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Reserve Currency Competition in a Polycentric World Financial System

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ABSTRACT

This research is devoted to the issues of reserve currency competition in the global financial system. The paper **aims** to investigate key sources of competitive advantages of reserve currencies in the context of the development of the global financial system towards currency multipolarity and assess how digital transformation can affect the drivers of reserve currencies' competitive positions in the global financial system. The author uses the following **methods** of scientific research: analysis, synthesis, abstraction, deduction, induction, and logical method. The article notes that the financial market capacity is the key factor of reserve currency competitiveness. The author emphasizes that monetary policy instruments that provide funding for financial institutions play a key role in strengthening reserve currency competitiveness in the global financial market. The author highlights that during the COVID-19 crisis monetary policy of the central banks that issue reserve currencies stabilized the situation in the world financial system and strengthened the positions of the major reserve currencies in the global financial market. The author notes that the increase of monetary policy cooperation between central banks points to the evolution of the world financial system towards currency multipolarity. The research emphasized that the development of ecosystems driven by digital transformation can significantly affect the competitive positions of currencies in the global financial system. The author **concludes** that the global financial system is evolving towards currency multipolarity meaning that the US dollar will remain a leading reserve currency and at the same time other reserve currencies will likely play a bigger role. **Further research** of currency competition problems may investigate the impact of digital transformation on competitive positions of reserve currencies in the global financial system.

Keywords: global financial system; currency competition; global financial market; international foreign exchange reserves; monetary policy; digitalization; central banks; reserve currencies; global banking system; currency multipolarity

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INTRODUCTION

The development of the world economy in the last decade has been characterized by an increase in the role of developing countries. It can be argued that economic growth in emerging countries has become one of the important drivers of the development of the world economy. At the same time, advanced economies continue to play a leading role in the modern global financial system. The state of the world financial system is still determined by the situation in the financial markets of the leading advanced economies.

The development of the global financial system in modern conditions is complex and contradictory. Digitalization processes have a significant impact on the global financial system. The digitalization of the global financial system is reflected in the widespread use of mobile banking technologies, the development of the business of fintech companies, the robotization of financial services, the use of remote customer identification technologies based on biometrics, as well as the development of financial business based on ecosystems. Technological innovations based on the use of digital technologies have significantly improved the quality of payment and settlement services through the introduction of online payments, providing opportunities for P2P and P2B transfers, as well as creating additional opportunities for making payments and transfers using mobile devices. The profound changes taking place in the global financial system under the influence of digitalization processes have contributed to improving the

quality and accessibility of financial services, as well as the emergence of new financial products that meet the needs of business entities. The state of the financial markets of advanced economies is characterized by a favorable environment, formed largely under the influence of significant support measures of monetary policy. Capitalization of the stock markets of the largest developed countries has grown significantly in recent years and are close to their historical highs.

At the same time, the modern world financial system is characterized by serious problems associated with an increase in the debt burden of the largest sovereign borrowers, an increase in the budget deficit of advanced economies, and an increase in volatility in the global foreign exchange market. A serious problem facing the advanced economies is the exacerbation of the problem of social inequality, which in the long run can lead to the loss of competitive advantages by the economy. In addition, further intensification of contradictions and conflicts between countries, in particular the US and China, can significantly affect the state of the global financial system.

Despite the end of the acute phase of the crisis caused by the coronavirus pandemic, the consequences of the restrictive measures introduced to combat the spread of infection have not yet been overcome and continue to have a negative impact on the industry and services of developed countries.

Consideration of problems related to the assessment of the role of the world's leading currencies in the global financial system and competition between them is the subject of research by Russian and foreign authors [1–6]. Among researchers considering the problems of currency competitiveness, there is no consensus on the effectiveness of the functioning of the global monetary and financial system, the vector of its further development and the features of currency competition at the present stage. Many issues related to the role of central banks in ensuring the competitive advantages of the currency in the face of increased international currency competition remain unresolved. The problems of digitalization of the financial sector in the context of solving the problem of increasing the competitiveness of the currency require further research. Issues related to the peculiarities of the development of the financial systems of the largest economies and the peculiarities of competition between the leading world currencies are of particular relevance in the context of the ongoing processes of digital transformation of the financial systems of the largest developed countries and the global financial system. The relevance of the research topic is also due to the need to identify key factors for the competitiveness of the world's leading currencies in the context of digitalization of the global financial system and overcoming the consequences of the coronavirus crisis. This paper is devoted to identifying the key factors in the competitiveness of currencies in the context of the polycentric development of the global financial system, as well as analyzing the processes of digital transformation in the context of the problems of international currency competition.

THE CONCEPT OF CURRENCY COMPETITION AND THE MAIN FACTORS DETERMINING THE COMPETITIVENESS OF A CURRENCY AT THE PRESENT STAGE OF DEVELOPMENT OF THE WORLD FINANCIAL SYSTEM

Currency competition is a complex, contradictory and multifaceted phenomenon, and when assessing it, it is important to take into account a significant number of factors. Despite the importance of economic factors in the competitiveness of currencies, it is also important to consider social, political, technological and behavioral aspects, which, according to the author, significantly affect the competitive position of the world's leading currencies.

The author considers currency competition as a dynamic process of rivalry between states or integration associations seeking to achieve and maintain the leading position of their currencies in the global financial system. For the global financial market participants, the competitiveness of a currency is determined

by its obvious advantages over other available currencies. The competitiveness of the currency is understood as the compliance of the currency with the criteria desired by the participants of the global financial market, allowing it to occupy a leading position in the global financial system.

Factors that determine the competitive advantage of a currency include:

- the capacity of the national financial market and the variety of instruments traded on it, considering the needs of financial market entities;
- the relative interest of companies and banks in attracting funding in the currency in question;
- the quality of the ongoing economic policy that promotes the development of the financial market while ensuring financial stability;
- level of development of the national payment system;
- share of the state or integration association in world trade;
- the rate of economic growth compared to other countries issuing reserve currencies;
- the capacity of the domestic market and the solvency of consumers.

When evaluating the role of currency in the system of international financial relations, the prevailing preferences of financial market participants regarding the choice of reserve currencies, which are characterized by a high share of inertia [7], are also important.

The competitiveness of a currency is an objective category and can be determined using a system of quantitative and qualitative indicators. These indicators include:

- the share of the relevant currency in international reserves;
- the volume of transactions with this currency in the world financial market;
- indicators of capitalization of stock and bond markets;
- volumes of issue of financial instruments denominated in the relevant currency;
- indicators characterizing the use of the currency in the implementation of foreign trade operations between countries.

In addition, important indicators characterizing the competitiveness of the currency are indicators characterizing the attraction of funding in the relevant currency by credit institutions and companies.

In addition to quantitative indicators that characterize the role of the currency in the global financial system, qualitative indicators are important, the key of which is the confidence of market participants in the economic policy pursued by national regulators, as well as the confidence of market participants in ensuring financial stability in the long term. Confidence is a subjective and ambiguous characteristic that is difficult to assess. According to the author, one of the possible approaches to assessing the degree of confidence of market participants in the ongoing economic policy is the cost of a credit default swap on government bonds. The low prices for these instruments reflect the high degree of market participants' confidence in the policy pursued by the monetary authorities of countries issuing reserve currencies.

An important consequence of the competition between reserve currencies is the high efficiency of the monetary policy pursued in these countries, which ensures financial stability and creates favorable conditions for the development of financial markets. Competition enhances the quality of policy, as the credibility of the financial system and the ability to adhere to policy objectives in the long term are important to market participants.

ASSESSMENT OF THE ROLE OF MAJOR RESERVE CURRENCIES IN THE WORLD FINANCIAL SYSTEM

The development of the global financial system at the present stage is characterized by a hierarchy of reserve currencies, which can be divided into three groups.

The first group includes the US dollar, which retains the status of the world's leading reserve currency.

The second group includes the euro, which also plays an important role in the global monetary and financial system, but is significantly inferior in importance to the US dollar.

The third group of world reserve currencies includes the British pound sterling, the Australian dollar, the Japanese yen, the Canadian dollar, the Swiss franc and the Chinese yuan. The reserve currencies belonging to this group also play an important role in the global financial market, but they are significantly inferior to the US dollar and the euro in terms of their importance. At the same time, in recent years there has been a slight increase in the value of reserve currencies of the second and third groups, which is manifested in an increase in international settlements carried out with their help, an increase in the capitalization of national stock markets, an increase in the volume of reserves placed in these currencies, as well as an increase in the supply of financial instruments expressed in those currencies. In addition, the inclusion of the Chinese yuan in the SDR currency basket and the conclusion of currency swap agreements by the People's Bank of China with the central banks of a number of countries helped strengthen the positions of the Chinese yuan to a certain extent in the global financial system.

The leading position of the US dollar in the global financial system is due to a number of factors. In particular, the implementation of settlements in US dollars for foreign trade operations is an important channel for the spread of the dollar and one of the factors explaining its leading role. The implementation of settlements in US dollars under foreign trade contracts creates the preconditions for an increase in demand for US dollar funding from companies and banks, stimulates demand for assets denominated in US dollars, and also dictates the need for operations on the derivatives market to manage the currency risks. In addition, the availability of US dollar funding creates favorable conditions for using the dollar as a settlement currency in foreign economic activity. Thus, the role of the US dollar as a currency for settlements under foreign trade contracts and the role of the US dollar as a key currency in transactions on the global financial market are closely related. The use of the US dollar in settlements for foreign trade transactions stimulates its use in making transactions in the global financial market, but at the same time, the key role of the US dollar in making financial transactions in the international currency and securities market creates additional prerequisites for the use of the US dollar in concluding foreign trade contracts. This conclusion is consistent with the results of the studies [8, 9].

One of the key indicators confirming the leading role of the US dollar in the global financial system is the share of the US dollar in the world's foreign exchange reserves. The US dollar also remains the most traded currency in the international foreign exchange market. According to the International Monetary Fund (IMF), transactions with the US dollar account for more than 44% of the trade turnover in the world currency market [10]. Debt instruments denominated in US dollars play the most significant role in the structure of the international debt market.

In addition, an important indicator that characterizes the competitive advantages of a reserve currency for participants in the global financial market is the volume of lending to non-bank foreign borrowers in the respective reserve currencies. This indicator characterizes the degree of convenience of using the reserve currency for companies in the non-financial sector, the depth of the national financial market, as well as the level of development of its infrastructure. *Table 1* shows that the US dollar remains the most popular foreign currency for non-banking organizations to attract credit resources in the international financial market.

A slight decrease in the percentage share of the US dollar in world reserves does not allow us to conclude that its role in the global financial system is significantly reduced and is due to objective needs for the diversification of accumulated reserves. In recent years, there has been a trend towards an increase in the volume of accumulated US dollar reserves in absolute terms (*Fig. 1*). At the same time, the assessment of the role of the currency only on the basis of international foreign exchange reserves does not provide an exhaustive picture of its role in the international financial market.

Table 1

Credit to non-bank foreign borrowers denominated in the following reserve currencies

year	US		Euro area			Japan		
	USD bn	%*	EUR bn	USD ** bn	%*	JPY bn	USD** bn	%*
2014	9,390	17.88	2,310	2,804	8.01	46,811	391	2.37
2015	9,920	18.12	2,479	2,699	8.36	45,339	377	2.28
2016	10,449	18.27	2,604	2,744	8.58	42,065	359	2.06
2017	11,115	18.61	2,897	3,475	9.30	44,250	393	2.14
2018	11,559	18.40	3,148	3,605	9.89	48,679	443	2.31
2019	12,113	18.43	3,324	3,734	10.09	48,359	446	2.24
2020	12,725	17.43	3,445	4,227	9.67	48,789	473	2.13
2021***	13,054	17.58	3,485	4,086	9.70	46,436	419	2.04

Source: compiled by the author based on the statistical data provided by the Bank for International Settlements (BIS). URL: https://www.bis.org/statistics/gli.htm?m=6%7C 333%7C 690 (accessed on 10.11.2021).

Notes: * — as a % of total credit to non-financial borrowers; ** — calculated using exchange rates at the end of each period, URL: https://www.bis.org/statistics/xrusd.htm?m=6%7C 381%7C 675; *** — as of Q1 2021.

As an estimate characterizing the role of the reserve currency in the international financial market, the author proposes an indicator equal to the volume of foreign exchange reserves placed in the corresponding reserve currency and the value of claims of international banks in this currency (Y).

The indicator of the value of international banking claims characterizes the value of assets in the corresponding reserve currency held by non-resident banks. This indicator allows assessing the significance of the reserve currency for the international banking system, as well as assessing the extent to which this currency is used by non-resident banks in the international financial market. In addition, this indicator shows the role of currency in world trade, since the presence of such assets in banks is due, among other things, to their servicing of clients engaged in foreign economic activity. A change in the volume of foreign exchange reserves placed in the corresponding reserve currency makes it possible to assess the demand for this currency from central banks when they form foreign exchange reserves. Thus, the proposed indicator allows assessing the degree of competitiveness of the reserve currency in the international financial market, considering the demand for it from credit institutions and central banks.

It seems appropriate to separately consider this indicator for the US dollar, given its key role in the international financial market. The data characterizing the dynamics of the calculated indicator for the US dollar indicate that the US dollar remains the key currency in the international financial market over the period under review and the US dollar has competitive advantages over other reserve currencies (*Fig. 2*).

The use of regression analysis made it possible to identify the trend component of the growth of the indicator under consideration for the US dollar, which is described by the equation of a log-linear time trend $\ln y = at + b$. The resulting regression equation is:

$$\ln(Y_{USD}) = 0.01117442t + 16.56552494,$$

where t — the time period.

The regression analysis data presented in *Fig. 3* confirm the significance of the obtained trend equation and its applicability to the considered data.

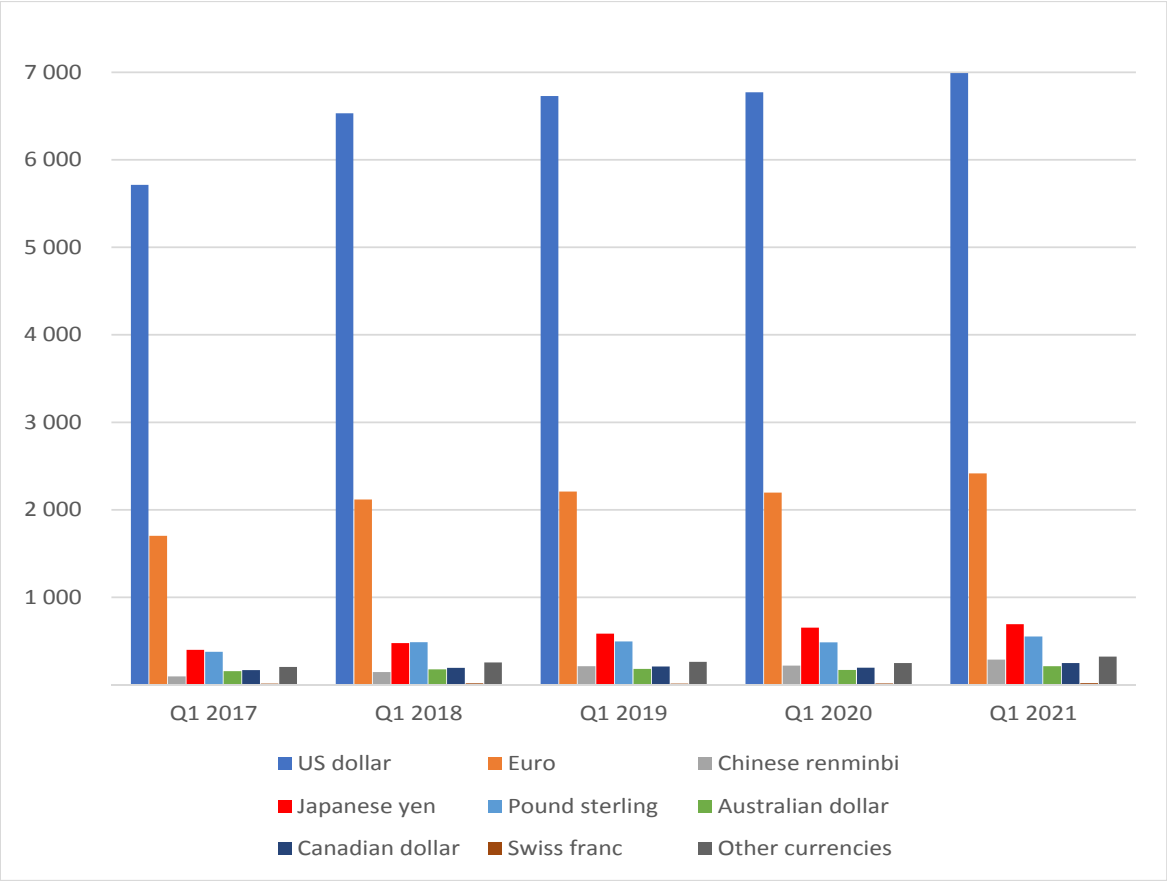

Fig. 1. **Composition of the international foreign exchange reserves by selected currencies, billion US dollars**

Source: compiled by the author based on IMF data. URL: https://data.imf.org/regular.aspx?key=41175 (accessed on 10.11.2021).

The stable growth of this indicator for the US dollar is due to the constant growth of US dollar assets of banks outside the US. This trend points to the growing importance of the US dollar to non-US lenders and to the key role of US dollar asset markets in the international banking system. The data obtained also testify to the inertia of the preferences of the participants in the international financial market regarding the choice of currencies for transactions, which is manifested in the preservation of the key role of the US dollar. These conclusions are consistent with the results of studies [11–13].

As part of the polycentric development of the global financial system, the US dollar is likely to retain its status as the world's main reserve currency. At the same time, as the volume of accumulated reserves grows, the volume of portfolios of participants in the global financial market increases and global trade grows, the need for diversification of foreign exchange assets will increase and thereby create prerequisites for some increase in the role of the euro, the British pound, the Australian dollar, the Canadian dollar and the Japanese yen. An important prerequisite for increasing the role of these currencies is the growth of their liquidity. In particular, the further strengthening of the role of the euro in the global financial system implies the completion of the formation of a single financial market and a single banking system in the euro area. The formation of a single financial market in the Eurozone will help increase its liquidity, increase the supply of financial instruments denominated in euros, as well as further develop the market for securitization products. An additional factor in strengthening the position of the euro could be the development of digital infrastructure, including the development of global ecosystems based on European business, as well as the improvement of digital technologies for making payments and settlements. In addition, the growth in the use of the euro in the

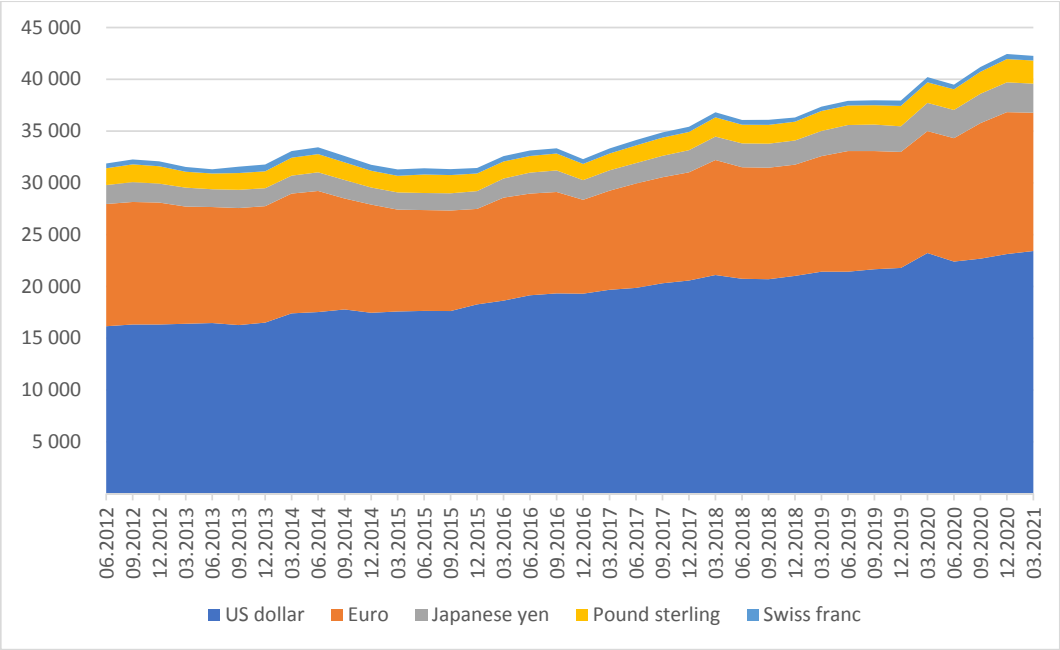

Fig. 2. **The role of selected reserve currencies in the global financial market, billion US dollars**

Source: compiled by the author based on the data from BIS, IMF. URL: https://www.bis.org/statistics/bankstats.htm?m=6%7C 31%7C69; URL: https://data.imf.org/regular.aspx?key=41175 (accessed on 10.08.2021).

Regression Statistics	
R Square	0.9804
Adjusted R Square	0.9798
Standard error	0.0169
Observations	36

	df	SS	MS	F-test	p-value for F test
Regression	1	0.48511	0.48511	1699	$1.29145 * 10^{-30}$
Residual	34	0.00971	0.00029		
Total	35	0.49482			

Coefficient	Coefficient value	Standard error value for the coefficient	Student's t-test for the coefficient	p-value for the coefficient
b	16.56552494	0.00575133	2880.29	$3.52586 * 10^{-93}$
a	0.01117442	0.00027107	41.22	$1.29145 * 10^{-30}$

Fig. 3. **Data of regression analysis of the indicator equal to the size of foreign exchange reserves and the value of claims of international banks for the US dollar (Y_{USD}) from 30.06.2012 to 31.03.2021**

Source: compiled by the author based on the data from BIS and IMF using Microsoft Excel. URL: https://www.bis.org/statistics/bankstats.htm?m=6%7C31%7C69; https://data.imf.org/regular.aspx?key=41175 using Microsoft Excel (accessed on 10.08.2021).

international financial market will be facilitated by a stimulating monetary policy that ensures the growth of final demand and an increase in the capacity of the financial market.

The development of the global financial system towards multipolarity will help increase its stability, create additional investment opportunities for market participants, as well as develop the infrastructure of the global financial market.

IMPACT OF MONETARY POLICY ON CURRENCY COMPETITIVENESS IN THE CONTEXT OF POLYCENTRIC DEVELOPMENT OF THE WORLD FINANCIAL SYSTEM

With the dynamic development of financial markets and the increasing importance of the financial sector for economic growth in developed countries, the policies pursued by the central bank are critical to ensure and maintain the competitiveness of the currency. The central bank influences the competitiveness of the currency in several key areas, the most important of which is monetary policy, as well as policies aimed at developing financial market infrastructure and introducing innovative financial technologies.

The effectiveness of the monetary policy of the central bank is determined by the degree to which the objectives of the policy are achieved and its validity in terms of creating favorable conditions for economic development. The inflation rate is a key benchmark in the conduct of the monetary policy of developed countries. In addition, the level of employment is also considered an important indicator characterizing the degree of effectiveness of the monetary policy. In a broader context, ensuring and maintaining financial stability is a strategic goal and at the same time the most important criterion for the effectiveness of the ongoing monetary policy [14–16]. Violation of financial stability inevitably means the loss of the competitive advantages of the currency.

Considering the leading role of the US dollar in the global financial system, the US Federal Reserve's approach to assessing financial stability risks deserves special attention. The US Federal Reserve identifies four groups of factors that could potentially lead to a violation of financial stability:

- excessive borrowing by business entities and growth in debt burden;
- "bubbles" in the market of financial assets;
- excessive leverage in the financial sector;
- possible deterioration of liquidity indicators of credit institutions.[1]

The complexity of assessing these factors lies not only in the fact that they are interrelated but also in the difficulty of identifying specific criteria that indicate an increase in certain risks. In particular, in practice, it seems very difficult to make an unambiguous conclusion about whether the growth in prices for financial assets is fundamentally justified or indicates the formation of a "bubble". In addition, the question of what level of the debt burden of business entities in the context of a high level of development of the financial system can actually be considered excessive, in many cases it is debatable and does not have an unambiguous solution. Consideration of financial stability issues in the context of determining the competitive advantages of world currencies involves specifying these factors and identifying key aspects of competitiveness that affect the appetite of global financial market participants for the world's leading currencies.

At the present stage, the monetary policy of central banks issuing reserve currencies is clearly stimulating. Monetary policy pursued by central banks combines keeping interest rates close to zero, buying assets in the securities market, and special funding programs [17, 18]. The implementation of quantitative easing programs by the world's leading central banks has led to a significant increase in their balance sheets, as well as indicators of the monetary base.

The coronavirus crisis has created serious risks for the competitiveness of the world's leading currencies, associated with widening spreads in corporate bond markets, as well as the prospect of disruption in the functioning of securitization markets and falling stock markets.

[1] Financial Stability Report. Board of Governors of the Federal Reserve System. May 2021. URL: https://www.federalreserve.gov/publications/files/financial-stability-report-20210506.pdf (accessed on 10.06.2021).

The use of monetary policy instruments made it possible to prevent the spread of the crisis [19]. The ultra-soft monetary policy pursued by the central banks of the countries issuing reserve currencies, both in the context of the global financial crisis and the current situation related to the spread of the coronavirus, was largely similar in nature and proved to be effective by creating additional prerequisites for the recovery of economic activity, increasing confidence in the financial system and strengthening the competitive positions of these currencies in the global financial system. In particular, the quantitative easing programs carried out by the ECB during the European debt crisis, as well as during the coronavirus pandemic, had a positive impact on the Eurozone economy and ensured an increase in investor confidence in the euro. Quantitative easing programs strengthened the competitive position of the euro in the global financial system and contributed to strengthening the financial stability of the Eurozone by creating additional conditions for lower government and corporate bond yields, as well as the growth of stock markets. The ECB's quantitative easing policy has provided additional liquidity to the securities market, boosted the confidence of economic actors in the eurozone financial system, and created additional competitive advantages for European companies and banks by reducing the cost of debt funding.

The quantitative easing programs implemented by the US Federal Reserve have also been successful both in terms of maintaining financial stability and restoring investor confidence in the financial system and in terms of creating favorable conditions for the recovery of the US economy in the post-crisis period.

Monetary policy by major central banks issuing reserve currencies has kept markets healthy and credit available to economic actors during the coronavirus crisis. An important result of the monetary policy of the world's leading central banks during the global financial crisis and the corona crisis was also the creation of additional conditions for changing the composition and structure of the portfolios of financial market participants in favor of more risky assets. The growth of risk appetite among the participants of the global financial market contributed to the stabilization of the credit market, the growth of demand for more risky assets, and also had a beneficial effect on the stock markets of countries issuing reserve currencies.

The positions of currencies in the international financial market are largely determined by the capacity of the financial markets of the respective countries or regional associations [20, 21]. Creating conditions for the development of the financial market, as well as for issuing a sufficient number of financial assets that are attractive investment objects and can satisfy the existing demand, is fundamentally important to ensure the leading position of the currency in modern conditions. In particular, the high capacity of the stock and bond markets is important in terms of ensuring a high level of competitiveness of the US dollar in the international financial market (*Table 2*). Strengthening the competitive positions of currencies requires leading central banks to pursue a monetary policy that contributes to increasing the capacity and depth of the financial market by ensuring high rates of GDP monetization, and developing funding instruments that allow access to liquidity in the respective currency, not only national but also foreign credit organizations.

A characteristic feature of the modern international financial market is a consistently high demand for bonds with high credit quality, due to the growth of assets of credit institutions and the increase in foreign exchange reserves of central banks. In works [22, 23] the authors note the shortage of bonds of a high-reliability category. High demand for this group of financial instruments stimulates the purchase of reserve currencies of countries with the largest financial markets and creates additional prerequisites for increasing their competitiveness.

The importance of expanding the capacity of financial asset markets determines the particular importance of not only the markets for government debt, stocks, corporate bonds, but also asset-backed bond markets. The effective functioning of the securitization market, especially mortgage securitization, can be considered as an important factor in

Table 2

Debt outstanding, equity outstanding and monetization of GDP for the countries issuing reserve currencies as of December 2020

	Bonds outstanding, billion USD	Government bonds outstanding, billion USD	Equity market capitalization, billion USD	Monetary aggregate M1 to GDP, %	Monetary aggregate M3 to GDP, %
USA	47,199	16,003.3	40,720	85	92
Eurozone	22,260	9,479.3	10,368	90	127
China	18,556	–	12,214	62	228*
Japan	14,670	8,377.6	6,718	173	275
UK	7,172	2,490.8	2,945	103	155
Australia	2,502	588.7	1,721	70	124
Canada	3,915	673.0	2,641	63	133
Switzerland	575	75.5	2,002	104	162

Source: compiled by the author based on the statistical data provided by the Organisation for Economic Co-operation and Development (OECD). DOI: https://doi.org/10.1787/data-00900-en; BIS. URL: https://stats.bis.org/statx/toc/SEC.html; World Bank Group. URL: https://data.worldbank.org/topic/financial-sector?view=chart; The Swiss National Bank. URL: https://data.snb.ch/en/topics/snb#!/cube/snbmonagg; The People's Bank of China, URL: http://www.pbc.gov.cn/diaochatongjisi/resource/cms/2021/01/2021011817552169087.htm (accessed on 10.08.2021).

Note: * — M2 to GDP is provided for China, %.

the competitiveness of the currency since this market segment creates additional prerequisites for the inflow of capital into the financial market and maintaining the demand for currency in the market in the long term.

A well-functioning securitization market makes it possible to create financial assets with attractive characteristics and thus attract investors interested in acquiring this asset type to the financial market. The use of securitization mechanisms also allows banks to increase lending without raising additional capital. The asset-backed bond market stimulates the development and growth of the household lending market, which is especially important for the largest economies with a high share of final consumption in GDP. For advanced economies that are issuers of the world's leading currencies, a high level of lending to the population contributes to the growth of the competitiveness of currencies by creating conditions for the growth of consumption and increasing the capacity of the domestic market.

The US securitization market is the largest in the world, the markets of other countries lag far behind it (*Fig. 4*). The high level of development of the asset securitization market is one of the factors that ensure the attractiveness of the US financial market and the leading position of the US dollar in the system of international financial relations.

The 2008 crisis development scenario also confirms the importance of this segment not only for the US economy but also for the global economy. Mortgage defaults, the securitization crisis and the resulting fall in residential real estate prices led to major disruptions in the mortgage securitization product market. The problems quickly spread to other segments of the financial market and led to the global financial crisis. In this context, it is also important to note that the monetary policy of the US Federal Reserve during the 2008 global financial crisis and the corona crisis contributed to the stabilization of the asset securitization market.

A reflection of the polycentric development of the global financial system is the development

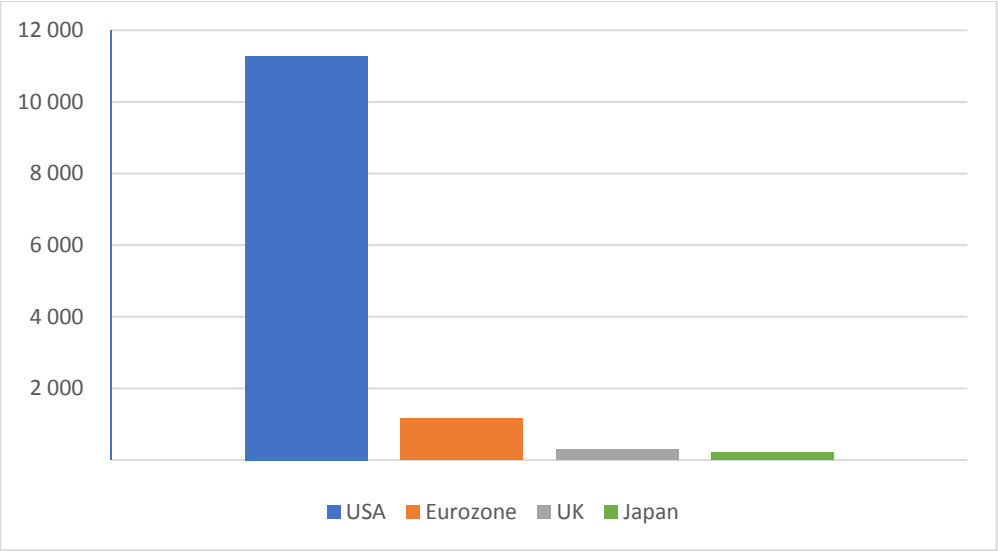

Fig. 4. **Largest global securitization markets based on issues outstanding as of Q1 2021, billion US dollars**

Source: compiled by the author based on the data from Association for Financial Markets in Europe. URL: https://www.afme.eu/Portals/0/DispatchFeaturedImages/AFME%20Q1%202021%20Securitisation%20Report%20v1.pdf; Japan Securities Dealers Association; https://www.jsda.or.jp/shiryoshitsu/toukei/doukou/files/2020doukou2bE.xls (accessed on 10.08.2021).

of cooperation between major central banks in conducting monetary policy. The basis for such cooperation is currency swap agreements. Swap agreements between central banks play a particularly important role during a crisis.

Periods of increased turbulence in the international financial market are characterized by an increase in demand for US dollar funding. This circumstance confirms the status of the US dollar as the world's leading reserve currency and also imposes the need for the US Federal Reserve to take into account not only the current state and prospects for the development of the US economy but also the situation in the international financial market and the needs of its participants in US dollar funding.

The US Federal Reserve actively used currency swaps as part of the fight against the 2008 crisis [24]. Swap agreements signed by the US Federal Reserve and major central banks helped reduce the cost of US dollar funding for credit institutions outside the US, became an additional factor supporting demand for dollar assets and reducing credit spreads, and also made an important contribution to strengthening the market participants' confidence in the US financial system [25]. In addition, these agreements contributed to the stabilization of the situation in the international financial market. The period of the acute phase of the crisis caused by the spread of the coronavirus disease was also characterized by a significant increase in demand for US dollar funding and an increase in its cost for credit institutions outside the United States. The Eurodollar market has demonstrated its vulnerability to deep crises, as a significant part of investors providing US dollar funding chose to reduce the size of funds placed in favor of more liquid assets of the highest reliability category, primarily short-term treasury bills. The conclusion about the presence of this pattern in the behavior of investors in the Eurodollar market was made on the basis of the work [26, 27].

At the time of the outbreak of the coronavirus crisis, a significant part of the US dollar funding in the international financial market was provided by non-US lenders. In addition, the largest credit institutions registered outside the United States held significant volumes of dollar-denominated assets on their balance sheets. Faced with the uncertainty associated with the spread of the coronavirus, companies and banks in the United States and countries that are major US trading partners have increased the demand for US dollar funding. At the same time, supply volumes decreased due to the transfer of

part of the portfolios to more liquid and reliable assets. A shortage of US dollar funding and an increase in its cost can provoke a sale of Us dollar assets, cause a significant drop in their prices, losses for credit institutions, and also lead to a decrease in the use of the US dollar in the international financial market.

The increase in international lending in US dollars, as well as the dependence of business entities outside the US on short-term US dollar funding, on the one hand, highlight the significant competitive advantages of the US dollar compared to other currencies on the international financial market, and on the other hand, impose the need for the US Federal Reserve to pursue an active monetary policy aimed at ensuring the availability of US dollar funding for banks and corporations outside the United States and maintaining the status of the US dollar as the main currency in the international financial market.

These circumstances explain the adoption by the US Federal Reserve of a wide range of measures aimed at ensuring the US dollar liquidity of foreign economic entities. During the 2008 global financial crisis and the corona crisis, the US Federal Reserve actively used swap agreements with key central banks to provide banks in the respective countries with additional US dollar liquidity. The importance of this tool is confirmed by its active use at the peak of problems with US dollar funding — the volume of US dollar liquidity provided through swaps by the US Federal Reserve reached $ 400 billion in March–April 2020 [28].

In addition to swaps, repo operations are another important channel for providing US dollar liquidity as part of the stimulating monetary policy pursued by the Fed. The liquid repo market plays an important role in ensuring the competitive advantages of the currency in the international financial market since repo transactions allow credit institutions to flexibly manage liquidity by attracting funding secured by securities. The repo market also allows credit institutions to create a leverage effect that increases the demand for financial assets and expands the capacity of securities markets denominated in the relevant currency.

To provide additional liquidity, the US Federal Reserve not only significantly increased the limits on repo operations, but also expanded the range of instruments used [29]. In the context of considering issues of currency competition, the FIMA (Repurchase Agreement Facility for Foreign and International Monetary Authorities),[2] program deserves special attention, which allows the central banks of other countries to enter into repo operations with the FRS secured by federal Treasury bonds stored in Federal Reserve Bank of New York.

The People's Bank of China, as part of its monetary policy, also actively uses currency swap agreements with central banks of other countries. According to the data, at the end of 2020, the People's Bank of China entered into more than 30 currency swap agreements [30]. These agreements allow foreign economic entities to access liquidity in yuan through the central banks of their countries and use the funds received to carry out the operations they need.

The conclusion of such agreements not only contributes to the growth of Chinese exports to the relevant countries but also ensures the growth of the competitive advantages of the yuan in the context of the multipolarity of the world monetary system. In addition, the conclusion of currency swap agreements will contribute to the further internationalization of the yuan and increase its role in the global financial system.

The policy pursued by the monetary authorities of China ensured the strengthening of the role of the yuan in the global financial market. At the same time, the Chinese yuan cannot currently be fully regarded as a currency capable of competing with key reserve currencies in the international financial market. China's share in world trade is much higher than the role played by the yuan in the international financial market. A further increase in its role is possible only in the event of further easing of restrictions on the movement of capital and the transition to a regime of free convertibility

[2] The Federal Reserve System. URL: https://www.federalreserve.gov/newsevents/pressreleases/monetary20200331a.htm (accessed on 10.08.2021).

of the yuan. In addition, the growth in the use of the yuan in the global financial system also implies an increase in the capacity of the Chinese financial market and liberalization of access to it for foreign investors.

The history of the development of the world financial system shows that the opportunities for cooperation between central banks in the implementation of monetary policy may be limited due to contradictions between them or differences in policy goals [31]. In addition, such cooperation is hindered by the existence of objective competition between the currencies and financial systems of countries and integration associations. At the same time, the cooperation of the world's leading central banks within the framework of swap agreements and repo operations in the course of a joint anti-crisis policy indicates both the key role of the US dollar in the modern global financial system and its polycentric development.

IMPACT OF DIGITALIZATION PROCESSES ON THE GLOBAL FINANCIAL SYSTEM AND OPPORTUNITIES FOR CHANGING CURRENT TRENDS

Digital transformation processes have a significant impact on the global financial system. An objective prerequisite for the rapid development of the processes of digitalization of credit institutions and the entry of fintech companies into the financial services market was consumer dissatisfaction with the quality and efficiency of traditional banking services [32]. The spread of coronavirus disease has accelerated the introduction of digital technologies and the digital transformation processes of credit institutions. The largest transnational banks consider digitalization to be the most important direction of their development.

The positions of credit institutions in the global financial market play a significant role in maintaining the competitive advantages of the currency. The digitalization of the global financial system has significantly increased the requirements for the speed, quality and convenience of services provided by credit institutions.

The improvement of customer-oriented business models by multinational banks based on the introduction of digital technologies allows them to increase the profitability of their business and gain additional competitive advantages in various markets. The global competitiveness of lenders is largely related to the ability to attract customers in the markets of various countries, offer financial products that meet their growing needs, as well as the ability to provide financial services based on advanced technologies.

The high competitiveness of credit institutions contributes to the development of the financial system of the state, the inflow of funds to the financial market, and also creates additional prerequisites for the growth of capitalization of the stock market and the growth of demand for the national currency. US lending institutions play a key role in the international financial market and are the largest providers of financial services. The high competitiveness of US credit institutions, due to the high credit ratings of international rating agencies, a stable financial position, as well as the high quality of their services in the international financial market are important to ensure the dominant position of the US dollar in the global financial system.

The development of the global financial system at the present stage indicates that the rapid introduction of innovative technologies leads to its profound changes, and also creates conditions for further changes in the business models of participants in the global financial market [33]. The processes of digital transformation of credit institutions and the global financial system in the future may affect the competitive positions of the world's leading currencies in the global monetary and financial system. In particular, the issuance of central bank digital currencies (CBDCs), improvements in payment and settlement technologies, and the development of ecosystems that enable the provision of both financial and non-financial services can help change the current situation.

Currently, all major central banks are at different stages of research into issues related to the issuance of digital money that meets the

needs of business entities in the context of accelerating the digitalization of the economy in developed countries [34]. The possible issue of CBDC can be seen as a response of central banks to the new needs of the digital economy in settlements and payments.

In particular, the possibility of issuing digital money with different characteristics is being considered by the European Central Bank,[3] the Bank of England,[4] the Bank of Canada,[5] the Bank of Japan,[6] the Swiss National Bank[7] and the Reserve Bank of Australia.[8] The People's Bank of China considers the study of the issue of the Central Bank of China one of the priority areas of its activity and was the first among the world's largest central banks to begin active testing of the digital yuan as part of a pilot project.[9] To date, the largest central banks have not made a final decision on the issuance of CBDC and their possible characteristics.

The issue of CBDCs will help accelerate the digitalization of the global financial system and the development of payment systems. The degree of influence of CBDCs on the financial system will be determined by their characteristics, as well as by how much new digital money will be in demand when making payments and settlements [35]. The possibility of issuing CBDC is considered in the context of increasing the competitiveness of the currency in the global financial system, developing payment and settlement systems, ensuring financial stability, improving the quality and availability of financial services, and stimulating competition among organizations providing financial services.

In case of the success of projects for the issuance of CBDCs, the competitive positions of the respective currencies may increase. CBDCs released in retail form, are potentially a convenient means for making payments and settlements within ecosystems.

The expansion of the business of the largest ecosystems can be seen as a factor that can have a significant impact on the development of the global financial system [36]. Ecosystem users gain access to unique combinations of products and services that create a competitive advantage for ecosystems and help them increase their market share [37]. The client-oriented development of ecosystems, as well as the availability of significant financial and technological resources at their disposal, create favorable conditions for their expansion in the world market. The global nature of the development of ecosystems, as well as the expansion of the range of goods and services offered, can provide additional support for digital currencies if they are used in them.

The use of CBDC in global ecosystems providing financial and non-financial services will not only provide additional demand for this currency but will also contribute to the development of the ecosystems themselves. Ecosystems created by the US and Chinese companies are not only world leaders in terms of the volume of operations, but also actively developing in foreign markets. The largest ecosystems include, in particular, US —Facebook, Alphabet, Amazon, Apple, Microsoft and Chinese — Alibaba, Tencent, JD.com.

The accumulated information about their customers allows companies, within the ecosystems they have created, to create financial and payment and settlement services that can

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[3] ECB. URL: https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210714~d99198ea23.en.html (accessed on 10.08.2021).

[4] Bank of England. Discussion Paper: Central Bank Digital Currency Opportunities, challenges, and design. 2020. URL: https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf?la=en&hash=DFAD 18646A77C 00772AF1C 5B 18E 63E 71F68E 4593 (accessed on 10.08.2021).

[5] Usher A. et al. Bank of Canada. The Positive Case for a CBDC. Staff Discussion Paper. 2021. URL: https://www.bankofcanada.ca/wp-content/uploads/2021/07/sdp2021–11.pdf (accessed on 10.08.2021).

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[7] Swiss National Bank. Press release. 10 June 2021. URL: https://www.snb.ch/en/mmr/reference/pre_20210610/source/pre_20210610.en.pdf (accessed on 10.08.2021).

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[9] Working Group on E-CNY Research and Development of the People's Bank of China. Progress of Research & Development of E-CNY in China. 2021. URL: http://www.pbc.gov.cn/en/3688110/3688172/4157443/4293696/2021071614584691871.pdf (accessed on 10.08.2021).

successfully compete with banking services. In particular, WhatsApp Pay allows individuals to make P2P transfers without commission; Alibaba has successfully entered the financial services market. The presence of various profitable lines of business hypothetically allows large technology companies in the ecosystems they have built to subsidize the provision of financial services at some point in order to continue their expansion in the international market [38].

Another possible option for the development of digital technologies in the field of payments and settlements in ecosystems is the use of stablecoins backed by fiat money. In particular, Facebook is considering issuing Diem, a stablecoin,[10] backed by fiat money. In particular, Facebook is considering issuing Diem, a stablecoin backed by the most liquid currencies. If a decision is made to launch a project, Diem stablecoins can be pegged either to one of the liquid currencies or to a basket of currencies. The use of stablecoins by the largest companies within the ecosystems and platforms they support can become an additional factor supporting the demand for currencies to which stablecoins are pegged.

Given these facts, we can conclude that the Chinese yuan and the US dollar can potentially benefit the most from accelerating digitalization processes towards the development of ecosystems, the issuance of digital currencies, as well as the creation of private digital assets used for settlements within the ecosystem. In this context, private digital assets are stablecoins backed by fiat money. Further expansion of global ecosystems to world markets and digitalization of financial systems may lead to a reduction in the use of national currencies in favor of digital currencies of the largest central banks or stablecoins accepted in ecosystems.

In the long term, we can expect a gradual change in the nature of international monetary competition due to the development of digitalization processes. Important factors determining the competitive advantages of currencies, in addition to those previously considered, will be the leadership of countries in the development of global ecosystems and the possibility of using the corresponding digital currencies or digital assets linked to certain currencies in them. Leading positions in the global financial system will be occupied by the currencies of countries that are world leaders in the development of global ecosystems and in terms of the degree of integration of their currencies into them.

CONCLUSIONS

The article examines the current problems of the competitiveness of reserve currencies. To assess the role of reserve currencies in the global financial system, an indicator is proposed that is calculated as the volume of foreign exchange reserves placed in the corresponding reserve currency and international banking claims in this currency. The world financial system is developing towards currency multipolarity, which is manifested in the increasing role of the euro, the British pound sterling, the Australian dollar, the Canadian dollar, and the Japanese yen while maintaining the leading role of the US dollar in the international financial market.

The capacity of the national financial market is becoming an increasingly significant factor in the competitiveness of the currency. Significant demand for financial assets with high credit quality provides demand for reserve currencies and is an important factor explaining the leading position of the US dollar in the global financial system. The article shows that in addition to the bond and stock markets traditionally considered in this context, the securitization market is of paramount importance. The ability to meet the demand for assets with the characteristics desired by investors becomes a key factor in the competitiveness of a reserve currency.

Monetary policy is an important tool for ensuring the competitiveness of the currency in the context of the polycentric development of the global financial system. During the corona crisis, the monetary policy pursued by central banks issuing reserve currencies was proactive and helped strengthen the positions of these currencies in the international financial market.

[10] Diem. URL: https://www.diem.com/en-us/learn-faq/ (accessed on 10.08.2021).

The availability of affordable funding instruments from the regulator is necessary to ensure the competitive advantages of the currency. Monetary policy, which creates conditions for increasing the capacity and depth of the financial market, creates favorable conditions for increasing the competitiveness of the currency in the international financial market. The implementation of a policy that ensures the strengthening of the role of the currency in the international financial market involves not only assistance in creating a favorable environment for issuers to enter the securities market, but also the development of refinancing instruments in the direction of providing liquidity to foreign credit institutions through repo operations and currency swaps.

The conclusion of the US Federal Reserve with the largest central banks of currency swap agreements indicates the expansion of cooperation between central banks in conducting monetary policy and is an objective reflection of the multipolarity of the global financial system. In addition, the conclusion of such agreements confirms the key role of the US dollar in the global financial system.

The acceleration of digitalization processes in the global financial system can affect not only the competitive positions of individual reserve currencies but also the factors of competitiveness of currencies in the global financial system. The scale of the business of the largest ecosystems and the prospects for their expansion into international markets make it possible to consider the degree of development of national ecosystems as a new factor in the competitiveness of the currency in the global financial system. The current trajectory of the expansion of the largest ecosystems allows us to draw a conclusion about the potential benefits for the US dollar and the Chinese yuan from the development of digitalization processes in the global financial system.

The capabilities of ecosystems, allowing them to meet the growing needs of economic entities in financial and non-financial services on a global scale, will provide key positions for the currencies of countries leading in the development of ecosystems. Due to the significant benefits of ecosystem development, countries issuing reserve currencies should adopt an approach that combines the creation of a favorable regulatory environment for the development of national ecosystems, protecting the interests of end consumers and stimulating competition. The possible use in ecosystems of digital currencies of central banks or stablecoins pegged to reserve currencies will provide additional demand for these currencies and create competitive advantages for them.

The strengthening of currency competition in the context of the multipolarity of the world economy is in the interests of consumers of financial products and services, contributes to an increase in the speed of the introduction of financial innovations, and also creates additional prerequisites for improving the quality of the economic policy pursued.

Further evolution of the global financial system towards multipolarity will increase its resistance to crises. The competition of reserve currencies in the context of the multipolarity of the global financial system will contribute to an increase in the supply of financial instruments of a high-reliability category, which, in turn, will create additional opportunities for diversifying market portfolios of participants, reducing the role of the US dollar in the international financial market by increasing the share of other reserve currencies, as well as the development of the international financial market.

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Income and Wealth Distribution in the European Union and Russia: Comparative Analysis

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ABSTRACT

The subject of the study is the features of economic relations between income and wealth distribution/redistribution in Europe and Russia from the perspective of the need to overcome excessive socio-economic inequality. **The aim** of the article is to determine the level of existing socio-economic inequality, to make cross-country comparisons of income and wealth differentials in society, and then to substantiate the possibilities of applying the best practices of foreign countries to reduce socio-economic inequality in Russia. **The methods** of research are philosophical (dialectical, critical), general scientific (methods of scientific abstraction, the unity of the historical and logical, analysis and synthesis, induction and deduction, analogy, classification), private scientific (economic and mathematical, statistical, functional). **The theoretical significance** of the study lies in the development of the theory and methodology of A. Ya. Kiruta and A. Yu. Shevyakov on excessive inequality. The recommendations proposed by the authors to reduce excessive inequality in Russia represent **the practical significance**. The study shows that the EU countries, which are characterized by smooth income distribution, are extremely unequal in wealth distribution. The Russian economy has excessive levels of inequality in terms of both income and wealth. At the same time, there is a polarization of Russian society and a concentration of income in the hands of the upper percipient. The Gini coefficient, the Kaitz index, and the ratio of median and minimum wages demonstrate the extreme degree of inequality in income distribution among Russians. The research investigates the losses from existing levels of inequality in the EU countries and Russia through changes in human development indices. The authors **conclude** that socio-economic policy aimed at reducing excessive inequality in Russia should be based on the principle of social federalism. Russia needs a comprehensive strategy to combat social stratification and a consistent policy aimed at the formation of a full-fledged middle class. The authors consider it necessary to introduce in Russia a non-taxable minimum income tax, a progressive scale of gift and inheritance taxes, and the introduction of a new wealth tax.

Keywords: income and wealth distribution; income concentration; socio-economic inequality; Gini index; inequality-adjusted human development index; redistribution policy

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INTRODUCTION

The problem of socio-economic inequality today is the cornerstone in matters of ensuring further economic growth. In the global economy since the 1980s, despite deep global and local crises, global economic growth was observed due to the development of scientific and technological progress, the breakthrough of certain emerging economies, globalization processes and many other reasons. However, as the President of the Russian Federation V.V. Putin rightly noted at the World Economic Forum in Davos on January 27, 2021, "the main question…what was the nature of this global growth, who benefited most from it?"

Differences in the socio-economic situation of individual countries and social groups, observed against the backdrop of global economic growth, emphasize the unevenness and heterogeneity of such development. These disproportions were especially acute in Russia. Since the 1980s, the share of income in the top decile in Russia has increased exponentially. According to the growth rate of the income share of the top 10% in 1980–2018 Russia was 2–5 times ahead of the USA, China, as well as the countries of Northern and Western Europe in terms of growth rates.

