing links between indicators of real output, productivity, capital intensity and the dynamics of financial flows leads to erroneous financial decisions at the level of private investors, companies, states and international organizations. The placement of financial resources in the US markets contributes to inflating financial bubbles, enhancing imbalances between the indicators of financial markets and the real sector, which ultimately poses a threat to the stability of global liquidity and the speculative nature of its circulation. Of particular concern are global derivatives markets, of which they are not key characteristics.

There is a number of indirect evidences of the chaos that has arisen in world finance, but we believe that the most important task of theoretical comprehension and practical analysis today is to find ways to protect capital from the threat of loss by withdrawing liquidity and forming fictitious capital in its place. Without pretending to solve this

problem as a whole, the authors proposed a methodological approach that makes it possible to identify the presence of fictitious capital and the forms of its manifestation on the basis of publicly available statistical data on the state of the banking sector and corporations at the center of the world financial system, the dynamics of foreign direct investment and the derivatives market. Identifying causal relationships and justifying tools for assessing the sources of fictitious capital and the forms of its manifestation in world financial markets will allow investors to avoid investments in toxic speculative instruments, and regulators — to timely predict the likelihood of a financial crisis in a particular market with signs of a financial bubble.

Signs of fictitious capital in the corporate sector include: independence of market liquidity from solvency in terms of balance sheet ratios, independence of capitalization from fundamental indicators of economic sector development, transformation of fundamental risks into opportunities for trading and arbitrage on a scale that significantly exceeds the calculated risk positions, not the main indicators of investment attractiveness are taken into account when making decisions on capital allocation.

Fictitious capital that does not have "citizenship" becomes an active participant, accounting for up to 50% of foreign direct investment plying between financial centers, traditional or developing. If a slowdown in capitalization in a certain market leads to an increase in foreign direct investment both in the direction of inflow and outflow, then this often indicates a financial bubble as a result of the formation of fictitious capital, i.e., the withdrawal of liquidity from production and trade sectors.

The process of increasing international turnover of financial resources through the United States is accompanied by a decrease in global investment in fixed assets, which indicates an increase in the impersonality and universality of financial capital when it turns into fictitious forms. Indeed, if banks direct resources in such a way that through firms they return to the financial market in a liquid form, then the process of their reinvestment seems questionable. In the same way, the diversion of resources to the US financial sector leads to their refusal to reproduce real capital by repackaging them into universal "faceless" units of fictitious capital that can quickly circulate and pass through the balance sheets of firms only to preserve sources of liquidity.

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Food Security: State Financial Support Measures for Sustainable Development of Agriculture in Russian Regions

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ABSTRACT

In the context of global economic instability, the problem of ensuring food security and sustainable development of agriculture at the international, national and regional levels becomes urgent. Existing methods for assessing the state of food security and sustainable development of agriculture, as a rule, have two main drawbacks: first, they are often static, and second, they include a scattered list of indicators that are difficult to systematically interpret in the analysis. Therefore, the **aim** of the study is to develop an adequate methodology for assessing the food security of the constituent entities of the Russian Federation. The construction of a thematic index is carried out in three stages: 1) a system of indicators is formed; 2) the values of indicators are normalized; and 3) sub-indices are calculated. The analysis of domestic and foreign literature on food security provided the **methodological basis** of the study. The system of indicators was clarified, which were combined into three groups (numerical indicators of the sphere of production, distribution, consumption, and food). The authors extended the retrospective assessment of food security at the meso-level by ranking and clustering Russian regions using hierarchical analysis and a new data filtering algorithm. The hierarchical procedure is based on a system of mathematical filtering of data, which is fundamentally different from existing methods for analyzing hierarchies. The authors replaced the fuzzy "what if" logic with a clear subordination of ranked indicators (subindices). The group of leaders was selected considering the accepted priority of indicators, the rest of the regions were united into a new subgroup, among which leaders and outsiders were singled out. At each new stage, new groups are ranked after excluding leaders and outsiders, they are in the "center of the circular convolution of data", the procedure for stopping the procedure is the presence of two groups. This is a fundamental feature, scientific novelty, and value of the mathematical apparatus for multidimensional ranking of Russian regions in terms of food security. The authors **concluded** that in modern Russia the problem of food security has not yet been resolved due to the insufficient use of general economic and special levers to increase the stability of the food system. The results of the study can be applied in the process of updating the state policy in the field of ensuring the sustainability of food systems at the macro- and meso-level of management.

Keywords: food security; regions of Russia; financial state support; Agriculture; index method; hierarchical analysis

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INTRODUCTION

The processes of globalization taking place in the economy have led to population growth, changes in consumption, production and trade patterns, and also significantly influenced the well-being of people around the world. Currently, the concepts of sustainable agricultural development and food security are dominant among many theories of socio-economic and environmental development.

World practice has developed many methods and a rather complex mechanism of state support and stimulation of the development of agriculture, which includes: a system of regulation of the agrarian market and agricultural production, various instruments of influencing the incomes of various agricultural producers, as well as the rural social structure, inter-sectoral and inter-farm relations. Empirical experience shows the dependence, in which the higher the level of government regulation, the higher the degree of self-sufficiency of the country in food. A critical analysis of modern concepts of the state's regulatory impact on agribusiness indicates the existence of a differentiated state policy even in economically developed countries. For example, the EU countries take a socially and environmentally friendly approach, while the US applies strict regulation [1–5].

In this context, a number of new questions arise about the role of the state in providing affordable and high-quality food for various segments of the population living in both urban and rural areas. At the same time, it should be noted that, in general, there are few and little-known global studies that assess food systems using several indicators of sustainability [6, 7]. There is only a partial understanding of how systems function at different levels of government, which prevents decision-makers from influencing food quality. At the same time, a review of scientific works indicates a lack of agreement among researchers regarding the need for certain indicators (justification for their choice is not provided) in the system of thematic assessment [8, 9]. The consequence of this is a high level of risk of cross-correlation between indicators, which ultimately can lead to distortion of the assessment results.

The sanctions pressure on the Russian economy from the EU countries and the United States made the issue of ensuring food security and sustainable development of agriculture urgent. The study of various aspects of food security and sustainable development of agriculture plays an important role in improving state policy in relation to the country's agro-industrial complex. In turn, this policy involves the development of effective measures of state support for domestic agricultural producers, primarily of a financial nature, considering the positive foreign experience. In modern conditions, this is impossible without an objective assessment of the results achieved (based on competitive benchmarking methods) using modern high-precision methods of economic and mathematical modeling. The foregoing predetermined the objectives of the study, which consists of developing an adequate methodology for assessing the food security of the constituent entities of the Russian Federation and systematizing measures of state financial support for sustainable agricultural development. To achieve the set objectives, it is necessary to address a number of tasks:

- analyze and classify food security assessment studies;
- build a food security index with methodological features;
- use it to conduct a retrospective assessment of the food security of the regions of Russia;
- to rank and cluster the constituent entities of the Russian Federation by the level of food security using the author's hierarchical procedure;
- to study the positive foreign experience of state financial support for sustainable agricultural development.

THEORETICAL AND METHODOLOGICAL ASPECTS OF ASSESSMENT OF FOOD SECURITY OF THE COUNTRY AND ITS REGIONS

Research on food security and sustainable agricultural development is a relatively new direction in economics that emerged at the end of the 20th century. This problem in a changing economy is complex and multifaceted, and it receives increased attention both in foreign and domestic literature. A significant number of works are devoted to issues directly or indirectly related to the research topic, which may be divided into several groups.

The first group includes few, but relevant works devoted to assessing the impact of economic globalization on the food security process as a result of the impact of a number of factors (population growth, changes in consumption patterns, production and trade patterns). For example, foreign authors [10] from the University of Athens and the UK Business School discuss the following issues: how globalization affects state policy in the field of food security; what is the degree of influence of global chains on the value creation process (*GVC*); dominance in trading markets; the role of investment and international markets for agricultural products. According to their hypothesis, there is a strong relationship between food security and globalization, which is characterized by the volume of investments and financing models of the agri-food sector of the economy.

The second group includes numerous international researches devoted to the study of the factors in the multi-indicator assessment of global food systems. For example, in the work of modern scientists from Switzerland and the USA [11], a multi-indicator assessment of the sustainability of global food systems is presented. The system of indicators proposed by them makes it possible to comprehensively assess the food security of the country and clarify the directions of development of the country's agriculture. It should be noted that the number of indicators required for assessment may vary from country to country depending on their geographic location, the quality of life of the population, and national dietary habits.

In the work of an international group of researchers from the International Center for Tropical Agriculture of Columbia, University of California, scientists from France, and the University of Denver, USA [12], a global map of food system sustainability was presented for the first time based on the analysis of data from 156 countries using 25 indicators combined into 7 groups. The study proposes an assessment of the development of food systems using such groups of indicators as nutrition, environment, food availability, socio-cultural well-being, sustainability, food safety, and the level of food spending.

The third group of scientific works includes studies of regulatory measures and support for the agri-food sector of the economy of European countries. For example, in [13], the authors considered the factors affecting the economic stability of agriculture, the impact of support policies on production efficiency, and the opportunities for economic growth. Their calculations demonstrate the effectiveness of the EU's Common Agricultural Policy in subsidizing agriculture.

The fourth group of investigated problems of theoretical substantiation and empirical measurement of the concept of sustainable development [14, 15].

And, finally, the fifth group of studies includes scientific works of Russian agricultural economists A. I. Altukhova [16], I. N. Buzdalova [17], G. I. Panaedova [18], N. Shagayda [19, 20], and a number of others [21–23] who study the problems of the state agraricultural policy of the Russian Federation. They provide data on the current state and directions of development of the agricultural sector in our country and focus on the need to adapt the accumulated world experience to the changing economic situation in Russia.

There is growing interest among researchers and analysts in the ability to define and empirically measure the resilience of food systems. Therefore, we focus on the methodological side of the issue. In our opinion, the approach can be implemented in five stages.

First stage. The theoretical aspects of food security include the definition of the required list of peer-reviewed articles, documents, and reports of expert groups and international development agencies, which discuss indicators of the sustainability of the food system.

The ***second stage*** includes a review of more than 80 documents, which shows that the literature on food systems typically distinguishes four dimensions of sustainability: economic, social, food security, and environmental. For example, the group of economic indicators includes the degree of openness of the economy, the level of debt, the budget deficit, the balance of export-import trade operations, GDP, GNI, etc. In turn, social indicators include unemployment rate, Gini coefficient, life expectancy at birth, health care costs, etc.

Third stage. To assess food security, the economic literature contains a large number of indicators that measure various aspects of economic sustainability.

The ***fourth stage*** in assessing food security is based on comparing the dynamics of investment and agricultural production. The impact of the size of budget funding on the results of agricultural production and food security is assessed.

Fifth stage. In the course of the study, the materials of the official websites of international organizations, regulatory legal acts, materials of ministries and departments, forms of state support, and trends in its development in the EU countries, the USA, China and the Russian Federation were analyzed.

Based on a review of thematic literature to assess the food security of a country and its regions, we consider it possible to apply a food security index, which includes three sub-indices and is calculated using the formula below:

$$I\,FP = f(P, D, C), \quad (1)$$

where *I FP* is Food Provision Index;

P — production, D — distribution and C — consumption are, respectively, the numerical indicators of the sphere of production, distribution, and consumption, as well as food production.

For example, production indicators that must be considered when analyzing the sphere of production are indicators of the output of various types of agricultural products and the level of self-sufficiency in food. Indicators characterizing food distribution may include:

- food price index;
- the magnitude of the change in the real money income of the population;
- the level of unemployment and the proportion of the population with incomes below the subsistence minimum.

Among the indicators characterizing the sphere of food consumption, it is proposed, in particular, to highlight the share of food expenditures in the structure of consumer spending and the volume of food consumption in accordance with rational consumption standards.

Thus, within the framework of the study, the assessment of food security of the constituent entities of the Russian Federation involves not only an analysis of the production capabilities of the agricultural sector of the regional economy but also considers the financial capabilities of the population for the consumption of basic (essential) food items.

RETROSPECTIVE ASSESSMENT OF FOOD SECURITY OF CONSTITUENT ENTITIES OF THE RUSSIAN FEDERATION

As part of the study, a retrospective assessment of the food security of the constituent entities of the Russian Federation

is carried out on the basis of the author's approach using the previously considered food security index. The information base for the thematic assessment is the data of official (regional) statistics for 2016–2018.[1] Before proceeding with the assessment of food security of the constituent entities of the Russian Federation, we will briefly describe the methodological features of constructing the index in the author's interpretation. To conduct a thematic assessment, we have developed a system of indicators. Its initial version consists of 43 indicators, grouped into three (presented in *Table 1*).

Such indicators are expressed in different units of measurement. Consequently, the correct convolution of indicators presupposes a preliminary normalization of their values. For most indicators (with the exception of the subgroup of indicators characterizing the per capita actual consumption of food), it is carried out using a minimax method:

$$x = \begin{cases} \dfrac{X - X_{\min}}{X_{\max} - X_{\min}}, \text{if the growth} \\ \text{of the indicator value is assessed positively;} \\ \dfrac{X_{\max} - X}{X_{\max} - X_{\min}}, \text{the opposite situation,} \end{cases} \quad (2)$$

where X, $X_{\max}$, $X_{\min}$ are, respectively, the actual (for each year separately) the largest and smallest values (for the analyzed period of time) of any indicator from the system.

Normalization of the values of indicators from the previously indicated subgroup is carried out according to the formulas below:

$$x = \begin{cases} \dfrac{X}{X_n} \text{IIIIIIIIIIIII} \\ \text{of the indicator within the normal range,} \\ \dfrac{X_{\max} - X}{X_{\max} - X_n}, \text{the opposite situation,} \end{cases} \quad (3)$$

where X_n is the rational rate of food consumption (in the context of their groups according to the recommendations of the Ministry of Health of the Russian Federation[2]).

The value of both the index and the three sub-indices is calculated by calculating the simple arithmetic mean, i.e., provided that all indicators from the system are equivalent.

The original system of indicators is specified (some factors are eliminated) according to the results of the calculation and analysis of the paired Pearson correlation coefficients. First, for a number of correlation coefficients (all factors with an effective indicator), their statistical significance is checked using the Student's t-test. During the test, it was found that the paired correlation coefficients of the effective indicator with factors 17, 18, 25, 26, 28, 30, and 42 are statistically insignificant. Therefore, these factors are not included in the final system of indicators for assessing the food security of the constituent entities of the Russian Federation. Secondly, the initial information was checked for multicollinearity (the phenomenon is considered established if the value of the pair correlation coefficient for any combination of factors exceeds 0.85). It has been experimentally proven that there is no multicollinearity in the initial data (an array of normalized values of indicators and index).

Appendix 1 presents not only the final results of the retrospective assessment of food security of the constituent entities of the Russian Federation (index calculation) but also their decomposition (in the context of three sub-indices). We analyze the variability of the data set (in the spatio-temporal context) of the above four indicators based on the calculation and interpretation of the values of the coefficient of variation. In 2016 and 2018 the spread in the values of the food security index of the constituent entities of

[1] Russian regions. Socio-economic indicators. 2019: col. art. M.: Rosstat; 2019.

[2] Recommendations for norms of food consumption that meet modern requirements for a healthy diet (approved by order of the Ministry of Health of the Russian Federation of August 19, 2016, No. 614).

Table 1

The system of indicators of food security of the constituent entities of the Russian Federation

Indicators	Assessment of the growth of the indicator value
Numerical indicators of production	
Agricultural production indices (in farms of all categories; in comparable prices; % to 2015):	
1. Crop production	Positive
2. Livestock	Positive
Yield (in farms of all categories; hundred kilograms per hectare of harvested area):	
3. Cereals and legumes (in weight after processing)	Positive
4. Sugar beet	Positive
5. Sunflower	Positive
6. Fiber flax	Positive
7. Potatoes	Positive
8. Vegetables	Positive
9. Milk yield per cow in agricultural organizations (kg)	Positive
10. Average annual egg production of laying hens in agricultural organizations (pcs.)	Positive
11. Average annual shearing of wool from one sheep in agricultural organizations (in physical weight; kg)	Positive
The ratio of food products produced and consumed by the population (%):	
12. Meat and meat products	Positive
13. Milk and dairy products	Positive
14. Potatoes	Positive
15. Vegetables and food melons and gourds	Positive
16. Eggs	Positive
Numerical indicators of distribution and consumption	
17. Indices of consumer prices for food products (December of the analyzed year to December 2015; %)	Negative
18. Ratio of average per capita money income of the population to the cost of a fixed set of consumer goods and services (%)	Positive
The ratio of the average monthly accrued wages of employees of organizations with the size of the subsistence minimum (%)	Positive
20. The ratio of the average size of assigned pensions to the size of the subsistence minimum (%)	Positive
21. The size of the population with monetary incomes below the subsistence minimum (% of the total population of the subject)	Negative
22. Unemployment rate (%)	Negative
23. Purchase of food products in the structure of household consumption expenditures (based on the results of a sample survey of household budgets; %)	Negative
Average per capita actual food consumption (% of the rational consumption rate):	
24. Meat and meat products	Within the norm – positive
25. Milk and dairy products	Within the norm – positive
26. Potatoes	Within the norm – positive
27. Vegetables and food melons and gourds	Within the norm – positive
28. Eggs	Within the norm – positive
29. Sugar	Within the norm – positive
30. Vegetable oil	Within the norm – positive
31. Bread	Within the norm – positive
Numerical indicators of food products	
Average per capita gross fee (kg per person):	
32. Grains (in weight after processing)	Positive
33. Beets	Positive
34. Sunflower seed	Positive
35. Flax fiber	Positive
36. Potatoes	Positive
37. Vegetables	Positive
38. Fruits and berries	Positive
Average per capita production of livestock products:	
39. Livestock and poultry for slaughter (slaughter weight; kg per person)	Positive
40. Milk (kg per person)	Positive
41. Eggs (pcs. per person)	Positive
42. Wool (in physical weight; kg per person)	Positive
43. Honey (kg per person)	Positive

Source: compiled by the authors.

the Russian Federation was 18.7%, and in 2017 — 19.5%. This means that during the analyzed period of time, there was a dispersion of the thematic index above the average. At the same time, if there was a deviation from the average for the sub-index of numerical indicators of consumption and distribution (more than 10, but less than 12%), then for the sub-indices the numerical indicators of the sphere of consumption, production, and food — a significant spread, amounting to about 27–29 and more 68%.

Thus, we can conclude that the differences in food security in the regions of Russia are mainly associated with different production capabilities of their agricultural sector of the economy.

To develop differentiated measures of state support for agricultural producers in the context of the constituent entities of the Russian Federation, it is necessary not only to rank the regions of Russia according to the achieved level of food security but also to carry out multidimensional clustering using modern methods of economic and mathematical modeling. As part of the study, multidimensional (nonlinear) data processing (simultaneously for three sub-indices) is carried out with the linking of indicators to the ranking center.

RATING AND CLUSTERING OF CONSTITUENT ENTITIES OF RUSSIAN BY FOOD SECURITY LEVEL

The thematic approach is described in detail in [24, 25]. The research uses an improved author's ranking technique, taking into account a set of initial data (sub-indices) and a fundamentally new filtering algorithm. Before carrying out computational experiments, we briefly describe the features of the approach and its step-by-step implementation. Regions-leaders and outsiders are filtered at each stage, the group of "average" regions is subjected to a new analysis, the leaders and outsiders of the second level are singled out, the former are below the leaders of the first level, the latter are above the outsiders of the first level, but below all leaders of the second level. Compression continues until the number of groups reaches two, then priority ranking (selected sub-index) is performed, the algorithm ends. The substantiation of the hierarchical procedure is contained in the system of mathematical filtering of data, which is fundamentally different from the existing methods of analyzing hierarchies, the fuzzy logic "what-if" is replaced by a clear subordination of ranked indicators (sub-indices). The group of leaders was selected considering the accepted priority of indicators, the rest of the regions were united into a new subgroup, among which leaders and outsiders stand out. At each new stage, new groups are ranked after excluding leaders and outsiders, they are in the "center of the circular convolution of data," the procedure for stopping the procedure consists in the presence of two groups. This is the fundamental feature, novelty, and value of the mathematical apparatus for the multidimensional ranking of Russian regions from the point of view of food security. So, within the framework of the study, in contrast to the aforementioned author's works on indexing and rating, when constructing a rating at the first level of hierarchical data analysis, ranking numbers for the initial indicators of regions obtained on the basis of their simple processing and initial filtering of information.

To construct an integral rating, three sub-indices (PDC) are used in descending order of priority, i.e. taking into account the previously conducted assessment of the variation of their values. Such indicators for the i-th region are denoted by, p_i, d_i и c_i, respectively.

Average values of indicators p_i, d_i и c_i for $i = (1,\ldots,N)$ are calculated using the formulas below:

$$\overline{p} = \frac{1}{N}\sum_{i=1}^{N} p_i;\ \overline{d} = \frac{1}{N}\sum_{i=1}^{N} d_i;\overline{c} = \frac{1}{N}\sum_{i=1}^{N} c_i. \qquad (4)$$

The methodology for constructing an integral food security rating of the constituent entities of the Russian Federation (IFSR) is carried out in several stages. At the first stage of the analysis, Russian regions are divided into groups according to the priority of sub-indices *C*, *P* and *D*: the first group has the highest priority (leaders), groups *P* and *D* follow in descending order of importance, and the last group includes outsiders. The regions of Russia that fall into the first group will have competitive advantages in relation to the subjects of the Russian Federation from other groups (second, third, etc.). We denote the number of groups by *m*, there are from two to eight groups. Initially, for the algorithm, we assume that $m = 8$. Next, we apply the procedure.

Stage 1. All the constituent entities of the Russian Federation are divided into 8 groups according to the following principle:

Group 1 — Russian regions *i*, for which $p_i < \overline{p}, d_i < \overline{d}, c_i < \overline{c}$;

Group 2 — Russian regions *i*, for which $p_i < \overline{p}, d_i \geq \overline{d}, c_i < \overline{c}$;

Group 3 — Russian regions *i*, for which $p_i \geq \overline{p}, d_i < \overline{d}, c_i < \overline{c}$;

Group 4 — Russian regions *i*, for which $p_i \geq \overline{p}, d_i \geq \overline{d}, c_i < \overline{c}$;

Group 5 — Russian regions *i*, for which $p_i < \overline{p}, d_i < \overline{d}, c_i \geq \overline{c}$;

Group 6 — Russian regions *i*, for which $p_i < \overline{p}, d_i \geq \overline{d}, c_i \geq \overline{c}$;

Group 7 — Russian regions *i*, for which $p_i \geq \overline{p}, d_i < \overline{d}, c_i \geq \overline{c}$;

Group 8 — Russian regions *i*, for which $p_i \geq \overline{p}, d_i \geq \overline{d}, c_i \geq \overline{c}$.

Stage 2. At each stage, the closing groups of the first and last are important, if there are more than two groups, then the regions of Russia that fall into the first and last group are ranked (above and below the circle, respectively, are excluded, and then the analysis continues in a narrower circle, returning to the beginning of the algorithmic procedure).

We will restrict ourselves to conducting computational experiments using the example of the formation of the first and last groups of constituent entities of the Russian Federation, which include, respectively, the leading regions and outsiders in food security.

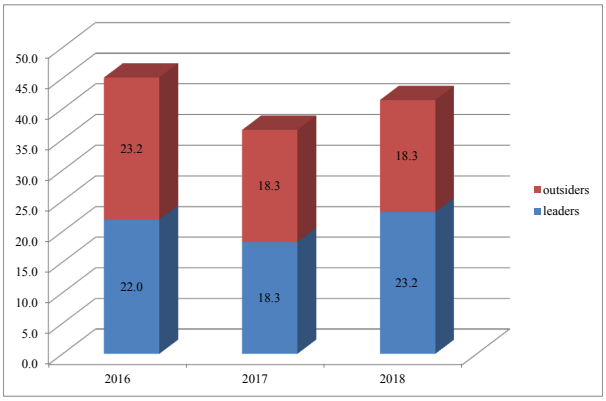

Fig. **Fragment of the cluster structure of Russian regions by the level of food security for 2016–2018**

Source: compiled by the authors.

Appendix 2 presents the results of ranking and clustering of Russian regions according to the achieved level of food security using the example of the above two groups.

During the analyzed period of time, there have been changes in the food security rating of the constituent entities of the Russian Federation. First, the competitive positions of most regions of Russia, not only in the overall ranking but also within clusters, are dynamically strengthening or weakening. Secondly, as a rule, the number of the constituent entities of the Russian Federation included in the group of leaders and outsider regions changed annually. All this is reflected in the cluster structure of Russian regions in terms of food security (shown in the *Figure*).

So, in particular, in 2018 (compared to 2016), there were positive changes in the cluster structure of the constituent entities of the Russian Federation, while the share of leading regions increased and the share of outsider regions decreased.

The results of ranking and clustering of Russian regions obtained in the course of the study can serve as a scientific basis for justifying federal and regional measures (primarily of a financial nature) of state

Table 2

The level of state support for agriculture in the EU, USA, China and the Russian Federation in 2018, USD

Countries	GDP, USD billion	State financial support for agriculture	
		Volume, USD billion	Level, % of GDP
EU	15800	57.9	3.4
USA	20237	139.6	6.8
China	13040	342.8	3.6
Russia	1652	3.4	2.1

Source: China statistical yearbook. URL: http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm; The official website for Food and Agriculture Organization of the United Nations. URL: http://faostat.fao.org; Government finance statistics — Summary tables. Luxembourg: Publications Office of the European Union. URL: https://ec.europa.eu/ eurostat/ web/agriculture/data/database (accessed on 23.03.2021).

Table 3

State budget expenditures of the EU countries, the USA, China and the Russian Federation for the development of agriculture in 1990–2019, billion dollars

Countries	1990	2000	2010	2013	2015	2016	2017	2018	2019
EU	24.9	37.7	71.8	72.4	79.8	62.8	54.4	58.0	56.0
USA	45.9	75.1	135.8	155.9	139.1	138.1	138.9	139.6	141.2
China	20.0	25.0	150.0	250.0	325.0	358.7	349.2	342.8	335.8
Russia	4.9	2.0	7.6	13.0	5.9	4.0	4.4	3.4	3.3

Source: cEconomic Research Service of U.S. Department of Agriculture. URL: https://www.ers.usda.gov/; OECD — Total support estimate. URL: https://stats.oecd.org/Index.aspx (accessed on 23.03.2021).

support for agricultural producers, which, in turn, will contribute to an increase in the level of food security of the constituent entities of the Russian Federation.

Currently, the EU countries, the USA and China are not only the world's largest producers of agricultural products but are also characterized by an effective system of state support for the agricultural sector of the economy. Therefore, the study ends with a brief description of their positive experience, which can be applied in Russia.

STATE FINANCIAL SUPPORT MEASURES FOR SUSTAINABLE AGRICULTURE DEVELOPMENT

Based on the methods of competitive benchmarking, we briefly characterize the level of state support for agriculture in the EU countries, the USA, China, and the Russian Federation (*Table 2*).

Thus, in the United States, government funding for agriculture is 6.8%, in China — 3.6%, and in the EU countries — 3.4% of gross domestic product. Among developed countries, the highest level of financing for agriculture is typical for Norway — 58%, Switzerland — 55%, Japan — 52% of gross revenue, which is explained by unfavorable climatic conditions, limited land resources, and a high standard of living. In Russia for 2010–201, the budget allocations for the development of agriculture amounted to about 0.37–0.57% of national GDP, in 2019–2.1%, while according to experts, they should be 3–3.5% of GDP.

A comparative analysis of budget expenditures for state financial support for agriculture in the EU countries, the USA, China, and Russia in dynamics for 1990–2019 is carried out. The data in *Table 3* shows that China is the world leader in total financial support from a budget, with funding in 2019 of

more than US$ 335 billion. Also, a significant amount of state support for agriculture from a similar source of financing is typical for the United States — US$ 141.2 billion and EU countries — US$ 56 billion.

In Russia, on the contrary, the volume of state financial support for agricultural producers from budgetary funds is insignificant and amounts to only US$ 3.3 billion. When the country entered the World Trade Organization, this problem was one of the main topics of negotiations, and the Russian Federation established the amount of state financial support for agriculture of US$ 89 billion. However, it was gradually reduced to US$ 36 billion, and then to US$ 16 billion. By the time of Russia's accession to the WTO by 2012, the volume of state financial support from budgetary funds was only US$ 9 billion. In addition, the obligations included requirements for its further reduction to US$ 4.4 billion by 2017, which was 20 times less than the declared volume.

The world's largest agricultural producer is the EU countries, which account for about 11% of the global volume. They have the most effective system of state support for agriculture within the framework of the Unified Agrarian Policy in three main directions:

- direct payments that ensure income stability and stimulate environmentally friendly agricultural production, rural development;
- the application of market measures necessary to deal with difficult market situations, such as a sudden drop in demand or a fall in prices as a result of oversupply;
- a set of rural development and support measures within the framework of the implementation of national and regional programs, to address the specific needs and problems of rural areas.

To implement these directions, the EU government applies various measures of state regulation of agriculture: import duties, quotas for imports and production, government intervention, and collection of taxes for non-use of land.

Funding for the Common Agricultural Policy in the EU is gradually decreasing. So, if in 1970 it accounted for 89% of the entire EU budget, then in the 1980s about 70% of the expenditure side, in 1990 it dropped to 50% on average and in subsequent years decreased to 42%. The downward trend continues, with agricultural funding expected to account for 27% of the EU budget by 2027. In 2018, the EU allocated over 58 billion euros to support farmers and develop agriculture. In addition to the European one, national co-financing of the agricultural sector is carried out: for example, Austria allocates 44% of its total income, and France — 17%. In total, the total amount of support is over 100 billion euros per year.

State support of the EU countries is carried out from two sources of funding: the European agricultural guarantee fund and the European agricultural fund for rural development. For example, direct payments to farmers are made by the European agricultural guarantee fund based on the area of agricultural land. The volume of financing from this fund is about 75% of the overall budget of the European Union. However, in order to receive subsidies, agricultural producers must strictly adhere to government conditions, which include certain standards (so-called cross-compliance). Also, the rules contain requirements for the preservation of soil and habitat, and the use of water.

The second source of funding (the European agricultural fund for rural development) accounts for about 25% of the payments of the European Union and is aimed at developing rural areas that have demographic problems and are prone to climate change. At the same time, the main goal of the fund is to create safe jobs and ensure a high quality of life in rural areas.

The United States is another major global agricultural producer and a leading player in the international food trade, accounting for about 10% of global agricultural production.

Also, the United States is the leader in food production per capita. The system of state financing of the agricultural sector in the country is carried out mainly within the framework of the "green box" activities. More than 80% of its volume is domestic food assistance to low-income groups of the population with an average monthly payment per person of about US$ 120. The second-largest public funding program for green box support is "general services", which accounts for 9.6%. Subsidized payments to support "untied" income and environmental programs are approximately the same at 3.8% on the volume of the "green box". Since 2014, the traditional budget aid has been replaced at the legislative level by another instrument — risk insurance with a budget of US$ 956.4 billion, as a result of which over several decades there has been an increase in public funding of the US agricultural sector from 4.4%. up to 6.8% of all budget funds appropriations.

When studying the foreign experience of state support for agriculture, in our opinion, the experience of China is of considerable interest. The country, pursuing a targeted protectionist policy of the state and consistent agrarian reforms, has made it possible to significantly increase the volume of agricultural production and become one of the largest producers in the world food market.

In China, both administrative and economic methods of state regulation and support of agriculture are used. But for the modern period, the priority has become to address environmental problems, improve the quality of life of the rural population, and increase the competitiveness of products. An analysis of agricultural subsidies in China showed that while maintaining the structure of state support in the country, the volume of direct and indirect public investment increased significantly. In particular, in 2018, 2.8% of funds from the national budget were directed to support agriculture in China. In the expenditures of subnational budgets of the provinces, a significant share is made up of expenditures on agriculture — 11% and mainly the use of "green box" measures.

Modern China is characterized by the innovative development of agricultural science, the introduction of borrowed and its own advanced agricultural technologies, which implies a further increase in funding for agricultural science, stimulation, and implementation of advanced technologies. By 2020, the Agricultural Development Bank of China plans to allocate 3 trillion yuan (or US$ 450 billion) to modernize the country's agricultural sector. The study of the experience of state support for the agricultural sector in China allows us to conclude that due to the similarity of climatic, economic, and political processes, it can be applied in Russia.

CONCLUSIONS

Foreign experience in ensuring food security and sustainable development of agriculture indicates that increasing the competitiveness of the relevant sector of the national economy is impossible without an effective mechanism of state support for agricultural producers. A systematic study of various aspects of ensuring the long-term sustainability of the food system is important for improving the state policy for the development of the agricultural sector of the country and its regions. And this requires constant monitoring of the situation.

The vector of development of Russian state support for domestic agricultural producers corresponds to the changes taking place in the countries of the world. At the same time, a review of scientific literature indicates that not all global trends are reflected in the methods for assessing the food security of the country and its regions, which indicates the need (relevance) for their improvement. Therefore, within the framework of the study, the goal was set and achieved to fill this gap in the scientific literature.

To assess the food security of the constituent entities of the Russian Federation, it is proposed to use the index of the same name,

which is based on the analysis of the numerical indicators of production, distribution, consumption, and food production. It allows, in close interconnection, to study not only the production capabilities of the agricultural sector of the constituent entities of the Russian Federation but also, for example, the degree of satisfaction of the population's need for essential foods, considering their financial capabilities. Statistical processing of the values of the thematic index and three sub-indices for 2016–2018 indicates that the differentiation of the constituent entities of the Russian Federation in terms of food security is largely due to the spread in the numerical indicators of food production.

For ranking and subsequent clustering of Russian regions based on the achieved level of food security, a modified author's approach is used, which involves a hierarchical data analysis with a fundamentally new filtering algorithm. In the course of computational experiments, a significant part of the constituent entities of the Russian Federation was correctly divided into two groups (regions — leaders and outsiders). Despite the fact that in 2018 (compared to 2016) there were positive changes in the cluster structure of Russian regions in terms of food security, currently, more than 18% are included in the group of outsider regions. Therefore, for the leadership of the country and its regions, the issue of not only strengthening the competitive positions of outsider regions in dynamics but also ensuring their transition in the future to a cluster characterized by a higher level of food security remains relevant. The study may be used as a scientific basis for improving state policy in the field of supporting domestic agricultural producers. In particular, the decomposition of the final results of the retrospective assessment, considering the ranking and clustering of the constituent entities of the Russian Federation, makes it possible, on the basis of competitive benchmarking methods, to quickly identify the reserves of the country's sustainable development of the food production system for the control at the meso-level.

Analysis of various sources allowed us to conclude that in modern Russia three main directions of state support for the agricultural complex can be distinguished: budget financing; provision of subsidies to producers and compensation of production costs, payment of transfers to consumers. Such support measures contribute to the entry of the Russian Federation into the number of countries characterized by relatively high-quality nutrition and an average level of affordability of food for the population.

However, according to a number of important indicators, the problem of food security in the country has not yet been resolved. For the Russian agricultural sector of the economy, the current stage is characterized as the period of meeting the WTO requirements and the transition from direct government funding to indirect investments. Analysis of the dynamics of expenditures of the federal budget of the Russian Federation shows that in the last years of the study period, expenditures increased, but insignificantly. At the same time, there is no connection between the measures of state support and its results. Considering the foreign experience of the EU countries, the USA and China, it can be concluded that the country does not widely use various general economic and special levers to increase the stability of the food system of the Russian Federation.

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Appendix 1

Index (and sub-indices) of food security of the constituent entities of the Russian Federation for 2016–2018

The constituent entity of the Russian Federation	P			D			C			I FP		
	2016	2017	2018	2016	2017	2018	2016	2017	2018	2016	2017	2018
1. Belgorod Region	0.531	0.586	0.540	0.655	0.597	0.623	0.389	0.382	0.388	0.519	0.526	0.514
2. Bryansk Region	0.572	0.602	0.606	0.658	0.631	0.667	0.242	0.257	0.268	0.493	0.504	0.518
3. Vladimir Region	0.325	0.318	0.325	0.689	0.652	0.661	0.094	0.090	0.096	0.345	0.332	0.339
4. Voronezh Region	0.488	0.488	0.490	0.632	0.601	0.613	0.320	0.318	0.319	0.473	0.465	0.468
5. Ivanovo Region	0.347	0.307	0.323	0.677	0.648	0.668	0.070	0.069	0.073	0.345	0.319	0.333
6. Kaluga Region	0.321	0.350	0.365	0.739	0.703	0.727	0.094	0.106	0.116	0.356	0.364	0.379
7. Kostroma Region	0.339	0.354	0.356	0.697	0.666	0.678	0.132	0.130	0.121	0.365	0.363	0.365
8. Kursk Region	0.455	0.475	0.483	0.591	0.540	0.534	0.349	0.366	0.363	0.457	0.458	0.459
9. Lipetsk Region	0.451	0.460	0.473	0.625	0.586	0.601	0.319	0.332	0.346	0.454	0.452	0.467
10. Moscow Region	0.295	0.335	0.321	0.660	0.621	0.653	0.038	0.036	0.036	0.308	0.315	0.317
11. Oryol Region	0.398	0.401	0.426	0.687	0.623	0.628	0.280	0.279	0.288	0.434	0.419	0.434
12. Ryazan Region	0.427	0.434	0.440	0.664	0.619	0.615	0.179	0.186	0.188	0.411	0.405	0.407
13. Smolensk Region	0.354	0.350	0.370	0.577	0.555	0.556	0.179	0.172	0.154	0.356	0.347	0.351
14. Tambov Region	0.429	0.455	0.444	0.593	0.533	0.555	0.342	0.380	0.381	0.443	0.451	0.452
15. Tver Region	0.321	0.318	0.346	0.620	0.594	0.618	0.144	0.121	0.135	0.341	0.327	0.349
16. Tula Region	0.458	0.470	0.480	0.727	0.683	0.683	0.127	0.132	0.133	0.424	0.420	0.425
17. Yaroslavl Region	0.396	0.386	0.420	0.713	0.678	0.681	0.170	0.160	0.181	0.406	0.390	0.412
18.Moscow	0.210	0.203	0.190	0.719	0.704	0.720	0.001	0.001	0.001	0.273	0.267	0.265
19. Republic of Karelia	0.191	0.184	0.196	0.605	0.573	0.608	0.026	0.024	0.026	0.244	0.233	0.247
20. Komi Republic	0.306	0.271	0.312	0.685	0.654	0.684	0.032	0.028	0.030	0.317	0.292	0.319
21. Arkhangelsk Region	0.292	0.270	0.289	0.691	0.674	0.684	0.032	0.029	0.032	0.312	0.297	0.309
22. Vologda Region	0.395	0.366	0.390	0.683	0.644	0.669	0.168	0.136	0.156	0.398	0.365	0.388
23. Kaliningrad Region	0.348	0.257	0.277	0.628	0.588	0.599	0.093	0.086	0.091	0.340	0.287	0.301
24. Leningrad Region	0.439	0.454	0.465	0.727	0.701	0.717	0.183	0.184	0.186	0.433	0.433	0.443
25. Murmansk Region	0.204	0.213	0.221	0.739	0.722	0.738	0.005	0.005	0.006	0.277	0.277	0.284
26. Novgorod Region	0.390	0.350	0.373	0.695	0.653	0.654	0.161	0.142	0.154	0.396	0.362	0.376
27. Pskov Region	0.320	0.316	0.317	0.603	0.580	0.591	0.110	0.113	0.120	0.327	0.320	0.325

Appendix 1 (continued)

The constituent entity of the Russian Federation	P			D			C			I FP		
	2016	2017	2018	2016	2017	2018	2016	2017	2018	2016	2017	2018
28.Saint Petersburg	0.000	0.000	0.000	0.817	0.793	0.802	0.000	0.000	0.000	0.204	0.198	0.200
29. Republic of Adygea	0.345	0.315	0.354	0.646	0.605	0.623	0.155	0.156	0.155	0.362	0.339	0.360
30. Republic of Kalmykia	0.291	0.299	0.273	0.540	0.523	0.518	0.114	0.122	0.109	0.299	0.301	0.284
31. Republic of Crimea	0.384	0.386	0.344	0.581	0.582	0.594	0.098	0.089	0.086	0.346	0.345	0.328
32. Krasnodar Region	0.449	0.449	0.437	0.628	0.579	0.577	0.217	0.217	0.208	0.423	0.410	0.402
33. Astrakhan Region	0.408	0.437	0.459	0.632	0.588	0.585	0.137	0.151	0.176	0.381	0.387	0.404
34. Volgograd Region	0.435	0.455	0.447	0.711	0.663	0.668	0.189	0.194	0.196	0.429	0.427	0.426
35. Rostov Region	0.451	0.479	0.443	0.733	0.692	0.698	0.207	0.220	0.202	0.447	0.453	0.433
36. Sevastopol	0.180	0.181	0.173	0.725	0.692	0.725	0.012	0.010	0.010	0.265	0.257	0.261
37. Republic of Dagestan	0.323	0.331	0.358	0.427	0.373	0.409	0.121	0.126	0.125	0.287	0.279	0.300
38. Republic of Ingushetia	0.294	0.271	0.275	0.408	0.375	0.398	0.061	0.059	0.067	0.251	0.232	0.242
39. Kabardino-Balkar Republic	0.432	0.451	0.464	0.570	0.514	0.508	0.253	0.285	0.297	0.412	0.416	0.424
40. Karachay-Cherkess Republic	0.416	0.418	0.436	0.568	0.554	0.562	0.185	0.167	0.161	0.383	0.375	0.384
41. Republic of North Ossetia – Alania	0.274	0.258	0.312	0.653	0.592	0.614	0.082	0.079	0.090	0.310	0.287	0.320
42. Chechen Republic	0.295	0.301	0.284	0.555	0.533	0.544	0.055	0.059	0.053	0.287	0.285	0.279
43. Stavropol Region	0.491	0.468	0.448	0.674	0.636	0.644	0.201	0.197	0.184	0.448	0.427	0.416
44. Republic of Bashkortostan	0.381	0.397	0.413	0.705	0.669	0.673	0.161	0.164	0.166	0.394	0.394	0.402
45. Republic of Mari El	0.359	0.339	0.390	0.596	0.563	0.580	0.169	0.156	0.182	0.360	0.339	0.374
46. Republic of Mordovia	0.514	0.524	0.530	0.643	0.584	0.582	0.320	0.310	0.314	0.487	0.474	0.477
47. Republic of Tatarstan	0.496	0.519	0.510	0.749	0.702	0.726	0.201	0.206	0.204	0.469	0.469	0.471
48. Udmurt Republic	0.450	0.445	0.444	0.761	0.726	0.722	0.213	0.216	0.206	0.455	0.445	0.440
49. Chuvash Republic	0.413	0.403	0.410	0.705	0.664	0.675	0.139	0.133	0.138	0.402	0.386	0.393
50. Perm Region	0.304	0.303	0.360	0.673	0.659	0.695	0.083	0.081	0.089	0.328	0.324	0.361
51. Kirov Region	0.403	0.380	0.413	0.670	0.628	0.646	0.150	0.143	0.160	0.393	0.370	0.394
52. Nizhny Novgorod Region	0.402	0.422	0.423	0.755	0.700	0.695	0.110	0.115	0.120	0.401	0.398	0.398
53. Orenburg Region	0.363	0.381	0.363	0.742	0.701	0.696	0.204	0.220	0.201	0.409	0.412	0.397
54. Penza Region	0.395	0.411	0.418	0.699	0.666	0.681	0.215	0.212	0.214	0.416	0.414	0.421
55. Samara Region	0.343	0.354	0.291	0.709	0.685	0.707	0.093	0.093	0.098	0.358	0.357	0.336

Appendix 1 (continued)

The constituent entity of the Russian Federation	P			D			C			I FP		
	2016	2017	2018	2016	2017	2018	2016	2017	2018	2016	2017	2018
56. Saratov Region	0.410	0.429	0.416	0.718	0.668	0.693	0.204	0.207	0.215	0.424	0.421	0.424
57. Ulyanovsk Region	0.362	0.386	0.386	0.683	0.643	0.660	0.132	0.131	0.130	0.372	0.372	0.376
58. Kurgan Region	0.356	0.354	0.348	0.675	0.628	0.634	0.149	0.190	0.156	0.372	0.372	0.361
59. Sverdlovsk Region	0.356	0.343	0.359	0.686	0.651	0.673	0.073	0.073	0.078	0.352	0.338	0.352
60. Tyumen Region	0.332	0.351	0.418	0.686	0.660	0.676	0.072	0.077	0.076	0.341	0.345	0.378
61. Chelyabinsk Region	0.334	0.346	0.342	0.721	0.690	0.711	0.090	0.093	0.091	0.356	0.354	0.358
62. Altai Republic	0.308	0.280	0.236	0.564	0.522	0.553	0.102	0.099	0.097	0.309	0.285	0.273
63. Republic of Tuva	0.193	0.243	0.256	0.511	0.490	0.527	0.045	0.045	0.047	0.227	0.244	0.260
64. Republic of Khakassia	0.278	0.305	0.331	0.714	0.675	0.689	0.091	0.092	0.092	0.330	0.332	0.347
65. Altai Region	0.493	0.494	0.478	0.572	0.532	0.536	0.284	0.278	0.276	0.449	0.437	0.431
66. Krasnoyarsk Region	0.355	0.342	0.337	0.733	0.699	0.707	0.103	0.097	0.098	0.372	0.356	0.356
67. Irkutsk Region	0.342	0.356	0.346	0.696	0.674	0.680	0.085	0.086	0.085	0.352	0.353	0.350
68. Kemerovo Region	0.333	0.325	0.330	0.707	0.685	0.724	0.081	0.081	0.080	0.350	0.341	0.352
69. Novosibirsk Region	0.349	0.367	0.368	0.680	0.644	0.653	0.103	0.108	0.107	0.356	0.357	0.360
70. Omsk Region	0.449	0.467	0.459	0.684	0.662	0.681	0.216	0.219	0.205	0.436	0.440	0.437
71. Tomsk Region	0.365	0.400	0.367	0.692	0.654	0.656	0.080	0.080	0.074	0.359	0.366	0.350
72. Republic of Buryatia	0.302	0.292	0.309	0.652	0.630	0.628	0.053	0.047	0.048	0.314	0.302	0.309
73. Republic of Sakha (Yakutia)	0.221	0.220	0.235	0.582	0.549	0.566	0.044	0.045	0.046	0.257	0.249	0.260
74. Zabaykalsky Krai	0.234	0.244	0.248	0.649	0.612	0.638	0.078	0.078	0.079	0.290	0.285	0.294
75. Kamchatka Region	0.288	0.288	0.298	0.702	0.722	0.733	0.032	0.034	0.034	0.313	0.319	0.326
76. Primorsky Krai	0.286	0.303	0.299	0.653	0.629	0.647	0.085	0.091	0.090	0.316	0.320	0.322
77. Khabarovsk Region	0.276	0.277	0.287	0.721	0.699	0.708	0.033	0.035	0.034	0.313	0.309	0.315
78. Amur Region	0.345	0.347	0.309	0.640	0.623	0.669	0.102	0.100	0.097	0.344	0.341	0.335
79. Magadan Region	0.142	0.158	0.160	0.637	0.658	0.671	0.023	0.025	0.025	0.229	0.242	0.247
80. Sakhalin Region	0.276	0.288	0.297	0.789	0.768	0.799	0.045	0.046	0.048	0.334	0.334	0.346
81. Jewish Autonomous Region	0.172	0.179	0.187	0.567	0.560	0.575	0.123	0.100	0.139	0.256	0.250	0.269
82. Chukotka Autonomous Region	0.245	0.247	0.245	0.712	0.644	0.608	0.005	0.004	0.005	0.289	0.272	0.262

Source: compiled by the authors.

Appendix 2

Fragment of the rating of food security of the constituent entities of the Russian Federation for 2016–2018

Cluster name	Cluster composition	Ranking place	Number of regions in a cluster
2016			
Regions-leaders	Republic of Tatarstan, Stavropol Region, Rostov Region, Udmurt Republic, Omsk Region, Leningrad Region, Volgograd Region, Ryazan Region, Saratov Region, Kirov Region, Oryol Region, Yaroslavl Region, Vologda Region, Penza Region, Novgorod Region, Republic of Bashkortostan, Orenburg Region and Kurgan Region	1–18	18
Regions-outsiders	Kaliningrad Region, Amur Region, Republic of Dagestan, Tver Region, Pskov Region, Republic of Altai, Republic of Buryatia, Chechen Republic, Moscow Region, Republic of Ingushetia, Republic of Kalmykia, Primorsky Krai, Republic of North Ossetia-Alania, Zabaykalsky Krai, Republic of Sakha (Yakutia), Republic of Tyva, Republic of Karelia, Jewish Autonomous Region and Magadan Region	64–82	19
2017			
Regions-leaders	Bryansk Region, Republic of Tatarstan, Rostov Region, Stavropol Region, Omsk Region, Volgograd Region, Leningrad Region, Udmurt Republic, Saratov Region, Penza Region, Chuvash Republic, Republic of Bashkortostan, Yaroslavl Region, Orenburg Region and Vologda Region	1–15	15
Regions-outsiders	Amur Region, Moscow Region, Republic of Dagestan, Tver Region, Pskov Region, Chechen Republic, Republic of Kalmykia, Republic of Altai, Republic of Ingushetia, Republic of North Ossetia — Alania, Kaliningrad Region, Zabaykalsky Krai, Republic of Tyva, Republic of Sakha (Yakutia) and Republic of Karelia	68–82	15
2018			
Regions-leaders	Bryansk Region, Republic of Tatarstan, Tula Region, Leningrad Region, Omsk Region, Stavropol Region, Volgograd Region, Udmurt Republic, Rostov Region, Nizhny Novgorod Region, Yaroslavl Region, Penza Region, Saratov Region, Kirov Region, Republic of Bashkortostan, Chuvash Republic, Vologda Region, Novgorod Region and Orenburg Region	1–19	19
Regions-outsiders	Tver Region, Pskov Region, Republic of North Ossetia — Alania, Republic of Buryatia, Chechen Republic, Kaliningrad Region, Republic of Ingushetia, Republic of Kalmykia, Republic of Tyva, Zabaykalsky Krai, Chukotka Autonomous Region, Republic of Altai, Republic of Sakha (Yakutia), Republic of Karelia and Jewish Autonomous Region	68–82	15

Source: compiled by the authors.

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Regions Supporting the Spatial Development of Russia: Budgetary Aspect

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ABSTRACT

The authors investigate the prospects for the spatial development of modern Russia highlighting the supporting regions considered in the budgetary aspect. The **relevance** of the study is due to the insufficient evidence for the effectiveness of the current policy of "equalization", as well as the need for breakthrough growth of the Russian economy within the framework of national development goals. The present paper **aims** to identify one of the key elements of the supporting framework of the spatial organization of Russia in terms of the level of fiscal capacity. The research **methodology** is based on the use of complex, statistical and comparative analyses. The authors used official data of Rosstat on the population, tax and non-tax revenues, gratuitous receipts in 2010 and 2019 by regions of Russia. The authors highlight the key aspects of the spatial development of the Russian economy in the regional context: human capital development, economic development, the functioning of spatial structures of various types, fiscal capacity, environmental component, location of information and communication infrastructure, and geopolitical position. The influence of the fiscal capacity parameter on the sustainable socio-economic development of the region is justified. The fiscal capacity index of the constituent entities of Russia is analyzed at the end of 2010 and 2019, the main trends are identified. The study presents a cartographic visualization of the Russian regions by per capita fiscal capacity for tax and non-tax revenues of the consolidated budgets in 2019. The authors carried out a comparative analysis of the revenues of consolidated regional budgets on the macro-regional level, as a result of which the leading regions were identified and their budget parameters described. The present paper outlines one of the key elements of the supporting framework of Russian spatial organization from the point of view of fiscal capacity and identifies potential regions supporting spatial development in the context of macro-regions. The authors **conclude** that the supporting framework of the spatial organization of Russia, formed by the level of fiscal capacity, characterizes the financial potential of the territories, which can contribute to the development of interregional cooperation, including through the use of mechanisms for ensuring "horizontal" inter-budgetary transfers and budget loans. The prospect for further research on this topic consists in assessing and shaping other elements of the spatial development of Russia and identifying, by uniting them, supporting regions that can stimulate the development of not only the semi-periphery and periphery of their macro-regions but also of the entire country.

Keywords: region; spatial development; supporting regions, supporting framework; fiscal capacity; tax and non-tax revenues; gratuitous receipts; social and economic development

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INTRODUCTION

Improving the quality of regional development is an important mechanism for achieving the national goal of Russia's entry into the world's largest economies. A significant territory of the state with an uneven distribution of natural resources requires balanced spatial development. The "equalization" policy pursued in recent decades has not shown sufficient economic efficiency to implement a breakthrough growth in the country's economy. This is especially important in light of the new national goal — "to ensure the growth rate of the country's gross domestic product above the world average while maintaining macroeconomic stability".[1]

In this regard, it seems appropriate to assess the trends, features, patterns, and prospects of the spatial development of modern Russia by identifying the supporting regions of spatial development. These regions, which combine various types of accumulated capital (human, economic, financial, etc.), have every opportunity to drive the development of their own territories, macro-regions, and economic growth on a national scale, provided that a state policy of polarized development is pursued scientifically [1, p. 12].

The main aspects of the spatial development of the economy in a regional context, according to the authors, are:

- development of human capital;
- economic development;
- functioning of spatial structures of various types;
- budgetary security;
- ecological component;
- publication of information and communication infrastructure;
- geopolitical position.

These aspects of spatial development form the main layers of the supporting structure of the spatial organization of Russia, as they characterize the economic, environmental, infrastructural, institutional, and social spheres of development of territories.

The authors consider the budgetary provision of the constituent entities of the Russian Federation as one of the main factors of the stability of the socio-economic situation of the regions. This indicator is actively used within the framework of the budget regulation mechanism used both in Russia and abroad [2, p. 101]. It is the level of provision of the budget with tax and non-tax revenues that characterizes the financial potential of a constituent entity of the Russian Federation, i.e. the ability of the regional budget to finance the powers assigned to it, which directly affects the quality and efficiency, solving the problems of socio-economic development of the territory [3, 4]. A higher indicator of a budgetary provision in the supporting regions determines their ability to provide better quality budget services, to pursue a more active investment policy [5, p. 811].

For the purposes of this study, we used the indicator of budgetary provision of tax and non-tax income per capita, which is defined as [6, p. 129]

$$\text{BP} = \frac{\sum TNT}{P},$$

where BP — level of budgetary provision with tax and non-tax revenues of the constituent entity of the Russian Federation per capita, thousand rubles;

TNT — tax and non-tax revenues of the budget of the constituent entity of the Russian Federation, thousand rubles;

P — the population of a constituent entity of the Russian Federation, thousand people.

Currently, the budgetary provision of Russian regions is characterized by significant differentiation. Its degree is due to the heterogeneity of the socio-economic space, uneven resource availability, natural and institutional features of certain territories [7, p. 111].

[1] Presidential Executive Order as of July 21, 2020, No. 474 "On the national development goals of the Russian Federation through to 2030". URL: https://www.garant.ru/products/ipo/prime/doc/74304210/ (accessed on 25.08.2020).

RESULTS

To analyze the average per capita budgetary provision of the constituent entities of the Russian Federation, based on data from Rosstat, the authors compiled their rating by the level of tax and non-tax revenues, considering gratuitous receipts from 2010 to 2019, which made it possible to identify current trends, including in the context of macro-regions (*Table. 1*).[2]

As a basis for structuring regions, a grid of macro-regions was chosen, provided for by the Spatial Development Strategy of the Russian Federation for the period up to 2025.[3] This document is of a strategic nature and sets long-term guidelines for territorial development. In this regard, the analysis of the localization of the supporting regions is of particular importance in terms of assessing the socio-economic situation in the Russian Federation at the meso-level (in the context of macro-regions).

The results are an independent layer of the structure of the spatial development of Russia in accordance with the standard budget parameter, the cartographic visualization is presented in the *Figure*.

The leading regions that are in the top twenty of the rating are highlighted in dark green. The green color on the map is used for regions ranked 21–40 in the ranking of regions of the Russian Federation. The regions ranked 41–60 in the rating are highlighted in orange. The regions in which the volume of tax and non-tax revenues per capita is minimal are highlighted in red.

The gap between the regions of the Russian Federation in terms of per capita budget revenues at the end of 2019, which ranks first and last, was 11 times.

An analysis of incoming cash flows (per capita) shows that the Nenets Autonomous Okrug remains the unchanged leader from 2010 to 2019, where the change in tax and non-tax revenues was 114%, and gratuitous receipts increased by 62%. At the same time, at the end of 2019, tax and non-tax incomes per capita in the Nenets Autonomous Okrug exceed the average value for the Russian Federation (74.92 thousand rubles) by more than 6 times.

The five leaders among the constituent entities of the Russian Federation in terms of tax and non-tax revenues in 2010 also included the Chukotka Autonomous Okrug, the Yamalo-Nenets Autonomous Okrug, the Khanty-Mansi Autonomous Okrug, and Moscow. In 2019, the Sakhalin Region entered the top five, displacing the Khanty-Mansi Autonomous Okrug to 7th place in the final rating. This is due to the fact that in Khanty-Mansicy Autonomous Okrug the growth in the volume of tax and non-tax revenues amounted to only 14%, and gratuitous receipts have grown almost 5 times.

Traditionally, the leading positions in the ranking are occupied by resource-extracting and small-numbered northern regions, which, on the one hand, is due to a greater concentration of minerals, and on the other, a higher cost of living [8, p. 69]. Moreover, such significant values of average per capita budgetary provision in these regions also affect the average values for the Russian Federation, as a result of which more than 70 regions of Russia have a level of budgetary provision per capita lower than the national average [9]. However, for the purposes of this study, such differentiation is not critical, since it is assumed that the benchmarks will be determined within each macro-region in which the constituent entities of the Russian Federation are relatively comparable.

At the end of 2019, the following regions are among the outsiders in the ranking of tax

[2] The level of estimated budgetary provision and the index of budgetary expenditures of the constituent entities of the Russian Federation for 2017–2019. The Ministry of Finance of the Russian Federation official website. URL: https://www.minfin.ru/ru/document/?id_4=116795 (accessed on 25.12.2020).

[3] Spatial development strategy of the Russian Federation for the period up to 2025. URL: https://www.economy.gov.ru/material/directions/regionalnoe_razvitie/strategicheskoe_planirovanie_prostranstvennogo_razvitiya/strategiya_prostranstvennogo_razvitiya_rossiyskoy_federacii_na_period_do_2025_goda/ (accessed on 22.01.2021).

Table 1

Comparative analysis of revenues of the consolidated regional budgets per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipt, %
Nenets Autonomous Okrug	414.72	53.19	472.65	86.36	1	1	0	114	162
Yamalo–Nenets Autonomous Okrug	213.86	4.52	456.31	18.77	3	2	1	213	415
Sakhalin Region	105.33	26.02	369.93	49.42	6	3	3	351	190
Chukotka Autonomous Okrug	313.65	84.66	322.09	818.58	2	4	–2	103	967
Moscow	107.97	3.91	203.64	5.75	5	5	0	189	147
Magadan Region	86.69	67.88	195.54	112.43	8	6	2	226	166
Khanty-Mansi Autonomous Okrug — Ugra	151.82	4.14	172.67	18.84	4	7	–3	114	455
Republic of Sakha (Yakutia)	82.49	50.32	165.64	91.87	9	8	1	201	183
Tyumen Region	44.61	11.71	151.72	7.09	24	9	15	340	61
Kamchatka Krai	64.93	90.21	122.60	172.15	12	10	2	189	191
Murmansk Region	61.45	12.47	116.67	19.40	15	11	4	190	156
St. Petersburg	87.22	7.82	115.05	5.49	7	12	–5	132	70
Komi Republic	70.10	8.69	108.10	11.29	10	13	–3	154	130
Krasnoyarsk Region	65.16	10.95	101.46	12.61	11	14	–3	156	115
Leningrad Region	42.49	5.44	88.35	7.07	29	15	14	208	130
Moscow Region	53.76	4.90	87.82	9.47	19	16	3	163	193
Amur Region	52.86	19.20	77.27	27.95	20	17	3	146	146
Khabarovsk Region	61.77	13.44	77.05	23.39	14	18	–4	125	174
Republic of Tatarstan	42.78	16.37	76.71	9.75	28	19	9	179	60
Irkutsk Region	59.20	10.24	73.26	21.47	16	20	–4	124	210
Arkhangelsk Region	47.07	17.25	71.82	26.23	22	21	1	153	152
Vologda Region	44.38	8.06	71.57	18.64	25	22	3	161	231

Table 1 (continued)

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipt, %
Kaluga Region	44.08	6.95	68.78	14.86	27	23	4	156	214
Primorsky Krai	35.96	19.96	66.11	19.51	40	24	16	184	98
Sverdlovsk Region	34.93	5.53	65.66	6.97	42	25	17	188	126
Belgorod Region	39.88	12.51	63.75	15.88	34	26	8	160	127
Kemerovo Region	41.65	6.90	60.79	11.82	30	27	3	146	171
Perm Region	40.40	6.58	60.29	10.17	32	28	4	149	155
Samara Region	40.15	6.47	58.52	8.66	33	29	4	146	134
Novosibirsk Region	40.64	7.45	58.07	12.33	31	30	1	143	166
Tomsk Region	37.87	10.70	57.43	16.74	36	31	5	152	156
Republic of Karelia	39.09	13.64	56.69	38.04	35	32	3	145	279
Tula Region	32.00	8.69	56.66	11.44	49	33	16	177	132
Nizhny Novgorod Region	44.79	6.31	56.65	10.06	23	34	–11	126	160
Krasnodar Region	32.34	7.12	56.32	8.58	48	35	13	174	121
Yaroslavl Region	47.77	10.36	55.55	9.55	21	36	–15	116	92
Kaliningrad Region	36.59	11.12	55.08	76.11	38	37	1	151	684
Lipetsk Region	34.81	6.49	52.83	13.55	43	38	–5	152	209
Kursk Region	29.71	8.60	51.35	17.82	55	39	16	173	207
Novgorod Region	44.19	7.70	50.77	19.95	26	40	–14	115	259
Chelyabinsk Region	59.19	6.73	50.74	11.20	17	41	–24	86	166
Jewish Autonomous Region	29.30	29.46	50.28	43.52	57	42	15	172	148
Republic of Khakassia	35.47	8.57	49.56	19.62	41	43	–2	140	229
Tver Region	36.25	8.65	49.35	13.79	39	44	–5	136	159
Orenburg Region	32.45	7.08	47.48	13.01	47	45	2	146	184
Udmurt Republic	29.69	7.15	47.19	15.44	56	46	10	159	216
Ryazan Region	22.14	10.72	46.61	17.23	72	47	25	210	161

Table 1 (continued)

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipt, %
Astrakhan Region	26.25	6.43	46.55	11.74	62	48	14	177	182
Republic of Bashkortostan	37.81	6.07	46.37	12.74	37	49	–12	123	210
Zabaykalsky Krai	32.62	15.88	46.22	37.94	46	50	–4	142	239
Voronezh Region	31.08	9.48	46.13	14.89	52	51	1	148	157
Ulyanovsk Region	26.08	9.48	44.58	11.43	64	52	12	171	121
Vladimir Region	29.88	8.96	44.02	13.33	54	53	1	147	149
Smolensk Region	63.65	8.22	43.62	13.68	13	54	–41	69	167
Rostov Region	27.73	8.43	42.95	9.72	60	55	5	155	115
Omsk Region	54.70	6.47	41.66	15.92	18	56	–38	76	246
Kostroma Region	31.88	12.05	41.23	24.56	50	57	–7	129	204
Sevastopol			38.07	48.66		58			
Republic of Buryatia	28.63	21.82	37.76	43.69	58	59	–1	132	200
Volgograd Region	33.26	5.89	37.40	14.97	45	60	–15	112	254
Pskov Region	28.29	13.46	37.15	28.06	59	61	–2	131	209
Republic of Mordovia	26.19	20.70	36.93	21.83	63	62	1	141	105
Kirov Region	26.82	14.11	36.30	20.39	61	63	–2	135	145
Oryol Region	29.94	11.70	35.46	20.50	53	64	–11	118	175
Saratov Region	24.59	7.35	35.25	14.43	67	65	2	143	196
Penza Region	25.42	12.84	33.57	17.70	65	66	–1	132	138
Republic of Adygea	19.64	16.08	33.32	28.86	75	67	8	170	179
Republic of Crimea			32.86	67.90		68			
Altai Republic	33.57	49.95	32.83	81.84	44	69	–25	98	164
Altai Region	24.76	13.72	32.74	21.47	66	70	–4	132	157
Stavropol Region	23.13	8.27	32.55	17.11	70	71	–1	141	207
Chuvash Republic	31.62	10.00	32.06	22.45	51	72	–21	101	224
Tambov Region	23.18	13.62	31.98	21.74	69	73	4	138	160
Bryansk Region	20.41	11.20	31.90	29.97	74	74	0	156	268
Mari El Republic	23.93	14.13	31.68	22.40	68	75	–7	132	159

Table 1 (continued)

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipt, %
Kurgan Region	23.04	15.04	30.90	34.33	71	76	–5	134	228
Republic of Kalmykia	19.45	19.61	30.57	35.86	76	77	–1	157	183
Ivanovo Region	21.21	12.09	29.42	21.65	73	78	–5	139	179
Tyva Republic	19.11	37.85	25.25	78.64	77	79	–2	132	208
Republic of North Ossetia – Alania	13.16	13.91	23.89	31.18	81	80	1	181	224
Kabardino–Balkar Republic	17.41	14.06	19.54	28.03	78	81	–3	112	199
Karachay–Cherkess Republic	16.75	19.76	18.95	46.22	79	82	–3	113	234
Republic of Dagestan	9.21	14.84	14.16	29.52	82	83	–1	154	199
Chechen Republic	13.35	44.06	12.93	54.08	80	84	–4	97	123
Republic of Ingushetia	6.91	34.92	8.91	44.80	83	85	–2	129	128
AVERAGE FOR RUSSIA	49.53	15.90	74.92	36.99	–	–	–	151	233

Source: Rosstat data and the authors' calculations.

and non-tax revenues: the Kabardino-Balkar Republic, the Karachay-Cherkess Republic, the Republic of Dagestan, the Chechen Republic, and the Republic of Ingushetia. Since 2010, all of the above regions of the Russian Federation have worsened their positions, losing from 1 to 4 positions in the rating. Thus, Chechnya dropped from 80th to 84th place, where tax and non-tax revenues per capita dropped by 3% over ten years. At the same time, the Republic of Ingushetia is in the last place, where the volume of tax and non-tax sources of income is 53 times less than that of the leader of the rating and 8.4 times less than the average value for the Russian Federation. (8.91 thousand rubles per capita).

The most significant drop in the rating of tax and non-tax revenues was noted in the Smolensk Region, from 30th to 54th place. Change in the volume of tax and non-tax revenues for 2010–2019 was –31%, and gratuitous receipts increased by 67%, which indicates a significant increase in financial dependence on a higher budget.

The highest growth in the rating is observed in the Ryazan Region, which has risen from 72nd to 47th place (+25 positions), where the change in tax and non-tax revenues remained 210%, and gratuitous receipts — 161%. It should be noted that, despite such rapid growth, in terms of the absolute value of tax and non-tax income per capita, the Ryazan

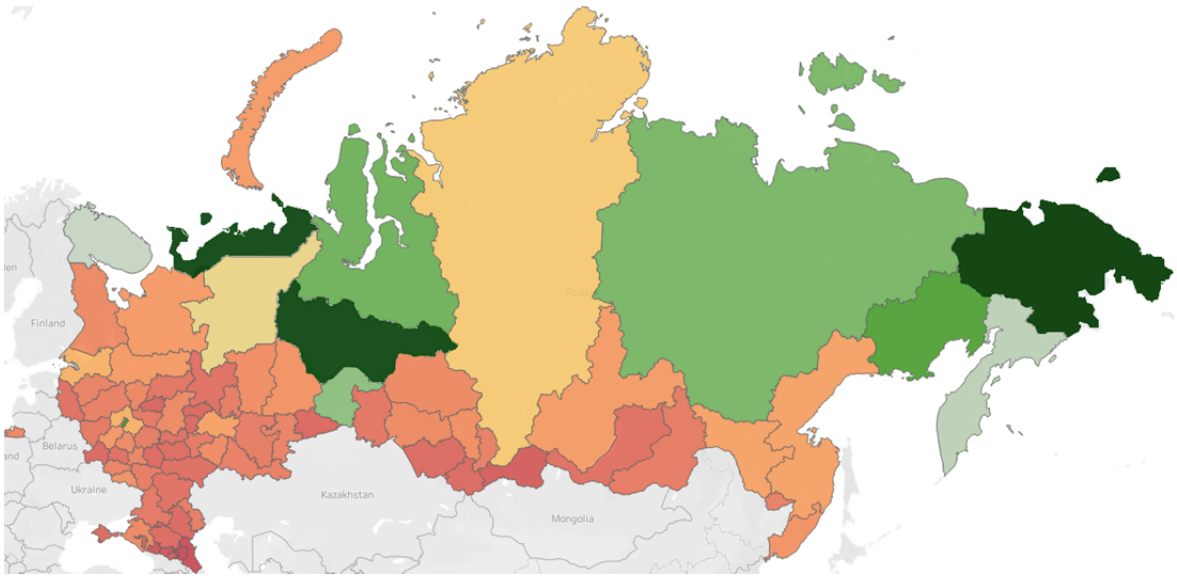

Fig. **Range of regions by the level of per capita fiscal capacity (tax and non-tax revenues of consolidated budgets) in 2019**

Source: compiled by the authors.

Region lags behind the average value for the Russian Federation by 37.79%.

Characterizing the budgetary provision of the regions, one cannot fail to note the tendencies in the provision of gratuitous receipts, which, on the one hand, allow the regions to fulfill their underfunded obligations, and on the other hand, indicate a decrease in financial independence of these budgets [10, p. 27].

Thus, the largest increase in the volume of gratuitous receipts (per capita) for the analyzed period was noted in the Chukotka Autonomous Okrug (by 733 thousand rubles) and the Kaliningrad Region (by 65 thousand rubles). The decrease in gratuitous receipts for 2010–2019 occurred in Primorsky Krai (–2.3%), Yaroslavl Region (–7.81%), St. Petersburg (–29.7%), Tyumen Region (–39.4%), the Republic of Tatarstan (–40, four%).

To determine the potential supporting regions of the spatial development of Russia, within the framework of this study, a comparative analysis of revenues to the regional budget was carried out, taking into account the ranking of the money supply per capita in the context of macro-regions. The distribution of 15 leading constituent entities of the Russian Federation by macro-regions in 2019 by the tax and non-tax revenues per capita is as follows (*Table 2*).

The largest number of regions of the Russian Federation, leading in terms of the volume of income tax per capita, is concentrated in the Far Eastern macro-region, which, as noted above, is mainly due to resource and population characteristics. Three leading regions are located in the North-West and Ural-Siberian macro-regions, one each in the Central and Angara-Yenisei macro-regions.

As part of the formation of the supporting structure for spatial development, a detailed analysis of the average per capita income of the consolidated budgets of the constituent entities of the Russian Federation for the macro-region was carried out.

The distribution of regions of the Russian Federation in the Central macro-region by the tax and non-tax and gratuitous receipts is presented in *Table. 3*.

Moscow is the undisputed leader of the entire Central macro-region. Despite the stable growth of tax and non-tax revenues (189%), the capital has taken only 5th place in the ranking over the past 10 years. In 2019, the volume of tax and non-tax income per capita

Table 2

Range of 15 regions leading by the level of per capita fiscal capacity of tax and non-tax revenues by macro-regions at the end of 2019

Macro-region	The number of regions leading by fiscal capacity	Region
Central	1	Moscow
Northwestern	3	St. Petersburg, Leningrad Region, Murmansk Region
Ural-Siberian	3	Khanty-Mansi Autonomous Okrug, Yamal-Nenets Autonomous Okrug, Tyumen Region
Northern	2	The Komi Republic, Nenets Autonomous Okrug
Angara-Yenisei	1	Krasnoyarsk Region
Far Eastern	5	Sakhalin Region, The Saha Republic, Kamchatka Krai, Magadan Region Chukotka Autonomous Okrug

Source: compiled by the authors.

amounted to 203.64 thousand rubles, which is 2.71 times higher than the average value in the Russian Federation, with the volume of gratuitous receipts — 5.75 thousand rubles per capita. The existing proportions indicate a fairly high level of budgetary provision of this region.

The territorial advantages of the Moscow Region make it possible to demonstrate positive growth in tax and non-tax revenues (163%). Over the past decade, the position of the Moscow Region has increased by three points in the ranking (from 19th to 16th place) due to an increase in tax and non-tax revenues by 34.06 thousand rubles (per capita), which is 1.17 times higher than the average for the Russian Federation.

Another benchmark for the development of the entire Central macro-region can be the Kaluga Region. The volume of tax and non-tax revenues of the regional budget in 2019 amounted to 68.78 thousand rubles per capita, which is 56% more than in 2010. The volume of gratuitous receipts amounted to 14.86 thousand rubles, having increased by 114% over the analyzed period. However, in terms of the absolute value of tax and non-tax income per capita, the Kaluga Region is 8.2% lower than the national average.

The average value of the level of budget security with tax and non-tax revenues per capita in the Central macro-region at the end of 2019 amounted to 61.08 thousand rubles (18.47% lower than the average for the Russian Federation), and in terms of the volume of gratuitous receipts — 15.83 thousand rubles (57.2% lower than the average for the Russian Federation). Despite the lag of the Central macro-region as a whole in terms of tax and non-tax income compared to the average values for the Russian Federation, a rather low level of gratuitous receipts should be noted as a positive fact, indicating a higher level of financial autonomy of the regions of this macro-region [11, p. 92]. Selected leading regions are ahead of the average macro-regional values.

Table 3

Comparative analysis of consolidated budget revenues of the Russian regions in the Central macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Moscow	107.97	3.91	203.64	5.75	5	5	0	189	147
Moscow Region	53.76	4.90	87.82	9.47	19	16	3	163	193
Kaluga Region	44.08	6.95	68.78	14.86	27	23	4	156	214
Tula Region	32.00	8.69	56.66	11.44	49	33	16	177	132
Yaroslavl Region	47.77	10.36	55.55	9.55	21	36	–15	116	92
Tver Region	36.25	8.65	49.35	13.79	39	44	–5	136	159
Ryazan Region	22.14	10.72	46.61	17.23	72	47	25	210	161
Vladimir Region	29.88	8.96	44.02	13.33	54	53	1	147	149
Smolensk Region	63.65	8.22	43.62	13.68	13	54	–41	69	167
Kostroma Region	31.88	12.05	41.23	24.56	50	57	–7	129	204
Oryol Region	29.94	11.70	35.46	20.50	53	64	–11	118	175
Bryansk Region	20.41	11.20	31.90	29.97	74	74	0	156	268
Ivanovo Region	21.21	12.09	29.42	21.65	73	78	–5	139	179

Source: Rosstat data and the authors' calculations.

As for the rest of the regions, despite the growth in tax and non-tax revenues, their revenues are still significantly lower than those of the designated leaders. Compared to other constituent entities of the Russian Federation, the reduction in income is noticeable in the Smolensk Region, where, with a decrease in the volume of tax and non-tax revenues by 20 thousand rubles, there is an increase in gratuitous receipts by 5.46 thousand rubles (per capita).

The distribution of the constituent entities of the Russian Federation of the Central Chernozem macro-region by the tax and non-tax income and gratuitous receipts is presented in *Table 4*.

The leader of the macro-region of the Central Chernozem Region is the Belgorod Region, where the budgetary provision of tax and non-tax revenues per capita in 2019 amounted to 63.75 thousand rubles, which is 60% more than in 2010. However, it should be

Table 4

Comparative analysis of consolidated budget revenues of the Russian regions in the Central Chernozem macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Belgorod Region	39.88	12.51	63.75	15.88	34	26	8	160	127
Lipetsk Region	34.81	6.49	52.83	13.55	43	38	5	152	209
Kursk Region	29.71	8.60	51.35	17.82	55	39	16	173	207
Voronezh Region	31.08	9.48	46.13	14.89	52	51	1	148	157
Tambov Region	23.18	13.62	31.98	21.74	69	73	–4	138	160

Source: Rosstat data and the authors' calculations.

noted that this cost is almost 15% lower than the national average. In addition, the average value of tax and non-tax income per capita in the Central Chernozem macro-region is 49.21 thousand rubles, which is more than 30% lower than the average for the Russian Federation; gratuitous receipts per capita in the macro-region on average amount to 16.78 thousand rubles against 36.99 thousand rubles on average across the Russian Federation.

Another driver for the development of the macro-region may be the Lipetsk Region, which has risen by 5 positions in ten years and occupies 38th place in 2019 due to an increase in tax and non-tax income by 52%.

The Kursk Region does not lag behind the Lipetsk Region, its revenues to the regional budget in 2019 amounted to 53.25 thousand rubles per capita, an increase of 73%. However, the indicators of the average per capita budgetary provision of the tax and non-tax income in the Lipetsk and Kursk regions are more than 1.4 times lower than the national average.

The distribution of constituent entities of the Russian Federation in the North-West macro-region by the tax and non-tax income and gratuitous receipts is presented in *Table 5*.

In 2019, the largest volume of tax and non-tax revenues in the macro-region was noted in the Murmansk Region due to the growth of tax and non-tax income by 90%. In 2010, St. Petersburg was the leader in terms of tax and non-tax revenues, which, despite an increase of 32%, dropped to 12th place in the ranking of regions of the Russian Federation, losing 5 positions. The highest growth in tax and non-tax revenues (+108%) occurred in the Leningrad Region, providing 88.35 thousand rubles in 2019 per capita and an additional 14 positions in the ranking in relation to 2010.

Table 5

Comparative analysis of revenues of the consolidated budgets of the Russian regions in the North-Western macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Murmansk Region	61.45	12.47	116.67	19.40	15	11	4	190	156
St. Petersburg	87.22	7.82	115.05	5.49	7	12	–5	132	70
Leningrad Region	42.49	5.44	88.35	7.07	29	15	14	208	130
Vologda Region	44.38	8.06	71.57	18.64	25	22	3	161	231
Republic of Karelia	39.09	13.64	56.69	38.04	35	32	3	145	279
Kaliningrad Region	36.59	11.12	55.08	76.11	38	37	1	151	684
Novgorod Region	44.19	7.70	50.77	19.95	26	40	–14	115	259
Pskov Region	28.29	13.46	37.15	28.06	59	61	–2	131	209

Source: Rosstat data and the authors' calculations.

The average per capita budgetary provision of tax and non-tax revenues per capita for the leaders of the North-Western macro-region exceeds the national average: Murmansk Region — by 55.73%, St. Petersburg — by 53.56%, Leningrad Region — by 17.93%. This indicates a fairly high level of budgetary provision of the selected regions, as well as the position of the macro-region as a whole since the average value of the tax and non-tax income per capita is 73.92 thousand rubles, with the national average — 74.92 thousand rubles.

The distribution of the constituent entities of the Russian Federation in the Northern macro-region by the tax and non-tax income and gratuitous receipts is presented in *Table 6*.

In this macro-region, the Nenets Autonomous Okrug has become the leader in terms of revenues to the regional budget throughout Russia, which should be singled out as a benchmark for the Northern macro-region. Despite a slight increase since 2010 (+14%), the volume of tax and non-tax revenues in 2019 amounted to 447 thousand rubles per capita, which is 6.3 times higher than the national average.

The distribution of the constituent entities of the Russian Federation in the Southern macro-region by the tax and non-tax income and gratuitous receipts is presented in *Table 7*.

The Krasnodar Region is the leader of the entire macro-region, which ranked 35th in 2019

Table 6

Comparative analysis of consolidated budget revenues of the Russian regions in the Northern macroregion per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Nenets Autonomous Okrug	414.72	53.19	472.65	86.36	1	1	0	114	162
Komi Republic	70.10	8.69	108.10	11.29	10	13	–3	154	130
Arkhangelsk region	47.07	17.25	71.82	26.23	22	21	1	153	152

Source: Rosstat data and the authors' calculations.

Table 7

Comparative analysis of revenues of the consolidated budgets of the Russian regions in the Southern macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Krasnodar Region	32.34	7.12	56.32	8.58	48	35	13	174	121
Astrakhan Region	26.25	6.43	46.55	11.74	62	48	14	177	182
Rostov Region	27.73	8.43	42.95	9.72	60	55	5	155	115
Sevastopol			38.07	48.66		58			
Volgograd Region	33.26	5.89	37.40	14.97	45	60	–15	112	254
Republic of Adygea	19.64	16.08	33.32	28.86	75	67	8	170	179
Republic of Crimea			32.86	67.90		68			
Republic of Kalmykia	19.45	19.61	30.57	35.86	76	77	–1	157	183

Source: Rosstat data and the authors' calculations.

Table 8

Comparative analysis of consolidated budget revenues of the Russian regions in the North Caucasus macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Stavropol Region	23.13	8.27	32.55	17.11	70	71	–1	141	207
Republic of North Ossetia — Alania	13.16	13.91	23.89	31.18	81	80	1	181	224
Kabardino-Balkar Republic	17.41	14.06	19.54	28.03	78	81	–3	112	199
Karachay-Cherkess Republic	16.75	19.76	18.95	46.22	79	82	–3	113	234
Republic of Dagestan	9.21	14.84	14.16	29.52	82	83	–1	154	199
Chechen Republic	13.35	44.06	12.93	54.08	80	84	–4	97	123
Republic of Ingushetia	6.91	34.92	8.91	44.80	83	85	–2	129	128

Source: Rosstat data and the authors' calculations.

due to the growth of tax and non-tax income per capita by 74%. The growth of gratuitous payments during this period was only 21%.

Another growth point of the Southern macro-region can be the Astrakhan Region, which in ten years has shown an increase in tax and non-tax revenues by 77% and has risen in the ranking by 14 positions.

However, the level of per capita budgetary provision of the Southern macro-region as a whole and of its leaders, in particular, is lower than the average Russian indicators. Thus, the average tax and non-tax income in the macro-region is 39.76 thousand rubles per capita, almost half the average for the Russian Federation. The average per capita budgetary provision of tax and non-tax revenues in the Krasnodar Region is lower than the average for the regions of Russia by 24.83%, in the Astrakhan Region — by 37.87%.

Separately, it is worth noting gratuitous receipts to the Republic of Crimea and Sevastopol, which significantly exceed the level of tax and non-tax receipts in these regions associated with the corresponding federal programs and development projects. [12, p. 65].

The distribution of the constituent entities of the Russian Federation in the North Caucasus macro-region by the tax and non-tax income and gratuitous receipts is presented in *Table 8*.

The North Caucasus macro-region showed the lowest values among the regions of Russia

Table 9

Comparative analysis of consolidated budget revenues of the Russian regions in the Volga-Kama macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Republic of Tatarstan	42.78	16.37	76.71	9.75	28	19	9	179	60
Perm Region	40.40	6.58	60.29	10.17	32	28	4	149	155
Nizhny Novgorod Region	44.79	6.31	56.65	10.06	23	34	–11	126	160
Udmurt Republic	29.69	7.15	47.19	15.44	56	46	10	159	216
Republic of Mordovia	26.19	20.70	36.93	21.83	63	62	1	141	105
Kirov Region	26.82	14.11	36.30	20.39	61	63	–2	135	145
Chuvash Republic	31.62	10.00	32.06	22.45	51	72	–21	101	224

Source: Rosstat data and the authors' calculations.

in terms of the level of budgetary provision with tax and non-tax income per capita. However, despite the fact that almost all the subjects of this macro-region have shown a loss of positions in the ranking (compared to 2010), there is an undoubted leader in the macro-region — the Stavropol Region. The growth of tax and non-tax revenues to the budget per capita amounted to 41%, 32.55 thousand rubles, which is 56.55% lower than the national average, but 1.74 times higher than the macroregional, which was equal to 18.7 thousand rubles in 2019. In other constituent entities of the Russian Federation of this macro-region, the volume of gratuitous receipts per capita is significantly higher than tax and non-tax income, which indicates a sufficiently high financial dependence on the federal budget [13].

The distribution of the constituent entities of the Russian Federation in the Volga-Kama macro-region by the tax and non-tax income and gratuitous receipts is presented in *Table 9*.

There are two main leaders on the territory of the Volga-Kama macro-region that could become guidelines for the development of the entire macro-region: the Republic of Tatarstan and the Perm Region. Due to an increase in tax and non-tax revenues by 79% (up to 76.71 thousand rubles per capita, which is 2.39% higher than the national average), the Republic of Tatarstan was able to take 19th place in the rating, providing growth by 9 positions compared to 2010. At the same time, the level of gratuitous receipts decreased to 9.75 thousand rubles, which indicates a fairly high level of fiscal autonomy of the regional budget.

In the Perm Region, the volume of tax and non-tax income per capita increased

Table 10

Comparative analysis of consolidated budget revenues of the Russian regions in the Volga-Ural macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Samara Region	40.15	6.47	58.52	8.66	33	29	4	146	134
Orenburg Region	32.45	7.08	47.48	13.01	47	45	2	146	184
Republic of Bashkortostan	37.81	6.07	46.37	12.74	37	49	–12	123	210
Ulyanovsk Region	26.08	9.48	44.58	11.43	64	52	12	171	121
Saratov Region	24.59	7.35	35.25	14.43	67	65	2	143	196
Penza Region	25.42	12.84	33.57	17.70	65	66	–1	132	138

Source: Rosstat data and the authors' calculations.

over the same period by 49%, amounting to 60.29 thousand rubles, which is almost 20% lower than the average value for the regions of Russia. At the same time, the average per capita budget provision with tax and non-tax revenues on average in the Volga-Kama macro-region in 2019 amounted to 49.45 thousand rubles (34% lower than the national average).

The distribution of the constituent entities of the Russian Federation in the Volga-Ural macro-region by the tax and non-tax income and gratuitous receipts is presented in *Table10*.

The leader in the Volga-Ural macro-region for the analyzed period is the Samara region, which showed an increase in tax and non-tax revenues by 46% and moved up in the ranking by 4 positions. The highest revenue to the regional budget in 2019 besides the Samara Region on the territory of the macro-region are noted in the Orenburg Region — 47.48 thousand rubles per capita in the form of tax and non-tax revenues and 13.01 thousand rubles of gratuitous receipts. Comparable provision of tax and non-tax income per capita in the Republic of Bashkortostan — 46.37 thousand rubles (+2 positions in the rating for 2010–2019).

However, it should be noted that the amount of tax and non-tax incomes per capita in the leading regions of the macro-region is more than 20% lower than the national average, and the average position on tax and non-tax income per capita in the Volga-Ural macro-region is 40.8% lower than the average across Russia and amounts to 44.3 thousand rubles.

The distribution of the constituent entities of the Russian Federation in the Ural-Siberian macro-region by the tax and non-tax income and gratuitous receipts is presented in *Table 11*.

The leaders of the rating of the Russian regions are concentrated in the Ural-Siberian macro-region. The clear points of growth in the macro-region in terms of the amount of

Table 11

Comparative analysis of consolidated budget revenues of the Russian regions in the Ural-Siberian macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Yamalo-Nenets Autonomous Okrug	213.86	4.52	456.31	18.77	3	2	1	213	415
Khanty-Mansi Autonomous Okrug – Yugra	151.82	4.14	172.67	18.84	4	7	–3	114	455
Tyumen Region	44.61	11.71	151.72	7.09	24	9	15	340	61
Sverdlovsk Region	34.93	5.53	65.66	6.97	42	25	17	188	126
Chelyabinsk Region	59.19	6.73	50.74	11.20	17	41	–24	86	166
Kurgan Region	23.04	15.04	30.90	34.33	71	76	–5	134	228

Source: Rosstat data and the authors' calculations.

tax and non-tax revenues per capita in 2019 include the Yamalo-Nenets Autonomous Okrug (456.31 thousand rubles — more than 6 times higher than the national average), Khanty-Mansi Autonomous Okrug (172.67 thousand rubles — more than 2 times higher than the national average) and the Tyumen Region (151.72 thousand rubles — more than 2 times higher than the national average). At the same time, the average value of the tax and non-tax income per capita for the macro-region as a whole is also higher than the average Russian level by 106.45 and amounts to 154.67 thousand rubles. The highest gratuitous receipts in the Ural-Siberian macro-region in the Kurgan Region — 34.33 thousand rubles per capita.

The distribution of the regions of the Russian Federation in the macro-region of South Siberia by the tax and non-tax income and gratuitous receipts is presented in *Table 12*.

The leader of the South Siberian macro-region in terms of tax and non-tax revenues to the regional budget in 2019 is the Kemerovo Region, which has improved its position relative to 2010 by 3 rating points, amounting to 60.79 thousand rubles per capita, which is 18.86% lower than the national average. At the same time, the volume of gratuitous receipts for the period under review increased by 71% and amounted to 11.82 thousand rubles per capita.

The second leader of the macro-region is the Novosibirsk Region, which grew in 2010–

2019 in terms of the volume of tax and non-tax income by 43% to 58.07 thousand rubles per capita. At the same time, the existing level of per capita budgetary provision of tax and non-tax income in the Novosibirsk Region is lower than the average for the regions of Russia by 22.5%, and the average value for the macro-region is 36.9%.

The distribution of the constituent entities of the Russian Federation in the Angara-Yenisei macro-region by the tax and non-tax income and gratuitous receipts is presented in *Table 13*.

In the Angara-Yenisei macro-region, the amounts of tax and non-tax revenues to regional budgets are distributed unevenly, which hinders the active development of the entire macro-region: Krasnoyarsk Region and Irkutsk Region are among the top 20 leading regions. The Republic of Khakassia is in the middle of the rating, and the Republic of Tyva is among the ten most lagging regions of the Russian Federation [14, p. 38].

The key points of the macro-region can be Krasnoyarsk Region (the volume of tax and non-tax income per capita in 2019 amounted to 101.46 thousand rubles, which is 35.42% higher than the average Russian level) and Irkutsk Region (the volume of tax and non-tax income calculated per capita in 2019 amounted to 73.26 thousand rubles — 2.22% lower than the national average). At the same time, the average value of the budgetary provision of the tax and non-tax income in the Angara-Yenisei macro-region, due to significant differences, was at the level of 62.38 thousand rubles per capita, which is 16.74% less than the average for the constituent entities of the Russian Federation.

The distribution of the constituent entities of the Russian Federation in the macro-region of the Far East by the tax and non-tax income and gratuitous receipts is presented in *Table 14*.

The main leaders in the volume of financial receipts among the constituent entities of the Russian Federation are concentrated in the Far Eastern macro-region, which is one of the most numerous in terms of the number of regions [15]. The largest growth in tax and non-tax revenues for 2010–2019 is noted in the Sakhalin Region (the change was 351%). The amount of tax and non-tax revenues in the Sakhalin Region is 369.93 thousand rubles per capita, which is almost 5 times higher than the national average.

The second leader of the macro-region is the Chukotka Autonomous Okrug: the volume of tax and non-tax revenues in 2019 amounted to 322.09 thousand rubles (4.3 times more than the national average), gratuitous payments — 818.58 thousand rubles per capita. Accordingly, the average value for the Far Eastern region was at a higher level (1.86 times) than the national average and amounted to 139.14 thousand rubles.

CONCLUSIONS

The analysis of the average per capita budgetary provision of tax and non-tax revenues of the constituent entities of the Russian Federation in the spatial aspect made it possible to distinguish the constituent entities of the Russian Federation in the context of macro-regions that have the potential to become a support for the regions in one of the key factors — the budgetary provision of the regional budget, since this aspect is important in the implementation of the policy of accelerated economic development of the territory:

- Central: Moscow, Moscow Region, Kaluga Region;
- Central Chernozem: Belgorod Region, Lipetsk Region, Kursk Region;
- North-West: St. Petersburg, Murmansk Region;
- Northern: Nenets Autonomous Okrug;
- South: Krasnodar Region, Astrakhan Region;
- North Caucasian: Stavropol Region;
- Volgo-Kama: Republic of Tatarstan, Perm Region;

Table 12

Comparative analysis of consolidated budget revenues of the Russian regions in the South Siberian macroregion per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Kemerovo Region — Kuzbass	41.65	6.90	60.79	11.82	30	27	3	146	171
Novosibirsk Region	40.64	7.45	58.07	12.33	31	30	1	143	166
Tomsk Region	37.87	10.70	57.43	16.74	36	31	5	152	156
Omsk Region	54.70	6.47	41.66	15.92	18	56	–38	76	246
Altai Republic	33.57	49.95	32.83	81.84	44	69	–25	98	164
Altai Region	24.76	13.72	32.74	21.47	66	70	–4	132	157

Source: Rosstat data and the authors' calculations.