The Oxford Committee for Famine Relief (Oxfam), which annually releases reports on inequality, timed to coincide with the World Economic Forum in Davos in January 2021, presented the report "The Inequality Virus".[1]

The report, based on the expert opinions of 295 leading world economists (including J. Sachs, G. Zukman) from 79 countries, states that the COVID-19 pandemic has caused increased inequality in the vast majority of countries. The report cites the following data: the share of the poor is recovering to the pre-pandemic level 14 times slower than the capital of the richest people on the planet. At the same time, the report focuses on gender and racial inequality. For example, in Brazil, the risk of death from coronavirus disease in African Americans is 40% higher than in the white population. In the US, the number of African American deaths from coronavirus is 22,000 more than the number of deaths among the white population.

Analysts emphasize that most of the wealth is currently concentrated in the hands of men. This is evidenced by reports published by Oxfam in previous years: only 26 people in the world (mostly men) own the same wealth as people in the bottom 50% of the world's population (about 3.9 billion people).

The bottom income decile has been hit hard by the pandemic, with COVID-19 morbidity and mortality rates among the poor higher than those in the middle class. This applies even to advanced economies (Great Britain, France, Spain). Branko Milanovic's research confirms that in societies with a constant average income, epidemics are negative forces of inequality (i.e., reinforce it) [1].

Unfortunately, empirical evidence suggests that over the past 30–40 years, the problem of socio-economic inequality has become the most obvious threat to economic and social security not only for the countries of the "third world", but also for industrialized countries [2].

The free movement of labor and the "open door" policies pursued until recently by many countries have resulted in more than half (60%) of the extremely poor living in middle-income countries and above. The stronghold of social stability — Western Europe — is currently experiencing a socio-economic crisis that exacerbates the "North-South" problem (the countries of Northern Europe are more prosperous and free from the difficulties inherent in Southern Europe — unemployment, extreme poverty, crime, high public debt, etc.) and increases the deprivation of certain segments of the population of access to basic social services (primarily for migrants, women and households at risk of poverty).

In the United States, by 2016, inequality had reached the level of the Civil War of 1861–1865; by 2020 the situation has not changed [3].

Analysts of the information agency "RosBusinessConsulting" state that the level of

[1] The Inequality Virus. The Oxford Committee for Famine Relief Report. Oxfam International. URL: https://www.oxfam.org/en/research/inequality-virus (accessed on 15.02.2021).

socio-economic inequality in Russia in 2018 reached a state characteristic of Tsarist Russia in 1905,[2] and continues to grow. In other words, with such disproportions in the distribution of income in Russian society, a social explosion occurred just over a hundred years ago (first the First Russian Revolution, and then the October Revolution).

At present, the public, the government of countries and the scientific community are faced with the question of finding ways to eliminate and increase excessive inequality. As the experience of European countries shows, one redistributive mechanism is not enough to solve a multifaceted and deep problem. Within the modern development model (based on the monopoly-oligopolistic position of leading corporations lobbying their interests in the governments of countries), there are prerequisites for further polarization of society and oppression of the interests of the lower strata of the population (income from capital accumulates faster than income from labor). The specificity of the Russian development model lies in the fact that such corporations are concentrated in the oil and gas sector, which increases disproportions in both sectoral and regional development, and the quality of economic management institutions deteriorates with distance from the center.

The proposed working scientific hypothesis is based on the fact that a competent combination of active social policy, the principle of social federalism and the redistributive mechanism can reduce the level of excessive socio-economic inequality in the country. In this regard, the aim of the work is to identify the causes and level of the prevailing socio-economic inequality, conduct a cross-country comparison of the differentiation of society in terms of income and wealth, followed by substantiation of the possibilities of applying the best practices of foreign countries to reduce the level of socio-economic inequality in Russia.

LITERATURE REVIEW

The first attempts to comprehend the causes of social inequality in society were made back in the Middle Ages in the context of a religious worldview, and for the first time in Western literature, inequality in the socio-economic aspect is most specifically mentioned in the works of J.-J. Rousseau. The thinker saw the reason for social inequality in private property [4], and in the book "Discourses on the beginning and foundation of inequality between people", he proposed a classification of social inequality into natural (or physical) and conditional (i.e. political) [5].

Domestic thinker and philosopher I. T. Pososhkov outlined the problem of inequality in the "The book of poverty and wealth" published in 1724, the main idea of which boils down to the need for economic equality among the population of Imperial Russia [6].

Born in the 18th century the school of Utopian socialism, which entered into an ideological struggle with representatives of classical political economy, insisted on the need for social protection for the poor.[3]

The Marxist theory raises questions of social and class equality, which is reflected in the works of K. Marx [7] and F. Engels [8]. The scientists formulate the theory of class struggle. The ideas of Marxists about class inequality and the relations of production underlying it were developed in their writings by the American scientist E. O. Wright [9].

A fundamentally new view of the nature of socio-economic inequality was proposed by the American scientist S. Kuznets in 1954 when he made a report at a meeting of the American Economic Association [10]. The scientist formulated the so-called "fundamental Kuznets law", which is graphically interpreted as an inverted U-shaped curve [11], reflecting the relationship between the level of socio-economic inequality and the country's economic development. According to the classic, as soon as a country reaches a certain high level of development, the trend

[2] Experts recognized inequality in Russia as comparable to 1905: RBC. URL: https://www.rbc.ru/economics/16/12/2017/5a33e2fc9a79471b6d846e24 (accessed on 15.02.2021).

[3] Tutov L. A., Philosophy and methodology of science. Textbook. Moscow: INFRA-M; 2019. 386 p.

of increasing the degree of socio-economic inequality turns in the opposite direction and begins to have a downward trend. In other words, in order for inequality in society to begin to decrease, it is necessary to achieve a significant degree of economic development.

Since then, many attempts have been made to establish the relationship between inequality, growth, demography, the level of development of the country and its stability [12].

A significant contribution to the development of the theory and methodology of socio-economic inequality was made by the French economist Th. Piketty, who refuted the hypothesis of S. Kuznets in his study.

Th. Piketty came to the conclusion that modern capitalism is a rentier economy [13]. At the same time, the scientist notes that in a number of countries (for example, in France) there has been a transition from a superrentier society (when the owner of the property receives an annual rent sufficient to live on it; this society is characterized by an excessively high degree of inequality of income from property and income from labor) to a less extreme form of rentier society (due to the fact that the incomes of top managers exceeded the incomes of rentiers due to the fall of the latter).

Th. Piketty is at the origins of the World Inequality Lab, which operates on the basis of the Paris School of Economics at the Berkeley Institute. F. Alvaredo,[4] G. Zukman [14], E. Saez [15], who specialize in studying the distribution of income and wealth in the world, within countries and between them, work under the guidance of an outstanding economist.

In his new book "Capital and Ideology", Th. Piketty focuses on the institutional and ideological reasons for the rooting of inequality in the world, arguing that each society justifies its own inequality — this is how various economic and social rules arise, designed to strengthen the established order of things, reinforcing this conclusion by the following example: Soviet leaders simply replaced one type of inequality (income from capital) with another — access to valuable goods [16].

Fundamental and applied studies of inequality in the 20th century are recorded in the works of J. Sachs [17], P. Krugman [18], J. Stiglitz [19, 20]. In the works of the latter, the "problem of one percent" and the objectivity of measuring the level of socio-economic inequality are raised.

Domestic scientists who focused on the problem of inequality A. Ya. Kiruta, A. Yu. Shevyakov introduced into scientific circulation the categories of normal (fair) and redundant (aggravating contradictions) inequality [21].

The problem of socio-economic inequality today worries many researchers, various expert assessments of the state of inequality in society are given, and the need to eliminate excessive inequality is declared. But scientists argue about ways and tools to achieve normal inequality: some see a way out in strengthening the role of the redistributive mechanism and imposing a tax on the rich (Th. Piketty and his associates), others (J. Stiglitz) — in changing the country's political course (in relation to the United States), Russian scientists — in strengthening the role of social policy and pension reform [22].

Academician S. Yu. Glaz'ev sees the reason for the blatant level of inequality in the country in the archaic nature of the technological structure of the Russian economy and links the decrease in the level of inequality with the technological modernization of the economy and institutional reforms [23].

Among the consequences of an unfair and uneven distribution of income may be a deterioration in the quality of economic growth and human capital, an increase in the deprivation of certain segments of the population of basic goods and services, a deterioration in the investment climate, social and political instability [24].

In connection with the above, the study of the experience of foreign countries that have reached and maintain the level of socio-economic inequality within the norm (6–8 times

[4] World inequality report — 2018. Coordinated by F. Alvaredo, L. Chancel, T. Piketty, E. Saez, G. Zukmam. World inequality lab. 2018. 300 p.

by the coefficient of funds[5]), is a promising area of research, since certain tools of economic policy (progressive taxation of income and property, active social policy, social contract, social federalism) can be subsequently adapted and built into the model of Russia's development.

MATERIALS AND METHODS

The methodological basis of the study is the system of views of the authors, based on the principles of methodological pluralism and a systematic approach to studying the level of inequality in different countries and studying the tools for reducing it. According to the authors, there is no universal method for analyzing economic reality, which is characterized by an excessive level of inequality in society, which is due to the complexity of the phenomenon of inequality, its causes and consequences.

The following methods of cognition were used in the work: philosophical (dialectical, critical), general scientific (methods of scientific abstraction, the unity of historical and logical, analysis and synthesis, induction and deduction, analogy, classification), particular scientific (economic and mathematical, statistical, functional).

The methodological approach used by the Central Economics and Mathematics Institute of the Russian Academy of Sciences (CEMI RAS) became the basis for distinguishing inequality into normal (a positive factor motivating labor productivity growth) and excessive (hindering the development of the system) [25]. In this regard, the paper uses both traditional methods for representing wealth and income inequality (Gini coefficients, funds, decile and quintile coefficients, Lorenz curve), and expansion of the Gini index of general inequality [26] into the Gini index of normal and superfluous inequalities.

Expansions of the Gini index are constructed according to the formula

$$G = 2\,\mathrm{cov}F\,(X, F(X))\,/m = \\ = (2/m)\int (x - m)(F(x) - F)\mathrm{d}F(x), \qquad (1)$$

where G — the Gini coefficient of the general inequality; $\mathrm{cov}F(X, F(X))$ — the is the covariance between the level of income X and the share $F(X)$ of the population with an income not higher than X; m — the average income for the entire population under consideration.

With a given poverty line z the variable X can contain components corresponding to incomes not lower and not higher than z (poverty level):

$$G = (2/m)\,\mathrm{cov}F\,(X - (z), F(X)) + \\ + (2/m)\,\mathrm{cov}F\,(X + (z), F(X)). \qquad (2)$$

Normal inequality is defined by the formulas:

$$GN = 2\,\mathrm{cov}F\,(X + (z), F(X))\,/\,m+, \qquad (3)$$

$$m+ = m + \Delta m, \Delta m = h(z - mP), \qquad (4)$$

where GN — the Gini coefficient of the normal inequality; Δm — s the increase in average income resulting from the increase in all incomes below the poverty line to this border; h — the proportion of the population with incomes below the poverty line; mP — the average income in this population group.

Excessive inequality is the excess of the general over the normal:

$$GE = G - GN = (2/m)\,\mathrm{cov}F\,(X - (z), F(X)) + \\ + (\Delta m/m)\,GN. \qquad (5)$$

The method of calculating this index is traditionally used to reflect the measurement of the degree of (un)equal distribution of income among the entire population [27]. In this paper, we will analyze the uniformity of the distribution of not only income but also wealth, proposed by the Swiss Credit Bank, for

[5] This threshold value of the coefficient of funds is justified in the studies of A. Ya. Kiruta, A. Yu. Shevyakov. According to their works, social and economic inequality is normal (stimulating for productive labor activity), the coefficient of funds in which does not exceed 6–8 times, and the Gini index does not exceed 0.4. When this threshold is exceeded, inequality from a naturally competitive market state is transformed into a threat to socio-economic development (becomes excessive).

completeness of information on the degree of inequality in society.

The information base of the study was the official statistics of the State Statistics Committee, Eurostat, World Bank, OECD, Global Wealth Databooks (Swiss Credit Bank), Euromonitor International, Oxfam, World Inequality Lab.

RESEARCH RESULTS

The level of socio-economic inequality is traditionally presented in Gini coefficients and funds. These coefficients are not without drawbacks in terms of forming a complex picture of inequality, but in the most general form, they objectively reflect the existing reality.

Fig.1 presents information on the values of the Gini coefficients for income and wealth in the countries of the European Union (EU) and Russia. The charts in the figure above show income shares by decile population in these countries.

Comparative characteristics of Russia and the EU countries in terms of the Gini coefficient show that inequality in Russian society is much higher than in the European Union. The Russian Gini coefficient for disposable income is as close as possible to the values of Bulgaria: 41.1% and 40.8%, respectively. In other EU countries, the value of this coefficient is within the normal range. It is scientifically substantiated that the boundaries of the normal distribution of income correspond to the level of the Gini coefficient *GN* = 0.4 (40%). In some cases (for example, to compare countries within the European area), *GN* can be taken as 0.3 (30%). In this paper, we will proceed from the fact that the threshold between normal and excessive inequality corresponds to the value of the Gini coefficient *GN* = 0.4 (40%).

The maximum inequality in disposable income is observed in the EU in the countries of the former socialist bloc (Latvia 35.2%, Lithuania 35.4%, Romania 34.8%, Estonia 30.5%) and in the countries of Southern Europe (Italy 3.4%), Spain. (33%), Cyprus (31.3%), Portugal (31.9%). In the same countries, the income share of the bottom decile is minimal and does not exceed 3% of national income. The most evenly distributed incomes are in Ireland and Scandinavian countries (Gini index does not exceed 29%), the share of incomes of the bottom decile in these countries is close to 4% of the national one.

The only country in which the situation in terms of the studied indicators of inequality is worse than in Russia is Bulgaria: the share of incomes of the bottom decile is 1.9%, the top decile is 31.9% (in Russia, 2.9 and 29.9%, respectively).

Th. Piketty refers Europe to countries with moderate inequality, and Scandinavian countries — to countries with weak inequality. Contrary to this, we note that EU countries with a low level of income inequality have high values of the Gini coefficient for wealth and vice versa. So, for example, in Denmark, with a Gini coefficient for income equal to 27.5%, a similar coefficient calculated for wealth is 83.8%, for Sweden — 27.6 and 87.6%, for the Netherlands — 26.8 and 90.2%.

The pattern is confirmed by all EU countries — with low income inequality, there is fairly high wealth inequality. The Russian economy is characterized by a high level of income inequality (Gini index G = 41.1%, GE = 1.1%) and wealth inequality (Gini index 87.9%).

The Gini coefficient for wealth most clearly characterizes the degree of uneven distribution of resources in society. The graph presented in *Fig.1* shows that the European society, which is more equal in terms of income than the Russian one, is replete with disproportions in the distribution of wealth: the Gini coefficient for wealth in the EU is prohibitively high and tends to grow: in 2010–2019 it increased from 79.9 to 82.4% (*Fig. 2*).

Against the background of increasing wealth inequality in the EU and Russia, there is an increase in median wealth, while the gap in the level of the median wealth per Russian adult and European is very large and reaches 8–10 times (*Fig. 3*).

A visual comparison of the distribution of income in Russia and Europe (on the example

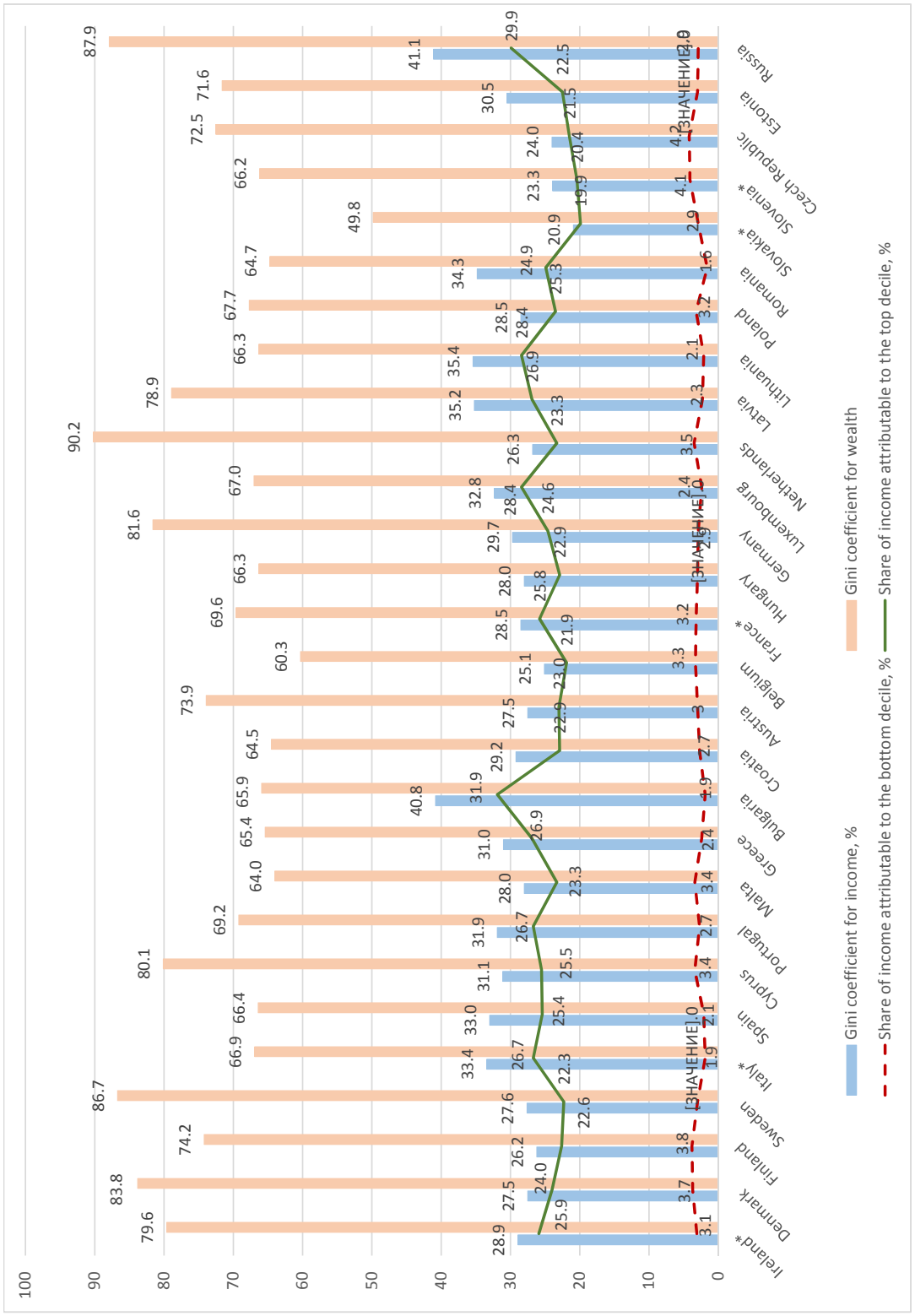

Fig. 1. **Inequality indicators in the EU countries and Russia (2019)**
Source: World Bank, SwissBank (Global wealth databook 2019). URL: https://www.interest.co.nz/sites/default/files/embedded_images/global-wealth-databook-2019.pdf (accessed on 17.01.2022).
Note: * – The figures are as of 2018.

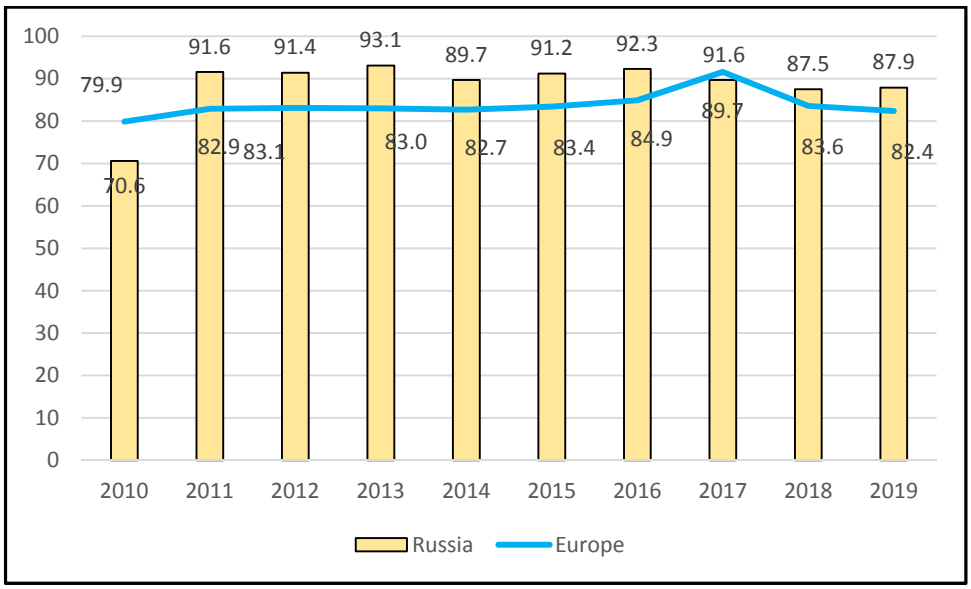

Fig. 2. **Dynamic of the Gini index by wealth in the EU and Russia, %**

Source: SwissBank (Global wealth databook 2019). URL: https://www.interest.co.nz/sites/default/files/embedded_images/global-wealth-databook-2019.pdf (accessed on 17.01.2022).

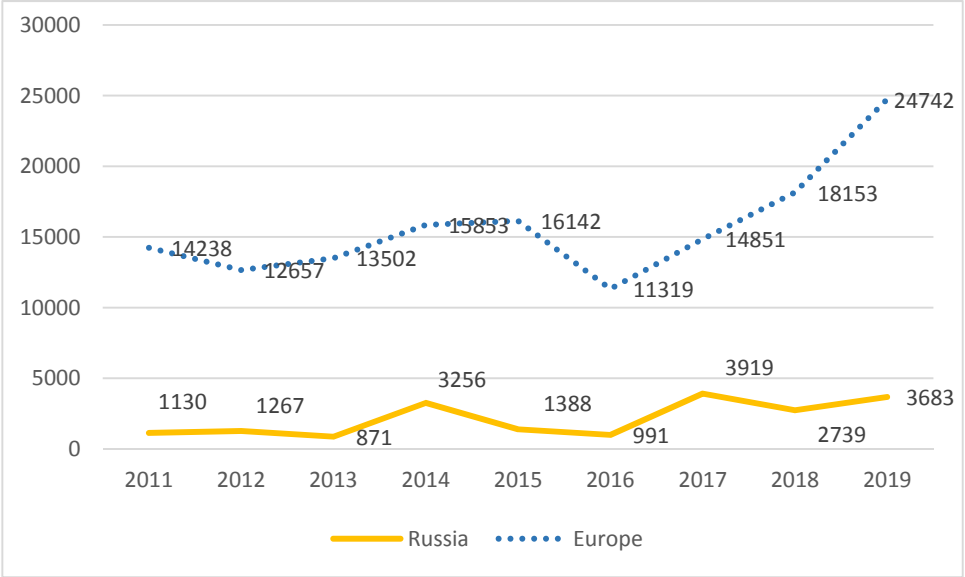

Fig. 3. **Median wealth per adult, USD**

Source: SwissBank. URL: https://www.interest.co.nz/sites/default/files/embedded_images/global-wealth-databook-2019.pdf (accessed on 17.01.2022).

of Belgium) will be presented using the Lorenz curve (*Fig. 4*).

It is not by chance that Belgium was chosen as a base for comparison — this is justified by the fact that in this EU country, inequality in terms of both income and wealth is one of the lowest. The Gini coefficient for disposable income in Belgium in 2019 was 25.1%, for wealth — 60.3%. Other countries of the European Union, as noted earlier, with low values of income inequality, have high wealth inequality.

Belgium is also characterized by a low distribution of income in favor of the top decile (21.9% versus 29.9% in Russia). As shown in Fig. 3, the degree of deviation of the Russian Lorenz curve from the line of conditional equality is noticeably stronger than the in-

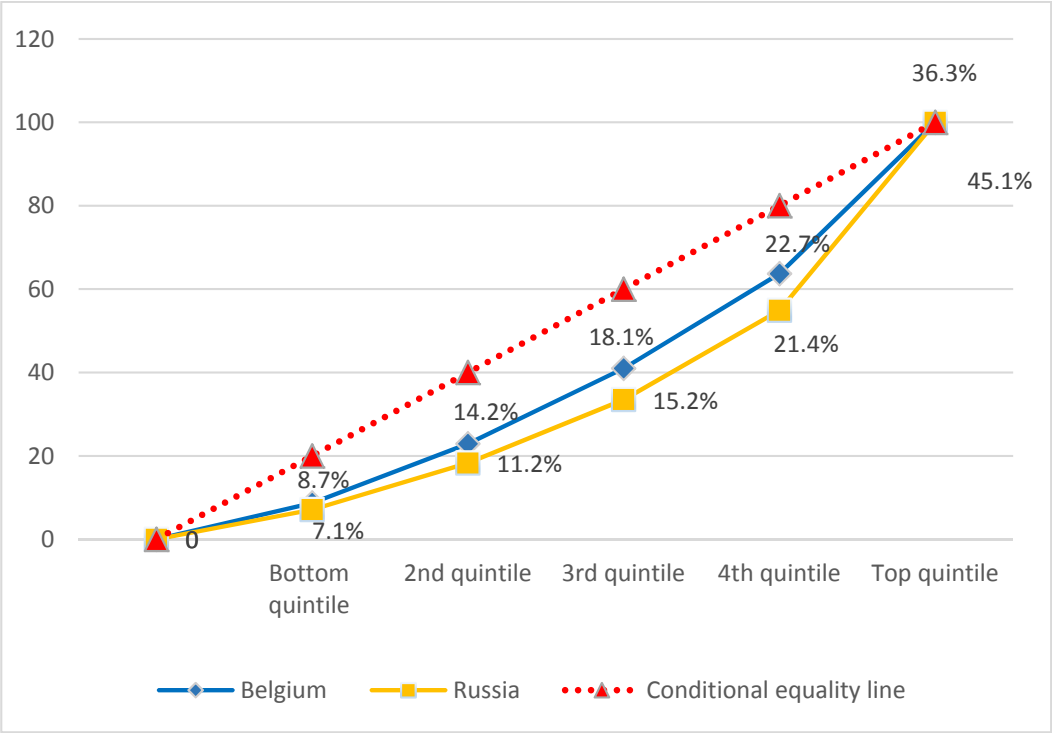

Fig. 4. **Distribution of income in Russia and Belgium: Lorentz curves (2019)**

Source: compiled by the authors according to the World Bank. URL: https://databank.worldbank.org/source/world-development-indicators# (accessed on 17.01.2022).

come distribution in Belgium. At the same time, the minimum wage in Belgium is 1,626 euros in 2019 (in the Russian Federation 156 euros), i.e. the gap in the minimum wage in Belgium and Russia is 10 times. With the average wage in Belgium, the minimum wage correlates in a ratio of 1:2. In Russia, the average salary in 2019 was 42,595 rubles, and the minimum was 11,280 rubles. (i.e., the average wage is 4 times higher than the minimum, which indicates an inadequately low value of the legally established minimum). The Kaitz index[6] (the ratio of the minimum wage to the median labor income) in Belgium is 73%, while in Russia it is only 22.4%.

Thanks to the research of the French economist Th. Piketty and the American Nobel Prize winner J. Stiglitz, it has become popular to measure the level of inequality in society using the "the share of the richest 1% in the total income of the population" indicator (*Table 1*).

[6] Youth Unemployment and Minimum Wages. U.S. DEPARTMENT OF LABOR. Bureau of Labor Statistics. Washington D.C.: U.S. Government Printing Office; 1970. No. 1657. 190 p.

It should be noted that the methods for assessing the distribution of income in studies led by Th. Piketty and in the reports of the World Bank differ significantly. Thus, according to the World Inequality Lab, the share of income in the top decile in Russia is 46%, and according to the World Bank, 46% is in the top quintile of Russian society.

Fig.1 shows that since the perestroika period, the average annual income growth rate of the poorest 50% of the population has been declining by 0.8% annually, while that of the top 10% has increased by 3.8% per year. Let us pay attention to the fact that as the share of the richest citizens narrows, the average annual growth rate of their income increases: the top-1% of the population increased their income by an average of 6.4% per year, the top-0.1% — by 9.5%, the top-0.01% — by 12.2%, upper-0.001% — by 14.9%. Thus, we can talk about the need to translate the assessment of the level of inequality by decile coefficients into percentile coefficients (distribution by one percent groups of the population).

Table 1

Annual income growth by population groups in Russia

Income group	Average annual income growth			
	1905–2016	1905–1956	1956–1989	1989–2016
Population	1.9%	1.9%	2.5%	1.3%
Bottom 50%	1.9%	2.6%	3.2%	–0.8%
Middle 40%	2.0%	2.5%	2.3%	0.5%
Top-10%	1.9%	0.8%	2.3%	3.8%
Top-1%	2.0%	–0.3%	2.5%	6.4%
Top-0.1%	2.3%	–1.2%	2.7%	9.5%
Top-0.01%	2.5%	–2.1%	3.0%	12.2%
Top-0.001%	2.7%	–3.0%	3.3%	14.9%

Source: World Inequality Lab. URL: https://wid.world/country/russian-federation/ (accessed on 17.01.2022).

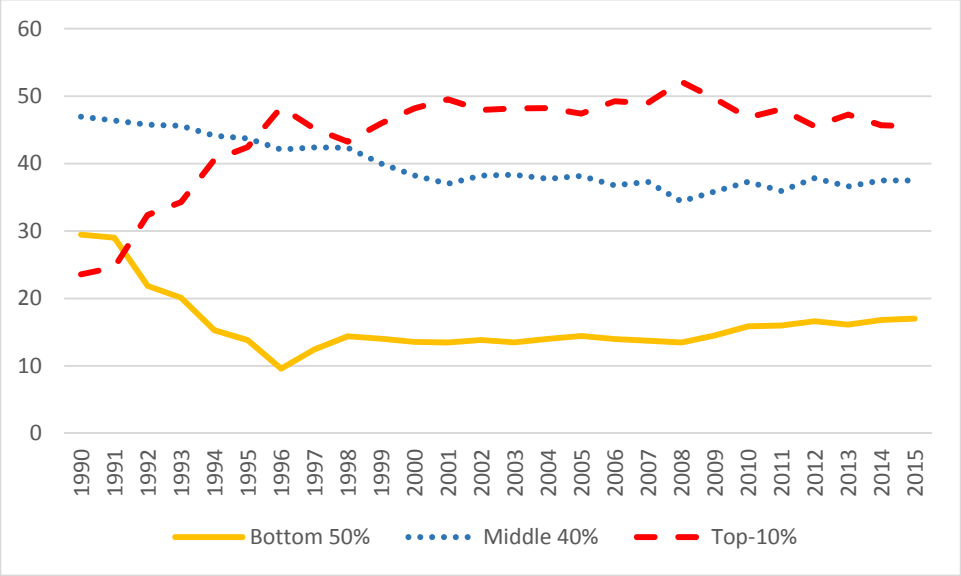

Fig. 5. **National income distribution by population groups in Russia**

Source: World Inequality Lab. URL: https://wid.world/country/russian-federation/ (accessed on 17.01.2022).

The dynamics of income distribution in Russia are characterized by the following. Trends in the top-10% and bottom 50% shares are mirrored: from 1990 to 1996 there is a sharp jump in the share of national income attributable to the top-10% (from 23.58 to 48.32%), at the same time, the share of national income accounted for by the poorest 50% decreases from 29.47% to 9.60%. After that, there is a slight smoothing, and by 2015, the top-10% account for 45.52% of Russia's national income, and the bottom 50% — 16.99%. Of greatest concern is the steady decline in the share of income attributable to the middle 40%, from 46.95% to 37.49% over a 25-year period (*Fig. 5*).

The extreme degree of uneven distribution of income among Russians is evidenced by the enormous growth in the wealth of US dollar millionaires — over the past 19 years, it has amounted to more than 2000% (*Fig. 6*). In Europe, the maximum increase in the fortune

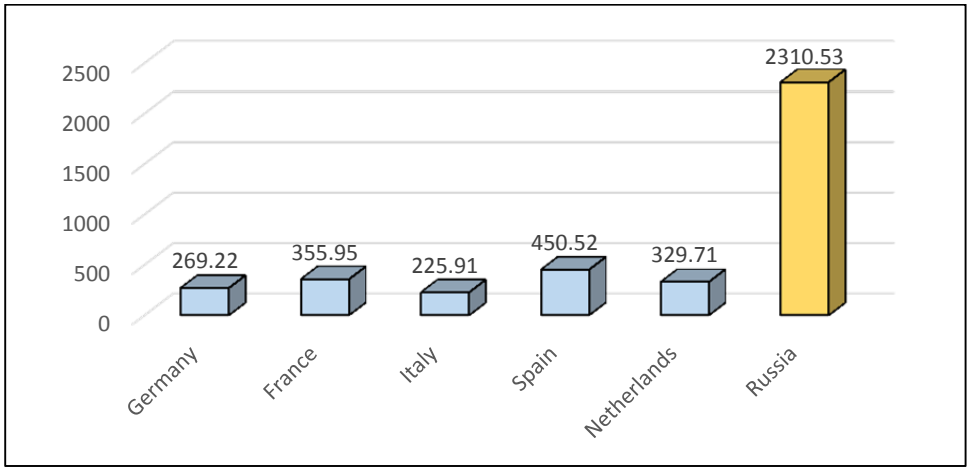

Fig. 6. **Wealth growth among millionaires in selected countries 2000–2019, %**

Source: SwissBank (Global wealth databook 2019). URL: https://www.credit-suisse.com/about-us/en/reports-research/global-wealth-report.html (accessed on 17.01.2022).

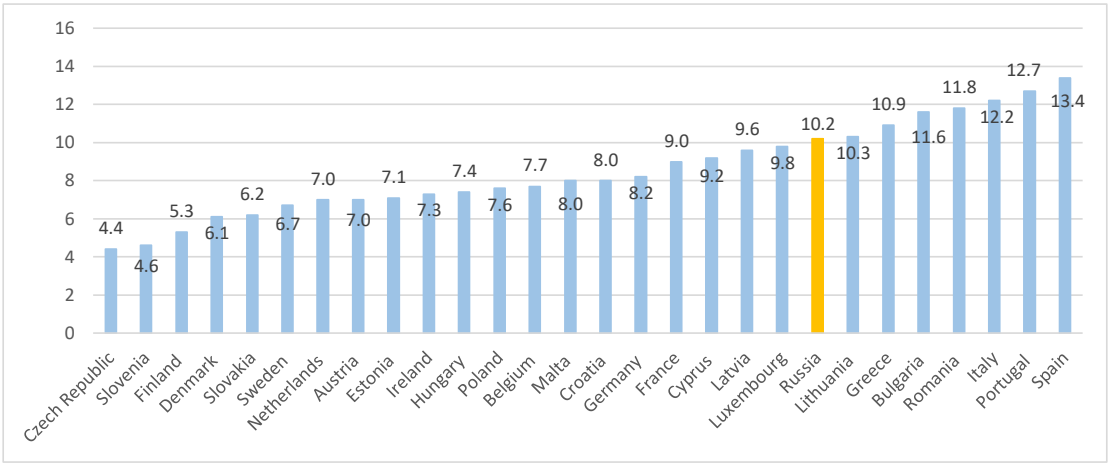

Fig. 7. **Country losses from inequality in 2019, %***

Source: compiled by the authors based on Human Development Report 2020. URL: http://hdr.undp.org/en/content/human-development-report-2020 (accessed on 17.01.2022).

Note: * — calculated as a percentage difference in the inequality-adjusted human development index and the human development index.

of US dollar millionaires over the same period was recorded in Spain — 450%.

Thus, it can be stated that the level of socio-economic inequality in Russian society is much higher than in the EU countries, however, even those countries in which it is within acceptable limits suffer losses from inequality (*Fig. 7*).

Russia's loss in the human development index from inequality is 10.2% in 2019, which is less than in the countries of Southern Europe (the North-South problem leaves its mark on European countries), but much higher than in many countries of the former socialist world (Czech Republic 4.4%, Slovenia 4.6%, Slovakia 6.2%, Poland 7.6%). Such losses of human capital can negatively affect both quantitative and qualitative indicators of economic growth.

It is believed that the EU countries have achieved success in implementing a policy of smoothing socio-economic inequalities, one of the instruments of which is tax policy. Unlike Russia, in most EU countries a multi-stage progressive scale of taxation of personal income and a rather complex system of

Table 2

Smoothing inequality in the distribution of wealth in the EU countries through the fiscal mechanism*

Country	Tax rates, %			
	Inheritance tax	Gift tax	Real estate tax	Property transfer tax
1	2	3	4	5
Belgium	27–95	20–80	1.25–2.5	10–12.5
Bulgaria	1–4	0.01–0.7	0.15	3–3.3
Czech Republic	0.5–40	7–40	0.5–40	4–15
Denmark	up to 36	–	1 to 3	–
Germany	7–50	–	from 0.35	3.5–6.5
Estonia	–	–	0.1–2.5	20
Ireland	up to 33%	up to 33%	0.18–0.25	–
Greece	0–40	0–40	0.1–1	3.09–24
Spain	7.6–34	7.6–34	0.4–1.1	7–10
France	5–40	up to 60	0.7–1.5	+
Croatia	5	5	+	25
Italy	4–8	4–8	0.76–10.6	4–8
Cyprus	–	–	–	–
Latvia	–	–	0.2–1.5	–
Lithuania	5–10	–	1	–
Luxembourg	+	+	up to 7.5	6
Hungary	+	+	3.6	2–4
Malta	–	–	–	12
Netherlands	10–40	10–40	0.3	2
Austria	0	0	–	2–3.5
Poland	0–12	0–12	+	2–23
Portugal	0	0	0.2–0.8	0–8
Romania	–	–	0.1	–
Slovenia	5–39	5–39	0.05–0.5	–
Slovakia	–	–	+	–
Finland	up to 32	up to 32	0.41–6	+
Sweden	–	–	0.75	+

Source: compiled by the authors.

Note: * — the "–" sign in the table means the absence of a certain type of tax in the country, "+" — the presence of a tax, but a complex mechanism for determining the amount of tax payment, calculated, as a rule, not as a percentage of the tax base.

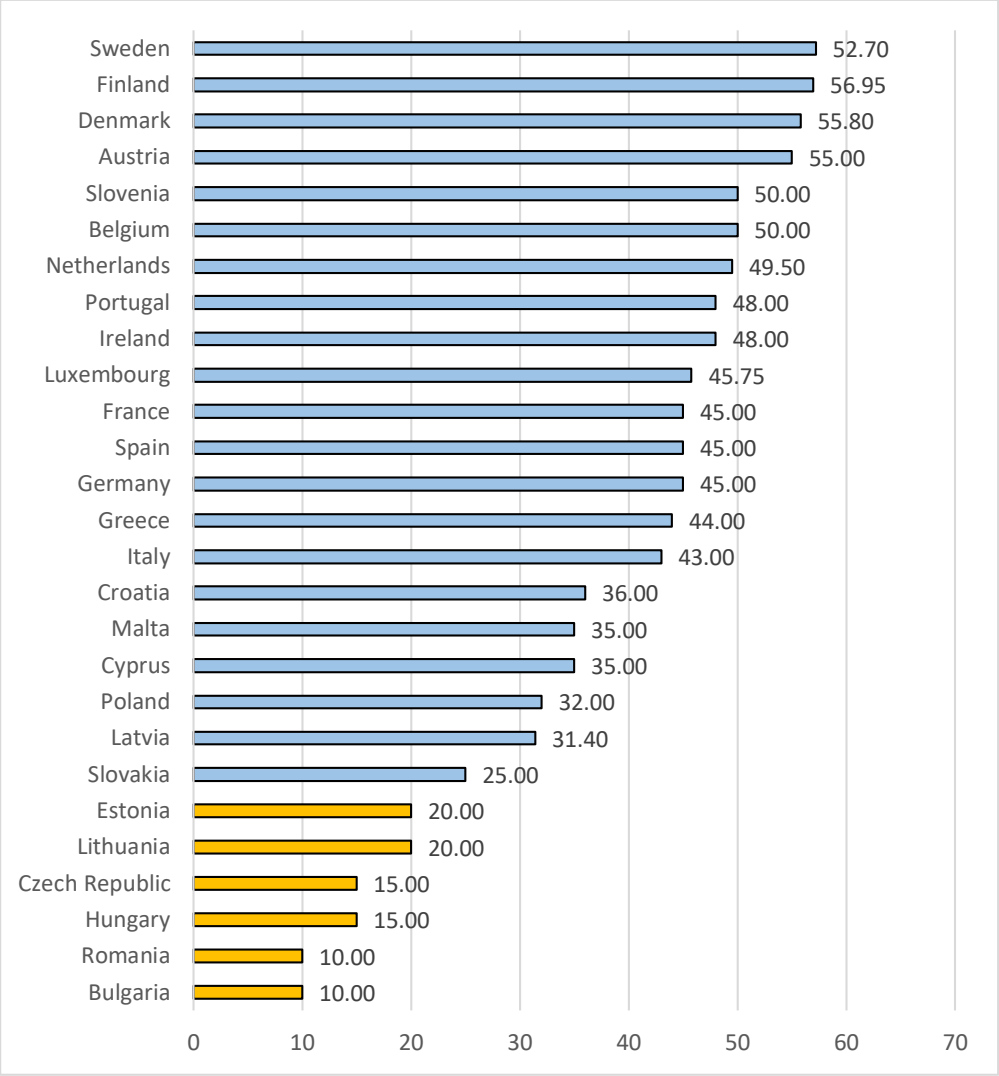

Fig. 8. **Maximum income tax rates in the EU countries, %***

Source: compiled by the authors.

Note: * – countries applying a "flat" income tax scale are highlighted in yellow.

property taxation are used, which increases the wealth of a person through inheritance, donation, transfer of property (*Table 2*).

Table 2 shows that in many countries high rates of taxes are applied on the transfer of property, inheritance, gift and possession (with the exception of Cyprus as a global offshore zone and the countries of Eastern Europe). This policy is aimed at curbing the formation of a society of rentiers who are able to receive passive income and concentrate a significant share of the national wealth in their hands. In most countries where there are no taxes on gift, inheritance, sale of real estate and property, the tax legislation contains separate provisions governing this process and determining the size of the fiscal exemption. In some countries (for example, in France) a luxury tax is applied. This kind of practice can serve as an effective tool for curbing the growth of wealth inequality. The fiscal tool for income equalization in the European society is a multi-stage progressive taxation scale for personal income, which is used in 21 EU countries (except Estonia, the Czech Republic, Bulgaria, Hungary, Romania, Lithuania). Often there is a withdrawal of more than half of the excess income from EU citizens (for example, in Sweden, Denmark, Slovenia, Finland, Austria, Belgium) (*Fig. 8*), which are redistributed through the budget system in favor of the poorest segments of the

population. The progressive scale of personal income tax (PIT) existed in Russia until 2000, then it was canceled due to inefficiency.

From January 1, 2020, Russia abandoned the "flat" personal income tax scale, returning the progressive mechanism, which is the first step towards a greater withdrawal of the income of super-rich citizens in favor of the budget system. Unlike Western European countries, the progression of personal income tax in Russia is targeted — budget revenues from an increase in the tax rate will be redistributed in favor of certain categories of citizens (children with rare and serious diseases), which will expand their access to medical services and improve the quality of life. This is undoubtedly an important step towards reducing disparities in access to basic services between strata of society.

As an argument in favor of the advisability of adopting the experience of the redistributive policy of the EU countries to reduce the level of economic inequality (due to its effectiveness), we present a comparative Table of Gini coefficients for primary and disposable income for the EU countries (*Table 3*).

Thus, we see that the level of income concentration in European countries is significantly reduced after taxes and transfers. For example, in Finland, the Gini coefficient for disposable income is 48% lower than for primary income, in Ireland — by 46%, in Belgium and Hungary — by 45%, in Luxembourg — by 41%, in France — by 40%. In Russia, the after-tax Gini coefficient is reduced by only 14%.

CONCLUSIONS

The problem of socio-economic inequality is the cornerstone of the development of modern world economies. Disproportions in the level and quality of life, the distribution of income and wealth have a negative impact on social and human capital, hindering national cohesion and demotivating labor activity. In the modern capitalist world, the problem has acquired a global scope and has attracted the attention of not only the scientific community,

Table 3

Concentration of primary and disposable income (2018)

	Gini coefficient for income before taxes and transfers	Gini coefficient for disposable income
France	0.505	0.302
Austria	0.494	0.279
Belgium	0.492	0.268
Czech Republic	0.462	0.262
Denmark	0.442	0.254
Estonia	0.512	0.361
Finland	0.495	0.257
Germany	0.479	0.292
Greece	0.566	0.343
Hungary	0.508	0.278
Iceland	0.386	0.244
Ireland	0.574	0.309
Italy	0.514	0.325
Luxembourg	0.48	0.281
Netherlands	0.417	0.283
Poland	0.464	0.3
Slovakia	0.428	0.269
Slovenia	0.452	0.252
Spain	0.513	0.341
Sweden	0.443	0.281
Switzerland	0.421	0.293
Russia	0.48	0.413

Source: ОЭСР / OECD. URL: https://www.oecd-ilibrary.org/taxation/post-taxes-and-transfers-disposable-income-gini-coefficients_7f704580-en (accessed on 17.01.2022).

but also international institutions, national leaders, and the public.

In Russia, there is excessive inequality in all respects: market, disposable income, wealth. It is noteworthy that the distribution of wealth is more than twice as uneven as compared to the distribution of disposable income. As the layer of the richest citizens narrows, there is an increase in the concentration of their incomes and wealth, and abnormally high average annual income growth rates. The economic policy pursued in the state (redistributive and social) does not greatly contribute to reducing the level of excessive inequality, reducing it by 17%.

It is generally accepted that the EU countries (especially the Scandinavian, Northern European and Western European countries) cope most successfully with the polarization of society by income, however, as the analysis showed, these countries face some challenges. This conclusion is supported by the reported losses from inequalities in the distribution of income, education, and health care in the Human Development Index. Against the background of normal levels of disposable income inequality in all EU countries, there is excessive wealth inequality, and not all households manage to achieve inclusiveness. Nevertheless, the fiscal policy of European countries, actively applying a progressive scale of taxation not only for income but also for material values, makes it possible to redistribute more than 60% of GDP through the budget system and ensures the alignment of the polar strata of society.

In previous studies, we calculated that with the introduction of a five-stage (from 0 to 33%) progressive personal income tax scale in Russia, the accrued annual personal income tax could increase by 1.85 times. At the same time, the share of income attributable to the bottom quintile may increase by 1.32%, while the share of income attributable to the top quintile may decrease by 4.11% [28].

Russian society today is not ready to accept a multi-stage progression in relation to inheritance, donation, transfer of property. Even the second stage of the personal income tax rate (15%) is justified by the targeted use of future budget revenues. Subject to the introduction of taxes on gifts, inheritance, transfer of property, the top decile that forms the elite still has the opportunity to use "shady" schemes to divert real estate transactions so that they do not fall under taxation.

Therefore, today a more significant and unambiguously perceived step towards smoothing out property inequality should be the introduction of a non-taxable minimum income tax (for family members whose incomes are below the subsistence minimum).

For Russia, the problem is acute not only of increasing the share of withdrawal of excess income in favor of the budget and society but also of raising the level of income and life of the lower decile, the formation of a full-fledged developed middle class. In this regard, the experience of the EU in the creation and use of structural funds, the implementation of the flagship initiative to combat poverty and exclusion 2010–2020, which in essence is a comprehensive strategy for the complete elimination of poverty in society, is of interest.

In the search for ways to overcome income inequality, we must not forget the growing wealth inequality. The fiscal mechanism alone is not enough to prevent the rules of the rentier society from taking root in the modern world. The challenge is so great that the most effective response to it should be systemic modernization based on the principle of social federalism. The latter comes from the concept of a just society — where access to the widest range of benefits is provided to all members of society, and income inequality is explained only by different life aspirations; the key goal of such a social order is not the distribution of income, but of opportunities.

The modern tax system in Russia requires changes, it must meet the challenges of our time and serve as an effective tool to reduce the burden of inequality. Inheritance and income taxes should be complemented by

a progressive wealth tax that can serve fair capital: it is more difficult to manipulate than income tax, especially for the very wealthy, whose taxable income is often a small part of their wealth, while real income multiplies wealth. In the future, progressive taxes on high wealth could become a source of financing for the general investment fund of the younger generation for various social needs (for example, education) [29].

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Monetary Policy Transformation of Major Central Banks During the COVID-19 Pandemic

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ABSTRACT

The paper **aims** to assess the scope, effectiveness and key instruments of monetary policy in advanced and emerging markets during the first wave of the COVID-19 pandemic. **The methodological basis** of the study was the reports of the central banks of the sample countries and the data of international organizations and financial market participants on monetary policies. The author assesses the scope of financial support for the economy by the central banks of the largest advanced and emerging markets during the crisis, including the size and share of quantitative easing in its total volume. The study identifies and characterizes the main groups of monetary policy measures during the COVID-19 pandemic, and also shows the monetary policy differences of advanced and emerging economies during the pandemic. The paper highlights larger direct financial support from the central banks of advanced countries. The difference in monetary policy instruments is that advanced economies use traditional monetary policy measures while emerging economies widely apply unconventional monetary policy instruments, primarily quantitative easing. The article presents a preliminary assessment of the effectiveness of monetary policy in China and Russia. The author **concludes** that the consequences of the monetary policy pursued by advanced countries in 2020 may lead to long-term stagnation in these countries and the rapid recovery of emerging markets due to the inflow of speculative capital from advanced countries. The study provides a post-pandemic forecast of the general direction of monetary policy and its driving factors. Enormous direct financial support, primarily through quantitative easing, from the central banks of advanced countries in 2020 had a positive impact on the economy in the short run, but the long-term consequences of such policies require further research.
Keywords: monetary policy; COVID-19 pandemic; ultra-accommodative monetary policy; unconventional monetary policy tools; quantitative easing

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INTRODUCTION

The global coronavirus pandemic that emerged in March 2020 led to the sharpest aggravation of the situation in the global economy and the global financial market since the Second World War (a widespread fall in stock prices, an increase in bond yield spreads, an increase in borrowing costs, a collapse in world oil prices, devaluation of national currencies against the US dollar, etc.).

The World Bank estimates that global GDP fell by 4.3% in 2020 (the worst global recession in 150 years, except for the Great Depression and two world wars[1]), despite an unprecedented government support for the world economy. In the first two months of the pandemic, governments around the world spent $ 10 trillion to mitigate the effects of COVID-19, which is 3 times the amount of government support during the global financial crisis of 2008–2009 [1, p. 2].

GENERAL CHARACTERISTICS OF THE MONETARY POLICY OF ADVANCED AND EMERGING ECONOMIES DURING THE PANDEMIC

The first rapid response of states to the economic consequences of the coronavirus was monetary policy measures, initially through large injections of liquidity into financial markets (in most countries since March 2020). They were followed by other measures that can be described as extraordinary in terms of the volume of assistance, the breadth of the tools used and the efficiency with which they were adopted. Due to this, financial market conditions began to stabilize as early as April 2020, and in general, the reaction of financial markets to COVID-19 turned out to be milder compared to the scale of the economic consequences (lower production, rising unemployment, etc.). Thus, the standard deviation of the index of global financial conditions from the average since 1995 in March 2020 increased to 3.8 (from a negative level, indicating a favorable financial market situation by the beginning of 2020); and during the global financial crisis of 2008–2009 the index value reached 6.7.[2]

The general vector of the monetary policy of states during the pandemic was its rapid aggressive easing in order to ensure the stable functioning of the foreign exchange and financial markets and uninterrupted lending to the economies of countries. The general vector of the monetary policy of states during the pandemic was its rapid aggressive easing in order to ensure the stable functioning of the foreign exchange and financial markets and uninterrupted lending to the economies of countries. The volume of this easing in the world is estimated at $ 11 trillion [12.5% (!) of global GDP in 2019] in the first three months of the wide spread of the virus (mid-February–mid-May 2020) [1, p. 6].

At the same time, there were significant differences between the monetary policies of advanced and emerging economies: both in the scale of financial assistance to the economy from central banks and in the preferred monetary policy instruments (*Table 1*).