Table 13

Comparative analysis of revenues of the consolidated budgets of the Russian regions in the Angara-Yenisei macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Krasnoyarsk Region	65.16	10.95	101.46	12.61	11	14	–3	156	115
Irkutsk Region	59.20	10.24	73.26	21.47	16	20	–4	124	210
Republic of Khakassia	35.47	8.57	49.56	19.62	41	43	–2	140	229
Tyva Republic	19.11	37.85	25.25	78.64	77	79	–2	132	208

Source: Rosstat data and the authors' calculations.

Table 14

Comparative analysis of consolidated budget revenues of the Russian regions in the Far East macro-region per capita in 2010 and 2019

Region	2010		2019		2010	2019	2010–2019		
	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Tax and non-tax income per capita (thousand rubles)	Gratuitous receipts per capita (thousand rubles)	Rank by tax and non-tax income per capita		Rank change	Change of tax and non-tax income, %	Change of gratuitous receipts, %
Sakhalin Region	105.33	26.02	369.93	49.42	6	3	3	351	190
Chukotka Autonomous Okrug	313.65	84.66	322.09	818.58	2	4	–2	103	967
Magadan Region	86.69	67.88	195.54	112.43	8	6	2	226	166
Republic of Sakha (Yakutia)	82.49	50.32	165.64	91.87	9	8	1	201	183
Kamchatka Region	64.93	90.21	122.60	172.15	12	10	2	189	191
Amur Region	52.86	19.20	77.27	27.95	20	17	3	146	146
Khabarovsk Region	61.77	13.44	77.05	23.39	14	18	–4	125	174
Primorsky Krai	35.96	19.96	66.11	19.51	40	24	16	184	98
Jewish Autonomous Region	29.30	29.46	50.28	43.52	57	42	15	172	148
Zabaykalsky Krai	32.62	15.88	46.22	37.94	46	50	–4	142	239
Republic of Buryatia	28.63	21.82	37.76	43.69	58	59	–1	132	200

Source: Rosstat data and the authors' calculations.

- Volgo-Ural: Samara Region, Orenburg Region;
- Ural-Siberian: Yamalo-Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug, Tyumen Region;
- South Siberian: Kemerovo Region, Novosibirsk Region;
- Angara-Yenisei: Krasnoyarsk Region, Irkutsk Region;
- Far East: Sakhalin Region, Chukotka Autonomous Okrug.

The selected regions form one of the key layers (along with human capital, economic development, the location of transport infrastructure, etc.) of the supporting structure of the spatial organization of Russia in terms of the level of budgetary provision, which characterizes the financial potential of the territories. The proposed scientific approach, combined with an analysis of the constituent entities of the Russian Federation on other aspects of spatial development, makes it possible to identify and evaluate all layers of the spatial development of Russia and their totality — in general, regions supporting the spatial development of Russia [16, 17].

The definition of supporting regions is of practical importance in two aspects.

First, the allocation of supporting regions allows forming the "points of growth" and centers of attraction of resources throughout the country (and not only in metropolitan agglomerations, which pull together the resources of both near and distant territories, effectively depriving them of opportunities for development). Acting as drivers of development at the meso-level, the supporting regions ensure their attractiveness at the macro-level, contributing to the preservation and accumulation of human and economic capital of the macro-region as a whole [18, p. 829]. Thus, conditions are created for the formation of a polynuclear spatial structure of the country, which in the future can provide greater stability of the spatial organization as a whole [19, 20].

Second, the supporting regions can become drivers for the development of semi-periphery and periphery of their macro-regions through the more active building of cooperation ties at the meso-level, implementation of joint projects, including in the field of infrastructure development. Comprehensive programs for the socio-economic development of macro-regions based on the support of regions using their human, economic, financial, and other resources can act as a development mechanism, which will make it possible to implement measures aimed at enhancing interregional ties and achieving a synergistic effect at the meso-level, which will reduce the differences of the constituent entities of the Russian Federation within the macro-region [21, 22].

The development of interregional cooperation is possible, including through the use of mechanisms for providing "horizontal" inter-budgetary transfers and budget loans [23, p. 53]. The implementation of measures in this area will also help to level out interregional differences and will contribute to a more efficient use of the potential of lagging territories. [24, p. 905].

In the future, at the level of macro-regions, special funds for socio-economic development can be formed for the implementation of joint projects.

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Pivovarova O. V. — collected statistical data, designed tables and graphical representations of the results, analyzed the results of the research.

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REVIEW

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Banks Financing the Green Economy: A Review of Current Research

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ABSTRACT

Achieving the goals of sustainable development and the transition to a green economy requires significant financial resources. Banks are active participants in the financing of projects and industries with a positive environmental and social impact. In this regard, the emerging responsible banking and its regulation are of scientific and practical interest, which ensures **the relevance** of the study. **The aim** of the study is to generalize and systematize the results of scientific research on the participation of banks in financing the green economy. In the context of the historical approach, the authors apply **the methods** of critical analysis, logical generalization, systematization, and grouping. The research is based on scientific publications by Russian and foreign authors. As **a result**, the authors substantiated the correlation of the concepts "green", "sustainable", "responsible" bank, and identified that such green financial instruments as green bonds, in some countries — green loans, green deposits, green leasing, and green insurance are being introduced into banking practices. Responsible banking is regulated using monetary and macroprudential policy instruments; in some countries, incentive-based regulation of responsible banking is mandatory. The authors **concluded** that responsible banking is moving towards the transformation of classic products and services into environmentally and socially oriented ones, accompanied by the transformation of business processes, management culture, and the content of banking policy. Responsible banking contributes to ensuring financial stability, but the regulator needs to use macroprudential tools to timely identify a green credit bubble, including through climate and environmental stress testing. **Prospects for further research** are aimed at assessing the impact of green financial instruments on the bank's performance, the role of responsible banking in achieving sustainable development goals, at finding the most effective monetary and macroprudential tools to stimulate responsible banking and ensure financial stability.

Keywords: banks; green economy; green loans; green bonds; green financial instruments; sustainable development; stimulating banking regulation

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INTRODUCTION

Over the past few decades, the attention of the world community has been focused on shifting the vector of development of economic processes and relations towards the rational and environmentally friendly use of natural resources. In June 1992, at the UN Conference in Rio de Janeiro, the concept of "sustainable development" was defined as development that meets the needs of the present and future generations.

The adoption of the concept of "sustainable development" required a search for ways to achieve sustainable goals, determine the directions of the transformation of economic relations, the emergence of a new term "green economy". "Green" refers to an economy that improves the welfare of individuals and social justice, significantly reduces environmental risks, and implies a favorable interaction between the environment, social development, and economic growth[1] [1].

The transition to a green economy requires more support, particularly financial [2]. This transition contributes to the transformation of the world financial system, the creation of new institutional structures, a change in the financial architecture, the redirection of financial flows, the introduction of new financial instruments, the formation of a regulatory framework, prudential regulation, a new culture of management of financial institutions. These transformations are called "greening" the financial system [3]. Supporting sustainable development by the financial system should have a positive effect on financial stability [4] and can play a key role in finance [5].

One of the directions of the transformation of the global and national financial architecture is the formation of a green banking system with a "network" type of financial intermediaries: green banks, development banks, as well as commercial banks with separate eco-financial divisions [6, 7]. The financial policy of banks, focused on achieving sustainable goals of society, is a tool for creating opportunities for the development of the green economy [8–10].

Since the 90s 20th century banks promoted sustainable development by financing first environmental and then social projects [11]. During the same period, the practice of doing business, including banking, is expanding in accordance with the Concept of Corporate Social Responsibility (CSR) [12]. In 1991, Deutsche Bank (Germany), HSBC Holdings, National Westminster Bank (US), Royal Bank of Canada and Westpac Banking Corporation (Australia) adopted the United Nations Environment Programme Finance Initiative (UNEP FI) [13], aimed at integrating environmental approaches into the operations and services of the financial sector. At the beginning of 2020, this programme was supported by about 170 banks around the world, including leading international banks, regional leaders, development banks, and banks specializing in financing environmental and social projects.[2]

The ongoing processes of greening the banking system have led to the special relevance of the theoretical understanding of the role of banks in financing the green economy, the need to generalize and systematize the results of relevant scientific research.

The structure of the article includes the following elements: the evolution of the concepts of green, sustainable, responsible

[1] Global Green New Deal: UNEP Report.: http://greenlogic.by/content/files/GREENTRANSPORT/UNEP90_RUS.pdf (accessed on 14.03.2020); Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication. URL: http://old.ecocongress.info/5_congr/docs/doklad.pdf (accessed on 14.03.2020).

[2] UNEP FI. URL: https://www.unepfi.org/banking/banking/ (accessed on 15.03.2020).

bank and banking, an overview of green financial instruments used in banking practice, and instruments for regulating responsible banking by the banking regulator. Finally, the main results are summarized and directions for future research are identified.

BANKS FINANCING GREEN ECONOMY: DEVELOPMENT OF TERMINOLOGY

The greening of the financial system was facilitated by the development of the theoretical apparatus of banking, the introduction of the concepts of "green", "sustainable", "responsible" banking into the scientific vocabulary.

The first mention of green banking as an environmentally friendly bank is associated with Triodos Bank, founded in 1980 in the Netherlands. In 1990, Triodos Bank launched a Green Fund strategy to finance environmentally friendly projects, later called green initiatives. Following the example of Triodos Bank, banks around the world are starting to implement green initiatives in their operations. In this regard, green banking was understood as any form of banking services that contribute to the country's and nation's obtaining environmental benefits,[3] green banks are engaged in green banking.

Officially, green banking has existed since 2003.[4] Despite the fact that the banking business is inherently environmentally neutral, the initial idea of a green bank was to minimize environmental damage from the bank's activities (reduce paper consumption, switch to electronic document flow, use of alternative energy sources, etc.). Also, banks could voluntarily participate in financing private environmental projects.

In 2007, a new financial instrument appeared on the world financial market — climate and green bonds, the first issuers of which were development banks [14–16]. Later, separate green development banks began to be created as public financial institutions. A 2015 report by the Organization for Economic Co-operation and Development (OECD)[5] defines a Green Bank as a public entity established specifically to facilitate private investment into low-carbon, climate-resilient infrastructure and other green sectors such as water and waste management; the green bank's mission is to leverage innovative finance to accelerate the transition to clean energy and combat climate change [2].

In the studies of the last decade, the green bank is considered not only as a state but also as a commercial financial institution [17–19], acting as one of the instruments of the green economy, contributing to environmentally sustainable development and socially responsible investments that attract entrepreneurs to cleaner production through financing environmental projects [20–22].

Research on green banking is carried out in two directions: internal and external [23]. The focus of internal research is the internal organizational business processes of the bank to reduce the negative impact on the environment [21, 24–26]; external focus — attracting and providing financial resources for the green economy [27–30].

In addition to the terms "green banking", "green bank" in the scientific literature the terms "sustainable banking" and "sustainable bank" are used.

[3] Dash R.N. Sustainable "green" banking: the story of Triodos Bank. URL: https://ru.scribd.com/document/37388173/Sustainable-Green-Banking (accessed on 15.05.2020).

[4] Green Banking Consultants Homes Ltd. URL: http://greenbankingbd.com/index.php/uncatagorise/2-history-of-green-banking (accessed on 15.05.2020).

[5] OECD report "Green Investment Banks: Scaling up Private Investment in Low-carbon, Climate — resilient Infrastructure" (2015). URL: https://www.oecd.org/environment/cc/Green-Investment-Banks-POLICY-PERSPECTIVES-web.pdf (accessed on 10.07.2020).

The first mentions of sustainable banking are from Sustainable Banking with the Poor: A Worldwide Inventory of Microfinance Institutions,[6] 1997. The study analyzed the credit and savings programs of microfinance institutions in Africa for their potential use to achieve sustainable development goals for improving human welfare. The study analyzed the credit and savings programs of microfinance institutions in Africa for their potential use to achieve sustainable development goals to improve human welfare. The subject of the research is microfinance organizations whose business model is focused on the social sphere. However, the term "sustainable banking" was not defined and was used by the authors of the report in the context of the financial institution's activities to provide financial assistance to low-income groups of the population.

A further interest of researchers in the interpretation of a sustainable bank is determined by the spread of the Concept of sustainable development, which becomes relevant not only for banks but also for other stakeholders. Banking policy, communication and transparency, environmental investment, and environmental risks are becoming central and interrelated components of the term "sustainable bank".

An analysis of the definitions of a sustainable bank in the scientific literature makes it possible to identify several non-contradictory approaches based on the internal and external directions of research in green banking and to develop them in interconnection towards sustainable banking. The first approach focuses on the bank's awareness of its role in sustainable development and the implementation of activities aimed at achieving sustainable goals. Such studies are devoted to the problems of transforming the bank's business processes, its financial policy, the development of operations with green financial instruments and their impact on the bank's efficiency, as well as the problems of forming a new internal management culture, including risk management, information disclosure [8, 31–36].

One of the directions of the transformation of the global and national financial architecture is the formation of a green banking system with a "network" type of financial intermediaries: green banks, development banks, as well as commercial banks with separate eco-financial divisions.

The second research approach to the term "sustainable bank" focuses on the external performance of the bank, which has a positive impact on people and the environment as a result of the adaptation of classic banking products and services to new social needs [8, 31, 37–40, 42]. Such a bank integrates ESG,[7] criteria into its activities, paying attention to

[6] The World Bank. Sustainable Banking with the Poor: a Worldwide Inventory of Microfinance Institutions. URL: https://silo.tips/download/a-worldwide-inventory-of-microfinance-institutions-abstract (accessed on 10.07.2020).

[7] Environmental, Social, and Corporate Governance (*ESG*) criteria are a set of performance standards for companies and banks that they use to test potential investments. Environmental criteria consider how the company operates in the field of environmental protection. Social criteria take into account how a company or bank manages employees and works with customers. Management criteria refer to company management, executive compensation, audit, internal control, and shareholder rights. The history of investing in accordance with ESG criteria begins in 2004. Former UN Secretary-General Kofi Annan invited the largest financial institutions to take part in a joint initiative under the auspices of the UN Global Compact with the support of the IFC. The term ESG was first coined in 2005 in the historical study "*Who Cares Wins*".

environmental risk management, socially responsible investments, and their impact on the environment [42–47].

Sustainable banking plays a triple role in promoting sustainable business thinking by providing financial resources to economic agents, in some cases financial advice for new projects or initiatives, aimed at supporting non-governmental organizations and government development programs a new sustainable model of the national economy, improves the reputation and image of the banking sector, demonstrating interest in the development of a green economy; characterized by the transparency of environmental information and communication [31, 40, 41].

The development of the terminology of green, sustainable banking was influenced by the concept of CSR. During the UN General Assembly on September 22–23, 2019 in New York, 132 banks from 49 countries (180 banks in 2020) signed the Principles for Responsible Banking,[8] to help any bank — regardless of the stage of its inclusion in the process of achieving sustainable development goals — aligning your business strategy with the goals of society. The implementation of the "Principles" is aimed at the formation and development of a stable (that is, ensuring the achievement of society's goals) banking system. These principles include:

- *the principle of alignment,* which implies the adaptation of the bank's business strategy to the needs and goals of society within the framework of national and regional requirements related to sustainable development;
- *the principle of impact and target setting,* implying a reduction in the negative impact on the environment and the reduction of environmental and social risks associated with the activities of the bank itself; implementation of the principle involves the publication by banks of environmental and social goals, which will receive the greatest attention from the bank's management;
- *the principle of clients and customers,* which involves building mutually beneficial relationships with customers to encourage achieving sustainable development goals and ensuring prosperity for current and future generations;
- *the principle of stakeholders,* which presupposes a proactive position of banks in relations with stakeholders in consultation, various interactions, and cooperation to achieve society's goals;
- *the principle of governance and culture,* which consists in effective intra-bank management and the formation of a culture of responsible banking;
- *the principle of transparency and accountability,* which implies that banks regularly review individual and collective implementation of the Principles of Responsible Banking, provide transparent reporting accounting for their positive and negative impact on the environment, and also assess their contribution to society's goals.

Thus, in 2019, representatives of the international banking community adopted the term "responsible bank", the activities of which can be defined as "responsible banking".

Research into the use of the terms green, sustainable and responsible banking in the scientific literature leads to the following conclusions. It combines the concepts of banks' awareness of the need to operate in a manner that minimizes environmental harm. The term green bank is used both in relation to the state green development banks and in relation to commercial banks, the terms sustainable and responsible bank — in relation to commercial banks.

[8] The Principles for Responsible Banking. URL: https://www.unepfi.org/banking/bankingprinciples/#:~: text=is%20urgently%20needed.-The%20Principles%20for%20Responsible%20Banking, and%20across%20all%20business%20areas (accessed on 06.06.2020).

In fact, sustainable banking is a broader concept that includes green banking: the activities of a green bank are aimed at minimizing the negative impact on the environment, while the activities of a sustainable bank contribute to the achievement of a sustainable development goal not only in the environment but also socially-wise.

A responsible bank is a more formalized concept based on outlined principles than sustainable and green in relation to commercial banks. Responsible banking can be characterized as the perfect form of sustainable banking, which has received official international recognition and implemented certain principles.

BANKS AND GREEN FINANCIAL INSTRUMENTS

The adoption by the world community of the concept of sustainable development has led to the formation of a new terminological apparatus, which implies the addition of "green" to the existing economic and financial terms, filling them with new content. The terms green finance, green investments, green financial instruments are used to denote relations associated with the accumulation of funds and their subsequent direction for the implementation of projects of environmental and social orientation, including with the participation of banks. In the scientific literature, there are two different approaches to define green finance and green investment. Representatives of the first approach identify both terms [48–50]. Representatives of the second approach distinguish between these terms: green finance is a wider range of relationships [16, 51]. Finance is green when it participates in financing public and private green investments, enforces public policies that encourage green projects, and is a component of the financial system that deals with green investments.[9]

For the banking sector, green finance is defined as financial products and services, under the consideration of environmental factors throughout the lending decision making, ex-post monitoring and risk management processes, provided to promote environmentally responsible investments and stimulate low-carbon technologies, projects, industries, and businesses.[10]

In 2007, a new financial instrument appeared on the world financial market – climate and green bonds, the first issuers of which were development banks.

Green financial instruments can be defined as financial assets and financial liabilities used by economic agents to achieve sustainable development goals. The green financial instruments for which the bank acts as a counterparty include green loans, green bonds, green deposits, green leasing, green insurance [7, 52–56].

The use of certain green financial instruments by different banks varies. Development banks have historically been green bond issuers, lending directly to environmental projects, and sustainable, responsible commercial banks, their green business units, are adapting their classic financial assets and liabilities to achieve sustainable development goals [45, 18].

Green lending is any type of credit instrument that is provided exclusively

[9] Lindberg N. Definition of Green Finance. German Development Institute. URL: https://www.die-gdi.de/uploads/media/Lindenberg_Definition_green_finance.pdf (accessed on 25.05.2020).

[10] Pricewaterhouse Coopers Consultants (PWC): Exploring Green Finance Incentives in China (2013). URL: https://www.pwchk.com/en/migration/pdf/green-finance-incentives-oct2013-eng.pdf (accessed on 25.05.2020).

for financing or refinancing, in whole or in part, new and/or existing available environmental projects [57, 58]. Green lending is the link between cleaner industries and financial institutions [36].

Depending on the category of the borrower, there are two main types of green loans: loans to organizations in strategic sectors (performing strategic national goals) and loans to other organizations [59, 60]. Depending on the lending mechanism, direct green lending and green relending are distinguished.

According to Bloomberg data, green loan volumes (including guarantee lines and letters of credit) exceeded US$ 99 billion in 2018; at the end of 2019 — at least US$ 81 billion.

Direct green lending is carried out through the provision of funds by banks with state participation directly to green companies with a large volume of requested funds.[11] Commercial banks can also independently carry out direct lending, depending on the demand for bank financing of green projects of borrowers [52]. With direct lending, banks organize the issuance of a loan, control its repayment, and the fulfillment of the terms of the loan agreement by the borrower.

In green relending, public funds are channeled first to a financial company, such as the National Development Bank, and then to commercial banks that finance green companies.[12]

To provide green loans, banks can form syndicates [61].

Green loans improve the quality of the aggregate loan portfolio of banks [60, 36], help to reduce credit, reputational and legal risks of the creditor bank [64, 65], improve its image, increase its competitiveness [27, 64, 65].

According to Bloomberg data, green loan volumes (including guarantee lines and letters of credit) exceeded US$ 99 billion in 2018; at the end of 2019 — at least US$ 81 billion.[13]

Green loans are provided by banks in accordance with the developed and approved credit policy. A bank can offer green credit products with attractive terms for borrowers (including the type of loan, terms, interest rate, and amount), thereby stimulating the creation and development of environmentally friendly and energy-saving industries and enterprises, influencing the change in the structure of social production, the ratio of dirty and green business, contributing to the green growth. At the same time, banks can "punish" enterprises that violate the norms and laws on environmental protection or energy conservation, stop lending, refuse to lend to projects without a positive impact on the environment, thus controlling the adoption of environmental risks by borrowers [55, 63, 66].

Green credit policy can be developed and implemented not only by responsible banks but also by the state [67]. The green credit policy of the state determines the strategic sectors, priority sectors (for example, energy conservation, renewable energy sources,

[11] Ministry of Finance of the Russian Federation. Research Report "Practical Experience in Supporting Green Finance (Case Study of G20 Countries)". URL: https://investinfra.ru/frontend/images/PDF/minfin-green-docs/minfin-green-docs-04.pdf (accessed on 09.05.2020).

[12] Ministry of Finance of the Russian Federation. Research Report "Green Finance as a Mechanism for Financial Support of Investment Activities to Ensure Balanced and Sustainable Growth: Opportunities for Russia". URL: https://www.minfin.ru/common/upload/library/2018/06/main/2016_Final_report.pdf (accessed on 09.05.2020).

[13] Sustainable Finance. The rise of green loans and sustainability linked lending (2019). URL: https://lpscdn.linklaters.com/-/media/files/thoughtleadership/green-finance/sustainable_finance_green_and_sustainability_linked_lending_linklaters.ashx?rev=86ebcb26-c283–4e5b-be26-b065f08cc27e&extension=pdf&hash=CA71D33707F9F4DFA52FD53B02F56065 (accessed on 15.01.2020).

clean technologies), for the implementation of projects in which green loans should be provided by both commercial banks and development banks [68].

In addition to green loans, green financial instruments of green development banks and responsible banks rightfully include climate and green bonds,[14] which are debt securities, from the placement of which the proceeds are used to finance environmental and climate projects [15]. Banks can finance new and refinance existing environmental projects with funds raised by securitizing assets into green bonds and then placing green bonds among third-party investors [69]. Bonds collateralized by commercial mortgages of environmentally certified buildings command lower spreads than bonds collateralized by other comparable real assets [70]. As of the end of 2019, global financial institutions had issued approximately US$ 86 billion in green bonds,[15] of which approximately US$ 31 billion were issued by development banks and approximately US$ 55 billion by other banks.

In contrast to the green loan, which is a financial asset of the bank, transactions with green bonds form not only financial assets but also financial liabilities of banks, since banks act as both an issuer and an investor in the bond market. [17, 71, 72]. Placing funds by banks in green corporate bonds requires the formation of financial market structures that assess the environmental risks of issuers of green bonds by assigning appropriate ratings [73]. Encouraging banks to place funds in green bonds should be carried out simultaneously with stimulating businesses to invest in environmentally significant projects, including through the development and application of a green fiscal policy by the state [74], and the formation of an effective regulatory framework [75, 76].

The development of transactions with green bonds will contribute to the development of the financial market both in the world and in Russia, and will also increase investment activity in the economy [77, 78]. The Central Bank of the Russian Federation defines the banking sector as one of the main participants in the domestic green finance market since it is a bank that can have a stimulating effect on the formation and development of the green bond market.[16]

The green credit policy of the state determines the strategic sectors, priority sectors (for example, energy conservation, renewable energy sources, clean technologies), for the implementation of projects in which green loans should be provided by both commercial banks and development banks.

Such green financial instruments as green insurance, green leasing, green deposits are currently at the stage of formation, their use is being tested in banking practice, including in Russia. For example, on March 10, 2020, Center-invest Bank introduced the Green deposit,[17] which is unique for the Russian banking

[14] A green bond is a type of climate bond that is labeled green by the issuer, which means that the bond complies with the principles developed by the International Association of Capital Markets: use of funds, selection and evaluation of projects for financing, revenue management, and reporting.

[15] Green Bonds. Global State of the Market 2019 (2020). URL: https://www.climatebonds.net/files/reports/cbi_sotm_2019_vol1_04c_0.pdf (accessed on 01.07.2020).

[16] Diagnostic note. Green finance: an agenda for Russia.URL: https://www.cbr.ru/Content/Document/File/51270/diagnostic_note.pdf (accessed on 20.05.2020); TCFD. Recommendations of the Task Force on Climate-related Financial Disclosures. Final Report. (2017). URL: https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-2017-TCFD-Report-11052018.pdf (accessed on 10.04.2020).

[17] Center-invest Bank. URL: https://www.centrinvest.ru/ru/about/news/36257/?sphrase_id=454460 (accessed on 06.04.2020).

sector, with a rate of 4.6% per annum. The collected funds will be used to finance projects that contribute to the achievement of sustainable development goals and the implementation of strategic national objectives. The deposit is made in rubles for a period of 17 months, the minimum deposit amount is 100 thousand rubles. This bank was also the first bank to place green bonds on the Moscow Exchange in 2019.

Since 2019, the Central Bank of Russia has begun adopting regulations in the field of green finance, and by 2021 plans to develop national rules and standards for verifying green financial instruments.

Banks that are actively involved in shaping sustainable development and a green economy must be ready to accept the changes that will arise in their activities in connection with the change in the paradigm of economic development in general. At first glance, changes in the bank's activities towards responsible business conduct are associated with additional costs and risks, including the risks of organizational changes. However, once introduced, these changes will become the driving force behind the bank's development, ensure its attractiveness in the eyes of investors and clients, and open up new market opportunities.

Researchers agree that the development of green financial instruments of banks is extremely important, if not crucial, for the development of green technologies, financing of environmentally friendly production, creation of green jobs, ensuring the implementation of the Concept of Sustainable Development [52, 53, 63, 66, 79, 80]. In the existing economic realities, despite the presence in society of a fully formed understanding of the need for a responsible attitude to nature, the declaration by states of the goal of increasing the welfare of the population, a significant transformation of the entire system of social production is required. Some responsible participants of the green economy need government support, particularly fiscal policy that stimulates economic agents, and for the banking sector additionally and to the system of incentive banking regulation and supervision.

REGULATION OF GREEN BANKING

Banks operate in a regulatory environment, their activities, including green, are subject to regulation. In different countries, the function of banking regulation and supervision is entrusted to the central bank or a specially created body, and can also be carried out by them jointly. Banking regulators, with appropriate government policies, can facilitate the channeling of finance to environmental projects by regulating the activities of banks for which regulatory instruments can be applied.

Depending on the type of policy implemented by the financial mega-regulator in relation to responsible banking, independently or jointly by several financial regulators, all regulatory instruments can be divided into instruments of monetary policy and macroprudential policy.

Within the framework of monetary policy, differentiated parameters of instruments can be applied, such as operations on the open market, interest rates, direct quantitative restrictions, and mandatory reserve requirements.

In quantitative easing for green lending, the central bank uses banks' green financial assets in open market transactions and differentiates interest rates for transactions with responsible and other banks. The use of instruments is constrained by the

lack of labeled green bonds, the lack of an established practice of assessing the green financial assets of banks. However, the preliminary announcement of the regulator's intention to include the green requirements of banks in the composition of assets for which additional liquidity can be obtained will stimulate issuers to identify suitable assets and issue "new" green loans, which, in turn, can be refinanced through green bonds [81–83].

Direct quantitative restrictions as an instrument of monetary policy aimed at stimulating responsible banking activities can be implemented by introducing credit quotas or limits. Credit quotas are fixed requirements for the structure of a bank's loan portfolio, establishing the obligation of banks to form part of the portfolio with loans with specific characteristics, strategic industries, or borrowers from specific geographic regions. Minimum mandatory quotas can be set for green projects in the banking portfolio, and maximum possible limits for carbon-intensive projects. However, a mandatory strict quota could potentially cause serious market distortions, lead to a green credit bubble and threaten financial stability.[18]

The differentiation of the required reserves ratio is aimed at stimulating banks to issue green obligations. Reduced reserve requirements may be provided for issued green bonds and attracted green deposits [84].

In addition to monetary instruments, macroprudential policy instruments can be used to regulate responsible banking. However, the main goal of the regulator should remain the goal of ensuring financial stability. Macroprudential regulation of responsible banking is carried out in two directions: through the differentiation of prudential norms and through increasing information transparency of the market.

As a result of the development of the theory and practice of doing socially responsible business, the concept of sustainable banking was formalized by highlighting special principles and transformed into the concept of responsible banking.

The easiest tool to use is the norms for the formation of provisions for possible losses on credit claims or insurance reserves. The reduced rates of insurance reserves established by the regulator for banks' green claims are a way to stimulate green investments in comparison with traditional investments since they reduce the cost of reserves and have a positive effect on banks' profits.[19]

Requirements for bank capital and its sufficiency, as well as requirements for the formation of insurance reserves, can be differentiated depending on the type of bank and the characteristics of its

[18] Schoenmaker D., Van Tilburg R., Wijffels H. What Role for Financial Supervisors in Addressing Systemic Environmental Risks? Sustainable Finance Lab Working Paper, Utrecht: Sustainable Finance Lab (2015). URL: http://unepinquiry.org/wp-content/uploads/2016/02/Working-paper-15-april.pdf (accessed on 15.06.2019); Volz U. Fostering Green Finance for Sustainable Development in Asia. Bonn: German Development Institute (2016). URL: https://www.diegdi.de/uploads/media/Fostering_Green_Finance_in_Asia_Volz.pdf (accessed on 02.04.2020).

[19] IFS. Greening the Banking System — Experiences from the Sustainable Banking Network (SBN). Input Paper for the G20 Green Finance Study Group (2017). URL: https://www.ifc.org/wps/wcm/connect/5962a2da-1f59–4140-a09112bb7acef40f/SBN_PAPER_G20_02102017.pdf?MOD=AJPERES&C VID=lHehxyG (accessed on 11.04.2020); Mason A., Martindale W., Heath A., Chatterjee S. French Energy Transition Law: Global Investor Briefing. The Principles for Responsible Investment Initiative (2016). URL: https://www.unepfi.org/fileadmin/documents/PRI-FrenchEnergyTransitionLaw.pdf (accessed on 10.04.2020); Climate Bonds Initiative (CBI). Greening the financial system. Tilting the playing field. The role of central banks, (2019). URL: https://www.climatebonds.net/files/reports/cbi-greening-the-financial-sytem-20191016.pdf (accessed on 15.04.2020).

credit investments. The introduction of reduced risk ratios for green credit claims reduces the aggregate bank risk. As a result, green loans, investments in green bonds, investments in environmental projects will put less pressure on capital than alternative investments of the bank [85, 86].

Green macroprudential regulation in Brazil, China, India, Vietnam, Nigeria, Indonesia is mandatory; in Mexico, France, Belgium, Germany, Turkey, Japan, South Africa and a number of other countries — voluntary; in Russia, USA, Canada, Great Britain, Australia, Argentina, Saudi Arabia, a number of European countries — submitted by the regulator for discussion [81, 82, 86].

When implementing macroprudential policies, climate change and environmental risks should be considered as factors that can lead to financial instability. To eliminate the impact of systemic environmental risk on financial and banking stability, increased reserve requirements for bank credit requirements for "brown" enterprises and industries, environmental capital surcharges, and increased risk ratios for bank claims to carbon-intensive and related sectors can be established. Also, restrictions on the risk of concentration of green claims in the banking portfolio can be introduced for individual counterparties, certain industries, or geographic regions, and climate stress testing can be carried out[20] [85, 87].

Developing the practice of implementing the Basel II international capital agreement to ensure market discipline, following the recommendations of the Task Force on Climate-related Financial Disclosures (TSFD),[21] the regulator pays attention to the transparency of information on environmental financial risks accepted by banks [79], which provides a framework for green macroprudential regulation and stress testing.

Another incentive tool for regulating responsible banking is the guidelines on environmental lending. Despite the differences between countries, the guidelines usually include recommendations for assessing environmental risks as well as incentive schemes for green finance. The most famous of these is the Green Credit Guidelines issued in 2012 by the China Banking Regulatory Commission (CBRC) as part of the government's green credit policy. The guidelines recommend that banks include targets for green loans in their lending policies and adjust their terms and conditions. The experience of China has shown that in order to achieve a positive macroeconomic impact on the environment, advisory guidelines must be complemented by differentiation of prudential norms.[22]

Since 2019, the Central Bank of Russia has begun adopting regulations in the field of green finance, and by 2021 plans to develop national rules and standards for verifying green financial instruments.[22] The Bank of Russia has developed standards for issuing green and social bonds, which entered into force on May 11, 2020. The standards suggest that when issuing green and social bonds, the exact details of the projects for which the funds are raised must be specified. Projects must be checked for compliance with Russian and international standards for green and social projects. This approach will allow issuers to label bonds for investors as green or social. To check the green bonds, the Central Bank of Russia is creating a methodological center and a verification system, auditing companies will act as inspectors.[23]

[20] Bank of Russia. Impact of Climate Risks and Sustainable Development of the Financial Sector of the Russian Federation. Public Consultation Report. URL: http://www.cbr.ru/content/document/file/108263/consultation_paper_200608.pdf (accessed on 07.06.2020).

[21] Created in 2019 by the Financial Stability Board (FSB), the Bank for International Settlements, and the G20.

[22] CB RF. National standards for green financing may appear in Russia. URL: https://www.cbr.ru/eng/press/event/?id=3932.

[23] CB RF. "On the standards for the issue of securities". URL: http://www.cbr.ru/Queries/UniDbQuery/File/90134/1030.

The macroprudential regulator is working to foster a culture of responsible banking, including environmental and climate change issues on its agenda, signaling the importance of these issues, presenting the results of ongoing research on the green agenda for public comment, organizing educational workshops for bankers and investors, addressing the potential lack of knowledge about green finance, which has been found to be holding back the spread of risk management practices. Finally, the involvement of central banks in discussing standards and methods for interacting with public policies aimed at developing a green economy also plays an important role in the search for internationally-agreed approaches to greening the financial system.

Thus, banking regulators and supervisors, central banks have at their disposal a wide range of instruments to influence the decisions of banks to participate in financing the green economy, as well as to stimulate banks to create and use green financial instruments. However, at the moment it is too early to make a definite conclusion about which regulatory instruments or policies are most effective or appropriate, as this will depend on the specific situation in the country and specific instructions received from banking regulators, central banks, in accordance with government policy.

CONCLUSIONS

As a result of generalization, critical analysis, and systematization of the existing scientific literature, the demanded areas of research on the participation of banks in financing the green economy were identified, namely: the development of banking terminology in the context of greening the financial system, the formation of green financial instruments and their use in banking practices, as well as monetary and macroprudential green regulation of responsible banking.

It has been established that the concepts of "green", "sustainable", "responsible bank and banking" are united by the presence of an environmental component, the orientation of banks to financing environmentally friendly enterprises and industries. The term green bank is applied to state-owned green development banks and commercial banks. The terms sustainable" and "responsible bank and banking" apply to commercial banks, regardless of their capital ownership. A sustainable bank is a broader concept than a green commercial bank, as it focuses on achieving sustainable development goals not only in terms of environmental protection but also in terms of human welfare improvement. As a result of the development of the theory and practice of doing socially responsible business, the concept of sustainable banking was formalized by highlighting special principles and transformed into the concept of responsible banking.

The development of the practice of responsible banking follows the path of transformation of classic products and services into environmentally friendly and socially oriented ones, accompanied by the transformation of business processes, management culture, and the content of banking policy. Such green financial instruments of banks as green bonds, green loans in some countries, are receiving the greatest development. Green deposits, green leasing have been introduced into banking practice, and green insurance is applied. A responsible bank gains competitive advantages in the market, improves its image, acting as a conductor of the green policy of the state, contributing to the greening of the economy.

Regulating responsible banking through monetary and macroprudential policy instruments follows the path of stimulating the development of green financial instruments of banks and limiting activities that contribute to the financing

of "brown" industries. It turned out that informing the regulator of economic agents about the recognition of the importance of the sustainable development agenda can stimulate banking operations aimed at financing the green economy. Responsible banking ensures financial stability, but the regulator needs to use macroprudential instruments to timely identify a green credit bubble, the concentration of systemic environmental risks in the banking sector, including through the use of climate and environmental stress tests. Monetary and macroprudential green regulation is carried out in accordance with the state policy in the field of sustainable development in general.

In our opinion, further research on the role of banks in financing a green economy will be carried out in the following areas: green financial instruments and performance indicators of a responsible bank; government policy of green credit; regulation of responsible banking and financial stability.

The range of research issues of the first direction will include: the impact of green financial instruments in the banking portfolio on liquidity, capital, and capital adequacy, risks, insurance reserves, income, expenses, and profit of the bank; factors of improving the profile of "risk-return" of green financial instruments; assessment of the competitive advantages of a responsible bank in the market; the relationship between Environmental, Social and Corporate Governance (ESG) and bank value; transformation of business processes, the internal culture of management, including financial management. The study of the impact of responsible banking on the achievement of sustainable development goals will be aimed at assessing the contribution of the banking sector to changing the structure of social production, fighting poverty, creating green jobs, assessing the formation of a culture of responsible business through banks by other economic agents, searching for effective legal norms and forms government support for responsible banking.

Research on the regulation of responsible banking and financial stability will focus on setting targets for green lending policies; defining conditions that balance the objectives of monetary and macroprudential policy for responsible banking; modeling scenarios of climate shocks and mechanisms of transmission of these shocks to the economy through the financial system; mechanisms for the preventive detection of emerging green credit bubble; search for the most effective monetary and macroprudential tools, depending on specific conditions and government policies, to achieve sustainable development goals.

The development of the practice of responsible banking and its regulation will solve the problem of limited data for empirical assessment, will provide an opportunity to substantiate and unify the system of indicators for further research on the role of banks in financing the green economy.

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Trust as the Basis of Partnership between Small Enterprises and Banks

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ABSTRACT

The presented study touches upon two groups of problems that significantly affect the development of the Russian economy. The first of them is the creation of conditions for the expansion and formation of small business, which, in particular, is a priority area of one of the national projects. The second problem is the establishment of relations of inter-firm trust in the domestic business environment, which is in demand in various sectors of the economy and has become, for example, the dominant topic of the St. Petersburg International Economic Forum. Hence, the **paper aims** to form, on the basis of trust relations, a model of interaction between small enterprises and banks, which makes it easier to obtain loans. The object of the paper is intercorporate (B2B) trust, and the subject is the improvement of relationships between small businesses and banks on the basis of trust. **The methodological basis** of the study is an integral approach that combines both institutional and sociological views on the phenomenon of trust, and the traditional economic analysis of the relationship between banks and their clients, small enterprises. The analysis showed, on the one hand, the complexity of the relationship between banks and small enterprises, and on the other hand, the prospects of these clients for banks. There was also demonstrated the role of the B2B trust as a tool for establishing steady mutually beneficial contacts of the subjects under consideration. The author **concluded** that the model of partnership between small enterprises and banks, based on the establishment of relations of trust between the parties, will stimulate investment processes in small business and support its development. The study presents the organizational solutions for the establishment of the proposed model.

Keywords: inter-firm trust; small and medium-sized enterprises; SME; B2B relations; loans; business ecosystem; partnerships

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Small and medium-sized enterprises provide a stable support for Moscow.
Sergey Sobyanin, Mayor of Moscow

INTRODUCTION

A significant task for the development of the Russian economy is to create conditions for the formation of domestic small and medium-sized enterprises (SMEs). Its development makes it possible to solve several fundamental tasks at once: to improve the competitive environment and the sectoral structure of the economy, to provide employment and self-employment of the population, to contribute to the growth of GDP and the innovative development of the country.

In this regard, one of the priority national projects for 2019–2024 is the project "Small and Medium-Sized Enterprises and Support for Individual Entrepreneurial Initiatives", and a little earlier, in 2016, the Government of the Russian Federation adopted the "Strategy for the Development of Small and Medium Business until 2030". Among its goals, it is worth noting the following one — "ensuring the availability of financial resources for small and medium-sized enterprises" as a key element of their formation.[1]

The availability of financial resources allows a start-up business to get on its feet faster, increase turnover and implement commercial ideas, but its financial capabilities are severely limited, since, as a rule, they are formed at the expense of the founders' personal funds [1]. According to a 2016 survey by the National Agency for Financial Research (NAFI), a quarter of domestic small firms were in dire need of loans.[2] The attraction of investment funds and the establishment of productive relations with banks as owners of credit resources is an urgent task for SMEs, to which many economists pay attention (E.M. Bukhvald, A.V. Vilensky, V. Ya. Gorfinkel, V.B. Toreev, E.G. Yasin, and others). In this regard, the formation of tools for mutually beneficial and productive cooperation of SMEs and banks is an urgent scientific and practical task.

Another area of consideration of this study, which is rarely discussed in the context of the relationship between SMEs and banks, is trust as a factor that directly affects the functioning of the economy and society, the relationship of its subjects. The theme of trust, invading the sphere of public consciousness and science, replaces close moral concepts, for example, hope, affection, friendship [2]. The category of trust is increasingly manifested in various spheres of life in Russia and around the world. So, in 2018, it was the main topic of the St. Petersburg International Economic Forum, which was attended by the heads of governments and large companies from many countries of the world, as well as leading experts.

In this study, we, first of all, will be interested in the possibility of using trust relationships for the formation of productive inter-firm relations, building a system of long-term mutually beneficial contacts, especially when solving the problem of SMEs' access to investment resources that they need.

With this in mind, the goal of this work is defined as the formation, based on trust relationships, of a model of interaction between small businesses and banks, which makes it easier to obtain borrowed funds. The object of the work is inter-corporate trust, and the subject is the influence of trust on improving relationships between small businesses and banks.

Based on the set goal, the following research logic is adopted in the article. First, the possibilities and features of inter-firm trust are analyzed, then the current state of small business, its characteristics as a borrower, the prevailing volumes of borrowing, and the reasons limiting the growth of lending

[1] The Russian Governmet. URL: http://government.ru/docs/23354/ (accessed on 19.10.2020).

[2] Berezina E. Loan out of access. Rossiyskaya Gazeta. 2016. No 117 (6985). URL: https://rg.ru/2016/05/31/potrebnost-malogo-i-srednego-biznesa-v-kreditah-uvelichilas.html (accessed on 19.10.2020).

are considered. Further, the possibilities of establishing interaction between banks and small enterprises based on trust and the formation of a partnership model of relationships are identified, and in conclusion, measures are presented that contribute to the formation of this model and the expansion of trust between SMEs and banks.

The category of trust is studied by specialists in many humanitarian disciplines, including psychology, sociology, economics, cultural studies, political science, neurophysiology, and other disciplines. In this work, we turn to economic views, or rather to the institutional approach to the study of the phenomenon of trust, to which the works of many researchers are devoted (A. L. Zhuravleva, P. J. Zak, D. Kh. Ibragimov, R. La Porta, N. Luhmann, J. F. Helliwell, and others). From this point of view, it is institutions that do not allow agents to deceive each other in economic relations.[3] Institutions regulate transaction costs, and the better these mechanisms, the more expensive the fraud; the higher the confidence, the lower the costs. Thus, transaction costs increase with increasing uncertainty and risk, if there is little information about the counterparty, then the cost of verifying its reputation will be required, or insurance of the transaction or hiring of consultants may be required. Another effect is that a rational agent, choosing opportunistic behavior, estimates in advance the consequences of deception, and if the risk of being caught, and the costs are high, he will refrain from such a decision [3, p. 8].

But institutionalism does not take into account some aspects that are important for this analysis, such as reputation or business relationships, so we also turn to the sociological point of view. New economic sociology argues that trust has a network character and is formed in the social environment [4]. Economic agents carrying out a transaction often know each other, their relationships are personified and woven into a network of social relationships (economic actions are included in social ties). For agents, repetitive actions are important, and, therefore, reputation, the opinion of others about your activities, which form the social capital of the company. According to M. Granovetter [4], here counterparties sacrifice momentary profits for the sake of maintaining proven relationships. The trust is created in the networks of personal connections, but social networks, in turn, do not always work the same way in economic relations, so the possibility of opportunistic behavior remains.

The noted methodological approaches allow us to consider the problem under study from different angels, to pay attention to various aspects of its manifestation.

This work will be useful for bank managers who define the customer relationship model; small business representatives choosing a bank and interested in the terms of attracting borrowed funds; officials who determine the conditions for the development of SMEs; as well as researchers studying theoretical and practical issues of the use of trust in inter-firm relations.

CATEGORY OF TRUST IN ECONOMY

In neoclassical economics, trust as a separate category was not considered and was not taken into account as an independent factor influencing decision-making by economic actors. Interest in the issue of trust emerged in the 1980s last century and is associated with the development of the concept of social capital of the company, presented in the works of J. Coleman, R. Putnam, and the US philosopher, sociologist, and economist F. Fukuyama, who focused on the relationship of this social virtue with welfare [5]. The noted authors drew attention to the fact that trusting relationships are a prerequisite for long-term economic ties, go beyond the

[3] In English-language literature, this situation is often described as "institutions matter".

interaction between companies and affect economic relations at the macro level.

In Russia, the economy of trust is in its infancy, which hinders the development of the country, and the low level of trust between the parties is determined, among other things, by the absence of organizational and economic forms organically associated with trust. At the same time, the emergence of various strategic alliances, networks, and other options for cooperation between companies demonstrates that relations are naturally formed in our economy based on considering the interests of the parties, ensuring the loyalty of counterparties, which determines interest, when analyzing this area of economic relations.

The term "trust" in modern management literature has many interpretations, which are presented in detail, for example, in the work of V.L. Tambovtsev [6]. As a rule, such definitions as "risk and uncertainty", "expectations", "confidence" [7] or psychological characteristics "reliability", "honesty", "benevolence" (referred, for example, by the client to the brand) [8]. Within the framework of this work, we will interpret trust as "the willingness to rely on the exchange partner" [9, p. 315].