Table 1 data show the unprecedentedly high volumes of financial injections into the economy by the central banks of developed countries and the high proportion of their use of such an unconventional monetary policy tool as the purchase of government and corporate securities [Quantitative Easing (QE)].

The scale of support by emerging economies for their financial and foreign exchange markets was much more modest and traditional in terms of monetary policy tools — with a greater emphasis on the use of indirect methods of regulating the volume of money supply: the release of financial resources and an increase in lending to the economy was achieved through a reduction in key and other interest rates and easing regulatory

[1] Global Economic Prospects: A World Bank Group Flagship Report. World Bank Group; January 2021. P. 3. URL: https://openknowledge.worldbank.org/handle/10986/34710/ (accessed on 17.01.2022).

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Table 1

Declared direct financial support to economy from central banks during the first wave (up to the 2020 fall) of the COVID-19 pandemic (as % of national GDP in 2019)

USA	EU	China*	Japan	UK	Germany	India*	Brazil*	Russia*	South Africa*
Volumes of direct financial support to the economy from the central bank, in % of GDP in 2019:									
48.0	25.4	6.1	47.1	33.7	19.6	3.7	5.8	1.1	2.1
Expected economic effect (release of financial resources) from easing regulatory requirements for financial institutions (reduction of reserve requirements, capital requirements, etc.), % of GDP in 2019 (for emerging economies):									
		1.8				1.3	8.7	0.2	n/a
Share of quantitative easing in the total volume of direct financial support, %									
22.4	42.3	0	43.6	97.6	0	3.7	0	0	23.1

Note: * — for emerging economies, the expected economic effect (release of financial resources) from the easing of regulatory requirements for financial institutions (reduction of reserve requirements, capital requirements, etc.) was also noted.

Source: USA — Monetary Policy Report Submitted to the USA Congress on June 12, 2020, Pursuant to Section 2B of the Federal Reserve Act; European Union — The ECB's Monetary Policy Response to the COVID-19 Crisis. The European Parliament's Committee on Economic and Monetary Affairs, Briefing; Updated July 17, 2020; China — China Monetary Policy Report Q1 2020. The People's Bank of China, Monetary Policy Analysis Group; May 10, 2020. 61 p.; China Monetary Policy Report Q2 2020. The People's Bank of China, Monetary Policy Analysis Group; August 6, 2020. 59 p.; Japan — Monetary Policy Releases 2020: from January 21, 2020 to September 17, 2020. Bank of Japan. URL: http://www.boj.or.jp/en/ (accessed on 17.09.2021); Germany — COVID-19: Crisis Resilience Made in Germany. Deutsche Bank Research; June 10, 2020; India — COVID-19 Related Measures: Press Releases: from March 3, 2020 to September 7, 2020. Reserve Bank of India. URL: https://www.rbi.org.in/ (accessed on 17.09.2021); Great Britain — Monetary Policy Report. The Bank of England, Monetary Policy Committee; August 2020. 53 p.; Brazil — Financial Stability Report. Vol. 19, no. 1. Banco Central do Brasil; April 2020. 80 p.; COVID-19 in Brazil: Impacts and Policy Responses. The World Bank; June 2020. 136 p.; Brazil's Policy Responses to COVID-19. Ministerio da Economia; Updated on April 7, 2020. 4 p.; Russia — Measures of the Bank of Russia to Mitigate the Effects of the Coronavirus Pandemic as to 11.09.2020 17:04. The Bank of Russia; 2020. 61 p. (In Russ.). URL: https://www.cbr.ru/info_2020/ (accessed on 11.09.2021); Monetary Policy Guidelines for 2021–2023. The Bank of Russia, 2020, 157 p. (In Russ.). URL: https://www.cbr.ru/about_br/publ/ondkp/on_2021_2023/ (accessed on 22.01.2021); South Africa — Our Response to COVID-19: Statements on the Monetary Policy — 2020. South African Reserve Bank. URL: https://www.resbank.co.za/ (accessed on 22.09.2021); Economic Relief Measures During COVID-19. Republic of South Africa Government; 2020. 12 p. All Countries — Police Responses to COVID-19: Policy Tracker. International Monetary Fund. URL: https://www.imf.org/ (accessed on 17.09.2021); COVID-19 Market Updates: Monetary Policy. International Capital Market Association. URL: https://icmagroup.org/ (accessed on 17.09.2021); Annual Economic Report. Bank for International Settlements; June 2020. 118 p.; COVID-19: Key Measures Taken by Governments and Central Banks. BNP Paribas Group Economic Research; June 15, 2020. 38 p. URL: https://economic-research.bnpparibas.com/Views/DisplayPublication.aspx?type=document&IdPdf=38920/ (accessed on 22.09.2020).

Note: Method of calculation. The volume of direct financial support for the economy from the country's central bank was calculated by the author by summing up the volumes of financial resources declared by the central bank for each of the monetary policy instruments used to fight the consequences of the coronavirus, which implies the allocation of financial resources to financial market participants, companies and households (by quantitative easing, supporting the liquidity of financial organizations, implementing foreign exchange interventions, implementing targeted programs of financial assistance to business entities, including by acquiring their securities, etc.). The volume of provided state guarantees and other indirect support measures that free up financial resources of financial institutions are not included in the calculation of direct financial support.

Calculation period. From the beginning of the country's central bank assistance in fighting the consequences of COVID-19 (for most countries — from March 2020, in China — from January 2020) to mid-September 2020.

Calculation accuracy. These tables may contain errors in the calculation of exact figures for the volume of financial assistance to economies from central banks due to the lack of data on certain areas of monetary policy pursued by countries.

requirements for financial institutions (reducing capital requirements, liquidity, financial leverage, reserve requirements, etc.).

At the same time, during the pandemic, there were also universal measures to support the economy, which were used by the central banks of the vast majority of both developed and developing countries. Such measures were the reduction of key and other interest rates; liquidity support for financial institutions (both targeted and unrelated); easing regulatory measures against market participants, contributing to the release of their financial resources for lending to the economy. Many countries have also provided direct financial support to crisis-hit industries/businesses.

The observed differences between developed and developing countries are largely due to the phase of the economic cycle in which these countries were at the beginning of the pandemic, and their monetary policy. Developed countries after the 2008–2009 global financial crisis experienced growth problems in their economies and continued to implement accommodative monetary policies, approaching 2020 with slower GDP growth, low or declining inflation, and very low interest rates. Under these conditions, the potential for further easing of monetary policy using its traditional tools turned out to be unavailable to these countries.

Developing countries, in the context of a slowdown in global economic growth, also carried out monetary policy easing, but in these countries the level of interest rates and inflation remained at a fairly high level, and the potential of traditional methods of monetary policy easing remained not completely wasted.

CHARACTERISTICS OF THE MAIN INSTRUMENTS OF MONETARY POLICY OF THE COUNTRIES DURING THE PANDEMIC PERIOD

Let us consider the main groups of countries' monetary policy measures during the COVID-19 pandemic.

1. A significant reduction in interest rates by the central banks of countries:

1.1. The key interest rate by developed countries [in the US and UK, the central bank key rate in March 2020 was reduced to almost zero; in the European Union (EU), key short-term interest rates remained unchanged only because they were close to zero or turned negative at the start of the crisis; in Japan, the rate is –0.1%] and many developing countries, for example, India, Brazil (the Selic key rate is reduced to a historically low level of 2%), South Africa (the key rate is reduced from 6.25 to 3.5%), Russia (the level of the key rate has been reduced from 6% to a historical minimum of 4.25%), Argentina, Mexico, Turkey, etc.

1.2. Other rates: the cost of short-term and long-term funding of financial institutions by the central bank, including through refinancing operations; interest on mandatory/excess reserves of financial institutions at the central bank, etc.

Reducing interest rates has become the most common monetary policy instrument in both developed and developing countries in 2020. Due to the higher level of key rates in developing countries compared to developed countries at the beginning of the pandemic, this monetary policy instrument was the first to be used more actively, and the percentage of cuts was higher in countries with higher key rates.

As noted earlier, the problem for developed countries was that, having entered the crisis with already very low interest rates, they were extremely limited in the ability of traditional monetary policy to revive the economy. Having reduced rates to values close to zero, and not daring to lower them to negative values (negative rates undermine the profitability of financial institutions and weaken the country's financial system), the central banks of the US, EU, Japan, and the UK had no choice but to start another round of quantitative easing (especially given the unprecedented nature of the economic downturn caused by the spread of the coronavirus in the world), see more [2].

2. The launch/increase by almost all developed countries of such an unconventional monetary policy tool as quantitative easing, in the face of the low effectiveness of

traditional monetary policy instruments due to the achievement by many countries of the "effective lower limit" of interest rates (see Paragraph 1).

The volume of current and crisis asset purchase programs (government, mortgage, corporate securities) in the United States is $ 3.1 trillion, in the EU — about 2 trillion euros, in Japan — more than 120 trillion yen ($ 1.1 trillion), in the UK — about 900 billion pounds.[3] Major quantitative easing programs are also being implemented by the central banks of Canada and Australia.

Interestingly, at the beginning of the pandemic, some developing countries also reached the lower limit of the key interest rate and launched/continued asset purchase programs (Israel, Poland, Chile, South Korea). An exceptional case was Indonesia, whose central bank temporarily switched to cash financing of the state budget. However, in general, this instrument of monetary policy was not actively used in emerging markets, and if quantitative easing programs were carried out, they were limited to the purchase of government securities[4] (central banks of developed countries also bought corporate paper). If in general in emerging markets the scale of QE was 0.2–2.8% of GDP, then in developed countries, the balance sheets of central banks in the first months of the pandemic strengthened significantly: for example, in the 4 largest developed markets (USA, EU, Japan and the UK) — by 8–15% in March-June 2020.[5]

In the whole, global purchases of financial assets as part of quantitative easing in 2020 only from the US, EU, UK and Japan exceeded $ 5 trillion.[6]

The scale of support to the functioning of financial markets through quantitative easing by the most developed countries is so unprecedented that it has led to conflict in the European Union.[7] The volume and distribution of funds for quantitative easing among the EU member states caused a protest in Germany and the suspension of the participation of the German central bank in the European program for the purchase of financial assets.[8]

In the US, quantitative easing has outperformed previous rounds of quantitative easing, including 80% more than the largest quantitative easing during the 2008–2009 global financial crisis.[9]

In developing countries, this unconventional monetary policy tool was used poorly (including in the context of the effectiveness of using lower interest rates to stimulate lending to the economy): in a number of countries, the volume of QE was low (China, India, South Africa), in some countries there was no QE at all (Brazil, Russia).

At the same time, in Brazil, for example, in May 2020, constitutional amendments were approved allowing the use of quantitative easing as an instrument of monetary policy: the central bank was given a temporary opportunity (until the end of 2020) to buy government bonds in the primary market, as well as corporate bonds with an international rating of at least BB — in the secondary market. However, due to inflationary and debt risks, the

[3] As of March 2021.

[4] The exceptions are the central banks of Hungary and Colombia, which also bought mortgage bonds and bank bonds, and the central bank of Chile, which bought exclusively bank bonds.

[5] The main directions of the unified state monetary policy for 2021 and for the period of 2022 and 2023. Central Bank of the Russian Federation; 2020. P. 114.

[6] Global Economic Prospects: A World Bank Group Flagship Report. World Bank Group; January 2021. P. 175.

[7] The scale of quantitative easing in the EU in 2015–2018 is 2.6 trillion euros ($ 3 trillion), i.e. 0.65 billion euros per year, in 2020 in one year — 1.47 trillion euros.

[8] Based on the existence of a ban on the provision of cash funding under Article 123 of the Treaty on the Functioning of the European Union, Germany suspended its participation in the Public Sector Purchase Programme (PSPP) in May 2020, indicating that the European Central Bank (ECB) had exceeded its powers and disproportionality of the support provided (the ECB buys government securities of the eurozone member countries in proportion to the share of national central banks in the capital of the ECB). This protest, however, did not extend to the purchase of financial assets carried out by the ECB under the Pandemic Emergency Purchase Programme (PEPP) launched in the EU in the second half of March 2020.

[9] In the US QE 1 (2008–2010) — $ 1.725 trillion, QE 2 (2010–2011) — $ 850–900 billion, Operation Twist (2011–2012) — $ 667 billion, QE 3 (2012–2014) — $ 1.14 trillion current round of quantitative easing (as of March 2021) — $ 3.1 trillion In just one month, the Fed bought more than $ 1 trillion (!) of government bonds [Annual Economic Report. Bank for International Settlements; June 2020. P. 38].

central bank announced that it will resort to this monetary policy tool only after the potential of traditional monetary policy methods to support the country's economy has been exhausted.

Appropriateness and barriers to the implementation of QE by developing countries

Quantitative easing, the use of which by the central banks of developed countries is largely a forced measure, is proposed by a number of scientists as justified for use in the context of the coronavirus pandemic in developing countries, subject to a number of conditions: a floating exchange rate, moderate inflationary expectations and government debt denominated in national currency. With capital outflow from developing countries, quantitative easing could relieve pressure on the debt securities market, especially in countries with a high share of foreign investors in the stock market (reducing the cost of borrowing for the entire economy), and provide effective cash funding of budget deficits, preventing stagnation in economics (see [3] for details).

Moreover, the experience of using quantitative easing by thirteen emerging markets during the coronavirus pandemic (many countries did it for the first time: India, Korea, Philippines, Poland, Turkey, South Africa) shows:

1. The success of these programs to restore investor confidence in the financial market (decrease in the yield of long-term bonds, stabilization of the exchange rate).

2. The absence of growth in inflationary expectations (including due to the limited volume of money emission) [4].

At the same time, it should be understood that developing countries are more limited in their monetary policy instruments, including the implementation of new emissions, compared to developed countries due to a number of factors, primarily the risks of exchange rate depreciation and the accompanying increase in inflation. This risk is especially high in the case of a significant presence of foreign investors in the domestic bond market (especially in the context of their low tolerance for lower yields in emerging markets). In addition, the financial markets of developing countries are less capitalized, which limits the scope of intervention of central banks in the market mechanisms of their functioning.

We should not forget about the significant negative consequences of quantitative easing: distortions in the yield curve and pricing in financial markets, including the formation of bubbles in financial markets (money flows into the financial sector instead of the real sector of the economy and households), growth in debt in the economy (and credit risks), inflationary risks, undermining market discipline, risks of political interference in monetary policy.

Assessing the impact of QE on developed and developing countries (past experience)

Quantitative easing carried out by developed countries during the global financial crisis of 2008–2009 played a positive role and helped both developed and developing countries avoid financial collapse. However, in the long term, against the backdrop of economic growth in developing countries in countries that implemented quantitative easing, economic stagnation and weak financial market dynamics persisted, which required new rounds of quantitative easing to revive. In other words, in developed countries there is a growing trend of increasing dependence of their economic well-being on the stimulation of economic activity by the state, the failure of market mechanisms for the functioning of the economy.

Quantitative easing by developed countries carries significant risks for developing countries as well, as it leads to a sharp inflow of speculative capital into their financial markets, which brings higher returns. About 40% of the increase in the money supply in the United States during the period of quantitative easing occurred during the global financial crisis of 2008–2009 (QE 1), turned into capital outflow [5].

This can lead to the formation of bubbles in the stock markets of developing countries,

an increase in the volatility of their exchange rates, the formation of an excessive debt burden of companies, inflationary pressure, and also cause large-scale financial shocks with a sharp increase in the outflow of capital from foreign investors. Therefore, the quantitative easing policy of developed countries has been repeatedly criticized by the BRICS countries.

3. Central bank liquidity provision to financial institutions:

3.1. Decoupled support:

3.1.1. A significant increase in the volume,[10] availability (due to the expansion of the composition of collateral) and frequency of refinancing operations by the central bank of financial institutions, the launch of longer repo operations, and a decrease in interest rates on them.

3.1.2. Issuance of loans at low interest rates. In particular, in Japan, the central bank actively increased the issuance of secured loans to banks at 0.1% per annum (Loan Support Programme); In Brazil, loans from the Central Bank of Brazil have become available against unsecured long-term debt obligations of financial institutions (debentures) as well as against financial institutions' debt obligations secured by financial assets/securities (letras financieras garantidas).

3.1.3. Launch of anti-crisis financing programs for financial market participants. For example, in the United States, since mid-March 2020, a Primary Dealer Credit Facility (PDCF) lending program has been operating under a wide range of collateral, as well as a bank lending program for assets acquired with money market funds (Money Market Mutual Fund Liquidity Facility — MMLF); Since May 2020, Pandemic Emergency Longer-Term Refinancing Operations (PELTROs) have been launched in the EU at reduced interest rates.

The volume of liquidity provided under the programs of refinancing by central banks of financial institutions during the first wave of coronavirus in the world amounted to: in the USA — $ 6 trillion, in the EU — more than 400 billion euros, in China — about 3 trillion yuan (more than $ 400 billion), in Japan — 90 trillion yen (~$ 840 billion), India — 2.75 trillion rupees (~$ 40 billion), Brazil — about 1 trillion reais[11] (about $ 200 billion) [6].

3.2. Targeted support (ensuring lending to business entities most affected by the consequences of the coronavirus, primarily small and medium-sized businesses): concluding targeted repo transactions with banks and launching special lending programs for financial institutions for these purposes. The volume of assistance provided during the first wave of COVID-19: in the United States — $ 600 billion, in the EU — 1.4 trillion euros, in China — more than 3 trillion yuan ($ 440 billion), in Japan — 55 trillion yen (more than $ 50 billion), in India — 2.75 trillion rupees (~$ 40 billion), in Brazil — 260 billion reais (more than $ 50 billion), in Russia — 675 billion rubles (~$ 9 billion).

The European Union (about 80%), China (51%), India (50%), Japan (38%) account for a particularly large share of financial assistance in this area of support for financial institutions.

In the EU, the volume of Targeted Longer-Term Refinancing Operations (TLTROs) has been increased.[12]

In China, structural monetary policy instruments (targeted assistance to the most affected sectors/types of companies) became a priority of monetary policy during the crisis: special programs for lending by the central bank to banks were launched to provide the latter with loans at a low interest rate (as well as with a delay interest and principal payments) to companies in industries most affected by COVID-19 (production of goods to combat the virus, agriculture, foreign economic activity, medium, small and micro businesses, etc.); banks began issuing annual loans (Targeted

[10] Including transition to satisfaction of bids at repo auctions in full (India, South Africa, Indonesia, Korea, Mexico).

[11] At the end of June 2020, only 7 billion reais (3.6%) were used.

[12] The purpose of TLTRO is to stimulate lending by banks to the real sector of the economy [non-financial companies and the population (excluding mortgage loans)]: when a bank reaches the planned lending volumes, it gets access to new repo loans under TLTRO, otherwise, early repayment of borrowed funds is required; if the bank exceeds planned lending levels, the cost of borrowing decreases.

Medium-term Lending Facility — MLF) for the purpose of lending to small and medium-sized businesses. An unconventional tool for supporting small and medium-sized businesses has become a temporary (for a year) repurchase by the central bank (through SPV) of loans issued to these business entities by local banks (without charging interest from banks for the use of funds), aimed at stimulating the issuance of new loans to these companies.

The Reserve Bank of India has increased repo operations with banks to ensure that the latter buy back corporate debt (both in the primary and secondary markets) and provide loans to business entities: large corporations, medium, small and micro businesses, mutual funds, exporters/importers, companies in agriculture, mortgage market participants, etc.

The Central Bank of Japan has begun refinancing banks to provide the latest annual interest-free loans to Japanese companies, including medium and small businesses.

In the United States, the refinancing of financial institutions that provide loans to small and medium-sized businesses has begun under the Main Street Lending Facility (MSLF) program.

In Brazil, the growth of lending to the economy and households (with a concomitant reduction in interest rates, prolongation of loans, etc.) by banks with state participation (Caixa, Banco de Brazil, National Development Bank —BNDES) is ensured. The goals of the loans were similar: supporting the liquidity of companies (including the purchase of loans from medium-sized banks to pay salaries), lending to medium, small and micro businesses, agricultural enterprises, etc.

In Russia, the Bank of Russia began lending at a preferential rate to credit institutions for the purpose of lending to small and medium-sized businesses; long-term repo auctions for banks were introduced, providing customers with the opportunity to restructure loans.

In general, liquidity support for financial institutions, including targeted support, has become one of the most common and main measures of countries' monetary policy during the coronavirus pandemic.

4. The launch of targeted financial assistance programs to companies and households through the purchase of both newly issued and already outstanding securities of companies (used mainly by developed countries: the USA, the EU, the UK), lending to companies for the purpose of paying wages, providing state guarantees, paying interest rates for a certain period of time on loans under approved schemes for assistance to the real sector of the economy and the population. The amount of assistance in this area is more modest, with the exception of the United States and Germany.

In the United States, since the end of March 2020, financial support programs for companies through the purchase of commercial paper (Commercial Paper Funding Facility — CPFF) have been implemented; support for large American companies through the implementation of their lending programs, including through the purchase of their securities: both newly issued (Primary Market Corporate Credit Facility — PMCCF) and already in circulation (Secondary Market Corporate Credit Facility — SMCCF); support for consumer loans (Term Asset-Backed Securities Loan Facility — TALF). The total amount of these programs is $ 850 billion.

In Germany, significant financial resources (more than 650 billion euros) were allocated to provide state guarantees for loans issued to companies to maintain their liquidity by the state bank KfW and a specially created Economic Stabilization Fund (WSF),[13] and the purchase of shares in large companies for the same purposes. A moratorium has been introduced on payments on consumer loans for households affected by COVID-19. At the Land level, tens of billions of euros worth of financial assistance pro-

[13] The provision of state guarantees for loans served as an incentive for banks to continue lending to the economy (in addition to the financial ability to issue loans thanks to the liquidity received from the Central Bank). Government guarantees also protect the central bank from credit risk, which is a transparent and efficient way to maintain its operational independence. 100% state guarantees on loans during the pandemic were issued in Germany, Hong Kong and Switzerland.

grams for companies and households have been launched.

Some developing countries have also used this tool of monetary policy (volumes — several billion US dollars).

For example, in Brazil, the federal government launched the Employment Crisis Program (Programa Emergencial de Suporte a Empregos — PESE), which provides loans to companies to pay wages to workers [limit is 40 billion reais ($ 8 billion)],[14] and funds 85% by the Treasury, 15% — by participating financial institutions. In addition, the five largest banks provided an opportunity to receive a two-month moratorium on payments on loans to small and medium-sized businesses and the population.

In South Africa, loans to small and medium-sized businesses issued during the COVID-19 pandemic to maintain their liquidity, including for paying wages to employees, began to be secured by state guarantees.

Scientific studies of the comparative effectiveness of direct financial support for financial institutions and non-financial companies in the context of the coronavirus pandemic indicate a significantly higher efficiency in directing financial flows to companies in the real sector in order to stimulate aggregate demand [7].

5. Expansion of currency swap lines and repo between central banks and softening of their conditions in order to stimulate liquidity in major world currencies (US dollar, euro, yuan). Foreign exchange interventions to maintain the exchange rate of their own currency for other countries (volumes during the first wave of the pandemic: Brazil — $ 51 billion, India — $ 2 billion, Russia — about $ 10 billion). Central bank provision of foreign exchange liquidity to banks (for example, Brazil, Korea, Mexico; small volumes).

The current crisis has further strengthened the role of the US as a lender of last resort. During the pandemic, the Fed repeatedly increased the size of the current currency swap lines with the central banks of the EU, UK, Canada, Japan and Switzerland, and also entered into temporary swap lines with a number of other countries (9 countries in total) in order to increase global US dollar liquidity. The outstanding volume of currency swaps at the end of April 2020 peaked at $ 450 billion (the main recipients are Japan and the EU). In addition, since the beginning of April 2020, the Fed has provided a temporary opportunity to enter into repurchase transactions in US government securities with national and international financial regulators in order to ensure that the latter attract financial resources without putting negative pressure on the functioning of the US government securities market.

During the crisis, the EU and China also contributed liquidity in euros and yuan, respectively, through currency lines with other countries, but on an incomparably more modest scale compared to the US (provided several tens of billions of euros/yuan).

6. Other tools that facilitate the release of financial resources in the banking system for lending to the economy: the weakening of regulatory requirements for the capital of financial market participants, including the dissolution of capital buffers, for the level of their financial leverage, liquidity, for securing bank loans, asset valuation, reduction of reserve requirements, delaying the introduction of new macroprudential requirements, etc.

Some countries resorted to less common measures, such as the abolition of dividend payments in 2019–2020 by banks on their shares and cash incentive payments to key employees (Great Britain, Brazil, South Africa, Russia[15]), a ban on the buyback of their own shares (Brazil), etc.

The vast majority of central banks in both developed and developing countries used regulatory easing to free up financial resources for banks during the crisis. Because in the pe-

[14] In fact, at the beginning of March 2021, 8 billion reais were provided (20% of the declared amount of the program). Acompanhamento das medidas emergenciais contra o coronavirus. URL: https://www.bndes.gov.br/wps/portal/site/home/bndes-contra-coronavirus/mais-informacoes/acompanhamento-medidas-emergenciais-contra-coronavirus/ (accessed on 13.03.2021).

[15] The Bank of Russia recommended that financial institutions pay dividends for 2019 only if they have sufficient capital reserves.

Table 2

Monetary policy effectiveness during the COVID-19 pandemic

USA	Japan	UK	EU	Germany	Brazil	China	India	South Africa	Russia
The volume of declared direct financial support to the economy from the central bank during the first wave of the pandemic (for developing countries, considering the estimated volume of released resources from the easing of regulatory requirements for financial institutions), % of GDP in 2019 (see Table 1)									
48.0	47.1	33.7	25.4	19.6	14.5	7.8	5.0	2.1	1.4
Change in real GDP in 2020 compared to 2019, % (according to OECD)									
–3.5	–4.8	–9.9	–6.8	–5.3	–4.4	2.3	–7.4	–7.2	–3.6

Source: Table 1, OECD Economic Outlook, Interim Report. OECD Publishing, Paris; March 2021. P. 4. URL: https://www.oecd-ilibrary.org/economics/oecd-economic-outlook/volume-2020/issue-2_34bfd999-en/ (accessed on 17.06.2021).

riod after the global financial crisis of 2008–2009 macroprudential supervision tightened in most countries, by the beginning of the pandemic, significant capital and liquidity reserves had accumulated in the financial sectors of the countries, the release of which in connection with the temporary easing of regulatory norms provided significant support to the economies of countries in the context of fighting the consequences of COVID-19.

7. Regional support, for example, in April 2020 the US Federal Reserve launched a program for the purchase of short-term municipal bonds from states and municipalities (Municipal Lending Facility — MLF) (limit — $ 500 billion), financial assistance from the Reserve Bank of India for the states (about $ 30 billion).

CONCLUSIONS: EFFECTIVENESS OF THE COUNTRY'S MONETARY POLICY DURING THE PANDEMIC

Table 2 presents data on the volume of GDP decline by countries in 2020, as well as figures characterizing the declared scale of monetary support for the economies of countries by their central banks.

Although many other factors influence the dynamics of economic development, in addition to the monetary policy of countries, the preliminary data in the table indicate that China conducted the most effective monetary policy during the coronavirus pandemic. Economic growth in this country, unlike most other countries, has not been stopped by the coronavirus pandemic. See [8] for details.

In this country, the main emphasis was placed on structural monetary policy instruments: financial support for the most affected economic entities (mainly through refinancing of banks by the central bank), and the objectives of this policy were achieved. In the first quarter and the first half of 2020, new yuan-denominated loans (7.1 trillion yuan (about $ 1 trillion) and 12.1 trillion yuan ($ 1.7 trillion) loans to micro and small businesses for 5 months of 2020 increased by 28% compared to the value at the end of May 2019. Economic indicators also testify to the high effectiveness of the ongoing monetary policy: the fall in GDP in January-February 2020 was replaced by growth since March 2020; in the second quarter, GDP growth exceeded that of the second quarter of 2019 by 3.2%. In general, for the first half of the year, the fall in GDP amounted to only 1.6%.[16]

Interestingly, in mid-2020, China (unlike the vast majority of other countries) announced the end of monetary easing in order

[16] China Monetary Policy Report Q2 2020. People's Bank of China, Monetary Policy Analysis Group; 2020, August 6. P. 46.

to prevent overstimulation of growth and debt in the financial sector.

When evaluating the effectiveness of monetary policy **in Russia** in 2020, the following features characterizing this policy should be noted:

- **some delay in the implementation of anti-crisis measures, their rapid phasing out**: measures to support the ruble exchange rate began in March 2020; at the end of April 2020, the Central Bank of the Russian Federation announced the transition to a soft monetary policy; on the planned termination of a number of anti-crisis measures with the simultaneous extension of part of the regulatory easing;
- **low volumes of support to the economy from the Bank of Russia (even in comparison with many developing countries**): about 1.5% of GDP (see *Table 1*);
- **the use of traditional monetary policy instruments** to combat the consequences of the pandemic: the main emphasis was placed on supporting the ruble exchange rate (operations on the open market for the sale of foreign currency), a consistent reduction in the key rate, support for small and medium-sized businesses through refinancing of commercial enterprises by the central bank banks, as well as easing regulatory requirements for financial participants in order to stimulate investment/lending to the economy and the population, debt restructuring and resolving problem loans. For more details on the main measures of Russia's monetary policy in the first months of the pandemic, see [9, p. 11].

Thus, it can be stated that during the coronavirus period, the Bank of Russia carried out a cautious easing of monetary policy, which did not correspond to the scale of the crisis in the country's economy. As before, the main guideline in the policy of the Central Bank is the level of inflation, and not the stimulation of economic development (unlike developed countries, whose support for their economies in 2020 was extraordinary in volume, reaching hundreds of billions — several trillion US dollars against several tens of billions of US dollars in Russia). A similar picture can be traced in terms of budget support for the economy by the Russian government. An analysis of the scale of fiscal measures to support the economies of the main developed and developing countries in 2020 indicates much more modest amounts of assistance in Russia compared to other countries. See [10, p. 52].

With the onset of the pandemic, a number of leading Russian scientists expressed their opinion about the inability to provide the economy with sufficient support from the state, about the outdated monetary and economic policy pursued by the country, which consists in trying to "just "wait out" the crisis"[17] and is fraught with the economy plunging into a prolonged economic depression [11, 12]. They presented proposals on using the resources accumulated by the state (National Wealth Fund, foreign exchange reserves), increasing government borrowing (especially in the context of a low level of public debt), launching a quantitative easing program of the Bank of Russia in order to support the economy and stimulate demand. In particular, V. L. Inozemtsev proposed a strategy to stimulate consumer demand for final products (with a categorical refusal to issue soft loans and state support for large enterprises) by increasing lending by the Bank of Russia in the amount of at least 10% of GDP annually for a period of at least the next three years.[18]

CONCLUSIONS: ASSESSMENT OF THE IMPACT OF THE COUNTRY'S MONETARY POLICY IN 2020 ON THE FUTURE DYNAMICS OF ECONOMIC AND FINANCIAL DEVELOPMENT OF DEVELOPED AND DEVELOPING COUNTRIES

In general, when describing the monetary policy of countries during the pandemic, two

[17] For more details, see Inozemtsev V.L. Demand — the state is called to account for. Gazeta.ru. May 31, 2020. URL: https://www.gazeta.ru/column/vladislav_inozemcev/13093363.shtml/ (accessed on 13.03.2021).

[18] Inozemtsev V.L. Demand — the state is called to account for. Gazeta.ru. May 31, 2020. URL: https://www.gazeta.ru/column/vladislav_inozemcev/13093363.shtml/ (accessed on 13.03.2021).

features that are unique to the current crisis can be distinguished. First, it is the **excessive efficiency** of response of the countries' central banks to the crisis, a lesson from the previous major global recession (2008–2009), which showed that the uncertainty of their policies increases the volatility in financial markets. Secondly, **expanding the operational capabilities** of central banks through the inclusion of new non-traditional monetary policy instruments (quantitative easing; temporary redemption of loan portfolios from banks in order to expand lending by the latter to the economy; direct financing of business entities that are not banks; support for regions through the purchase of municipal securities, etc.), making the most of all available means to mitigate the economic and financial impact of COVID-19.

At the same time, developing countries have carried out a fairly conservative and cautious easing of the monetary policy compared to developed countries, which flooded financial markets with liquidity and launched a new, by far the largest round of quantitative easing. Given that in previous rounds of quantitative easing, about 30–40% of funds flowed to the financial markets of developing countries [5], after the end of the pandemic, we can expect another rapid recovery in these markets — recipients of US, EU, UK and Japan-printed money, An influx of capital can lead to temporary economic growth and rapid recovery in the stock markets of these countries (compared to the supposedly long stagnation in developed countries), but in the end, the next crisis will become a trigger for the withdrawal of speculative capital from these markets and their immersion in a new round of devaluation of the national currency, defaults and financial losses.

The scale of this destabilizing factor in the dynamics of the financial markets of developing countries is evidenced by the scale of the reversal of capital of international investors during the current crisis: in March 2020 alone, emerging markets lost $ 80 billion — a historical record for the monthly volume of capital outflow from developing countries to developed markets.[19] In the future, taking into account the increase in money emission by developed countries, these indicators may increase significantly along with the volatility of the financial markets of developing countries.

Thus, it can be stated that financial crises only aggravate the dependence of their well-being, which is painful for developing countries, on the economic situation in developed countries and on the economic and monetary policies pursued by these countries.

CONCLUSIONS: FORECAST OF THE GENERAL MONETARY POLICY VECTOR AFTER THE COVID-19 PANDEMIC

When forming monetary policy in the near future, the central banks of countries will rely on the following main factors:

1. The state of the banking sector. One of the economic consequences of the pandemic was the transition of the economies of countries to the stage of illiquidity and their rescue by the banking sector with the participation of central banks. However, the stage of illiquidity may be followed by the stage of financial insolvency for a significant number of companies, with subsequent transfer of losses to the banking sector. The probability of development of events in this direction is the higher, the greater the scale of liquidity injections into the economies of countries was carried out during the crisis. For central banks, this will mean the need to start encouraging banks to replenish reserves rather than encouraging them to use them to support the economy.

2. The rate of inflation. There are currently two opposing factors affecting prices globally: a sharp decline in aggregate demand and containment of its recovery in the face of uncertainty with the spread of the virus reduces price growth while rising production costs and lower prices increase labor productivity associated with a number of circumstances (new the realities of the production of goods and the provision of services in the context of social distancing, deglobalization and disruption

[19] Annual Economic Report. Bank for International Settlements; June 2020. P. 10.

of production chains, their reorientation to local markets). In developing economies, prices are also rising due to the depreciation of national currencies.

Experts from the Bank for International Settlements point to the likely predominance of deflationary factors in the short term [13] and, accordingly, the legitimacy of continuing the stimulating monetary policy by the central banks of the countries.[20] The likelihood of such a scenario is growing due to the difficulties that countries are experiencing in containing the spread of coronavirus in 2021.

3. The level of public debt. The crisis associated with the 2020 pandemic has led to a significant increase in the level of public debt in general and its size, and, above all, in developed countries, the share on the balance sheets of central banks. In many advanced economies, central bank balance sheets are at an all-time high and are projected to grow in the future, albeit at a slower pace.[21] Under these conditions, monetary policy will come under pressure due to the fiscal need to maintain low interest rates to service the public debt — even in the face of rising inflation.

Thus, if during the pandemic the interests of central banks and governments coincided, then at the exit from the crisis — in the event of the emergence/intensification of inflation and the deterioration of the financial situation of banks — it would be advisable for central banks to move to tighten monetary policy, this will be contrary to budgetary interests [14, 15]. Under these conditions, the central banks of the countries will be under pressure from the executive authorities, and it will be quite difficult to reverse the vector of monetary policy. This is also evidenced by the experience of the global financial crisis of 2008–2009.

A particularly sharp conflict of interest may arise for the central banks of the largest advanced economies: given the volume of liquidity they throw into the market [in 2020, the G4 countries conducted quantitative easing by about $ 6 trillion, which is comparable to the international reserves of all developing countries (about $ 8 trillion[22])], these countries could face severe banking crises and high inflation rates, requiring a sharp tightening of monetary policy at a high cost of servicing public debt, making such a tightening highly undesirable.

[20] Annual Economic Report. Bank for International Settlements; June 2020. P. 60.

[21] Annual Economic Report. Bank for International Settlements; June 2020. P. 62.

[22] International Monetary Fund (IMF) Data Access to Macroeconomic & Financial Data: Data Template on International Reserves and Foreign Currency Liquidity. URL: http://data.imf.org/ Data as of June 2020. (accessed on 17.02.2021).

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The Armey Curve: An Empirical Analysis of Selected Balkan Countries and Russia for the Period 2006–2019

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ABSTRACT

The subject of the analysis is to check the validity of the Armey curve which is frequently used in the scientific literature and to establish the optimal level of the public sector. **The aim** of the present study is to analyze the impact of the public sector through public expenditure on the possibility of achieving economic growth. The estimation is based on annual data for the period 2006–2019 of selected Balkan countries and Russia. The authors apply the ordinary least squares (OLS) **method** for a nonlinear regression model. **The conclusion** is that the Armey curve is valid for some of the countries involved in the research among which Serbia, North Macedonia and Russia. The public expenditure to Gross Domestic Product ratio's threshold value, which maximizes economic growth, ranges from 32.94 to 42.37%. The average share of public expenditure in the analyzed countries is approximately equal to the threshold values that are obtained which is indicative of achievement to some extent the desired economic performance. However, the **results** of the study show that the growth of the public sector and its impact on economic development should not be underestimated.
Keywords: Armey curve; public expenditure; economic growth; Balkan countries; Russia

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INTRODUCTION

There is no consensus in the scientific literature on the impact of public expenditure on a country's social and economic development. The topic of the degree of government intervention in the economic activity is discussed in many scientific debates between different schools of economic thought. The object of analysis in both theoretical and empirical research is the size of the public sector (measured by public expenditure as a percentage of Gross Domestic Product), on the one hand, and determining the optimal levels of this sector that would have a positive effect on the economy, on the other hand. For this reason, various models have been developed and tested, which present theoretically, empirically and graphically the relationship between expenditure and economic growth. In this regard, the Armey curve is used as an appropriate tool.

The present study focuses on empirical testing of the relationship between public expenditure and economic growth, using the Armey curve, for five selected countries in the Balkan region and Russia. Some of the Balkan countries are members of the European Union (Bulgaria and Greece). Serbia and North Macedonia are candidates for European Union membership. Kosovo and the European Union have already signed a Stabilisation and Association Agreement, which is the formal start of the accession negotiations. Russia is also included in the analysis, as a country that has strengthened foreign trade, socio-economic and partnership relations with the Balkan countries. The time period used for the purposes of the analysis is from 2006 to 2019.

The study is structured in four sections. The first section outlines the theoretical and empirical foundations of the relationship between public expenditure and economic growth in the light of the Armey curve. The second section presents the methodological framework of the analysis and descriptive statistics for the variables that are included in the model. The third section consists of applying the developed regression model, assessing the optimal level of the public sector and discussing the results. The last section includes conclusions.

LITERATURE REVIEW

Public expenditure is an important tool in the conduct of any government financial, economic and social policy. The relationship between public expenditure and economic growth is modeled and presented in a large number of scientific studies. Some of them

focus on establishing the direction of causality [1–3]. Meanwhile, other studies emphasize the impact of expenditure on growth, highlighting the structure of public expenditure and its effects on economic performance [4–6]. Moreover, in some of these researches, it is concluded that government activities have a stimulating role for the national economy. Other authors take the opposite side in this debate, arguing that rising public expenditure has a negative impact on economic growth. This provoked a group of authors, including R.J. Barro [7], G. Scully [8] and D. Armey [9], to find evidence to support the fact that the relationship is nonlinear. It is postulated that with the gradual increase in public expenditure, gross domestic product (GDP) also tends to grow, but this is valid until a certain point. The increase in expenditures, and hence the influence of the public sector above a certain threshold, is not accompanied by higher growth rates. D. Armey [9] argues that both low and very high levels of public expenditure can have adverse consequences in the pursuit of economic growth. This requires finding an optimal level (PubEXP*), at which the public sector will lead to an increase in GDP. The authors mentioned above derive and present the impact of public expenditure on economic growth in a similar way, using an inverted U–shaped curve (*Fig. 1*). The size of the public sector is shown on the horizontal axis (abscissa), represented by the public expenditure as a percentage of GDP, while the rate of economic growth is shown on the vertical axis (ordinate).

R.J. Barro [7] points out that improving a country's infrastructure through a public resource can be interpreted as a positive sign in terms of future investment activity, and hence for better economic performance. The subsequent expansion of the public sector (by increasing public expenditure) requires the provision of additional resources for its financing. This means that the public revenues have to be increased, which can create an additional tax burden for economic agents. The higher tax rates may lead to more adverse effects on private investors and their expected future rate of return, and this will also affect the incentives to invest in the economy [10]. The expansion of the public sector can be financed not only through taxes but also through the issuance of government debt. However, the participation of the government in the capital markets may lead to an increase in interest rates on borrowed funds and create a so-called *crowding out effect* on private investments [11]. C.N. García [12] derives two main characteristics of public expenditure. On the one hand, public expenditures contribute to tackling market failures, but on the other hand, their excessive growth and use in an ineffective way may lead to government failures. Thus, the Armey curve can be used as a tool for measuring the expenditure efficiency of the public sector.

In modern empirical studies, scholars have verified the validity of the theoretical foundations of the Armey curve, which describes the relationship between public expenditure and economic growth. Different groups of countries are subject to analysis. The basis of these studies is not only to establish the relationship between public expenditure and economic growth but also to determine the optimal level (threshold) of public expenditure that would promote a higher growth rate of the national economies. H. Mavrov [13] concludes that there is a nonlinear relationship between public expenditure and economic growth in Bulgaria, where the public expenditure to GDP ratio's threshold value is 28% for the period 1990–2004. In addition, the study investigates the impact of public expenditure categories (classified by function). The validity of the Armey curve is confirmed for some of them (for example education, healthcare services and social security), while for the categories of economic activities and services, general public services and other expenditures only the hypothesis of the linear relationship is established.

O.F. Altunc and C. Aydin [14] test the validity of the Armey curve for selected Balkan countries, including Turkey, Bulgaria and Romania. They find the presence of a nonlinear relationship based on available data for the period 1995–2012. The obtained results show that the threshold values of public expenditure vary between 22% and 25% of GDP, which does not correspond directly to the situation in the analyzed countries. It should be noted that the share of public expenditure to GDP significantly exceeds the calculated optimal levels in these countries. Therefore, governments need to focus on the opportunities to improve public sector efficiency. C. Yüksel [15] points out that the public expenditure and economic growth nexus are extremely dynamic, and differences can be observed not only for individual countries but also for different periods, including within the same economy.

De K. Witte and W. Moesen [16] also investigate and confirm the existence of the Armey curve using time series data for the member countries of the Organization for Economic Co–operation and Development (OECD). Through applying a DEA analysis, they find that the

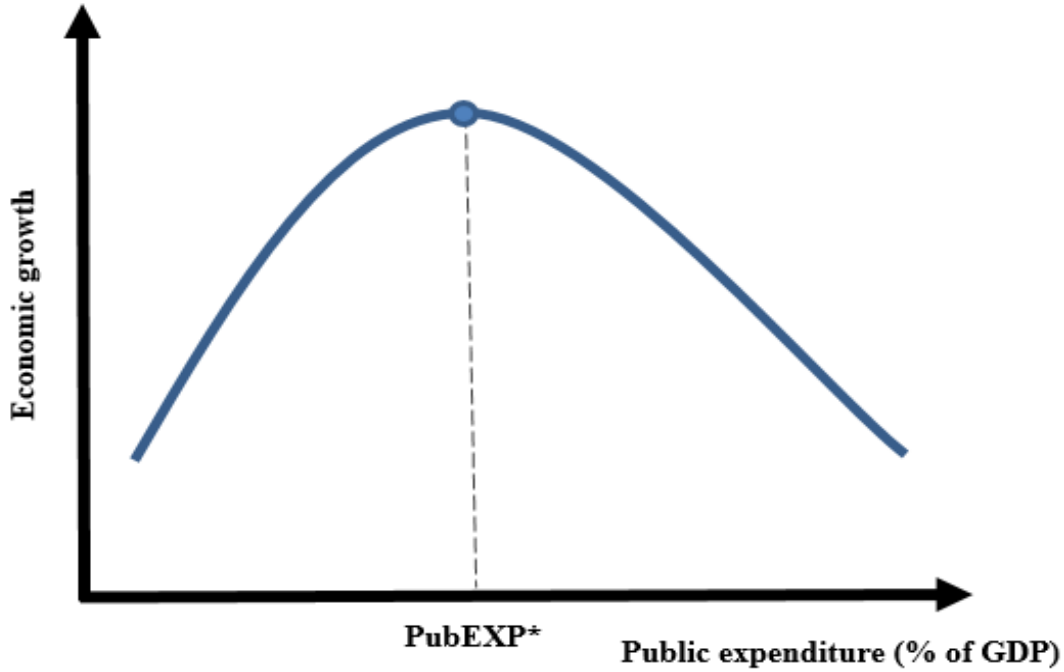

Fig. 1. **Armey curve**
Source: adapted from [7].

average value of the optimal level of public expenditure to GDP for 23 countries is equal to 41.22% in the long run. This result is significantly higher than the conclusions reached by H. Mavrov [13], O.F. Altunc and C. Aydin [14] for some of the Balkan economies. De K. Witte and W. Moesen [16] explain the higher expenditure to GDP ratio with the concept of the household size. According to this concept, the number of children in families is gradually declining in modern societies and this provokes parents to expect the government to take on more responsibilities. In other words, it strengthens the government's role in promoting social responsibility. Furthermore, P.V. Iyidogan and T. Turan [17] emphasize that the future challenge to the fiscal policy of the countries and the size of the public sector may be the growing ageing population and hence the rising social security expenditure. The differences in the obtained results may also be due to the specification of the empirical models and the explanatory variables included in the analysis. For example, some studies use government consumption expenditure (as part of the expenditure approach to calculating GDP) as a measure of the public sector, while other investigations use the value of public expenditure from the budget execution reports.

F. Forte and C. Magazzino [10] examine the relationship between the size of the public sector and the economic growth of the European Union Member States for the period 1970 to 2009. The countries under analysis are very heterogeneous. That is why, the authors divide them into groups, which they study separately. The differences between the groups arise from the labor market development, the structure of public expenditure and the level of welfare. The authors conclude that the optimal levels of public expenditure to GDP are as follows: for Eastern European countries — 40%, for Western European countries — 38.32%, for the Anglo–Saxon countries — 40.77% and for the Mediterranean countries — 42.06%. C.N. García [12] reaches similar estimates for the Spanish economy by calculating a threshold of 40% for the period 1980–2016.

There are scientific studies in which the theoretical foundations of the Armey curve are partly confirmed. For instance, D. Lupu and M. Asandului [18] conduct a study for eight Eastern European countries and conclude that only in three of them the validity of the curve is proved. G. Bozma, S. Basar and M. Eren [19] confirm the existence of the Armey curve only for some of the G7 countries (USA, France and Canada). This is not valid for Germany, United Kingdom, Japan and Italy.

DATA AND METHODOLOGY

In the present study, we use a nonlinear regression model to conduct econometric analysis. The dependent

variable is economic growth (EGR) defined as the growth rate of real GDP. Economic growth is presented as a function of public expenditure (PubEXP) and other selected exogenous factors (ExVariables).

$$\text{EGR} = f\left(\text{PubEXP},\ \text{ExVariables}\right). \quad (1)$$

Therefore, public expenditure (presented as percentage of GDP) is included as an independent variable in the model. The square of the variable public expenditure as a percentage of GDP is also included in the regression model. This is frequently used when testing for the presence of the Armey curve and proving a nonlinear relationship between the dependent and the independent variable. This approach is applied in the studies of R.K. Vedder and L.E. Gallaway [20], H. Mavrov [13], F. Forte and C. Magazzino [10] and O.F. Altunc and C. Aydin [14]. In addition, an exogenous variable is added to the independent variables in the econometric model specification of the present study. In the empirical literature, this approach is commonly used in research on this topic. The following indicators are widely used as exogenous variables: unemployment rate [14, 18], trade openness [21–23], investment and consumption expenditures [21, 22], population and tax rates [24]. The public revenue as a percentage of GDP is chosen as an exogenous variable in the present analysis. In this way, the impact of both the expenditure and the revenue side of the budget on economic growth can be investigated. M.G. Attinasi and A. Klemm [25], F.T. Boldeanu, I. Tache and M. Ion [26] use a similar technique and thus aim to show the impact of fiscal policy on overall growth. Furthermore, in the literature review section of our study, it is emphasized that the expansion of the public sector requires additional resources in government budgets, which further affects economic development.

We use ordinary least squares (OLS) method as econometric technique of analysis. Following regression model is used to test the validity of the Armey curve:

$$EGR_{i,t} = \beta_0 + \beta_1 PubEXP_{i,t} + \\ + \beta_2 \left(PubEXP_{i,t}\right)^2 + \beta_3 \left(PubREV_{i,t}\right) + \varepsilon_{i,t}, \quad (2)$$

where: EGR — economic growth, presented as a growth rate of real GDP;

PubEXP — public expenditure as a percentage of GDP;

PubREV — public revenue as a percentage of GDP;

ε — residual component;

$i = 1...6$;

$t = 2006, ... 2019$.

To assume the validity of the Armey curve, the coefficient β_1 has to be positive ($\beta_1 > 0$), while the sign of the coefficient β_2 has to be negative ($\beta_2 < 0$). For countries where the Armey curve is valid, we can calculate the threshold value of the public expenditure to GDP, which promotes higher economic growth. F. Facchini and M. Melki [24], F. Forte and C. Magazzino [10], O.F. Altunc and C. Aydin [14], D. Lupu and M. Asandului [18] determine this optimum (threshold) using the value of the coefficients before the parameters of the model as follows:

$$PubEXP^* = -\frac{\beta_1}{2\beta_2}. \quad (3)$$

In the present study, we test the validity of the Armey curve for the economies of Bulgaria, Kosovo, Serbia, Greece, North Macedonia and Russia. The countries, which we include in the scope of our study, are positioned in Southeast Europe. Most of them are located in the Balkans. Russia is included in the analysis due to the country's historical, economic and political relations with other Balkan economies. The study is based on annual time series data for the period from 2006 to 2019. The data set used in the analysis is obtained from the reports on the execution of the consolidated budget, published by the Ministries of finance of the countries and other fiscal institutions. We also use the International Monetary Fund's macroeconomic statistics and Eurostat as a source of data.

The descriptive statistics of the variables used in the regression model for the six selected countries are shown in *Table 1*.

EMPIRICAL RESULTS

The results of the applied model are presented *in Table 2, Table 3, Table 4* and *Table 5*. Based on the results shown in *Table 2*, we confirm the validity of the Armey curve for three of the analyzed countries — Serbia, North Macedonia and Russia. As can be seen from *Table 2*, all independent variables in the nonlinear regression model for these countries are statistically significant in levels at 1, 5 and 10%. Thus, the increase of the public sector in Serbia, North Macedonia and Russia contributes to a better economic performance, but this is valid up to a certain threshold value of the public expenditure to GDP ratio.

Table 1

Descriptive statistics

Variables	Mean	Min	Max	Median	Std. Dev.	Coefficients of variation	Skewness	Kurtosis
Serbia								
EGR	2.39	–2.70	6.40	2.45	2.74	1.15	–0.37	–0.82
PubEXP	42.87	40.41	45.16	42.87	1.34	0.03	–0.01	–0.32
PubREV	40.04	37.32	42.11	40.05	1.57	0.04	–0.30	–1.24
North Macedonia								
EGR	3.04	–0.50	6.50	3.15	2.01	0.66	–0.26	–0.42
PubEXP	34.04	31.62	36.03	33.99	1.16	0.03	–0.24	–0.22
PubREV	31.75	29.65	35.41	31.44	1.74	0.05	0.65	–0.63
Russia								
EGR	2.43	–7.80	8.50	2.15	4.17	1.72	–0.78	0.83
PubEXP	35.20	31.12	41.35	34.80	2.42	0.07	0.97	1.41
PubREV	35.59	32.40	40.21	34.83	2.52	0.07	0.67	–0.84
Bulgaria								
EGR	2.83	–3.37	6.80	3.30	2.79	0.98	–0.48	–0.06
PubEXP	36.91	33.70	43.30	36.45	2.70	0.07	0.92	0.29
PubREV	36.37	31.90	38.80	36.70	2.27	0.06	–0.53	–0.93
Kosovo								
EGR	3.94	1.20	8.30	3.90	1.51	0.38	1.42	3.73
PubEXP	26.27	17.35	29.40	27.48	3.42	0.13	–1.69	1.69
PubREV	25.53	22.82	28.18	26.12	1.49	0.06	–0.19	–0.76
Greece								
EGR	–1.19	–10.15	5.65	–0.37	4.30	3.61	–0.56	–0.37
PubEXP	51.65	45.10	62.70	50.75	4.63	0.09	0.82	0.34
PubREV	45.43	38.90	50.30	47.35	4.32	0.10	–0.42	1.52

Source: Authors' own calculations based on: Republic of North Macedonia. Ministry of Finance. URL: https://finance.gov.mk/budget-execution-reports/?lang=en; Republic of Serbia. Ministry of Finance. URL: https://mfin.gov.rs/en/documents2-2/macroeconomic-data-2; Republic of Kosovo. Ministry of Finance. URL: https://mf.rks-gov.net/Page.aspx?id=2,125; Eurostat. URL: https://ec.europa.eu/eurostat/web/products-statistical-books/-/ks-ek-20-001; Russian Federation. The Federal Treasury. URL: https://roskazna.gov.ru/ispolnenie-byudzhetov/konsolidirovannye-byudzhety-subektov/; Republic of North Macedonia. Ministry of Finance. URL: https://finance.gov.mk/%d0%b4%d0%be%d0%ba%d1%83%d0%bc%d0%b5%d0%bd%d1%82%d0%b8-2/; International Monetary Fund. URL: https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020 (accessed on 11.07.2021).

Table 2

Testing the Validity of the Armey Curve in Serbia, North Macedonia, Russia, Bulgaria, Kosovo and Greece

Dependent variable: Economic growth (EGR)					
	Intercept	**PubEXP**	**PubEXP2**	**PubREV**	**Validity of the Armey curve**
Serbia					
Coefficients	−9.15455	41.65213	−49.14776	0.90650	Yes
P-value	0.07870*	0.08452*	0.08130*	0.04512**	
Standard Error	4.67566	21.75230	25.35596	0.39611	
t Stat	−1.95791	1.91483	−1.93831	2.28850	
North Macedonia					
Coefficients	−6.22163	36.63494	−55.60289	0.72802	Yes
P-value	0.04321**	0.04274**	0.03828**	0.01179**	
Standard Error	2.68878	15.78825	23.31375	0.23694	
t Stat	−2.31391	2.32039	−2.38498	3.07251	
Bulgaria					
Coefficients	1.93843	−11.68344	14.25340	1.23959	No
P-value	0.07319*	0.05154*	0.06413*	0.00225***	
Standard Error	0.96846	5.28614	6.85072	0.30467	
t Stat	2.00156	−2.21020	2.08056	4.06852	
Greece					
Coefficients	2.46763	−8.87279	7.64825	0.10496	No
P-value	0.00591***	0.00721***	0.01122**	0.51642	
Standard Error	0.70897	2.63917	2.46599	0.15605	
t Stat	3.48057	−3.36195	3.10148	0.67262	
Kosovo					
Coefficients	0.34540	−3.17306	5.89730	0.44706	No
P-value	0.05642*	0.02648**	0.04901**	0.11495	
Standard Error	0.16015	1.22031	2.63281	0.25893	
t Stat	2.15670	−2.60021	2.23992	1.72653	
Russia					
Coefficients	−2.27366	11.45220	−16.85436	1.02351	Yes
P-value	0.05689*	0.06423*	0.04844**	0.00531***	
Standard Error	1.05663	5.50676	7.50161	0.28871	
t Stat	−2.15178	2.07966	−2.24676	3.54504	

Note: * indicate significance at 10% level; ** indicate significance at 5% level; *** indicate significance at 1% level.

Source: Authors' own calculations based on: Republic of North Macedonia. Ministry of Finance. URL: https://finance.gov.mk/budget-execution-reports/?lang=en; Republic of Serbia. Ministry of Finance. URL: https://mfin.gov.rs/en/documents2-2/macroeconomic-data-2; Republic of Kosovo. Ministry of Finance. URL: https://mf.rks-gov.net/Page.aspx?id=2,125; Eurostat. URL: https://ec.europa.eu/eurostat/web/products-statistical-books/-/ks-ek-20-001; Russian Federation. The Federal Treasury. URL: https://roskazna.gov.ru/ispolnenie-byudzhetov/konsolidirovannye-byudzhety-subektov/; Republic of North Macedonia. Ministry of Finance. URL: https://finance.gov.mk/%d0%b4%d0%be%d0%ba%d1%83%d0%bc%d0%b5%d0%bd%d1%82%d0%b8-2/; International Monetary Fund. URL: https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020 (accessed on 11.07.2021).

Table 3

Adequacy of regression models

	Serbia	North Macedonia	Bulgaria	Greece	Kosovo	Russia
Significance F	0.03216	0.01439	0.01248	0.00167	0.00613	0.00105
Multiple R	0.75437	0.79760	0.80428	0.87564	0.83389	0.88768
R Square	0.56908	0.63616	0.64687	0.76675	0.69538	0.78799
Adjusted R Square	0.43980	0.52701	0.54093	0.69677	0.60400	0.72439
Standard Error	0.02051	0.01383	0.01888	0.02368	0.00949	0.02188
Observations	14	14	14	14	14	14

Source: Authors' own calculations based on: Republic of North Macedonia. Ministry of Finance. URL: https://finance.gov.mk/budget-execution-reports/?lang=en; Republic of Serbia. Ministry of Finance. URL: https://mfin.gov.rs/en/documents2-2/macroeconomic-data-2; Republic of Kosovo. Ministry of Finance. URL: https://mf.rks-gov.net/Page.aspx?id=2,125; Eurostat. URL: https://ec.europa.eu/eurostat/web/products-statistical-books/-/ks-ek-20-001; Russian Federation. The Federal Treasury. URL: https://roskazna.gov.ru/ispolnenie-byudzhetov/konsolidirovannye-byudzhety-subektov/; Republic of North Macedonia. Ministry of Finance. URL: https://finance.gov.mk/%d0%b4%d0%be%d0%ba%d1%83%d0%bc%d0%b5%d0%bd%d1%82%d0%b8-2/; International Monetary Fund. URL: https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020 (accessed on 11.07.2021).

According to the results shown in *Table 2*, it can be concluded that the Armey curve is not valid for Bulgaria, Kosovo and Greece. As already mentioned above, the sign of the regression coefficient β_2 has to be negative while the regression coefficient β_1 has to be positive in order to confirm the existence of the curve.

The adequacy of the regression models is also checked (*Table 3*). The obtained results verify that all nonlinear regression models are adequate at 5% significance level. The models are characterized by a relatively high explanatory power, measured by the coefficient of determination (*R Square*) and the adjusted coefficient of determination (*Adjusted R Square*). Taking into account the obtained values of the coefficients of determination, it is concluded that the differences in the economic growth can be to a large extent explained by the simultaneous influence of the expenditure and revenue of the public sector.

All regression models are additionally tested for heteroskedasticity (by the Breusch–Pagan test), autocorrelation (by the Breusch-Godfrey test) and normal distribution of the residuals (by the Chi-square test). The results in Table 4 highlight that the regression models for all countries included in the analysis can be accepted as accurate. The residuals are homoskedastic, normally distributed and lack of first-order autocorrelation.

In addition, we calculate the public expenditure to GDP ratio's threshold value (PubEXP*) for the countries where the Armey curve is valid. The results are published in *Table 5* below.

The calculated threshold value of the public expenditure to GDP ratio in Serbia is 42.37% for the period 2006–2019. When we compare this value with the data from the descriptive statistics given in *Table 1*, it is established that the average value for the period in the scope of the analysis (42.87%) is approximate to the determined optimum. For instance, the public expenditure accounted for 45.16% of Serbia's gross domestic product in 2014. It is significantly higher than the calculated threshold. The period under review is characterized by volatility in the GDP growth rate, ranging from –2.7% to 6.4%.

The obtained optimal values for the size of the public sector in North Macedonia and Russia are quite similar. The real growth rate of GDP would maximize when the public expenditure to GDP ratio is equal to 32.94% in North Macedonia, while in Russia the threshold is 33.97%. For both countries the annual average data shows that the economies are close to their optimum, which maximizes economic growth. However, it should be noted that while public expenditure varies between 31.62% and 36.03% of GDP for the period 2006–2019 in North Macedonia, in Russia this share varies more widely — from 31.12 to 41.35% of GDP. The dynamics in the ratio for Russia are observed primarily for the period up to 2011.

In *Figure 2* we show a simulation model of the Armey curve in Serbia, North Macedonia and

Table 4

Regression diagnostics and specification tests

Model	Breusch-Pagan test for heteroskedasticity	Breusch-Godfrey test for first-order autocorrelation	Test for normality of residual (Chi-square)
Model (Serbia)	H0: heteroskedasticity not present Test statistic: LM = 2.54598 p-value = 0.467039	H0: no autocorrelation Test statistic: LMF = 0.0248925 p-value = 0.878118	H0: error is normally distributed Test statistic: Chi-square(2) = 5.68269 p-value = 0.0583471
Model (North Macedonia)	H0: heteroskedasticity not present Test statistics: LM = 1.69645 p-value = 0.637723	H0: no autocorrelation Test statistic: LMF = 0.277351 p-value = 0.611174	H0: error is normally distributed Test statistic: Chi-square(2) = 1.82067 p-value = 0.40239
Model (Bulgaria)	H0: heteroskedasticity not present Test statistic: LM = 1.02946 p-value = 0.794123	H0: no autocorrelation Test statistic: LMF = 0.538966 p-value = 0.481549	H0: error is normally distributed Test statistic: Chi–square(2) = 2.68648 p-value = 0.260999
Model (Kosovo)	H0: heteroskedasticity not present Test statistics: LM = 5.07455 p-value = 0.166419	H0: no autocorrelation Test statistic: LMF = 1,66776 p-value = 0,228738	H0: error is normally distributed Test statistic: Chi-square (2) = 0.340242 p-value = 0.843563
Model (Greece)	H0: heteroskedasticity not present Test statistics: LM = 4.93886 p-value = 0.176329	H0: no autocorrelation Test statistic: LMF = 2.44049 p-value = 0.152675	H0: error is normally distributed Test statistic: Chi-square (2) = 5.07709 p-value = 0.0789811
Model (Russia)	H0: heteroskedasticity not present Test statistics: LM = 1.41689 p-value = 0.701581	H0: no autocorrelation Test statistic: LMF = 0.00723785 p-value = 0.934064	H0: error is normally distributed Test statistic: Chi-square (2) = 3.24816 p-value = 0.197093

Source: Authors' own calculations based on the results from the regression model.

Russia. The illustration of the curves is based on the results from the regression model developed and applied above, taking into account the effect of public expenditure and the calculated threshold in *Table 5*. The data shows that in Serbia the changes in the size of the public sector (with a change in public expenditure in the range of 10% to 60% of GDP) would significantly affect the rate of economic growth, especially when the government is not actively involved in economic processes. At the same time, the dynamics of the public expenditure to GDP ratio in North Macedonia can also have a substantial impact on economic development. This can be seen from the concave shape of the Armey curve for North

Table 5

Public expenditure to GDP ratio's threshold value

Country	Threshold value, %
Serbia	42.37
North Macedonia	32.94
Russia	33.97

Source: Authors' own calculations based on the results from the regression model.

Macedonia. When the share of public expenditure to GDP decreases (below the certain threshold), this would lead to a slowdown in the growth rate in North

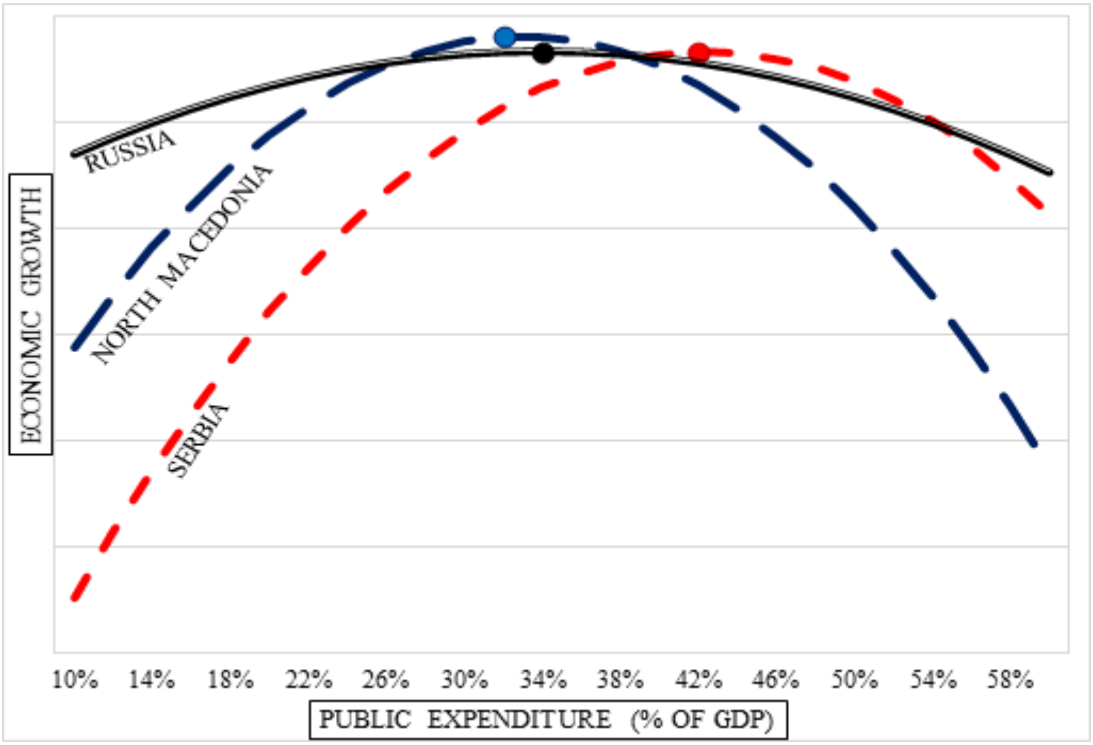

Fig. 2. **Modelling the Armey curve in Russia, North Macedonia and Serbia**

Source: authors' own calculations based on the results from the regression model.

Macedonia, but this decline would be significantly less than the decline that would be observed in the economy of Serbia. On the other hand, the higher size of the public sector (above the set optimum) would have a significantly more negative effect on the economic growth of North Macedonia. The Armey curve for Russia is smoother than the curves for Serbia and North Macedonia. This suggests that more tangible changes in the public expenditure to GDP ratio would not lead to large variations in the level of Russia's real gross domestic product.

CONCLUSIONS

Empirical testing of the validity of the Armey curve allows us to conclude that the nonlinear model representing the relationship between public expenditure and economic growth is partly applicable. This permits us to further assess the optimal size of the public sector in countries where the Armey curve is valid. The results from this assessment show that in the period 2006–2019, countries such as Serbia, North Macedonia and Russia manage their public sector in a way that to some extent allows the desired economic performance to be achieved. The obtained thresholds are approximately equal to the average values of the analyzed fiscal indicators. However, in certain years of the analyzed period, these countries also show some changes in the ratio of public expenditure to GDP, which contributes to the stimulating or restraining effects on the national economies. This is a particularly actual problem in the current COVID-19 pandemic. Attempts by countries around the world (including Serbia, North Macedonia and Russia) to deal with the crisis lead to a sharp rise in the public expenditure in 2020. The uncontrolled increase in public expenditure during the pandemic, whether in the form of anti-crisis measures, can lead to fiscal imbalances if the effectiveness of these expenditures is not taken into account. That is why further research can focus on different types of public expenditure and analyze their optimal levels, which would maximize economic growth. This analysis could also be extended by prioritizing the importance of public expenditure to a national economy. In this way, it will be possible to analyze in more detail the policies pursued so far and to draw conclusions about whether the financial resources have been used in a sufficiently reliable manner.

In conclusion, it is necessary to find the necessary balance between the optimal size of the public sector, the structure of public expenditure and their efficiency in order to pursue higher rates of economic growth.

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Study of Intellectual Capital on Drugs and Pharmaceutical Industry of India: Using Panel Data Analysis

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ABSTRACT

Intellectual capital is becoming increasingly important in financial decisions made by managers in the information-based environment. However, only a small portion of a company's total assets is represented by intangible assets (such as concessions, licenses, patents, and trademarks). The current research **investigates the relationship** between an organization's Intellectual capital and its health. A **new model** — Modified Extended Value-added Intellectual Capital Coefficient — was also proposed. The **findings** were compared with the two existing models, namely, Value Added Intellectual Coefficient and Modified Value Added Intellectual Coefficient. Panel data regression is used to assess the performance of 25 Indian pharmaceutical and drug companies throughout the period 2010–2019. Human capital efficiency, structural capital efficiency, and relational capital efficiency have been proven to have a substantial positive correlation with return on assets (ROA). In addition, a negative yet significant link exists between organizational capital efficiency and a company's profitability. Under the Value Added Intellectual Coefficient, human capital and structural capital efficiency do not affect the market value to book value. The market value-to-book value, on the other hand, is positively impacted by capital employed efficiency.

Keywords: financial health; pharmaceutical sector; organizational capital efficiency; intellectual capital

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1. INTRODUCTION

The economy has evolved from physical assets to an information-based environment in recent years. The information-based economy focuses on the contributions, originality, capacity, relationships, database, and knowledge of human resources within the premises of an organization. Intellectual Capital (IC) adds value to the product and services by actively managing the intangible assets, thus impacting the organization's health. Hence, tangible and intangible assets are essential sources for the growth of an organization. However, the relevance of IC is increasing day by day, but the disclosure of IC is limited in financial statements [1]. This is because the International Financial Reporting Standards (IFRS, 138) restricted the reporting of intangible assets, excluding goodwill in the financial statements [2]. Moreover, there is no proper framework for reporting IC [3]. Also, the reporting and disclosure of IC are in infancy in India [4]. Moreover, the quality of the human resource is still a concern in developing nations as regular training, skills, knowledge needs to be imparted to the employees. Because of this, the Indian Government, under the Ministry of Skill Development and Entrepreneurship (2015) scheme, has recognized the growth of intellectual assets, human capital, and innovation.

A well-managed IC will boost the organization's worth and skill in the financial market. Furthermore, the ongoing expansion of science and technology has made IC ideal for knowledge innovation. However, the management is inconsistent in reporting IC because of divergent results. The inconclusive results attribute no defined

methodology to be used in developed or developing nations to calculate IC. Though many studies have used the Pulic model, the calculation of Structural Capital (SC) has been criticized. P. Ståhle, S. Ståhle, S. Aho [5] criticized the estimation of SC based on the Organization's Learning theory. The theory emphasizes a firm's capabilities, acquiring new knowledge and converting them into distinct methods, models, and copyrights. As a result, the studies have modified the calculation of SC. Our analysis also tried to fill this gap by introducing a new calculation measure for SC and renaming the variable organization capital (OC).

The present study examines Intellectual Capital Efficiency's impact on 25 Drugs and Pharmaceutical Industry's financial performance during 2010–2019. Also, the paper compares the new model Modified Extended Value-added Intellectual Capital coefficient (MEVAIC™) with the existing two models, namely, Value-Added Intellectual Coefficient (VAIC™) and Modified Value-Added Intellectual Coefficient (MVAIC™).

The paper has considered the pharmaceutical sector for three reasons. Primarily, it is a prominent sector in investing in intellectual property and Research and Development activities. Secondly, this sector induces high investment in IC and can face worldwide competition because of R&D's experts, leading to new drugs, innovation, and patents [6]. Therefore, this sector is the best to examine different frameworks. Finally, the pharmaceutical industry is contemplated innovative and research-focused due to Human Capital, R&D activities, the innovation of process or product, and intellectual dealing [7]. Therefore, our findings will help determine the appropriate framework for measuring IC's Drugs and Pharmaceutical industry performance.

This research adds to the existing literature in many ways. Firstly, a new variable, Organization Capital efficiency (OCE), has been introduced to see its impact on Financial Performance (FP). Secondly, this study has introduced a new model, MEVAIC, to conduct the empirical test and reveal robust results. Thirdly, the findings suggest that IC adds to the value of a company. Hence, it is essential to study the impact of intellectual capital on Indian Firms. Fourthly, it will be beneficial for the management in the measurement of IC.

The research draws up the subsequent sections. Section 2 focuses on the extent of literature and formulation of research questions. Section 3 discloses the research procedure and describes the variables used in the research. The fourth section discusses the study's result and finding, succeeded by the conclusion, limitations, and implications in section five.

2. LITERATURE REVIEW

It was in the 1990s when the term 'intellectual capital' gained attraction. Intangible assets are a form of intellectual capital, which are non-physical sources of value derived from novelty, structural goals, or human resources. The researchers define IC as an intangible value creation component [8]. As a result, IC has three components: human, structural, and relational or customer capital. The first and foremost component is Human Capital (HC), defined as employees' experience, ability, skills, attitude, morals, and capabilities [9]. It can be enhanced by providing training to the employees. This investment in training and development will create both tangible and intangible assets for the organization. The second component is Structural Capital (SC), which means "the set of knowledge and intangible assets derived from the processes of action owned by the organization and that remain in it when people leave". In other words, it is knowledge created by enterprises that cannot be separated from the entity. Patents, discoveries, progress, copyright, know-how, and systems all appends to SC. The third component is Relational Capital (RC) that refers to an organization's external relationships with the government, suppliers, consumers, and stockholders [10]. This capital is an organization's ability to create value with external investors. With a good market reputation, goodwill, customer satisfaction, strategic alliances, enterprises can expand significantly.

2.1. Model VAICTM

A. Pulic [11] has developed the model of VAIC™ to measure the efficiency of crucial resources. It is the most widely used research model due to its simplicity [12] and cross-sectional comparisons [13] and to examine the relation between IC and FP. In addition, the VAIC™ method is objective

as it doesn't require any grading, judgment, or weightage [14]. This model is prevalent because of audited data availability [2].

2.2. Research gap

Despite having so many advantages, it has been criticized by a few. D. Maditinos, D. Chatzoudes, C. Tsairidis et al. [12] have challenged the VAIC model in terms of its reliability. They have stated that this model neglects its negative book value, resulting in reduced output value compared to input values. P. Ståhle, S. Ståhle, S. Aho [5] criticize this model for theoretical inconsistencies, excluding external capital and calculation of SC. Several attempts have been made to modify the SC calculations, and new models have been introduced [2, 7]. The present study is also an attempt to address the criticism. Previous studies have treated R&D as SC but have also changed the calculation of SCE. This study only changes SC's parameter, but the calculation method of SCE is the same as proposed by A. Pulic [11]. We have also replaced the old SCE measure with the OCE measure to understand the models better.

2.3. Prior Studies

The pharmaceutical and medication sector has undertaken numerous studies all around the world. According to certain research, IC has a substantial impact on an organization's performance [15]. Tangible assets or physical capital have been suggested in certain studies to be important to firm success [16–18].

A study [19] on top 200 listed companies from 2010–2015 used the VAIC™ model to estimate IC's impact using Ordinary Least Squares (OLS). It was found that firm performance differs in firms with or without government. Also, CEE, HCE, and ICE significantly impact performance, whereas SCE was insignificant. S. Aslam, S. Amin [20] also used the VAIC™ model, and the study revealed that IC has a positive effect on the firms' financial performance.

Z. Xinyu [21] researched in China during 2000–2001 to 2009–2010 using the VAIC™ model and concluded that HC and CE impact IC but SC does not have any effect. The study by K. Tandon, H. Purohit, D. Tandon [22] concluded that HCE and CEE positively impact profitability and market valuation, but SCE failed to show any impact on corporate performance. I. M. Nazir, Y. Tan, M. R. Nazir [10] applied system GMM to examine the relationship of IC on FP. The results show the positive association of IC with FP. The research was conducted in Australia on 571 firms for the period 2005–2014.

From the literature mentioned above, there are mixed results. The most widely used method is VAIC™, with dual components. Different researchers are exploring various components in their framework and trying to study the effect.

This paper aims to estimate the value of IC of Drugs and Pharmaceutical industries in India and study its impact on the FP. The VAIC™ model is the base model. However, this model only examines HC and SC. Many researchers [7, 23, 24] modified this model using new components: RC, process capital, and innovation capital. The second model used for the comparison is MVAIC™, which uses RC as an additional component. The third model proposed in this study is MEVAIC™.

This is a unique study as no previous research has been conducted to examine the different frameworks. This study tries to answer two research questions

RQ1: How do the components of IC impact the FP of an organization?

RQ2: How do the components of IC impact the market performance of an organization?

3. RESEARCH METHODOLOGY

To analyze the effectiveness of the three models, the drugs and pharmaceutical sector has been considered. Information-based resources impact the industry, making it an excellent place to look at the components of IC [25]. The sample, data, models, and variables utilized in the study are discussed in this section.

3.1. Sample and Data

This study's data was sourced from the Capitaline Database, a secondary source. The sample comprises 25 pharmaceutical companies in India. The selected companies are listed under the Bombay stock exchange (BSE-500). Initially, there were 36 firms; 11 were dropped because of negative Value Added (VA). According to VAIC™, the model does not apply to businesses that have more input than output. The information of the variables was readily available in the database. The data values missing in the data have been manually filled from

Annual Reports. The data has been collected for a decade study from 2010–2019. Thus, the final sample size was 25 firms for ten years, owing to 260 observations. The data is processed in Stata 14 to examine the relationship among the variables.

3.2. Variables

3.2.1. Predicted Variables — This study includes two important predicted variables to measure the firms' performance in various research [26, 27]. Return on assets (ROA) is employed as the profitability indicator and market-to-book value (MB) indicator for the Market Performance. The measured variable has been elucidated below:

a. ROA is calculated by dividing operating income by total assets [4].

b. MB is computed by dividing Market Capitalisation with Shareholder's equity [6].

3.2.2. Control variables — Studies have used control variables for firm size, industry, and leverage to study IC's impact on an organization's performance [28, 29]. However, this study has not introduced any control variable in the regression equation as the sectors are the same and can be compared [7].

3.2.3. Explanatory Variable — The study employs five explanatory variables

a. HC Efficiency (HCE)

b. SC Efficiency (SCE)

c. RC Efficiency (RCE)

d. OC Efficiency (OCE)

e. Capital Employed Efficiency (CEE)

Before proceeding to the analysis, the details about the three models are mentioned below:

1. The VAIC™ Model:

A. Pulic [11] suggested the model of VAIC™ measure IC. This model conceptualizes Value Added (VA) as a measure to calculate the Intellectual Capital Efficiency (ICE). Many studies have considered the VAIC™ model to analyze the impact of IC on a firm's performance [4, 7, 26]. However, the calculation of VAIC involves specific steps.

Step 1: Calculation of VA

$$VA = OUT - IN,$$

Where,

OUT — Output, which is calculated with the help of total sales or total revenues

IN — Input, which is the cost of materials, services, and components

In other words, VA can also be expressed as:

$$VA = OP + EC + D + A.$$

OP represents the Operating Profit, EC is the Employee Cost, D stands for the depreciation, and A is Amortization.

Step 2: Calculation of the efficiency of HC, SC, and capital employed (CE).

2.1. Calculation of HCE

$$HCE = \frac{VA}{HC}.$$

Here, HC is the proxy for Wages and Salaries.

2.2. Second Component is SCE and is calculated as follows:

$$SCE = \frac{SC}{VA}.$$

Here, SC is the difference between VA and HC.

So, as per A. Pulic [11], ICE is the total of the coefficients of HCE and SCE.

$$ICE = HCE + SCE.$$

A. Pulic [30] stated that to know the true and fair image of the resources creating value in the organization, it is necessary to consider inputs production function.

2.3. Calculation of CEE

$$CEE = \frac{VA}{CE}.$$

Where CE is the book value of net assets of the company.

Step 3: Calculation of Value-Creating Efficiency, which is the total of all the efficiency Coefficients.

$$VAIC = ICE + CEE$$

OR

$$VAIC = HCE + SCE + CEE$$

OR

$$VAIC = \left(\frac{VA}{HC}\right) + \left(\frac{SC}{VA}\right) + \left(\frac{VA}{CE}\right).$$

2. The MVAIC™ Model:

N. Bontis [23] suggested The *MVAIC™* framework estimates ICE on the FP. The VAIC™ Model framework used the coefficients of three sub-components HCE, SCE, and CEE. The MVAIC™ Model calculates the RCE

coefficient [23, 31, 32] along with the other three sub-components. The RCE is computed as follows:

$$RCE = \frac{RC}{VA}.$$

Here RC is relational Capital, which denotes advertisement, marketing, and selling and distribution expenditure. It is assumed that such costs are incurred to build and sustain relationships with external stakeholders [7].

$$MVAICTM = HCE + SCE + RCE + CEE.$$

3. The MEVAIC™ Model:

In this model, the measurement criterion for SC is different from the base model. The proxy to calculate SC is through R&D expenditure [7]. According to the VAIC model, SC is the difference between value added and employee cost. This means that SC is the total operating profit, depreciation, and amortization, which is incorrect as per the organization's learning theory [5]. Because of this issue, different researchers have tried to overcome this issue by introducing a modified version of VAIC. J.A. Nazari, I.M. Herremans, R.G. Issac et al. [33] divided the component into customer, innovation, and process capital. S. Vishnu, V.K. Gupta [7] proposed three new models with two new proxy measures. The new measures were RC that was calculated using selling and marketing expenses. Also, the SC measurement was changed to R&D expenses instead of the difference between VA and HC. However, the author didn't change the base model; instead, it introduced three different models. In the first model, VA was used in the numerator to measure the efficiencies of all the components. In the second model, Net Sales were used instead of VA to calculate the coefficients of components of IC. In the third model, intensities were calculated using net sales in the denominator. The Adjusted VAIC model has been proposed by M. Nadeem, C. Gan, C. Nguyen [34], where SC is calculated using R&D expenses and copyrights investment. Also, M. Nadeem, C. Gan, C. Nguyen [34] have renamed SC as Innovation capital (INVC). No study has changed SC's calculation without any other change in the MVAIC™ model. This model is similar to MVAIC™, except the calculation of SC has changed. The SC has been renamed OC for ease of understanding.

$$OCE = \frac{OC}{VA}.$$

Where OC = R&D expenses and OCE is Organizational Capital Efficiency. So,

$$MEVAICTM = HCE + OCE + RCE + CEE$$

$$MEVAIC = \left(\frac{VA}{HC}\right) + \left(\frac{OC}{VA}\right) + \left(\frac{VA}{RC}\right) + \left(\frac{VA}{CE}\right).$$

The details about the models can be witnessed in *Fig. 1 and Fig. 2.*

4. FINDINGS AND DISCUSSION

4.1. Regression Equations

Numerous researchers have applied OLS regression to estimate the impact of IC on business profitability, which has the problem of not accounting for variation across time or groups [35]. The research has used a panel data regression model to overcome this problem. Nine regression equations across three models have been tested to assess the impact of IC on financial health. The equations are as follows:

Model 1: VAIC™

$$Y_{it} = \alpha + \beta_1 (HCE_{it}) + \beta_2 (SCE_{it}) + \beta_3 (CEE_{it}) + \varepsilon_{it}.$$

Model 2: MVAIC™

$$Y_{it} = \alpha + \beta_1 (HCE_{it}) + \beta_2 (SCE_{it}) + \\ + \beta_3 (RCE_{it}) + \beta_4 (CEE_{it}) + \varepsilon_{it}.$$

Model 3: MEVAIC™

$$Y_{it} = \alpha + \beta_1 (HCE_{it}) + \beta_2 (OCE_{it}) + \\ + \beta_3 (RCE_{it}) + \beta_4 (CEE_{it}) + \varepsilon_{it}.$$

Where Y is the predicted variable, α is the constant, β is the regressor's coefficient, and ε is the error term for cross-section *i* at time *t,* respectively.

The panel data regression can either be Fixed Effect (FE) or Random Effect (RE). To determine the suitable regression model, the Hausman specification test by M. Arellano [36] is applied [37].

4.2. Results

4.2.1. Descriptive Statistics

The summary of the variables for all three models has been presented in *Table 1*. It can be observed from *Table 1* the mean value of HCE is the maximum

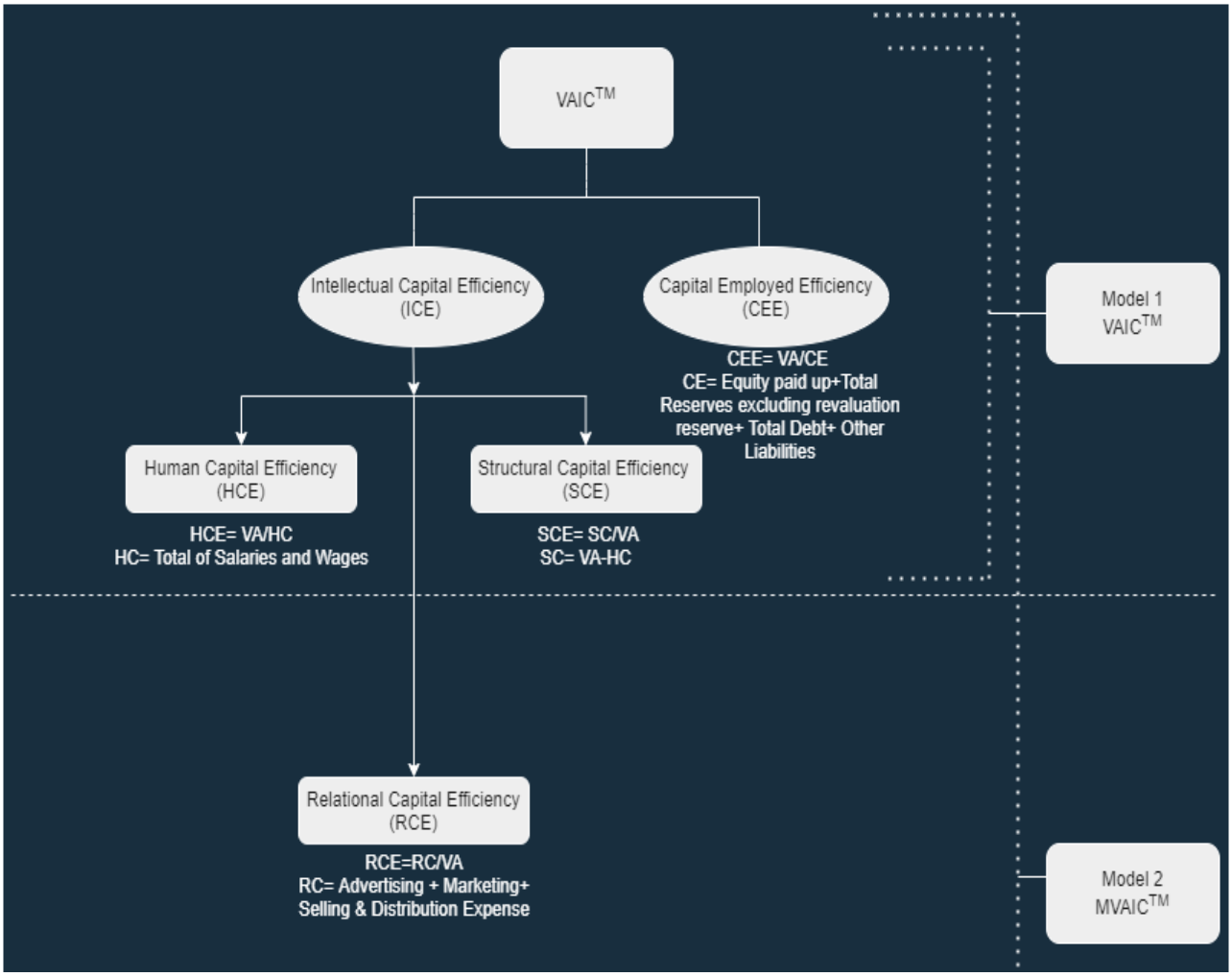

Fig. 1. **Model 1: VAIC and Model 2: MVAIC**

Source: compiled by the author.

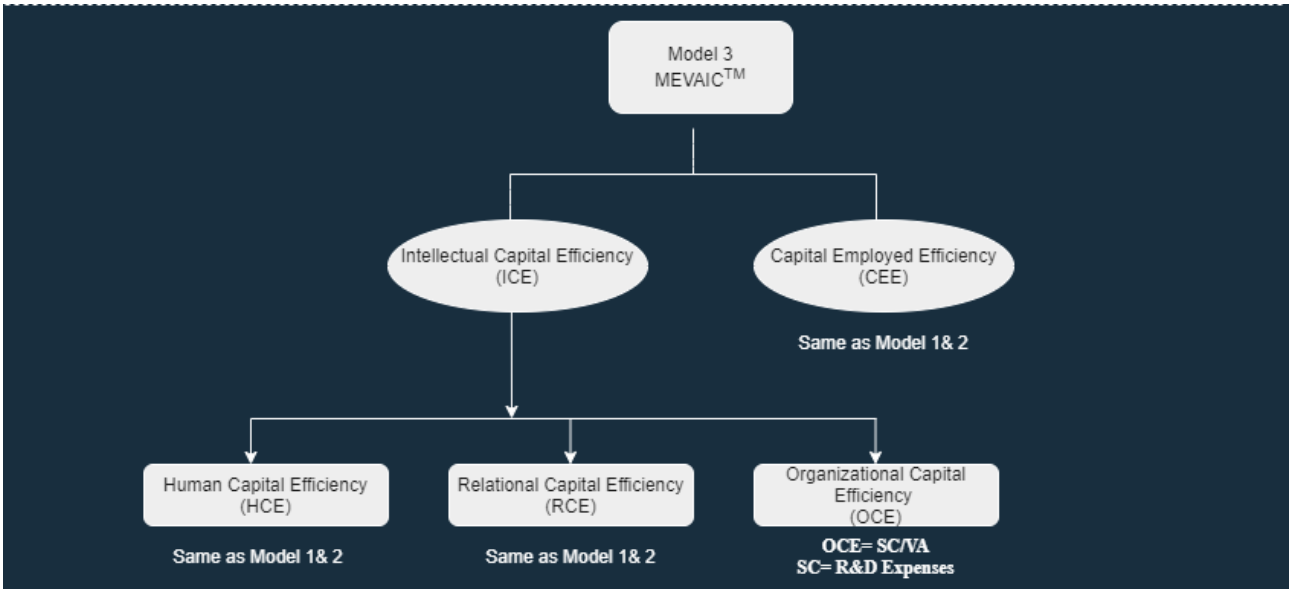

Fig. 2. **Model 3 — MEVAIC**

Source: compiled by the author.

Table 1

Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
HCE	12.785	7.928	5.996	80.982	*N* = 250
SCE	0.907	0.032	0.833	0.988	*N* = 250
OCE	0.052	0.044	0.000	0.243	*N* = 250
RCE	0.054	0.033	0.001	0.171	*N* = 250
CEE	0.950	0.349	0.085	2.047	*N* = 250
VAICTM	14.642	8.033	7.570	83.229	*N* = 250
MVAICTM	14.695	8.027	7.574	83.261	*N* = 250
MEVAICTM	13.840	7.993	6.740	82.274	*N* = 250
ROA	0.821	0.314	0.068	1.742	*N* = 250
MB	4.604	4.752	0.000	40.554	*N* = 250

Source: compiled by the author.

Table 2

Correlation Matrix

Variables	HCE	SCE	OCE	RCE	CEE
HCE	1.000				
SCE	0.7597**	1.000			
OCE	–0.2214**	–0.1201	1.000		
RCE	–0.1698**	–0.2445**	0.0532	1.000	
CEE	0.2102**	0.1529*	–0.2065**	0.185**	1.000

Source: compiled by the author.

(80.982) of Bliss GVS Pharma, and the minimum value of HCE (5.996) is Syngene International Limited. This represents that Bliss GVS Pharma spends less on its employee in comparison to Sygene International Limited. Also, the mean value of HCE is maximum than SCE, RCE, and OCE. Therefore, the study is in line with [38, 39]. The total of intangible assets (HCE, RCE, SCE, OCE) is more than CEE, which means that companies concentrate more on intangibles than tangibles. Of the three models used in this study, the standard deviation of MEVAIC™ (7.993) is less in comparison to VAIC™ (8.033) and MVAIC™ (8.027). This means that the data for MEVAIC™ is more clustered in contrast to the other two models.

4.2.2. Correlation

The correlation graph is displayed in *Table 2* between the explanatory variables of all three models. It can be observed that no explanatory variable is strongly correlated with other variables. Therefore, there is no multicollinearity problem as no variable in the correlation matrix has a coefficient more than 0.8 [40]. Apart from this Variance Inflation Factor (VIF) is calculated to test the issue of multicollinearity. *Table 3* shows the values of VIF. The highest value of VIF is 2.5, which suggests that multicollinearity is not present in the data as VIF values are less than 10 and the tolerance level is above 0.10 [41, 42].

4.2.3. Diagnostic Test

Before applying the panel regression, the following diagnostic tests were used:

1. Stationarity — The Levin, Lin, and Chu unit root test was used to determine stationarity. As the p-value is less than 0.05, the alternate hypothesis is accepted. This means there is no unit root or stationary in the data.

2. Multicollinearity — From *Table 3*, it can be witnessed that VIF is 2.5, which is less than 10, and tolerance level above 0.10 [41].

3. Heteroscedasticity — Breusch-Pagan test was applied to test the heteroscedasticity, and the results depicted that the p-value is less than 0.5%, thus rejecting the null hypothesis. Hence, there is the problem of Heteroskedasticity.

4. Serial Autocorrelation — The Wooldridge serial correlation diagnostic test was applied, and the results did not accept the null hypothesis. Thus, there was the problem of autocorrelation in the data.

Therefore, there was the problem of heteroscedasticity and autocorrelation in the data. For this, robust regression results are shown.

4.2.4. Panel Regression Analysis

The effect of IC on FP was examined using panel data regression analysis. Panel data regression can control companies' factors and report individual heterogeneity [15].

From *Tables 4–6* the results could be inferred for panel data. When all the three models using a regression for ROA are considered, R^2 in all the three models is very high, and there is not much difference between the values of R^2. All the components IC, HCE, SCE, CEE, RCE, and OCE impact the traditional measure of Firm Performance. The newly introduced component, OCE, also has a negative and significant effect on ROA. Of all the three models, Model 3, MEVAIC, has the highest F value of 23.96, which is substantial at a confidence interval of 95 percent. Our findings confirm that HCE impacts a company's performance; investing in employees should be considered an investment rather than a cost.

The last explained variable which has been used to study the market performance is MB. HCE and RCE are negative and significant efficiencies in the case of market performance. However, CEE is positively significant with MB. SCE and OCE have no impact on the market performance of an organization. When all the three models are considered, the best model to measure the Market Performance is Model 2: MVAIC™. It has the highest coefficient of determination and F Statistics value, 10.2 percent and 7.73, respectively. The panel data results reveal that the traditional VAIC model didn't give the best results amongst all three models. As under VAIC model, HCE and SCE do not affect the MB, however, MB is positively impacted by CEE.

Table 3

VIF and Tolerance Results to check Multicollinearity

Variable	VIF	1/VIF
HCE	2.5	0.40054
SCE	2.47	0.40557
CEE	1.14	0.87562
RCE	1.13	0.8849
OCE	1.09	0.91417
Mean	VIF	1.67

Source: compiled by the author.

It means that businesses should concentrate on improving staff abilities and sustaining relationships with stakeholders. Expenditures on information and networking, policies, and frameworks should also be managed effectively to reap the maximum benefits. In addition, the usual care should be devoted to financial capital at the same time. If these assets are appropriately used and managed consistently, they can produce more profitable results. As a result, the conclusion is that entire intellectual capital should be considered to acquire a competitive edge and improve business financial performance.

5. CONCLUSIONS

Due to globalization and open competition, India's business environment has changed significantly, creating an array of new prospects. Businesses must focus on intangible asset productivity and efficiency and the growth of tangible asset value to thrive in a competitive climate. Because of this, IC is seen as a vital part of creating value for companies in a knowledge-based economy. In addition, IC elements can be shown to influence the organization's health.

From *Fig. 2* change in the model could be seen, and panel data analysis of the same using the three

Table 4

Model 1 — VAIC™

Model 1 — VAIC	Model 1: ROA		Model 2: MB	
Variables	Fixed Effect Coefficient (t-value)	Random Effect Coefficient (z-value)	Fixed Effect Coefficient (t-value)	Random Effect Coefficient (z-value)
Constant	−0.75 (−13.22)*	−0.841 (−15.58)*	2.77 (0.32)	0.181 (0.02)
HCE	0.001 (4.11)*	0.001 (4.17)*	−0.064 (−1.88)	−0.062 (−1.88)
SCE	0.799 (12.2)*	0.903 (14.56)*	−0.408 (−0.04)	2.993 (0.34)
CEE	0.879 (186.32)*	0.875 (200.81)*	2.543 (3.59)*	1.989 (3.22)*
R square (Within)	0.996	0.9954	0.0613	0.0605
Rho	0.647	0.479	0.443	0.403
Hausman Test	χ^2 = 193.73, Prob > χ^2 = 0.0000		χ^2 = 143.82, Prob > χ^2 = 0.0000	
Model appropriate	**Fixed Effect Model**		**Fixed Effect Model**	
F− Statistics/ Wald	11.66	χ2 = 52958.6	7.16	χ^2 = 12.22
Chi−square	Prob > F = 0.0000	Prob > χ^2 = 0.000	Prob > F = 0.0000	Prob > χ^2 = 0.0067

Source: compiled by the author.

Table 5

Model 2 — MVAIC™

Model 2 — MVAIC	Model 1: ROA		Model 2: MB	
Variables	Fixed Effect Coefficient (t-value)	Random Effect Coefficient (z-value)	Fixed Effect Coefficient (t-value)	Random Effect Coefficient (z-value)
Constant	−0.751 (−13.35)*	−0.877 (−16.36) *	2.931 (0.35)	2.128 (0.28)
HCE	0.001 (4.28) *	0.001 (4.27)*	−0.070 (−2.12)*	−0.066 (−2.06) *
SCE	0.794 (12.23) *	0.939 (15.28) *	0.631 (0.07)	1.636 (0.19)
RCE	0.131 (2.19) *	0.125 (2.42) *	−28.188 (−3.16) *	−20.587 (−2.76) *
CEE	0.876 (182.4) *	0.870 (197.32) *	3.060 (4.29) *	2.463 (3.89) *
R square (Within)	0.996	0.996	0.102	0.101
Rho	0.651	0.392	0.485	0.427
Hausman Test	χ^2 = 128.1, Prob > χ^2 = 0.0000		χ^2 = 150.15 Prob > χ^2 = 0.0000	
Model appropriate	**Fixed Effect Model**		**Fixed Effect Model**	
F− Statistics/ Wald	10.28	χ^2 =53887.66	7.73	χ^2 = 20.40
Chi−square	Prob > F = 0.0000	Prob > χ^2 = 0.000	Prob > F = 0.000	Prob > χ^2 = 0.0004

Source: compiled by the author.

Table 6

Model 3 — MEVAIC™

Model 3 — MEVAIC	Model 1: ROA		Model 3: MB	
Variables	Fixed Effect Coefficient (t-value)	Random Effect Coefficient (z-value)	Fixed Effect Coefficient (t-value)	Random Effect Coefficient (z-value)
Constant	−0.054 (−7.59)*	−0.053 (−6.1)*	3.161 (3.81)*	2.787 (3.48)
HCE	0.002 (9.65)*	0.003 (10.8)*	−0.068 (−2.4)*	−0.056 (−2.18)*
OCE	−0.146 (−2.91)*	−0.127 (−2.59)	4.045 (0.69)	10.238 (2.03)*
RCE	0.147 (1.92)*	0.115 (1.59)	−27.897 (−3.13)*	−19.152 (−2.67)*
CEE	0.889 (148.71)*	0.886 (150.69)*	3.153 (4.52)*	2.551 (4.14)*
R square (Within)	0.993	0.993	0.098	0.095
Rho	0.780	0.670	0.468	0.350
Hausman Test	χ^2 = 356.18, Prob > χ^2 = 0.0000		χ^2 = 94.69 Prob > χ^2 = 0.0000	
Model appropriate	**Fixed Effect Model**		**Fixed Effect Model**	
F– Statistics/ Wald	23.96	χ^2 = 31137.94	6.28	χ^2 = 23.16
Chi–square	Prob > F = 0.0000	Prob > χ^2 = 0.000	Prob > F = 0.000	Prob > χ^2 = 0.0001

Source: compiled by the author.

models VAIC™ [11], MVAIC™ [23], and MEVAIC™ proposed in the current study can be observed from *Tables 4–6*. It can be witnessed that MEVAIC™ is the best model for measuring ROA using panel data as the value of F-statistics is higher in Model 3. Investors, policymakers, shareholders, and regulators will benefit from the conclusions of this study. With this tool, executives can better understand regulating and enhancing their organization's IC while increasing their outlay on tangible resources. As a result of the findings, both investors and shareholders will be able to make better investment decisions and analyze the IC of companies to optimize financial rewards. In addition, the study provides valuable information for policymakers and regulators who want to examine a firm's IC efficiency and compare different industries to develop adequate rules for reporting intellectual capital. Businesses should effectively manage and invest in IC to maximize their profitability, according to the research findings. Despite the growing relevance of IC, only a few companies report on it or acknowledge it in their annual reports, and IC is still a relatively new concept in India.

The study suffers from its limitations. It has limited its research only to the pharmaceutical sector, which can be a future scope. The analysis can be applied to other industries, and the new proposed model can be verified for different sectors. Cross-country comparisons can be prepared. Productivity can also be calculated, and other proxies to measure profitability can be employed.

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Gupta S. — discussed the research results and conclusions.
Gupta V.K. — discussed the analysis techniques.

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Econometric Assessment of the Level of Development of Balanced Foreign Economic Relations in Conditions of Uncertainty

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ABSTRACT

The article presents an assessment of the factors influencing the balanced foreign trade ratio of foreign economic relations on the basis of the author's methodological approach on the example of the Republic of Azerbaijan. **The relevance** of the study is due to the importance of optimizing foreign trade policy through an econometric assessment of factors affecting the balance of foreign trade ratio. **The aim of the study** is to form a model of econometric assessment of factors affecting the level of development of balanced foreign economic relations in conditions of uncertainty. The author uses entropy, statistical and econometric **methods**, including coefficient and regression analyses. The paper presents a regression analysis of the relationship between the balance of foreign trade activity, the entropy of exports and imports, the real and nominal effective exchange rate of the national currency against foreign currencies, the degree of openness of the economy, and assessment using the EViews software package. The synthesis of the theoretical and methodological apparatus presented in the modeling of factors affecting the balance of foreign trade activity constitutes the **scientific novelty** of the research. The study revealed that an increase in the nominal and effective exchange rate of the national currency of each country in relation to foreign currencies, as well as the degree of openness of the economy, significantly increases the coefficient of balanced foreign trade activity. The author **concludes** that by determining the entropy, quantity and usefulness of information on the share of the main import or export partner countries of the country under study, it is possible to assess the foreign trade activities of the countries, as well as the influence of the balanced coefficient of foreign trade on the nominal and effective exchange rate of the national currency in relation to foreign currencies. **The results of the study** can be used in subsequent studies to assess the factors affecting the level of development of balanced foreign economic relations of countries, and as a methodological basis for the policy of optimizing the management of the country's economy.

Keywords: trade turnover; balanced foreign trade; uncertainty; trade balance; import; export; entropy; effective exchange rate; determination coefficient; regression level; correlation coefficient

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INTRODUCTION

The most important task of any economic system is to ensure stable economic development. The strategic role of foreign trade in providing sustainability of the economic system is that foreign trade is based on the realization of competitive advantages by moving's the boundaries and due to additional sales markets stimulates expanded sales production in the exporting country. However, the world practice shows that intensive development of international trade, as well as the same regionalization and globalization, have an unequal impact on the economy of different countries.