In essence, trust is the expectation of one economic entity from the conscious (neo-opportunistic) behavior of another in a situation where the former voluntarily made the achievement of his interests dependent on the actions of the latter. Trust cannot be negotiated or reflected in a contract; it is an informal institution that develops on the basis of the experience of interaction between agents. Trust acts as a tool to compensate for uncertainty, reduce the complexity of the system.

Trust, as an economic category, directly affects the efficiency of the functioning of commercial structures. F. Fukuyama noted that the prevalence of mistrust in society is equal to the introduction of an additional tax on all forms of economic activity, from which societies with a high level of trust are spared [5]. The presence of trust between partners can significantly reduce the cost of economic activities (in some cases, up to 50% due to the lack of the need for supervision and control [10, p. 83]). The importance of trust as a factor of economic growth was noted by Nobel Prize winners J. Stiglitz and K. Arrow.

The positive influence of intercorporate trust on the efficiency of firms and their competitive advantages has been demonstrated in many works, for example, in [6, 11, 12]. H.-Y. Ha drew attention to the priority value of trust when consumers choose their suppliers [13], and when determining the brand value— M. Mingione, L. Leoni [14]. In the works of N. Høgevold, G. Svensson, M. Roberts-Lombard [15] and D.-S. Yim [16] the critical importance of trust as a basis for the formation of long-term business relationships is noted. The complex of factors that determine public confidence in credit institutions is presented in the work of O.I. Lavrushin, N.E. Sokolinskaya [17].

The development and maintenance of successful long-term relationships of social exchange, the presence of trust of the parties are a prerequisite for mutually beneficial inter-firm contacts, increasing competitiveness, reducing the risk of opportunism, which is especially important in an increasingly dynamic and unpredictable business environment [18]. The importance of trust pushes towards maintaining cooperation with established partners, refraining from entering into short-term alternative cooperation ties. The founders of the theory of trust and commitment in relationship marketing R. Morgan and S. Hunt identified these factors as key elements of the success of partnerships, and the joint presence of a relationship of commitment[4] and trust, and not just one element, is most conducive to

[4] Commitment, within the framework of this approach, is "the desire to maintain a valuable relationship" [9, p. 301]. Speaking about the relationship of trust and commitment, it can be characterized by the words of J. O'Shaughnessy [19]: "... trust is the basis of customer commitment".

increasing the effectiveness of relationships [20]. The factors noted (social exchange, trust, commitment) make it possible to understand why relationships with similar economic results can be perceived by the parties as successful or unpromising.

But it should be borne in mind that in inter-firm relations, in fact, as in interpersonal, it is not the maximum level of trust that is required, but the optimal, along with trust, it is necessary to have healthy distrust, the presence of analysis and control systems to protect against excessive dependence on the counterparty or overestimated expectations [21]. For example, one of the confidence-building tools is the willingness of partners to share information and knowledge. But with such information transparency, it is necessary to remember about the presence of insider information, therefore it is advisable to distinguish between public, confidential, and information available to the limited group of people.

We further consider the possibilities of applying these views to build productive relationships between SMEs as a promising area for the development of domestic entrepreneurship and banks as owners of investment resources that are so necessary for small companies. We start with an analysis of the state of small business and its relationship with the banking sector.

SMEs SITUATION

The Russian government declares special attention to the formation of SMEs in the country, which, in particular, was reflected in the adoption of a national project for the development of SMEs, which implies an increase in the share of such entities in the Russian GDP to 32.5% by 2024. This figure was 22% of GDP, and in 2018 the share of small businesses in the economy even slightly decreased, amounting to 20.2%.[5]

Small business has been particularly affected by the pandemic since it is largely involved in the provision of services, where the largest decrease in consumer demand was noted (cafes and restaurants, trade, entertainment, recreation, etc.). Therefore, we can expect that the number of SMEs following the results of this crisis will significantly decrease. According to a survey conducted by the Russian Chamber of Commerce and Industry at the end of 2020, the return to the pre-crisis state, according to the respondents, will take more than a year, and the fact that SMEs will not withstand the consequences of coronavirus intervention, according to 78% of the interviewed entrepreneurs and 68% of government officials.[6]

At the same time, the closure of a small enterprise during this difficult period does not always mean its liquidation, it may remain in a mothballed, inactive state and will be ready to "wake up" with the restoration of demand. During the crisis, the state did not leave SMEs without support, a set of financial assistance measures was adopted, tax incentives were provided, but these measures are rather institutional in nature, rather than a form of direct financial participation.

It will be fully possible to see how the steps taken will help small businesses after the end of the pandemic, but since the main trends and, first of all, the position of the state will remain unchanged, the trend of the processes is unlikely to change, and will continue. In this regard, we assess the dynamics of small business development that has been forming in recent years.

According to the Federal Tax Service (FTS) of Russia, the share of small businesses in 2018 was 19.1%, which is one-third more than in 2014 (13.4%).[7] At the same time, the volume of revenue of small enterprises from 2014 to

[5] Rosstat. URL: https://rosstat.gov.ru/folder/210/document/13223?print=1 (accessed on 20.11.2020).

[6] Chamber of Commerce and Industry of the Russian Federation. URL: https://tpprf.ru/ru/interaction/committee/komrazv/news/383502/ (accessed on 20.11.2020).

[7] It is calculated as the ratio of the proceeds of small enterprises operating under special tax regimes to the country's GDP.

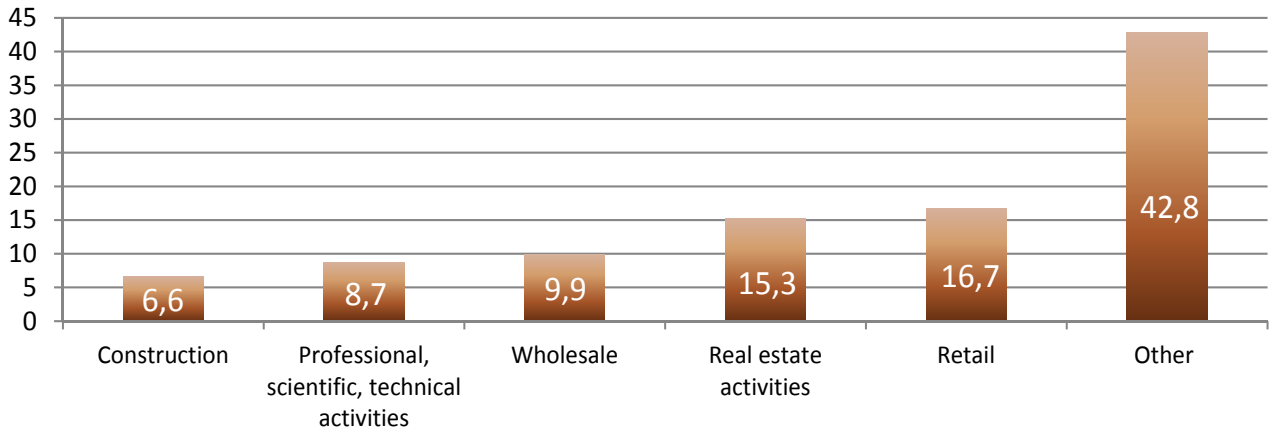

Fig. 1. **Distribution of small businesses by industry (%)**

Source: Federal Tax Service data.

2018 almost doubled (from 8.6 trillion to 17.0 trillion rubles),[8] which is significantly higher than the indicators of organizations that do not use STS,[9] whose revenue (excluding the oil, gas and metals) during the same period grew by only 29%. The share of people employed in the small business sector of the total number of people employed in 2018 was 19%. Small businesses are mainly located in Moscow, the Moscow region, and St. Petersburg. As we can see, the small business occupies a significant share in the country's economy, and its role will inevitably grow, which is the basis for banks to consider it as a promising client and form special procedures for interaction with this category of borrowers.

Speaking about the spheres of activity in which domestic small enterprises operate, we note that, according to the FTS,[10] such areas are wholesale and retail trade, operations with real estate (16.7; 9.9 and 15.3% of receipts according to the STS). Then there are professional, scientific and technological activities, construction, manufacturing industries (another 6–9% of receipts each) (*Fig. 1*). If we compare these data with the industry affiliation of borrowers from among small enterprises, then, according to the Expert RA,[11] the largest share are occupied by trade companies (46%), followed by manufacturing (12%), financial and insurance activities (12%), construction (6%) and real estate (5%). As we can see, data on the industry affiliation of small enterprises, their profile activity as a whole coincides with the structure of loans issued to them, trade enterprises are the leader.

The peculiarities of SMEs as clients of banks are noted. This category of borrowers is characterized by a small amount of funds with which they work, a small number of transactions, and the absence of significant assets that can be used as collateral for loans. Their financial situation is unstable and significantly depends on the current market conditions, they are very mobile, they easily move from bank to bank, actively use information technologies, resort to online services (chatbot customer service). The complexity of banks' interaction with SMEs is largely determined by the low transparency of the latter. This circumstance increases the risks of breach of contracts and makes it difficult to identify clients in terms of their compliance with AML/CFT requirements.[12]

[8] Federal Tax Service of Russia. URL: https://analytic.nalog.ru/portal/index.ru-RU.htm (accessed on 20.11.2020).

[9] STS is a simplified taxation system, a tax regime traditionally used by small businesses.

[10] FTS data are interesting as they reflect the activities of operating companies.

[11] Expert RA. URL: https://www.raexpert.ru/researches/banks/msb_2019/ (accessed on 20.11.2020).

[12] AML/CFT — Anti-Money Laundering/Combating the Financing of Terrorism.

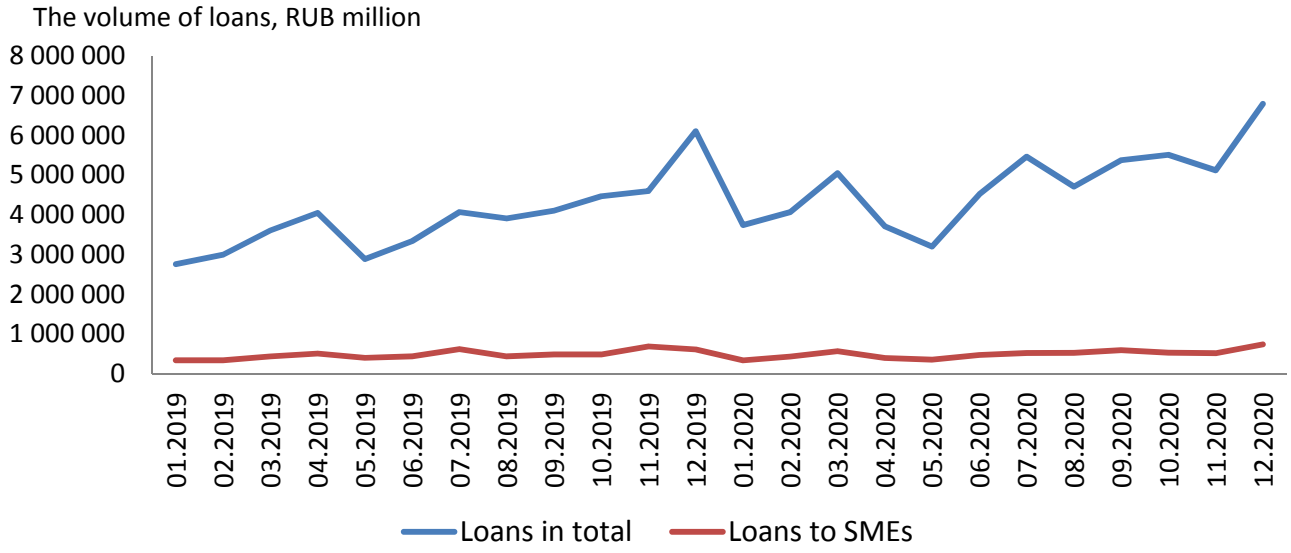

Fig. 2. **The volume of loans provided by the 30 largest banks in 2019–2020 to its borrowers**

Source: compiled by the author on data from the Central Bank of the RF.

One should also consider the low level of trust between domestic SMEs and banks, which was highlighted in the work of N.E. Egorova, E.A. Koroleva [22]. Although, as shown by the example of Polish companies, researchers K. Jackowicz, Ł. Kozłowski, A. Strucinski [23], the choice of a bank by SMEs is more influenced by trust than by the economy (the cost of transactions).

Next, we will consider how these features affect the relationship between small businesses and banks.

SMEs LENDING

First, there are some statistics on the volume of lending to SMEs by domestic banks. The SMEs lending segment has been one of the fastest-growing in recent years; banks have become significantly more active in this market. So, according to the Central Bank of the Russian Federation, in 2019, SMEs received more loans by 15% than in 2018, while the volume of lending has been growing for the third year.[13] The number of loan agreements with SMEs in 2019 increased by 30% compared to the previous year, while lending to large businesses remained practically unchanged over the same period (–0.4%). This growth is largely due to the significant expansion of government support programs for SMEs. The volume of loans to SMEs due to state support in 2019 turned out to be 2.5 times more than in 2018 (according to 28 banks surveyed by Expert RA[14]). At the same time, the economic difficulties associated with the pandemic suggest that records in the SMEs lending segment remained in 2019.

According to the Central Bank, large banks are the main lenders for SMEs, they determine the dynamics of this market. In 2019, the 30 largest banks by assets accounted for about 80% of loans issued to SMEs, and in 2018 this figure was 74%. As a result, the portfolio of loans to SMEs of these banks in 2019 showed the highest growth since 2011 — by 20.4% and reached 23.6 trillion rubles at the end of the year. At the same time, the volume of lending to SMEs by banks not included in the top 30 in 2019 was 9% less than in 2018, and their loan portfolio decreased by 8%.

The situation in the small business lending market is largely determined by two main

[13] Central Bank of Russia. URL: https://cbr.ru/statistics/bank_sector/sors/ (accessed on 20.11.2020).

[14] Expert RA. URL: https://www.raexpert.ru/researches/banks/msb_2019/ (accessed on 20.11.2020).

Table 1

Assessment by small enterprises of factors limiting investment activity (% of the total number of organizations)

Reasons not to invest	2017	2018
Uncertainty of the economic situation in the country	42	61
High inflation rate in the country	38	58
High interest rate on commercial loans	41	54
Lack of own financial resources	44	49
Complicated process for obtaining loans	35	48
Investment risks	31	47
Imperfect legal and regulatory framework governing investment processes	21	35
Insufficient demand for products	23	27

Source: Rosstat data. URL: https://rosstat.gov.ru/bgd/regl/b19_47/Main.htm (accessed on 20.11.2020).

players — Sberbank and VTB. They increased the debt of SMEs by the end of 2019 by 32% and 31%, respectively. What about the rest of the banks? The portfolio of SMEs loans of other banks, excluding the noted leaders, decreased by 2% in 2019. Moscow remains the main region for issuing loans to SMEs, and in 2019 the growth rate in the capital was 39%, as a result, in 2019, Moscow accounted for 29% of loans issued against 24% in 2018.

To assess the importance of SMEs for banks, we consider the share of loans received by them in the total volume of funds issued by the 30 largest domestic banks (and they, as already noted, are the main lenders to SMEs). According to the Central Bank of the Russian Federation,[15] SMEs account for only 10–12% of all resources issued by these banks (12% at the beginning of 2019 and 11% at the end of 2020). This proportion did not change significantly during the pandemic. At the same time, taking into account the overall growth of the loan portfolio, the amount of loans to small and medium-sized businesses more than doubled over this period from 335 billion to 735 billion rubles. The dynamics of lending to SMEs and other borrowers in the period under review are shown in *Fig.2*.

When discussing the topic of credit and investment support for SMEs (necessary for any growing company), the question arises — what reasons, from the point of view of SMEs, limit the investment activities of small businesses? The answer to the question is presented in *Table 1*, which shows the main arguments in favor of refusing to invest, as well as the proportion of enterprises that chose the appropriate justification.

We have analyzed the answers. In 2019–2020 in Russia, inflation, as well as the rate of attracting credit resources, significantly decreased compared to 2017–2018. (so, in 2020, the key rate fell to 4.25% per annum). That is, the factors that determined answers No. 2 and partly No. 3 were largely leveled out. Then, if we do not take into account the vague reason No. 1 (*the uncertainty of the economic situation in the country*), we can say that the main factor of refusal from investments

[15] Central Bank of Russia. URL: https://cbr.ru/statistics/bank_sector/sors/ (accessed on 20.12.2020).

Table 2

Hierarchy of customer-bank relationships

Dominant trait	Typical customer statements
Passion	• I can't imagine the world without this company • Perfect company for people like me
Pride	• Treat me with respect • Proud to be a client
Honesty	• Honest problem-solving • Always treat me fairly
Trust	• Everything is done as promised • A name (reputation) that I can always trust
Rational satisfaction	• Relationship satisfaction • Likely to continue cooperation • Likely to recommend

Source: compiled by the author on [25].

remains No. 5 (*a complicated process for obtaining loans*) since answer No. 4 (*lack of own financial resources*) is its consequence. It is interesting that factor No. 8 (*insufficient demand for products*) is in the last place among the restrictions, from which we can conclude that the growth of investment is limited not so much by the lack of demand, as is usually the case, but by organizational reasons.

In this case, the establishment of relationships between banks and SMEs (reducing cause No. 5) will have an integrated effect. We consider possible ways of addressing this problem.

PARTNERSHIP MODEL OF INTERACTION OF A BANK WITH CLIENTS — SMEs

The aforementioned trends in the development of SMEs, government support, and foreign experience make this category of clients very promising for banks. Moreover, the profitability of banks in the retail business is declining, and it is difficult to attract new large clients since they rarely change their location.

In this regard, the question arises of how to build effective interaction with designated customers, what model of relationships should be followed? The answer to it has several aspects and is associated, in particular, with identifying factors that are mutually beneficial for the parties and allow building partnerships.[16]

We consider in this connection the product and customer-oriented models of the retail bank's activities as the most common operating technologies. In the product (transactional) model, the central element is a financial product (service) or transaction (operation). This approach is largely focused on increasing sales of individual products (or cross-selling of priority products), increasing the number of transactions.

The client-oriented model of a credit institution, to which it switches after the creation and/or exhaustion of the previous model, is more focused on the client (his needs), on the maximum number of serviced persons, and an increase in the number of products to the counterparty. The main feature here is the approach to clients, the quality and availability of banking services, the establishment of relationships with

[16] We suggest thinking of the partnership in business as "... a form of business activity aimed at interacting with other entities in the process of pursuing business interests of the participants in the framework of their joint economic activities" [24, p. 38].

Table 3

Hierarchy of customer perception of the bank

Nature of perception	Manifestations
Strategic relevance	• Relationship with the bank helps the client to fulfill his dream, to get closer to his goals
Status and respect	• The client is proud of the relationship, even when he does not interact with the bank, speaks about the benefits of this relationship • Feels a boost in status when using a bank card or talking about her relationship with the bank • Feels good when thinking about the relationship with the bank
Commitment	• The bank adequately interacts with various groups of clients • Sincere friendliness in interaction, the team is interested in establishing mutually beneficial contacts • Creation of a club atmosphere, clients can take part in events of interest to the same clients
Trust and security	• The bank is perceived as a trustworthy and reliable partner, it is impartial and will act in the best interests of the client
Compliance (expectations)	• Willingness to contact the bank in addition to purchasing or using a particular banking product. • Providing planning or financing advice to clients

Source: compiled by the author on [26].

counterparties, awareness of their needs and capabilities. In this model, there is a transition from offering several standardized and not strongly related services, as in the previous model, to the formation of individual "packages" focused on the client's needs.

As you can see, the model of the bank's interaction with clients is being transformed towards the more active building of long-term partnerships, expanding the range of services provided, considering individual requests and characteristics of the client. The tendencies for expanding cooperation, increasing customer loyalty correspond to the partnership model of interaction. In this regard, we will comment on its content when organizing work with SMEs.

Since, as has been shown, loans to SMEs account for just over 11% of the portfolio of even the 30 largest banks, which are the main lenders of SMEs, it can be concluded that small volumes of loans do not allow receiving significant income, but there are more such clients than large players. In such a situation, commissions (settlement services, payment instruments) and earnings on accounts can become the main source of income from banking services when working with SMEs. Lending is becoming a tool for attracting new customers, which allows us to offer other banking services in the future. The bank's task is not so much to make money on a loan but to establish long-term inter-firm cooperation in order to generate income from settlement and cash services and non-banking services.

According to Denis Osin, Small and Microbusiness Director of Alfa-Bank, the share of this block in the bank's operating profit was 11% in 2017, about 20% in 2018, and already 27% in 2019.[17]

The question arises: how to establish such mutually beneficial long-term cooperation? We turn to the previously noted work of

[17] Builov M. Business for SMEs. Kommersant newspaper No.36. 28.02.2020, p. 10. URL: https://www.kommersant.ru/doc/4269650 (accessed on 20.11.2020).

Table 4

Possible consequences of the bank's adoption of the partner model

Positive	Negative
• rising the bank's reputation and expanding business ties; • attracting new clients; • decreasing the number of bad loans (overdue debt); • reducing the cost of organizing the issuance of a loan and control of the Borrower; • prospects for growth of profits from banking services in the future; • additional income from the provision of non-core services	• the need to adapt business processes to the tasks of building trust relationships and organizing a partner network; • making investments in the creation and maintenance of the network and the possible risk of their loss

Source: compiled by the author.

R. Morgan and S. Hunt [20]. According to their views, the presence of trust and commitment between the parties has a direct impact on the development of partnerships. These factors are the main prerequisite for the success of the partnership strategy, in fact, as well as the main indicator of the strength of the relationship.

It is the trust that is the main element of building long-term relationships between the bank and the client. We try to substantiate this thesis, and for this, we will consider the options for the client's perception of a retail bank as a partner. *Table 2* shows the hierarchy of relationships (feelings) that a customer experiences towards the bank (based on the survey data presented by the business journal Gallup [25]). The bottom line contains the initial connection level, then moves up to the top line where the ideal position is set.

Table 3 shows the options for a client's perception of his bank as a business partner. They are also ranked from bottom to top, from initial state to maximum location (data from the consulting company Senteo [26]).

As can be seen, the level of customer attitude to the bank can vary significantly: from an elementary desire to continue cooperation to pride in their involvement in the business. Trust in both surveys is classified as basic in the hierarchy of customer-bank relationships, although not at the primary level. If the client was able to make sure of the competence, reliability, predictability of the bank, then the process of building trust goes into the stage of closer interaction. Further, as the experience of communication and interpersonal interaction is accumulated, relations either develop or are inhibited. If the trust meets the expectations of the parties, there is a recognition of common values and interests.

Interfirm relations are a social resource of the bank used to address economic and social problems. Such a network resource becomes capital when investment in relationships leads to the growth of other types of capital, primarily economic. Since the ultimate goal of the bank is to achieve sustainable financial performance, it will strive to create an effective and long-term system for obtaining added value based on trust and commitment to relationships on the part of customers, including them in its partner network.[18] As part of the partnership, the bank is interested in extending the "Lifetime Value" (LTV[19]) of a small entrepreneur. If owing to the bank, an entrepreneur expands his business, this will increase his loyalty, increase his turnover, the funds he keeps in the bank, and services he may need.

However, the relationship between a bank and a borrower, a SME within the framework

[18] We suggest thinking of the network as "a group of independent economic agents interconnected by relations of trust, the benefits of cooperation, long-term and stable cooperation and informational ties" [27, p. 101].

[19] LTV — Lifetime Value.

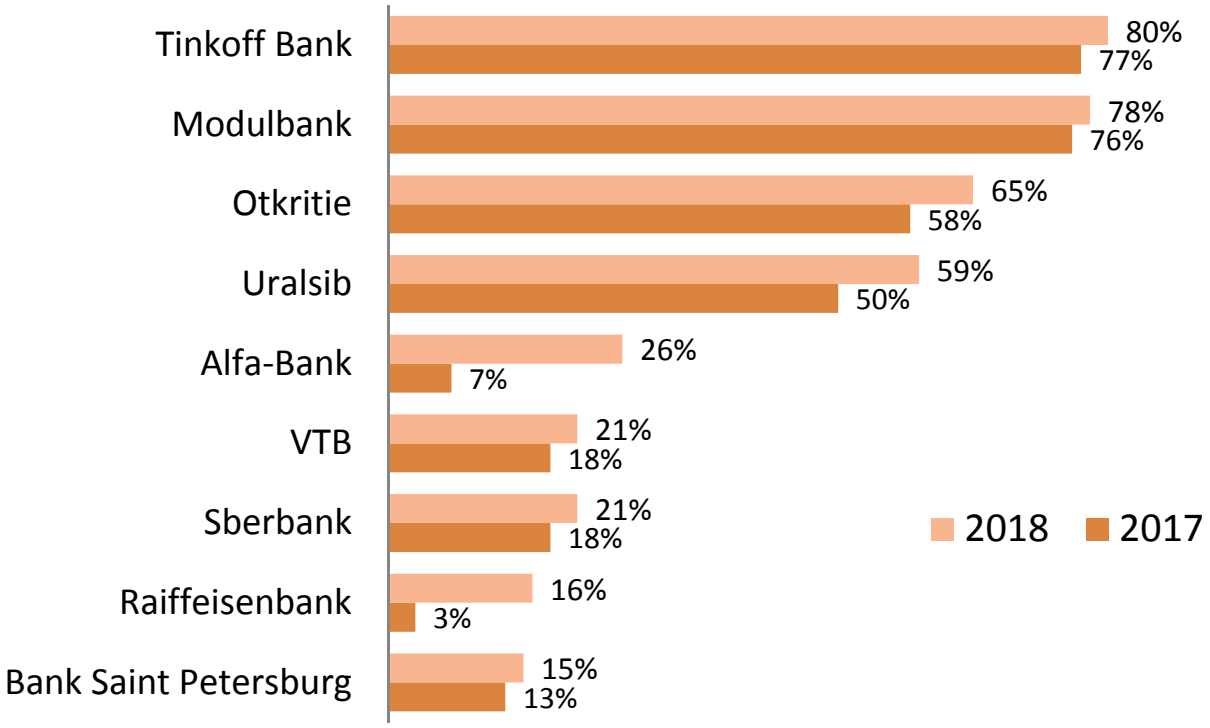

Fig. 3. **Share of fee and commission income in the total revenue of a number of banks in 2017 and 2018**

Source: Frank RG data. URL: https://frankrg.com/5463 (accessed on 20.11.2020).

of the model under consideration, can hardly be called equal. The bank is the dominant element of this network, determining the rules for its development and internal interaction. It is clear that the bank has the strongest positions here, the company applies to the bank for a loan, and not vice versa. By changing the terms of borrowing, the bank can make them more or less interesting for the borrower, change the terms of service, and the latter is determined in his requests to the bank. At the same time, the client can "vote with his feet", refuse the services of the bank, which will weaken the partner network and the investments made in it. SMEs, as already noted, are quite mobile, they easily change banks, and the presence of trusting relationships is an argument in favor of retaining them and building long-term relationships.

Summarizing what has been said, we identify the possible pros and cons for a bank for building partnerships (*Table 4*).

Considering the circumstances noted, we will further consider the organizational decisions that the bank should make in order to establish a full-fledged partnership model, interaction with small businesses, and ensuring the trust of the parties.

ORGANIZATIONAL MEASURES TO ENSURE CONFIDENCE IN THE PARTNERSHIP MODEL

In recent years, banks have been actively developing services that allow customers to receive a set of necessary services, including non-banking ones, in one place. The way they are presented and offered by banks is evolving from a showcase with partner products to a single platform and further to a set of services, network partnerships, and business ecosystems. Today, due to the growing interest in cooperative ties,[20] the banking sector is

[20] The growing popularity of cooperative ties is largely due to the development of digital technologies that increase the speed, reach, convenience, efficiency, and scalability of business systems.

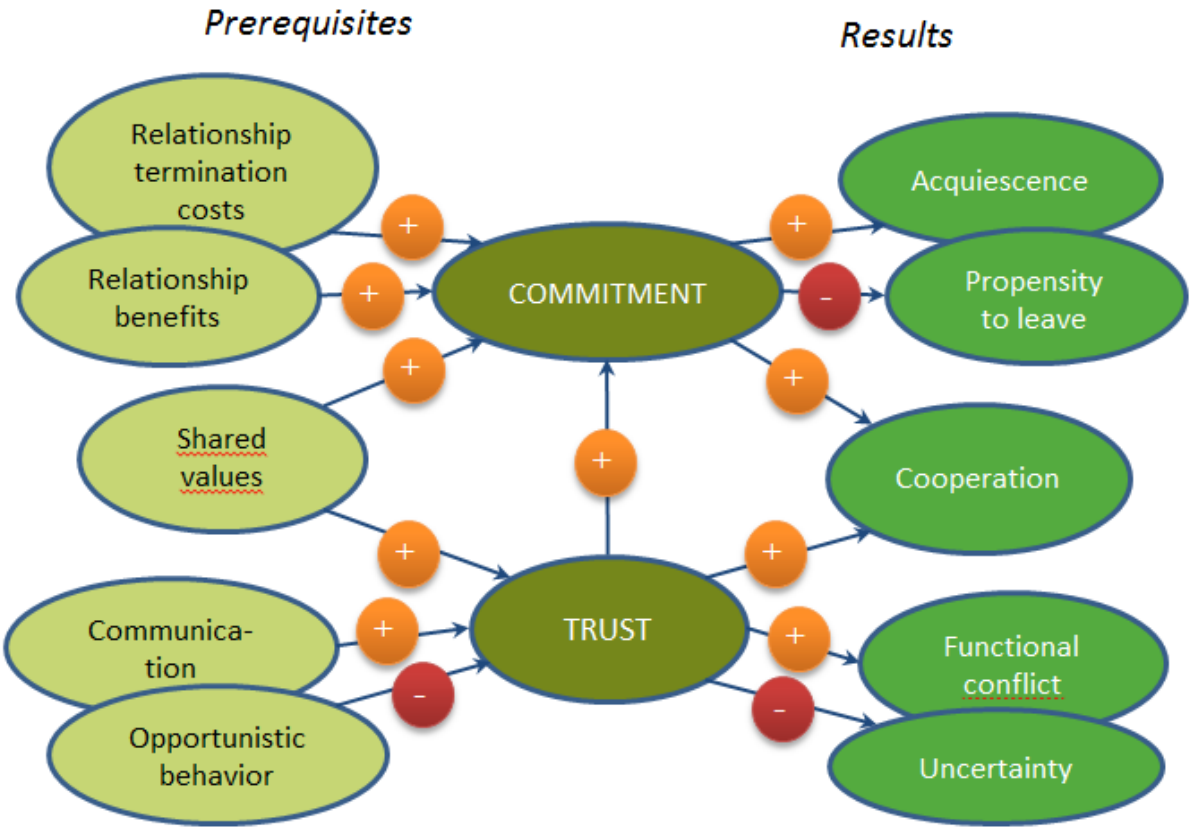

Fig. 4. **Commitment and trust: Prerequisites for the appearance and nature of manifestation**
Source: [20].

paying close attention to creating ecosystems around its own brands. Similar actions were taken by Sberbank, Tinkoff Bank, Alfa-Bank, VTB, and a number of other companies.[21]

There is no common understanding of what the banking ecosystem is yet; different authors put their own interpretations into this. For example, Oliver Hughes, Chairman of the Management Board of Tinkoff Bank, gives the following practical definition: "An ecosystem is about modern technology, a unified brand, data usage, fast scaling of services and lower acquisition costs through the ecosystem. effect and scale. There are many services, and not only in one area" [28].[22]

Individual banks have already adapted their ecosystems for the SME segment. Thus, according to the analytical company Frank RG, in 2018 SMEs purchased non-financial services through banks for 20–25 billion rubles. Fee income from additional business services not related to traditional banking products can be a significant source of income for banks. Thus, the share of fee and commission income in revenue in 2018 was 80% for Tinkoff Bank, 78% for Modulbank, and 65% for Otkritie (*Fig. 3*).

How can a bank attract small businesses to its community (ecosystem)? Obviously, it should provide a demanded and competitive

[21] A detailed analysis of the current state of the ecosystem form of management of the financial sector in Russia is presented in [29].

[22] The author is referring to the definition proposed by the BCG Henderson Institute, "a business ecosystem is a dynamic group of largely independent economic players that create products or services that together constitute a coherent solution" [30]. This definition implies that an ecosystem has a specific value proposition and a specific, albeit changing, group of actors with their own roles. But, since the study of banking business systems is not the subject of this article, we will restrict ourselves to the point of view stated above.

range of banking and non-banking services.[23] If the technology of working with financial services is quite traditional and was touched upon in the previous section, then the provision of non-banking services has no such history. In this regard, we will consider what services a SME needs today.

SMEs face many challenges every day. Some of them are important for the development of a company, running a business, others, for example, administrative or service ones, only support the main business, but this does not become less important. The company must ensure that all processes, both primary and secondary, are carried out at a high level. Otherwise, lags, for example, in the work of the accounting department, warehouse, information systems will slow down the work of the entire company. But small businesses, as a rule, are significantly limited in material, financial, time, or human resources, they are focused on the implementation of their business ideas, here are their priorities. In this regard, it is challenging for small companies to ensure high-quality execution of non-core processes. If we invest limited resources, then in the deployment of the main activity. Therefore, they are objectively interested in outsourcing part of their non-core functions to specialized performers who ensure high-quality and inexpensive execution of supporting processes.

In this case, if the bank can provide SMEs with a set of relevant non-banking services,[24] provided at a competitive level (quality, price, terms), for example, within the framework of a "package" offer, then customers will have additional incentives to establish interaction, connect to a partner network of the bank. As an example, we note Sberbank, which offers start-up entrepreneurs the "Own Business" service, which includes an expanded set of non-financial services: from a personal lawyer to a customer relationship management system (CRM) and website development.[25]

We dwell in more detail on the methods of forming the client's trust in the bank, since, as shown, the presence of trust ensures the transition from formal one-time contacts to partnerships, greater informational openness, and stability of relations [32]. We also note that in business models that use a systemic trust,[26] as opposed to models based on personal trust (one-to-one communication), the level of trust is usually slightly lower. Thus, in the work of S. Gruber [33], using Airbnb[27] as an example, it is shown that digital tools that form systemic trust (certificates, ratings, and reviews) cannot replace personal communication between partners, personal contacts form deeper connections than the model of an impersonal system. Therefore, when building trust in the bank's ecosystem, it is necessary to ensure productive personal contacts.

Trust cannot be built only through advertising, it is created by everyday actions, teamwork and the speed of its formation depends on the quality of interaction multiplied by the frequency of contacts. Customer confidence is 40% formed by their current impressions of the service received [34]. In this regard, the bank, as the initiator of the creation of the network, must have the competencies, organizational abilities to manage relationships and their development, for example, by adapting its processes to

[23] When providing clients with non-financial services, banks use one of the following strategies: non-banking services under their own brand; non-bank offers from partners; mixed policy (services under its own brand and discounts from partners).

[24] These most popular works, based on their modularity, include legal support, accounting, obtaining licenses and patents, information support, which is commented in detail in [31]. And, for example, trade enterprises, as the most common type of small business, are interested in services in the field of warehouse accounting and logistics, procurement management.

[25] Sberbank. URL: https://www.sberbank.ru/ru/s_m_business (accessed on 20.11.2020).

[26] By systemic trust in the context of N. Luhmann's views, we mean impersonal trust in the system itself and its institutions, for example, in information technologies or communication platforms formed on their basis.

[27] Airbnb is an online platform for listing, finding, and short-term rentals of private homes around the world.

the tasks of creating trust or making special investments.

The basic element of trust is the exact fulfillment of a promise, responsibility for one's actions. The components of trust are also: conscientious and competent attitude towards clients, which forms the bank's business reputation; information transparency; communication outside of a business (personal relationships); common goals; partner reliability and honesty.[28]

Morgan and Hunt, in their now-classic work [20], identified five traditional input factors that influence the formation of inter-firm trust and commitment. These prerequisites are the level of possible costs from the termination of the relationship; potential benefit from the relationship; the presence of common values among partners; the level of communication between the parties; and the lack of evidence of opportunistic behavior. These parameters form the level of trust of the parties and determine the degree of partners' commitment to maintaining the relationship. The task of the bank as the initiator of the partner network is the correct use of the noted conditions, which make it possible to form the necessary level of relationships.

In turn, trust and commitment translate into five practical aspects that make long-term relationships productive. These include acquiescence, lack of propensity to leave, willingness to cooperate, attitude to possible conflicts (commitment to the constructive resolution of disputes), reducing the uncertainty of a partner's actions. The relationship between these parameters is shown in *Fig. 4*.

One of the practical mechanisms for increasing the level of inter-firm trust is the establishment of information and reference support for SMEs from the bank. This service allows you to increase the level of communication between the parties, as a result of which a positive experience of cooperation is accumulated, shared values are formed and added value is created. A similar package is provided, for example, by the SME Corporation with the software product "SME Business Navigator",[29] and in the work of N.E. Egorova, E.A. Koroleva [35] substantiates the use of an extended system of adaptive credit and investment consulting for these purposes.

Summarizing what has been said, we note that the establishment of a full-fledged functioning of the partnership model of interaction between SMEs and banks will allow both parties to solve important tasks: the first is to facilitate fundraising and post-crisis recovery, and the second is to build up the client network and generate additional income.

CONCLUSIONS

The theoretical and methodological significance of the study lies in the use of an integrated approach that combines, on the one hand, institutional and sociological views on the phenomenon of trust, and on the other, an analysis of the problems of banks' relationships with their customers — SMEs. The role of inter-firm trust in establishing mutually beneficial contacts between the parties has been identified and shown, the effectiveness of using a trusted partnership model of interaction has been substantiated, which makes it possible to activate investment processes in small businesses and support its development.

Within the framework of traditional relationships, small business is not a particularly desirable client for a bank, since loan amounts are small, collateral opportunities are limited, and information transparency is low. The transition to a partnership model helps to correct the situation. The formation of a partner

[28] Other circumstances forming a partnership are discussed in *Tables 2* and *3*.

[29] Information Resources Portal. URL: https://smbn.ru/ (accessed on 20.11.2020).

network by a bank, for example, by the type of ecosystem, allows not only to expand the client base, earn on commissions but also to form long-term relationships. A key element of this format of relations is building trust between the parties, for which the bank's personnel will have to master the technology of forming a partner environment, gaining trust, including through extended contacts within the ecosystem. This will not only improve the reputation and business relationships of the bank but also reduce the cost of services for participants by increasing transparency and reducing transaction costs. SMEs, having become a client of such a partner network, gets access to lending on preferential terms already as partners, as well as to a set of relevant additional services.

Thus, the practical significance of the work is determined by the fact that the use of the proposed version of the partnership model by banks will activate credit and investment processes and increase the level of mutual trust, which is especially important for SMEs in the post-recovery of demand after the pandemic.

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Digitalization of the Financial Activities of Platform Companies: Competitive Potential and Social Impact

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ABSTRACT

The **aim** of the article is to define the characteristics of platform companies and their digital platforms as new mechanisms of competition and social transformation in the global economy. The **relevance** of the article is due to the demand for the experience of foreign platform companies as the main business models for the competitive development of the economy. The authors apply **methods** such as theoretical analysis of scientific publications (analysis, synthesis, generalization); deduction as a procedure for the transition from the general to the particular; analysis of the structure of the influence of platform companies on the strategies of competition, highlighting the differences between the platform and linear business models; determining the influence of platform companies on competition among offline partners; identification of competition between platform companies and within them; highlighting aspects of the social impact of the functioning of platforms and platform companies. The study **is based** on the works of domestic and foreign authors devoted to the analysis of the development of platform companies and the assessment of the social impact of these processes, as well as the interaction between the authors and developers of digital platforms. The **scientific novelty** of the article is provided by the analysis of a wide range of competition tools, which favorably distinguish the platform approach to modern business from the linear one. The results of the analysis make it possible to form a model of the competition ecosystem in the platform economy. The authors **conclude** that the basis of the competitive success of platform companies is their ability to expand the scale of activities (as a result of optimizing various types of assets), to minimize costs by involving external users in the process of creating added value, and cross-platform cooperation. The authors **recommend** that Russian business entities use the experience of foreign platform companies to gain competitive advantages not only in the Russian IT sector but also outside of it. Particularly important are: decentralization of quality control procedures, creation of new sales markets, collection, and processing of large amounts of data, development of strategies for entering markets as suppliers and contractors, diversification of activities at the stage of attracting investments, a social construction.
Keywords: digital economy; digitalization; platform companies; digital platforms; competition; social impact

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INTRODUCTION

In the modern economy, platform companies, which are usually based on digital platforms, demonstrate the greatest dynamics and success in the competition. Their "offensive" on the world economy is evidenced by the global ranking of the Top 100 public companies by market capitalization[1] as of June 2020, where Apple is in second place, third to eighth places are distributed as follows: Microsoft, Amazon, Alphabet, Facebook, Tencent, Alibaba. All of these companies have made digital platforms the backbone of their businesses. In the Forbes ranking of the most valuable brands in the world for 2020, platform companies occupy the top 5 positions.[2]

The recent rapid success of platform companies is due to the fact that they are using fairly new methods of competition, as well as actively transforming the traditional methods of competition that were used before the digital boom, thereby significantly influencing the development of society.

At the same time, a traditional linear company is a company that builds its internal and external relations on the basis of linear chains — from the processing of raw materials to production and distribution. In the economy of platform companies, linear communications are replaced by cooperation networks [1].

The competitive practices that underlie the success of platform companies deserve research because of their apparent effectiveness in allowing them to occupy and actively expand niche markets. The way platform companies compete and gain market share has a significant impact on society.

[1] Global ranking of the top 100 public companies by market capitalisation (June 2020 update). URL: https://www.pwc.com/gx/en/audit-services/publications/assets/global-top-100-companies-2019.pdf (accessed on 12.03.2021).

[2] Forbes' annual list of the World's Most Valuable Brands. 2020. URL: https://www.forbes.com/powerful-brands/list/#tab: rank (accessed on 12.03.2021).

PLATFORM COMPANIES AND DIGITAL PLATFORMS: GENERAL AND PARTICULAR

The need to distinguish between the concepts of "platform companies" and "digital platforms" is explained by the fact that:

- platform company business model is based on the use of a digital platform; a platform company usually owns a digital platform, it can integrate other online services, as well as to conduct offline business related to the digital platform [2];
- digital platform — a software package implemented on the servers of a platform company or a group of companies; a digital platform is a single business process based on modern digital technologies to provide services to platform users.

The digital platform, as the main product of the platform company, forms a new type of organization of business processes and, as a result, new features of the social structure. New technologies do more than just improve productivity and wealth. They bring to life traits and characteristics that change the daily life of people, their usual consumer behavior, and business. Thus, the combination of smartphones and social media has impacted the daily lives of users, acquiring a new habit of learning about new events on social media. The social consequences of the development and competition of platform companies deserve careful study in connection with the need to stop their negative effects and stimulate positive ones.

According to D. Evans, digital platforms are mechanisms based on software code that that stimulate the development of many types of economic activity [3]. The concept of "digital platform" is given a fairly wide range of definitions. In its generalized form, it is a digital structure that allows two or more groups of users to interact [4], as well as a platform that supports a set of automated processes and the consumption of typical digital products (services) by a significant number of consumers [5]. In an economic sense, it is a digital platform that provides

mutually beneficial interactions between manufacturers and consumers. The activities of platform companies, their active use of digital platforms have led to the emergence of a new type of network market. It is a two-way market or socio-economic institution implemented on a digital platform and based on socio-economic activities for the transfer of value between parties registered on the digital platform. This transfer may or may not be carried out by money in various forms. In fact, a two-sided network market is a modern economic phenomenon introduced through the formation of a software product — a digital platform that is created and maintained by a platform company (a group of companies).

A platform company provides a digital platform as a digital infrastructure for the interaction participants and sets the rules for them. The main task of the digital platform is to create connections between users and facilitate the exchange of goods, money, and/or social currency (ratings), thereby contributing to the creation of new value by all participants in the interaction [6].

It should be noted that the market of the ancient Greek city, in its essence, was also a platform that brought together sellers and buyers. But due to the limited means of communication, this platform for many centuries was entrenched only in the distribution of goods and services [7]. With the emergence and development of capitalism in the economy, the model of linear production was established for a long time. The key to the success of this model is cost savings through increased production while incorporating manufacturing and control technologies (Ford assembly line). The model has evolved — Toyotism [8] replaced Fordism, which breaks down the production process into even smaller components with more careful control over each of them. Later, product platforms began to be introduced, but the essence of the production process remained linear.

The revolution marked by the emergence of platform companies took place in the early 2000s due to the reduction in the cost and growth of the availability of computing power, as well as a sharp increase in the amount of computer memory, reduction in the cost, and acceleration of the processes of transmission and storage of information, the development of the Internet [9]. In their composition, digital platforms form new sales markets, types of value of goods, works, services, and methods of competition [10], one of the models is presented in [11]. This model is described by a set of mathematical formulas that allow analyzing changes in financial flows, considering changes in the external financial and economic environment, which allows introducing new methods of competition into the activities of a platform company or improving existing methods of competition that increase its competitive potential.

The platform company, using the digital platform as its "digital weapon", eliminates intermediaries, while it becomes an intermediary itself, which is not considered as an impartial participant in the modern market. Platform companies pursue their business goals by customizing search engines and delivering search results to their needs through digital platforms, and this has an impact on society.

At the same time, with all the expansion of platform companies, line companies are not willing to give up their positions in the competitive struggle. They adapt by implementing business practices that have proven effective in a platform business model. Thus, large linear industries are actively digitizing their business processes, initially creating internal closed digital platforms based on "digital twins" to improve management efficiency, and then open these platforms for partners to create a collaborative network of suppliers and buyers on their basis (BMW, Boeing). By partially opening platforms for users of their products, line companies can collect feedback on their work, like platform companies, outsourcing some

of their quality control processes to external users. This approach allows line companies to move to the production of customized products — completing a mass product with additional elements at the request of a specific customer (Nike). Platform solutions are used by builders of smart cities, buildings, apartments. The advent of portable and low-cost 3D printing machines will drive platform solutions deeper and deeper into the linear business, transforming it from the inside out. The sphere of cooperation between line and platform companies is no less wide. For eBay sales, goods are needed, for travel through the Uber platform — taxi cars, for rental housing through Airbnb — the construction, repair, and maintenance of this housing. Traditional line companies are engaged in the production of goods, cars, construction, and repair of housing, for which the expansion of the platform business provides new opportunities for development.

Since the activities and competition of platform companies transform the activities of line companies, leading to a symbiosis of the platform and linear business models, the study of the competitive potential of platform companies seems to be even more necessary from the point of view of using the global experience of platform companies to increase the competitiveness of Russian line and platform companies.

COMPETITIVE POTENTIAL OF PLATFORM COMPANIES

There are a large number of publications devoted to research in the field of the theory of perfect and other types of competition, in particular, on identifying the features of the concepts of "competition", "competitiveness", "competitive advantages", "competitive potential", and the relationship of these concepts with each other [12]. However, in our case, the most correct and sufficient is the definition of dynamic competition, proposed by Joseph Schumpeter, as "... the rivalry of the old with the new, with innovations" [13].

As mentioned above, platform companies are just new economic agents replacing traditional line companies. Therefore, at present, there are still no practical and theoretical provisions that allow to give a strict definition of the concept of "competitive potential of a platform company". In this regard, and from the point of view of systems theory, it is proposed to consider the functions and processes that determine their multi-level competitiveness as the competitive potential of platform companies [14]. These, in our opinion, include those substances that form a new model of the competitive ecosystem of the decentralized platform economy due to the following factors (*Fig.*):

- differences in methods of competition between linear and platform business models (Block K1);
- competition between offline partners (Block K2);
- competition between platform companies (Block K3);
- competition within the platform (Block K4);
- social consequences of the platform economy (Block K5).

We briefly consider the functional features of the K1-K5 blocks.

DIFFERENCES IN COMPETITION METHODS BETWEEN LINEAR AND PLATFORM BUSINESS MODELS (BLOCK K1)

Network effects used by platform companies. The network effect occurs when an increase in the number of people using a product leads to an increase in its value [15]. The increase in the number of drivers registered with Uber leads to an increase in the availability of drivers, which increases the number of customers. Their growth in turn attracts new drivers, etc. As a result, the value and cost created by the platform grow with the number of users. The platform company creates a product that allows two or more groups of users to interact with each other, making an economic

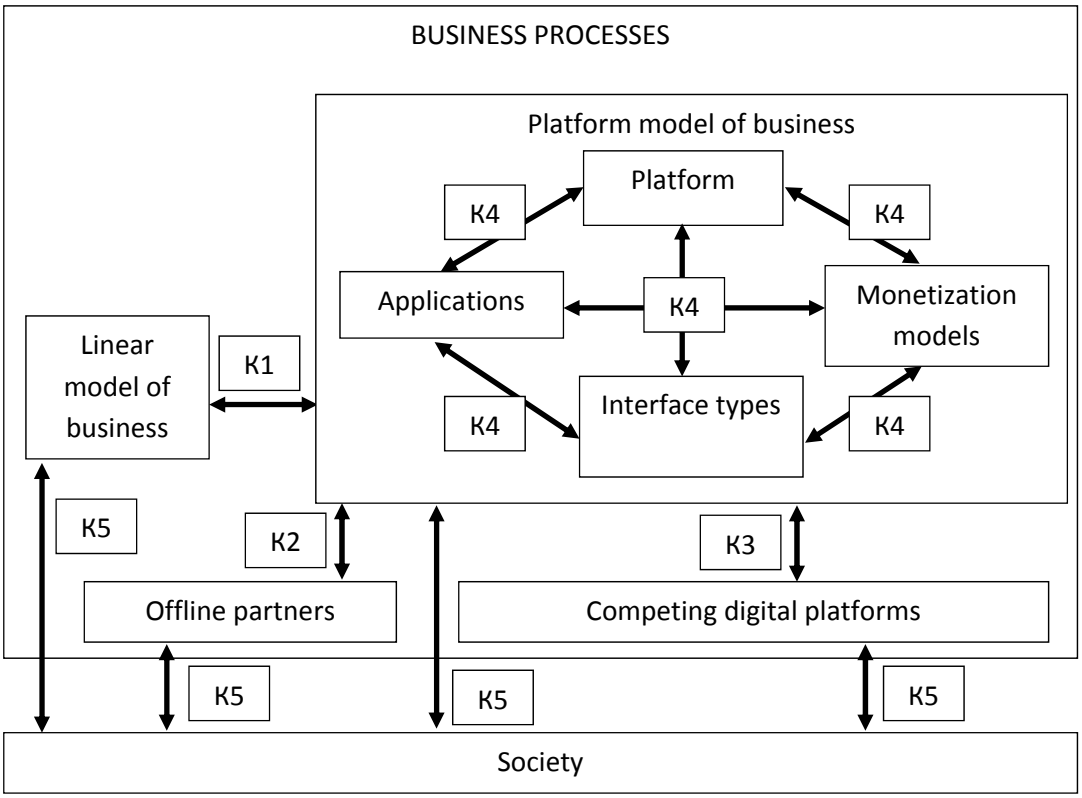

Fig. **Competition ecosystem model in the platform economy**

Source: complied by the authors.

exchange. By serving independent groups of consumers, the platform company creates a two-way (multilateral) market [16], creating two-way (multilateral) network effects.

As a result, in contrast to the linear production model, in which the cost of a product is determined by limited supply and no substitutes, in the platform model, an increase in supply will lead to an increase in the cost of the product [17].

Expansion of existing and creation of new markets. By entering existing markets, platform companies expand them significantly, which is rarely possible for line companies. Thus, Uber in the United States attracted more than 160 thousand drivers, some of whom had not previously been involved in the transportation of passengers for money and, most importantly, attracted millions of passengers, a significant part of whom had not previously used taxi services [18]. New sales markets are being created, for example, in the field of cloud technologies, data collection, and processing, providing developers with a platform for implementing applications for potential users, etc.

Zero marginal cost. The effect occurs because the cost of copying and distributing the original version of the platform application over the Internet is practically zero (as opposed to the marginal costs of line companies). These costs are not completely zero, as distributing the application requires the development of the original version of the product, development and technical support on the Internet, platform management, etc. Distributing the original version of the application by copying and skyrocketing consumer growth brings marginal costs to near zero. However, distribution requires manufacturing and infrastructure (Uber, Netflix), and sometimes the goods (eBay), resulting in a certain combination of linear and platform models.

Extending zero marginal costs to suppliers. Platform companies also cut costs by actively

engaging external developers and content creators (users), as opposed to line companies, by decentralizing production. As a platform company, their work is often free because, for example, users who post photos to Instagram are not paid to do so. In fact, many platform companies do not create their own product to entice users of their platforms to do so. The rapid development of such an approach in the field of production will occur in connection with the massive use of 3D printers, which will allow the transition to large-scale decentralization of production processes in various industries — from construction to engine building.

Platform companies don't try to own property. Competing line companies tried to expand production capacity, monopolize the sources of raw materials (Standard Oil refined 95% of oil produced in the United States by 1880), and platform companies competed, bringing users together. The ownership model is being replaced by a sharing economy business model, an example of which is the Uber business model. As a result of this approach, combined with network effects, platform companies tend to grow much faster than line companies. In such an economy, the centralized consumption of individual goods (personal car) also becomes decentralized (taxi, car-sharing).

Data as new value. Processed, structured datasets have value in their own right. In addition, their use provides a quick response to changes in user sentiment, which significantly improves the management efficiency of the platform company compared to the linear business, which usually receives information about the response of users to their product with a significant delay. The competitive advantage of platform companies over line companies is that they actively use information to create user feedback loops. In addition, data analysis allows making advertising more targeted, oriented at a specific consumer, to a certain extent — decentralized.

Outsourcing of the control mechanism. It is another successful area of decentralization of business processes of platform companies. If product quality control is an internal mechanism of the line company, then the platform company often assigns it to the competence of external users, using the mechanisms of supplier/developer reputation and moderation of posted content on the digital platform. Specifically, the mechanisms include customer reviews (ratings) about service providers (Airbnb, Uber), goods (eBay), quality of the content (YouTube), control of moderators and other users for compliance with the terms of use of the platform.

This approach significantly reduces the quality control costs of platform companies while strengthening quality control, which gives these companies a significant competitive advantage over the linear business model. Recently, line companies have been actively moving to a system of online reviews of their products and services, evolutionarily drifting towards the application of platform experience.

A new marketing approach. In a linear business model, marketing is separate from production. The attractiveness of the created product is positioned in the minds of consumers through advertising. The platform model should initially be attractive enough to naturally attract users. Advertising can handle this. However, in a linear model, the disappointment of buyers with a product does not necessarily lead to its return, while platform users can massively leave it. This is evidenced by the history of social networks such as Friendster and MySpace. Thus, Friendster lost in terms of increasing the number of MySpace users, which, in turn, did not respond in time to reputation losses due to poor content moderation.

Network effects enhance this process. Thus, marketing is an integral part of the product offered by the platform company. Selling a product in the platform economy is not a one-

time promotion, but serving customers who need to be retained [19].

COMPETITION BETWEEN OFFLINE PARTNERS (BLOCK K2)

Freelance and e-commerce as cost-cutting methods. Above this situation has already been described from the point of view of free labor of users. But the influence of platform companies on the processes of competition among paid partners is no less great. In fact, this is the entry of platform companies into the international labor market, primarily through the use of specialized freelance resources (platforms). By decentralizing the state by attracting remote developers from poorer regions of the world, the platform company, on the one hand, reduces its costs, but, on the other hand, by increasing competition, reduces the income of developers. As a result, developers need to constantly learn and improve their reputations.

Marketing is an integral part of the product offered by the platform company. Selling a product in the platform economy is not a one-time promotion, but serving customers who need to be retained.

Using online auctions to find equipment and supplies also reduces their prices, allowing millions of competing suppliers to bargain. The exception is specialized suppliers who provide unique services or products that are difficult to replace. But global online competition is also dropping their numbers. This approach blurs the boundaries of country resource markets, leading to a fusion of ideas at the international level that fosters innovation.

Competition for developers. This situation is the opposite of the previous one. Platform companies are vigorously competing for the best application, software, and peripheral developers. Platform game developers compete to host their game on the latest console. Different platform companies can make proposals to the developer of a promising application about placing the finished product on their platform in the hope that it will significantly increase its attractiveness to users. A striking example of such competition is the purchase by Facebook in 2016 of the Belarusian application MSQRD, which allows applying filters to user photos.

Increased competition between machine and man. The British Encyclopedia used the services of special people who distributed it to subscribers. In the conditions of the electronic publication of encyclopedias, these people are not needed, since anyone can visit the Wikipedia page on the Internet. At the same time, the competition "machine-man" can spread further and lead to competition "machine-machine", for example, among analytical programs processing large data arrays.

Hypercompetition. It is typical not only for partners but also for platform companies. Digital platforms accelerate the competitive processes in the economy. With their use, companies develop quite quickly, capitalizing, capturing the market, and going broke over the course of several years. The situation with partners is similar. A developer who has created a successful version of an application can quickly gain worldwide fame, appropriate funding, and profits. For example, the Finnish company Rovio Entertainment (developer of Angry Birds), founded in 2003 by three students, received US$ 42 million in funding in March 2011. Two years earlier, the game it developed had cumulatively over a billion downloads, making it the top-selling game on the App Store.[3] But at this time, Rovio is unable to repeat its success. This indicates

[3] Fried I. Rovio Passes a Billion Angry Birds Downloads, Still Mulling IPO. AllthingsD: Tech Portal, 2012. URL: http://allthingsd.com/20120509/rovio-ceo-when-to-go-public-is-up-to-dad-other-owners/ (accessed on 09.09.2020).

that in the modern market, the current sustainable advantage of any company is an illusion since both companies and their partners do not have reliable competitive advantages.

Accelerate business processes and reaction times for competitive success. The nature of business processes is changing towards their intensification. Thus, the development of a new version of a platform application usually begins before the development of the previous version is complete. Customer support is carried out twenty-four seven, minimizing the response time to a request to several hours (in some cases, minutes). The concept of "non-working hours" is disappearing, since the processes of purchases and sales, customer support, etc. carried out without interruptions, on holidays and weekends — 24 hours a day.

All of the above changes the nature of the buying and selling process. The desired product, for example on Avito, can be bought in seconds. As a result, the slightest confusion can leave a potential buyer without a product.

COMPETITION BETWEEN PLATFORM COMPANIES (BLOCK K3)

User reputation as the basis of their loyalty to the platform. It is used quite often by platform companies, but initially, they did not see it as a way to retain customers. The importance of reputation has occurred to some extent automatically. Essentially, a good reputation score (or rating) earned by a user on a certain platform (which leads to certain preferences and gain of customers) slows down the transition of this user to another platform, as he will need to earn his reputation again. Profile markets are emerging where highly reputable profiles become tradable.

Interfaces and functions competition. Platform companies compete with each other for the usability of their platforms and the usefulness of the functions they offer. But the oversaturation of the platform with various useful functions may not give it an advantage, but, on the contrary, by making it too complex, neutralize the network effect, leading to a churn of users (the story of the first social network for students Club Nexus) [20]. The way to combat oversaturation is a multi-level interface that is simple for ordinary users but allows experienced users to connect new functions, use new settings, up to programming on the platform.

Preventing apps from being hosted across platforms. Platform companies use rules, techniques, and protocols to prevent applications running on their platforms from being hosted on competing platform sites. This placement promotes a switch between platforms of user attention and, therefore, can lead to their churn. For example, Apple discourages the use of the Adobe Flash Player application for viewing audio and video content, forcing developers to use tools developed directly by Apple.

Mergers and acquisitions of platform companies. Through these mechanisms, platform owners are trying to acquire companies that create value for users, which in many ways intersects with the value created on their platforms. For example, platform owners acquire companies that develop applications that allow them to more efficiently search for information on their platforms. Likewise, social media owners can acquire companies that successfully develop browser games. Because of this, platforms try to bind network data and users to themselves, amplifying the effect of network effects.

Shared resource consumption by platform companies. It should be noted that in order to increase competitiveness, some platform companies may partner with others to provide resources. For example, many platform companies rely on Amazon Web Services for cost savings, cloud database rentals, middleware, virtual servers, serverless computing, storage, and development tools. For the same purpose, Uber uses Google maps.

Competition as cooperation. It is a symbiosis of platform companies and venture capital investments in a favorable business

environment. A striking example of the fact that competition in the system of platform companies presupposes active cooperation is the business climate in Silicon Valley, based on the exchange of knowledge, experience, and financial support. Founders of successful startups, venture capitalists invest part of their profits in the development of many other startups, realizing the competition from their side. IT companies understand that their top employees can leave the company, and using the experience gained, they found their startups, some of which have a bright future. Stanford University provides students with resources for scientific development. As a result, competition and cooperation, exchange of ideas and experience become an integral part of each other. Thus, YouTube links on Facebook increase popularity and increase YouTube audience, while Facebook and Google (the owner of YouTube) are competitors for the audience. In turn, YouTube publishes links to its contributors' Facebook and Instagram profiles. As a result, by competing, companies complement each other, thereby forming a type of network effect in which it is their interaction (despite the competition) that increases the value of each of these platforms (and, therefore, platform companies) for users.

Competition of digital ecosystems. As part of the competition for sales markets, platform companies expand their markets of presence, forming spheres of influence through a network of platforms and services that complement each other and compete with each other within the same platform company. An example of such an ecosystem is the Yandex system, which includes Internet search with many additional services, ordering food, car sharing, smart speaker, taxi service (including the current development of self-driving cars), etc.

Monopolization. The drive for monopolization is embedded in the key mechanisms that ensure the competitiveness of platform companies (network effect, zero marginal costs). The more users visit the platform, the higher its value for each of them. The more data is collected and processed by the platform, the more accurate forecasts are formed based on them. Different ways of attracting and retaining users on the platform are an integral competition mechanism between the platform companies. Monopolization is intensified by user actions, the creation of a unique profile on the platform, and the formation of a reputation. As a result, for a user, the abandonment of a specific platform is a waste of time spent on developing a profile, accumulated within the framework of the social communications platform, which strengthens users' binding to a specific platform.

Cross-subsidization. This happens as follows: one division of a platform company reduces the cost of services provided by its platform to users (possibly to zero in the case of a freemium pricing model), preventing them from switching to other platforms, another division of the same company increases prices for services of other platforms, thereby compensating for the losses incurred. Often, using such a mechanism, costs are passed on to users who have less elastic demand for platform services. For example, Google, like other postal services, offers free postal services to them, given that the number of its users is variable, but at the same time raises the price of advertising. This considers the fact that with an increase in the number of users, advertisers are more interested in their presence on Google [21].

Freemium. Some platform companies (for example, developing game platforms) compete with each other, providing users with a version of the product (application) with limited functionality, but at the same time offering a fully functional paid version. Having appreciated the convenience of the free version, creating and developing their profile, some users are ready to switch to a paid subscription.

COMPETITION WITHIN THE PLATFORM (BLOCK K4)

Competition between the platform and applications developed on its basis. This type of competition tends from intra-platform to cross-platform. Various applications of the same type compete on the same platform for the attention of users, in turn, to a certain extent repeating the evolutionary process of platform development as a whole and, thereby, directly influencing the development path of a particular platform. This competition was singled out in a separate form due to the fact that the owners of the most successful applications can take control of the platform (and, therefore, the platform company) from its direct owners.

Competition of monetization models. Within a single platform developed by a platform company, several monetization models can compete, replacing each other or working simultaneously. Typically, a model that generates stable, dynamic cash flow wins when the following principles are met:

- no reduction in access to the value that users are accustomed to receiving;
- moving from free to paid must be accompanied by the creation of additional value to justify the fees.

Competition between platform interface types. This field for the competition is quite wide: from competition between different sets of functions to competition between different concepts for the further development of the platform on the part of its owners and developers, which is reflected in the concept of interface development. In this case, the opinion of users becomes crucially important, so that platform companies often experiment. For example, randomly placing key buttons on the interface of their platforms (Buy, Add as Friend, etc.), and then tracking user behavior changes for better or worse after each such placement of buttons.

Various directions in which platform companies are transforming the methods of competition, strengthening their competitive potential, raises the question of the need to further study competition both between platform companies and between the platform and line companies [22].

THE SOCIAL IMPLICATIONS OF PLATFORMS IN THE MODERN ECONOMY (BLOCK K5)

The stratification of society is associated with different levels of integration of the population and business into the digital economy. Along with the first-level digital divide, which implies different access for different segments of the population to digital infrastructure, there is a second-level digital divide, which means a difference in the ability to master digital technologies and the speed of information processing by enterprises. As part of the acceleration of competition processes, people who are prone to the rapid adoption of innovations, learning, accelerated adaptation, generation, and implementation of ideas quickly and fairly early get rich, at the same time becoming role models. Mark Zuckerberg, founder of Facebook, became a billionaire at 23, Evan Spiegel (Snapchat) at 23, Larry Page (Google) at 30, etc. On the one hand, this increases the wealth stratification of society, but on the other hand, platform companies can become quite effective social elevators, which, in turn, attracts new staff to the IT industry.

At the same time, national security threats emerging as digital headhunting becomes global, social elevators go beyond the national level without requiring physical border crossings. The distribution of added value is getting out of the control of the state, moving to a supranational level controlled by global corporations [23].

Increased stratification of economic opportunities. Active platform users with the necessary experience are able to attract orders from all over the world, acquire competencies of the international standards, successfully implementing (monetizing)

their skills. Platform communications give users access to information, allowing them to track consumer sentiment in order to timely adjust products and services to their changes, thereby staying in the market trend. Users' lack of desire and experience to use digital platforms in this way limits their contacts with customers and suppliers, thereby leading to a reduction in their economic opportunities and, as a result, income.

Competition for access to personal data. Analysis of personal data allows companies to build marketing strategies, predict changes in the behavior of consumers, competitors, and suppliers. This allows the company that owns the data to design a more effective strategy for its development. As a result, one of the activities of the platform companies is the collection and processing of personal data of users. At the same time, the formation of digital profiles of citizens, the use of big data analysis based on the information of these profiles should reduce the risks of unauthorized access to personal data. Besides in the future, when digital profiles of residents of regions and countries will be formed, the analysis of big data will allow tracking trends and, without risk, building strategies for the development of these large territorial entities.

CONCLUSIONS

The present study aims to identify the characteristics of platform companies and their digital platforms as new mechanisms of competition in the modern world economy, introducing new features into the traditionally established socio-economic processes of organizing economic life. The authors identified the specifics of the functioning of platform companies and digital platforms, developed a model for the ecosystem of the digital economy, and identified the types of competitive potential of a platform company.

The results of the study show that the variability of the advantages of platform companies does not allow them to build long-term market strategies, since this leads to a combination of monopolization and competition in which the platform company "survives" competition, offering users unique products of the digital platform, forms its competitive potential.

In our opinion, within the framework of the Russian economy, it is most important to consider the genesis of the development of platform companies prone to decentralization. First of all, this is decentralization at the stage of formation of platform companies, which finds practical expression in venture capital investment and the creation of a certain, not even economic, but social environment that facilitates mass contacts between idea generators, developers, scientists, and other investors with the simultaneous widespread use of outsourcing (for example, Silicon Valley). Decentralization also occurs at the stage of developing additions and updates to a digital product, new applications to it with the involvement of third-party developers, the result of whose work is often not paid, but their product can be placed on digital platforms as a product for users to buy. Thus, by caring for their own well-being, these developers increase the competitiveness of the platform company. Equally important is decentralization at the stage of quality control of developed and operating IT products, which allows platform companies to reduce the costs of this process.

The development of digital platforms is based on finding the best IT solution for a new product, offered not only by employees of platform companies but also by independent developers and users, as well as investors who invest in many new projects, considering the fact that the profit from successful investments can cover previous losses.

Decentralization is important for the effective development of today's ultra-fast economy when there is no adequate solution about the development strategies of companies due to the fact that consumers do not always understand what product or service they need. Therefore, the search for a new solution by many company founders, product developers, and customers is extremely important — this leads to market success: consumers themselves receive the planned product in the market, which makes the platform company competitive. This scheme is not only changing the global economy, but it can and should be used in the Russian economy as a response to the modern challenges of digitalization.

The experience of developing platform companies may not only be used in IT (recreating Silicon Valley). It should be used when creating conditions for breakthrough development in the field of biology, medicine when creating new materials and production technologies. This experience can also be applied in the design of new socio-economic institutions, which is beyond the scope of the article but seems to be the direction of foresight analysis of the development of the identified trends.

The findings of the study can be useful for many Russian companies both line companies (for the development and implementation of measures in response to the growing competition from platform companies) and new platform companies being formed in the Russian context (for choosing a policy development and development of methods for promoting services of their digital platforms).

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Ryzhkova M.V. — analysis of research results; substantive agreement with the co-authors of the research results; editing the text of the article and general conclusions of the study.

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The Impact of Digitalization on the Financial Performance of Russian Companies

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ABSTRACT

Digitalization is one of the most urgent problems for Russia; companies need to gain a competitive advantage, increase their efficiency and improve business performance. The aim of the study is to identify the relationship between the financial performance of Russian companies and the degree of digitalization of their business processes. Operating profit was chosen as the main financial indicator reflecting the results of the current core activities of the companies. To calculate the digitalization index, McKinsey information data was taken on six parameters: digital marketing, digital product experience, e-commerce, electronic customer relationship management (E-CRM), social networks. The authors used regression analysis of data from 482 companies from 20 industries for the period 2017–2019 as a research method for testing the hypotheses. The findings of the study revealed that the digitalization index has a positive effect on the operational efficiency of companies, but the degree of influence differs depending on the industry, age, and size of the enterprise. The authors concluded that the greatest effect from digitalization is observed among companies with traditionally high digital maturity. These are companies from the financial, technology, or communications industry, where business digitalization is vital and where a slowdown in digital transformation processes can push such enterprises far back in the ranking. Assessing the impact of digitalization of Russian companies on their operational activities will allow the management of companies to choose the right strategy in matters of digital transformation, which will ensure the company's competitiveness, increase its efficiency and contribute to its development. On a national scale, the results of this study can help decide which industries should be subsidized for digital innovation.

Keywords: digitalization; digitalization index; operational efficiency; operating profit; performance; company age; company size; new technologies

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INTRODUCTION

Digitalization is traditionally understood as the transformation of existing processes into digital form and thereby gaining benefits in terms of financial and operational efficiency [1]. This process is a key business trend today: more and more industries are launching a strategy of actively introducing digital tools (digital transformations) into their business processes.

Digital transformation means more than the introduction of new technologies. Digitalization is a restructuring of business models, a change in the approach to conducting internal and external processes. In addition to new technologies, companies need completely new skills, corporate culture, organizational and operating models.

Digitalization has enormous potential in terms of increasing efficiency, speed, and quality of work, reducing costs, increasing equipment productivity, efficiency in the use of raw materials, labor, and other aspects of business efficiency. L. Fuentelsaz et al. argue that the introduction of new technologies directly affects the productivity of the company through qualitative changes in operational processes [2]. In addition, in developing countries, digitalization is seen as a driver of economic growth by increasing capital and labor productivity, reducing transaction costs, and facilitating access to global markets [3].

Currently, Russian enterprises are at an extremely low level of digitalization [4]. Thus, according to the results of the research "Index of readiness of Russian companies for digital transformation", 91% of manufacturing enterprises in Russia use an outdated business model. However, 78% of respondents said they intend to use digital technology to improve production processes in the next 3–5 years. At the same time, only 4% of companies have a high level of digitalization of the production process, and only the same 4% of companies widely use digital solutions in various corporate functions. Additionally, M. Galimova [4] conducted a study, based on the results of which it was concluded that most Russian companies are not ready for digitalization for some fundamental reasons: the lack of an appropriate corporate culture within the organization, knowledge, and skills to implement and use technologies, outdated business models. In the course of the same study, it was revealed that Russian enterprises do not see global opportunities for digital transformation and are not ready to join the digitalization race. Thus, Russian companies face the question of the need to accelerate such processes and assess the benefits of such transformation.

The aim of the study is to assess whether business digitalization affects the main (operational) efficiency of Russian companies, and also to determine whether this impact depends on the size and age of the company.

Despite the fact that the topic of digitalization of enterprises is currently underdeveloped by the academic community, over the past few years, a number of scientific studies have appeared that are significant for the start of its development. Thus, the methodological basis of this study will be the work of J. Manyika et al. and J. Wroblewski et al., who deeply considered the concept of digitalization [5, 6]. Unlike previous studies in this field, the article assesses the impact of the degree of digitalization of an enterprise on operational efficiency, depending on the economic sector, the size of the company, and also its age. All of these factors affect the speed at which digital change is introduced and the benefits of such transformations.

This paper looks at the impact of digitalization from a new perspective and with a new level of detail that can help guide better governance decisions for digital transformation. The article uses data on not yet studied Russian companies, which will be useful for studying the specifics of the impact of digitalization within the country. Exclusive data includes an enterprise-specific digitalization index and relevance (end of 2019) as companies have seen their peak in digitalization strategies in recent years.

THEORETICAL OVERVIEW

While digital transformation has only become a particularly popular topic of discussion in the past decade, the importance and inevitability of digitalization have been debated as far back as the 1990s and 2000s.[1] However, there are few scientific studies on the digitalization of business processes these days, and most of them are devoted to the concept of digitalization, and not to modeling specific dependencies and effects, at least to a deeper level than the country one. In addition, it should be noted that Russian business still rarely focuses on the level of digital technologies. The current level of digitalization of business in Russia is not high, so there is practically no research based on the data of Russian companies, with the exception of massive surveys of business leaders about their digitalization practices. Nevertheless, there are still a number of works closely related to the topic of this study.

One of the objectives of the study is to determine if the degree of digitalization of a company affects its performance indicators in comparison with other companies, and if so, how exactly. Digital maturity has become a defining element of corporate competition [5].

A. McAfee and E. Brynjolfsson argue that industry competition becomes more dynamic due to successfully implemented digital systems, while companies that cannot adapt properly and in a timely manner risk falling behind and becoming uncompetitive [7]. Ignoring new technological innovations these days can have long-term consequences for the future competitive environment of the company [8]. For example, technology has changed traditional competition, and the gap between leaders and laggards has widened.

J. Manyika et al. and Y. Yoo claim that digitalization opens up new opportunities for companies, increases operational efficiency, expands innovative boundaries, and allows better allocation of resources [5, 9]. This is confirmed by L. Fuentelsaz et al., who believe that the introduction of new technologies directly affects the company's productivity through changes in the production process itself [2]. Back in the 1980s, M. Lieberman and D. Montgomery clearly stated that technology leadership is one of the main drivers of first-mover advantage, which often leads to increased profitability in the future [10].

H. Bouwman, M. de Reuver, S. Nikou based on interviews with companies from 11 countries showed that companies with a higher degree of digitalization have more efficient and innovative business models in general [11]. One of the most striking examples of how digitalization directly affects efficiency was shown by M. Barret and G. Walsham, who described how technology allows brokers and underwriters to operate in an e-commerce environment, which can dramatically increase both profitability and efficiency (speed, percentage of errors, volumes) [12].

Also, by the example of the banking industry S. Scott et al., based on data from SWIFT, a global data security provider, has provided strong evidence that technology investments have a positive and significant impact on long-term profitability and productivity [13].

K. Hayes, using the example of the US company Walmart, showed that the corporation is a leader in its segment because it uses advanced digital tools for collecting and analyzing data on their consumers' buying habits. [14]. Digital retail giant Amazon uses advanced algorithms that show shoppers products based on the consumers' record and predictably adjust prices to increase sales and profits. Also, retail banks are using automated digital systems such as mobile channels and web presence to increase paperless workflows and reduce costs [15].

Another example of how digitalization can improve efficiency is in the case of the automaker Tesla Inc. The company can update

[1] Auriga. Digital Transformation: History, Present, and Future Trends. 2016. URL: https://auriga.com/blog/digital-transformation-history-present-and-future-trends/ (accessed on 17.02.2021).

the software of its electric vehicles without the help of the car owner [16].

E. Van Bommel et al. found that virtual environments, ubiquitous big data, and digital channels are increasing companies' knowledge about customers. At the same time, technology is changing the way the consumer makes decisions, and in the context of digitalization, consumers know more about the product and its alternatives [17]. Also, E. Van Bommel et al. note that companies must not only collect data but also use sophisticated analytics to interpret it.

In general, according to a study by R. Dobbs et al., the profits of firms in sectors that are more dynamically transitioning to digital technologies are growing, and companies with a higher level of digital maturity have higher profitability [18]. A study by J. Bughin and N. van Zeebroeck proves that companies that try to unleash their full digital potential get the most benefits, and their revenues are higher than that of the average company [19]. Also, J. Manyika et al. argue that it is important to understand that digitalization is not limited to the introduction of new technologies that automate processes and lead to significant cost savings [5]. Additional information such as analytics helps companies better understand their customers, adapt to their dynamically changing preferences, and align strategy with consumer trends. Also, J. Manyika et al. proved economic growth driven by the changes brought about by the ongoing digitalization process [5]. Specifically, the authors explore in detail two topics that they believe will impact future growth, namely capital efficiency and multi-factor productivity driven by digital activity.

At the moment, there are a number of works and expert opinions proving an undoubted positive relationship between business digitalization and the characteristics of its effectiveness. For example, some studies have specifically shown that digital technology increases profits, value, and positively affects productivity [20].

It is important to understand what approaches have been used to model the relationship between digitalization and business efficiency. I. Kaufman et al. using a sample of more than one and a half thousand industrial enterprises in Germany conducted a study of how the introduction of digital technologies affects the efficiency of their production [21]. Various performance indicators (productivity, income per employee, etc.) were taken as dependent variables, and various indicators of the level of digitalization (the degree of automation, the range of digital products used, etc.) were taken as independent variables. The findings of the study showed the obvious and positive impact of digitalization on productivity.

A similar study was conducted by M. Agboola et al., which analyzed the impact of digitalization on the efficiency of commercial banks in Nigeria [22]. The study used direct statistics and a sample of 370 employees of commercial banks. The survey was used as the main data collection tool. It was found that there is a moderately significant and positive relationship between the digitalization process and the efficiency of a commercial bank.

B. Hildebrandt, A. Handelt, S. Firk, and L. Kolbe, using data from the world's largest car manufacturers from 2000 to 2013, found empirical evidence of the positive impact of mergers and acquisitions with digital companies on the efficiency of a business model. [23]. Besides, the authors found signs of a positive impact of digital innovation on the expected future performance of car manufacturing companies, which confirms the importance of digital transformation.

J. Wroblewski conducted a study in which he explored the impact of digitalization on the company's performance, namely: whether companies with digital maturity outperform their less mature competitors. The paper analyzed data from Swedish enterprises and showed that digital maturity increased the operational efficiency of companies and the

return on their shares [6]. But the results of the study did not lead to a conclusion about the benefits of more digitalized companies.

In general, there is currently a limited number of studies examining the impact of digitalization through data-driven modelling. First of all, this is due to the limited volume of such data and limited access to them due to corporate confidentiality and the lack of a clear procedure for collecting and aggregating such data (digitalization), as well as the lack of a formulated and general approach to such research. At the same time, the findings of the studies differ because they are not obvious, which gives value to the results of this paper.

HYPOTHESES

The main logic of the study is based on the assertion that there is a relationship between the degree of digitalization of an enterprise and its efficiency (operational, financial). Due to the fact that in most of the existing literature an unconditional positive effect of digitalization is asserted, we can test the following hypothesis [2, 5, 9, 15, 18].

H1: In general, there is a positive dependence of efficiency on the degree of business digitalization.

However, different industries have different specifics, in particular, some industries are more dependent on digital tools. Thus, it is assumed that the effects will be different depending on the industry, and the degree of digitalization is likely to differ depending on the industry. According to the study "Digitalization of business in Russia and abroad" conducted by the Institute for Statistical Studies and Economics of Knowledge of the Higher School of Economics (2019),[2] as well as the work of J. Wroblewski, companies working in the field of technology, information and communications traditionally are more mature in terms of digitalization. [6]. We propose to check whether this fact is explained by the increased effect of digitalization.

H2: The greatest effect of digitalization is observed among companies in the field of finance, technology or communications.

We assume that the effect of digitalization depends on the size of the company. Larger companies may have a smaller effect on the level of digitalization, for example, due to the large volume of fixed costs that do not depend on the level of digital presence in business processes (office maintenance, salaries, etc.) [24]. Or, conversely, smaller companies benefit less from using less advanced technologies due to the lack of a large amount of free capital [9].

Since opinions differ on this, we will assume that the effect will not be different or will be slightly different as the main hypothesis.

H3: The magnitude of the digitalization effect does not depend on the size of the company.

There are a number of studies that show that more mature companies are less flexible about structural change, including digital transformation. This is due to the fact that the transformation of an old business requires extremely significant capital expenditures [25–29]. At the same time, the digitalization of a mature business may bring less effect than the launch of a new one using new technologies. This is primarily due to the fact that the effective functioning of the digital environment requires restructuring, including the corporate culture itself [5].

H4: More mature companies benefit less from digitalization.

METHODOLOGY

Dependent variable. Business digitalization affects all performance indicators of companies. In this study, the operating profit margin is taken as the dependent variable because it is used most often and best reflects the efficiency of the company's core activities. Operating profit margin is a measure of income received after deducting expenses incurred in the course of operating income-related activities. This parameter was used in similar models by J. Wroblewski, H. Lam,

[2] URL: https://issek.hse.ru/data/2019/10/03/1542994758/NTI_N_146_03102019.pdf (accessed on 18.03.21).

A. Yeung and E. Cheng, to reflect the company's efficiency [8, 30]. The operating profit margin will be calculated using the following formula:

$$Operation\ profit\ margin = \frac{operating\ profit}{revenue} \times 100\%, \quad (1)$$

where *Operating profit = operating income — operating expenses*.

Explanatory variables. To assess the level of digital maturity of a company, a metric will be used in which the degree of digital maturity is measured in six dimensions, namely: digital marketing, experience with digital products, e-commerce, electronic customer relationship management (E-CRM), social media.

Digital marketing measures a company's ability to use search engine marketing and advertising to attract customers. Experience with digital products makes it possible to assess the web presence of a company. E-commerce reflects a company's ability to sell goods digitally. E-CRM includes a company's ability to improve customer relationships through digital channels (e.g. unique personalization). Social media measures a company's engagement with social media such as Facebook or Twitter.

The formula for calculating the metric is as follows:

$$Digitalization\ Index = \frac{\sum_{i=1}^{n} X_i}{n}, \quad (2)$$

where n is the number of metrics (6), i is the metric's number, X_i is the value of the number of the metric i, which can take values from 0 to 100. This metric was used in studies of the Russian market by ISSEK HSE (2019), KPMG (2019), McKinsey & Company (2019), and Bank Otkritie with NAFI (2019).

To improve the representativeness of the research results, it is necessary to include structural explanatory variables in the model. The main fundamental indicator that can show the profitability of a company is belonging to a particular industry since the rate of return and profitability differ for different industries due to different scales of production, class of products and services, capital intensity, and other factors [31]. Thus, a binary variable will be added to the model, equal to 1 for companies operating in the field of finance, technology, or communications, and 0 otherwise. According to J. Wroblewski, digitalization has the most significant impact on these industries [6].

The profitability of an enterprise is also significantly influenced by its size, which is expressed in the value of its total assets, so this variable will be included in the model [32, 33].

In addition, the age of the company should be taken into account, as there is a number of studies proving that more mature companies are less efficient, because, first of all, there are high capital costs of transformation (including digital transformation) to change activities and thereby increase profitability. Thus, new players gain an advantage in profitability due to the initial access to new approaches and technologies [25–28]. According to a study by J. Bughin and N. van Zeebroeck, often new market players with a high degree of digitalization occupy up to 20% of the market in the first 5 years of operation [19].

To make the model's results more representative, we include an additional variable: the debt-to-equity ratio. This variable is often used by researchers when analyzing the profitability of a company, for example, in the works of H. Song, C. Zhao, J. Zeng; W. Ruiqi, F. Wang, L. Xu, C. Yuan [34, 35]. According to the pecking order theory, companies have priorities in terms of sources of funding. From the point of view of this theory, the most preferred source of financing for current activities or individual projects is its own funds. Other sources should be used when, firstly, the net present value of the project is positive and, secondly, there are not enough own funds to finance it. Consequently, more efficient firms try to increase the share of equity in the capital structure, which affects profitability.

As a result, the following model will be tested in this study:

$$OPMi,t = \beta_0 + \beta_{DI}\, DI_{i,t} + \beta_{sector2} Sector_{it} + \\ + \beta_{assets5} \ln(Assets_{it}) + \beta_{age} \ln(Age_{it}) + \\ + \beta_{\frac{D}{E}} \frac{D}{E}_{i,t} + \beta_{OPM} OPM_{i,t-1} + \varepsilon_{it}, \quad (3)$$

where: $OPMi,t$ — Operating Profit Margin, current term;

$DI_{i,t}$ — Digitalization Index (0–100);

$Sector_{it}$ refers to an industry more or less dependent on digital instruments; a dummy variable that takes the value 1 for industries that are more dependent on digitalization (in the field of finance, technology or communications), and 0 for industries that are less dependent on digital technologies;

$Assets_{it}$ — the natural logarithm of the company's assets (a proxy variable reflecting the size of the company);

Age_{it} — the natural logarithm of the company's age (proxy variable reflecting the number of years since the company was founded);

$\frac{D}{E}_{i,t}$ — the ratio of equity to the company's borrowed funds;

$OPM_{i,t-1}$ — an operating profit margin of the previous period;

I — company number (1–500);

t — the number of the year (2017–2019);

ε_{it} — a random error, distributed according to the normal law;

β — coefficients reflecting the influence of the digitalization index, size and age of the company on the indicator of operating profit.

DATA DESCRIPTION

Data of the annual ranking of the 500 largest companies in Russia in terms of revenue RBK-500 for 2017–2019 were taken for the study. The 2019 ranking includes 401 private companies and 81 state-owned companies. The sample included representatives from more than 20 different industries. The data were taken to calculate the operating profit margin, determine the sector of the economy, total asset value and capital structure to calculate the debt-to-equity ratio. Information on the age of companies was collected manually from the Federal Tax Service database.

The digitalization index is a parameter with a numerical value from 0 to 100, where 0 is no digitalization, 100 is the maximum digitalization. The index data was taken from the corresponding annual survey of digitalization of Russian business, which McKinsey & Company has been conducting since 2017. However, it was not possible to determine the digitalization index for all companies from the RBC-500 list. A number of companies were not included in the rating for all three years and were excluded from the sample.

Table 1 shows descriptive statistics for the data. As a result, the sample size consists of observations of 402 Russian companies over 3 years. Total observations in the sample — 1206.

Before building the model, it is required to make sure that the regressors are not correlated with each other. *Table 2* shows the correlation coefficients of the parameters.

As can be seen, none of the pairs of parameters is significantly correlated. The highest correlation (45%) is observed between the value of the profit rate of the current and the previous period, which is consistent with the logic of the model.

Below is the distribution of companies by industry (*Table 3*). The largest part of the sample consisted of manufacturing and consumer goods companies, the smallest — construction, electricity, and other smaller industrie.

ANALYSIS OF RESULTS

According to the test results, the model with random effects showed the best results, so it will be used in the analysis (*Table 4*).

Four of the six parameters of the model were found to be significant at different levels of significance. Thus, the natural logarithm of the company's age and the debt-to-equity ratio do not affect the company's operating

Table 1

Descriptive statistics

Variables	Average	Standard deviation	Min	Max
OPM current	0.05	0.18	–3.31	0.80
Age	33.66	32.41	1.00	241.00
Sector	0.17	0.38	0	1.00
DI	31.65	6.28	15.25	59.10
Assets	443.19	1 996.32	0.01	31197.50
DE	1.19	25.95	–799.44	322.27
OPM previous	0.06	0.17	–3.31	0.80

Source: authors' calculations.

Table 2

Correlation matrix

	OPM current	Age	Sector	DI	Assets	DE	OPM previous
OPM current	1.00						
Age	0.01	1.00					
Sector	–0.03	–0.02	1.00				
DI	0.27	–0.14	–0.01	1.00			
Assets	0.05	0.14	0.19	0.04	1.00		
DE	0.01	–0.01	–0.01	–0.00	–0.00	1.00	
OPM previous	0.45	–0.01	–0.06	0.24	0.03	0.01	1.00

Source: authors' calculations.

Table 3

Distribution of companies by industry

Industry	Number of companies
Development and construction	20
Manufacturing	96
Information technology and communication	18
Defense and mechanical engineering	51
Consumer goods	66
Trade	43
Transport	29
Finance	47
Power engineering	22
Others	10
Total	402

Source: authors' calculations.

Table 4

Model result

Variables	Coefficients	Standard deviation	Z	P-value	95% confidence intervals	
Ln(age)	0.01	0.01	1.45	0.15	0.00	0.02
DI	0.00***	0.00	6.53	0.00	0.00	0.01
Ln(assets)	0.00***	0.00	1.73	0.01	0.00	0.01
DE	0.00	0.00	0.36	0.72	0.00	0.00
OPM previous	0.43***	0.03	15.37	0.00	0.37	0.48
Sector	−0.01**	0.01	−0.76	0.04	−0.04	0.02
Constant	−0.17***	0.03	−5.24	0.00	−0.24	−0.11

Note: P-value — significance level; Z — (z-score) — measure of the relative spread of the observed value; */**/*** — significance levels: 10/5/1% respectively.

Source: authors' calculations.

Table 5

The result of the model for companies in finance, technology, or communications

Variables	Coefficients	Standard deviation	Z	P- value	95% confidence intervals	
Ln(age)	0.00	0.00	0.64	0.52	0.00	0.01
DI	0.04***	0.00	2.86	0.00	0.00	0.00
Ln(assets)	0.00**	0.00	0.47	0.04	0.00	0.00
DE	0.00	0.00	0.40	0.69	0.00	0.00
OPM previous	0.83***	0.02	33.72	0.00	0.78	0.88
Sector	−0.04**	0.02	−2.30	0.02	−0.08	−0.01
Constant	0.00	0.00	0.64	0.52	0.00	0.01

Note: P-value — significance level; Z — (z-score) — measure of the relative spread of the observed value; */**/*** — significance levels: 10/5/1% respectively.

Source: authors' calculations.

profit margin at any level of significance. But at the 1% significance level, the company's profitability is positively influenced by the digitalization index, company size, and profitability of the previous period. In addition, at the 5% significance level, participation in the financial, technology, or communications sector has a weak negative effect. The key observation is that the digitalization of the enterprise does affect its profitability.

To test the hypotheses put forward, it is necessary to divide the sample into several different groups: by company age, size and industry. To test hypothesis H2, we split the sample into companies from the financial, technology, or communications sector and other companies. The results of building models for two groups of industries are presented in *Tables 5, 6*.

In general, the same results are observed as in the general sample: only the coefficients

Table 6

The result of a model for companies in other industries

Variables	Coefficients	Standard deviation	Z	P–value	95% confidence intervals	
Ln(age)	0.04	0.04	1.03	0.30	–0.04	0.12
DI	0.01***	0.00	4.56	0.01	0.01	0.02
Ln(assets)	–0.01**	0.01	–0.63	0.03	–0.03	0.02
DE	0.01	0.01	0.77	0.44	–0.02	0.03
OPM previous	0.15**	0.07	2.21	0.03	0.02	0.29
Sector	–0.60***	0.20	–3.04	0.00	–0.98	–0.21
Constant	0.04	0.04	1.03	0.30	–0.04	0.12

Note: P-value — significance level; Z — (z-score) — measure of the relative spread of the observed value; */**/*** — significance levels: 10/5/1% respectively.

Source: authors' calculations.

with the parameters were significant: digitalization index, asset value, and profit of the previous period. It should be noted that for the main investigated variable (digitalization index) there is a different order of influence and significance. For companies in the sector of finance, technology, and communications, this coefficient is significant at any reasonable level of significance and has a value of 0.04. And for the rest of the sectors, the same parameter is significant precisely at the level of 1% and higher with a coefficient value of 0.01, which indicates a lower level of dependence and influence on the dependent variable.

We evaluate the models for larger and smaller companies (since our sample consists only of large companies, it would be wrong to divide companies into large and small). According to statistical tests, the most acceptable was the division of companies into companies with assets of more than 50 billion rubles and less. The model results are presented in *Tables 7, 8*.

As a result, for larger companies belonging to a particular industry does not affect profitability, while for smaller companies this parameter remains significant at the 5% significance level with a weak positive relationship. The influence and the level of significance of the degree of digitalization for both samples are practically the same: the parameter is significant at any reasonable level of significance with a weak positive effect.

To test the hypothesis about the difference in the significance of the digitalization degree for younger and more mature companies, we will also divide the sample into two parts and build two models with random effects for comparison. Likewisw, through statistical tests it is considered appropriate to divide companies into groups over 25 and younger. This division does not violate the stability of the sample and is logically correct since the largest gap in technology has occurred in the last 25 years (UNCTAD Secretariat, 2018). The model results are presented in *Tables 9, 10*.