The deepening of the international division of labor in the globalized world economy has significantly increased the interdependence of economies by stimulating the convergence of the world environment, creating conditions for the expansion of international economic relations between different countries. International trade, which accounts for 80% of international relations, has a significant impact on the level of development of foreign trade, responding more quickly to economic and political changes in any region of the world [1].

In the last period of 2020, the reduction of demand for oil in the world market, unfavorable economic situation in a number of countries, social tensions

and sanctions have had a negative impact on world trade in goods. An explosion at a radioactive and toxic warehouse of Vale's company in Brazil on January 25, 2019, the severe economic damage to iron ore and other industries caused by Cyclone Veronica in Australia in March 2019 ($ 1.2 billion), and the negative effects of the COVİD-19 pandemics negatively affected the development of international trade around the world, resulting in a 3.0% decrease in world commodity exports in 2019 compared to 2018, or $ 579.34 million. In the first quarter of 2020, international trade in goods decreased by 3% and world exports by 7.6%, and this decline continued until the end of 2020.[1] It should be noted that all this creates conditions of uncertainty in the development of foreign economic relations between the countries of the world and requires the improvement of economic policy in the direction of the level of development of balanced foreign economic relations.

In recent years, economic policies based on increasing exports and stimulating economic growth have been expanding among the world countries with the depreciation of national currencies. In neighboring countries, including most of the CIS countries, the depreciation of the national currency and the sharp decline in world oil prices have had a serious impact on the Azerbaijani manat. Thus, on February 21, 2015, by the decision of the Central Bank of the Republic of Azerbaijan, the Azerbaijani manat was devalued, the exchange rate against the US dollar was reduced by 34% and the decision was made to switch to a floating exchange rate on December 21, 2015. It should be noted that after this decision, which was the 4th largest devaluation of the manat, 1 US dollar continued to depreciate and amounted to 1.7 manats. The depreciation of the national currency in Azerbaijan during the year affected macroeconomic indicators and led to a decrease in trade turnover. Thus, due to the depreciation of the national currency in 2019 compared to 2014, the volume of GDP decreased by 36.0% or 32.6 billion USD. Taking into account the negative consequences of the COVID-19 pandemic, the volume of GDP in 2020 compared to 2014 decreased by 43.3% or by 32.63 billion US dollars and trade turnover by 33.9% or by 12.545 billion US dollars.[2] It should be noted that the rise in the real exchange rate plays a key role in the appreciation of the manat, so this indicator is important in the development of economic relations in the face of external uncertainty.

The level of development of balanced foreign economic relations is mainly determined by the balanced foreign trade ratio. This indicator is expressed as the ratio of the country's foreign trade balance (the foreign trade balance) to trade turnover. Among the factors that directly affect the level of development of balanced foreign trade relations, the degree of openness of the country's economy, expressed in the ratio of trade turnover to GDP, the entropies of exports and imports are important. From this point of view, it is possible to determine the level of development of balanced foreign economic relations in the Republic of Azerbaijan by econometrically assessing the impact of these indicators on the balanced foreign trade ratio.

LITERATURE REVIEW

Although there are studies on the econometric assessment of the development of foreign economic relations, there is no consensus on the econometric assessment of the factors affecting the level of development of balanced foreign economic relations. Researchers advocating a floating exchange rate regime claim that all crises occur in countries where the national currency is linked to one of the world's leading currencies, and that a stable financial regime is the cause of these financial crises. Despite the long development of theories developed by proponents of fixed exchange and floating exchange rates, and since then there have been many works written on the problem, there has been no agreement on exchange rates and their choice, the dominance of the exchange rate for a particular country, the impact of balanced foreign economic relations. Although there are more modifications to the exchange rate regime, I. Varyash and other economists divide the exchange rate regimes into three main groups: the ratio of one currency to another, the transition regime, and the floating exchange rate regime [2]. The IMF distinguishes between fixed-rate mode, transition mode, and floating degree mode within these three groups.

Despite the long development of theories developed by proponents of fixed exchange and

[1] URL: https://customs.gov.az/az/faydali/gomruk-statistikasi/xarici-ticaretin-veziyyeti-haqqinda/ (accessed on 13.06.2021).
[2] URL: https://www.stat.gov.az/source/trade/ (accessed on 13.06.2021).

floating exchange rates, and since then there have been many works written on the problem, there has been no agreement on exchange rates and their choice, the dominance of the exchange rate for a particular country, the impact of balanced foreign economic relations.

Summarizing the various opinions of scientists allows you to conclude that the balance of foreign trade whether as an economic category is defined not only numerical export parameters and imports, and becomes important strong, innovative development of the economy, growth in the level of well -being and the solution of general economic problems [3–6].

Research by S. Edwards shows that countries with unstable economic conditions rarely choose a rate similar to one of the world's currencies [7]. The author's research notes that countries with lower growth rates and softer restrictions on capital flows prefer a more rigid exchange rate regime. Most developed countries are even more inclined to apply floating exchange rates. The author's research notes that declining net capital inflows reduce the supply of manat, which in turn leads to a rise in the real exchange rate and, as a result, the national currency gains value.

In his study, J.M. Rizzo analyzed the choice of exchange rate regimes in developing countries over a period of twenty years and concluded that countries with low inflation prefer to use a fixed exchange rate regime instead of a floating exchange rate [8].

Research by I. Domach and others shows that countries with economies in transition prefer not to use a floating exchange rate regime when there is a small budget deficit, high openness of the economy, high level of development of the private sector, and the domestic market [9].

At the same time, countries with broad access to foreign financial markets and a large share of monetary reserves are opting for a more flexible exchange rate regime.

In the economic literature on the impact of the exchange rate regime on macroeconomic indicators, most researchers note that the exchange rate regime has a significant effect on inflation. The authors conclude that a stable exchange rate regime with a consistent macroeconomic policy leads to lower and more stable inflation. Edwards believes that the exchange rate regime influences inflation through the application of financial discipline.

Using the VAR method for exchange rate transfer, many researchers, including Rossi and Leigh (2002), M. Carty (1999), Aliyu (2009), Shehu Usman Rano (2009), examined the impact of exchange rate changes on price indices and concluded that exchange rate and import price shocks have little effect on domestic inflation in most countries, even in developed countries [10–12].

METHODOLOGY

Since economic development is always accompanied by risks, methodological approaches are important in assessing economic events. From this point of view, the field of study and application of econometrics can be both economic theory and economic events. Compared to economic theory, econometrics reflects both the quantitative and qualitative aspects of these events. For example, economic theory suggests that an increase in price results in a decrease in demand for a product, an increase in real interest rates in the debt capital market reduces net capital inflows; a decrease in net capital inflows reduces the supply of the national currency, and so on. Although it proves such issues, it does not answer the question of under what circumstances they occurred. Areas of application and use of econometrics are the factors that shape the development of economic events and processes. In this regard, in the example of the Republic of Azerbaijan, the EViews application software package was used in the econometric assessment of the level of development of balanced foreign economic relations under conditions of uncertainty. It should be noted that the use of this software package increases the statistical significance of the model and the quality of research by conducting various tests and graphical analysis of trends to detect heteroscedasticity, autocorrelation of the regression model and eliminate them.

The study examined the entropy of exports and imports, along with the nominal and effective exchange rates of the manat to foreign currencies, the impact of the openness of the economy on the balance of balanced foreign trade activity of the Republic of Azerbaijan in the EViews application software package. The entropy of exports and imports is important in assessing the associative activity of each country with

the surrounding world. Assessment of associative activity is the science of Sociology or Associations, which studies the most general laws of the origin, activity, development, and management of associations in nature, society and thought as a new scientific direction. Although this science is based on the methodological basis of system ology, synergetic and cybernetics, it is formed as an integration of traditional science and art. Sociology should be based on the principles of uncertainty, instability, and ambiguity.

Entropy will be calculated mainly by the following formula [13].

$$H = -\sum_{i=1}^{m} p_1 \times \log p_i \,, \tag{1}$$

where H — is the entropy, p_i — is the specific weight of the partner country in the country's total imports or exports, and i — is the partner country.

The amount of information is determined in accordance with the formula

$$\mathrm{i} = n \times H \,, \tag{2}$$

and the usefulness of the information with

$$F = H_0 - H_1 \,. \tag{3}$$

In these formulas, the amount of information, the number of research cycles, the usefulness of the information, and the entropy, respectively.

Using the research method, it is possible to calculate the entropy of exports and imports of the Republic of Azerbaijan on associative activities with countries around the world.

It should be noted that the level of development of balanced foreign economic relations in the conditions of uncertainty is assessed by the dynamics, structure, and composition of foreign economic relations. Based on these indicators, the share of imports and exports in total trade turnover and GDP (the degree of openness of the economy), the growth rate. Trade turnover by meat and geographical structure, the participation level of priority areas in foreign trade with different countries, etc. is determined. The most important of these indicators for assessing the associative activity of the country is the indicator of the level of development of balanced foreign trade relations [14].

$$C = \frac{Foreign\,Trade\,Balance}{Tradeturnover} \,, \tag{4}$$

where C — is the ratio of balanced foreign trade activity. This ratio varies in the range $-1 \le C \le 1$. As the national economy of each country is significantly dependent on mutual import and export operations, it has not been possible to achieve a fully balanced foreign trade in the world practice. Using this methodology, it is possible to assess foreign economic relations between countries.

DATA, ANALYSIS, AND RESULTS ANALYSIS OF FOREIGN TRADE OF THE REPUBLIC OF AZERBAIJAN

The location of the Republic of Azerbaijan in a more favorable geographical location at the intersection of two transport hubs and the creation of a transport hub, which has recently become a hub for all vehicles on the East-West, North-South routes, have a positive impact on the development of foreign economic relations. Studies show that the share of key partners in Azerbaijan's imports and exports tended to be equal regularly. This tendency is mainly because foreign economic policy in the country is aimed at balancing imports and exports. All this can be seen more clearly in the chart below (*Fig. 1*).

As can be seen from the graph, the trade turnover reached a peak of 54.93 billion US dollars in 2008 for the entire period under review. This increase is mainly due to the increase in the price of oil on the world market, which is the basis of exports in the Azerbaijani economy. In recent years, the fall in oil prices on the world market has resulted in a decrease in trade turnover. At the same time, this decline is closely linked to the effects of the global financial crisis and the COVID-19 pandemic. The continuation of the global financial crisis in the world has led to a decrease in the real and effective exchange rate of the Azerbaijani manat against foreign currencies since 2014, leading to a decrease in exports and trade turnover. As a result, the foreign trade balances, although having an active balance, decreased in 2015–2020 compared to 2014. As the economic policy pursued in foreign trade was more focused on balancing imports, the foreign trade balance was positive for all periods studied.

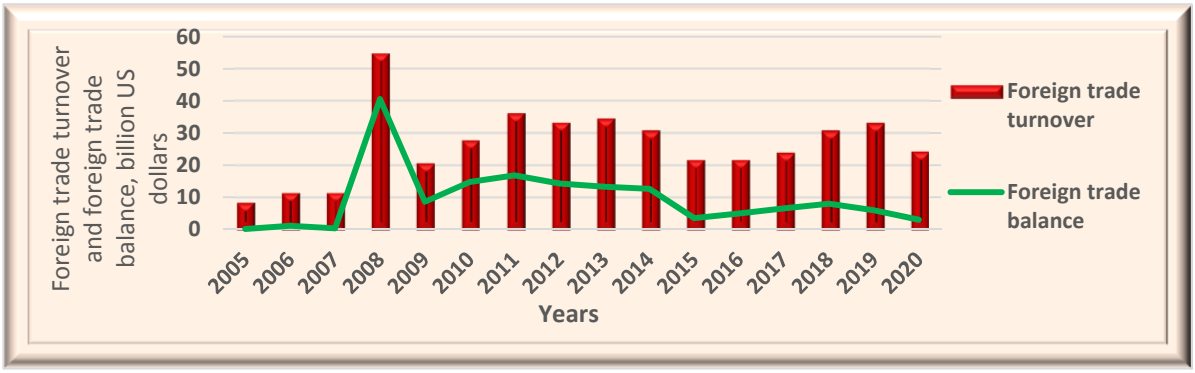


Fig. 1. **Foreign trade turnover and foreign trade balance of the Republic of Azerbaijan for 2005–2020, billion USD**

Source: compiled by the author based on information. URL: https://www.stat.gov.az/source/trade/?lang=en (accessed on 13.06.2021).

ECONOMETRIC ASSESSMENT OF THE FACTORS INFLUENCING THE LEVEL OF DEVELOPMENT OF BALANCED FOREIGN ECONOMIC RELATIONS IN THE REPUBLIC OF AZERBAIJAN

The level of development of balanced foreign economic relations in each country is characterized by a balanced foreign trade activity ratio. In order to econometrically assess the factors affecting the balanced foreign trade ratio, let us assess the impact of the entropy of exports and imports, the real and effective exchange rate of the Azerbaijani manat against foreign currencies, as well as the degree of openness of the economy. According to the methodology presented, the entropy of exports and imports, the degree of openness of the economy, and the balanced foreign trade ratio are calculated according to the statistical data of the State Statistics Committee and the State Customs Committee of the Republic of Azerbaijan for 2005–2020 and reflected in the table below (*Table 1*).

To conduct a regression analysis of the entropy of exports and imports in the Republic of Azerbaijan with the coefficient of balanced foreign trade activity characterizing the level of development of balanced foreign economic relations in the Republic of Azerbaijan for 2005–2020, the relationship between the real and nominal effective exchange rate of the Azerbaijani manat; EViews, Matlab, MS Excel, Mathcad, etc. from ready mathematical software packages can be used. For this purpose, using the EViews software package, which is more widely used in economic research, we obtain the following result based on the data in the table above (*Table 2*).

Based on the results obtained from the EViews application software package, the regression equation will be as follows:

Estimation Command:

==========

LS Y X5 X4 X3 X2 X1 C

Estimation Equation:

==========

$$Y = C(1)*X5 + C(2)*X4 + C(3)*X3 + C(4)*X2 + C(5)*X1 + C(6)$$

Substituted Coefficients:

==========

$$Y = 0.518015528607*X5 + 1.28038888125*X4 - 0.446045654134*X3 - 0.117429885594*X2 - 0.396726454072*X1 - 0.586023553649 \quad (5)$$

As can be seen from the table, there is a very high correlation between the variables Y and X1, X2, X3, X4 and X5 according to the Chedok scale. $R = 0.927$.

With the help of the F-Fisher criterion, the statistical significance of the set of regression equations can be checked. For this purpose, the F-Fisher criterion should be compared with the value of $F_{tab.}(\alpha; m; n-m-1)$. According to *Table 2*, this reflects the results of the EViews software package,

$$F - statistic\left(Fisher's\ criterion\right) = 25.4.$$

If we determine the value of Table F in EXCEL using the formula

$$F_{tab.}(\alpha; m; n-m-1) = F_{tab.}(0.05; 5; 10) = 3.33.$$

The F-Fisher criterion, compared with the value of $F_{tab.}(\alpha; m; n-1)$, appears to be the $F - Fisher\ criterion > F_{tab.}(25.4 > 3.33)$. This means that the regression equation is statistically significant. This means the adequacy of the established model (5). The statistical significance of the individual coefficients included in the model can also be determined with the help of t-statistics.

Table 1

Balance of foreign trade activity ratio in the Republic of Azerbaijan for 2005–2020 and dynamics of factors influencing it

Years	Entropy of imports (X1)	Entropy of exports (X2)	Nominal effective exchange rate of manat against foreign currencies (X3)	Real effective exchange rate of manat against foreign currencies (X4)	Degree of openness of the economy (X5)	Balanced foreign trade activity ratio (Y)
2005	0.734	0.665	0.921	0.858	0.646468	0.015891
2006	0.7525	0.678	0.9	0.89	0.554682	0.094983
2007	0.7877	0.761	0.854	0.951	0.356175	0.029282
2008	0.79	0.721	1.001	1.218	1.124323	0.738921
2009	0.821	0.634	0.983	1.155	0.470111	0.411933
2010	0.741	0.716	1.042	1.277	0.528467	0.527868
2011	0.709	0.757	1.081	1.342	0.550812	0.462877
2012	0.896	0.85	1.083	1.303	0.481618	0.424749
2013	0.941	0.496	1.081	1.315	0.466907	0.381279
2014	0.983	0.876	1.245	1.466	0.492012	0.503588
2015	0.999	0.882	0.897	1.1	0.389569	0.106709
2016	0.933	0.83	0.663	0.913	0.466828	0.034545
2017	0.961	0.823	0.659	0.943	0.552845	0.222612
2018	0.967	0.778	0.726	0.996	0.656372	0.258495
2019	0.957	0.727	0.734	0.99	0.691299	0.179216
2020	0.9513	0.831	0.756	1.003	0.574344	0.122994

Source: compiled by the author based on the author's calculations and materials. URL: https://customs.gov.az/en/faydali/gomruk-statistikasi/xarici-ticaretin-veziyyeti-haqqinda/(accessed on 13.06.2021).

$$Y = -0.3967 * x_1 - 0.1174 * x_2 - 0.4460 * x_3 + 1.2804 * x_4 + 0.5180 * x_5 - 0.5860, \; R^2 = 0.927$$

$$t \quad (-1.65) \quad (-0.58) \quad (1.67) \quad (5.59) \quad (4.68) \quad (-2.05), \quad DW = 1.894.$$

As can be seen from the regression equation obtained from the EViews application software package, the increase in factor X1, which represents the entropy of exports, X2, which represents the entropy of imports, as well as X3, which represents the nominal effective exchange rate of the Azerbaijani manat to foreign currencies, characterizes the level of balanced foreign economic relations. Decreases factor Y, which reflects the ratio of balanced foreign trade activity, increases factor X4, which represents the nominal effective exchange rate of the Azerbaijani manat against foreign currencies, and factor X5, which indicates the degree of openness of the economy that increases the Y factor. However, to ensure the adequacy of this result, it is necessary to check the statistical significance of the given coefficients. For this purpose, the following hypothesis should be tested:

$$H_0 : \beta_1 = 0$$
$$H_0 : \beta_1 \neq 0$$

The crisis points of the student's distribution will be $\alpha = 0.05$, based on the 5 sign variables included in the model at the level of significance and the amount of choice will be $t_{0.025;10} = 2.228$. The coefficients of the variables X1,

Table 2

The Result of the EViews Software Package

Dependent Variable: Y				
Method: Least Squares				
Date: 06/13/21 Time: 20:50				
Sample: 2005 2020				
Included observations: 16				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X5	0.518016	0.110660	4.681147	0.0009
X4	1.280389	0.228885	5.594016	0.0002
X3	–0.446046	0.267653	–1.666506	0.1266
X2	–0.117430	0.202360	–0.580302	0.5746
X1	–0.396726	0.239802	–1.654392	0.1291
C	–0.586024	0.286242	–2.047299	0.0678
R-squared	0.927115	Mean dependent var		0.282246
Adjusted R-squared	0.890673	S.D. dependent var		0.215979
S.E. of regression	0.071413	Akaike info criterion		–2.160687
Sum squared resid	0.050998	Schwarz criterion		–1.870966
Log likelihood	23.28549	Hannan–Quinn criter.		–2.145851
F-statistic	25.44064	Durbin–Watson stat		1.893785
Prob(F-statistic)	0.000022			

Source: EViews application was developed by the author based on the software package.

X2, and X3 are not statistically significant according to the crisis point of the student's distribution. on the contrary, the coefficients of the variables X4 and X5 are statistically significant. Although the coefficient of free boundary is smaller than the point of crisis of the student's distribution, it is entirely desirable that the free boundary is in the model. The coefficient of determination is statistically significant $\left(R^2 = 0.927\right)$ as it is high enough based on the results obtained from the EViews software package.

According to the EViews application software package, the hypothesis of autocorrelation can be tested from *Table 2* to Durbin-Watson statistics. In this case, $\alpha = 0{,}05$, with 5 explanatory variables to the significance level for $m = 5$ and $n = 16$ observations, the Durbin-Watson crisis points will be as follows [15, p. 337].

$$d_l = 0.615;\ \ d_u = 2.157.$$

Since $d_l = 0.615 < DW = 1.894 < d_u = 2.157$, no conclusion on the existence of autocorrelation has been determined [15, p. 311]. This means that the regression equation is statistically significant, and the constructed model

$$Y = -0.3967 * x_1 - 0.1174 * x_2 - 0.4460 * x_3 + \\ +1.2804 * x_4 + 0.5180 * x_5 - 0.5860$$

is adequate. Since the coefficients for the X4 and X5 variables included in the model are statistically significant, we can conclude that a single increase in the X4 factor, the nominal effective exchange rate of the Azerbaijani manat against foreign currencies, increases the coefficient reflecting the balance of foreign trade by 1.2804 units. Also, an increase of 1 point in the X5

coefficient, which reflects the degree of openness of the economy, leads to an increase by 0.586 points in the coefficient, which reflects a balanced foreign trade activity.

The fact that the coefficient of determination $R^2 = 0.927$ means that the corresponding regression equation is explained by 92.7% of the variance results and 7.3% by the influence of other factors. The high coefficient of determination indicates that the regression equation is better able to express the initial data and that the majority of the resulting factor (92.7%) is explained by the factors included in the model.

As a result of the study, it is possible to determine the percentage change in the outcome factor by calculating the elasticity coefficient, which represents the percentage change in the dependent variable as a result of a 1% increase in the free variables included in the linear regression equation. This ratio is calculated according to the following formula [15, p. 313].

$$E = \frac{\alpha_i \times \bar{x}_i}{\bar{y}}, \quad (6)$$

here α_i — are the coefficients of the relationship equation. $\bar{x}_i$ — calculated average value of causal factors for the studied periods $\bar{y}$ — a calculated average of the resulting factor for the studied periods.

Since the coefficients of the variables X4 and X5 are statistically significant for the crisis point of the student's distribution, if we calculate the effect of these variables on the outcome factor by the coefficient of elasticity, we obtain the following result.

$$E_{\text{Real effective exchange rate of Azerbaijani manat in relation to foreign currency}} = \frac{\alpha_4 \times \bar{x}_4}{\bar{y}} = \frac{1.284 \times 1.1075}{0.282246} = 5.024,$$

$$E_{\text{Degree of openness of the economy}} = \frac{\alpha_5 \times \bar{x}_5}{\bar{y}} = \frac{0.562677 \times 0.51803}{0.282246} = 1.032668.$$

Calculations show that the increase in the nominal effective exchange rate of the Azerbaijani manat against foreign currencies by 1% led to an increase in the coefficient of balanced foreign trade activity by 5.024%. An increase in the openness of the economy by 1% leads to an increase in the balance ratio of foreign trade activity by 1.03%.

All this characterizes the level of development of balanced foreign economic relations in the Republic of Azerbaijan.

The dynamics of the Fitted and Actual values of the EViews application software package with the regression equation of the built-in model (5), as well as the residuals between them are given in the graph below (*Fig. 2*).

Balance of foreign trade activity characterizing the level of development of balanced foreign economic relations in the Republic of Azerbaijan for 2005–2020, entropy of exports and imports, real and nominal effective exchange rate of Azerbaijani manat against foreign currencies, degree of economic openness shown in the graph (*Fig. 3*). Based on changes in the entropy of imports (X1) and exports (X2) reflected in this graph, it can be considered that the state intervention in the import policy in the economy of the Republic of Azerbaijan is aimed at balancing imports.

Graphical description of the entropy of exports and imports in the Republic of Azerbaijan with the coefficient of balanced foreign trade activity in the Republic of Azerbaijan for 2005–2020, the real and nominal effective exchange rate of the Azerbaijani manat against foreign currencies, the openness of the economy was as follows (*Fig. 4*).

A number of characteristics of the balanced foreign trade activity ratio found by the regression equation obtained based on the EViews application software package are shown in the graph below (*Fig. 5*).

It should be noted that using the graph, it is possible to determine the forecast prices of the balance of foreign trade activity in the Republic of Azerbaijan (*Fig. 6*).

As can be seen from the graph, the forecast prices of the balanced foreign trade activity ratio in the Republic of Azerbaijan will be reduced by 2025. This means that the level of development of balanced foreign trade relations in the country is expected to decrease. This decrease is primarily due to the fact that the volume of exports in the Azerbaijani economy is substantially dependent on the oil factor. Increasing the share of the non-oil sector in exports will result in an increase in the foreign trade balance, which will have a positive impact on the development of balanced foreign trade relations in the future.

CONCLUSIONS

Research shows that the frequent changes in socio-economic processes in the globalized world economy in recent years, resulting in uncertainty, have a significant

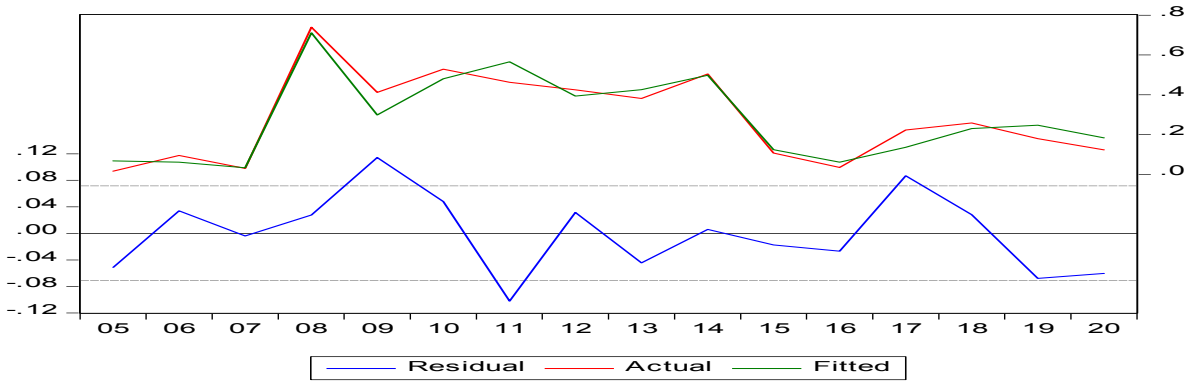


Fig. 2. **Balanced foreign trade activity ratio in the Republic of Azerbaijan for 2005–2020 and actual prices obtained on the basis of the software package of factors influencing it and the dynamics of balances between them**

Source: EViews application was developed by the author based on the software package.

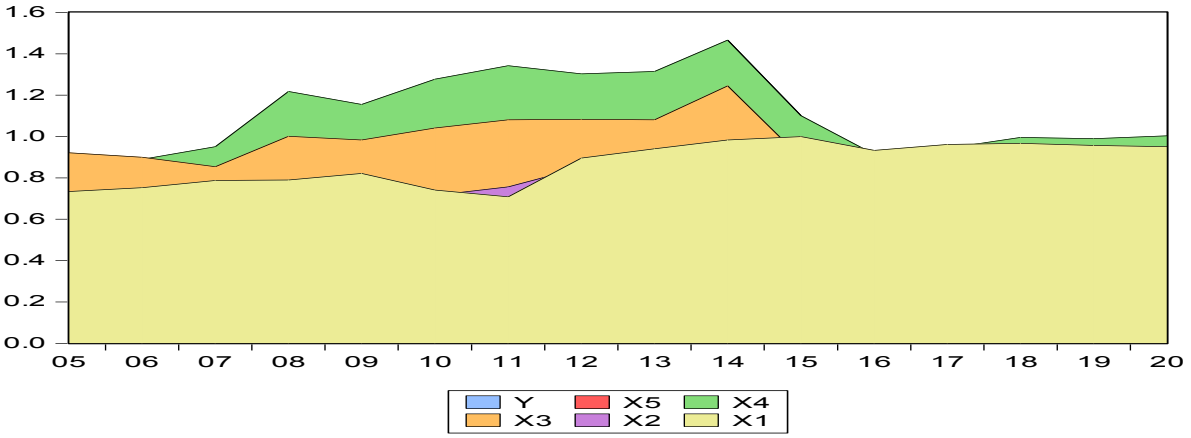


Fig. 3. **Area band on the relationship between the balance of foreign trade activity in the Republic of Azerbaijan and the entropy of exports and imports, the real and nominal effective exchange rate of the Azerbaijani manat to foreign currencies, the degree of openness of the economy (2005–2020)**

Source: EViews application was developed by the author based on the software package.

impact on the level of development of balanced foreign economic relations. To assess the level of development of balanced foreign economic relations in the conditions of uncertainty in the study, the balanced foreign trade ratio was calculated, the factors directly affecting this indicator were analyzed on the example of the Republic of Azerbaijan and evaluated in EViews software package. The explanatory variables involved in the model are grouped as the entropy of exports and imports in the Republic of Azerbaijan, the real and nominal effective exchange rate of the Azerbaijani manat against foreign currencies, and the degree of openness of the economy. Using the research methodology, it is easy to assess the level of development of balanced foreign economic relations in the face of uncertainty, easily identifying the positive and negative trends in foreign trade of any country.

As a result of the study, it was determined that in the example of the Republic of Azerbaijan, the entropy of exports and imports with a balanced foreign trade ratio, real and effective exchange rate of the Azerbaijani manat against foreign currencies, as well as the degree of openness of the economy

$$Y = -0.3967 * x_1 - 0.1174 * x_2 - 0.4460 * x_3 + \\ +1.2804 * x_4 + 0.5180 * x_5 - 0.5860$$

has a very high correlation expressed by the regression equation $\left(R^2 = 0.927\right)$.

The study found that the increase in the explanatory variable X1 expressing the entropy of exports, the explanatory variable X2 expressing the entropy of imports, as well as the explanatory variable X3 expressing the nominal effective exchange rate of the Azerbaijani manat against foreign currencies Although the Y factor, which

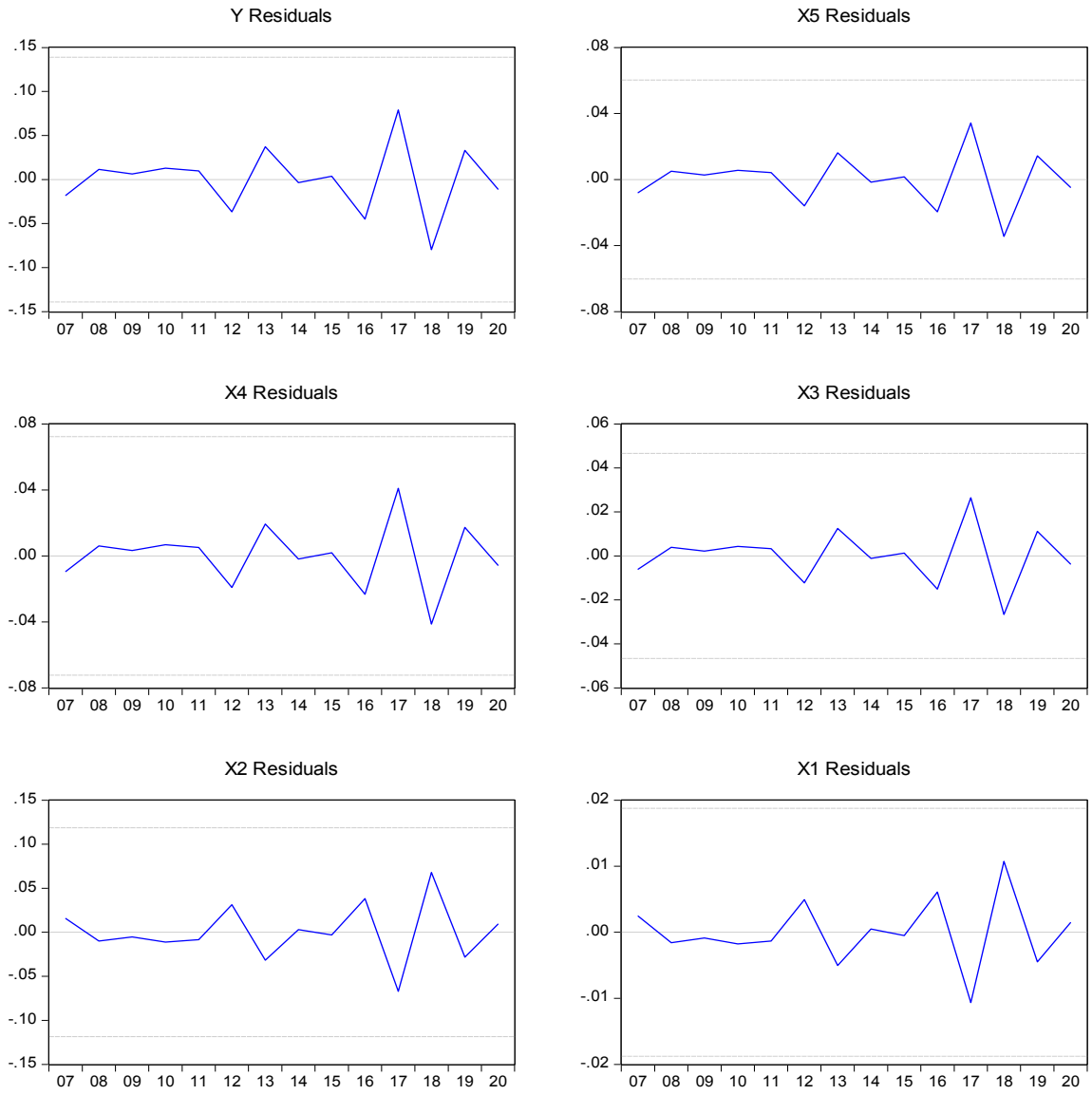
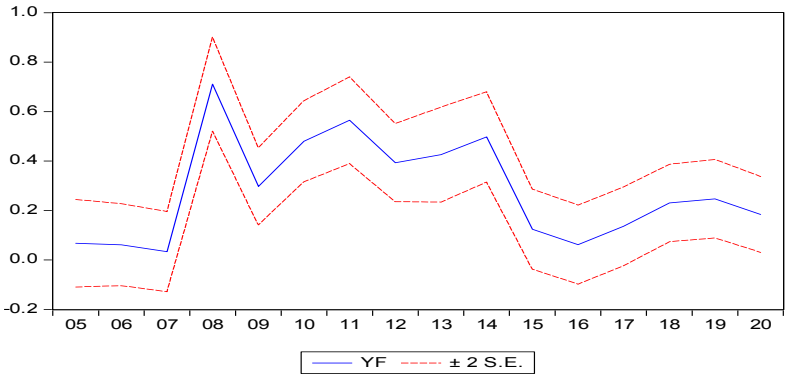


Fig. 4. **Balance of foreign trade activity in the Republic of Azerbaijan for 2005–2020 and balance dynamics of the factors influencing it**

Source: EViews application was developed by the author based on the software package.



Forecast: YF	
Actual: Y	
Forecast sample: 2005 2020	
Included observations: 16	
Root Mean Squared Error	0.056457
Mean Absolute Error	0.046918
Mean Abs. Percent Error	42.95064
Theil Inequality Coefficient	0.080885
Bias Proportion	0.000000
Variance Proportion	0.018917
Covariance Proportion	0.981083

Fig. 5. **Prices of balanced foreign trade activity ratio in the Republic of Azerbaijan by years, standard errors, characteristics for the forecast**

Source: EViews application was developed by the author based on the software package.

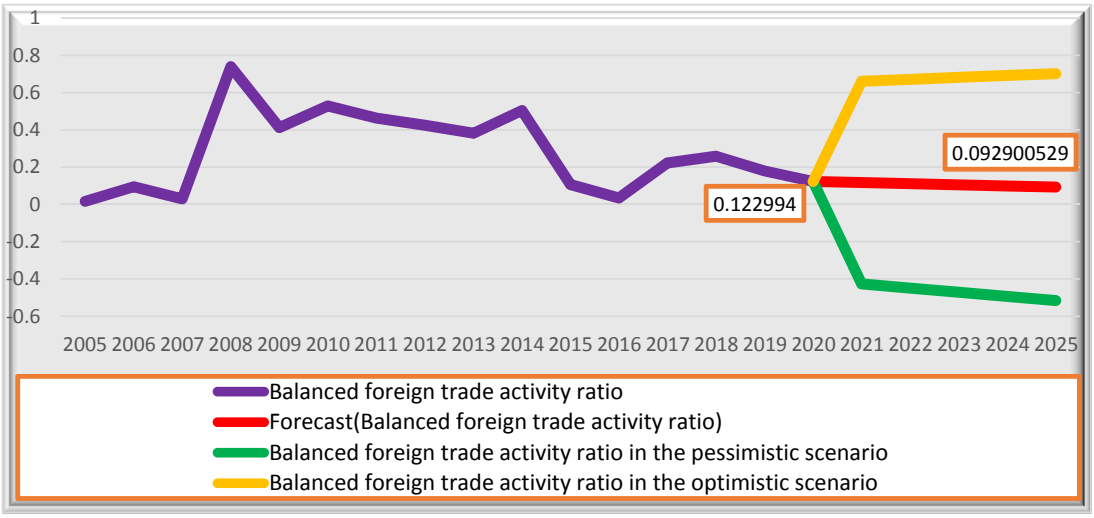


Fig. 6. **Forecast prices of balanced foreign trade activity ratio in the Republic of Azerbaijan**

Source: compiled by the author based on the data in *Table 1*.

represents the trading activity ratio, reduces the outcome factor, the ratios of the variables X1, X2, and X3 are not statistically significant according to the crisis point of the Student's distribution. The coefficients of the explanatory variable X4, which represents the nominal effective exchange rate of the Azerbaijani manat against foreign currencies, included in the model, and the explanatory variable X5, which expresses the degree of openness of the economy, are statistically significant.

The study found that the increase in the entropy of exports and imports on the explanatory variables included in the model reduces the ratio of balanced foreign trade activity, which characterizes the level of development of balanced foreign economic relations. Although an increase in entropy means a decline and a decrease means progress, since each economic event has its own nature, an increase in entropy may indicate progress in one case and a decrease in another. For example, the increase in entropy in foreign trade is a positive thing for Azerbaijan and a negative thing for foreign partners. In relation to management and research processes, the increase in entropy indicates the complication of the problem.

According to the statistics of the State Statistics Committee and the State Customs Committee of the Republic of Azerbaijan for 2005–2020, according to the elasticity coefficient calculated in accordance with the recession equation obtained in the EViews software package, it was determined that 1% increase in the nominal effective exchange rate A balanced foreign trade activity ratio, which characterizes the level of development of economic relations, increases by 5.024%, and a 1% increase in the openness of the economy results in a 1.03% increase in the balance of foreign trade activities, which characterizes the level of development of balanced foreign economic relations.

According to the EViews application software package, the balance of foreign trade activity coefficient in the Republic of Azerbaijan for 2005–2020 and the dynamics of the balances of the factors influencing it, as well as the balanced foreign trade activity coefficient by years, standard errors, were determined. A number of characteristics of its use are given. According to forecasts, the balance of balanced foreign trade activity in the Republic of Azerbaijan will decrease by 2025.

Thus, using the research methodology, it is possible to optimize foreign trade policy by econometrically assessing the factors affecting the balanced foreign trade ratio, which characterizes the level of development of balanced foreign economic relations in the context of uncertainty for each country.

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Insider Trading and Informed Trading Patterns

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ABSTRACT

This paper **aims** to examine how corporate insider trading influences trading patterns of foreign and institutional investors especially in firms with high discretionary accruals and low book-to-market ratios as proxies for information uncertainty. This study uses **methods** such as trading patterns of informed traders who are considered to gather more precise information before and after insider trading and tests how insider trading affects informed traders. The **results** of this study provide evidence that insider trading is likely to influence informed traders' trading patterns. After controlling for firm-specific factors, this study finds that the event and the amount of insider trading affect significantly foreign and institutional trading patterns. Furthermore, the relation between informed trading and insider trading is more enhanced when firms have a high level of discretionary accruals and a low book-to-market ratio. Prior studies have focused on the association between abnormal returns of insider trading and types of insider information disseminated, while informed trading patterns and insider trading with information uncertainty have not been specifically considered. This study enables practitioners to interpret corporate insider trading with information uncertainty on informed trading patterns.

Keywords: discretionary accruals; informed trading; insider trading

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1. INTRODUCTION

Corporate insider trading is regulated in many countries. Recently financial regulators in Korea reveal new financial policies, focusing on intensified regulation of unfair trading including corporate insider trading. Following this movement, unfair trading can be strongly monitored, then insider trading may decrease, containing informative insider trading as of signaling channel of firms. As continual debating in many literature, insider trading has good and bad effects in financial markets. Prior literature report that insider trading could reduce stock demand and return rates of outsiders by information asymmetry, while insider trading could reduce investment risk by spreading out useful information of firms [1]. The informed traders are insiders [2], but this paper tries to distinguish inside informers from outside informers such as foreign traders and institutional investors. After here, this study calls informed outsiders as informed traders and informed insiders as insiders. Informed traders are regarded as experts who can scrutinize the informativeness of insider trading and collect more precise information than others [3]. Some informed traders may neglect insider trading because of unfairness or uninformativeness and are only involved in stock trading activities with informative insider signals. If so, trading patterns of informed investors are significantly related to a certain type of insider trading. On the other hand, if informed traders consider insider trading as only unfair trading, there is no evidence of the relation between insider trading and trading patterns of informed traders or there is only the opposite response of informed traders to insider trading. Thus, this study focuses on trading patterns of informed traders who are considered to gather more precise information before and after insider trading and tests how insider trading affects informed traders.

Prior research on insider trading [1, 4, 5] reports the theoretical background and economic efficiency of insider trading. According to the empirical research of insider trading [6–8] have focused on insider trading and abnormal returns. D. Aboody and B. Lev [9] examine whether firms with R&D investment and insider trading have more stock returns than firms with non-R&D investment and insider trading. L. Cohen et al. [10] show that abnormal stock returns of opportunistic insider trading are greater than routine insider trading. They also report that opportunistic trading is highly occurred firms with weak governance structure. J. Lakonishok

and I. Lee [11] provide evidence that insiders in smaller firms may have more information on future returns. H.N. Seyhun [2] provides evidence that shareholders have not restricted insider trading in employment contracts and do not demand additional restrictions on insider trading. If insider trading hurts the wealth of shareholders, shareholders may have desired to restrict insider trading.

H.E. Leland [1] shows analytical evidence that trading by insiders is likely to reduce investment from outsiders, assuming that outsiders only have the information of the current stock price and firms do not issue new shares. Since insiders will recognize their corporate performance precisely and participate in the stock market, outsiders will invest less in the unfair market. However, H.E. Leland [1] also shows that new and useful information will be spread out by insider trading and will reduce the investment risk of outsiders. This may influence informed traders' investment decisions more than uninformed outsiders's decisions. In the real market, institutional traders are major investors and they are considered as informed investors who are able to gather more precise information than others.

To test how insider trading influences informed traders' activities, this paper examines the change of informed trading patterns before and after insider trading. This study also utilizes the corporate information environment through the level of discretionary accruals and book-to-market ratio because it is deemed to be proxies for investment risk of stock trading. When firms experience a low book-to-market ratio and a high level of earnings management, the effect of insider trading on informed traders may be more amplified because informed traders are able to evaluate the information environment of companies. This suggests that the event, the amount, and environment of insider trading may have informativeness to informed traders.

After controlling for firm-specific factors, this study provides evidence that the event and the amount of insider trading affect foreign and institutional trading patterns. Furthermore, this study finds that the relation between informed trading and insider trading is more enhanced in firms with a high level of discretionary accruals and low book-to-market ratios.

Based on the results, this study provides further evidence for the effect of insider trading and informed trader's activities. Since informed traders are likely to reflect a bad aspect of insider trading and respond to a good aspect of insider trading, this study helps policymakers to understand corporate insider trading in firms with information uncertainty on informed trading patterns, when they face investment risk proxied by discretionary accruals and book-to-market ratios. Results in this study may help to reform insider trading regulation and apply it in the real business environment, especially in firms with a great portion of informed traders.

The rest of this paper has five sections. The second section shows the study background and develops the hypotheses. The third section discusses the research method and the data selection procedures. The fourth section reports empirical results, and the last section concludes this study.

2. BACKGROUND AND HYPOTHESES

2.1. Insider trading

Empirical research on insider trading [6, 8, 10] mainly discusses insider trading and abnormal returns, while few studies have examined informed trader and insider trading with information uncertainty. D. Aboody and B. Lev [9] examine that firms with R&D investment and insider trading show more stock returns than firms with non-R&D investment and insider trading. L. Cohen et al [10] show that abnormal stock returns of opportunistic insider trading are greater than routine insider trading. They report that opportunistic trading occurs in firms showing weak governance structures. J. Lakonishok and I. Lee [11] test that insiders in smaller firms may have more information of future returns.

H.E. Leland [1] provides an analytical model that insider trading is likely to reduce investment from outsiders in a certain situation that outsiders only observe the current stock price and firms do not issue new shares. Since insiders will recognize their corporate performance precisely and participate in the stock market, outsiders will invest less because of the unfairness of the capital market. Unlike prior studies, this paper employs informed trading patterns and insider trading in firms with information uncertainty, which are meaningful proxies measured as discretionary accruals and book-to-market ratio. Using these measures, this study tests the change patterns of informed traders before and after insider trading with information uncertainty.

2.2. Information uncertainty

S. Huddart and B. Ke [7] test corporate information environment and abnormal returns by insider trading.

For measuring information environment, they use analysts' coverage, institutional trader ratios, book-to-market ratios, R&D investment, a loss indicator, and median past abnormal returns. D. Aboody et al. [12] discuss that firms having systemic risk proxied by discretionary accruals show risk premium when insiders trade, so abnormal returns are more related to insider trading in firms with systemic risk. K.A. Rozanov [13] uses top managers' insider trading and shows that corporate governance has a tendency to determine stock price patterns by managers' insider trading. When firms have weak governance, price patterns of managers' trading increase and manager forecasts are biased. As in prior literature, this paper considers high discretionary accruals and low book-to-market ratios to control the effect for information uncertainty of firms.

As the trading patterns of informed traders after insider trading represent different aspects of insider trading, this paper examines the effect of insider trading on the trading patterns of informed traders. This study predicts that the trading patterns of informed traders are likely to be followed by informative insider trading because insider trading brings new and important information. If insider trading is not informative, insider trading may cause opposite or insignificant trading patterns by informed traders against insider trading. This argument leads to the first hypothesis in null form, as follows:

H1: Insider buying and selling are not associated with buying and selling patterns of foreign and institutional traders.

Insiders would be aware of information uncertainty in firms, so insiders in firms with information uncertainty may desire to signal their information to the market. Alternatively, insiders in firms with information uncertainty may want to behave opportunistically and exploit exclusive information to hurt outsiders. Thus, to investigate whether insider trading in firms with information uncertainty affects the trading patterns of informed investors is required. This argument leads to the second and third hypotheses.

H2: Insider buying and selling in firms with high discretionary accruals are not associated with buying and selling patterns of foreign and institutional traders.

H3: Insider buying and selling in firms with low book-to-market ratios are not associated with buying and selling patterns of foreign and institutional traders.

If the first hypotheses show a significant relation between insider trading and trading patterns of foreign and institutional traders, this study predicts that there would be an incremental effect caused by information uncertainty.

3. RESEARCH METHOD AND DATA SELECTION

To test how insider trading affects trading patterns of informed traders, this paper uses an indicator representing the event of insider trading, the amount of insider trading, an indicator for information uncertainty, and interaction terms among insider trading terms and information uncertainty terms. To reduce statistical noise and exclude liquidity transactions by insiders, this study chooses an intensive insider trading month, identifying an indicator of the event and the amount of insider trading as in J.F. Jaffe [14]. For measuring the level of a firm's information uncertainty, this paper utilizes discretionary accruals and book-to-market ratios. Both discretionary accruals and book-to-market ratios can be used as proxies for information uncertainty, enhancing investment risk [7, 12, 15].

3.1. Earnings quality

For the information uncertainty of corporate financial reporting, discretionary accruals are used as a proxy of earnings management. This study utilizes the modified-Jones discretionary accruals model as suggested in P. Dechow et al. [16]. For assigning firms with the high level of discretionary accruals, firms in the first quartile of the greatest discretionary accruals correspond to firms with high discretionary accruals. Since discretionary accruals are calculated by estimation errors, this paper calculates each firm's discretionary accruals through each industry and year clusters. Discretionary accruals are computed by equation (1) as used in P. Dechow et al. [16] and calculating procedures are explained in K.S. Ali et al. [17].

$$\frac{TA_{it}}{A_{it-1}} = \alpha_0 \frac{1}{A_{it-1}} + \alpha_1 \frac{\Delta REV_{it} - \Delta AR_{it}}{A_{it-1}} + \alpha_2 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it}, \quad (1)$$

where

A = the total assets in year $t - 1$;

TA = the total accruals (net income — cash flow from operations) in year t for firm i;

ΔREV = the difference between revenues in year t and in year $t-1$;
ΔAR = the difference between accounts receivables in year t and in year $t-1$;
PPE[1] = the net depreciable property, plant, and equipment in year t;
DA = discretionary accruals from the estimated residuals in model (1).

3.2. Book-to-market ratio

As in J. Liew and M. Vassalou [18], the book-to-market ratio is of risk factors that can explain firms' growth in the capital market and even future economic growth in some countries. This study calculates the book-to-market ratio with firms' book value of equity in the previous insider trading. Prior studies in insider trading [7, 20] also consider the book-to-market ratio as an indicator for the level of the information environment of firms because a low book-to-market ratio indicates firms with high growth and information asymmetry. For identifying firms with the low level of book-to-market ratio, firms in the first quartile of the bottom book-to-market value correspond to firms with the low book-to-market ratio. For controlling the industrial and periodic effects, each firm's ratio from each industry and year clusters is calculated.

3.3. Research model

As in prior studies [7, 12, 15], this study expects that insider trading and information uncertainty influence trading patterns of informed traders as in equation (2). This paper uses the following model to test the three hypotheses, and definitions of variables are in *Table 4* Panel A.

$$\begin{aligned} For_{it}(or\ inst_{it}) = {} & \beta_0 + \beta_1 ITBUYd_{it} + \beta_2 ITSELLd_{it} + \beta_3 ITBUYv_{it} + \beta_4 ITSELLv_{it} + \beta_5 dda_{it} \\ & + \beta_6 dbm_{it} + \beta_7 ITBUYd_{it} \times dda_{it} + \beta_8 ITBUYd_{it} \times dbm_{it} + \beta_9 ITSELLd_{it} \times dda_{it} \\ & + \beta_{10} ITSELLd_{it} \times dbm_{it} + \beta_{11} ITBUYv_{it} \times dda_{it} + \beta_{12} ITBUYv_{it} \times dbm_{it} \\ & + \beta_{13} ITSELLv_{it} \times dda_{it} + \beta_{14} ITSELLv_{it} \times dbm_{it} + \beta_{15} priorv_{it} + \beta_{16} SIZE_{it} \\ & + \beta_{17} ROA_{it} + \beta_{18} CFO_{it} + \beta_{19} LEV_{it} + \beta_{20} GRW_{it} + \sum IND\,\&\,YR + \varepsilon_{it} \end{aligned} \quad (2)$$

As in prior studies [12, 15, 20, 21], this study expects that firms with a lower book to market value, a smaller size, a higher return, a greater cash flow ratio, greater leverage, and a greater growth rate are likely to have more inside information and stronger reaction by traders.

Based on prior research, several control variables are added. SIZE may control the impacts by omitted variables on the investment environment [10]. J.D. Piotroski and D.T. Roulstone [15] show a positive relationship between CFO, ROA, and insider buying. LEV may capture firm's risk and informed traders reflect bad credit news in trading activities [22]. GRW is also considerable, implying that if firms with growth options, investors tend to experience information uncertainty [23].

3.4. Data selection

Table 1 provides the sample used in this study from 2007 to 2011. This paper excludes firm-month observations with insufficient financial data, those in financial service industries, those with the second consecutive insider trading month, and those with negative equity. Financial data are extracted from the KIS-VALUE database by NICE Information Service and Fnguide database by FnGuide Inc., and insider trading samples are obtained from DART System (Data Analysis, Retrieval and Transfer System) by Financial Supervisory Service in Korea.

4. EMPIRICAL RESULTS

4.1. Descriptive statistics

Table 2 reports descriptive statistics of dependent, independent, and control variables. This study winsorizes variables with continuous values at the 1st and the 99th percentiles to control for the effects of extreme observations.

[1] Consistent with J. Culvenor et al. [19]. PPE excludes land and construction in progress.