In this case, the "degree of digitalization" parameter is significant only at the 10% level of significance for younger companies, while for more mature companies — at any. Thus, more mature companies are more dependent on the introduction of new technologies.

To sum up the model:

H1: In general, there is a positive dependence of efficiency indicators on the degree of business digitalization.

Table 7

The result of a model for larger companies

Variables	Coefficients	Standard deviation	Z	P–value	95% confidence intervals	
Ln(age)	0.02	0.01	1.62	0.11	0.00	0.05
DI	0.00***	0.00	6.19	0.00	0.01	0.01
Ln(assets)	0.00**	0.01	0.01	0.03	–0.01	0.01
DE	0.00	0.00	0.10	0.92	0.00	0.00
OPM previous	0.36***	0.04	8.90	0.00	0.28	0.44
Sector	–0.02	0.02	–0.74	0.16	–0.06	0.03
Constant	–0.29***	0.08	–3.88	0.00	–0.44	–0.14

Note: P-value — significance level; Z — (z-score) — measure of the relative spread of the observed value; */**/*** — significance levels: 10/5/1% respectively.

Source: authors' calculations.

Table 8

The result of a model for smaller companies

Variables	Coefficients	Standard deviation	Z	P–value	95% confidence intervals	
Ln(age)	0.00	0.00	0.08	0.93	0.00	0.00
DI	0.01***	0.00	5.57	0.00	0.00	0.00
Ln(assets)	0.00**	0.00	1.11	0.02	0.00	0.01
DE	0.00	0.00	0.78	0.44	0.00	0.00
OPM previous	0.86***	0.02	37.25	0.00	0.81	0.90
Sector	0.00**	0.01	–0.08	0.04	–0.01	0.01
Constant	–0.01**	0.01	–0.50	0.02	–0.03	0.02

Note: P-value — significance level; Z — (z-score) — measure of the relative spread of the observed value; */**/*** — significance levels: 10/5/1% respectively.

Source: authors' calculations.

The first hypothesis was confirmed, the coefficient with a variable degree of digitalization in the general sample is significant, having a positive effect on the operating profit margin.

H2: The greatest impact of digitalization is observed among companies in the field of technology, finance, or communications.

This hypothesis was also confirmed since the variable in the model responsible for digitalization turned out to be more significant and has a greater influence on the dependent variable in a sample of companies belonging to the financial, technology, or communications sectors.

H3: The magnitude of the digitalization effect does not depend on the size of the company.

The third hypothesis was also confirmed since there were no considerable differences in the impact and significance of the digitalization variable.

Table 9

The result of a model for old companies

Variables	Coefficients	Standard deviation	Z	P–value	95% confidence intervals	
Ln(age)	0.01	0.01	0.54	0.59	–0.02	0.04
DI	0.02***	0.00	5.71	0.00	0.01	0.01
Ln(assets)	0.01**	0.00	1.56	0.02	0.00	0.02
DE	0.00	0.00	–1.10	0.27	–0.01	0.00
OPM previous	0.29***	0.04	7.66	0.00	0.22	0.37
Sector	–0.03**	0.02	–1.48	0.04	–0.07	0.01
Constant	–0.25***	0.08	–3.15	0.00	–0.40	–0.09

Note: P-value — significance level; Z — (z-score) — measure of the relative spread of the observed value; */**/*** — significance levels: 10/5/1% respectively.

Source: authors' calculations.

Table 10

The result of a model for young companies

Variables	Coefficients	Standard deviation	Z	P–value	95% confidence intervals	
Ln(age)	0.00	0.01	0.27	0.78	0.02	0.02
DI	0.00*	0.00	1.66	0.09	0.00	0.00
Ln(assets)	0.00***	0.00	–0.57	0.01	0.01	0.00
DE	0.00	0.00	0.44	0.66	0.00	0.00
OPM previous	0.89***	0.04	22.19	0.00	0.81	0.97
Sector	0.00***	0.01	0.04	0.01	0.03	0.03
Constant	–0.04	0.03	–1.05	0.29	0.10	0.03

Note: P-value — significance level; Z — (z-score) — measure of the relative spread of the observed value; */**/*** — significance levels: 10/5/1% respectively.

Source: authors' calculations.

H4: More mature companies benefit less from digitalization.

This hypothesis is not confirmed by the results of the model, since for younger enterprises it turned out that the parameter of the degree of digitalization is significant only at the level of 10% significance with a weak coefficient of influence, while for more mature companies the coefficient is much more significant and has a greater impact on profitability.

CONCLUSIONS

This study complements the topic of business digitalization with new findings since a new digitalization index of a company was used. Despite the fact that this study has some limitations and areas for development, its results can be used for practical purposes. Thus, the results of the analysis provide a general understanding of the importance of digitalization in relation to its impact on profitability, as well as an understanding of

which companies, which industries, what scale and age, this relationship has the strongest impact on. Different areas require different levels of digital implementation and adjustment over time. The research results will allow companies to better understand and evaluate the specifics of changes in business processes as a result of the formation of a digital company. Today, the cost of digitalization is high, so the results obtained will allow us to appreciate the benefits of the company's digital maturity level.

From the point of view of not only an individual company, but the whole country, the results of this study can help decide which industries should be subsidized for digital innovation. As has been illustrated by the study, digitalization increases profitability, which means that the rate of economic growth should increase.

The study has a number of limitations.

First, the sample consists only of large Russian companies and excludes small and medium-sized enterprises. A sample of smaller companies may show different results from the results obtained in this study.

Second, the study used the operating profit margin as the dependent variable and did not have any other metrics. There is a possibility that digitalization will have a greater impact on other performance indicators not directly related to the company's profitability.

Third, the digitalization index is detailed for specific companies, but not detailed for its constituent parts. Since different aspects of digitalization may be less or more relevant to different industries, different criteria can have different impacts depending on the profile of the company.

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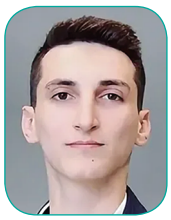

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Methodology for Assessing the Impact of the Diffusion of Blockchain Technologies on the Development of the National Economic System (illustrated by the example of the Russian Economy)

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ABSTRACT

Distributed data storage technologies are becoming an integral part of the modern economy. In this regard, today it is very **relevant** to a search for formalized approaches to assessing the impact of blockchain technologies on key parameters of macroeconomic generations. The **subject** of the research is the system of relations between economic entities of the national economy, associated with the perception of blockchain technologies that permeate economic processes. The **aim** of the study is to develop a methodological toolkit for scenario forecasting of possible consequences for the national economy of the introduction of blockchain technologies into the economic sector. The authors apply **methods** of cointegration analysis, scenario modeling, substantiation of the studied patterns by methods of regression analysis, etc. The authors use works of foreign and Russian scientists, official data of the Federal State Statistics Service of the Russian Federation as an information and statistical database. The authors systematize positive and negative externalities; propose an algorithm for studying the influence of blockchain technologies on the dynamics of GDP through the transformation of the key parameters of the functioning of the financial and real sectors of the economy; build a model and assess the possible impact on GDP of the integration of blockchain technologies into the economy. As a result, the authors make the following **conclusions**: to the greatest extent, the integration of blockchain technologies into the business processes of the national economy affects the change in the financial results of credit institutions, an increase in capital liquidity of economic agents, as well as the acceleration of the processes of socialization of channels of access of business entities to financial markets (expanding access of economic agents to exchanges). Scenario modeling of changes in these factors made it possible to establish that the potential for additional GDP growth in the Russian economy can reach about 1% per year as part of the integration of distributed data storage technologies into the system of economic relations. The developed and approved methods for the formalized assessment of the impact of blockchain technologies on the dynamics of economic growth create the basis for clarifying methodological approaches to the study of the problem posed, open up new opportunities for holding discussion platforms on this topic.

***Keywords*:** blockchain technologies; dynamics of economic growth; GDP; financial sector of the economy; blockchain systems; modeling; cointegration; scenario analysis; risks

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INTRODUCTION

The digitalization of the socio-economic environment is fundamentally transforming the traditional spheres of economic activity. Analog television has been replaced by digital; fiat payments are being replaced by electronic ones; the data exchange and management models built on their basis have been transferred to the electronic document management system, etc. Blockchain technologies can also significantly change the established processes and business models of business entities, as well as the financial sector, continuing the development of the FinTech paradigm.

Blockchain technology was developed by S. Nakamoto in 2008 [1] in order to bypass centralized systems for regulating transactions and operational processes based on the use of distributed (decentralized) data storage mechanisms. Thus, "an algorithm was created on the basis of which the buyer and the seller can make transactions directly over the network using encryption and conciliation mechanisms through the participation of blockchain network nodes" [2].

MATERIALS AND METHODS

With regret, we have to state that, despite the growing interest of experts and the scientific community in distributed data storage technologies and the problems of studying their impact on the development of the national economy and its individual sectors, there are different opinions about the solution to the question posed and the lack of common approaches to a formalized assessment of possible generated opportunities and risks. As a rule, existing studies devoted to the problems of studying the impact of blockchain technologies on economic dynamics are limited either by qualitative characteristics or implemented through the prism of expert assessments, as well as the reasoning of general logical order. At the same time, most authors believe that studies of this kind are extremely relevant, significant from a practical and scientific point of view, and require the development of an appropriate methodological apparatus. For example, this position can be found in the works of E. A. Pekhtereva [3], R. K. Nurmukhametov, P. D. Stepanov, T. R. Novikova [4], Yu. A. Konopleva, V. N. Kiseleva, S. E. Cheremnykh [5], E. D. Butenko, N. R. Isakhaev [6], V. A. Popov [7], M. A. Markov, M. D. Slyusar, O. R. Trofimenko [8], N. Yu. Sopilko, K. L. Malimon, I. A. Kanyukov [9].

Foreign scientists also pay close attention to the problems posed. Most of the works of foreign researchers note the need to study blockchain technologies both from the point of view of qualitative and quantitative analysis [10–20].

Strengthening the argumentation about the role of blockchain technologies in the modern developing world, their possible impact on macroeconomic generations, it should be noted that some countries have recently been actively moving towards the development and integration of the technologies under consideration into the economic environment. To illustrate this, we can give an example of the People's Republic of China, where "since May 2020, the national cryptocurrency of the Central Bank of China (DCEP)".[1] Some Chinese banks in 2020 began to use distributed data storage technologies in their operational activities in terms of making payments, maintaining digital accounts, maintaining a big data register, and other purposes.

As additional examples, it should be noted that back in 2015, an international consortium (R 3) was organized, bringing together more than 80 financial

[1] The launch data of the national cryptocurrency of China is out. RBC, 16.04.2020. URL: https://www.rbc.ru/crypto/news/5e982b909a7947cba287a41b (accessed on 29.04.2020).

institutions practicing the use of blockchain technologies. Companies in the non-financial sector of the economy are also actively involved in the study and testing of blockchain technologies as part of their business operations. And companies in the IT sector are beginning to actively generate proposals and developments in this area.

Distributed data storage technologies are no less actively being integrated into the economic turnover of the national economy of the Russian Federation. Thus, according to the draft roadmap for the development of blockchain technologies in the Russian Federation, developed by the State Corporation Rostec, "the volume of the distributed registry technologies market in Russia in 2018 amounted to 2 billion rubles, by 2024 it will increase for 180 billion — 454 billion rubles.[2] In the world, the market for distributed ledger technologies in 2018 amounted to US$ 2 billion, by 2024 it will increase to US$ 23–54 billion" (*Fig. 1*).

The solution to the question of the importance of blockchain technologies and their impact on the parameters and stability of the national economy lies, first of all, in identifying and determining the key effects generated by their use in the operational activities of the business entities.

It is clear that blockchain technologies are of high priority in the implementation of financial and operational transactions in terms of:

- reduction of intermediary commissions for their implementation;
- socialization of channels of access to financial markets (expanding access of economic agents to stock exchanges);
- expanding the possibilities for increasing the liquidity of the capital of credit institutions by increasing the efficiency of operational processes (which ensures the reduction of operational and credit risks);
- expanding the possibilities for increasing the financial stability of the business community through an additional increase in working capital, as a result of the localization of commission income on financial transactions in the financial markets, etc.

In a concentrated form, the opportunities formed as a result of the integration of distributed data storage technologies into the economic environment of the financial and real sectors of the national economy are presented in *Table 1*.

Disregarding the risks and threats associated with the integration of blockchain technologies into the financial and real sectors of the economy, described in detail in the works of G. O. Krylov, V. M. Seleznev [21, 22], the authors attempt to build a model that estimates the impact of the blockchain technologies on the possible dynamics of gross domestic product. At the same time, it should be emphasized that the proposed approach is truncated since it does not take into account the risks caused by "possible laundering of criminal proceeds due to the planetary structure of distributed ledgers; anonymity and cross-border nature of blockchain transactions, potential attacks like 51%, etc. These risks are the main obstacle to the diffusion of blockchain technologies in the credit and financial sector" [21, 22]. Moreover, according to the Financial Action Task Force (FATF) recommendations, which are generally recognized international standards, these types of risks are very significant, therefore Recommendation 15 for virtual asset service providers draws attention to the need to assess the risks that may arise "in connection with:

- development of new products and new business practices, including new delivery mechanisms;

[2] Russia will spend 36 billion rubles on the development of the blockchain. What will it give? URL: https://www.cnews.ru/articles/2020–04–19_v_rossii_potratyat_36_mlrd_rub_na_razvitie (accessed on 29.12.2020).

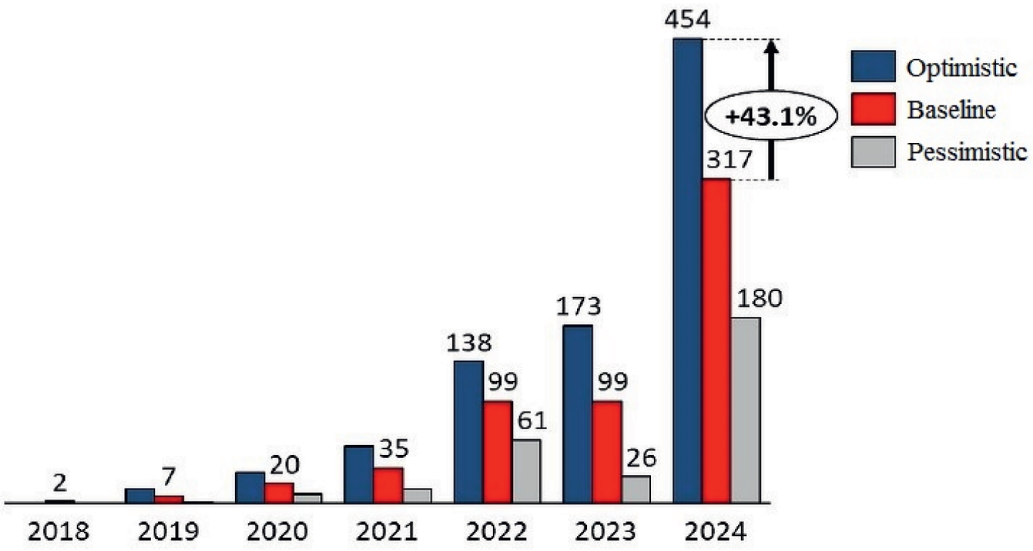


Fig. 1. **Forecast of the market size of distributed ledger technologies in Russia until 2024, RUB billion**

Source: CNews. Russia will spend 36 billion rubles on the development of the blockchain. What will it give? URL: https://www.cnews.ru/articles/2020–04–19_v_rossii_potratyat_36_mlrd_rub_na_razvitie (accessed on 29.12.2020).

• the use of new or developed technologies for both new and existing products".[3]

In a concentrated form, the research algorithm is presented in *Figure 2*, which, on the one hand, demonstrates the positive externalities from the diffusion of distributed data storage technologies into the economic environment, and on the other hand, the negative externalities caused by the generated risks. Meanwhile, in this study, in accordance with the subject of the study and the set goal, only the positive effects arising from a decrease in the cost of transactions, a decrease in the operational and credit risks of credit institutions, and the socialization of channels of access to financial markets are analyzed. It is important to note that the analyzed effects are not fully presented considering the opportunities highlighted in *Table 1* that is generated in the economy in the process of diffusion of blockchain technologies into the economic environment. At the same time, the use of the proposed algorithm makes it possible to cover the most large-scale transformations of the economic environment caused by the "blockchain" of the economic environment: reducing the cost of transaction costs as a result of the transition of the payment system to digital money; reduction of operational and credit risks of credit institutions; expanding the trading volume of the stock market due to the socialization of channels of access to financial markets (expanding the access of economic agents to exchange platforms). At the same time, it should be emphasized again that the generated effects undoubtedly have a wider range and require separate studies for the possible calibration of the results obtained.

In accordance with the presented algorithm and approach to the study, the authors built a model and implemented the corresponding estimates, which make it possible to determine the degree of impact on GDP of the integration of blockchain technologies into the economic environment. Solving this problem allows us to understand the sensitivity of the country's economic dynamics to adjustments occurring in certain functional segments of the national economy.

[3] FATF (2019), Guidance for a Risk-Based Approach to Virtual Assets and Virtual Asset Service Providers, FATF, Paris. URL: www.fatf-gafi.org/publications/fatfrecommendations/documents/Guidance-RBA-virtual-assets.html (accessed on 02.03.2021).

Table 1

Positive externalities caused by the integration of blockchain technologies into the business environment

1. Blockchain technologies, which form the basis for crypto transactions, open up new opportunities for the development of investment markets, in fact, socializing the processes of investment activity of economic agents
2. Blockchain technologies are capable of providing accelerated dynamics of economic development by optimizing costs and reducing transaction costs of business entities.
3. Blockchain technologies make it possible to increase the level of automation of the operational processes of financial organizations, which provides them with increased competitiveness and increased financial results (the use of blockchain technologies in the financial environment will lead to a machine-to-machine transaction model, which involves the elimination of many intermediary organizations serving transactions)
4. The maximum possible level of security for the functioning of blockchain systems in conditions of unauthorized access (hacking) to the data of its participants. Systems based on blockchain technologies are highly secure (due to mechanisms of decentralized data storage based on consensus mechanisms) and in the near future, according to experts, breaking cryptographic keys will be practically impossible
5. Blockchain technologies can eliminate many of the known and current problems in the financial services sector — fraud, operational risks, delays in the system of financial transactions and payments
6. Blockchain technologies provide regulators with the ability to control ongoing financial transactions if they are integrated into open blockchain networks
7. The use of blockchain technology helps to reduce the costs of financial transactions associated with compliance with the regulatory requirements of national and international jurisdictions
8. The use of distributed data storage technologies in the payment system will reduce the cost of transactions, which will have a corresponding positive impact on the release of total working capital
9. The use of cryptocurrency in the process of exchanging assets provides: – low level of transaction costs as a result of the liquidation of intermediary institutions to support financial transactions; – public authentication of participants in blockchain transactions minimizes the risks of payment fraud, which makes this form of payment less risky compared to the traditional one based on the use of credit cards; – the digital money protocol ensures that only authorized parties can spend funds from a specific account with the desired level of confidentiality and guaranteed pseudonymity
10. Reducing human error in the financial sector. The most important component that substantiates the positive prospects for the dynamic development of blockchain technologies is the possibility of creating smart contracts on their basis that neutralize the risks of ambiguous situations, which will lead to the elimination of conflicting relations between the parties to the transaction
11. Strengthening control over the financial market by regulators as part of the application of the concept of using open blockchain systems
12. The blockchain system, being a decentralized database for storing and processing data, provides a continuous process of access to them, unlike traditional repositories, where network downtime or overloads are possible, which can lead to limited user access to information databases
13. Blockchain is able to neutralize country differentiation of legal regulation of business processes, including support for financial transactions. However, in this case, it becomes necessary to switch to electronic money as payment
14. Participants in blockchain systems contribute to the creation of a low level of uncertainty and improve the performance of generating financial transactions
15. The use of blockchain technologies makes it possible to significantly expand the range of services in the field of financial transactions. At the same time, such an expansion will be achieved, first of all, not by increasing the level of automation of processes, but by the emergence of new formats for building business models. Blockchain technologies allow creating new business models as a result of a radical change in the architecture of trust between participants, which, in turn, can transform the organizational and managerial parameters of the functioning of enterprises (business entities)
16. The integration of blockchain technologies into the financial ecosystem will reduce the cost of transactions as a result of an aggravated competitive environment in the market for money transfer services
17. Blockchain technologies are a very effective tool for providing new forms of business development based on attracting investments and forming new principles of work in the capital markets in the form of ICO
18. A large-scale opportunity for globalization and removal of geographic barriers to transactions is being formed, based on the programmable identity of the reputation activity of blockchain network users and the reliability of transactions between its participants, regardless of their location and publicly available identification data. domain

Source: developed by the authors.

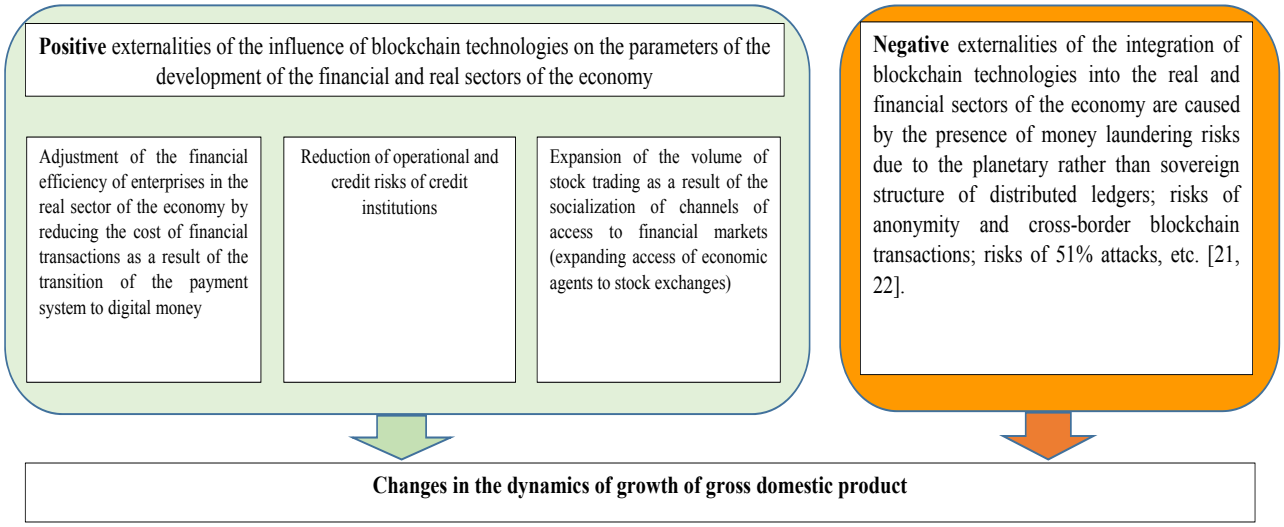


Fig. 2. **Algorithm for studying the impact of blockchain technologies on GDP dynamics through the transformation of key parameters of the functioning of the financial and real sectors of the economy**

Source: complied by the authors.

The research uses quarterly data from official sources. The calculations were carried out using the EViews statistical package. *Table 2* shows the variables of the developed model, their symbols, and data sources. The quarterly dynamics of the indicators under consideration for the period from 2008 to 2019 are shown in *Figure 3*. The sample size allows calculations since it exceeds the established critical values of the Dickey-Fuller statistics [23].

An important methodological aspect that predetermined the order of constructing the model is that in the case of studying financial time series, the use of traditional methods of correlation and regression analysis can lead to problems expressed in bias, inconsistency, and inefficiency of the estimates obtained. This means that such a model may be unsuitable for further analysis and forecasting.

The study of dependencies between financial (stochastic) time series can be carried out using the method of cointegration analysis [23]. The initial stage of the analysis is to determine the rank of cointegration. At the same time, in order to identify the rank of cointegration between the studied series, it is necessary to make sure that the analyzed series belong to the category of integrated series of the 1st order.

Checking the stationarity of the first difference was carried out using the Dickey-Fuller test, which includes checking the following condition (as applied to the analyzed time series): $y_t \sim I(1)$, if the series of first differences $\Delta y = y_t - y_{t-1}$ is stationary $\Delta y_t \sim I(0)$.

$$\Delta yt = \beta_0 + \beta_1 t + \varphi_{yt-1} + \chi_i \sum_{t=1}^{m} \Delta y_{t-1} + \mu_t. \qquad (1)$$

The results of testing the considered time series for stationarity are presented in *Table 3*.

Thus, the estimates obtained in relation to the analyzed time series demonstrate that the studied series are stationary at a 5% significance level.

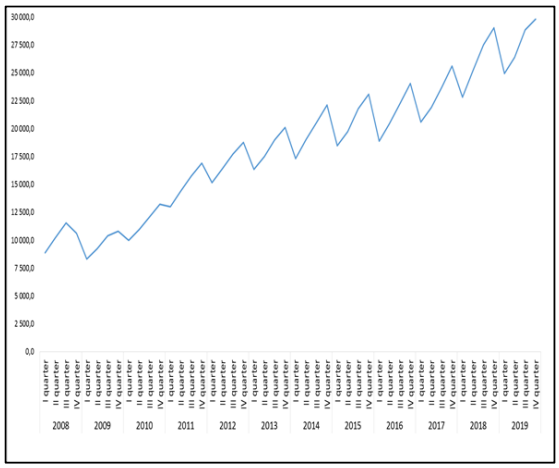
In addition to checking for the presence of a unit root, it is necessary to check the causal relationships between the indicators using the Granger method. Granger's basic idea is that the causes of X_t precede the effects of Y_t and affect future y values. Although the effect values do not affect future *x* values [24].

Table 2

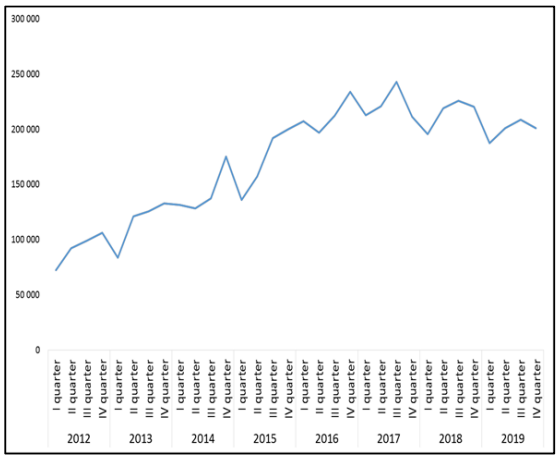
Description of the variables of the developed model

Variable	Designation	Data source
Dependent		
Gross Domestic Product, RUB billion	GDP	Rosstat
Independent		
Stock market trading volume, RUB billion	V_{trade}	Moscow exchange
Funds transfer made through the payment system of the Bank of Russia using transfer services/settlement systems, RUB billion	$V_{transactions}$	Central Bank of Russia
Total profit/loss received by operating credit institutions, RUB million	$V_{fin\ res}$	Central Bank of Russia

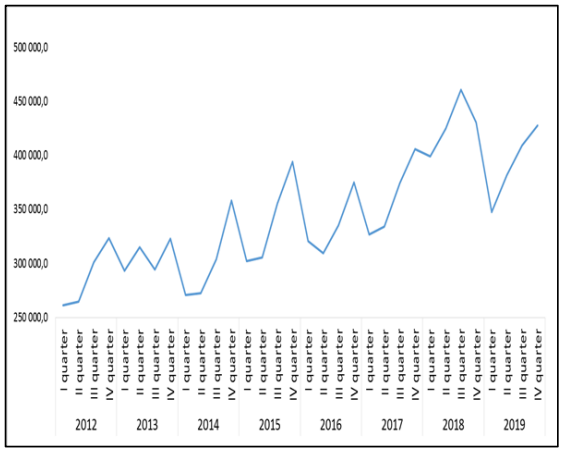
Source: compiled by the authors.



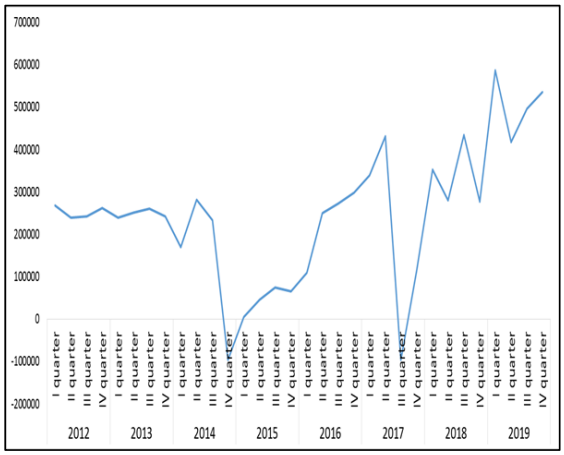
Dynamics of changes in the volume of GDP from 2008 to 2019, quarterly data, RUB billion



Dynamics of changes in the trading volume in the stock market from 2012 to 2019, quarterly data, RUB billion



Dynamics of changes in the number of remittances from 2012 to 2019, quarterly data, RUB billion



Dynamics of changes in profit (loss) of credit institutions from 2012 to 2019, quarterly data, RUB billion

Fig. 3. **Quarterly dynamics of the indicators used in the model for the period 2008–2019**

Source: compiled by the authors.

Table 3

Stationarity test results

Variable	t-stat.	Value	Output
GDP	–3.10	0.03	stationary
V_{trade}	–6.39	0.000	stationary
$V_{transactions}$	–7.98	0.000	stationary
$V_{fin\ res}$	–3.27	0.002	stationary

Source: compiled by the authors.

Table 4

Analysis of short-term relationship between time series (Granger causality)

Pairwise Granger Causality Tests			
Date: 12/22/20 Time: 15:33			
Sample: 1 32			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
PROFIT does not Granger Cause GDP	30	1.61992	0.2180
GDP does not Granger Cause PROFIT		2.28819	0.1223
TRADE does not Granger Cause GDP	30	0.68524	0.5132
GDP does not Granger Cause TRADE		0.95557	0.3982
TRANSACTION does not Granger Cause GDP	30	1.25353	0.3028
GDP does not Granger Cause TRANSACTION		2.64359	0.0909
TRADE does not Granger Cause PROFIT	30	1.65056	0.2122
PROFIT does not Granger Cause TRADE		2.55923	0.0975
TRANSACTION does not Granger Cause PROFIT	30	4.15116	0.0278
PROFIT does not Granger Cause TRANSACTION		1.20829	0.3156
TRANSACTION does not Granger Cause TRADE	30	1.11006	0.3452
TRADE does not Granger Cause TRANSACTION		1.08075	0.3547

Source: compiled by the authors.

$$y_t = \alpha_1 + \sum_{i=1}^{n} \beta_i x_{t-1} + \sum_{i=1}^{n} \alpha_i y_{t-1} + \mu_{1t}, \quad (2)$$

$$x_t = \alpha_2 + \sum_{i=1}^{n} \chi_i x_{t-1} + \sum_{i=1}^{n} \alpha_i y_{t-1} + \mu_{2t}. \quad (3)$$

The results of the Granger causality test are shown in *Table 4*.

According to the results obtained, the hypothesis of the absence of a causal relationship was refuted for all the studied pairs of time series at the 5% significance

Table 5

Coefficients of the cointegration equation

Variable	Parameters	t-stat.	P-value
Profits (losses) of credit institutions	6.357514	3.026973	0.0054
Transactions	0.050255	5.140039	0.0000
Stock market trading volume	0.014291	3.616089	0.0477
C	–48.67934	–0.021281	0.9832
R-square	0.868906		
Normalized d R-square	0.854340		

Estimation Equation:

==========

GDP = C(1)*PROFIT + C(2)*TRANSACTION + C(3)*TRADE + C(4)

Substituted Coefficients:

==========

GDP = 6.35751406019*PROFIT + 0.0502550677569*TRANSACTION + 0.0142908071432*TRADE – 48.6793413181

Source: compiled by the authors.

level, except for the pair "the volume of remittances made through the Bank of Russia payment system" and "profit (losses) of credit institutions" by Granger.

If the set of time series is an integrated process of the first order, then the application of the regression model can lead to biased, inconsistent, and ineffective estimates [25]. Such series are called cointegrated and use the cointegration equation.

To test joint integration, the scoring method used in this study includes the Johansen and Juselius co-integration test [26]:

$$Y_t = A_1 Y_{t-1} \ldots + A_n Y_{t-n} + BX_t + \varepsilon_t \qquad (4)$$

Cointegration equation:

$$\Delta Y_t = \rho Y_{t-1} + \sum_{i=1}^{m-1} T_i \Delta Y_{t-i} \varphi X_t + \varepsilon_t, \qquad (5)$$

where

$$\rho = \sum_{i=1}^{n} A_i - I \text{ and } T_i = -\sum_{j=i+1}^{n} A_j . \qquad (6)$$

Based on the implemented iterations, the following equation of the required dependence was obtained:

$$GDP = 48.67 + 0.01 * V_{trade} + \\ + 0.05 * V_{transactions} + 6.35 * V_{fin\ res} \qquad (7)$$

Figure 4. shows a comparison of actual GDP values with those predicted based on the resulting model.

The developed equation of cointegration indicates the presence of a positive impact on GDP of the considered exogenous factors, which makes it possible to quantify the degree and possible potential of their influence in terms of the impact on them of the "blockchain" of economic processes.

Based on the results obtained as the final iteration of the study, scenario analysis of the effect of adjusting the values of the considered set of factors due to the diffusion of distributed data storage technologies on the dynamics of economic growth in the Russian Federation was carried out.

1. Scenario analysis of the dynamics of the total volume of profit/loss received by operating credit institutions.

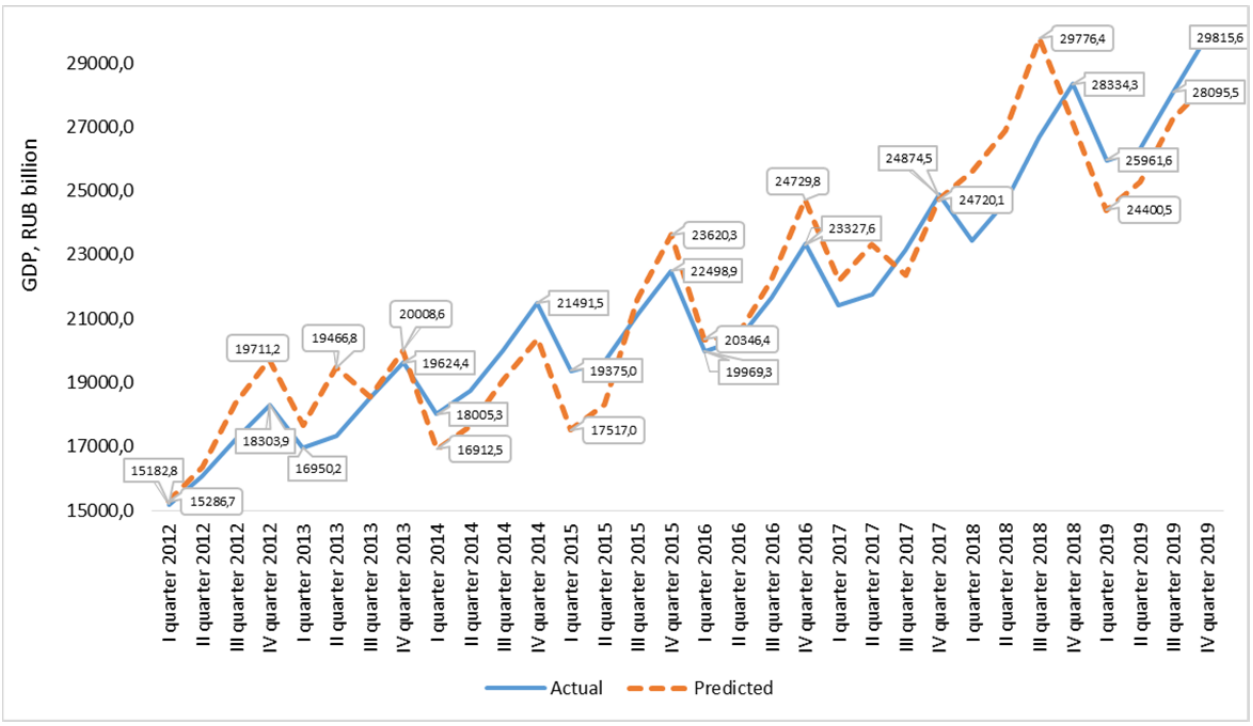


Fig. 4. **Comparison of the actual and predicted time series**

Source: compiled by the authors.

Assessment of macroeconomic generations through the integration of blockchain technologies into the banking sector is based on probabilistic scenario analysis of the adjustment of credit and operational risks of credit institutions. This approach is based on the basic functional principles of distributed storage technology, including:

- algorithmization and automation of accounting and data processing processes;
- reduction in the cost of intermediary services;
- data confidentiality;
- verification of assets;
- transition to new forms and types of business models;
- elimination/localization of opportunistic management models;
- control;
- data security, etc.

In more detail, the implementation of this function of blockchain technologies from the point of view of generated effects for financial market organizations is presented in [27–31].

OPERATIONAL RISKS

The level of operational risks of credit institutions is determined on the basis of the Basel Accords[4] [32] and amounts to at least 15% of the average value of the bank's gross income. The Central Bank of the Russian Federation set the value of this indicator at the level of 12.5% (as of 01.01.2020).

Based on the hypothesis that the use of blockchain technologies in the activities of financial organizations will lead to positive effects due to the optimization and increase in the efficiency of operational processes, it seems promising to revise the system for forming reserve standards in relation to operational risk.

A decrease in reserve rates (as part of the strategy for using blockchain technologies in operating activities) for operational risks will accordingly determine the growth of financial efficiency of credit institutions,

[4] Basel Accords. URL: https://ru.wikipedia.org/wiki/%D0%91%D0%B0%D0%B7%D0%B5%D0%BB%D1%8C_II (accessed on 22.04.2020).

Table 6

Estimating the significance of the regression equation coefficients

	t-stat.	P-value
Y-intersection	0.039	0.969
Loans issued, RUB billion	3.105	0.017
Operational risk (OR) with a coefficient of 12.5%, RUB billion	–2.852	0.041
$R^2 = 0.86$		

Source: compiled by the authors.

which is confirmed not only by the logic of this process but also by the simplest ones. econometric calculations (*Formula 8*, *Table 6*).

$$Y = 12.24 + 0.19 X_1 - 0.18 X_2, \qquad (8)$$

where Y is the financial results of the activities of credit institutions, billion rubles; X_1 is the volume of loans issued, billion rubles; X_2 is the value of operational risk (OR) with a coefficient of 12.5%, billion rubles.

Based on the model obtained (*Formula 8*), scenario analysis of the generation of possible effects in the form of an increase in the financial performance of credit institutions as a result of a decrease in reserve rates under the pressure of a decrease in operational risks was carried out. It is important to note that the scenario calculations below are largely consistent with analytical assessments on this issue published by the consulting company Accenture Consulting (in their opinion, the diffusion of blockchain technologies into the ecological environment of the banking sector can reduce operational risks from 10 to 50%).[5]

Based on these estimates, as well as guided by considerations of finding guaranteed effects, in this study, a baseline scenario is an option that provides for a reduction in the reserve ratio for operational risks by 20% from 12.5% to 10% of the average financial results over the past three years. As of 2019, these are 8137.4[6] and 6509.9 billion rubles, respectively (determined by calculation). The choice of this scenario is undoubtedly probabilistic, but it fits into the upper bound of the first quartile of the range of possible changes discussed above.

At the same time, it should be noted that the proposed scenario is very conservative, taking into account the effects listed above that arise as part of the diffusion of blockchain technologies into operational processes. Based on this analysis strategy, as well as on the basis of *Formula 8, Table 7* presents the final estimates characterizing the financial results of the activities of credit institutions in the framework of the scenario under consideration.

CREDIT RISKS

The mechanism of trust and consistency of actions built into the blockchain technology, which limits the opportunistic principle of interaction between

[5] Blockchain in banking: analyzing the value of technology for investment banks. URL: https://habr.com/ru/company/wirex/blog/400565/, (accessed on 22.04.2020).

[6] Review of the banking sector of the Russian Federation (Internet version). Analytical indicators. No. 200, June 2019. URL: https://cbr.ru/Collection/Collection/File/19777/obs_200.pdf (accessed on 22.04.2020).

Table 7

Scenario analysis of adjustments to the financial results of the banking sector of the Russian Federation in connection with a decrease in the provision rate of operational risks to 10% of the gross income of a credit institution

Indicator	Value
The amount of capital reserved for operational risks, considering the diffusion of blockchain technologies into the operating system of credit institutions, RUB billion	6509.9
Financial results of credit institutions, RUB billion (determined by Formula 8)	2095.4
A scenario of an increase in financial results in relation to the actual value (as of 01.01.2020), RUB billion	58.6*

Note: * – for reference, the actual financial results of the activities of credit institutions as of the date under review amounted to 2,036.8 billion rubles.

Source: compiled by the authors.

Table 8

Estimating the significance of the regression equation coefficients

	t-stat.	P-value
Y-intersection	0.928	0.377
Loans issued, RUB billion.	7.108	0.000001
RVP for loans, total (RUB million)	–4.765	0.001
$R^2 = 0.93$		

Source: compiled by the authors.

counterparties, allows us to put forward a hypothesis according to which the use of the studied technologies by credit institutions will reduce or even exclude (in the optimistic scenario) doubtful, problematic and bad debt [33–35]. Open blockchain systems are able not only to form the reputation rating of borrowers/counterparties of credit institutions but also to create an information basis for optimal management of decisions in the field of credit activities. This, in turn, predetermines the minimization of negative externalities between participants in integrated blockchain systems. In addition, it is important to note that "the use of distributed data storage technologies will make it possible to form KYC procedures more efficiently, to operationalize the interaction processes between participants in a credit transaction (for example, based on the use of smart contracts), to create conditions for automating managerial decision-making, etc." [36].

According to the data, the aggregate amount of credit risks in the banking sector of the national economy reaches about 5.7 trillion rubles per year, judging by the data on the reserves actually formed in 2019 for possible loan losses. It is important to emphasize that in recent years the dynamics of credit risks have been characterized

Table 9

Increase in the financial results of credit institutions in the Russian Federation by minimizing credit risks through the use of blockchain technologies

Indicator	Value
Forecasted value of capital reserves for credit risks, RUB billion (according to the scenario)	5318.1
Potential for reduction of required reserves for possible credit risk losses*	394.5
Estimated value of the indicator "Financial results of the activities of credit institutions", RUB billion **	1374.7
Absolute deviation of financial results from the baseline — actually formed value as of 01.01.2019, RUB billion***	+29.9

Note: * — the calculation was carried out as a deviation of the actual amount of reserves (RUB 5712.6 billion as of 01.01.2019) from the scenario value; ** — calculated on the basis of formula 9, where X1 is the actual value of the volume of issued loans, X2 is the projected value of the capital reserved for credit risks, RUB billion (according to the scenario: 5318.1); *** — the calculation was carried out as the difference between the actual level of financial results of credit institutions (2018: RUB 1,344.8 billion) and the predicted value using formula 9 (RUB 1,374.7 billion).

Source: compiled by the authors.

Table 10

Integrated assessment of the impact of operational and credit risks on the change in the financial results of credit institutions in the Russian Federation in the process of diffusion of blockchain-technologies into the operating environment, billion rubles

Operational risk value (actual/baseline scenario), RUB billion	Credit risk value (actual/baseline scenario), RUB billion	An increase in the financial results of the banking sector as a result of a decrease in: operational risk/credit risk/total, RUB billion
8137.4 / 6509.9	5 712.6 / 5318.1	+58.6 / +29.9 / +88.5

Source: compiled by the authors.

by steady growth, which in no way can contribute to the growth of the financial stability of credit institutions.

To identify the dependencies that reveal the influence of credit risks on the key parameters of the financial results of the banking sector, a corresponding regression model was built.

$$Y = -437.28 + 0.23X1 - 0.3X2, \quad (9)$$

where Y — financial results of credit institutions, billion rubles; $X1$ — the volume of loans issued, billion rubles; $X2$ — formed reserve for possible loan losses.

Further, based on our previously presented and published studies that reveal

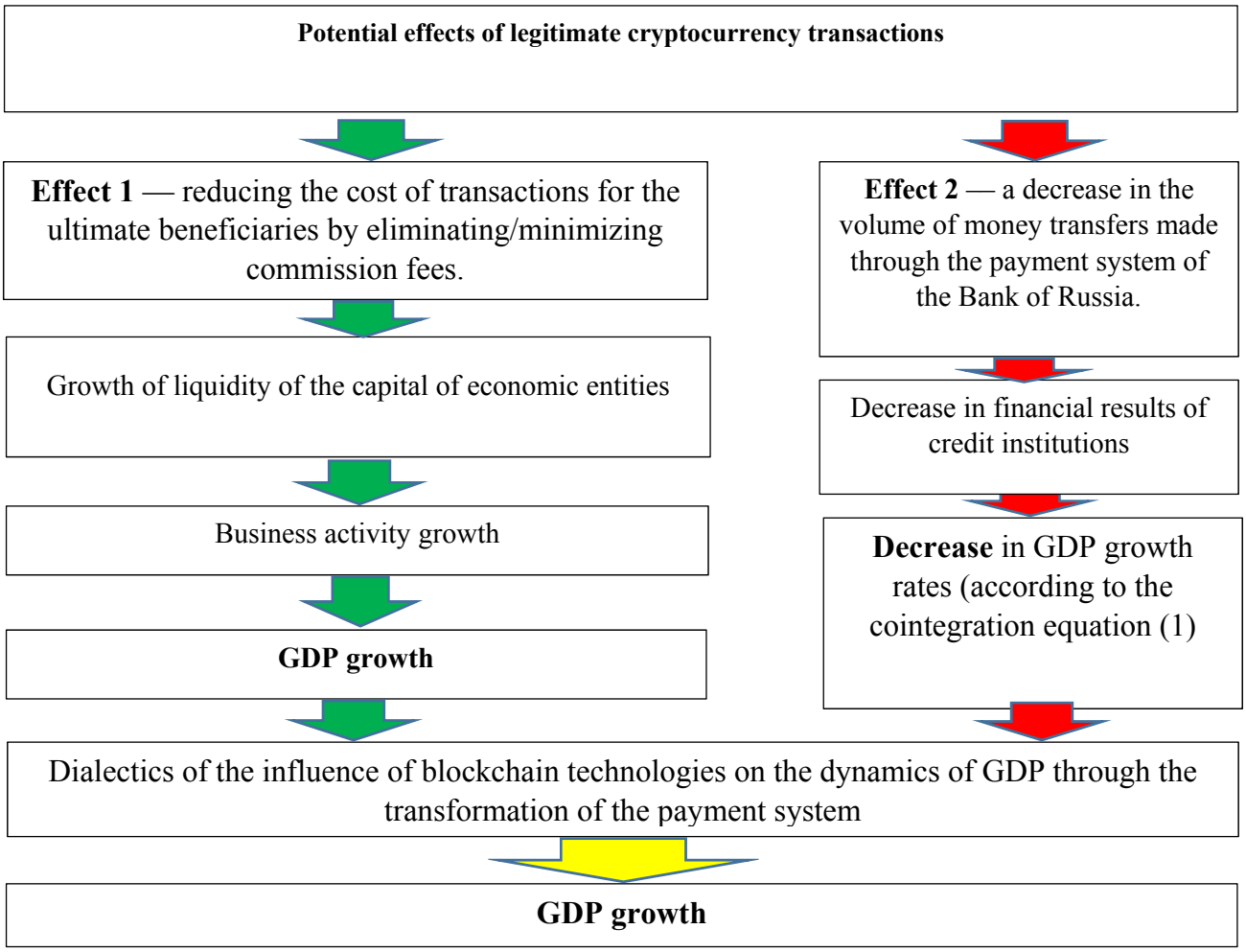


Fig. 5. **Graphical interpretation of the impact of blockchain technologies on the process of transformation of the payment system**

Source: complied by the authors.

the actual and projected cost of capital reserved by the Russian banking sector for credit risks [37, 38], *Table 9* presents data that reveal a possible increase in financial results of credit institutions by minimizing them under the pressure of blockchain processes. As a basis, a scenario was chosen that provides for a 25% reduction in doubtful and problem loans. This scenario is related to the baseline one and provides the minimum possible effects, thereby practically guaranteeing the possible results generated in the banking sector in the direction of "Lending" using blockchain technologies.