Table 1

Sample Descriptions

Selection Criteria	Observations
All firm-month observations on the Korea Stock Exchange (KSE)	46,440
(Less) Firm-month observations with insufficient financial data (Less) Financial service	(7,547) (4,860)
(Less) Firm-month observations with consecutive insider trading month	(44)
(Less) Firm-month observations with negative equity	(81)
Final Sample Size	33,908

Source: built by the author based on data from KIS-VALUE, FnGuide, DART system.

The mean value of the change ratio of the net stock buying amount of foreign investors (For_Netv) is 0.0002, which is scaled by market value.[2] The mean value of the absolute total trading ratio (For_Absv, 0.0127) is about the sum of buying and selling ratio of foreign traders (For_Buyv and For_Sellv). Inst_Netv has the mean value around zero, and Inst_Absv is the sum of the stock buying and selling ratio of institutional investors (Inst_Buyv and Inst_Sellv). While the max value of For_Netv is similar to that of Inst_Netv, the max value of For_Buyv and For_Sellv is half of Inst_Buyv and Inst_Sellv. The binary variable for the event of Insider buying (ITBUYd) accounts for 1.3% of this test sample and the ratio of Insider selling dummy (ITSELLd) is about half of ITBUYd. The average amount of insider selling (ITSELLv) is around half of the insider buying amount (ITBUYv). Regarding the level of discretionary accruals and book-to-market ratios, firms with high discretionary accruals and the low book-to-market ratio at the first quartile account for about 24% of the final sample.

Table 3 shows the correlation matrix by the variables used in the empirical analyses. The highest correlation of continuous variables is 0.4921 between ROA and CFO.[3] The rest of the variables are not highly correlated. The highest VIF value in the regression analyses is below 2.3 and the condition index (not tabulated) is low which infers that multicollinearity is not serious in this study.[4]

[2] For avoiding endogeneity issue, all dependent variables, For_Netv, For_Absv, For_Buyv, For_Sellv, Inst_Netv, Inst_Absv, Inst_Buyv, and Inst_Sellv, are computed by the different ratio of trading amount between in after month and in before month of insider trading.

[3] Dropping either ROA or CFO does not change the conclusion in this study and yields qualitatively identical results.

[4] For mitigating heteroscedasticity problem, this study uses heteroscedasticity-consistent estimators as in H.A. White [24]. Durbin-Watson test does not provide statistical evidence of autocorrelation in these regression models (not tabulated).

4.2. Regression results

Panel A and panel B of *Table 4* represent the empirical results of multivariate regression analyses to test three hypotheses. The For_Netv model provides the relation between insider trading and the net stock buying amount of foreign investors. ITBUYv*dda is significant and negatively associated with For_Netv at the significance of 5 percent. When insiders in firms with high discretionary accruals purchase stocks more, one of the informed traders, foreign investors, tend to avoid risk and reduce stock buying for the firm. The coefficient of ITSELLv*dda means that insiders selling also influences decreased net trading amount by foreign traders. If insider selling carries information of a firm's performance, foreign traders consider insider selling as a significant sign of firms with high discretionary accruals. Regarding ITSELLv*dbm, the net amount by foreign traders are likely to be increased when firms have a low book-to-market ratio and insiders sell their stocks.

When this study includes indicator variables for the event of insider trading, ITBUYd*dda and ITSELLd*dda, an intercept is increased by the event of insider trading in firms with high discretionary accruals, and the effect of the amount of insider buying and selling in firms with dda are intensified at the significant level of 1 percent.

The For_Absv model shows the influence of insider trading on absolute total trading amounts by foreigners. ITBUYv*dda has a significant coefficient as in For_Netv model but ITSELLv*dda is opposite to that of For_Netv model. This may result in the difference in

Table 2

Descriptive Statistics

Variables (N=33,908)	MEAN	STD	MIN	Q1	Median	Q3	MAX
For_Netv	0.0002	0.1646	−4.7900	−0.0233	0.0000	0.0245	5.1280
For_Absv	0.0127	0.3843	−9.5885	−0.0511	0.0000	0.0513	11.7026
For_Buyv	0.0064	0.2091	−5.0201	−0.0257	0.0000	0.0254	6.6146
For_Sellv	0.0061	0.2092	−4.5684	−0.0270	0.0000	0.0290	5.6380
Inst_Netv	0.0003	0.2335	−4.8832	−0.0301	0.0000	0.0329	6.1575
Inst_Absv	0.0112	0.4407	−7.1486	−0.0472	0.0000	0.0418	20.3354
Inst_buyv	0.0058	0.2570	−4.3017	−0.0246	0.0000	0.0193	10.9541
Inst_Sellv	0.0056	0.2403	−3.8191	−0.0237	0.0000	0.0231	10.5338
ITBUYd	0.0134	0.1148	0	0	0	0	1
ITSELLd	0.0069	0.0826	0	0	0	0	1
ITBUYv	0.0437	0.3763	0.0000	0.0000	0.0000	0.0000	7.1976
ITSELLv	0.0220	0.2649	0.0000	0.0000	0.0000	0.0000	3.2351
dda	0.2283	0.4198	0	0	0	0	1
dbm	0.2395	0.4268	0	0	0	0	1
priorv	0.0004	0.2899	−18.7932	−0.0288	0.0000	0.0300	15.3744
SIZE	26.5175	1.4959	23.8791	25.4343	26.2011	27.3520	30.7195
ROA	0.0314	0.0822	−0.3907	0.0084	0.0376	0.0733	0.2136
CFO	0.0447	0.0848	−0.2275	−0.0019	0.0440	0.0925	0.3004
LEV	0.4345	0.1924	0.0431	0.2871	0.4469	0.5758	0.8945
GRW	0.1121	0.2250	−0.5099	0.0048	0.0799	0.1769	1.2284
Definitions of variables are in *Table 4* Panel A.							

Source: built by the author based on data from KIS-VALUE, FnGuide, DART system.

the dominant change ratio of buying and selling by foreign traders.

In panel B of *Table 4*, the test results show whether buying or selling patterns of foreign traders dominate net trading patterns or absolute total trading patterns by foreigners. The event of insider selling affects selling amounts of foreigners, and this increases absolute total amounts by foreign traders. ITSELLd with dda reduces For_Sellv which increases the net buying amount of foreigners. ITBUYv with dda is likely to decrease For_Buyv and For_Sellv in the same direction which cause decline of For_Netv and For_Absv. This indicates that insider buying in firms with dda decrease For_Buyv greater than For_Sellv. These results infer that insider buying is one of committing personal capital and contribute to stop of foreigners' selling even in firms with dda, while this behavior fails to promote foreigners' buying. This result is consistent with Aboody et al. (2005) which report that firms with high discretionary accruals pay more risk premium when insiders trading. Regarding ITSELLv*dbm, the results fail to find any significant domination of For_Buyv or For_Sellv, directing an increase of For_Netv. Consistent with this study's prediction, foreign traders regard insider selling in firms with dda as an important signal for deciding selling patterns.

Table 5 shows the test results of three hypotheses for institutional traders. The Inst_Netv, net buying amount by institutional traders, are positively related to ITBUYv with dda at the significance of 1 percent. Unlike For_Netv, institutional traders prefer firms with dda when they respond to insider buying.

After including indicator variables for the event of insider trading, ITBUYd and ITSELLd, there is a significant relation between Inst_Netv and ITSELLv with dda and the effect of ITBUYv with dda are enhanced.

Table 3

Pearson Correlation Matrix

Variables (N=33,908)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. For_Netv	0.00	0.39***	−0.39***	−0.22***	0.03***	−0.07***	0.13***	0.00	0.00	0.00	0.00	0.00	0.00	−0.22***	0.00	0.00	0.00	0.00	0.00
2. For_Absv	1	0.92***	0.92***	−0.04***	0.34***	0.27***	0.33***	−0.01**	0.02***	−0.01**	0.02***	0.01	0.00	0.06***	0.00	−0.01	0.01	0.01**	−0.01
3. For_Buyv		1	0.69***	−0.12***	0.32***	0.22***	0.36***	−0.01**	0.01**	−0.01**	0.01**	0.00	0.00	−0.03***	0.00	−0.01	0.01	0.01**	0.00
4. For_Sellv			1	0.05***	0.30***	0.28***	0.25***	−0.01**	0.02***	−0.01**	0.02***	0.01	0.00	0.14***	0.00	−0.01	0.01	0.01**	−0.01
5. Inst_Netv				1	0.08***	0.52***	−0.41***	0.01	−0.01	0.01	−0.01	0.00	0.00	−0.37***	0.00	−0.01	0.00	0.00	0.00
6. Inst_Absv					1	0.89***	0.88***	−0.02**	0.02***	−0.01**	0.02***	0.01	0.00	0.05***	0.01	0.00	0.01**	0.01**	0.00
7. Inst_buyv						1	0.57***	−0.01*	0.02***	−0.01	0.02***	0.01	0.00	−0.12***	0.01	−0.01	0.01*	0.01**	0.00
8. Inst_Sellv							1	−0.02***	0.02***	−0.02***	0.02***	0.00	0.00	0.22***	0.01	0.00	0.01**	0.01*	0.00
9. ITBUYd								1	−0.01*	1.00***	−0.01*	−0.02***	−0.02***	0.00	0.01*	−0.01**	−0.02***	0.01**	−0.01*
10. ITSELLd									1	−0.01*	1.00***	0.00	0.00	0.00	0.04***	−0.01	−0.02***	0.01	0.00
11. ITBUYv										1	−0.01*	−0.02***	−0.01**	0.00	0.01**	−0.02***	−0.02***	0.01**	−0.01*
12. ITSELLv											1	0.00	0.00	0.00	0.04***	−0.01	−0.02***	0.01	0.00
13. dda												1	0.08***	−0.01	−0.10***	−0.12***	−0.14***	0.09***	0.12***
14. dbm													1	0.00	0.16***	0.06***	0.12***	0.18***	0.06***
15. priorv														1	0.00	0.02***	0.02***	−0.02***	0.00
16. SIZE															1	0.20***	0.14***	0.17***	0.14***
17. ROA																1	0.49***	−0.33***	0.19***
18. CFO																	1	−0.22***	0.01
19. LEV																		1	0.10***
20. GRW																			1

Source: built by the author based on data from KIS-VALUE, FnGuide, DART system.

Notes: ***, **, and * represent significant levels at the 1, 5, and 10 percent levels, respectively.

Table 4

Informed Traders and Insider Trading — Foreign Traders

Panel A. Net and Absolute total Trading

Variables (*N* = 33,908)	For_Netv						For_Absv					
	Coeff.	White *t*		Coeff.	White *t*		Coeff.	White *t*		Coeff.	White *t*	
Intercept	0.003	0.2		0.003	0.2		0.030	0.7		0.031	0.7	
ITBUYd	–	–		−0.006	−1.0		–	–		−0.029	−1.6	
ITSELLd	–	–		−0.023	−1.0		–	–		0.095	2.4	**
ITBUYv	−0.001	−0.2		0.001	0.2		−0.005	−0.2		0.009	0.4	
ITSELLv	−0.006	−0.1		0.015	0.4		0.037	0.5		−0.046	−0.7	
dda	0.000	−0.2		−0.001	−0.4		0.007	1.2		0.007	1.2	
dbm	−0.001	−0.6		−0.001	−0.5		−0.005	−0.8		−0.004	−0.8	
*ITBUYd*dda*	–	–		0.028	1.8	*	–	–		0.037	0.9	
*ITBUYd*dbm*	–	–		−0.018	−0.9		–	–		−0.025	−0.6	
*ITSELLd*dda*	–	–		0.075	2.1	**	–	–		−0.066	−1.1	
*ITSELLd*dbm*	–	–		0.002	0.1		–	–		−0.050	−0.9	
*ITBUYv*dda*	−0.053	−2.2	**	−0.069	−3.0	***	−0.283	−3.0	***	−0.302	−3.0	***
*ITBUYv*dbm*	−0.002	−0.1		0.008	0.7		−0.061	−1.3		−0.050	−1.1	
*ITSELLv*dda*	−0.129	−2.0	**	−0.204	−3.5	***	0.228	2.7	***	0.286	2.9	***
*ITSELLv*dbm*	0.135	2.1	**	0.131	1.9	*	−0.009	−0.1		0.024	0.3	
priorv	−0.128	−7.2	***	−0.127	−7.2	***	0.081	2.9	***	0.081	2.9	***
SIZE	0.000	−0.4		0.000	−0.4		−0.001	−0.4		−0.001	−0.5	
ROA	−0.008	−0.6		−0.009	−0.6		−0.014	−0.3		−0.013	−0.3	
CFO	0.018	1.2		0.018	1.2		0.055	1.5		0.055	1.5	
LEV	−0.001	−0.2		−0.001	−0.1		0.032	2.5	**	0.032	2.6	**
GRW	0.001	0.1		0.001	0.1		−0.010	−0.9		−0.010	−0.9	
IND/YEAR	Included			Included			Included			Included		
F-value	75.93	***		61.06	***		9.4	***		7.84	***	
Adj R square	0.050			0.051			0.006			0.006		
Max VIF	1.86			2.24			1.86			2.24		

In the Inst_Absv model, there are more significant coefficients when indicator variables are added, the event of insider trading. Indicator variables, ITBUYd, ITSELLd, and ITBUYd*dda, influence the change of an intercept, and the amount of insider buying in firms with dda, ITBUYv*dda, decreases the absolute total trading amount of institutional investors as in For_Absv.

Panel B of *Table 5* provides the test results of buying or selling patterns of institutional traders, directing net trading patterns or absolute total trading patterns by institutions. The event of insider buying and selling influences buying and selling amounts of institutional traders which lead to direct absolute total amounts by institutional traders. ITBUYd with dda promotes Inst_Sellv and increases the absolute total trading amount of institutions, Inst_Absv. ITBUYv with dda are prone to decrease Inst_Sellv, which declining Inst_Absv at the significance of 10 percent. This indicates that decreased selling of institutional investors is bigger than increased Inst_Buyv. As in For_Absv model, this result infers that insider buying with dda limit to selling of institutional traders, while ITBUYv with dda increases Inst_Buyv and Inst_Netv. Following insider buying in firms with dda, institutional investors show trading patterns consistent with this study's prediction for insiders' buying signal with informativeness.

In summary, this study predicts that trading patterns of informed traders are followed by informative insider trading, and unimportant insider trading causes opposite or insignificant trading patterns by informed traders against insider trading. This paper finds that insider trading is likely to influence stock trading patterns of informed traders, institutional investors and foreign traders. This result suggests that the event and the amount of some insider trading provide informativeness to informed traders.

Table 4 (continued)

Panel B. Buy and Sell Trading

Variables (*N* = 33,908)	For_Buyv						For_Sellv					
	Coeff.	White *t*		Coeff.	White *t*		Coeff.	White *t*		Coeff.	White *t*	
Intercept	0.020	0.9		0.021	0.9		0.017	0.7		0.017	0.8	
ITBUYd	–	–		−0.018	−1.6		–	–		−0.012	−1.6	
ITSELLd	–	–		0.036	1.6		–	–		0.059	2.4	**
ITBUYv	−0.004	−0.3		0.005	0.3		0.001	0.1		0.007	0.6	
ITSELLv	0.017	0.8		−0.013	−0.5		0.019	0.4		−0.033	−0.8	
dda	0.003	1.0		0.003	0.8		0.004	1.3		0.004	1.3	
dbm	−0.003	−1.1		−0.003	−1.0		−0.002	−0.5		−0.002	−0.5	
*ITBUYd*dda*	–	–		0.031	1.6		–	–		0.014	0.6	
*ITBUYd*dbm*	–	–		−0.020	−0.9		–	–		−0.001	−0.1	
*ITSELLd*dda*	–	–		−0.002	−0.1		–	–		−0.065	−1.8	*
*ITSELLd*dbm*	–	–		−0.020	−0.7		–	–		−0.029	−0.8	
*ITBUYv*dda*	−0.155	−2.9	***	−0.172	−3.1	***	−0.168	−2.9	***	−0.175	−2.8	***
*ITBUYv*dbm*	−0.030	−1.2		−0.021	−0.9		−0.039	−1.5		−0.038	−1.5	
*ITSELLv*dda*	0.047	1.4		0.045	1.2		0.182	2.8	***	0.243	3.6	***
*ITSELLv*dbm*	0.047	0.9		0.057	1.1		−0.063	−1.1		−0.041	−0.7	
priorv	−0.023	−2.0	**	−0.023	−2.0	**	0.103	5.0	***	0.103	5.0	***
SIZE	−0.001	−0.7		−0.001	−0.8		0.000	−0.4		0.000	−0.4	
ROA	−0.010	−0.4		−0.010	−0.4		−0.003	−0.1		−0.003	−0.1	
CFO	0.035	1.7	*	0.035	1.7	*	0.020	1.0		0.020	1.0	
LEV	0.016	2.4	**	0.016	2.4	**	0.017	2.4	**	0.017	2.4	**
GRW	−0.005	−0.9		−0.005	−0.9		−0.005	−0.9		−0.005	−0.9	
IND/YEAR	Included			Included			Included			Included		
F-value	4.80	***		4.11	***		33.61	***		27.24	***	
Adj R square	0.003			0.003			0.023			0.023		
Max VIF	1.86			2.24			1.86			2.24		

Source: built by the author based on data from KIS-VALUE, FnGuide, DART system.

Notes: ***, **, and * represent significant levels at the 1, 5, and 10 percent levels, respectively.

Definitions of variables are in *Table 4* Panel A.

For_Netv indicates that the change ratio of net trading amount scaled by market value is measured by the change of net stock trading amount by foreign traders in between the previous month and the next month of insider trading. As of *For_Netv*, *For_Absv*, *Inst_Netv*, and *Inst_Absv* represent the change ratio of absolute total stock trading amount by foreign traders, net and absolute total trading amount by institutional investors, respectively. *For_Buyv* indicates that the change ratio of trading amount scaled by market value is measured by the change of stock purchase amount by foreign traders in between the previous month and the next month of insider trading. As of *For_Netv*, For_Buyv, *For_Sellv*, *Inst_Buyv*, and *Inst_Sellv* denote the change ratio of stock selling amount by foreign traders, stock buying and selling amount by institutional investors, respectively. *ITBUYd* and *ITSELLd* are 1 if a firm has insider buying and insider selling in each month, respectively, and 0 otherwise. *ITBUYv* and *ITSELLv* denote the natural log value of monthly insider buying and insider selling amount. *dda* is 1 if a firm has high discretionary accruals in the previous year and each industry and 0 otherwise. *dbm* is 1 if a firm has a low book to market value in the prior year and each industry and 0 otherwise. *priorv* denotes the net of foreign and institutional trading amount scaled by market value in the previous month. *SIZE* is the natural log of the beginning total assets. *ROA* is net income scaled by total assets at the beginning. *CFO* is the operating cash flow scaled by the beginning total assets. *LEV* is the leverage ratio from total debt scaled by the beginning total assets. *GRW* denotes the beginning asset changes scaled by prior assets. *IND/YEAR* is dummies representing each industry and year.

There is further evidence that this phenomenon is more intensified when firms experience information uncertainty through low book-to-market ratios and high earnings management.

5. CONCLUSION

This study examines how insider trading influences the trading pattern of foreign and institutional investors. H.E. Leland [1] shows analytical analyses that insider

Table 5

Informed Traders and Insider Trading — Institutional Traders

Panel A. Net and Absolute total Trading

Variables (*N* = 33,908)	Inst_Netv						Inst_Absv					
	Coeff.	White *t*		Coeff.	White *t*		Coeff.	White *t*		Coeff.	White *t*	
Intercept	0.003	0.1		0.003	0.1		−0.06	−1.3		−0.054	−1.2	
ITBUYd	–	–		0.006	0.7		–	–		−0.055	−3.1	***
ITSELLd	–	–		0.002	0.1		–	–		0.117	2.3	**
ITBUYv	0.001	0.1		−0.002	−0.3		−0.04	−1.8	*	−0.014	−0.9	
ITSELLv	−0.054	−1.2		−0.057	−1.1		0.07	0.8		−0.032	−0.4	
dda	0.002	0.5		0.002	0.6		0.01	1.6		0.010	1.4	
dbm	−0.002	−0.6		−0.002	−0.7		−0.01	−1.6		−0.009	−1.6	
*ITBUYd*dda*	–	–		−0.011	−0.5		–	–		0.061	2.0	**
*ITBUYd*dbm*	–	–		0.026	1.2		–	–		−0.038	−1.1	
*ITSELLd*dda*	–	–		−0.049	−0.8		–	–		0.046	0.5	
*ITSELLd*dbm*	–	–		−0.023	−0.4		–	–		0.000	0.0	
*ITBUYv*dda*	0.105	2.7	***	0.111	2.6	***	−0.01	−0.3		−0.038	−1.8	*
*ITBUYv*dbm*	0.012	0.7		0.000	0.0		0.02	0.6		0.034	1.4	
*ITSELLv*dda*	0.078	1.4		0.131	2.0	**	−0.02	−0.2		−0.083	−0.7	
*ITSELLv*dbm*	−0.026	−0.3		0.012	0.1		0.01	0.1		−0.053	−0.4	
priorv	−0.295	−6.0	***	−0.295	−6.0	***	0.07	2.4	**	0.072	2.4	**
SIZE	0.000	−0.1		0.000	−0.1		0.00	1.2		0.002	1.2	
ROA	−0.009	−0.5		−0.009	−0.5		−0.02	−0.4		−0.016	−0.4	
CFO	0.033	1.7	*	0.033	1.7	*	0.08	1.7	*	0.080	1.7	*
LEV	−0.001	−0.1		−0.001	−0.1		0.04	2.6	**	0.039	2.6	***
GRW	−0.003	−0.4		−0.003	−0.4		−0.02	−1.4		−0.015	−1.4	
IND/YEAR	Included			Included			Included			Included		
F-value	218.6	***		175.0	***		5.9	***		5.4	***	
Adj R square	0.134			0.133			0.004			0.004		
Max VIF	1.86			2.24			1.86			2.24		

trading is likely to reduce investment from outsiders when outsiders only have the current stock price information and firms do not issue any new shares. Since insiders will recognize their corporate performance precisely and participate in the stock market, outsiders will invest less to avoid unfairness. However, H.E. Leland [1] also shows that insider trading reveals new and useful information, reducing the investment risk of outsiders. This may influence informed traders to choose investment decisions more than uninformed traders. In the real market, institutional traders and foreign traders are major investors and they are considered as informed investors who are able to gather more precise information.

This study also employs the corporate information environment through the level of discretionary accruals and book-to-market ratios because it is deemed to be proxies for investment risk of stock trading. After controlling for firm-specific factors, this study provides evidence that the event and the amount of insider trading affect foreign and institutional trading patterns. Furthermore, this study finds that the relation between informed trading and insider trading is more enhanced when firms face a high level of discretionary accruals and a low book-to-market ratio. This study helps policymakers to understand the result of corporate insider trading in firms with earnings management and book-to-market ratio on informed trading patterns. Since informed traders are likely to reflect a bad aspect of insider trading and respond to a good aspect of insider trading, different regulations may be appropriate to firms with a great portion of informed traders.

Following prior literature, this study also provides additional evidence of the relation between insider trading with investment risk and informed trading patterns. This study also helps practitioners in the capital market to understand insider trading related to investment risk. Future studies may examine the effect of various characteristics of investment risk with insider trading and informed trading activities in detail.

Table 5 (continued)

Panel B. Buy and Sell Trading

Variables (*N* = 33,908)	Inst_Buyv						Inst_Sellv					
	Coeff.	White *t*		Coeff.	White *t*		Coeff.	White *t*		Coeff.	White *t*	
Intercept	−0.028	−1.1		−0.03	−1.0		−0.037	−1.5		−0.035	−1.5	
ITBUYd	–	–		−0.02	−2.9	***	–	–		−0.030	−2.7	***
ITSELLd	–	–		0.06	1.9	*	–	–		0.062	2.2	**
ITBUYv	−0.019	−1.7	*	−0.01	−1.0		−0.021	−1.6		−0.006	−0.6	
ITSELLv	0.007	0.2		−0.04	−0.9		0.055	1.2		0.003	0.1	
dda	0.006	1.4		0.01	1.3		0.005	1.3		0.004	1.1	
dbm	−0.006	−1.6		−0.01	−1.6		−0.003	−1.1		−0.003	−1.0	
*ITBUYd*dda*	–	–		0.02	1.4		–	–		0.035	1.8	*
*ITBUYd*dbm*	–	–		0.00	−0.2		–	–		−0.031	−1.6	
*ITSELLd*dda*	–	–		0.01	0.2		–	–		0.028	0.4	
*ITSELLd*dbm*	–	–		−0.01	−0.2		–	–		0.008	0.1	
*ITBUYv*dda*	0.048	2.2	**	0.04	1.7	**	−0.057	−2.3	**	−0.074	−3.0	***
*ITBUYv*dbm*	0.015	0.8		0.02	1.1		0.004	0.2		0.017	1.2	
*ITSELLv*dda*	0.035	0.7		0.02	0.3		−0.052	−0.8		−0.091	−1.2	
*ITSELLv*dbm*	−0.002	0.0		−0.02	−0.2		0.027	0.4		−0.017	−0.2	
priorv	−0.110	−3.1	***	−0.11	−3.1	***	0.181	9.0	***	0.181	9.0	***
SIZE	0.001	1.0		0.00	1.0		0.001	1.5		0.001	1.4	
ROA	−0.013	−0.6		−0.01	−0.6		−0.003	−0.1		−0.003	−0.1	
CFO	0.056	2.1	**	0.06	2.1	**	0.024	1.0		0.024	1.0	
LEV	0.019	2.2	**	0.02	2.3	**	0.019	2.4	**	0.020	2.5	**
GRW	−0.009	−1.3		−0.01	−1.3		−0.007	−1.1		−0.007	−1.1	
IND/YEAR	Included			Included			Included			Included		
F-value	24.29	***		19.84	***		72.89	***		59.17	***	
Adj R square	0.016			0.016			0.048			0.049		
Max VIF	1.86			2.24			1.86			2.24		

Source: built by the author based on data from KIS-VALUE, FnGuide, DART system.

Notes: ···, ··, and · represent significant levels at the 1, 5, and 10 percent levels, respectively.

Definitions of variables are in *Table 4* Panel A.

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Industry-Level Stock Returns Response to COVID-19 News

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ABSTRACT

The COVID-19 pandemic has impacted the stock markets of many countries. Understanding the impact of this pandemic on industries is an important and **relevant** basis for a thorough explanation of stock market movements during this period. The **aim** of this study is to examine how stock returns of non-financial sectors in Vietnam's stock market react to information about the COVID-19 pandemic. The event study **method** is applied to analyze three main events related to the emergence and outbreak of this pandemic in Vietnam in 2020. The first event (January 23, 2020) and the second event (March 6, 2020), respectively, were the time when Vietnam officially announced that it had recorded the first case positive for COVID-19 in the Hochiminh city and Hanoi. The third event is on March 30, 2020, Vietnam announced that it will apply a blockade order in all provinces and cities nationwide to limit the outbreak of this pandemic. Closing price data from January 1, 2019 to April 14, 2020 for five industry indexes (Basic Materials, Consumer Goods, Consumer Services, Industry and Utilities), used in this study. The **results** show that the stock prices of all five sectors reacted in the same meaningful direction (negative/positive) after the event that Vietnam confirmed the first patient confirmed with COVID-19 in Hochiminh city and the nationwide blockade event was announced, proving that the stock market is affected by psychology. In industries, Industry and Consumer Services are the two sectors that respond the most to events, but Basic materials are the least affected. The study found that the Consumer Goods industry had the most positive results in the five industries for the following two events; The Utilities industry reacted negatively to the first information that could create potential risks of a COVID-19 outbreak in the community, especially in the two major economic centers of Vietnam. **Conclusions** from this study show that Vietnam's stock market is inefficient, research results and insights on industry responses to disease information contribute to strategic planning for policymakers and investors in the future.

Keywords: COVID-19; industry response; blockade; event study; signalling theory; behavioural finance; efficient market; Vietnam

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INTRODUCTION

Research on Pandemic Pasts [1] concludes that no infectious disease has yet to forcefully affect the stock market like the COVID-19 pandemic- 19. Current COVID-19 studies are mainly focused on China [2], the United States [3] and some developed countries [4, 5], however, for developing countries whose stock markets are ranked in emerging or frontier markets, the number publication is still few. In addition, a few recent studies on the impact of COVID-19 in undeveloped stock markets are prioritized for the financial sector [6] or the pharmaceutical industry [7], so the overall picture of the impact of the pandemic on industries in these markets is not yet available. Vietnam is a country that has most of its border with China — a country that was heavily affected by COVID-19 in early 2020, so it cannot avoid the negative impact of this pandemic. Affected by the COVID-19 pandemic, VNIndex fell –32.85% from the beginning of 2020 to 649.1 points on March 31, 2020. This is the lowest point of VNIndex since 2017. It can be seen that for unexpected events, psychological factors will influence the behavior of investors very strongly, and this is clearly reflected in price fluctuations in the stock market [2]. However, Vietnam is one of the few countries in the world with positive economic growth in 2020.[1] From this fact, it is very important to understand the short-term movements of stock prices by sectors regarding COVID-19 developments in Vietnam and motivates the author to carry out this study. Therefore, this article will

[1] World Bank. Taking Stock, July 2020: What Will Be the New Normal for Vietnam? The Economic Impact of COVID-19. Washington DC: World Bank; 2020. August. DOI: 10.1596/34268

focus on studying how the COVID-19 pandemic has impacted the short-term response of sectors on the Vietnamese stock market in the early period of 2020.

To measure the short-term impact at the industry level caused by the COVID-19 pandemic, the first two official announcements about the risk of disease outbreaks in Hochiminh city and Hanoi and the nationwide blockade order for the first time in Vietnam, is used to analyze the reaction of stock prices on the Vietnamese stock market. These three events will be used to survey five non-financial industries: Basic Materials, Consumer Goods, Consumer Services, Industry and Utilities. The industry's response to each announcement is measured by cumulative extraordinary returns based on the event research methodology. The industry's response to each announcement is measured by cumulative abnormal returns based on the event research methodology. The results from the study are expected to suggest investors, corporate managers and policy makers to make better decisions in the future.

LITERATURE REVIEW

The efficient market theory states that a market is said to be efficient when stock price movements are random, stock returns are unpredictable, so the set of returns is stocks over time tend to follow a normal distribution. Based on a theoretical review and empirical studies [8], shows that the adjustment of stock prices in the market is classified based on three levels of information as weak form, semi-strong form and strong form. All historical information is reflected in stock prices that are characteristic of weak-form efficient markets. Stock prices reflect both historical information and all publicly available information, which is characteristic of the semi-strong form. Compared with the semi-strong form, in the strong form, the amount of information reflected in the stock price is supplemented with information that investors have obtained through exclusive access. Therefore, a market is said to be efficient (strong form) when stock prices in the market already reflect all information [8], so that investors will not be able to obtain an abnormal return based on this information [9]. In other words, the behavior of investors according to the efficient market theory is economic people and they always act rationally.

Behavioral finance theory: A study of decisions in uncertain situations [10, 11] has shown that decisions are not entirely "economic people" as in efficient market theory whose decisions are influenced by psychological bias. Behavioral finance theory implicitly assumes that the information structure and characteristics of market participants influence investor decisions [12]. Therefore, this theory is often used to explain the existence of abnormal returns in financial markets [13].

Signaling theory, first applied to employment decisions in the labor market [14], has been used to explain information asymmetry in many real-life situations. economics [15]. This theory was quickly applied to explain the decisions of stock investors in the financial markets [16], especially when combined with the event research method [17]. When an unexpected event occurs, the investor — the recipient of the information — interprets the impact of these events. As a result, investor behavior will be reflected in trading results in the stock market [18]. Using the event study method [19] points out that legal scandals related to top managers have been published that have caused the share prices of this company and other companies in the same industry to fall sharply. It implies that investors interpreted the event as an industry-wide risk signal rather than merely corporate risk directly related to the event. Information related to public health [18] argues that the signal theory that can explain events about the COVID-19 pandemic has increased the risk for both companies in the sector. financial and non-financial sectors. This is evident by the stock-specific risk-return relationship being positive in the results of [18]. In other words [18] would like to emphasize that during the pandemic, rising stock prices are a signal that reflects the expectation that the performance of these companies will also increase.

IMPACT OF COVID-19 ON INDUSTRY IN SOME COUNTRIES

Basic materials industry: The impact of COVID-19 on the Basic Materials industry has been realized in several countries such as China [2], New Zealand [4]; Turkey [5]; United States [3] and Vietnam [20] but the results are not quite the same. Using the event study method, the results of studies in a number of countries have shown that the stock prices of the Basic materials industry react to information related to the COVID 19 outbreak [2, 4, 5]. The closure of Wuhan on January 23, 2020 and the WHO warning about COVID-19 as a global pandemic had a negative impact on the Basic Materials industry on the

Chinese stock market, respectively [2] and the Turkish stock market [5]. Following news that New Zealand announced a blockade to prevent the development of COVID-19 in the community [4] indicates that the profit of the Basic Materials industry is alternating between increases and decreases. This shows the fluctuation of investor sentiment towards this event. Using Google search volume to measure investors' attention to information related to COVID-19 [3] found that as investors increased focus on COVID-19 and/or an increase in COVID-19 cases will negatively impact the industry. In addition, the more sources reporting on COVID-19, the more negative impact on the profits of the Basic Materials industry, conversely, the more the word "Panic" is mentioned in the news, the more impact it will have on the bottom line. positively on the profitability of this industry [21].

Consumer Service Industry: Research on the United States stock market [22] show that both the event including the shutdown of Wuhan and the event that China confirmed this pneumonia of unknown cause can be transmitted from person to person, both neutral impact on the Consumer Services industry. But the share price of this industry fell sharply on the event that Italy announced the blockade on February 23, 2020 [22]. Further investigating sub-sectors in Turkey [5] pointed out that the Wholesale-Retail and Sports-Entertainment industries both showed negative cumulative abnormal returns around the day WHO warned COVID-19 was a global pandemic, in which, Sports-Entertainment and recreation is the more affected sub-sector. Similar to [2, 5] using the New Zealand Stock Exchange COVID-19 event study method also shows that the cumulative abnormal returns of the Sports-Entertainment sector are negative for the window (–10; 0), but is positive for the Wholesale-Retail industry. Travel and direct clothing retail are likely to remain negatively impacted until the COVID-19 pandemic is contained, while online retailers (like Amazon) will benefit during the pandemic [23].

Consumer Goods Industry: Using the dependent variable as return of the Consumer Goods industry, five days after the COVID-19 lockdown as five dummy variables and some other control variables in the regression equation [4] shows that the regression coefficients of the dummy variables are statistically significant. In which, day t = 1; 3 after the lockdown is greater than zero, otherwise, the regression coefficient at day t = 2; 4; 5 is less than zero. This result implies that the news that the lockdown in New Zealand due to COVID-19 has affected the return of the Consumer Goods industry and the impact is alternating between positive and negative. Research with many different events [24] shows that cumulative abnormal returns for stocks of food manufacturing companies were negative only when Vietnam announced the detection of the first patient infected with the virus. COVID-19 but this sector's stock reacted positively to the next events. In the US, google search volume for COVID-19 positively impacted the Consumer Goods industry profits at event date in both the single model and the model using the number of new infections as the control variable [3]. However, [3] shows that the first difference in google search volume for COVID-19 negatively affects the return of this industry for both the model with or without the control variable. Consumer Goods sub-sector study [23] shows that the return of durable household goods in the United States is negatively impacted by the COVID-19 crisis even when under control macro variables. Measuring the impact of COVID-19 by analyzing more than 19,000 global news sources chronologically [21] shows that the Consumer Goods industry responds positively to gossip related to the panic about COVID-19.

Industrials: Gossips expressing fear over COVID-19 positively impact industry returns [21], conversely, daily changes in search volume on google related to COVID-19 (daily new infections controlled) positive impact on industry return [3]. Using the same event study method [2, 5] indicates that events related to COVID-19 have all impacted the share price of the Industry. [5] shows that Industry's cumulative abnormal return fell the most on +/– 5 days around the day WHO declared COVID-19 a pandemic — and then the force from this announcement wanes. Using the Wuhan closure date (January 23, 2020) as the event date [2] shows that the industry abnormal returns are less affected at the event date, the cumulative abnormal return is positive for event windows (–30.0); (–20;0); (–10;0); (0;20); (0;30). This result shows that both before and after the Wuhan closure event, a positive impact on China Industry stock returns. Using industry characteristics as the control variable [4] shows that 3/5 days after New Zealand's lockdown has a significant impact on industry return. Specifically, day 1 and day 4 have a positive impact, on the contrary, day 2 has a positive impact on the return of the industry. Different from studies showing the direct impact of

the COVID-19 pandemic on the Industry [23] points out that businesses related to production equipment, machinery and electronic equipment suffer indirect effects from COVID-19. Therefore, these industries will only recover when the macro economy recovers, not just the COVID-19 pandemic is under control [23].

Utilities Industry: The response of Utilities returns to the COVID-19 pandemic has been inconsistent. P. He, Y. Sun, Y. Zhang, T. Li [2] studies the response of industries to the COVID-19 event in China. The results showed that the Utilities sector was one of the industries with the strongest positive abnormal returns on the day of the event. However, the days before and after the event had no significant impact on the industry's abnormal returns. In contrast to [2], research by [3] shows that the return of the Utilities industry is negatively affected by the change in google search volume about the COVID-19 pandemic. Research by [4] shows the alternating positive and negative effects after the day New Zealand announced the blockade due to COVID-19. In addition, [21] shows an increase in the level of talk about the COVID-19 panic that positively impacts Utilities stock returns, but the proportion of sources about COVID-19 has a negative impact on the return of this industry. Studying the evolution of COVID-19 in the United States according to three events, [22] argue that the profit of the Utilities industry increased sharply with the event of Wuhan closure (Incubation phase) and China confirmed that COVID-19 can be transmitted through close contact (outbreak phase) because the customers of this industry are mainly domestic, not dependent on the global market. Moreover, the demand for their products is not affected much by the outbreak of disease [22]. However, as investors sold off stocks due to growing United States recession fears ahead of Italy's COVID-19 lockdown announcement (Fever phase), these stocks underperformed effectively [22].

Based on a review of previous studies, it can be seen that the impact of COVID-19 on the response of each industry is very different between countries. In addition, studies have mainly focused on a sub-discipline rather than a major one [2, 5, 20, 23] therefore, the impact of the pandemic on the whole industry has not been seen. It can be seen that using the results from these studies to apply to Vietnam is not feasible, so this article will investigate based on the five industry indexes — the composite index of all listed companies. listed in each of these industries — for research. The events selected by this article are guaranteed to follow closely with the COVID-19 outbreak situation in Vietnam, so the reality will be higher.

RESEARCH METHODS AND DATA

Research Methods

The event study method is often used to empirically test the relationship between stock prices and events. Based on the results of calculating abnormal returns, accumulating abnormal returns and performing tests to evaluate the impact of each event on stock price changes. Models used to calculate abnormal returns include: mean adjusted model; market adjusted model; and market model [25, 26]. The mean adjusted model assumes that a security's interest rate, risk premium, and risk are constant over time. Therefore, the abnormal return is calculated as the difference between the actual return of a security and the estimate from historical data, often with large deviations when the market volatility occurs on the day of the event [27]. The market adjusted model, which assumes that previously expected returns are the same for all securities [26] has shown its limitation when it comes to calculating abnormal returns. The market model is the most commonly used model in event studies. The advantage of this model is the abnormal return has a smaller variance than the raw return. This makes statistical tests more robust [28] and more predictive [29]. Therefore, this study will use a market model to calculate abnormal returns.

Calculate raw return

$$.r_{it} = \ln \frac{(P_{i,t} + D_{i,t})}{P_{i,t-1}} \quad (1)$$

Similar to [2, 6, 28, 29], this paper uses the market model to calculate the normal rate of return.

$$R_{i,t} = \alpha_{i,t} + \beta_i R_{m,t} \quad (2)$$

Calculate the average abnormal return as the difference between the raw return and the normal return.

$$AR_{i,t} = r_{i,t} - (\alpha_{i,t} + \beta_i R_{m,t}) \quad (3)$$

Calculate the cumulative abnormal return in the event window $(t_1; t_2)$ as the total abnormal return of between t_1 and t_2.

$$CAR_{i(t_1,t_2)} = \sum_{t=t_1}^{t_2} AR_{i,t} \quad (4)$$

In which:

$P_{i,t}$; $P_{i,t-1}$ is the daily closing price of stock i at day t and day (t – 1); $D_{i,t}$ is the dividend of stock i on the ex-dividend date t.

.$r_{i,t}$ is the crude return of stock i at day t, and is taken as the logarithm of the sum of $P_{i,t}$ and $D_{i,t}$ relative to $P_{i,t-1}$.

.α_i; β_i, is the coefficient of freedom and the coefficient of regression from equation (2), respectively; Rm, t is the market rate of return.

$AR_{i,t}$ is the average abnormal return of stock i at day t. $CAR_i(t_1; t_2)$ is the cumulative abnormal return of stock i in the event window from t_1 to t_2.

Events and event windows: VNIndex has had many trading days with sharp declines in 2020, especially in Q1. At the end of the first quarter of 2020, VNIndex closed at 662.26 points, down –31.5% compared to 966.67 points as the closing price on January 2, 2020. The days that VNIndex dropped the most in 2020 included: –3.27% (the biggest drop in January 2020); –6.48% (March 9, 2020); –6.27% (March 23, 2020) and –5.45% (July 27, 2020). When compared with the developments in the fight against COVID-19 in Vietnam, the days when the VNIndex dropped sharply were all related to infections in the community, which led to the outbreak of this disease (*Table 1*).

This article will use three events related to the emergence and outbreak of COVID-19 in Vietnam in early 2020 and examine its impact on share prices of five sectors in the stock market. After the WHO in China reported cases of pneumonia of unknown cause detected in Wuhan city[2] [31], on January 23, 2020, Vietnam recorded the first case positive for this disease in Hochiminh city[3] [32]. Because January 23, 2020 is the 29th day of the Lunar New Year, coinciding with the longest holiday of the year for Vietnamese people, the event date for the first event is used as the first trading day after the Lunar New Year holiday. The second event was the time when Vietnam recorded the first patient infected with COVID-19 in Hanoi on March 6, 2020.[4] The third event was on March 30, 2020, Vietnam announced a 15-day blockade order in all provinces and cities nationwide to prevent the outbreak of COVID-19.[5] The blockade event in Danang city showed little impact on Vietnam's stock market [6], so this article does not present the results of this event on stock prices of all sectors.

Event windows: To be able to compare the impact of each event on the stock market sectors, event windows are used that range from 5 days before each event to the event date and from the event date to 10 days after each event.

Data:

VNIndex is used as the general index of Vietnam stock market. The data sample is the daily closing price of VNIndex and industry indexes collected from January 2, 2019 to April 14, 2020. In which, the estimated time is the daily transaction data for one year before the event occurs. Five industries are used index of five industries including Basic Materials; Consumer Goods; Consumer Services; Industry; Utilities. The full daily frequency industry index calculated by FiinPro (http://fiinpro.com/) is used in this article. VNIndex's daily closing price is collected at https://www.bloomberg.com/quote/VNINDEX:IND

RESULTS AND DISCUSSION

The results from the three events are presented in *Tables 2, 3, 4*. For each event, interpretation and discussion of the results are shared in this section.

Event on January 23, 2020:

Information about the first COVID-19 infection in Vietnam announced before the Lunar New Year holiday has been reflected in the days after this holiday. Of the five studied industries, there are two industries that achieved abnormal returns

[2] World Health Organization -WHO. Novel Coronavirus (2019-nCoV): SITUATION REPORT 1. 2020:1–5. ULR: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1–2019-ncov.pdf (accessed on 05.6.2021).

[3] Nhandan. Ho Chi Minh City strives to maintain role as Vietnam's economic engine. 2020. URL: https://en.nhandan.vn/business/item/9185402-ho-chi-minh-city-strives-to-maintain-role-as-vietnam%E 2%80%99s-economic-engine.html (accessed on 05.6.2021).

[4] Dung T. VN confirms 17th COVID-19 infection case, first in Ha Noi. 2020. ULR: http://news.chinhphu.vn/Home/VN-confirms-17th-COVID 19-infection-case-first-in-Ha-Noi/20203/39076.vgp (accessed on 05.6.2021).

[5] Quynh N.X., Uyen N.D.T. Vietnam Orders 15-day Nationwide Isolation from April 1. 2020. URL: https://www.bloomberg.com/news/articles/2020–03–31/vietnam-orders-15-day-nationwide-isolation-from-april-1 (accessed on 05.06.2021).

Table 1

Statistics of VNIndex's decrease related to COVID-19 events in Vietnam

Events	Description	VNIndex
January 23, 2020 (29 Lunar New Year)	The first patient infected with COVID-19 was recorded in Vietnam	On January 30, 2020, the first day after the Lunar New Year holiday, VNIndex – 3.27%, the strongest decrease in January
March 6, 2020	The first patient infected with COVID-19 was recorded at Truc Bach street – Hanoi	On March 9, 2020, VNIndex decreased –6.48%
March 30, 2020	Vietnam announced a nationwide 15-day lockdown due to COVID-19	On March 23, 2020, VNIndex decreased –6.27%
July 26, 2020	Danang City announced a blockade order due to COVID-19	On July 27, 2020, VNIndex fell –5.45%

Source: compiled by the author.

significantly greater than zero at day $t = 0$ and $t = 1$, namely Basic Materials (AR[0] = 1.3%) and Utilities (AR[1] = 1.4%), respectively. However, the cumulative abnormal returns [0; t] with $t \geqslant 3$ of all five industries are significantly less than zero. The largest cumulative abnormal returns after the first event date of the industries are: Consumer services (CAR[0;3] = –9.1%); Industry (CAR[0;4] = –6.3%); Consumer goods (CAR[0;4] = –6.1%); Basic Materials (CAR[0;3] = 4.9%) and Utilities (CAR[0;4] = –3.9%).

After Vietnam recorded the first case of COVID-19, the stock price of the Basic Materials industry with negative cumulative abnormal returns was similar to the reaction of the Oil and Gas industry [20]. Unlike [20] the abnormal return of the Basic Materials industry is significantly positive at the event date, while the Oil and Gas industry is not. This difference may be because the Basic Materials industry is mainly affected by COVID-19, while the Oil and Gas industry is under the double impact of both the COVID-19 epidemic and the negative impact of world oil prices. Since the market capitalization of Food-Beverage companies accounts for about 90% of the total market capitalization of the Consumer Goods industry, the cumulative abnormal return of Food-Beverage companies [24] negative is the main reason for the abnormal return of the Consumer Goods industry to be negative. The initial reaction of the shares of Basic Materials and Utilities was positive but quickly fell more sharply in the following days, similar to the reaction of the rest of the sectors, showed the herd behavior of investors. They are strongly influenced by psychological factors. Results from the first event of industries support the prospect theory in behavioral finance by [11].

Event on March 6, 2020:

The reaction of industry stocks to the news that Hanoi recorded the first case of COVID-19 infection on March 6, 2020, had different divergences. All 16 recovered COVID-19 patients in Vietnam announced in the 3rd week of February 2020 could be the explanation for the accumulated abnormal profits of the Consumer Services and Industry sectors. are all significantly positive prior to the second event date. At the event date, only the abnormal returns of Consumer Services industry are –1.3% statistically significant. It shows that the Consumer Services sector has reacted very quickly to this new information compared to the rest. After the event date, except for the cumulative abnormal profit of the Basic Materials industry which is not statistically significant, the Consumer Goods industry has CAR[0;4] = +1.7%, the remaining three industries accumulated abnormal returns are negative. The fact that stock prices reacted in opposite directions before and after the events of March 6, 2020 is reflected in the cumulative abnormal return for the Consumer Services industry (CAR[–2;0] = +2.3% vs. CAR[0; 5] = –6.7%) and Industry (CAR[–4; 0] = +4.5% vs. CAR[0; 7] = –7.4%) showed relevant information COVID-19 has a rapid and strong impact on these two industries. Signals from published information can be interpreted by investors based on their understanding of the disease that has been reported by the media. The disease caused by COVID-19 is a new disease without a vaccine (at the beginning of 2020), which can lead to death and is easily transmitted in the community between people

Table 2

Results of abnormal return (AR) and cumulative abnormal return (CAR) for the event on January 23, 2020

	Event on January 23, 2020				
AR	**Basic Materials**	**Consumer Goods**	**Consumer Services**	**Industrials**	**Utilities**
−5	−0.002	−0.001	−0.007	−0.001	-0.006
−4	0.001	−0.005	0.005	−0.009*	-0.010
−3	0.001	−0.001	0.000	−0.001	-0.007
−2	0.007	0.002	−0.001	0.002	0.001
−1	0.003	−0.001	0.002	−0.004	0.007
0	0.013*	−0.003	−0.003	−0.002	0.002
1	−0.005	−0.014***	−0.024***	−0.004	0.014**
2	−0.020**	−0.018***	−0.03***4	−0.008	-0.021***
3	−0.024***	−0.011***	−0.033	−0.035***	-0.021***
4	0.004	−0.017***	0.005	−0.017***	-0.011
5	−0.001	0.000	0.002	0.019***	0.003
6	0.018**	−0.001	0.001	0.001	0.020***
7	−0.009	0.014***	0.013**	0.003	0.001
8	0.002	0.001	−0.014**	0.001	0.013**
9	−0.005	−0.005	0.002	0.000	-0.008
10	0.001	0.001	0.004	0.013**	0.004
CAR	**Basic Materials**	**Consumer Goods**	**Consumer Services**	**Industrials**	**Utilities**
[−5;0]	0.009	−0.006	−0.002	−0.012	-0.014
[−4;0]	0.011	−0.005	0.005	−0.012	-0.009
[−3;0]	0.011	0.000	0.000	−0.003	0.002
[−2;0]	0.010	0.001	0.001	−0.002	0.008
[0;2]	−0.024**	−0.033***	−0.058***	−0.012	-0.007
[0;3]	−0.049***	−0.043***	−0.091***	−0.046***	-0.028**
[0;4]	−0.044***	−0.061***	−0.086***	−0.063***	-0.039***
[0;5]	−0.045***	−0.060***	−0.084***	−0.044***	-0.036**
[0;6]	−0.027	−0.061***	−0.082***	−0.042***	-0.016
[0;7]	−0.036*	−0.048***	−0.069***	−0.039***	-0.015
[0;8]	−0.034	−0.047***	−0.083***	−0.038***	-0.002
[0;9]	−0.039*	−0.052***	−0.082***	−0.038**	-0.009
[0;10]	−0.038	−0.051***	−0.078***	−0.025	-0.005

Source: authors' calculations.

Table 3

Results of abnormal return (AR) and cumulative abnormal return (CAR) for the event on March 6, 2020

	Event on March 6, 2020				
AR	**Basic Materials**	**Consumer Goods**	**Consumer Services**	**Industrials**	**Utilities**
−5	0.000	0.013***	−0.001	−0.005	−0.007
−4	0.001	0.006	−0.013*	0.008	0.019***
−3	0.008	0.000	0.000	0.018***	−0.002
−2	0.000	−0.002	0.012*	0.010*	−0.010
−1	−0.004	0.002	0.011*	0.010*	−0.003
0	−0.002	−0.001	−0.013*	0.001	−0.005
1	−0.005	−0.005	−0.016**	−0.032***	0.006
2	0.016**	0.011**	−0.003	0.002	−0.022***
3	−0.006	0.006	0.022***	0.004	−0.010
4	0.002	0.006	0.018***	−0.020***	0.004
5	0.001	−0.012***	−0.008	−0.028***	−0.009
6	0.012	0.010**	0.002	0.001	0.038***
7	0.011	−0.010**	0.006	−0.001	0.006
8	0.001	−0.006	0.009	0.016***	−0.014*
9	−0.007	−0.017***	−0.013*	−0.011**	0.002
10	−0.011	0.014***	0.035***	0.005	0.039***
CAR	**Basic Materials**	**Consumer Goods**	**Consumer Services**	**Industrials**	**Utilities**
[−5; 0]	0.006	−0.008	0.009	0.040***	−0.003
[−4; 0]	0.006	0.005	0.011	0.045***	0.004
[−3; 0]	0.004	−0.001	0.023**	0.037***	−0.015
[−2; 0]	−0.004	−0.001	0.023**	0.019**	−0.013
[0; 2]	0.010	0.005	−0.019**	−0.030***	−0.016
[0; 3]	0.005	0.011	−0.041***	−0.026***	−0.026**
[0; 4]	0.007	0.017*	−0.059***	−0.045***	−0.022
[0; 5]	0.008	0.005	−0.067***	−0.073***	−0.031*
[0; 6]	0.020	0.016	−0.065***	−0.072***	0.007
[0; 7]	0.031	0.005	−0.059***	−0.074***	0.014
[0; 8]	0.032	0.000	−0.051***	−0.058***	0.000
[0; 9]	0.025	−0.017	−0.063	−0.069***	0.002
[0; 10]	0.014	−0.003	−0.028	−0.065***	0.041*

Source: authors' calculations.