Table 10 presents quantitative basic estimates of a possible cumulative increase in the financial results of credit institutions due to their use of blockchain technologies in their activities.

2. Scenario analysis of the impact of the development of a cryptocurrency transaction system.

It is important to note that today there is no consensus on the extent to which the introduction of crypto transactions into the economic activities of business entities can affect the stability and dynamics of economic growth.

Some experts [39–41] believe that the use of digital money generates risks of a decrease in control over the payment system by the central regulator, and also contributes to a decrease in the profits of

Table 11

Scenario analysis of changes in commission income of credit institutions in the Russian Federation and an increase in the liquidity of economic entities as a result of the transition of the payment system of the Russian Federation to the crypto environment

Total money transfers, as of 01.01.2019		Estimated commission rate, % *	Fee and commission income, RUB billion	Sensitivity analysis of the reduction in fee and commission income of credit institutions as a result of the reduction of the indicator "Transfer of funds" by:											
				Scenario 1: 10%			Scenario 2: 20%			Scenario 3: 30%			Scenario 4: 50%		
				Total remittances, billion rub	Fee and commission income, RUB bln	Growth of liquidity of the capital of economic entities, RUB billion **	Total remittances, RUB bln	Fee and commission income, RUB bln	Growth of liquidity of the capital of economic entities, RUB billion **анги	Total remittances, RUB bln	Fee and commission income, RUB bln	Growth of liquidity of the capital of economic entities, RUB billion **	Total remittances, RUB bln	Fee and commission income, RUB bln	Growth of liquidity of the capital of economic entities, RUB billion **
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
number, million units	volume, RUB billion	0.09	1396.8	1409815.3	1268.8	128.0	1253169.2	1127.9	268.9	1096523.0	986.9	409.9	783230.7	704.9	691.9
1,715.7	1,566461.4														

Note: * – the value of the rate is determined by calculation based on the ratio of commission income of credit institutions and the volume of money transfers for the year; ** – the increase in the liquidity of the capital of economic entities corresponds to a decrease in commission income of credit institutions (for scenario 1, column 4 – column 6).

Source: compiled according to the Central Bank of the Russian Federation. URL: https://cbr.ru (accessed on 25.04.2020).

Table 12

Significance parameters of the regression equation

	Coefficients	t-stat.	P-value
Y-intersection	–6243.90	–0.16	0.87
Average per capita money income of the population	6.16	4.97	3.61912E-05
$R^2 = 0.88$			

Source: compiled by the authors.

financial institutions and, as a consequence, leads to a decrease in GDP dynamics. Other experts believe [42–46] that the introduction of crypto transactions into the circulation will contribute to the growth of the gross national product as a result of opening up opportunities for optimization and building new business models that expand the range of business operations, the development of a system of smart contracts, overcoming intermediary services, transition to a peer-to-peer payment and asset exchange system, minimization of transaction costs by minimizing commission fees, etc.

Our position on the issue under consideration is that both points of view are fair. In this regard, when solving the problem of a formalized assessment of the impact of cryptocurrency transactions on economic growth, it is important to adhere to a consolidated position and consider the existing multidirectional generated effects. *Figure 5* shows a graphical interpretation of the proposed approach.

Effect 1. The assessment is based on the construction of four scenarios for the integration of digital money into the economic environment (*Table 11*) and generally corresponds to similar assessments presented in the works of foreign experts on this issue [16, 47–50].

As a baseline scenario, within the framework of the analysis of the sensitivity of GDP to an increase in the liquidity of the capital of economic agents as a result of the transition of the payment system to crypto transactions, the most conservative scenario No. 1 was adopted, which provides, according to the estimates, an increase in the liquidity of economic entities up to 128 billion rubles (*Table 11*).

Effect 2. From the point of view of a formalized assessment of the economic effect, it should be stated that the transition of transactions to the crypto environment will not affect the volume of remittances carried out through the payment system of the Bank of Russia. In addition, when it comes to launching the so-called digital ruble, built on the principles and technologies of blockchain, but at the same time retaining control by the regulator. In other words, the effect of "communicating vessels" arises — the transfer of payments from the fiat environment will lead to a proportional growth of the payment system based on the use of digital money.

The only negative effect here may be the loss of part of the income by credit institutions in the form of transfer fees. However, given that the share of this profit item is less than 1% of the total profit of banking institutions, the negative

Table 13

Possible effects caused by the correction of the studied factors of the cointegration model as a result of the diffusion of blockchain-technologies

No.	The exogenous factor of the cointegration model	Expected, in accordance with the scenario analysis, increase in the value of the factor, RUB billion
1	$V_{fin\ res}$ – total profit/loss received by operating credit institutions	+ 88.5 per year; + 22.125 on average per quarter
2	V_{trade} – stock market trading volume	+ 9246.63 on average per quarter
3	Increase in working capital, growth of business activity (effect of 1 factor $V_{transactions}$)	+128.0 per year (baseline scenario 1, Table 9)

Source: compiled by the authors.

Table 14

Analysis of the sensitivity of gross domestic product to changes in exogenous factors of the model

No.	Factor	Average quarterly GDP growth, RUB billion	GDP growth per year, RUB billion
1	$V_{fin\ res}$ – the total amount of profit/loss received by operating credit institutions	22.125 * 6.35 = +139.7	558.8
2	V_{trade} – the volume of trades in the stock market	9246 * 0.01 = +92	368.0
3	Increase in working capital, revitalization of business activity	25.3*	101.2
	TOTAL:	332.7	1028.0

Note: * – the calculation was carried out according to the Formula 11. Explanation of calculations: 20513 + 0.79 * ((34351/4) + 128/4) = 27322.6 – considering the growth of working capital by 128.0 billion rubles annually. 20513 + 0.79 * (34351/4) = 27297.3 – excluding the increase in liquidity by 128.0 billion rubles. Quarterly growth = 27398–27297 = 25.3 billion rubles.

Source: compiled by the authors.

externalities created will be insensitive both for the financial sector and for the national economic system as a whole.

3. Scenario analysis of the adjustment of the trading volume in the stock market as a result of the diffusion of blockchain technologies.

According to the MICEX,[7] in 2019 the trading volume in the stock, money, foreign exchange, and commodity markets amounted to 778.155 billion rubles. (URL: https://www.moex.com/ru/ir/interactive-analysis.aspx). The average brokerage commission for leading brokers in 2019 corresponds to 0.3% of the transaction amount. Thus, we can conclude that the commission fee corresponded to the value of 2,334.465 billion rubles, which corresponds to approximately 1,325 rubles per 1 resident of the Russian Federation. A large number of brokers, the lack of transparency in the calculation of commissions, and the difficulty of finding information are obstacles for new investors. In addition, brokerage fees, custody fees can account for more than half of an investor's potential income. In 2019, several of the largest US brokers at once — Interactive Brokers, Charles Schwab, TD Ameritrade и E*Trade — announced that they were waiving commissions for online stock trading. Companies expect zero commissions to attract more customers.

To test the hypothesis that there is a connection between trading volumes on the stock exchange and an increase in household income due to the abolition of commission fees, a regression model was built. "Trading volume on the MICEX" was selected as a dependent indicator, and "Average per capita money income of the population" was selected as an independent indicator. The following equation is obtained with a coefficient of determination equal to $R^2 = 0.88$ (*Table 12)*:

$$Y = -6243.9 + 6.16_x. \quad (10)$$

The equation allows us to estimate the effect of canceling brokerage commissions. Thus, the increase in household income by 1,325 rubles contributes to a quarterly increase in trading volumes on the MICEX by 9246 billion rubles.

RESULTS AND DISCUSSION

According to the presented research algorithm, 3 key factors will affect the gross domestic product of the national economy as part of the integration of blockchain technologies into the economic environment:

1. $V_{fin\ res}$
2. V_{trade}
3. Increasing the liquidity of economic agents due to the growth of working capital. This effect is determined on the basis of the dependences obtained below between the level of change in current assets and the dynamics of GDP (*Formula 11*).

$$Y = 20513 + 0.79x. \quad (11)$$

It is important to pay attention to the fact that the value of such an indicator of the constructed cointegration model as $V_{transactions}$ will not change due to the generated effect of "communicating vessels". This means that the use of blockchain technologies in operational activities and the crypto transactions built on their basis will not affect the volume and cost characteristics of payments made in the economy. There will be a flow of transactions on the blockchain environment accompanied by traditional electronic/fiat regulatory mechanisms.

Table 13 presents the main resulting effects characterizing a possible increase in the studied exogenous factors due to the diffusion of blockchain technologies into the national economic system.

Based on the results obtained, which reveal the features of the possible growth

[7] MICEX — Moscow Interbank Currency Exchange.

of exogenous factors of the constructed model, *Table 14* presents an analysis of the sensitivity of GDP to their projected adjustments.

CONCLUSIONS

Based on the results obtained, we can state that within the framework of the considered effects caused by the possible integration of distributed data storage technologies into the system of economic relations, the GDP growth potential can reach about 1% per year, which, can seriously affect the intensification processes of macroeconomic dynamics. At the same time, it should be noted that the recorded potential growth is more likely to be classified as conservative since the basis for scenario calculations was taken from adjustments characterizing very moderate possible transformations of factors used in the cointegration model.

In conclusion, we would like to note that, the constructed model and the proposed solutions cannot claim to be a reference algorithm for the implementation of this kind of research. Realizing the depth of the question posed, it is important to state the presence of a wider set of factors and processes in the economy, transforming under the influence of the introduction of distributed data storage technologies into the economic environment.

Meanwhile, the built-in potential of the constructed model, including, among other things, scenario analysis of possible adjustments of exogenous factors in the context of an extremely limited information base, revealing the features and prospects of the diffusion of blockchain technologies into the real and financial sectors of the national economy, allows us to outline not only possible consequences but also to obtain formalized estimates of the probabilistic change in the gross national product. This, in turn, opens up new horizons for interpreting the prospects and reasons for legitimacy of blockchain technologies and opens up new opportunities for holding discussion platforms on this topic.

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Banderov V. V. — performed a probabilistic analysis of the prospects for economic development in the context of the diffusion of blockchain technologies.
Abdukaeva A. A. — developed a cointegration equation, wrote the research conclusions.

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China's Economic Growth in 2010–2017: Analysis from the Perspective of the Input-Output Model and Modern Monetary Theory

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ABSTRACT

The article **aims** to analyze the external and internal growth factors of the People's Republic of China in 2010–2017. The authors use **methods** such as input-output modeling, statistical methods, content analysis of scientific publications. The study explores different perspectives on China's rapid economic growth in recent decades. In particular, the authors consider neoclassical models that investigate and explain the dynamics of the Chinese economy due to the accumulation and development of factors of domestic production. Some studies are analyzed, which consider economic growth as a result of the final demand, both internal and external, on the basis of the input-output approach. The article examines the views that interpret the monetary policy as one of the most important factors in stimulating economic growth. The authors, based on the economic growth decomposition method, determine the components due to domestic demand and the components due to exports, both for the entire Chinese economy and for particular industries. Calculations based on the data of input-output balances for 2010–2017 allowed the authors to draw a **conclusion** about the significant contribution of domestic demand to the economic growth of China in the context of active monetary stimulus. Thus, the novelty of the study is ensured by the fact that Thirlwall's law does not apply to modern China –– stimulating the economy in China does not lead to a decrease in the trade surplus due to the monetary and financial sovereignty, industrial competitiveness, and the innovative economic development. The search for tools for adapting China's monetary policy to the realities of Russia and the Republic of Belarus opens up opportunities for future research on the topic.

***Keywords*:** input-output analysis; global value chains; China; factors of economic growth; monetary policy; modern monetary theory

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INTRODUCTION

In scientific studies of the factors of economic development, several groups of theories and approaches can be distinguished that explain and quantitatively describe the factors of economic growth in economies, including the Chinese economy. The neoclassical growth theory is dominant. It explains the GDP growth by an increase in the volume of production factors, as well as an increase in their productivity, which is identified with the total productivity of production factors.

Post-Keynesian approaches have become widespread, explaining economic growth not by the presence of factors, but by the demand for goods and services. In particular, we considered the possibilities of applying the input-output methodology in analyzing the growth of the Chinese economy, as well as theoretical approaches to monetary stimulation of economic growth.

Previously, the authors used this research methodology to analyze and forecast economic growth on the example of the economies of Belarus and Russia [1, 2]. In particular, it was possible to establish that the positive results of stimulation are temporary and may be accompanied by crises: in Belarus, the growth of domestic demand due to the increase in the money supply with the ruble exchange rate restrained was observed in 2010 and in 2013–2014. The negative consequences of the stimulus were not long in coming: in 2011 there was a sharp collapse of the ruble exchange rate, and in 2015 a two-year recession began. These circumstances do not allow us to call the attempts of monetary stimulation of the economy of Belarus successful.

After a decline in export earnings in 2014, the Central Bank of Russia pursued a rather tight monetary policy, but in 2020 there were some signs of softening in the form of maintaining the ruble exchange rate, which is explained by the counteraction to the economic downturn caused by the pandemic crisis.

Currently, the official website of the Asian Development Bank (ADB) has publicly available input-output tables for the period from 2010 to 2017 of some economies of Asia and the Far East, including the economy of China.[1] It also published an analytical report on their application to analyze economic growth and global value chains in key economies of the region.[2]

Our interest in analyzing the Chinese economy using the methodology previously developed and applied for Belarus and Russia is due to the following reasons. We aimed to test and verify the calculations by comparing their results with those of the ADB report; to calculate previously used indicators for the Chinese economy, which are not taken into account in the ADB methodology, in particular, the contribution of the added value of the main manufactured products to the trade balance; to test the hypothesis: monetary policy stimulates China's economic growth, or China's economic growth is "natural" and is mainly driven by factors such as exports, foreign direct investment (FDI), research and innovation activities.

Before using the methodology, we have developed, we consider the results of research on the development of the Chinese economy known from scientific publications, dividing them into three groups:

a) application of neoclassical growth theory to the Chinese economy;

b) the application of the "input-output" methodology for the analysis of the Chinese economy;

c) an overview of scientific and practical approaches to monetary stimulation of economic growth.

NEOCLASSIC MODELS OF ECONOMIC GROWTH AND THEIR APPLICATION FOR THE ECONOMY OF CHINA

The most widespread in scientific publications is the neoclassical theory of growth, or growth through the use of internal factors of production — labor, capital, entrepreneurship, science and innovation [3, 4]. Various modifications of this theory have made it possible to prove that in high-income countries over the past 50 years, human capital, knowledge, development and technology transfer have contributed more to economic growth than other "material" factors of production [5].

Studies of the factors of economic growth in China from the point of view of neoclassical growth theory are also based on the assessment of the contribution of labor, capital and total factor productivity (TFP).

Thus, E. Hong and L. Sun [6] argue that China's rapid economic growth is mainly due

[1] URL: https://data.adb.org/dataset/peoples-republic-china-input-output-economic-indicators (accessed on 23.03.2021).

[2] Economic Indicators for Eastern Asia. Input-Output Tables. December 2018. Metro Manila, Asian Development Bank, 2018. 310 p. DOI: http://dx.doi.org/10.22617/TCS 189778–2

to the accumulation of factors of production, while technological progress does not play a significant role.

Since 1978, China has received over US$ 1 trillion in foreign direct investment. The rapid growth of China's role as a new pole of global economic growth since the early 1990s was closely linked to FDI inflows on such a large scale.

The export share of Chinese subsidiaries of multinational corporations (TNCs) in total Chinese exports increased from 26% in 1992 to 50% in 2000 and reached 60% in 2006. Using a spatial dynamical model and raw data from 1980 to 2005, E. Hong and L. Sun [6] demonstrated that foreign direct investment inflows have a significant positive impact on overall factor productivity both within and between provinces in China. An increase in the ratio of foreign direct investment to total investment in fixed assets by 10% will lead to an increase in TFP and per capita income by more than 1%.

This finding is supported by other studies that similarly identify foreign direct investment as a source of TFP growth [7, 8].

The article by J. Han, Y. Shen [9] assesses the impact of China's regional financial development on the growth of total factor productivity; provincial panel data from 1990 to 2009 were used in the calculations. The study shows that high rates of development of the financial sector lead to an overall increase in factor productivity by reducing inequality between provinces in the distribution of resources. According to the analysis, the contribution of technological progress to the growth of the Chinese economy is more than 90%; it is the main channel through which the financial sector drives TFP growth. In addition, the development of the financial sector leads to poverty reduction.

A study by H. Liao, X. Liu, C. Wang [10] examines the dissemination and assimilation of knowledge and technologies by industrial enterprises in China on the basis of a sample of more than 10 thousand firms with local and foreign investments for the period 1998–2001 The results show that there is positive cross-industry productivity gains from R&D and foreign presence, while data on intra-industry productivity gains from foreign direct investment in Chinese firms are less reliable.

Zh. Yao [11] calculates the total factor productivity for the industrial sector of the Chinese economy using production functions. The results confirm that reform policies and the opening up of the Chinese economy contributed to higher productivity growth, but conclude that TFP began to decline after the 2008 financial crisis.

Despite the widespread use of neoclassical growth models in the study of the factors of economic development, they have a significant problem, since, they poorly consider the influence of internal and external demand on economic dynamics. The demand factor is key in post-Keynesian economic growth models, which are grouped together with demand-driven growth models. The input-output analysis is used as a general methodology for constructing this class of models.

APPLICATION OF THE INPUT-OUTPUT METHODOLOGY FOR ANALYSIS OF CHINA'S ECONOMY GROWTH

A study of the Chinese economy at the level of aggregated indicators such as GDP growth, inflation, interest rates, exchange rates, foreign exchange reserves may be superficial. These indicators do not reflect the specifics of the work carried out in the Chinese economy, do not reveal bottlenecks that can change the direction of its evolution. The use of input-output tables provides a comprehensive understanding of the "inner workings" of the Chinese economy, its bottlenecks, and evolutionary characteristics, as stated by Canadian professor C. Debressona, a specialist in inter-firm collaboration [12].

Most of the Chinese provinces surpass many countries in the world in terms of population and GRP, therefore China pays great attention to interregional cooperation.

To analyze the economic interaction of the provinces of China, an interregional input-output table is used, the procedure for compiling which is described in detail by Zh. Zhang, M. Shi, Zh. Zhao [13].

The interregional input-output model is used as an analytical tool to track the movement of profits between provinces in China in order to identify signs of tax evasion by firms, including VAT and income tax [14]. The intraregional structure of the tables follows the input-output table in China's national statistics and includes more detailed information on the domestic value chain.

Labor force employment in China has become another important issue that has been addressed using the input-output methodology. H. Doan and L. Trinh [15] analyze the sources of employment growth and assess the contribution of exports, labor productivity, technological innovation, and domestic final demand to the creation of new jobs in China. As a source of information, they used the annual data of the input-output tables for 1981–2010. The study found that an increase in final demand, including domestic demand and exports, is the main driver of employment growth in China. The rapid growth in final demand compensates for the decline in employment caused by the growth of labor productivity, especially in the 2000s. Since China's accession to the World Trade Organization, the contribution of exports to job creation has increased significantly, especially in manufacturing and agriculture. Labor productivity has grown in all sectors, primarily in the manufacturing industry. Technological innovation has become the main source of productivity growth in manufacturing and agriculture [15].

X. Jiang [16] analyzes the state of employment in China under the influence of changes in the structure of the trade balance at the sectoral level using input-output tables. Jiang estimates the potential additional output that would be required if China used its trade surplus as the primary vehicle to absorb its surplus labor. It was found that the ability of sectors of the Chinese economy to create new jobs is inversely proportional to the contribution of these sectors to the trade balance.

A modification of the input-output model focused on the analysis of the energy sector has become widespread in China. Z. Tan, L. Li, J. Wang, Y. Chen [17] investigated the potential impact of the system of differentiated electricity prices on macroeconomic indicators. And S. Lindner et al. [18] present a methodology for disaggregating the electricity sector in China's national input-output table using regional information and data on the operating and maintenance costs of power plants. The electricity sector is subdivided into the transmission and distribution sector, as well as eight subsectors representing different types of technologies in power plants. The structure of electricity consumption in each industry is determined considering the regional presence of the industry and the regional balance of electricity. The disaggregated input-output table contains refined indicators suitable for calculating CO_2 emissions from international exports from China.

Input-output tables by country (e.g., WIOD, Eora, TiVA) are becoming more common in research and are used in the analysis of global value chains (GVC). The criteria for the participation of the economy in the GVC (GVC Participation), the calculation of which is carried out according to the data of multi-regional tables, will be discussed below. However, the level of vertical specialization can also be measured on the basis of traditional (national) input-output tables using an indicator of import intensity.

According to the generally accepted methodology, when calculating the import intensity of a certain product, no distinction is made between its sales markets. When delivered for export or for the domestic market, it is assumed that the import intensity is the same. The use of adapted tripartite

input-output tables (for 2002 and 2007) made it possible to separately calculate the import intensity of export products of the manufacturing industry, regardless of the products remaining in the domestic market, and thereby more accurately assess the vertical specialization of China [19].

The analytical report of the Asian Development Bank (2018)[3] considers the methodology for using input-output tables to calculate the most important macroeconomic indicators and shows the results of their calculation for the period from 2010 to 2017, including for the PRC economy. The article presents the calculations of important macroeconomic indicators that would be impossible to calculate without using the methodology and the availability of detailed data from the input-output tables. Among them is the part of GDP created through the export of goods and services (GVA attributed to exports), as well as the part of GDP created from final demand in the national economy (GVA attributed to final demand).

The results of the calculation based on the data of the Chinese economy showed, for example that the contribution of exports to GDP for the period from 2010 to 2017 decreased from 22.7% to 16.4% — the growth of the Chinese economy is becoming focused mainly on domestic demand. Against the background of a general decline in the contribution of exports to GDP, indicators of China's GVC participation make it possible to detail these changes by country and industry. Among the most important importers of value added produced in China (included in exported goods and services), the USA, Japan and India dominate, while Japan's share decreased over the time period under consideration. High-tech goods prevail among China's export goods. Over 8 years, the volume of their gross exports increased by 40%, and the added value in exports — by 50%, which indicates a decrease in the import intensity of exported products due to an increase in the localization of production.

Summarizing the results of the above studies, we can conclude that the classical input-output methodology allows a sufficiently deep and detailed analysis of various aspects of economic growth, however without additional information and additional analytical procedures, it does not fully disclose all sources of growth in the Chinese economy.

THEORY AND PRACTICE OF MONETARY STIMULUS FOR ECONOMIC GROWTH

The COVID-19 pandemic and lockdown sparked a "monetary response" from the world's leading central banks to the 2020 economic crisis. Assets of the world's seven leading central banks (excluding the People's Bank of China and central banks of other emerging economies) reached US$ 25 trillion in October 2020, an increase of US$ 8 trillion in 9 months of this year, nearly 10% of global GDP. For 9 months of 2020, in dollar terms, the Fed's assets grew by US$ 3.1 trillion (which is about 15% of the annual US GDP), the assets of the ECB grew by US$ 2.9 trillion, the Bank of Japan — by US$ 1.3 trillion, the central banks of England, Switzerland, Canada, and Australia — in aggregate by more than US$ 1 trillion.[4] The growth of the balance sheets of central banks indicates the injection of liquidity (money supply) into the economy, this process is also accompanied by an increase in the debt of sectors of the economy.

Scientific interest in the monetary stimulus of economic growth increased after the financial crisis of 2008, to neutralize the effects of which quantitative easing (QE) was applied, which means the purchase by central banks of illiquid financial assets, instead of which liquid money was supplied to the markets. At the same time, interest rates were reduced to their minimum values.

[3] Economic Indicators for Eastern Asia. Input-Output Tables. December 2018. Metro Manila, Asian Development Bank, 2018. 310 p. DOI: http://dx.doi.org/10.22617/TCS 189778–2

[4] Ryabov P. Faith in immortality. IA Aurora. URL: https://aurora.network/articles/1-mirovoy-krizis/86158-vera-v-bessmertie (accessed on 23.03.2021).

By 2015, the US Federal Reserve began a slow reduction in the balance sheet, gradually raising rates, and QE came to be seen as a temporary measure that should have been completed after the economy returned to solid "natural growth", which did not require regulatory support. However, shortly after the start of the pandemic crisis, QE did not stop and became the main and almost the only measure of anti-crisis regulation.

In the scientific literature, controversy has been emerging for years, with proponents and opponents clashing over monetary stimulus for economic growth. The former call QE an innovation that is available for practical implementation only in countries with a developed financial sector; the latter refer to the incompatibility of incentives with the main postulates of economic theory and predicts the collapse of the financial system if QE continues.

According to experts from the Research Department of the National Bank of the Republic of Belarus [20], the US Federal Reserve System was able to release US$ 6 trillion to support the economy without inflationary consequences only due to the fact that there is US$ 13 trillion deficit in the global financial market. China made a significant contribution to the formation of demand for dollars, which financed its own investment projects in dollars since investors did not accept country risk in yuan.

The "principle of the long-run money neutrality" is widely known, according to which the growth of money supply over a sufficiently long period does not affect real economic activity (economic growth and employment), but only leads to an increase in the general level of prices and wages. Based on this principle, well-known economists Sergei Guriev and Aleh Tsyvinski argue that in the real economy, central banks are not able to accelerate economic growth by changing monetary policy.[5]

According to M. Demidenko et al. [20], most of the proposals of numerous experts about new, "non-inflationary" methods of monetary stimulation of the economy are myths. Such myths include, for example, the statement about the possibility of increasing the monetization of the economy (the ratio of the money supply to GDP) due to emission; the possibility of targeted emission that does not lead to inflation, or investment emission; the possibility of writing off overdue loans in commercial banks. The authors also call modern monetary theory (MMT) a myth that is now widely discussed in financial and scientific circles. MMT simply postulates the possibility of economic growth through monetary stimulus.

A detailed theoretical presentation of the main postulates of MMT is given, for example, in the work of E. Tymoigne, L. R. Wray [21]. MMT is essentially post-Keynesian monetary theory; experts associate its increased popularity with the 2008 global financial crisis. It turned out that standard working models of monetary policy, based on the principle of monetary neutrality, are also not suitable for explaining the causes of the financial crisis, nor for developing measures to counter it [22]. Rather than targeting inflation as the primary goal of the central bank, the post-Keynesian school proposes additional goals for monetary policy, including measures of the exchange rate, balance of trade, unemployment rate, and income distribution [23].

The practical application of MMT is considered[6] the introduction of quantitative easing by the leading central banks of the world for more than 10 years since 2008, which has never led to inflation.

Despite the popularity of the new theory, the central banks of most emerging economies are influenced by

[5] Sergei Guriev, Aleh Tsyvinski: The Central Bank is not able to accelerate growth. Vedomosti, 21.05.2013. URL: https://www.vedomosti.ru/opinion/articles/2013/05/21/chto_mozhet_i_chego_ne_mozhet_cb (accessed on 23.03.2021).

[6] Tunev V. MMT: what is the modern money theory why everyone is talking about it. Yango.Pro. 24.12.2019. URL: https://yango.pro/blog/mmt-chto-takoe-sovremennaya-teoriya-deneg-i-pochemu-o-ney-vse-govoryat/ (accessed on 23.03.2021).

the mainstream economics and its models, which is also explained in the MMT. In particular, proponents of MMT distinguish between sovereign and non-sovereign monetary systems. Full fiscal monetary sovereignty exists in countries where the consolidated public sector (treasury and central bank) issues fiat currencies with flexible exchange rates, such as Australia, the United States, the United Kingdom, and Japan [24].

Assuming that only economies with sovereign monetary systems are able to fully realize the benefits of MMT, i.e. to stimulate the growth of the money supply in the long term, then the introduction of MMT principles into the practice of regulating the economy with non-sovereign currency systems is threatened with failure. This logic explains the fears of the central banks of emerging economies, including Belarus and Russia, to use elements of emission stimulus of economic growth.

Taking the above countries as economies with sovereign monetary systems, as well as the economies of the eurozone, we pose the question: does the Chinese economy have financial (monetary) sovereignty? On the one hand, there are many examples of government control over the Chinese foreign exchange market, which makes it impossible to fully call the yuan exchange rate regime flexible — for example, restrictions on transactions with cryptocurrencies, which are much stricter than in the United States and Europe. On the other hand, in 2016, the International Monetary Fund added the yuan to the basket of reserve currencies used to calculate Special Drawing Rights (SDRs). The share of the yuan in the currency basket is about 11%, which theoretically increases China's chances of becoming a country with a sovereign monetary system.

With the onset of the global financial and economic crisis, China felt a decrease in external demand for its products and began to reorient its economy from exports to domestic consumption. In 2009–2010, the PRC authorities took a number of measures to stimulate domestic demand. The equivalent of US$ 500 billion was earmarked for the plan to stimulate the growth of the Chinese economy, which accounted for 20% of China's GDP and 80% of government spending. Almost half of these funds went to finance infrastructure projects, the rest went to support agriculture, the development of environmentally friendly technologies, support for low-income segments of the population, the development of science and innovation [25].

Chinese experts argue [26] that China began to apply elements of monetary stimulus to the economy much earlier than the onset of the global financial crisis, in 1993. The annual growth of the M2 money supply in peak periods exceeded 30%, but already by 2019, it fell to 10%. Over the past several decades, China's Ministry of Finance, in cooperation with the PBoC, has repeatedly injected capital into financial institutions, characterizing China's monetary stimulus situation as similar to quantitative easing in the United States. The result was an increase in the debt of economic sectors, primarily the commercial non-financial (up to 160% to GDP) and financial (up to 130% to GDP) sectors. Credit expansion, according to the authors, inevitably led to an increase in debt and the accumulation of financial risks.

Without claiming to put an end to scientific discussions about the factors of economic growth in China, we carried out a number of independent calculations that allowed us to draw some conclusions regarding the specifics of this growth and its determining factors.

METHOD OF DECOMPOSITION OF ECONOMIC GROWTH BASED ON INPUT-OUTPUT BALANCE

According to the classical formula, GDP, calculated as the sum of expenditures on the

purchase of domestically produced final goods and services, is equal to:

$$GDP = C + I + G + EX - IM, \quad (1)$$

where C — consumer spending of households and non-profit organizations; I — gross fixed capital formation (investments in current and non-current assets); G — government procurement of goods and services; EX — export; IM — import.

Let us denote by D the expenses for the purchase of final goods and services (i.e. $C + I + G$), carried out within the country. Then formula (1) can be rewritten as:

$$GDP = D + EX - IM. \quad (2)$$

Therefore, in this case, it is about domestic demand (D) and external demand (EX) as two fundamental factors in the formation of GDP in the Keynesian paradigm. However, for a complete assessment of their real contribution to GDP, one should "get rid" of the third term in formula (2) — imports.

By definition, imports consist of imports of intermediate goods and services used in domestic production and imports of final goods and services consumed domestically or exported to a third country (we omit this case for the purposes of this article):

$$IM = IM_{intermediate} + IM_{final}, \quad (3)$$

where $IM_{intermediate}$, IM_{final} — import of intermediate and final goods and services, respectively.

On the other hand, domestic demand in formula (2) in general includes both expenditures on domestic final goods and services, and on imported ones, i.e.:

$$D = D_{domestic} + D_{imp} = D_{domestic} + IM_{final}. \quad (4)$$

Thus, based on formulas (3) and (4), we can rewrite formula (2) as follows:

$$GDP = D_{domestic} + EX_{domestic} - IM_{intermediate}. \quad (5)$$

As mentioned above, imports of intermediate goods and services used in domestic production are contained in a certain proportion (shares) in domestic final goods and services for domestic and foreign consumption.

To formalize this fact, we present the imports of goods and services for intermediate consumption in terms of the coefficients of the intensity of imports of domestic final goods and services consumed domestically (im_D), and the intensity of imports of domestic final goods and services provided for export (im_{ex}):

$$IM_{intermediate} = im_D \cdot D_{domestic} + im_{ex} \cdot EX_{domestic}. \quad (6)$$

Import intensity here is understood as the total import intensity, i.e., the share of both direct and indirect costs of imported goods and services that were used for the production of domestic final goods and services, considering all existing technological chains in the national economy.

Now formula (5) can be rewritten using (6) in the form of two required terms:

$$GDP = D_{domestic} \cdot (1 - im_D) + EX_{domestic} \cdot (1 - im_{ex}) = VAD + VAX, \quad (7)$$

where VAD, VAX are parts of GDP (gross value added of national origin) formed by domestic and foreign demand, respectively.

To assess the coefficients of import intensity introduced into formula (6) both at the level of the economy as a whole and (which is especially interesting) at the level of its individual industries, we will use the input-output methodology.

In this case, we use the results obtained by the authors earlier [1, 2], briefly describing their main provisions. Note that some of them are reflected in the publications of other Belarusian researchers [27–29, 31].

The starting point will be the balance equation of Leontief, rewritten taking into account the division of flows of goods and services into domestic and imported ones:

$$\left(A_{domestic}+A_{imp}\right)\cdot X+\left(Y_{domestic}+Y_{imp}\right)=X+IM\ , \quad (8)$$

where $A_{domestic,}\ A_{imp}$ are the matrices of direct costs, built according to the data of intermediate consumption of domestic and imported goods and services, respectively (dimension $n\times nn$); $Y_{domestic}, Y_{imp}$ — column vectors containing data on the end-use (including export) of domestic and imported goods and services, respectively (dimension $n\times 1$); X is a column vector describing the total volume of output of goods and services produced within the country at basic prices (dimension $n\times 1$); IM is a column vector describing the total volume of imported goods and services (dimension $n\times 1$).

If we solve formula (8) for X, taking into account that imported goods and services are consumed within the framework of intermediate consumption (increases linearly with an increase in the volume of production within the country) and within the framework of final use (does not depend on the volume of output, but only on exogenous factors — for example, from the preferences of households), we obtain the following expression:

$$X=\left(E-A_{domestic}\right)^{-1}\cdot Y_{domestic}\ , \quad (9)$$

where E is the identity matrix of the corresponding dimension.

The matrix $\left(E-A_{domestic}\right)^{-1}$ in formula (9) is the matrix of the total costs of domestic goods and services per unit (1 ruble) of the final demand for domestic goods.

The aggregate of the total costs of imported goods and services required for the production of domestic products with a change in the final use of domestic goods and services per unit (1 ruble) can be found using the matrix of the total import intensity:

$$C=A_{imp}\cdot\left(E-A_{domestic}\right)^{-1}. \quad (10)$$

In particular, a specific element of the matrix c_{ij} shows how much the demand for imports in the *i*-th industry will increase with an increase by unit of the final use of domestic goods and services in the *j*-industry.[7]

Thus, the import component (direct and indirect) in the output of *j*-th industry will be equal to:

$$c_j=\sum_{i=1}^{n}c_{ij}\ . \quad (11)$$

And the added value of national origin for the *j*-th industry (product) per unit of the final product, respectively, can be found by the formula:

$$va_j=1-c_j. \quad (12)$$

We note that from the point of view of the basic logic of the Leontiev model, the total import intensity and the added value of national origin per unit (ruble) of the final product are unchanged values (constants) and are set by the production "recipe" in the *j*-th industry.

At the same time, the amount of gross exports of goods and services for all sectors, weighted by the share of the national value added in the value of final products, gives us the total value of national value added in exports (VAX). And the amount of the final use of domestic goods and services for all industries, weighted by the coefficients of the added value of the final product, shows the added value of national origin created through sales in the domestic market (VAD):

$$VAX=\sum_{j=1}^{n}ex_{domesticj}\cdot\left(1-c_j\right), \quad (13)$$

[7] The import intensity is indicated differently than in formulas (6) and (7), deliberately in order to distinguish between two approaches: aggregated at the level of the economy as a whole and on the basis of the balance of inputs and outputs.

$$VAD = \sum_{j=1}^{n} d_{domesticj} \cdot \left(1 - c_j\right). \quad (14)$$

By analogy with formula (7), we write down the decomposition of GDP into two parts, however, unlike the general approach, in this case, we have the opportunity to unambiguously determine the total import intensity of each of the industries using the input-output table and obtain estimates of the contribution of domestic and external demand in the formation of GDP:

$$GDP = VAD + VAX = \sum_{j=1}^{n} d_{domesticj} \cdot \left(1 - c_j\right) + \\ + \sum_{j=1}^{n} ex_{domesticj} \cdot \left(1 - c_j\right). \quad (15)$$

Of particular interest is the assessment of the trade balance in the context of each of the industries reflected in the input-output tables. This estimate can be obtained by the formula:

$$tb_i = ex_{domesticj} \cdot \left(1 - c_j\right) - d_{domesticj} \cdot c_j - IM_{final,j}. \quad (16)$$

Thus, the balance of trade for each "product" depends on the added value of national origin embodied in exports; intermediate imports contained in domestic goods and services consumed in the domestic market; import of finished products.

INTERPRETING THE MAIN RESULTS

For the calculations, the authors used data of the input-output tables for 2010–2017, presented on the ADB website,[8] in US dollars at the nominal exchange rate. During the analyzed period, the average rate of the yuan against the dollar fell from 6.77 yuan to the dollar to 6.13, and then rose again to 6.73.[9] Such insignificant and multidirectional fluctuations of the exchange rate suggest that the influence of the yuan exchange rate on the indicators of economic growth and the balance of payments of China in the analyzed period was insignificant.

For the sake of fairness, it should be noted that when assessing economic growth, indicators in constant prices are used, but they are too difficult to calculate in input-output tables, where it is necessary to maintain balance equalities between indicators. Indicators in "current" US dollars, of course, will include an inflationary component. Meanwhile, GDP, measured in dollars at the nominal exchange rate, is one of the most important development goals of China, which claims to be the first economy in the world. In terms of GDP, taking into account PPP, China has already overtaken the United States, but not all experts consider this estimate to be correct in the context of comparing the sizes of economies.

Based on formula (16), we estimated the contribution of the most important products or sectors of the Chinese economy that produce final products to the country's trade balance. This estimate differs from the data summarized in the balance of payments, as it takes into account the added value of the final products of national origin, rather than their price. The indicators of the contribution of each product to the trade balance characterize the international specialization of the economy: the products that form the trade deficit are intended mainly for the domestic market, the net profit from their exports is lower than the import of final products in this industry and intermediate imports in the composition of domestic goods and services.

This group of economic activities includes the construction industry; production of transport equipment; as well as non-tradable services — public administration, education, health care (*Fig. 1*). For the products of these industries, domestic demand exceeds export earnings; these industries are developed by export earnings from other industries, which create a positive trade balance. Such products

[8] URL: https://data.adb.org/dataset/peoples-republic-china-input-output-economic-indicators (accessed on 23.03.2021).

[9] URL: https://ru.investing.com/currencies/usd-cny-historical-data (accessed on 23.03.2021).

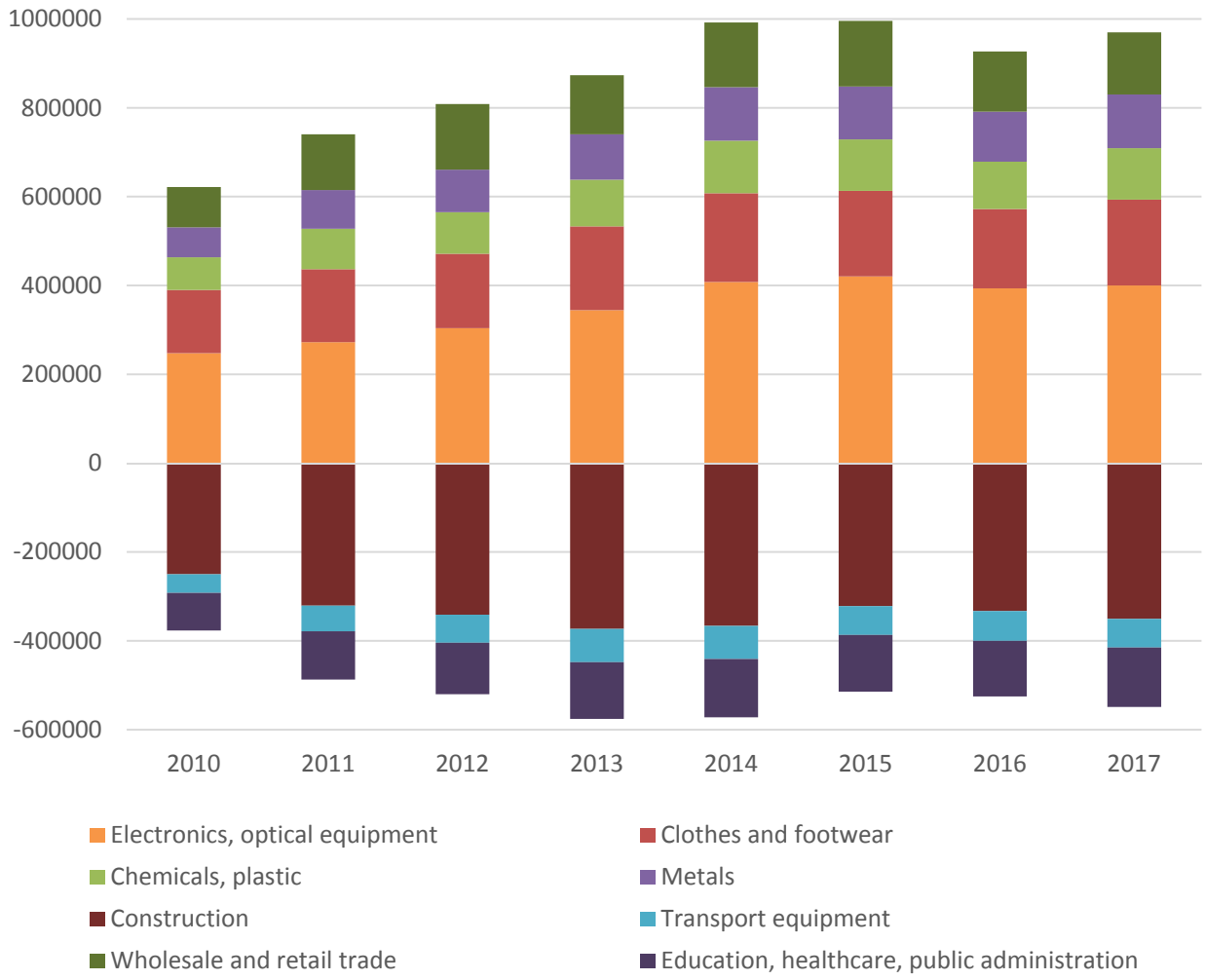

Fig. 1. **Dynamics of the contribution of particular industries to the trade balance (added value of national origin, USD million)**

Source: calculated by the authors based on ADB data.

are characterized by an excess of net export proceeds over imports. They define the international specialization of a country.

The bulk of China's net export revenue comes from electronics and optical equipment. This industry generates about US$ 400 billion in net export revenue per year. Another US$ 600 billion in net export earnings are generated by such goods as clothing and footwear; chemical products, rubber, and plastic; metals; as well as wholesale and retail trade services. More than half of China's net export revenues are generated by high-tech sectors of the economy.

To gain a better understanding of China's international specialization, we will analyze the dynamics of indicators of the integration of industries into global value chains (GVCs), which are calculated using data from multi-regional input-output tables. As known, the criterion for the participation of the national economy in the GVC is the indicator "Total GVC participation," which is calculated as the sum of two other indicators:

- Backward GVC Participation: the share of the value of imported components (foreign added value) used for the production of export products in the value of export products of a given country, otherwise — downward or backward linkages in the GVC;
- Forward GVC Participation: the share of the value of national components (national

Table 1

Backward linkages dynamics (BW) and RCA in China, 2005–2015

RCA dynamics, % / BW dynamics, %	Decrease	Increase
DECREASE	Production of commodities (–11; –42) Food industry (–19; –26) Light industry (–42; less than –17*) Mineral products (–32; –63)	Woodworking industry (–27; +12) Chemicals and pharmaceutical products (–35; +33) Plastic and rubber products (–39; +13) Metal products (–31; +22) Machinery and equipment (less than –33**; +14) Motor vehicles production (–31; +65)
INCREASE	Fuel industry (+4; –42)	

Notes: * – depending on the sub-industry, the dynamics of the RCA value ranges from –17% to –41%; ** – mechanical engineering: –36%; electrical, electronic and optical equipment: –33%.

Source: the table is compiled on the basis of the Revealed comparative advantage data. URL: https://wits.worldbank.org/CountryProfile/en/country/by-country/startyear/LTST/endyear/LTST/tradeFlow/Export/indicator/RCA/partner/WLD/product/Total; Trade in Value Added: 2018. OECD. WITS. World Bank. URL: https://stats.oecd.org/Index.aspx? DataSetCode=TIVA_2018_C 1 (accessed on 23.03.2021).

added value) used for the production of export products of other countries in the value of the export products of a given country, otherwise — ascending or forward linkages in the GVC.

To assess the impact of industry integration in GVCs, we use the Revealed Comparative Advantage (RCA) indicator. This indicator was proposed by B. Balassa [32] to identify the country's trade advantages in relation to industrial products. RCA is calculated as the ratio of the share of exports of a certain type of product in the total volume of a country's exports to the share of the same type of product in the world export volume. Index values of more than 1 indicate that the country has a competitive advantage in the production of this type of product.

The following tables show data on the growth of indicators of the backward (BW) and forward (FW) integration of the Chinese economy and the change in the RCA indicator for 2005–2015. *Tables 1, 2* are compiled according to the matrix principle in such a way as to compare the growth or decline in the competitiveness of industries with changes in the indicators of forward and backward linkages in the GVC. The first number is the percentage change in the forward or backward GVC channel over the period 2005–2015, the second is the percentage change in RCA over the same period.

Analysis of the integration of sectors of the Chinese economy into the GVC allows us to draw the following conclusions:

1. All industries in which China has lost competitiveness in terms of RCA are low-tech. All industries in which China has increased its competitiveness are medium and high-tech (except for woodworking).

2. In all industries with increased competitiveness, we note a surprising combination: BW indicators are negative, FW indicators are positive. This means that China has successfully restructured its medium and high-tech industries. On the one hand, there were processes of import substitution, since negative BW values indicate the substitution of imported supplies of components for national exports by domestic production. On the other hand, the positive growth of FW indicates a successful foreign economic

Table 2

Forward linkages dynamics (FW) and RCA in China, 2005–2015

FW dynamics, % \ RCA dynamics, %	Decrease	Increase
DECREASE	Fuel industry (0; –42)	Woodworking industry (0; +12)
INCREASE	Production of commodities (+2; –42) Food industry (+44; –26) Light industry (+6; less than –17*) Mineral products (+44; –63)	Chemicals and pharmaceutical products (+24; +33) Plastic and rubber products (+47; +13) Metal products (+3; +22) Machinery and equipment (менее +14**; +14) Motor vehicles production (+38; +65)

Notes: * — depending on the sub-industry, the dynamics of the RCA value ranges from –17% to –41%; ** — mechanical engineering: +14%; electrical, electronic and optical equipment: –10%.

Source: the table is compiled on the basis of the Revealed comparative advantage data. URL: https://wits.worldbank.org/CountryProfile/en/country/by-country/startyear/LTST/endyear/LTST/tradeFlow/Export/indicator/RCA/partner/WLD/product/Total; Trade in Value Added: 2018. OECD. WITS. World Bank. URL: https://stats.oecd.org/Index.aspx? DataSetCode=TIVA_2018_C 1 (accessed on 23.03.2021).

expansion of semi-finished products manufactured in China. They replace similar production facilities of foreign competitors. Consequently, the national technological base has reached a high level of competitiveness, which makes it possible to combine the development of its own import-substituting industries with an increase in the export of intermediate products of high-tech industries.

3. Similar ratios of BW, FW, and RCA can be seen in low-tech industries where China has diminished its competitive advantages. Since it is almost impossible for an individual country to achieve RCA growth in all sectors, a deterioration in competitive positions in certain areas is inevitable and even natural. It is important that China, "losing its position" in the production of finished products of low-tech industries, is pursuing a successful policy of import substitution of components and foreign economic expansion of its own production of intermediate products.

Then we will consider the dynamics of the contribution of exports and domestic demand to China's GDP, which can be estimated using formula (15). *Fig. 2* shows the decomposition of GDP into two parts, formed at the expense of domestic and external final demand, respectively, in the dynamics for 2010–2017.

Fig. 2 illustrates that over the specified period, the contribution of exports in absolute terms did not change significantly (from 1.4 to 2.0 trillion US dollars), and in relative terms, it steadily decreased from 23 to 16%. On the contrary, the share of domestic demand in GDP grew by an average of 17% per year and more than doubled in absolute terms. The values of the relative indicator of the contribution of exports to GDP, calculated in accordance with the methodology developed by us, completely coincide with the results given in the analytical report of ADB,[10] which confirms the accuracy of our methodology.

Thus, the data in *Fig. 2* confirm the conclusions drawn from the indicators of the vertical specialization of the Chinese

[10] URL: https://data.adb.org/dataset/peoples-republic-china-input-output-economic-indicators (accessed on 23.03.2021).

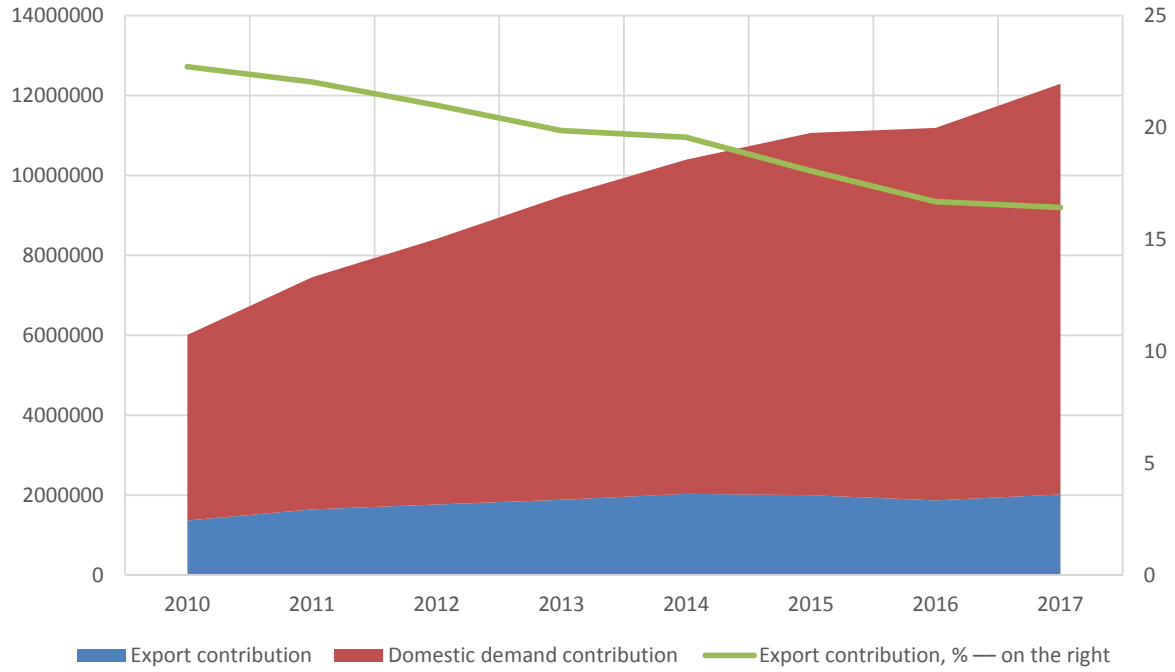

Fig. 2. **Contribution of exports and domestic demand to GDP (gross value added), USD million**

Source: calculated by the authors based on ADB data.

economy. The country is relatively reducing the export of finished products of low-tech industries, for example, light industry, which for many years was the locomotive of the "Chinese economic miracle", but at the same time, it is successfully implementing import substitution of components used in the production of finished products in all industries. The growth in the competitiveness of national technologies in the entire chain of manufacturers working on the production of finished products is reflected simultaneously in a decrease in BW and an increase in FW, which results in an increase in the added value created through sales in the domestic market (VAD).

Is the growth of domestic demand in China spontaneous, or are there signs of stimuli? *Fig. 3* shows the dynamics of GDP, the contribution of domestic demand to GDP (VAD), as well as the national money aggregate in the national definition of M2, converted into US dollars at the nominal exchange rate.

There is a fairly close correlation between the three indicators shown in the figure (above 0.99), which can be interpreted as follows: the growth of domestic demand is the main factor behind the increase in China's GDP in the selected time interval. At the same time, the increase in the M2 money supply became the main factor in the increase in domestic consumer and investment demand for goods and services. 1 dollar of growth in nominal GDP due to domestic demand (VAD) is approximately 2 dollars of growth in money supply M2 when converted at the exchange rate.

Is China's GDP growth in dollars real economic growth, or are prices rising? The exact answer to this question requires additional calculations, but as a first approximation, we can say that there is both an increase in prices in dollar terms and real economic growth. For example, the price index for rental housing in China from 2010 to 2017 increased by 49%.[11] Over the same period, the value added in the construction

[11] URL: https://data.oecd.org/price/housing-prices.htm (accessed on 23.03.2021).

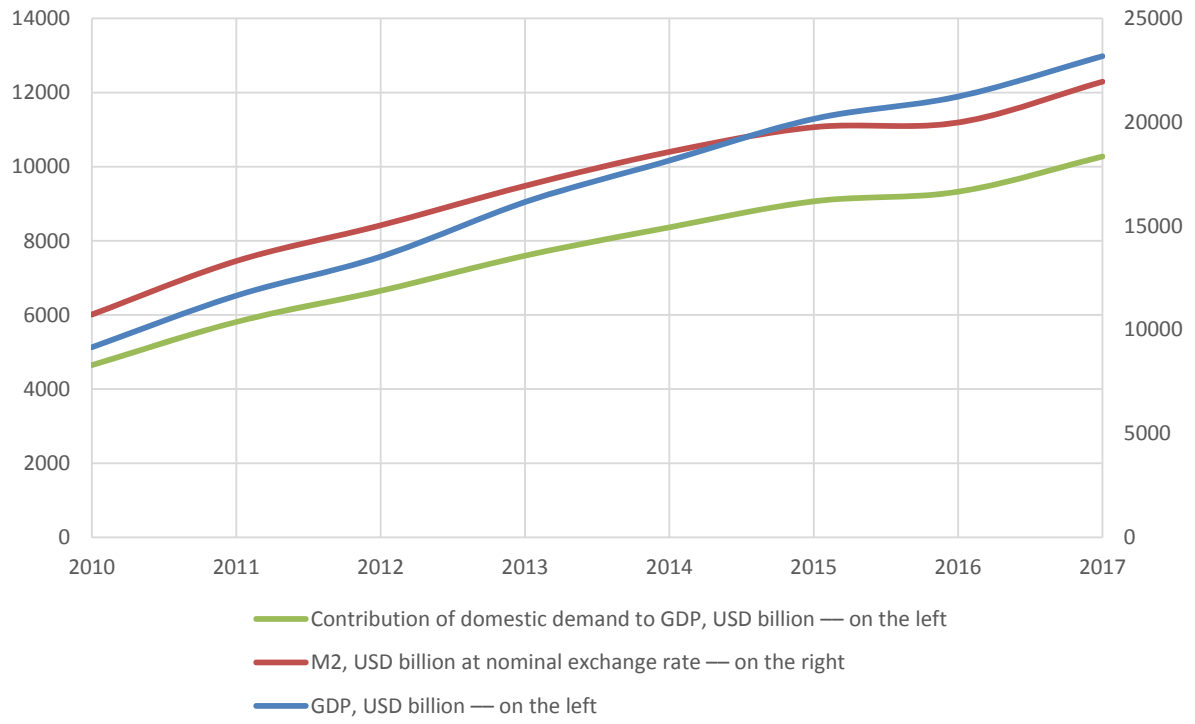

Fig. 3. **Dynamics of M2 money supply, GDP and the contribution of domestic demand to GDP**

Source: calculated by the authors based on ADB and Bloomberg data. URL: https://tradingeconomics.com/china/money-supply-m2?user=reuters%7Cbloomberg (accessed on 23.03.2021).

sector increased by 103%. If we consider the economy of China as a whole, then the total accumulated economic growth for 2010–2017 at constant prices amounted to 167%[12] (growth over the period 67%); China's GDP growth in dollars was 104%, while growth in the domestic demand contribution (VAD) component of GDP calculated above was 121% over the period.

In other words, the inflationary consequences of stimulating growth in China's domestic market are significant and account for about half of the GDP growth at current prices, but the real rates of economic growth were no less significant.

The ratio of the monetary aggregate M2 to GDP for the analyzed period increased from 1.52 to 1.89. For comparison, in Belarus, the same coefficient, which is called the level of monetization of the economy,[13] is 0.15. That is, our indicator is an order of magnitude lower than in China.

Further evidence of the stimulus that is driving China's economic growth is the dynamics of the sector's debt indicators, which began to skyrocket since the 1990s. According to a study [18], from 2010 to 2015, the ratio of the debt of all sectors of the Chinese economy to GDP increased from about 310% to 410%. In absolute terms, corporate debt during this period increased from 75 to 170 trillion yuan, that is, more than doubled; financial sector debt — from 40 to 100 trillion yuan. In terms of dollars at the nominal exchange rate, the increase in domestic debt is 2010–2015 alone turned out to be at least US$ 25 trillion.

The share of corporate debt in the total structure of China's domestic debt in 2015 was 49%, while the share of debt in the financial

[12] Calculated according to the World Bank, 2010 = 100%, then the indicator is multiplied by the growth index of each subsequent year until 2017. URL: https://databank.worldbank.org/ (accessed on 23.03.2021).

[13] When assessing the level of monetization, the aggregate M3 is used more often than M2.

sector was 34%. The share of domestic debt was 97%, respectively, only 3% of the total debt of sectors of the Chinese economy falls on external debt.

It is clear that by 2017, China's domestic debt increased even more, both in absolute terms and in relation to GDP. At the same time, the following proportion is characteristic of the macroeconomic indicators considered: the increase in domestic debt in absolute terms is 1.5–2 times higher than the growth in the money supply M2. M2 growth in absolute terms is almost 2 times higher than GDP growth generated by domestic demand and estimated in actual prices (VAD). About half of the increase in nominal VAD represents real growth, the other half is inflationary. Thus, under conditions typical for the selected period, including a relatively stable exchange rate of 6.5 yuan per dollar, 1 yuan of real economic growth accounts for at least 4 yuan in the form of an increase in the money supply M2 and 6–8 yuan from the increase in debt sectors of the economy.

If the growth was "natural", i.e. it was not caused by stimulus measures, the growth of the money supply should be considered as a consequence of the increase in GDP caused by other factors. But why is the amount of money growing faster than nominal GDP? Why are dollar prices rising in China? How to explain the rise in debt?

The considered example looks like evidence, if not confirming the accuracy of the provisions of the MMT, then at least prompting to pay attention to it.

CONCLUSIONS

According to most researchers, the key factors of China's economic growth in the period from the 1980s to the early 2000s were foreign direct investment and exports, which have shaped the modern model of an open economy and served as the basis for its technological modernization. The analysis carried out in the paper using input-output tables and the method of decomposition of GDP into "national" and "export" components, taking into account the full import intensity of goods and services, shows that in the period from 2010 to 2017, domestic demand in China grew much faster than export earnings and accounted for 83.6% of GDP in 2017. Thus, we conclude that among the sources of growth of the Chinese economy in recent years, not external, but domestic non-monetary and monetary factors predominated.

At the same time, a number of non-monetary factors can be attributed to industrial policy, the priorities of which were determined by analyzing the dynamics of the calculated indicators of the integration of industries into global value chains (BW, FW, RCA) and the indicators of the contribution of individual goods to the trade balance at the added value of national origin were calculated. Thus, on the one hand, the industrial sector is constantly being modernized, which allows it to reach the global level of competitiveness, which is reflected in the specialization of Chinese industries in the high-tech segment. On the other hand, the policy of import substitution is being implemented, as a result of which domestic demand is satisfied mainly by domestic goods and services.

Correlation analysis of the dynamics of the monetary aggregate M2, GDP, and the calculated contribution of domestic demand to GDP ($r > 0{,}99$ in all pairwise comparisons) shows that monetary factors are used to stimulate domestic demand, namely: an increase in the money supply, including by increasing domestic debt of the financial and non-financial sectors of the economy.

Such monetary policy seems justified from the point of view of heterodox modern monetary theory (MMT), but in many ways contradicts the traditional point of view. It is believed that attempts to stimulate domestic demand in developing countries, according to the Thirlwall's Law, are limited to the balance of payments. If against the backdrop of falling exports, governments and central banks of emerging economies stimulate domestic

demand by increasing money supply, after a short time imports begin to grow, the state of the balance of payments deteriorates, the national currency depreciates, real incomes of sectors of the economy fall, and economic growth stops. But this does not happen in China, stimulating the economy does not lead to a decrease in the trade surplus due to the combination of many conditions — the presence of monetary and financial sovereignty, the competitiveness of industry, the innovative nature of economic development.

At the same time, it is hardly worth expecting and hoping that the same sources and factors of economic growth can be fully used in Russia and Belarus. And the problem here is not even that the domestic financial system, from the point of view of modern monetary theory, does not fully possess monetary sovereignty, but, first of all, that the country's specialization is reduced to raw materials, not high-tech products, and this does not always allow the use of innovations for the production of goods and services competitive on the world market and, as a consequence, for the driver of economic growth.

To expand the possibilities of using the Chinese experience to stimulate economic growth in Russia and Belarus, it is necessary to simultaneously modernize both the financial system and industry. When analyzing the goals and directions of such modernization, among other things, the analytical tools proposed in the article can be used.

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Parkhimenka U.A. — revision of the methodology for the decomposition of economic growth factors for the possibility of its use with the international standard of input-output tables; development and description of a mathematical model; statistical calculations using the model.
Shablinskaya T.V. — development of the initial version of the methodology for the decomposition of economic growth factors (as applied to the economy of Belarus).

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ORIGINAL PAPER

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Problems of Financial Investigation and Recovery of Stolen Assets*

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ABSTRACT

In the context of the globalization of national economies, the processes of recovering stolen assets are becoming a difficult task, requiring their tracing and detection not only in our country but also in foreign jurisdictions. Not only country's law enforcement agencies but also corporate governance bodies should play an active role in the process of detecting and recovering stolen assets. In this regard, the improvement of methodological tools that facilitate the tracking, detection and recovery of stolen assets is of scientific and practical interest and ensures the relevance of the study. The purpose of the study is to improve the mechanisms for countering the withdrawal of assets by unscrupulous owners, interest groups. The authors apply methods of dialectical scientific cognition based on a set of recognized private scientific and general scientific methods: formal-logical, comparative-legal, statistical, intersectoral legal analysis. The scientific novelty of the research is the identification of negative factors affecting the volume of stolen assets, their impact on the economic health of the state, private sector, and the improvement of methods for detecting and recovering assets. The results of the study help the authors to identify the main problems of detection and recovery of stolen assets, formulated the directions of the strategy for the return of stolen assets, formalized the processes of tax administration in countering the legalization of illegally obtained property. The recovery of stolen assets is an extremely time-consuming process which requires not only collective action of government agencies but also effective interstate cooperation within the legal framework. The paper presents a comparative analysis of the legislation of a number of countries. The authors identify deficiencies in the Russian law, which does not fully prescribe the procedure for detecting and returning stolen assets to the territory of the country. The authors conclude that in order to improve the mechanisms for countering the withdrawal of assets, it is necessary to apply an integrated approach, improving the legislation of the Russian Federation and fostering collective action of the country's law enforcement agencies, private sector, and society to successfully confront new challenges and threats. The results of the study may be used to improve the competence of law enforcement officers involved in detecting and returning stolen assets, as well as to develop a more successful methodological and evidence base approach in countering the legalization of illegally obtained property.

***Keywords*:** the withdrawal of assets; assets recovery; money laundering; cash-out transaction; misappropriation and embezzlement; abuse of power; financial security

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INTRODUCTION

Currently, the Financial University is one of the largest scientific and educational complexes that provide educational services on training financial investigation analysts and experts in the field of economics, management, and finance. One of the features of modern economic science is the increased attention of economists to legal institutions conducting comprehensive research including the issues of tracing and recovering assets. As part of the development of scientific, expert-analytical, and innovative activities of the Financial University, an international discussion was held with the participation of representatives of law enforcement agencies of foreign countries from Germany, France, the Netherlands, Belgium, Hungary, Lithuania, as well as of the Federal Financial Monitoring Service. The experts noted that in the modern world, the detection and recovery of assets is an urgent problem for all countries. Some experts estimate that developing countries lose about US$ 20–40 billion annually due to bribery, misappropriation of funds, and other financial misconduct. Most of the proceeds of crime find a "safe haven" in the world's financial centers. These illicit flows represent a drain on social services funds and economic development programs leading to global impoverishment. Many developing countries have attempted to recover the stolen assets [1, p.65]. A number of successful high-profile cases involving international cooperation have shown that asset recovery is possible. However, this is a complex practice that requires collective action and cooperation of national agencies and ministries in different jurisdictions, as well as the ability of law enforcement agencies in different countries to track and protect assets and use different legal tools, whether it is criminal forfeiture, non-conviction based confiscation, civil claims or other alternatives.

Based on the results of the presentation of the participants in the discussion, it was possible to identify those unresolved problems associated with the tracing and detection of stolen assets using various financial instruments that are relevant for Russia. It was repeatedly noted that in the Russian Federation "2 trillion rubles are laundered annually, and about 1 trillion rubles are transferred abroad" [2, p. 70].

According to expert assessment, it is difficult and sometimes impossible to trace assets transferred abroad unless urgent measures are taken to detect them [3, p. 89]. Assets transferred to the international financial system are quickly transferred from one state to another. Their traces of origin are lost in a variety of transactions from account to account, from bank to bank. They are split up, combined, and transferred to other jurisdictions to cover their tracks.

The main issues requiring urgent solutions as follows:

- detection and identification of assets abroad;
- solving the problems of the private sector to detect and recover stolen assets.

METHODS

The main research methods are the method of dialectical scientific knowledge, based on a set of recognized private and general scientific methods: formal-logical, with the help of which the interpretation of legal norms is given; comparative legal, which allowed for a comprehensive analysis, assessment and comparison of various aspects; statistical, including collection, analysis, and synthesis of data; method of cross-sectoral legal analysis, which made it possible to consider legal institutions in the context of sectors of the economy. At the same time, a standard assessment system was used. The main document ensuring the processes of detection, identification, and seizure of assets abroad is the requirement of the federal legislation on the identification of

the debtor's property within the framework of bankruptcy procedures,[1] the UN Convention,[2] the recommendations of the Financial Action Task Force on Money Laundering (FATF),[3] legislation of foreign state, as well as ratified international treaties of the Russian Federation.

The analysis of the norms of international law in the field of reversion a property into the state revenue, in respect of which information has not been provided confirming its acquisition with legal income, should begin with the European Convention for the Protection of Human Rights and Fundamental Freedoms, where, according to Art. 1 of Protocol No. 1 does not provide for the full and unlimited inviolability of private property, but only its unconditional respect within the framework of state legislation and the principles of international law. In addition, according to the United Nations Convention against Corruption,[4] adopted in 2003 by the UN General Assembly, combating corruption is an inherent responsibility of all countries, as it affects their economies, leading to serious threats to the stability, sustainability and security of society, by undermining the structure, democratic and ethical values of the state, they harm the progressive development of the country.

The crime of illicit enrichment criminalizes "an unexplained increase in the welfare of a public servant during his tenure". Article 20 of the UN Convention against Corruption contains the most widely quoted definition of illicit enrichment: "a significant increase in the assets of a public official that he or she cannot reasonably explain in relation to his or her legitimate income".[5] Illicit enrichment is classified as an "acquisitive crime" in the sense that, like money laundering, fraud, and theft, it is related to those who receive illicit income. Illicit enrichment legislation serves a procedural purpose, effectively helping law enforcement agencies in situations where they do not have sufficient evidence to prove that public officials engaged in bribery, embezzlement, or other offenses that anticipate illegal proceeds.

RESULTS

In the course of the study, shortcomings of the Russian legislation were identified, which do not fully ensure the procedure for identifying and returning stolen assets to the territory of Russia. As Russian practice shows, the activities of the General Prosecutor's Office of the Russian Federation on the return of stolen assets to the territory of Russia are at an insufficient level.[6] This is connected, on the one hand, with the collection and generalization of information on unfair enrichment, on the other hand, with the need for a special check, according to the results of which, when confirming the illegal origin of financial assets, the prosecutor's office is filing a lawsuit to reverse this property into state revenue.

In this case, it is the defendant's responsibility to prove the legitimacy of income sources for the acquisition of property, which is fully consistent with paragraph 5 of Art. 31 of the UN Convention against Corruption. States Parties may consider establishing a requirement for the perpetrator to prove the legitimate origin of the alleged proceeds of a crime or other

[1] Federal Law of the Russian Federation of October 26, 2002, No. 127-FZ "On Insolvency (Bankruptcy)". URL: http://www.consultant.ru/document/cons_doc_LAW_39331/ (accessed on 15.10.2020).

[2] Conference of the States Parties to the United Nations Convention against Corruption of May 27–29, 2019. URL: https://www.unodc.org/documents/treaties/UNCAC/WorkingGroups/ImplementationReviewGroup/27–29May2019/V1905974r.pdf (accessed on 15.10.2020).

[3] URL: https://pasmi.ru/archive/253308/ (accessed on 15.10.2020).

[4] UN Convention against Corruption Adopted by General Assembly Resolution 58/4 of October 31, 2003. URL: https://www.un.org/ru/documents/decl_conv/conventions/corruption.shtml (accessed on 15.10.2020).

[5] See above.

[6] General Prosecutor's Office of the Russian Federation "Review of the practice of detecting and returning from abroad assets obtained as a result of committing crimes". URL: http://gochs.tomsk.gov.ru/upload/docs/Obzor_po_vozvratu_aktivov_file_122_189_3706.pdf (accessed on 15.10.2020).

asset subject to confiscation, insofar as such a requirement is consistent with the basic principles of their national law. Defendants, in particular, can provide evidence of the receipt of an asset under civil law transactions, for example, an investment of funds received under a loan agreement, a donation agreement, maternity capital. At the same time, imposing on the owner of the disputed property the burden of proving the fact of its acquisition on legal income does not exclude the right of the court, considering the actual circumstances of the case, to reverse into state income only that part of the property, the legitimate acquisition of which has not been proven [4, p. 320].

As Russian practice shows, the activities of the General Prosecutor's Office of the Russian Federation on the return of stolen assets to the territory of Russia are at an insufficient level.

Since the granting of the relevant powers by the Federal Law "On Control over the Compliance of Expenditures of Persons Holding Government Positions and Other Persons with Their Incomes" (from 01.01.2013 to 31.12.2019), the prosecutor's office has initiated more than 1.5 thousand control procedures, 243 (16%) statements of claim for the conversion of property objects into the income of the Russian Federation, for which the officials did not provide information proving their acquisition with legal income. These are cars, land, residential and non-residential premises. Courts satisfied 81% of prosecutors' claims.

Table 1 presents the dynamics of cases in courts of general jurisdiction.

The recommendations of the Financial Action Task Force on Money Laundering (FATF), which worked in Moscow from March 11 to March 29, 2019, has noted the need for further development of this tool. The Panel has found that Russia was not actively involved in capital recovery efforts. The Central Bank sent only 47 inquiries abroad about 240 clients of 99 foreign banks over 2017–2018.[7]

Bloomberg calculated that in 25 years the value of assets withdrawn from Russia could reach an astronomical US$ 750 billion, which is equivalent to half of the country's GDP.[8]

It is the financial and credit sphere of Russia that is currently one of its most vulnerable links from the point of view of economic security.

During the discussion, representatives of foreign countries spoke about the problem of proving misappropriation of property, focusing on the insufficient evidence collected, as well as on the lack of evidence of the acquisition of foreign assets at the expense of funds received from the commission of corruption crimes in Russia. As a result, the national courts of foreign states refuse to seize the property of the defendant [5, p. 120].

In a number of cases, prosecutors do not have the appropriate qualifications and knowledge necessary to analyze and collect sufficient evidence of the legalization of a stolen asset outside of Russia. To improve the skills of law enforcement officials, a practical guide has been developed to help those who are struggling with the strategic, organizational, investigative, and legal challenges associated with the recovery of stolen assets. [6] It is difficult to disagree with the authors of this guide, who rightly believe that stolen asset has taken gigantic proportions, threatening the economic security of states. Stolen funds are difficult and sometimes impossible to find unless appropriate measures are taken in a timely manner. We fully agree with the authors

[7] URL: https://pasmi.ru/archive/253308/ (accessed on 15.10.2020).
[8] URL: https://expert.ru/2020/09/24/ofshoryi/ (accessed on 15.10.2020).

Table

Cases of reversion of movable and immovable property to the state revenue in 2013–2019

	2013–2016	2017	2018	2019
Cases with a decision	19	32	80	112
Satisfied Claims	12	29	67	89
Dismissed cases to satisfy the claims	7	3	13	23
Funds awarded for recovery on secured claims, RUB	Data is unavailable	5,983,067	24,746,338	32,056,708

Source: compiled by the authors on the reports on the work of the courts of general jurisdiction for the consideration of civil and administrative cases in the first instance over the year. URL: http://www.cdep.ru/index.php?id=79&item=4891 (accessed on 15.10.2020).

on the need to develop practical measures for extrajudicial confiscation and return of assets. However, it should be emphasized that the proposed measures require updating due to the use of digital technologies in criminal practice.

Another drawback of the country's law enforcement agency in the strategy of the asset recovery procedure is the absence of an approved conceptual apparatus of the term "asset". This, in our opinion, makes it difficult to perform the required actions to detect assets. It should be emphasized that for the preparation of financial statements[9] the following definition of an asset is used: "assets are economic assets, control over which the organization has obtained as a result of a fait accompli of its economic activities and which should bring it economic benefits in the future. Future economic benefits are the ability of assets to directly or indirectly contribute to the flow of cash to the entity". It is necessary to define the conceptual basis for the identification and return of assets to the territory of Russia. Within the framework of this article, the return of assets will be understood as the legal process of tracing, identifying, and recovering funds stolen (withdrawn) by persons who have committed illegal actions, have not proven the legitimacy of the acquired property owned by them, their family members, affiliates, and hidden in foreign jurisdictions.

The procedure for tracing and recovering assets obtained illegally from abroad is more complicated [7, p. 64]. At the same time, the actions of the state to repatriate the proceeds of crime hidden in foreign jurisdictions are complicated by the difference and inconsistency of the legislative acts of different states on the procedure for the seizure and confiscation of assets. These assets include cash in bank accounts, financial instruments, real estate, movable

[9] The concept of accounting in the market economy of Russia, approved by the Methodological Council for Accounting under the Ministry of Finance of the Russian Federation on December 29, 1997. URL: http://www.consultant.ru/document/cons_doc_LAW_17312/ (accessed on 15.10.2020).

property, art and artifacts, and precious metals.

The effectiveness of the application of measures for the search, identification, seizure, and confiscation of property in Russia is directly related to the ability of law enforcement agencies to timely establish the presence and location of the relevant property, as well as to prove its connection with a crime [8, p. 545].

STAGES OF ASSETS RECOVERY

The asset recovery process, in our opinion, may consist of several stages:

- tracking;
- freezing;
- arrest and seizure;
- confiscation;
- return of assets.

The tracking process locates the stolen assets. At the same time, the main method of this stage is the creation of a paper trail through a financial investigation of the disputed property, as well as the preparation of written requests to foreign countries in order to confirm or not confirm the location of the assets.

Bloomberg calculated that in 25 years the value of assets withdrawn from Russia could reach an astronomical US$ 750 billion, which is equivalent to half of the country's GDP.

After receiving the evidence base on the location of assets, the procedure for freezing them begins with an appeal to law enforcement agencies in order to block existing accounts.

With the help of the procedure for the seizure of disputed assets, the goals of limiting the rights to alienate an asset in favor of third parties are achieved [9, p. 72].

The mechanism of confiscation of stolen property contributes to its reversion to the state revenue to compensate for the damage caused.

For each step, procedural procedures should be established to identify and document the evidence base for the recovery of stolen assets, considering how the process in one state will affect the detection and recovery of assets in other jurisdictions. In this case, the UN Convention, where a separate chapter was devoted to this issue, can serve as a methodological basis for the return of stolen assets. Based on the recommendations of the UN Convention, there are several directions of the strategy for the recovery of stolen assets.

The *first direction* is the recognition of the debtor in bankruptcy proceedings on the territory of Russia and further recognition of the bankruptcy of Russia abroad. The advantage of this direction is the receipt from the bankruptcy administrator of the Russian Federation of the necessary information about the structure of a foreign asset and the establishment of control over it.

The *second direction* is to apply directly to a foreign court with a petition for bankruptcy or the introduction of a foreign bankruptcy procedure in addition to the Russian case. In this case, the court of a foreign state will appoint a local manager who will look for assets and distribute them among creditors in this state.

The *third direction* is the recognition and enforcement of the decision of the Russian court abroad, obtaining court orders on the seizure of assets and disclosure of information, etc.

Within the framework of the *fourth direction*, a separate case is initiated in a foreign court, which will allow an active campaign to trace and identify the foreign asset of the debtor. But there are also negative factors in this direction. The fact is that in a number of cases, foreign legislation may not consider the claims of Russian

creditors at all or establish a different priority, for example, taking into account the priority of satisfying the claims of foreign creditors.

Although each of these areas deserves equal attention from the point of view of ensuring the efficiency of the entire process of asset recovery, the criterion of efficiency is mainly the "confiscation" of assets, that is, the deprivation of property acquired as a result of criminal actions, which entails the transfer of it into the ownership of the state [9, p. 65]. According to some experts, confiscation of property should be distinguished from other forms of gratuitous seizure of property into state ownership. At the same time, it is noted that in the domestic legislation there is no alternative of foreign procedures and rules for confiscation of property, which do not require conviction and establishment of a person's guilt in committing a criminal act [10].

Summarizing the considered directions, we can formulate an unambiguous conclusion that the cost of the procedure for returning foreign assets to the territory of Russia may turn out to be less than the costs incurred, which may induce individual creditors to abandon legal proceedings or join forces to detect stolen assets.

ECONOMIC AND LEGAL ASPECT OF THE LEGALIZATION (LAUNDERING) OF THE PROCEEDS OF CRIME

To ensure the sustainable development and existence of a democratic society, effective methods and legal mechanisms are required to protect public relations from criminalization and abuse of state power, the legitimacy of which is largely based on public trust. Consequently, the legislative body that initiates these legal mechanisms has the right to establish increased requirements for the reputation of public officers in order to eliminate doubts about their moral qualities and, accordingly, the legitimacy and disinterestedness of their actions as public power holders [11, p. 200]. This conclusion is consistent with the provisions of the UN Convention against Corruption, the preamble of which states that preventing and eradicating corruption is the responsibility of all states since it affects their economies, poses serious threats to the stability and security of society, undermines democratic and ethical values, justice and harms sustainable development.

Money laundering contributes to the establishment of control of certain criminal communities over certain sectors of economic activity, the financing of terrorism, the growth of corruption, encourages the means of unfair competition [12, p. 30].

Both the legal aspect of money laundering and the economy are expressed in various forms of economic damage. The literature has repeatedly noted that the harm from money laundering must be considered simultaneously from the point of view of law and economics [13, p. 171].

The latter is especially important since the scale of money laundering can lead to deformation of key areas of life: tax, budget, monetary, as well as to a decrease in the effectiveness of the macroeconomic policy pursued in the state, an increase in a negative impact on the development and efficiency of market mechanisms. According to the IMF, the total amount of legalized money in the world is about 2–5% of world GDP. Accordingly, on an annualized basis, this amounts to 0.9–2.4 trillion US dollars, which actually contributes to the global business cycle and cash flow. Money laundering is closely related to many macroeconomic consequences, among which we single out an unpredictable change in demand for the money supply, an increase in the volume of fluctuations in transnational capital and foreign exchange flows as a result of unpredictable cross-border foreign exchange transfers, etc.[10]

[10] IMF Annual Report. URL: https://www.imf.org/external/pubs/ft/ar/2019/eng/assets/pdf/imf-annual-report-2019-ru.pdf (accessed on 15.10.2020).

TAX ADMINISTRATION AS A TOOL TO COUNTERACT LEGALIZATION OF ILLEGALLY ACQUIRED PROPERTY

Tax administration can be recognized as one of the segments of the economic and legal mechanism for detecting and identifying the property as illegally acquired, during which tax evasion schemes are disclosed by subjects of both state and private economic activity.

It is correct to highlight the following methods of tax evasion in economic activities:

The cost of the procedure for returning foreign assets to the territory of Russia may turn out to be less than the costs incurred, which may induce individual creditors to abandon legal proceedings or join forces to detect stolen assets.

I. Complete concealment of business activities (lack of tax registration; failure to submit tax returns).

II. Partial concealment of economic activity (distortion of the tax base/object of taxation, tax fraud).

The development of tax administration should also be seen as an important factor in increasing the efficiency of detecting and identifying the property as illegally acquired. Indeed, due to the improvement of the quality of tax administration, business transparency indicators are also growing, and there is also a voluntary abandonment of semi-legal schemes in order to reduce tax risks.

In the context of the global information economy, the Federal Tax Service of Russia considers the informatization of tax authorities and the automation of tax procedures to be the main direction in the development of tax administration. Information technology can reduce transaction costs, including the relationship between tax authorities and taxpayers, by making all processes more transparent, including monitoring the "purity" of real estate transactions. As a result of the high technological level of internal control over the ASK VAT, some fly-by-night firms have left the market, as the cost of cashing out funds through VAT schemes has increased significantly.

Not only the number of persons with Internet access has increased, but also the number of transactions carried out without identifying counterparties. As known, in order to prevent fraud, the role and responsibility of banks in financial transactions are increasing. Finally, the strengthening of globalization processes with the corresponding complication of tracking financial transactions also predetermines the exceptional importance of modern information technologies of tax control.

One of the most significant advances in the application of new information technologies for office tax audits is the typology of tax evasion schemes, which has not yet been fully developed. The currently known schemes ("chains") are still relatively small, but it can already be concluded that all of them, in one way or another, consist in the fact that a subject evading tax obligation is built into the business perimeter. Predictive analytics methods can hold significant promise in the implementation of the task of countering tax evasion.

When the template is applied to a dataset based on campaign results, rather complex cross-regional tax evasion patterns can be identified early on.

Among the measures of tax administration, we will single out such an electronic resource of the Federal Tax Service of Russia as individual account of taxpayers (legal entities, individual entrepreneurs, individuals). The Tax Code of the Russian Federation introduced a rule according to which a

taxpayer, including an individual, is obliged, in the absence of any object of property in his personal account, to voluntarily add the type of property and its official registration data.

However, in any case, the problem of legalizing property arises before tax evaders. With all the common concepts and forms of legalization, let us single out such content of legalization as the creation through transactions of civil law grounds for acquiring a legal right to money or other property obtained illegally [14, p. 20]. At the same time, as a rule, the following main methods of legalization are distinguished:

- financial transactions, primarily on a large scale, based on illegally acquired funds and other assets;
- non-financial transactions with property, other assets acquired as a result of criminal activity.

The Federal Law "On Counteracting the Legalization (Laundering) of Criminally Acquired Incomes and Financing of Terrorism", in terms of transactions with monetary funds or other property, defines them as actions with monetary funds or property, regardless of the form of conduct, committed by individuals/legal entities, individual entrepreneurs with the aim of establishing, terminating or changing the rights and obligations associated with them. Thus, in fact, two concepts — "financial operation" and "deal" are combined.

In accordance with the provisions of Russian legislation, financial transactions include, first of all, banking transactions defined as such by the current Civil Code of the Russian Federation, for example:

- attracting funds from individuals and legal entities, individual entrepreneurs in deposits;
- investing the funds received on its own behalf and at the same time accepting all associated costs for itself;
- settlement and cash services for the clients of the credit institution;
- carrying out collection operations;
- implementation of interbank and cross-border transfers;
- issuance of guarantees for loans from third parties, providing for the fulfillment of obligations in cash;
- conclusion of contracts of assignment or contracts of trust management of funds;
- finance lease agreements.

Financial transactions are actions aimed at solving a specific problem of the organization and management of monetary relations arising from the formation and use of cash flows. Consequently, a financial transaction is a transaction between individuals or legal entities associated with the transfer of ownership of any type of property, including cash.

PROBLEMS OF PRIVATE SECTOR IN THE SPHERE OF DETECTION AND RECOVERY OF STOLEN ASSETS

One of the problems of the private sector in terms of the recovery of withdrawn assets from the control of the owner is the sale of assets to third parties prior to the commencement of bankruptcy proceedings. In this case, the sale of assets occurs at reduced prices, which contributes to the rapid onset of bankruptcy due to an increase in losses from economic activities and the inability to pay off accounts payable. Moreover, the sale can be carried out by both affiliated and independent third parties. In this case, such tools are used as the execution of an assignment agreement, assignment of the right of claim, factoring, etc., which allow the withdrawal of assets with impunity, if it is impossible to prove the fact of collusion in the absence of signs of ownership [15, p. 310].

Arbitration managers and the internal control system of a business entity should provide significant assistance in detecting and recovering stolen assets. They are obliged to focus their attention on the processes of committing suspicious transactions, which can occur during both normal and unusual activities.

The liquidator should be suspected of having signs of illegal withdrawal of assets abroad on the following grounds:

- the presence of a significant volume of transactions for unusual transactions;
- conclusion of transactions with the terms of the mandatory provision of a pledge of assets significantly exceeding the transaction amount;
- the use of fly-by-night firms in the chain of business operations;
- participation in the economic turnover of such financial instruments as a bill of exchange, the issuance of loans without collateral;
- the presence of financial transactions with affiliated persons, etc.

To confirm illegal withdrawal of assets abroad, it is necessary to launch procedures for the financial examination of business transactions carried out in previous years, as well as filing a petition to the General Prosecutor's Office of the Russian Federation for seizure, blocking of foreign accounts and recovery of stolen goods [16, p. 45].

The internal control system in the process of detecting and recovering stolen assets should operate with such evaluative categories as "fairness", "reasonableness", "violation of the law" since it is very difficult to understand when the risks of entrepreneurial activity are allowed and when the management of the business entity is ineffective.

The estimated value or professional judgment of the internal control entity, which, relying on advanced information technology, can identify signs of suspicious and unusual transactions, plays an important role in the development of preventive and servicing measures to combat asset stripping. At the same time, they must have a formalized form so that it is possible to develop and implement control procedures in the internal control system.

VIRTUAL ASSETS: CONTROL ISSUES

Virtual assets have become another issue. In the modern world, there is a constant increase in crimes with their use, this indicates the insufficient work of law enforcement agencies. It is necessary to develop tools for legal regulation and control of the turnover of virtual assets [17, p. 62]. Today, digital assets in Russia are in a gray zone, so they need to be legalized and recognized at the legislative level. The Central Bank of the Russian Federation is working on solving this problem.[11]

An important step in this matter was the adoption in Russia of the Federal Law of July 31, 2020, No. 259-FZ "On digital financial assets, digital currency and on amendments to certain legislative acts of the Russian Federation". This legal act governs and regulates the issuance, accounting, and circulation of digital financial assets. The law introduces the concept of "digital assets", in accordance with which digital rights are recognized. They also include monetary claims, possible rights to issue securities, participation in the authorized capital of a closed joint-stock company, the requirement to transfer equity securities to other information systems.

Another concept introduced by this law is "digital currencies", which is understood as a set of some digital data (code or special record) located in the information environment. They can be accepted as a means of payment, not being an official currency on the territory of the Russian Federation or another state, or as investments without a person responsible for fulfilling obligations, with the exception of the system operator, who ensures the functioning and procedure for issuing this means of payment [17, p. 60].

[11] Public consultation report. URL: https://cbr.ru/analytics/d_ok/dig_ruble/ (accessed on 10.02.2021).

It is possible to cite a large number of legal precedents on digital currencies in both international and Russian law enforcement practice, despite the lack of proper regulation of these issues in the legislation.

The first operation to confiscate bitcoins can be considered the liquidation by US law enforcement agencies of one of the largest anonymous digital drug markets SilkRoad. Its assets were sold at four bitcoin auctions for a total of US$ 30 million at the exchange rate for the period of transactions. Further, the seizure and sale of confiscated cryptocurrency in the United States have become commonplace.

In Russia, the decision of the Ninth Arbitration Court of Appeal, which in May 2018, considered the case on the sale of property in the event of personal bankruptcy, became a precedent. The court obliged the debtor to provide the bankruptcy administrator with access to the contents of the crypto wallet to be included in the bankruptcy estate and thereby recognized the cryptocurrency as property. In connection with the recommendations of the FATF (International Financial Action Task Force on Anti-Money Laundering), the plenary session of the Supreme Court in February 2019 ruled that Art. 174 and 174.1 of the Criminal Code on money laundering should also apply to cryptocurrencies.

We believe, the main method for implementing the mechanism for tracking, identifying, and confiscating digital assets should be international rules governing the control over the circulation and emission of cryptocurrencies. At the same time, it is required to develop and determine the legal status of virtual assets, as well as standards for determining the procedures associated with their turnover. Including for the implementation of the principles of confiscation, it is necessary to form official crypto accounts of government agencies, the procedure for storing the seized cryptocurrency, its implementation, since for the most part, it has great volatility, therefore it must be promptly converted into national payment instruments.

CONCLUSIONS

Having studied and summarized the practice given in the article on the formation and development of mechanisms for the system of seizure and recovery of assets, we can conclude that only the use of an integrated approach in identifying problems related to the confiscation and recovery of assets, especially in extrajudicial practice, a detailed study of this issue, the implementation of measures on the assessment of national risks and threats, the preparation and approval of new international legal acts in the field of combating money laundering and the financing of terrorism, as well as the strict implementation of their provisions at the national level will allow the global financial system to successfully confront new challenges.

The integration in this area will be determined by the system of cooperation between law enforcement agencies of states with commercial structures and, first of all, the credit and financial sector, auditors, arbitration managers, and specialists in internal control.

An urgent solution is required for financial and legal problems caused by the limited competence of law enforcement agencies to collect evidence abroad, as well as the need to overcome banking, commercial and other types of secrets protected by law, both on the territory of individual states and jurisdictions, and in cyberspace when using crypto-assets by the organized crime for their illegal purposes. This task will have to be performed in difficult conditions, given the fact that crypto-assets are increasingly being used and introduced into the system of legal economic relations and are becoming more available for citizens to use in their daily activities. To develop an effective economic and legal mechanism, it is necessary to harmonize the legislation

of the Russian Federation, to combine the efforts of law enforcement agencies and civil society in the search and punishment of those responsible for the illegal withdrawal and use of assets. The methods proposed in the article are of undoubted interest for law enforcement agencies, whose functions include countering the withdrawal of assets, detection, and recovery of illegally acquired or stolen assets, as well as for the private sector when conducting fraud investigations into the illegal withdrawal of assets.

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