Table 4

Results of abnormal return (AR) and cumulative abnormal return (CAR) for the event on March 30, 2020

	Event on March 30, 2020				
AR	**Basic Materials**	**Consumer Goods**	**Consumer Services**	**Industrials**	**Utilities**
−5	−0.001	−0.006	−0.011	−0.012*	0.007
−4	0.007	0.014***	0.001	0.006	0.025***
−3	−0.014*	0.000	−0.008	0.002	−0.009
−2	−0.029***	0.007	−0.019***	−0.013*	−0.014*
−1	−0.014*	0.004	−0.019***	−0.006	−0.003
0	0.020***	0.004	0.013**	−0.004	0.008
1	0.011	−0.002	0.002	0.003	−0.006
2	−0.003	0.001	−0.003	0.004	−0.006
3	−0.007	0.002	0.000	−0.004	0.003
4	−0.002	0.004	−0.010	0.008	−0.003
5	−0.009	0.014***	0.004	0.003	−0.010
6	−0.001	0.004	−0.004	0.000	0.004
7	0.003	−0.002	0.003	0.012*	0.020***
8	0.015**	0.002	0.027***	0.013*	0.002
9	0.004	−0.010**	0.032***	0.011*	0.000
10	0.020***	0.010**	−0.013**	−0.004	−0.009
CAR	**Basic Materials**	**Consumer Goods**	**Consumer Services**	**Industrials**	**Utilities**
[−5; 0]	−0.051***	0.020*	−0.055***	−0.023	0.006
[−4; 0]	−0.050***	0.026***	−0.044***	−0.011	−0.002
[−3; 0]	−0.057***	0.012	−0.045***	−0.017	−0.026**
[−2; 0]	−0.043***	0.011*	−0.037***	−0.018*	−0.017
[0; 2]	0.008	0.000	−0.001	0.007	−0.013
[0; 3]	0.001	0.002	0.000	0.003	−0.010
[0; 4]	−0.001	0.006	−0.011	0.011	−0.013
[0; 5]	−0.009	0.020*	−0.007	0.014	−0.023
[0; 6]	−0.010	0.023**	−0.012	0.015	−0.019
[0; 7]	−0.008	0.022*	−0.008	0.026	0.001
[0; 8]	0.008	0.023*	0.019	0.039**	0.002
[0; 9]	0.011	0.014	0.052**	0.050**	0.002
[0; 10]	0.031	0.023	0.038*	0.046**	−0.007

Source: authors' calculations.

through close contact. In Vietnam, consumer-related services are mainly provided directly at stores, workers of the processing industry are often concentrated in production with high density, so public information about the case of COVID-19 infection implies the health risks and economic losses that are present if there is contagion in these industries. The results from the second event support the signal theory.

Event on March 30, 2020:

On March 30, 2020, Vietnam announced a nationwide blockade order due to COVID-19 starting from the first day of April 2020. Abnormal returns of all five industries are significant before the event date (*Table 4*), of which only the abnormal return of the Consumer Goods industry is positive (CAR[−5;0] = +2.0%; CAR[−4; 0] = +2.6%; CAR[−2; 0] = +1.1%) has shown the excessive anxiety of stock investors when the provinces and cities detected positive cases of COVID-19. It can be seen that the negative economic impact on businesses related to the COVID-19 outbreak is reflected much more slowly than the response of investor sentiment. Therefore, this result supports prospect theory. Two out of five industries had significant abnormal returns at the event date: Basic Materials (AR[0] = +2.0%) and Consumer Services (AR[0] = +1.3%). Ten trading days after the event date, the cumulative abnormal returns of the Basic Materials industry and the Utilities industry are not statistically significant. This result is different from [2] on the Chinese stock market. P. He, Y. Sun, Y. Zhang, T. Li [2] shows that the cumulative abnormal returns of the Basic Materials industry (mining) are all negative with the event windows (before the event, at the event and after the event). Different from the cumulative abnormal returns that alternately increase and decrease after the event date for sectors on the New Zealand stock market [4], the cumulative abnormal returns of the three industries include Consumer Goods, Consumer Services and Industry on Vietnam's stock market were all meaningful positives after the event day. In which, the largest cumulative abnormal return of the Consumer Goods industry is CAR[0; 6] = CAR[0; 8] = +2.3%), the Consumer Services industry is CAR[0; 9] = +5.2% and Industry is CAR[0; 9] = 5%. The positive reaction after the event showed an increase in confidence of stock investors in the government's blockade measures. The implication from this result supports prospect theory and signal theory.

CONCLUSIONS AND IMPLICATIONS

Conclusions

The purpose of this article is to examine the reaction of stock returns across sectors in the stock market to the first news about COVID-19 outbreaks in Vietnam. Accumulated abnormal returns in the event research methodology are used to measure industry responses to individual events. The first COVID-19 patients were recorded in Hochiminh City and Hanoi, and the announcement of the nationwide blockade were the three events considered for five non-financial industries. These sectors include Basic Materials, Consumer Goods, Consumer Services, Industry and Utilities. Research results show that all five industries reacted negatively after the event that Hochiminh city recorded the first patient infected with COVID-19 and responded positively after the nationwide blockade order was announced supporting the behavioral finance theory. The reaction between industries has clearly diverged to the information that Hanoi recorded the first case of infection (the second event) and before the time when Vietnam applied the nationwide blockade order, which can be explained by the theory signal. In general, across industries, the Basic Materials industry is the least affected, the two sectors that react the most (negatively/positively) to the events are Industry and Consumer Services. This result is reasonable because investors infer based on their general understanding that the industry in Vietnam is mainly the light industry, and consumer services are mainly provided in stores. Therefore, these are the two industries that are strongly affected by the characteristics of COVID-19 that are highly contagious between people in close contact. The difference of this study compared to previous studies is the response of the Consumer Goods and Utilities industry. The Utilities sector is not the best performer of all the industries as the results from previous studies show that the industry reacts negatively to two events -in terms of infections first recorded in Hochiminh city and Hanoi. It shows concern about possible damage from production disruptions in Vietnam's two major economic centers to the Utilities industry. Except for the first event, the Consumer Goods sector had the most positive results of all industries with the other two events.

Implications

The study provided a snapshot of the overall industry response to the first events of COVID-19 and the individual industry's response to each subsequent event. The existence of abnormal returns of industries related to events shows that Vietnam's stock market is not efficient. Therefore, the results from this study add to the set of decision criteria of investors to exploit the anomalies in the Vietnamese stock market. For regulators and policymakers, understanding industry responses to outbreak-related contingencies will help them be more proactive and prepare appropriately for similar events in the future.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

This study provides insights into the stock price reactions of sectors on the Vietnam stock market, compares and contrasts stock price reactions across sectors through events affecting public health. However, the dataset currently mainly focuses on companies listed on the stock market, which shows the limitation of the study. Therefore, future research directions can overcome this limitation by using the data of the whole company in each industry or expanding the research by industry at the level of countries.

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Fiscal Effects of Applying Initiative Budgeting Methodology in Public Finance

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ABSTRACT

The subject of the research is the methodology and practice of initiative budgeting (the Russian term for participatory budgeting) as applied to taxation. **The relevance** of the study is explained by the fact that the experience accumulated in Russia allows us to speak about the productivity of the initiative budgeting methodology in relation to other areas of public finance. The initiative budgeting methodology is part of a more general theory of citizens' participation in governance and budget decision-making, which is being formed in Russian and foreign studies. The article **aims** to study the emergence of fiscal effects of applying the methodology of initiative budgeting in public finance and to develop proposals on this basis aimed at finding reserves for increasing local budget revenues. To formulate conclusions and recommendations, the authors use **methods** such as content analysis of scientific publications on the development of participatory budgeting practices abroad and logical generalization. The study substantiates that one of the promising practices of initiative budgeting may be the participation of citizens in decision-making on the allocation of part of the expenditures of local budgets to co-finance projects of initiative budgeting. At the same time, additional positive effects appear in the form of increased motivation for collection and an overall increase in the volume of local taxes and fees. Thus, there is a productive integration of the initiative budgeting methodology and tax policy at the local level. The authors propose possible strategies for introducing an initiative budgeting experiment in Russian regions. The authors **conclude** that the initiative budgeting methodology allows creating ways to motivate local governments and citizens to increase local budget revenues. There is a **prospect** of expanding the scope of application of initiative budgeting tools to solve the financial problems of municipalities.

Keywords: participatory budgeting; initiative budgeting; taxation; tax collection; tax authorities; municipality

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INTRODUCTION

Initiative budgeting (hereinafter referred to as IB) is understood as a set of various practices that involve the direct participation of citizens in the definition and selection, as well as subsequent control over the implementation of selected projects financed from budget funds. Initiative budgeting refers to participatory practices associated with giving citizens real power in terms of decision-making in the field of public finances. Initiative budgeting is considered a tool to improve the efficiency of budget spending [1]. This is "one of the most successful forms of public participation in the budget process, through which close interaction between authorities and citizens is carried out in those issues that have traditionally been considered the prerogative of the former" [2].

The methodology of initiative budgeting is a theory about involving the population in solving territorial issues by determining the directions for spending budget funds. Abroad, it is better known as the methodology of participatory budgeting (hereinafter referred to as PB). The specified methodology assumes the possibility of participation of the population in the distribution of a certain share of the expenditure part of the budget, which is formed, among other things, at the expense of taxes paid. Thus, people participate in the distribution of their own funds, which have acquired the status

of public finance. This circumstance led us to the assumption that the very fact of the participation of individuals in supporting the adoption of budget decisions can be a motivating factor for paying taxes.

LITERATURE REVIEW

The first wave of interest in the fiscal effects of participatory budgeting was sparked by data from Latin America that showed a positive relationship between citizen participation in the budget process and tax collection. A comparative study by Y. Cabannes, which analyzes the activities of 25 municipalities in Latin America and Europe, reveals a significant decrease in the level of tax offenses after the launch of the PB [3]. The author writes that the PB practice led to an increase in tax revenues and a decrease in arrears. In Campinas, Recife and Cuenca, tax revenues have risen significantly in a few years; in Porto Alegre, property tax debt has been reduced from 20% to 15%, and in less than a decade, property tax revenue has grown from 6% to nearly 12% of the municipality's total revenue. The change in tax habits of citizens is due to the fact that citizens see specific results of budget spending. The author of the study cites the following quotation from the staff of the municipality of Puerto Asi, explaining the reasons for the change in behavior: "The community, having learned about the budgetary and financial situation of the municipality, begins to understand its budgetary constraints. Then, faced with a lack of resources for the implementation of their projects, the community decides to cooperate with representatives of the municipality, invests its funds or materials, seeking not only to increase the number of available resources but also to expand the initially approved architecture" [3]. The joint budget stimulated and revived traditional teamwork at the community level. Another financial impact to be considered is the reduction in the operating costs of such projects. This has been especially important in the conflict-torn municipalities of Colombia, where participatory budgeting has restored destroyed infrastructure — bridges, roads, irrigation facilities, wells that local residents can maintain and protect themselves. Positive results of the impact of the direct participation of citizens in making budget decisions on tax collection have also been identified in Switzerland [4].

Researchers A. Schneider and M. Baquero found that PB led to a significant increase in tax revenues in the municipality of Porto Alegre, which is considered the pioneer and birthplace of participatory budgeting [5].

In another study, Y. Zamboni compares the effectiveness of Brazilian municipalities that have and have not implemented PB: the study confirmed a significant relationship between PB implementation and increased tax revenues [6].

Of interest is the study of fiscal effects published in May 2019. It analyzes the results of an online survey covering 50 countries [7]. The survey revealed that the tax culture of citizens is significantly higher in those countries where: a) significant efforts are being made to combat corruption; b) citizens have the opportunity to express their wishes to the government on budget expenditures. This pattern was confirmed by a large sample of 65,000 respondents from different countries. Residents across countries were more likely to report greater tax compliance when they were given the opportunity to voice their preferences for government spending. Of all the positive effects of participatory budgeting identified by researchers, including an increase in public investment in low-income communities, the activation of non-profit organizations, an increase in voter turnout, and an increase in tax collection are of particular importance, as this leads to an increase in the overall aggregate budget, which can later be used to meet public needs. Thus, the direct participation of citizens in budget decisions has become a practical solution to some of the key problems that various cities and territories face. According to the authors, governments that implement mechanisms of civic participation, invest in democratic accountability and legitimacy, receive dividends in the form of tax revenues [8].

Existing studies contain a lot of evidence of how the participation of citizens in direct decision-making practices affects the quality of relations between the state and civil society. Significant experience has been accumulated abroad in the participation of citizens in solving issues related to the conduct of communities, cities and regions through various tax practices that enable residents to independently determine, within a given corridor, what taxes to pay and in what amount. The analysis of this experience seems appropriate for understanding and possible application in Russian practice.

THE PRACTICE OF INITIATIVE BUDGETING AS A WAY OF MOTIVATION TO INCREASE BUDGET REVENUES OF THE TERRITORIES

The practice of initiative budgeting is understood as a number of procedures for organizing the participation of citizens in budget decision-making, defined in a special manner and enshrined in regulatory and methodological documentation. If within the framework of practice, the decisions made by society are final and subject to mandatory execution by the authorities, citizens have real powers to spend budget funds. When implementing regional practices of initiative budgeting, funds are attracted from regional, and in some cases, federal budgets, and are implemented on the territory of two or more municipalities. Funds from local budgets are attracted to implement municipal practices; they are localized within the same municipality.

A project of initiative budgeting is understood as a project proposed by a resident (residents) of the municipality, in the form and in the manner prescribed by the practice of initiative budgeting, implemented, among other things, on the terms of co-financing from the regional budget and to the budget of the municipality, at the expense of off-budget funds (funds of individuals and legal entities), as well as part of the taxes paid by citizens to the local budget, aimed at resolving issues of local importance through the implementation of work and (or) the provision of services, the result of which will be high-quality and (or) quantitative changes in the public infrastructure of the municipality. Thanks to initiative budgeting projects, municipalities have additional opportunities to improve social infrastructure facilities and a new quality of services. However, an initiative budgeting project becomes possible only when a mechanism is created to motivate citizens to participate through procedures that are perceived as fair: when citizens are given the opportunity to put forward those projects that are aimed at solving problems that concern them, when citizens, after discussions with their participation, make decisions on the nomination of projects, when citizens participate in competitive procedures for the selection and subsequent implementation of projects, including through co-financing, but, most importantly, when the procedures are open and public control is exercised over the implementation of projects.

1. Promotion of ideas by citizens.

Initiative budgeting requires citizens to come up with ideas as a precondition. The ideas of the project do not come down from "above", but are put forward by the citizens. Each project idea is a problem that citizens can solve at the expense of budgetary funds. Initially, general rules and conceptual boundaries for the promotion of projects are established (description of the project and ways to solve the problem, deadlines, budget, technical feasibility).

2. Discussion of ideas by citizens.

Discussion is the most important procedure of initiative budgeting, based on the citizens' discussion of which project is the most priority for the municipality. It is the citizens who determine which project should receive funding or participate in a competitive selection if any is expected in practice. During such discussions, local communities develop a common language, interaction between themselves and with government officials. The latter, in turn, attend the meetings as experts and consultants, not project lobbyists. It is participation in citizens' meetings and the experience of direct communication with citizens that lead to an increase in trust in the authorities and an increase in the level of satisfaction with their work. In some initiative budgeting practices, there is no discussion stage and only voting determines the choice of citizens. The simplification of the initiative budgeting procedure by the organizers does not allow the full potential of this social technology to be used.

3. Selection of projects by citizens.

Based on the results of the discussion, citizens participate in the project selection procedure. To a lesser extent, such participation is present in the formalized competitive selection. The selection criteria are known in advance and, having formed an application for participation in the selection, the participants of the initiative group of citizens and the administration can assess the chances of winning in advance. The presence of transparent procedures and clear criteria can significantly reduce subjectivity in the selection of projects by the competition commission. Increasingly, voting on the basis of digital platforms, including using the blockchain, penetrates into the practice of choosing initiative budgeting projects. Such decisions reinforce the

legitimacy of the selection of projects since it is almost impossible to interfere in it from the outside and falsify the data. However, the voting verification procedure is still relevant.

4. Participation of citizens in the implementation of projects.

Unlike one-time projects to involve citizens in creating a comfortable urban environment, initiative budgeting involves regular, annual implementation. Project selection procedures are timed in such a way as to correspond to the stages of the budgeting process. In this case, the implementation of the project is carried out in the next budget year after the selection by the project. At the same time, in Russia, there are widely represented practices for the implementation of initiative budgeting, which allow the implementation of projects within one calendar year within the budget allocations for their implementation. Citizens participate in the implementation of initiative budgeting through initiative payments, as well as their own labor participation.

5. Open nature of procedures and accountability of the authorities.

The openness of participation procedures and public reporting on implemented projects allows maintaining interest in the practice, informing about the progress of implementation of initiatives chosen by citizens, and attracting new participants through the opportunity to see completed projects.

Foreign literature describes various ways to finance joint projects. The most common option is the distribution of funds from the state and municipal budgets. In addition, funding for civic participation practices comes from investment funds (for example, funds founded by city council members in New York and Chicago), trust funds (Portugal), social development funds (in most Latin American countries).

Mexico has a non-trivial experience in PB fundraising. In 2014, the government of this Latin American country introduced a royalty tax applicable to all mining concession holders in the country. The proceeds went to a special Fund for Sustainable Regional Development of the Mining States and Municipalities (the so-called Subsoil Fund), which was distributed among the communities of cities and villages in the mining zone. The funds received were directed to their economic development and the growth of the quality of life of the citizens living in them at the expense of state investment programs. The main goal of the Subsoil Fund is to redistribute tax revenues from mining companies in favor of municipalities in the development zone by financing social infrastructure projects that have a positive impact on residents, the environment and the sustainable development of mining regions. Initially, the Regulations on the Fund did not provide for a mechanism for considering the opinions of citizens when choosing investment projects for state funding. The municipality of Cananea, Sonora, has launched an experimental participatory budgeting practice aimed at (a) increasing the transparency of the use of funds allocated to the municipalities of the mining regions, (b) involving citizens in the decision-making process on the choice of public investments carried out by the Fund [9].

Thus, there is reason to believe that initiative budgeting has a significant potential for increasing local budget revenues by motivating citizens to pay taxes, participating in the definition of projects for which part of the taxes paid is directed.

PARTICIPATION OF TAXPAYERS IN SOLVING ISSUES OF LOCAL IMPORTANCE

Abroad, voluntary participation in the formation of budget revenues through the voluntary payment or non-payment of relevant taxes is a rare practice. In most cases, taxation systems are structured in such a way that they leave no room for voluntarism and flexibility, are universal for all, and involve sanctions for tax evasion. However, in a number of cases, there is a "democracy of the taxpayer". In this regard, it makes sense to turn to various tax mechanisms from foreign experience, which give citizens the opportunity to independently determine how to form a certain segment of the budget revenue.

In Japan, since 2008, there has been a practice of paying local taxes to the budgets of other municipalities: the Furusato Tax program[1] is being implemented, which allows residents to decide for themselves where part of their tax payments will go. The mission of the program is to enable taxpayers to support the municipalities of their choice, to stimulate the devel-

[1] Furusato Tax. URL: www.furusato-tax.jp (accessed on 20.11.2020).

opment of small municipalities with modest budgets. Citizens who have left their native places can thus transfer part of their taxes to another locality in Japan by paying the "hometown tax" (Furusato nozei). Donations are deductible from personal income tax and other local taxes.[2] There is an upper limit on the amount of the donation depending on the amount of taxable income. In return, local residents send gifts from a special catalog to taxpayers from other regions for their tax payments.[3] Another important incentive for paying voluntary donations is the possibility of obtaining a tax deduction. With the exception of the first 2,000 yen, the value of donations may be deducted from income tax and residence tax liabilities. To avoid abuse, there are upper limits on such donations based on a person's income. The maximum amount of the tax deduction is determined by the income and property tax paid for the previous year. After making the payment, the person must keep the check and then use it when filling out the tax return.

In addition to directing funds to individual municipalities, the taxpayer can also choose the development programs that he wants to support specifically, for example, in the field of ecology, development of local tourism, childcare, etc.

The topic of tax transparency and accountability, participation of citizens in taxation has long been given close attention by governments of different countries and heads of international organizations. Such interest is explained by the search for factors that can increase tax collection and increase tax revenues. This process becomes particularly important at the municipal level.

Some authors note how the relative level of participation of citizens positively affects their behavior related to taxation [10]. At the same time, citizens' observance of tax laws is only partly rational. People pay taxes not only because the costs of not paying taxes exceed the tax payments themselves, but also because they perceive them as part of an ethical contract with the state. Accordingly, the more fair the government is in the eyes of citizens and the more accountable the authorities, the higher the willingness of taxpayers to fulfill their tax obligations.

In foreign literature, the concept of "tax morality" is used to describe and study this phenomenon [11]. In the Russian language, it is not so common and is often replaced by the concept of "tax discipline", however, such a translation is not accurate and loses an important semantic connotation. "Discipline" is the obligatory subordination of all members of the team to the established order, rules. "Morality" is the rules of ethical life. Tax morality, in contrast to tax discipline, is strongly associated with citizens' assessment of the actions of state bodies. If the work of the authorities is assessed as transparent, accountable, democratic, then citizens, in turn, are more willing to bear their moral obligations.

The most common strategies of the tax authorities usually include tougher penalties for tax evasion, the introduction of administrative measures to encourage compliance with laws. However, the implementation of such measures can be very costly and therefore inefficient. In countries with a high level of corruption, many citizens and firms are often skeptical about taxation, seeing it as a tool for unfairly withdrawing part of their personal income. This situation can lead to a vicious circle: large segments of the population do not receive adequate public services and are deprived of the opportunity to hold public authorities accountable. If the government fails to provide much-needed public services, then its legitimacy is questioned and citizens resort to deliberate tax evasion. In such a situation, governments are unable to collect the necessary tax revenues and improve the delivery of public services, which entails a new round of frustration in the work of governments. The result is growing distrust, a downward spiral in tax payments, and poor quality of public services. Thus, the introduction of programs for the participation of citizens in decision-making, the creation of motivation to pay taxes, and an increase in fiscal transparency can serve as an engine for systemic changes in the country's public finances.

From the point of view of increasing the tax motivation of citizens, the experience of those practices of participatory budgeting that are implemented exclusively at the expense of funds received from the payment of local taxes attracts attention. This approach was implemented, for

[2] Japan's rural tax scheme led to a small town bun fight. Can it be fixed? Apolitical. 14.12.2018. URL: https://apolitical.co/en/solution_article/japan-hometown-tax (accessed on 20.11.2020).

[3] Gifts for Furusato Nozei. URL: https://en.furumaru.jp/info/whats_tax.php (accessed on 20.11.2020).

example, in Italy until 2008. In 2008, the municipal tax on the first house owned was abolished, which undermined the financial independence of local governments, since in some cities up to 30% of the local budget was formed from paying this tax. After the abolition of this tax, many participatory budgeting practices were curtailed in the country [12]. In other countries where citizen participation in budget decision-making takes place at the local level, funds are also usually allocated from local budgets generated from local tax revenues.

A new stage in the development of participatory practices in Russia and the world is associated with the expansion of existing methodologies of involvement and the inclusion of information and communication technologies and Internet solutions in them. Electronic participation technologies have great potential in terms of facilitating and deepening participation processes at different levels of interaction between citizens and authorities [13].

These applications of information and communication technologies are not mutually exclusive. For example, technologies designed for collective public decision-making through electronic voting may include the functionality of dialogue platforms for forming citizens' preferences and discussing them, as well as consulting technologies for conflict resolution.

SUGGESTIONS FOR THE APPLICATION OF THE IB TOOL TO INCREASE LOCAL BUDGET REVENUES IN RUSSIA

Foreign studies show that on the territory of municipalities that regularly implement projects with the participation of citizens, tax discipline is increasing, and the collection of local taxes and fees is increasing. However, when applying the methodology of initiative budgeting, it is necessary to consider the presence of institutional restrictions on the mechanism for calculating and paying local taxes and fees. These include the delimitation of tax powers of local governments, established by the Tax Code of the Russian Federation, the delineation of tax revenues between the levels of the budget system, established by the Budget Code of the Russian Federation, as well as the low degree of involvement of tax authorities in supporting initiative budgeting projects [14].

Most of the taxes that form the tax revenues of the budget system of the Russian Federation, both in terms of quantity and volume of funds, are paid by organizations. These are taxes such as VAT, corporate income tax, mineral extraction tax and others. Citizens do not feel their involvement in these taxes. Contributions to the Pension Fund, Federal Compulsory Medical Insurance Fund, related to the employee's wages, are increasingly becoming the object of attention of citizens. Of course, the population is primarily interested in taxes for which it bears the tax burden: personal income tax, transport tax, personal property tax and land tax. Given that the transport tax is a source of the formation of regional budgets, for the purposes of this article, we will focus on a group of other taxes on individuals mentioned above, which are key to solving local problems. The financial well-being of municipalities and the possibility of creating modern infrastructure on their territory depend on the increase in the level of collection and increase in the receipts of these taxes.

The initiative budgeting methodology also allows creating the following ways to motivate local governments and citizens to increase local budget revenues:

1. Improving the visibility and convenience of presenting revenues and expenditures of local budgets. Illustration of a project of initiative budgeting in the system of expenditures of a specific local budget (budget of a municipal district, budget of an urban settlement, budget of a rural settlement, budget of an urban district, budget of an urban district with intracity division, budget of an intracity district, budgets of an intracity municipal formation of federal cities of Moscow, St. Petersburg and Sevastopol) and sources of budget revenues. It is expedient, in our opinion, a more detailed presentation of budget data in the context of the directions of spending money in the framework of initiative budgeting and the sources of their formation. Despite the achievements already made by the current Citizens Budget project, the way information is presented often requires knowledge of economics. The vast majority of citizens are not interested in dry information about budget classification codes, sources of financing the budget deficit, planned and executed expenditures in the context of municipal programs.

2. An effective tool for involving citizens in the tax-legal field, whose economic activity is to provide paid services to individuals and organizations without the involvement of employees, is the mechanism of taxation of professional income through a mobile application. While digital technologies are an effective tool for facilitating tax payments, tax compliance is also important for the legalization of citizens' incomes. The possibilities of identifying self-employed citizens who do not pay taxes are much higher at the level of a particular municipality than at the level of a constituent entity of the Federation. In this regard, we consider it appropriate to transfer part of the income from professional income tax (PIT) to the level of local budgets and at the same time grant taxpayers the right to voluntarily redirect part of the amounts of PIT payable to the budget of the municipality for the implementation of a specific project of initiative budgeting may be of interest to local authorities in identifying potential taxpayers.

3. As a development of the Japanese idea described above on the payment of local taxes to the budgets of other municipalities, it is possible to introduce an incentive mechanism for offsetting the amounts allocated for the implementation of the initiative budgeting project against payable taxes, primarily personal property tax and land tax. This will also make it possible to strengthen public control over the spending of funds within the framework of initiative budgeting without additional costs from the state. According to the Budget Code of the Russian Federation, the transfer of part of the tax paid from one local budget to another at the request of the taxpayer is not allowed. This circumstance hinders the development of initiative budgeting, considering the fact that the place of residence of an individual or the implementation of his activities may not coincide with the boundaries of the municipality in which the initiative budgeting project is being implemented. Personal income tax is paid at the place of work (including through a tax agent), personal property tax and land tax — at the location of the property. In this regard, we believe that the introduction of amendments to the budget and tax legislation in terms of expanding the rights of taxpayers when deciding whether to direct their tax payments to the relevant project will contribute to the development of initiative budgeting. In order to avoid an imbalance in local budgets, it is advisable to limit this right by setting the maximum amount of taxable wages and the deadline for the taxpayer to submit a notification of his decision no later than the deadlines for approving the planned indicators of the relevant local budgets.

SUGGESTIONS FOR THE PRACTICE OF PARTICIPATION OF TAXPAYERS IN IB PROJECTS

From the whole range of possible procedures for civic participation, one should choose those that will ensure the optimal implementation of the selection and discussion of initiative budgeting projects. Unfortunately, there is no ready-made and tested mechanism of public participation in the tax sphere in Russia and abroad.

The proposed approach to the development of an IB implementation procedure differs from those used in that it provides for a number of mandatory actions at the level of the municipality, the responsible regional executive authority and the territorial bodies of the Federal Tax Service. Due to the innovative nature of the IB practice, such a procedure should provide for more detailed procedures for the participation of citizens, a greater amount of information and educational support at all stages of the implementation of the practice. The experimental nature of field testing, among other things, should include an exploratory component.

The procedure for introducing the practice of participation of taxpayers in the distribution of taxes credited to local budgets for the implementation of initiative budgeting projects consists of three components.

The first component is the procedure for the actions of the territorial bodies of the Federal Tax Service to implement a pilot experiment on the territory of the selected constituent entities of the Russian Federation. This order must include:

a) a description of the procedure for the taxpayer to choose an initiative budgeting project co-financed by him at the expense of part of the income from local taxes and fees, from federal and regional taxes and fees credited to local budgets;

b) determining the procedure for the transfer by the Federal Tax Service of a part of local taxes and fees and a part of federal and regional taxes and fees credited to local budgets for the implementation of initiative budgeting projects;

c) a description of a public campaign to inform citizens about the experiment being conducted in the constituent entities of the Federation, its goals and objectives, as well as the possibilities of civic participation;

d) a description of the method of informing taxpayers by the territorial bodies of the Federal Tax Service (FTS) about the local taxes and fees paid by them and part of the federal and regional taxes and fees credited to local budgets;

e) a description of the method of integrating the digital IB platform (if used) and taxpayer accounts on the FTS website;

f) conducting an annual analysis of the practice of citizens' participation in the distribution of part of the income from local taxes and fees, from federal and regional taxes and fees credited to local budgets, for the implementation of initiative budgeting projects.

The second component is the procedure for the actions of state authorities of a constituent entity of the Russian Federation to ensure the participation of citizens in the distribution of part of the income from local taxes and fees, from federal and regional taxes and fees credited to local budgets, for the implementation of initiative budgeting projects. This order must include:

a) a description of the decision of the regional executive authority on the allocation of part of the budget of the constituent entity of the Russian Federation to finance initiative budgetary activities, in accordance with which projects selected by citizens are co-financed from part of the income from local taxes and fees, from federal and regional taxes and fees credited to local budgets for the implementation of initiative budgeting projects;

b) identifying channels and methods for conducting an information campaign on the possibility of spending part of the taxes paid under initiative budgeting projects in the territory of a constituent entity of the Russian Federation;

c) determining the participation of citizens through a digital platform created to discuss initiative budgeting projects, to decide which projects will be co-financed from part of the taxes paid, as well as to include projects in the list of projects elected by citizens;

d) a description of the procedure for the competitive selection of projects put forward by citizens in municipalities and providing for the expenditure of part of the income from local taxes and fees, from federal and regional taxes and fees credited to local budgets;

e) determining the procedure for transferring funds from the budgets of the constituent entities of the Federation to special accounts in local governments;

f) description of the procedure for the implementation of initiative projects within the framework of this practice;

g) informing about the results of the introduction of this practice of initiative budgeting;

h) ways to evaluate the results of economic and social effects from the implementation of this practice;

i) providing advice to practice.

The third component is the procedure for the implementation of initiative budgeting projects by municipalities. This order must include:

a) the decision of the representative body of local self-government to establish a part of local taxes and fees paid by citizens for their co-financing of initiative budgeting projects;

b) determining the specifics (on the basis of federal legislation) of holding meetings, gatherings, conferences of citizens to discuss initiative projects in order to decide which projects are subject to co-financing from the part of taxes paid and included in the list of projects elected by citizens;

c) posting information about selected projects on the website of the administration of the municipality and providing information for websites of public services and personal accounts of taxpayers;

d) features of the choice by taxpayers of projects for which they direct part of the taxes they pay;

e) nomination of the project (projects) that received the greatest financial support from the taxes of citizens in the municipality, for participation in the competitive selection of projects in the constituent entity of the Russian Federation;

f) a description of the procedure for the operation of the competition commission for the selection of projects put forward by citizens, considering the redistribution of taxes paid by them;

g) conclusion of an agreement on the allocation of additional subsidies to the municipality for the implementation of the project;

h) transfer of part of the funds from the payment of local taxes by citizens to a separate sub-account of the project to the bank account of local governments;

i) auctions;

j) project implementation;

k) an information campaign based on the results of the implementation of initiative budgeting projects in municipalities and a constituent entity of the Russian Federation;

l) a public report on the volume and expenditure of funds for the implementation of projects.

As general recommendations regarding the procedure for financing initiative projects of citizens in the framework of the tax experiment, the following should be borne in mind:

a) the funds of municipalities and the funds of citizens are excluded from the co-financing of this type of projects as duplicating;

b) it is advisable to ensure the development of a single digital solution designed for the purposes of nomination, discussion and selection by citizens of the project for subsequent participation in the competitive selection

Guided by this approach, the responsible regional executive authorities in the constituent entities of the Russian Federation independently decide how to integrate the new IB practice into the ecosystem of participation that has developed in the region. Of course, today there can be no strict regulations for the implementation of IB within the framework of a tax experiment. The creation of such a regulation is precisely one of the tasks of pilot testing organized in different regions, with different practices and unique experience in developing IB tools.

Possible strategies for deploying the experiment in the constituent entities of the Russian Federation may be as follows.

The "either-or" strategy involves integration into the existing regional IB model, where local governments, together with citizens, will voluntarily decide in what form of IB they will participate — traditional or involving co-financing projects redirecting taxes to projects.

The "both" strategy implies the possibility of parallel participation both in the traditional form of IB and in the tax experiment. A special case may be the situation when the municipality independently implements the practice of IB and at the same time decides to participate in a tax experiment at the regional level.

The "pilot zone" strategy involves the administrative definition of a territory or individual municipalities that will only have the opportunity to participate in an experimental form of IB. The advantage of such a strategy would be the ability to concentrate information, training and counseling opportunities.

The "parallel experiment" strategy assumes the possibility of participation in the tax experiment of municipalities with experience of successful participation in IB, with experience of participation without victories, as well as municipalities that previously did not have such an opportunity. This option meets the objectives of the study more than others, as it will allow to compare the experience of participation of different municipalities in the experimental IB model.

CONCLUSIONS

1. The participation of taxpayers in decision support suggests that IB tools can be used to motivate the population to pay taxes.

2. The results of scientific research show that the participation of citizens in the practices of IB has a positive effect on the quality of relations between the state and civil society. Of all the positive effects of participatory budgeting that have been documented by researchers, including increased public investment in low-income communities [15], activation of civil society [16], increased voter turnout,[4] improved public welfare and health [17], increased tax collection is of particular importance, because it leads to an increase in the total aggregate budget, which can then be used to meet public needs.

3. The IB methodology involves the presentation of ideas by citizens, their discussion, the selection of projects, the regularity of implementation, public reporting by the authorities.

4. Despite the fact that abroad the practice of voluntary participation of the population in the formation of budget revenues through the voluntary payment or non-payment of relevant taxes has not

[4] Participatory budgeting increases voter likelihood 7%. Participatory Budgeting Project. URL: https://www.participatorybudgeting.org/participatory-budgeting-increases-voter-turnout-7/ (accessed on 20.11.2020).

become widespread, nevertheless, there are certain mechanisms for the influence of taxpayers on the practice of ensuring IB, and they have shown their effectiveness.

5. The methodology of initiative budgeting makes it possible to create ways to motivate local governments and citizens to increase the volume of local budget revenues. In the Russian Federation, it is advisable to develop this methodology in the direction of increasing the visibility of budgets, attracting part of the income from taxation of the self-employed population to IB projects, and introducing a mechanism for offsetting expenses on IB projects against paid taxes.

6. The procedure for implementing the practice of participation of taxpayers in the distribution of taxes credited to local budgets for the implementation of IB projects should include such components as the procedure for the actions of tax authorities, public authorities, the procedure for implementing IB projects of municipalities.

7. The authors propose possible strategies for introducing the experiment in the constituent entities of the Russian Federation.

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Cognitive Model of the National Financial Market: Creating Process and Prospects for Assessing the Security of its Functioning

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ABSTRACT

The subject of the research is the Russian financial market. **The aim** of the study is to develop a cognitive model of the Russian financial market to assess the security of its functioning. **The relevance** of the study is due to the need to assess the reaction of the national financial market to various exogenous and endogenous stressors in the face of growing geopolitical tensions and the emergence of new artificial restrictions on the access of domestic investors to foreign sources of capital. The belonging of modern financial markets to complex adaptive systems consisting of elements and relationships, the formal description of the dynamics of which is very problematic, determines the advisability of using cognitive analysis and modeling **methods** in the process of assessing the safety of their functioning. **A feature** of the study is that when building a cognitive model of the national financial market, the author uses as the main elements not individual actors of the financial market, but macroeconomic aggregates that characterize the state of the financial market and the economy as a whole. The actor-network structure of the national financial market presented in this way makes it possible to consider the high degree of interpenetration of the financial and real sectors, which is characteristic of the modern economy. **The novelty** of the paper lies in the development of tools for analyzing the dynamics of the financial market as a result of constructing a methodological framework for studying the security of its functioning based on cognitive modeling. The developed cognitive model shows how the identified macro-aggregates change as a result of the spread of a positive or negative impulse, allowing to highlight the critical factors ensuring the sustainable functioning of the financial market. The author **concludes** that in the case of a balanced state of the considered macroeconomic aggregates, the existing hierarchical structure of the Russian financial market makes it possible to localize and neutralize crisis phenomena of an endogenous nature. At the same time, within the framework of the existing networks of the interaction of the financial market, exogenous stress impulses will intensify and lead to a violation of its effective performance of the function of capital circulation. **The practical significance** of the research results lies in the ability to determine the stabilizing processes and mechanisms operating in the economy as a whole and in the financial sector in particular, and in their absence, to identify the possibilities for their design that can increase the systemic security of the functioning of the country's financial market.

Keywords: financial market; cognitive modeling; security of financial market; cognitive model of the financial market; complex adaptive systems

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INTRODUCTION

Solving the problems of ensuring the safety of the functioning of complex systems of various nature becomes particularly relevant in the context of the emergence of new technologies, the complexity of relationships and organizational structures, etc. Currently, literally all aspects of socio-economic life are covered by processes of accelerating change and growing instability. The ongoing processes also largely affect the national financial market, raising the issue of relevant assessment methods and ways to ensure the safety of its functioning in the face of growing geopolitical tensions and the emergence of new artificial restrictions on the access of domestic investors to foreign sources of capital.

According to Yu. A. Danilova, O. V. Buklemishev [1], M. A. Eskindarov, V. V. Maslennikov, E. A. Zvonova [2], E. A. Loktionova [3], D. Baur, N. Schulze [4], and others the security of the financial market lies in the stable and efficient performance by the market of the functions of organizing the unhindered movement of capital, carried out at an acceptable level of transaction costs, contributing to the effective development of the national economy and ensuring the protection of the economic interests of the country at the international level. The theoretical and practical interest in the problem of ensuring the security of the functioning of national financial markets is largely due to the structural and functional changes taking place in the world economic system. The ongoing globalization of financial markets, the active development of the institutional structure of the global financial system and the emergence of new financial instruments not only act as drivers for the development of national financial markets but also create new threats to the security of their functioning.

W. Arthur [5], J. Foster [6], E. Solt [7], Yu. V. Lakhno [8], and others showed that being complex adaptive systems, financial markets are dynamic networks of interactions, the elements of which change their behavior in accordance with a micro-event or a set of events that initiate changes. Since, as proved by J. Foster [9], F. Hayek [10], J. Holland [11], C. Hooker [12], and others, understanding the behavior of individual elements of complex adaptive systems does not provide a complete understanding of the behavior of the entire system, and a formal description of the relationship between their elements is quite problematic, to assess the response of the financial market as a whole to various kinds of exogenous and endogenous stressors, it becomes appropriate to use the cognitive modeling technique.

Cognitive modeling is the process of modeling the behavior of complex systems in response to changes in the external environment, based on the identification of factors that quantitatively and qualitatively characterize the state of systems, and the analysis of existing cause-and-effect relationships [13]. The main tool for cognitive modeling is a cognitive map — a causal network, the vertices of which are the elements of the system or the main factors of the problem situation, and the arcs are the causal relationships between them [14]. Detailed information about the methodology of cognitive analysis and modeling, as well as about the features of the practical use of cognitive tools for solving problems of managing complex semi-structured socio-economic systems, can be found in [15–19].

Based on the general scheme for the implementation of cognitive analysis and modeling, presented in the work of V. I. Maksimov, E. K. Kornoushenko and S. V. Kachaev [20], the process of assessing the security of the functioning of the national financial market based on the constructed cognitive map can be represented as consisting of the following stages:

1. The choice of any exogenous or endogenous factor that is a stressor for the system under consideration.

2. Analysis of the movement of the impulse, which arose as a result of the action of the selected factor, along the logical chains of the cognitive map.

3. Identification of the process of attenuation or amplification of the negative impulse as it spreads along the logical chains of the cognitive map.

4. General assessment of the stability of the system to the selected stressor.

5. Development of recommendations for the construction of a cognitive scheme that contributes to the attenuation of the negative impulse and leveling its consequences.

6. Despite the development of the relevant theoretical and methodological tools, cognitive modeling as a method of studying financial markets is rarely use. Due to the need to consider a lot of factors that affect a complex system, the development and analysis of cognitive models are time-consuming processes. However, modern digital technologies make it possible to build multi-element cognitive maps and apply cognitive modeling in very complex socio-economic systems, where elements and their relationships are distinguishable, but a formal description of the relationships between system elements is problematic.

Meanwhile, the possibilities of using cognitive modeling to predict the influence of certain exogenous and endogenous factors on the dynamics of the financial market as a complex adaptive system determine the applicability of this approach to assessing the level of security of its functioning. Through a visual representation of the interrelations of the elements of the financial market, based on their theoretical understanding, the cognitive model makes it possible to identify both the processes leading to the strengthening of the destabilizing forces acting in the system, and the processes that contribute to the strengthening of the destabilizing forces as well as restoration processes of the dynamic balance of the system. A targeted impact on these processes within the framework of the implementation of the state economic policy can improve the systemic security of the functioning of the country's financial market.

COGNITIVE MAP OF THE RUSSIAN FINANCIAL MARKET

Cognitive modeling, like any modeling in general, begins with a simplification of the object of modeling by highlighting critical elements, factors and relationships, since the initial complexity and uncertainty of the interactions of all elements of the analyzed real system as an object cannot be transferred within the framework of the analysis. The adequacy of the constructed cognitive map and its compliance with the goals of modeling depend on the choice of factors, elements and networks of interaction between them, describing the process of functioning of the modeling object.

Cognitive modeling of processes occurring in financial markets is usually carried out by identifying individual subsystems of the financial market (banking market, insurance market, stock market, foreign exchange market, etc.) with their subsequent integration by formalizing the links between them [21, 22]. In our opinion, to solve certain problems, the use of this approach is justified and effective. However, in order to assess the security of modern financial markets operating in conditions of a high degree of interpenetration of the financial and real sectors, when determining the peaks of the future cognitive map, it is necessary to take into account both the features of the structural organization of the market and the features of its relationship with the real sector of the economy.[1]

[1] The need to develop a new approach to assessing the security of the functioning of financial markets, which is fundamentally different from the traditional one, in which an integral assessment of the level of its security is obtained as a result of "adding" the values of the level of security of its individual elements, is disclosed in the article: Loktionova E.A. Development of a methodology for assessing the security of the financial market based on the actor-network theory. Finance and credit. 2020;26(10):2268–2289.

According to Yu. A. Danilov, I. V. Larionova, B. B. Rubtsov, D. Yu. Fedotov and others, **the Russian financial market has the following features that determine its structural organization:**

1. Absence of dominant segments of the financial market that determine the dynamics of development of its other segments. Despite the fact that a number of indicators (the predominant share of bank deposits in the structure of household savings, a significant share of bank loans in the structure of borrowed capital of organizations, the performance by the Bank of Russia of the functions of a mega-regulator of the financial market, etc.) indicate the dominance of the banking sector in the Russian financial market, it cannot be said that the banking sector is the driver of its development [23].

2. The presence of strict control over the banking sector due to compliance with the International Standards of the Basel Committee on Banking Supervision, which prevents the flow of high-risk financial instruments through the banking sector to other segments of the financial market [24–26].

3. Lack of a developed market for innovative financial instruments that unites different segments of the financial market. In Russia, there is no exchange market for securitized derivatives, and the structure of OTC transactions is very different from the structure prevailing in other countries: about 80% of all transactions with derivative financial instruments in the domestic OTC market are transactions with swaps, 17% — transactions with forwards and only 3% — transactions with other instruments (options, interest rate agreements and swaptions) [27]. Since insurance, banking and investment capital are inseparable from each other in the world market as part of the creation and circulation of innovative financial instruments, the crisis, having originated in one segment, quickly passes through these financial instruments to other segments of the financial market. On the other hand, the lack of a developed market for innovative financial instruments means that market participants do not have modern tools for managing investment risks.

4. Insufficient intensity of the use of internal channels of long-term financing of the economy due to the current structure of savings of the population [28], the peculiarities of the interaction of companies in the real sector with the financial market [29], insufficient number of large institutional investors [30], high concentration of financial market participants and their reduction number [31, 32], etc. Thus, according to the National Association of Stock Market Participants (NAUFOR), the Central Bank of the Russian Federation and Rosstat, despite the great interest of private investors in individual investment accounts (IIA), the share of cash in the structure of household savings is about 25%.[2] The debt of legal entities on loans by the end of 2020 increased by 11% in annual terms, increasing the share of bank loans in the structure of borrowed capital of organizations.[3] At the end of 2020, the diversification of Russian financial market instruments is still insignificant (70% of the share market turnover was accounted for by the shares of the 10 most liquid issuers and was carried out through the 10 largest brokers); the concentration of assets of financial market participants continues to grow (80.9% of the assets of insurance companies account for the 20 largest insurers; 63.6% of the net assets of the Russian banking sector — for the 5 largest banks),[4] while the number of financial market participants is declining (from 2014 to 2021 The number of companies licensed to carry out brokerage, dealer, depository and securities management activities decreased from 1093 to 407, non-state pension funds — from 119 to

[2] Monetary incomes and expenditures of the population. URL: https://rosstat.gov.ru/compendium/document/13270 (accessed on 24.06.2021).

[3] Financial stability review. URL: http://www.cbr.ru/collection/collection/file/31582/ofs_20–2.pdf (accessed on 24.06.2021).

[4] Overview of the Russian financial sector and financial instruments. 2020. URL: http://www.cbr.ru/Collection/Collection/File/32168/overview_2020.pdf (accessed on 24.06.2021).

43, management companies — from 396 to 250, insurance companies — from 425 to 160, banks — from 834 to 366).[5]

Given the peculiarities of the structural organization of the Russian financial market and the nature of its interrelations with the real sector of the economy, in order to build a cognitive model that makes it possible to identify critical factors and mechanisms for ensuring its stability, it is necessary to single out macroaggregates that are backbone for the financial market and the national economy, the dynamics of which determines a process that ensures the internal and external balance of the economy, and the dynamics of the functioning of the real and financial sectors of the economy.

An analysis of the literature on the main trajectories of development of the real and financial sectors of the modern economy [33–35] made it possible to determine the following factors through which the interaction and interpenetration of the financial and industrial sectors occurs, which determines the stability, efficiency and security of the financial market:

- average rate of return on production capital;
- average rate of return on financial capital;
- the size of financial capital;
- cost of industrial capital;
- volume of the financial market.

The average rate of return on industrial capital determines the investment attractiveness of the real sector of the economy. Usually the average rate of return on industrial capital is not considered as a key factor in determining the level of security of the financial market. However, as R. Brenner showed, the dynamics of the average rate of return of industrial capital determines the dynamics of development and the security of the financial market in the long term [36]. In the case of a sufficiently high rate of return, the financial market actively implements its redistributive function, transforming financial capital into industrial capital and vice versa. These processes activate the development of the institutional environment of the financial market, making it more efficient and adequate to the modern requirements of market and production entities. In the event of a fall in the rate of profit on industrial capital, financial capital may "break away" from the real sector of the economy. In this case, the movement of financial capital is carried out mainly within the framework of the financial market, which leads to a significant discrepancy between the average profitability of financial and industrial capital, the formation of imbalances in the economy, and in time, to a financial crisis.

When analyzing the security of the functioning of the financial market, it should be taken into account that the factors of average profitability of financial and industrial capital are a kind of transmission mechanisms that, on the one hand, characterize the ongoing processes in the economy, being the result of all interactions in the economic system, and on the other hand, they are key drivers of ongoing change.

The rate of return on financial capital determines the level of investment activity in the financial market. The rate of return of industrial capital determines investment activity in the real sector of the economy, but indirectly through the activity of financial capital within the framework of the functioning of the financial market. Thus, the growth of the real sector of the economy is determined by the development of the financial market, but the growth of the financial market can be activated not due to the development of the real sector, but due to the inflow of such a part of financial capital as speculative capital.

Speculative capital is one of the main catalysts for the processes taking place in the financial sector: it accelerates both the growth of market activity and the development of crisis phenomena. According to M. Rothbard, speculative capital is not a factor in the formation of crises, but rather

[5] Overview of key indicators of professional participants in the securities market. URL: https://www.cbr.ru/analytics/rcb/review_rcb/#a_91271 (accessed on 24.06.2021).

a factor accelerating the process of smoothing disproportionate structures, while the source of the crisis is the monetary policy of the state [37]. If one can argue with the opinion of M. Rothbard on the stabilizing function of speculative capital, then it is obvious that speculative capital increases the liquidity of financial assets due to the presence of a pool of speculators who are ready to buy and sell transactions with financial assets not for the purpose of long-term investment, but for the purpose of earning on market fluctuations. As a result of increased market liquidity, the risks of investing in long-term assets are generally reduced, and investment activity is picking up. Thus, within the framework of the cognitive model of the financial market, speculative capital as a part of financial capital should be considered not as a purely negative factor underlying crisis processes, but as a factor that enhances the processes taking place on the market and, in certain situations, helps the financial system to come to a new state of equilibrium after the appearance of imbalances due to the implementation of various kinds of exogenous and endogenous events.

The inclusion of speculative capital in the cognitive model is associated with two difficulties. First, speculative capital is not separated from investment capital by any demarcation line. The speculative capital of an economic entity can easily be transformed into investment capital and vice versa as a result of a change in the economic situation. Secondly, speculative capital, by its nature, can be quickly withdrawn from circulation in the financial market [38], and, conversely, with a rapid increase in the profitability of financial assets within this financial market, speculative capital in huge amounts (compared to the capacity of the market itself or with the country's GDP) can be brought to the market.[6] In other words, within the framework of constructing a cognitive map, speculative capital should be considered as the most mobile and influential component of financial capital, the value of which depends on the volume of GDP and other macroeconomic indicators, the level of development of the infrastructure of the national financial market, the level of transaction costs, the degree of the feasibility of the possibility of inflow to the national financial foreign capital market and transfer of the capital of national investors to international trading platforms, etc.

One of the main functions of the financial market is to provide the real sector of the economy with industrial capital, which is a necessary condition for expanded reproduction. Acting as a source of growth in the capital-labor ratio and production capabilities of the economic system, industrial capital provides for the costs of R&D and the introduction of new technologies into production. Industrial capital, on the one hand, is a condition for innovative activity, and on the other hand, it is a conductor of the results of this activity in the economic system.

Within the framework of the cognitive map of the financial market, the size of industrial capital is a target factor. That is, through the relationships that exist within the financial system, it is possible to identify processes that increase and decrease the amount of industrial capital. However, industrial capital is embedded in the system of network connections of the formed cognitive map not only as a passive but also as an active factor (in the terminology of the actor-network theory — an actor) that influences the dynamics of development. the real sector of the economy, and hence, through the feedback system, and in the financial market. Unlike speculative capital, industrial capital is inherently more stable as a result of its attachment to the real processes of movement of goods, the provision of ser-

[6] An example of a rapid decrease in the volume of speculative capital is given by A. Tooze: as a result of the bankruptcy of a number of large banks in the process of the development of the financial crisis of 2007, there was a massive outflow of speculative capital. As a result, the financial markets of America and Europe experienced a significant shortage of liquidity, which was repaid by huge cash injections from the governments of countries affected by the crisis [38].

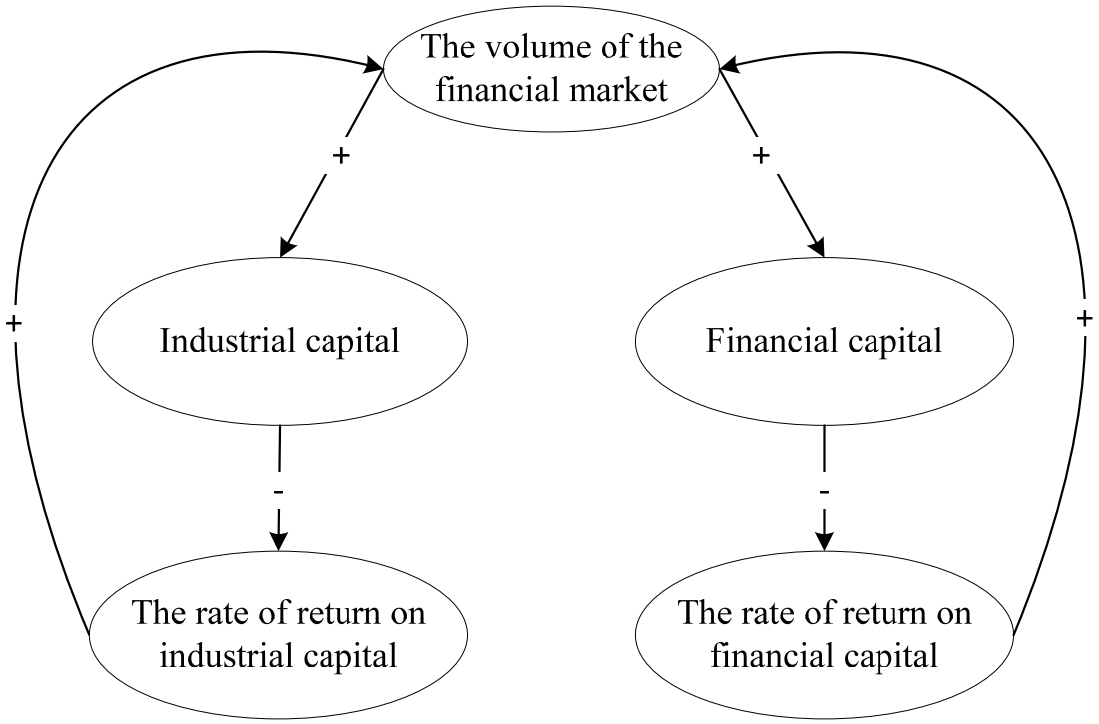

Fig. 1. **Basic cognitive map of the national financial market**

Source: compiled by the author.

vices, the establishment of commodity production chains, etc. Accordingly, the level of security of the functioning of the financial market is largely determined by the stability of the growth of industrial capital and the ability of the financial system to amortize negative disturbances in terms of the impact on the volume of industrial capital.

The concept of the security of the functioning of modern financial markets is based on the idea of the stability and efficiency of their performance of the function of capital movement, which ensures a stable process of expanded reproduction. This function can be characterized by a number of indicators, one of which is the volume of the financial market. The stable growth of the financial market directly indicates that the financial market is fulfilling its function of financing the real sector of the economy. The growth in the volume of the financial market can be ensured by the growth of industrial capital in the presence of an increase in financial capital, which, on the one hand, acts as a source of growth in industrial capital, and on the other hand, is an indicator of the stability of the functioning of both the industrial and financial sectors, since in the case of an increase internal imbalances and as a result of the manifestation of the financial or economic crisis, financial capital in terms of its speculative component tends to rapidly decline.

Thus, to determine the dynamics of industrial capital, it is necessary to include in the cognitive map such a factor as the volume of the financial market. This factor, on the one hand, determines the actual volumes of industrial and financial capital, divided in accordance with the ratios of the rates of return, and on the other hand, it is itself, among other things, determined by the rates of return of industrial and financial capital: the higher the rate of return of industrial and financial capital, the more incentives to enter the market with «outside» (temporarily free or foreign) capital. If we conditionally accept the volume of the financial market as a fixed value, then the ratio of the volumes of financial and industrial capital directly correlates with the ratio of their rates of return.

The basic cognitive map of the national financial market, linking the identified factors into a single system striving for equilibrium due to the presence of stabilizing networks of interaction, is shown in *Fig. 1*.

The constructed basic cognitive map of the national financial market should be expanded by including additional factors that determine the dynamics of its development. The content of the cognitive map of the financial market should form semantic areas that, on the one hand, determine the relevant factors of its functioning, and on the other hand, reflect the logical networks of interaction. To solve the problem of constructing a cognitive map of the national financial market, which makes it possible to assess the level of security of its functioning, it is advisable to form the following semantic sections:

• interaction between the real and financial sectors of the economy (these areas are key in the process of forming a cognitive map of the financial market, the purpose of which is to analyze the safety of its functioning);

• balance of external and internal balances (in the context of globalization and the close interweaving of the financial systems of the countries of the world, external balance factors become decisive in ensuring the stable functioning of the financial market).

Thus, further expansion of the cognitive map of the financial market, used as a tool for analyzing the security of its functioning, should occur mainly due to the inclusion in it of factors that determine the volume of the financial market, the level of transaction costs. financial transactions, as well as factors and network interactions that form processes. stabilization of the external and internal balance of the economy.

P. Temin, exploring the problems of equilibrium of internal and external balance and revealing the process of formation and deepening of crisis phenomena both in the real and in the financial sectors of the economy, uses the Trevor Swan diagram [39]. According to the Swan Diagram, internal equilibrium is expressed in the coincidence of supply and demand within the national economy at full employment of resources. The external balance is a dynamic correspondence of imports and exports, leading to a stable level of obligations of the country to other countries. Revealing the process of formation of disproportions of various nature, leading to a drop in the level of use of available resources, and hence to a drop in the real volume of production in the country, T. Swan argues that the main factor in stabilizing external and internal balances is the exchange rate [40]. Since the change in the exchange rate, which is the most important element of the national financial market, leads to the emergence of reaction waves in other segments of the financial market, the results of T. Swan's research can be used to build a cognitive map of the financial market. market to highlight the key factors for stabilizing the financial and economic system as a whole.

Summarizing the results of the study by P. Temin, T. Swan, R. Brenner and M. Rothbard, we can draw the following conclusions:

1. The key factors that determine both the process of ensuring the internal and external balance of the economy and the dynamics of the functioning of the real and financial sectors of the economy are: the exchange rate of the national currency, the rate of return of industrial capital and the rate of return of financial capital (as well as their ratio), the volume of the national product. The exchange rate of the national currency and the rate of return are balancing factors, i.e. factors, due to the flexible change of which the entire financial and economic system of the country is stabilized, and the national product is an inertial, target factor, the dynamics of which determines the safety and efficiency of the functioning of the entire national financial market. The volume of the national product is connected by direct positive feedback with

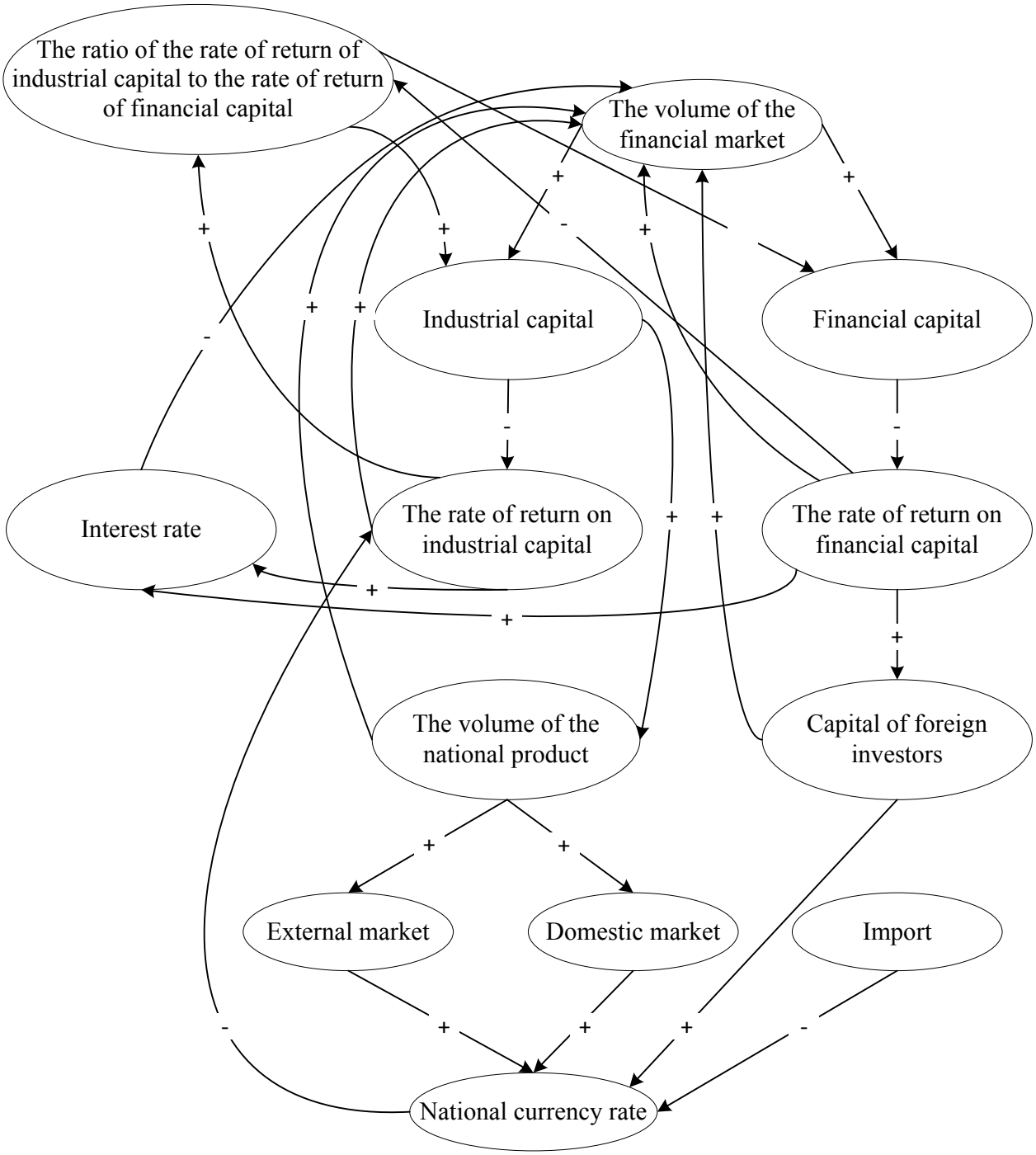

Fig. 2. **Expanded cognitive map of the national financial market**

Source: compiled by the author.

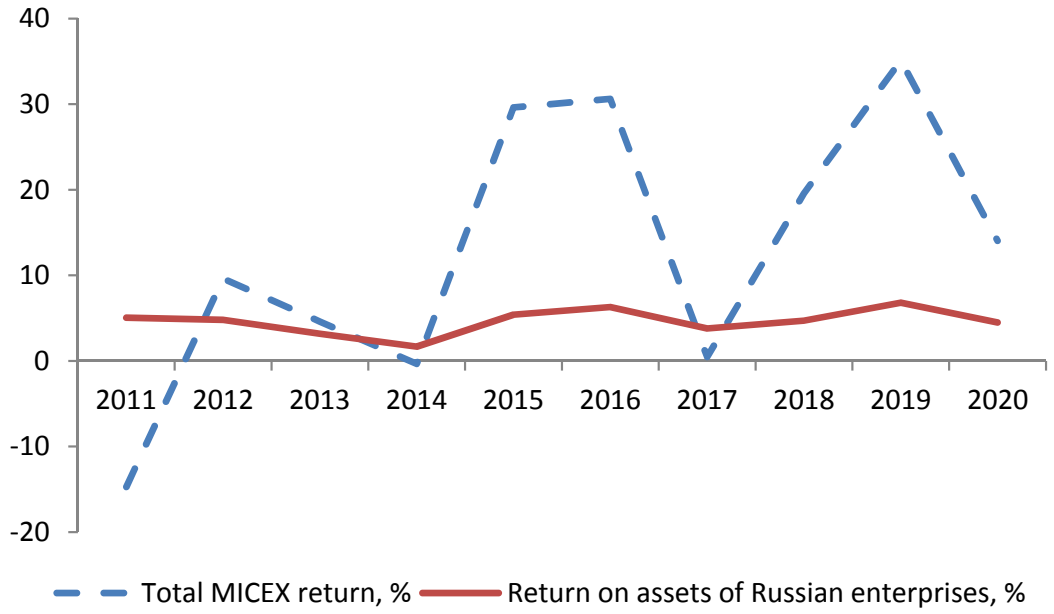

Fig. 3. **Dynamics of industrial and financial capital's profitability**

Source: compiled by the author on data of the Moscow Exchange and Rosstat. URL: https://www.moex.com/ru/index/totalreturn/MCFTR/profitability; https://rosstat.gov.ru/storage/mediabank/GOyirKPV/Rus_2020.pdf (accessed on 24.06.2021).

the volume of the financial market and with the volume of industrial capital: the greater the volume of industrial capital, the higher the volume of the national product, the greater the volume of the financial market and, ceteris paribus, the greater the volume of industrial capital.[7]

2. Additional factors representing the dynamics of the functioning of the financial market are the capital of foreign investors and the interest rate.

An extended cognitive map of the national financial market, which considers the key and additional factors that determine the dynamics of the functioning of the real and financial sectors of the economy, as well as network interactions that form the processes of stabilizing the external and internal balance of the economy, is shown in *Fig. 2*.

The peculiarity of this cognitive map is that its main elements are not the subjects of the financial market, but macroeconomic aggregates that characterize the state of the financial market and the economy as a whole. As a result of cognitive modeling, a network of relationships is built showing how macroaggregates change as a result of the spread of a positive or negative impulse: through which channels the impulse propagates, which macroaggregates are covered, and what is the further impact on the financial result. The market as a whole and its individual elements have macroaggregates that have experienced the influence of an impulse. The constructed network of interactions makes it possible to determine the stabilizing mechanisms operating in the economy, and in their absence, to identify the possibilities for their construction.

RESULTS

An analysis of the constructed cognitive map shows that the critical factors for stabilizing and ensuring the stable functioning of the financial market as a whole are the flexibility of changing the rate of return of production and financial capital, the free inflow and outflow of foreign capital, and low transaction costs. For the stable and

[7] In this network of interactions, the rate of return on industrial capital acts as a negative feedback factor.

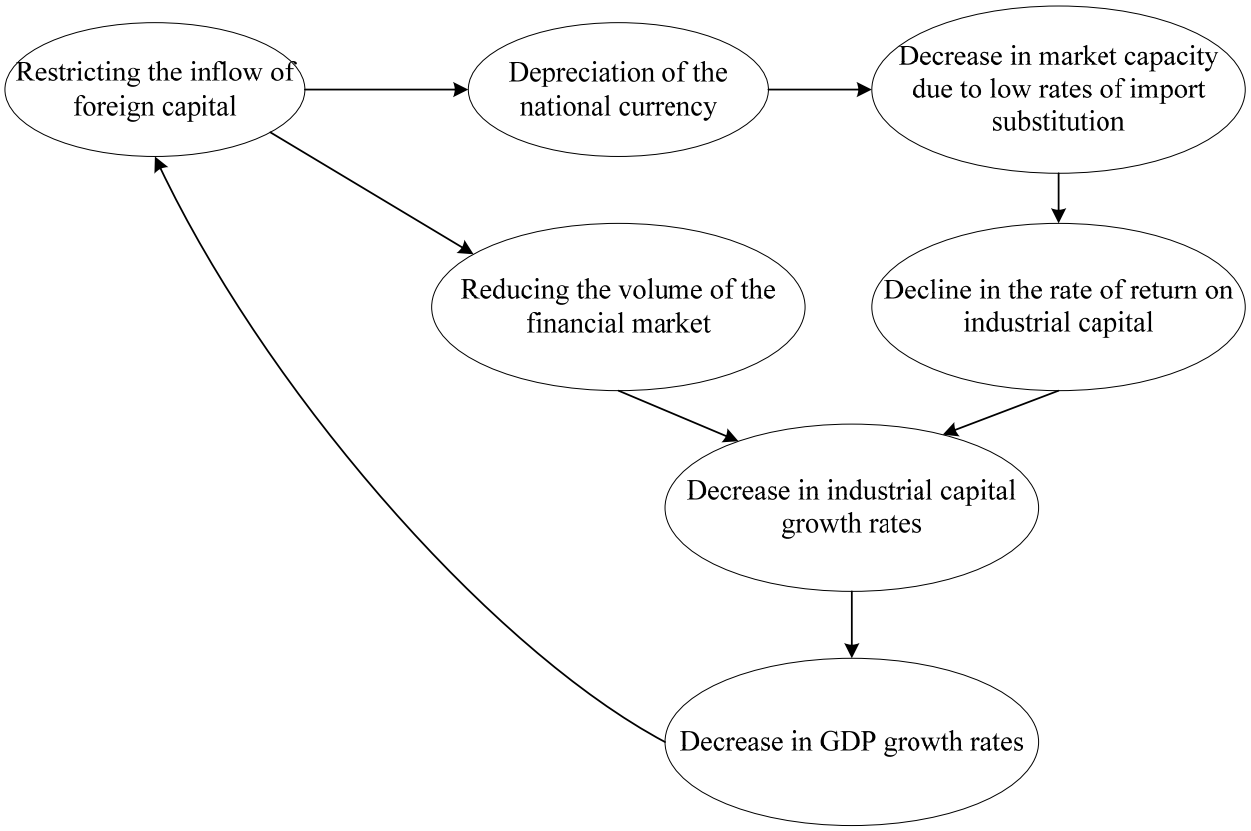

Fig. 4. **The contour of the impulse propagation resulting from the realization of the threat of limiting the inflow of foreign capital to the national financial market**

Source: compiled by the author.

safe functioning of the financial market, the dynamics of financial capital must correlate with the dynamics of industrial capital. To do this, the rate of return on financial capital should approach the rate of return on industrial capital, adjusted for the level of investment risk.

Since in Russia, in comparison with other countries, each individual segment of the financial market is relatively isolated and is not a system-forming one, threats to the security of its functioning are reflected precisely in the state of identified and accounted for macroeconomic aggregates. in a cognitive map, rather than aggregates that characterize the state of individual markets. The Russian financial market is hierarchically arranged in such a way that, with a balanced state of the selected macroaggregates, crisis phenomena are localized and resolved within individual subsystems (banking, insurance, securities, etc.) without leading to the collapse of the entire system. Given this feature, an important stage in the analysis of the security and efficiency of the functioning of the national financial market using a cognitive map is the identification of endogenous and exogenous factors that form imbalances in the economy and the financial sector.

Endogenous factors for the emergence of disproportions in the financial system are those factors that, formed within the framework of the functioning of financial market institutions, distort the ratio of the rate of return of financial capital and the rate of return of industrial capital. For example, with a steady excess of the rate of return of financial capital over the rate of return of industrial capital, the financial market overheats, manifesting itself in a rapid influx of speculative capital and the formation of financial bubbles, which

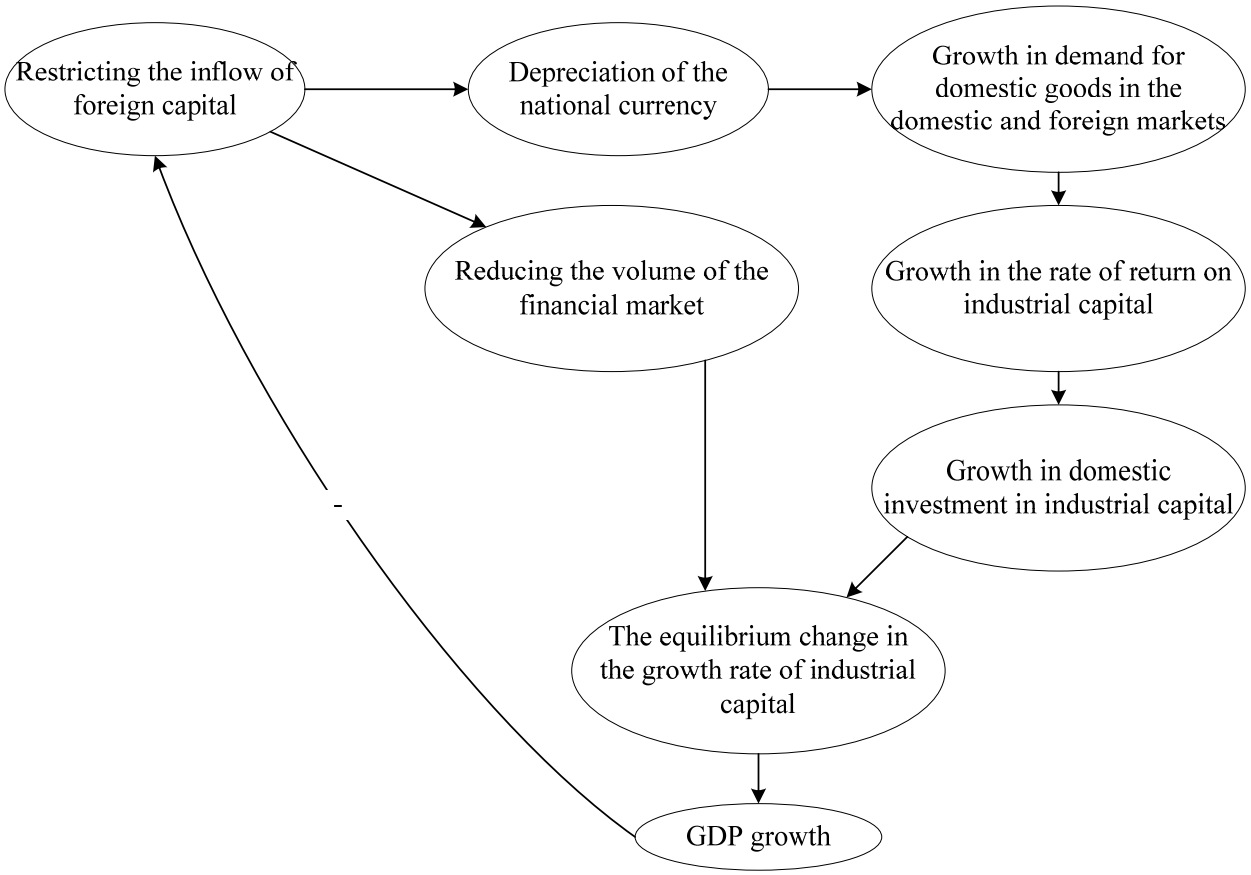

Fig. 5. **Target contour with negative feedback, including a mechanism for ensuring the inflow of foreign capital to the national financial market**

Source: compiled by the author.

disrupts the normal process of capital turnover in the economy.

Another source of risk of reducing the efficiency of the financial and industrial sector of the national economy is the excessively high volatility of the profitability of financial capital, which leads to a decrease in the ratio between the profitability of financial and industrial capital and, as a result, there is a violation of the stabilization mechanisms of the financial system. This is exactly the situation that has been observed in Russia for the last 10 years. *Fig. 3* shows the dynamics of the profitability of production and financial capital circulating on the stock market in 2011–2020.

Fig. 3 shows that in 2011–2020 the volatility of returns on financial capital circulating on the equity market was very high, ranging from –14.72% to 35.11%. The correlation between the two returns was insignificant and amounted to 0.657.

Exogenous factors of destabilization of the financial market are factors formed within the framework of the functioning of political, social and general economic institutions, leading to a prolonged excess (or underestimation) of the actual rate of return of industrial capital over its equilibrium level (understood within the neoclassical school) in the economy as a whole or in individual industries.

Using the developed cognitive map of the national financial market, let us consider whether its structures contain elements and relationships that would generate closed negative feedback loops at the system level, sufficient to extinguish exogenous and endogenous negative impulses. As examples of events that can become sources of exogenous and endogenous negative

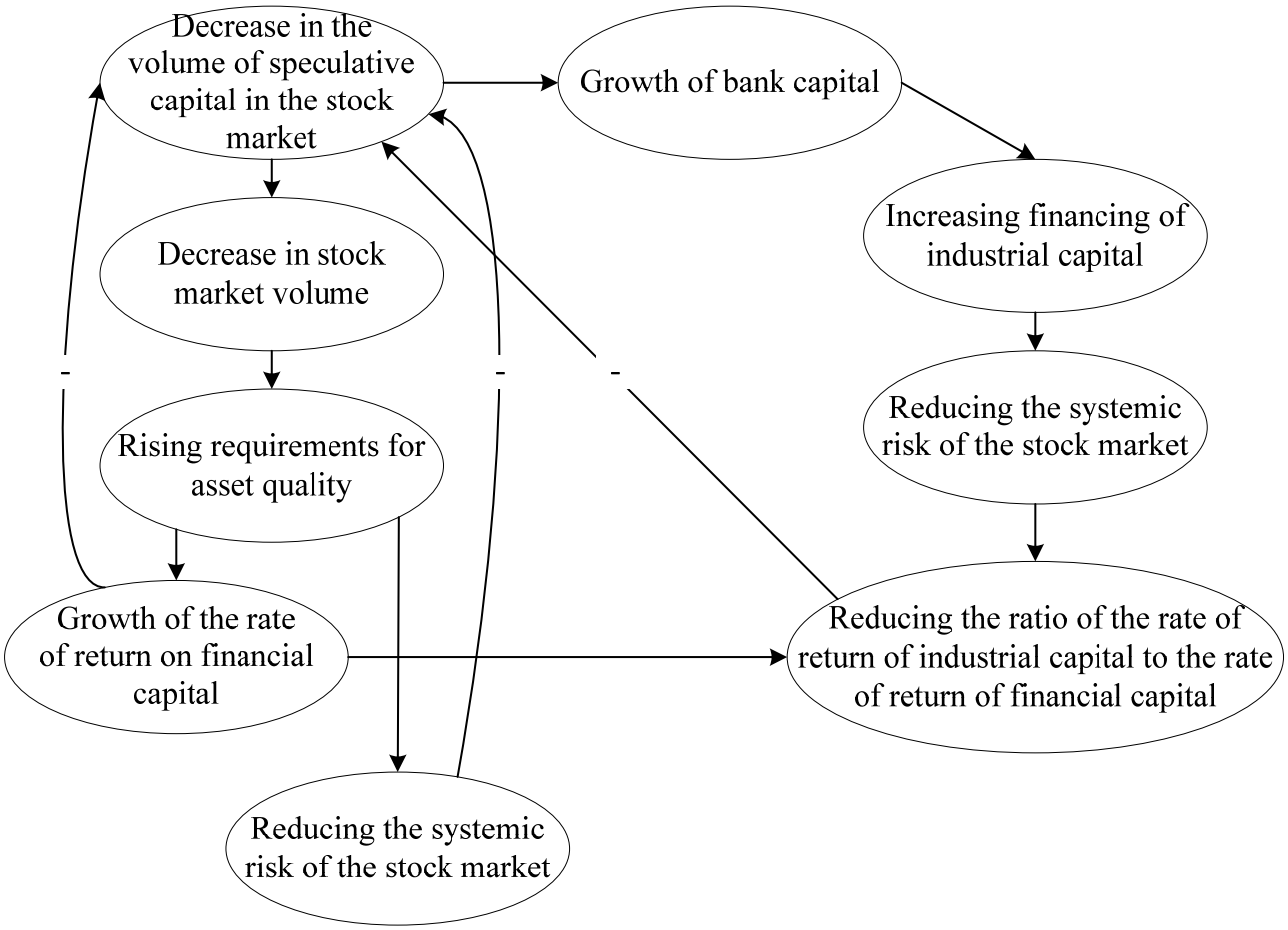

Fig. 6. **Closed contour with negative feedback, reflecting the mechanism of stabilization of the national financial market in the event of an endogenous threat of a change in the structure of financial capital**

Source: compiled by the author.

impulses, let us consider the restriction of the inflow of foreign capital into the national financial market and the reduction in the volume of speculative capital in the stock market due to the growing uncertainty in the dynamics of its further development.

The contour of the distribution of the impulse that arose as a result of the realization of the threat of restricting the inflow of foreign capital to the national financial market is shown in *Fig. 4*.

The presented contour shows that the impulse caused by the implementation of such an exogenous threat to the security of the financial market as a restriction of the inflow of foreign capital into the country does not fade over time, but destabilizes the market, reducing the efficiency of the development of the national economy. As a result of the depreciation of the national currency, there is a decrease in the capacity of the domestic market (a reduction in aggregate demand): due to the low rates of import substitution in a number of industries, a "redistribution effect" occurs when the share of spending on imported goods increases in the structure of household spending, which reduces the demand for similar domestic goods and reduces the capacity of their markets. It should be noted that this statement is true for the national economy and may be different for local markets. For example, a depreciation of the ruble can significantly increase the capacity of the domestic food market.

It can be seen from the above contour that the negative impulse from the

introduction of financial sanctions can only be extinguished within the framework of the development of the real sector of the economy by increasing the competitive advantages of domestic producers through the depreciation of the national currency, accelerating the pace of import substitution and accelerated development of export-oriented industries.

Fig. 5 shows the target negative feedback loop, which includes a mechanism for ensuring the inflow of foreign capital into the national financial market.

Thus, the absence at the system level of elements and links that generate closed loops of negative feedback, is sufficient to dampen the negative impulse generated by such an exogenous factor as the forced reduction in the inflow of foreign capital within the framework of the sanctions imposed against Russia, can be compensated by building a target loop, including a mechanism for ensuring the inflow of foreign capital into the national financial market. In turn, in the current situation, the effective construction of this target outline is possible only as a result of creating an institutional environment favorable for the functioning of the real sector of the Russian economy.

At the same time, due to the peculiarities of the Russian financial market, the implementation of such an endogenous threat as a reduction in the volume of speculative capital represented on the national stock market, due to the growth of uncertainty and risks of its further dynamics, development creates a closed contour with negative feedback, stabilizing the work of the considered financial system (*Fig. 6*). An increase in the uncertainty of the functioning of the stock market as a whole leads to an increase in the volatility and riskiness of individual financial assets. Due to the structural features of the Russian financial market, an increase in its volatility will lead to the fact that investors will give preference to less risky investments in the banking sector over the more risky placement of capital in the stock market. The growth of banking capital, facilitating an increase in the financing of industry, will ultimately lead to a decrease in the ratio of the rate of return of industrial capital to the rate of return of finance capital and the return of part of speculative capital to the rate of return of finance capital to the stock market.

As noted above, the formation of this contour is possible for a number of both structural and institutional reasons. The relatively high development of such segments of the financial market as the stock market and the banking sector determines that, with a high probability, the unfavorable situation in the stock market will lead to an outflow of part of speculative capital specifically to the banking sector, which is traditionally the main source of raising funds for Russian industrial companies. The absence of institutional obstacles in the form of legislative restrictions and high transaction costs will also contribute to the flow of capital from one sector of the financial market to another and its transformation from financial to industrial and vice versa, thereby ensuring the implementation of existing mechanisms for creating a balance and stabilizing the situation in the context of the spread of a negative endogenous impulse.

Further use of the constructed cognitive map to analyze the impact on the financial market of additional exogenous (decrease in the level of income of the population) and endogenous (decrease in the capitalization of the Russian stock market) factors led to the conclusion that the domestic financial market is characterized by relatively high resistance to endogenous stressors and its low stability to exogenous stressors.

For example, an unfavorable change in the exogenous factor "the level of income of the population" in relation to the financial market, caused by the introduction of international sanctions, forms a self-reinforcing process that reduces economic activity and poses a threat to ensuring

the effective and stable functioning of the financial market. The fall in the income of the population reduces domestic demand and triggers the process of reduction in industrial production, well studied in the framework of neo-Keynesianism, accompanied by a further decline in the income of the population and the contraction of the financial market due to the outflow of deposits from banks and the manifestation of the multiplier effect of an even greater reduction in credit capital.

At the same time, the fall in the capitalization of the Russian stock market as a result of an unfavorable foreign policy situation leads to the formation of a negative impulse of reaction, which, passing through the feedback contour, fades. The main mechanism leading to the damping of the impulse is the change in the rate of return of financial capital. An increase in the relative attractiveness of financial capital by reducing the ratio of the two types of rates of return and by converting part of industrial capital into financial capital forms a force that restores the initial level of capitalization of shares in the market. A fall in the volume of industrial capital, on the contrary, triggers a mechanism leading to its stabilization: a fall in the volume of industrial capital leads to an increase in its rate of return, and hence to an increase in its attractiveness for the private direct investment through increased savings.

CONCLUSIONS

Cognitive modeling, which is currently actively used in various areas of economic science, can also be used in the field of analyzing the security of the functioning of financial markets. In the process of creating a cognitive map, a network of relationships is built, showing what changes occur in the system as a result of the propagation of a positive or negative impulse.

A feature of the cognitive map of the financial market of Russia presented in the article is that when it is built, not individual subjects of the financial market are used as the main elements, but macroeconomic aggregates that characterize the state of the financial market and the economy like everyone else. This makes it possible to consider the high degree of interpenetration of the financial and real sectors, which is characteristic of the modern economy.

An analysis of the cognitive map of the Russian financial market, as well as a study of the functioning of the actor-network structures of the national financial market, led to the conclusion that the decisive factors in stabilizing and ensuring the stable functioning of the financial market as a whole are the flexibility of changing the rate of return of production and financial capital, free inflow and outflow of foreign capital, low transaction costs.

It is shown that an important step in the analysis of the security and efficiency of the functioning of the national financial market using a cognitive map is the identification of endogenous and exogenous factors that form imbalances in the economy and the financial sector. It is concluded that, given the balanced state of the macroeconomic aggregates under consideration, the existing hierarchical structure of the Russian financial market makes it possible to localize and neutralize crisis phenomena that have arisen within individual subsystems (the banking sector, the insurance market, and the securities market, etc.) without the collapse of the entire system. That is, the endogenous causes of crisis phenomena will be quickly corrected, which will lead to the attenuation of stress impulses. At the same time, stress impulses of an exogenous nature will intensify within the existing networks of the interaction of financial markets and lead to a violation of the effective performance of the function of capital circulation.

The practical significance of the results of the study lies in the ability to determine the stabilizing processes and mechanisms operating in the economy as a whole and in the financial sector in particular, and in their absence, to identify the possibilities for their construction. A targeted impact

on stabilizing and destabilizing processes within the framework of the implementation of the state economic policy makes it possible to increase the systemic security of the functioning of the country's financial market.

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Research of Methodological Principles and Financial Mechanisms of Macro-Strategic Management of the Dynamics of Technological Innovation Systems

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ABSTRACT

Production and consumption systems need radical innovations to meet the challenges of the post-industrial world. The questions of how systemic innovations or changes in socio-technical systems are implemented and in what form the principles and mechanisms of macro-strategic management of them can be organized are very relevant. Equally relevant is the issue of ensuring the inflow of resources for technological development, such as public funding or private capital. **The aim** of the article is to study a new model for the implementation of innovations in socio-technical systems based on a system dynamics approach. The author applies **methods** of a systematic approach to the analysis of economic processes and phenomena, methods of statistical and econometric analysis, methods of grouping and classification, economic and mathematical modeling, methods of comparative historical and cross-country analysis, forecasting methods and expert judgments. The article examines the methodological principles and mechanisms of macro-strategic management of the dynamics of technological innovation systems and ensuring their financial support. The author proposes a new methodological approach based on system dynamics, which combines two modern concepts of technological innovation systems management: the concept of "innovation engines", based on the research on new technological innovation systems, and the concept of a "three-vector transition module". A model of the emergence or decline of technological innovation systems in the context of various transitional processes (changes) in socio-technical systems is identified. **The scientific novelty** of the research lies in the development of new and improvement of the key methodological approaches currently used for the strategic management of the dynamics of technological innovation systems. **The conclusions** of the article show that the new methodological approach proposed by the author provides an important first step towards the study of more formalized models for studying the dynamics of technological innovation systems.
Keywords: innovation; dynamics; technological innovation system; model; approach; financial support

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INTRODUCTION

Today, most modern countries are facing serious socio-economic challenges of post-industrial development, such as population aging, climate change, depletion of natural resources, etc. Many studies recognize that gradual changes aimed at increasing production efficiency or introducing new solutions into existing socio-technical systems are insufficient. The authors of these studies increasingly argue that entire systems of production and consumption, which are integral components of socio-technical systems, need radical innovations [1].

The field of science related to the study of the dynamics of technological innovation systems is relatively young. Such studies were initiated by J. Markard [2] in 2008. Questions about how systemic innovations or changes are carried out in socio-technical systems and in what form the principles and mechanisms for managing macro strategic changes in socio-technical systems are implemented remain largely unexplored. An exception is a limited number of studies within the framework of the UN program "Transforming our World: the 2030 Agenda for Sustainable Development".[1]

While this research area has expanded its conceptual base in recent years, two other conceptual strands continue to structure debate and analysis in this area. The first concept of technological innovation systems, i.e. "engines of innovation", was proposed by A. Bergek and M. Hekkert [3]. The second concept of "sustainable transition" was proposed by J. Markard [4]. Numerous empirical studies in the field of retrospective and modern analysis of changes in socio-technical systems and the implementation of systemic innovations have ensured a significant understanding of the patterns and mechanisms that affect the direction and scale of transformational changes. Thus, possible approaches to macro-strategic management of the dynamics of technological innovation systems were discussed in the studies of A. Smith's "Reflexive Management" [5], D. Loorbach "Transition management for sustainable development" [6], R. Kemp. "Strategic niche management" [7]. Currently, the application and development of these analytical approaches and management methods are dominated by qualitative thematic approaches. Although there are notable exceptions, including the work of G. Holtz [8], which explored the use of formal approaches to modeling the transformation of socio-technical systems.

Modeling transitions to sustainable development is a complex task due to the multidimensional processes involved, however, expanding the methodological tools for studying the transition process is a fruitful direction for further study. This poses a challenge for researchers to more accurately formulate and study the cause-and-effect relationships between the various dynamics of developing systems.

This study aims to contribute to this group of scientific research by identifying a model for the emergence or decline of technological innovation systems in the context of various transitional processes (changes) in socio-technical systems and developing a new formal approach on this basis and improvement of already used key methodological approaches to the strategic management of dynamics of technological innovation systems. In many respects, this can be achieved through the use of the concept of A. Bergek and M. Hekkert about "engines of innovation", which is in good agreement with the formal model of system dynamics, both in terms of causation and feedback models. This is also combined with the concept of a "three-vector transition module", developed by the author within the framework of the "sustainable transition" approach.

Thus, this article makes an important contribution to this area of research by proposing a formal model that is a combination of two key approaches. Although the second approach considered in this article, according to such authoritative researchers as J. Markard,

[1] Transforming our World: The 2030 Agenda for Sustainable Development. United Nations. Department of Economic and Social Affairs. Sustainable Development. URL: https://sdgs.un.org/2030agenda (accessed on 18.09.2021).

B. Truffer [2], K. Weber [9], and others, has potential serious advantages, yet, few researchers have considered these aspects in terms of critical analysis.

The main question to which this article is intended to answer is: "How do technological innovation systems arise (or die out) in the conditions of various transient processes in socio-technical systems and what management strategy can increase the efficiency of their dynamics?" This question can be answered by solving the following problems of structural research.

First of all, it is necessary to conduct a deep theoretical and methodological analysis of the existing research on technological innovation systems, the "sustainable transition" approach and other approaches to modeling socio-technical changes.

Next, we present a theoretical description of the modeling approach used in our study.

We then proceed to discuss the results of the behavior of our model based on the analysis of the dynamics of technological innovation systems in the context of the "sustainable transition" approach and under different conditions of resource flows for technological development. Basically, these are external resources, such as public funding or private capital, without which there can be no development of a technological innovation system.

In conclusion, we summarize our findings and prospects for further research.

THEORETICAL FOUNDATIONS OF MODELING THE DYNAMICS OF TECHNOLOGICAL INNOVATION SYSTEMS

While interest in approaches to modeling the sustainable transition is certainly not ignored in the wider sustainability research community,[2] it is only recently that sustainability advocates have begun in-depth research on the potential of more formal approaches. One of the first pioneering attempts to develop a model explaining the multi-level dynamics of socio-technical changes was undertaken within the framework of the European Union project [10].

The European Union model was based on agent-based modeling techniques with some elements of system dynamics, and an attempt was made to update four previous case studies. The results of this study concluded that the model more closely resembles the analogy of a heuristic method[3] applied to innovation systems, applied in an attempt to capture the overall dynamics of interaction between niches, modes, and landscapes of a technological innovation system. It has proven difficult to model the various vectors in such a way that they represent historical events reflecting the results of previous case studies.

More generally, since 2012, several reviews of the results of case studies on modeling the transition to sustainable development have been published, indicating an emerging thematic research circle [11–13]. The overviews above highlight the importance of downsizing transition models, i.e. focusing the model on specific parts of the overall transition dynamics, in order to improve the performance potential of the model. The need to conduct a sensitivity analysis to test the consequences of "additional assumptions" was also emphasized [14].

A number of researchers argue that evolutionary theory and existing evolutionary models can be a good starting point for the analysis of systemic innovation and socio-technical change, given that transitional models such as "sustainable transition" are already based on evolutionary theory [4]. In addition, J. Halbe [12] concludes that the transition modeling program can be supplemented by combining higher-level abstract approaches such as "sustainable transition" with lower-level abstract approaches to make them more comparable.

We believe that the use of technology innovation systems research is a promising factor

[2] Club of Rome. The Limits to Growth: A Report for the Club of Rome's Projecton the Predicament of Mankind. Universe Books, New York. 1972.

[3] The heuristic method in economics is a method of analyzing economic phenomena and processes based on intuition, analogies, experience, ingenuity, based on the ability to intuitively solve those problems for which a formal mathematical solution is not known.

in the transient modeling agenda. It is noteworthy that, despite their noticeable attractiveness (significance) in the general array of scientific literature on transition processes, as far as we know, there are still no studies that would attempt to model the dynamics of technical and innovative systems. This is paradoxical, given that this approach has already delved into a rather complex understanding of how different processes or functions influence each other and how these interactions shape the emergence of new innovative systems. They provide a good starting point for modeling given that many of the underlying causal relationships and feedback methods have already been detailed and tested in a large number of previous case studies. In this regard, a systematic technological innovation approach contains all the components that fit well into the development of a formal model. At the same time, modeling technological innovation systems can improve our understanding of the complex behavior that results from complex relationships and dynamics. Separate approaches to technological innovation systems have been discussed in detail in other studies [15, 16]. Much of the existing scientific literature on technological innovation systems focuses on understanding how new innovation systems emerge around individual technical innovations such as biogas, solar photovoltaic technologies, or electric vehicles, and on measures to support the development and diffusion of these innovations.

Meanwhile, we recall that the key aspects of the concept of the system of technological innovations are "system functions". Similarly, to the method of A. Bergek and M. Hekkert [3], we distinguish 7 different functions:

1) entrepreneurial activity;
2) knowledge development;
3) knowledge diffusion;
4) search management;
5) market formation;
6) resource mobilization;
7) legitimacy creation.

In addition to these functions, "structural dimensions" are distinguished in the scientific literature. As A. Wieczorek noted in his studies [15], these "structural dimensions" include networks and relations between subjects (for example, at the level of networks or individual contacts), institutions (for example, rules, regulations, customs, procedures, etc.) and technological structures (for example, infrastructure).

Note that there is some confusion in the scientific literature on technological innovation systems about how functions relate to structures. K. Hillman argues that functions should be understood as "processes of building a structure" [14]. From this point of view, functions are processes that form the contours of the development of structures such as new entities, infrastructures, or institutions. Other researchers argue that functions have analytical properties of the innovation system that can be used for evaluation purposes: "functions show the state of a particular innovation system at a certain point in time" [17]. In this article, we largely adhere to the second point of view and assume that the relationship between functions and structures is modeled only at an aggregate level.

Much research on technological innovation systems has been devoted to understanding how the interactions between functions shape the development of these innovations. In this context, as a starting point for developing a model of technological innovation systems, we follow the methodology of R. Suurs [11]. In his study, R. Suurs put forward a hypothesis that functions influence each other at different stages of the development of an innovation system, thereby grouping them into the concept of "innovation engines". More precisely, he developed a configuration of causal relationships based on large-scale case studies. Such a causal analysis agrees with the principle of constructing a formal model of system dynamics since the model contains all the components (for example, causal logic, inhibition, and the feedback method).

R. Suurs [11] identifies four so-called "engines" of innovation. As the first "engine", he considers the "engine of scientific and technological progress", which refers to those models of innovation systems in which the

development and diffusion of formal scientific knowledge, supported by government R&D programs, is central. The result of this model of knowledge development and diffusion is the formation of initial pilot projects and other entrepreneurial activities that can increase further financial and institutional support if the results confirm initial expectations, or, conversely, reduce support if the results of these projects are perceived as negative. The key functions of this "engine" are "knowledge development", "knowledge diffusion", "search management" and "resource mobilization".

As the second "engine", R. Suurs considers the "entrepreneurial engine", which refers to models of innovation systems in which the main dynamics of innovation is formed by increasing the number of firms and entrepreneurs active in the innovation system, which increases the legitimacy in the eyes of external investors. In some cases, special lines are also provided for further provision of external resources, for example, to firms seeking temporary financial support to reduce risks when investing in venture capital projects.

Unsustainable commercial activities in niche markets also generate some initial financial resources within the innovation system. These reviews contribute to the development of knowledge through, for example, the publication of feasibility studies or reviews of proposed innovative projects. Consequently, the "learning" dynamic that forms the basis of this "engine" expands from "learning" through seeking to "learning" through action. The key functions of this "engine" are similar to those of the previous "engine of scientific and technological progress", except that "entrepreneurial activity" and "creating legitimacy" play a dominant role here.

The third engine, the "system formation engine", is a model of the dynamics of an innovation system, which is formed through the growing organization of network participants, infrastructure development and institutional reconfiguration. These actors that support the innovation system expand and begin to attract wider public support [11], for example, through the creation of user communities or the institutionalization of market relations through changes in regulations or the construction of additional infrastructure. A practical example here is the creation of a wide network of charging stations for electric vehicles. The "engine of system formation" is a socially and institutionally particularly difficult stage in the development of an innovation system, since the volume of required resources in this model increases significantly compared to the two previous "engines", and the volume of generated internal resources through market sales is still limited. Therefore, from the point of view of functions in this "engine", all functions are important, but the key is the function of "market formation" [17].

The last, fourth, "engine" is the "engine of the market". When the subjects of the innovation system begin to successfully orient themselves in the new institutional configuration created within the framework of the third "engine", it is argued that the innovation system begins to be created by the "market engine". It mainly refers to the innovation system model, which is supported by internal financial resources due to significant market demand, sufficient to provide all the necessary processes in the innovation system. From the point of view of the functional components in this "engine", all functions are important, but the "creating legitimacy" function plays a less important role [17].

In conclusion to the approach of R. Suurs, we note that, despite the presence of clear advantages, this approach has been criticized for a limited conceptual understanding of how the emerging innovation system interacts with its wider environment [17], although, as we note, there are conceptual points of view, for example, as the concept of "creating legitimacy" [13] or the concept of "blocking and stimulating mechanisms" by S. Jacobsson [16]. The interaction between innovation systems and their contexts is important because technological innovation systems

do not emerge in a vacuum, and their fate depends on how they interact with the wider environment and what their dynamics are in that environment.

A significant contribution to the formation of a systematic approach to technological innovation was made by A. Bergek [3], who introduced the identification of four types of "contexts" associated with the dynamics of the technological innovation system.

In our model, we integrate the emerging innovation systems with the concept of the "vector of socio-technical transition" [1]. The concepts of "regime" and "landscape", introduced in the context of multi-level analysis, potentially open up fruitful opportunities for studying this interaction between the innovation system and the context [18].

Meanwhile, F. Giles and D. Shot [13] identify four different types of "transition vectors" in their studies, depending on the time of interaction between niche levels, regimes and landscapes within the technological innovation system and the nature of the interaction between the niche and the current socio-technical structure. In turn, according to the time of interaction of levels, they distinguish:

1) the time of the emergence of pressure on the technological landscape, when the niche has not yet received significant development;

2) the time of the emergence of pressure on the technological landscape, when the niche has already developed significantly.

According to the nature of interactions, there are:

1) competitive relations between the niche and the existing regime;

2) co-dependent relationship between the niche and the existing regime.

In their research, F. Geels and J. Schot [13] note that "... niche innovations compete with the existing regime when they seek to replace it. Niche innovations have a codependency relationship if they can be accepted as a competency-enhancing adjunct to the existing regime for solving productivity problems." In our case, we interpret this criterion as follows. In the case of a competitive relationship, the incumbent regime responds to the nascent innovation system by stepping up its lobbying efforts against the nascent technological innovation system and building up innovation efforts in the dominant socio-technical regime, for example, through a new wave of innovation in the existing system of technology. For example, increasing the environmental efficiency of coal technologies in response to innovations in clean technologies. Or when participants choose parts of an emerging innovation system (for example, co-burning of organic waste in coal-fired power plants). The last example entered science as the so-called "sailboat effect", proposed by A. Cooper and C. Smith [17], due to which the efficiency of the current regime increases in the light of the growth of new technological innovation systems. The effect of the "sailboat effect", thus, increases the complexity of the implementation of the innovation system in relation to the current regime. In the case of codependency, this effect is still present, but much more limited, since the emerging innovation system experiences less competition from mainstream markets (simply due to their codependent nature).

All of the above can be summarized in the following three main transitional modules as integrals for emerging technological innovation systems.

1. "Direction of transition", in which:

a) pressure on the landscape occurs at a time when the system of technological innovation has not yet received significant development;

b) the initial resistance to the socio-technical regime is great since the subjects of the regime respond to this pressure by increasing their innovative efforts in the dominant socio-technical regime and only then slowly and hesitantly seek innovation outside the socio-technical regime.

2. "Directions of deregulation and pro-regulation", in which:

a) pressure on the landscape also occurs at a time when the system of technological

innovation has not yet received significant development;

b) the subjects of the regime lose faith in the existing socio-technical regime and are actively looking for alternatives, i.e. resistance to the regime is relatively weak.

3. "Strategic path of transformation", which can be divided into two sub-directions:

• "technological substitution direction", in which:

a) pressure on the technological landscape occurs at a time when the technological innovation system has benefited from previous significant support and development efforts;

b) the current actors of the socio-technical regime continue to maintain the existing socio-technical configuration through innovative efforts;

• "direction of reconfiguration", in which:

a) pressure on the landscape also occurs at a time when the system of technological innovation is already well developed;

b) the actors of the socio-technical regime begin to adapt the elements of this innovative system to the existing socio-technical configuration, which implies a relatively low resistance to the regime.

Next, we will explain in detail how we managed to combine these two concepts into a single formal model. Subsequently, we use the model to examine the dynamics of the technological innovation system in the context of the three different transition modules listed above.

METHODOLOGICAL MECHANISM FOR MODELING THE DYNAMICS OF TECHNOLOGICAL INNOVATION SYSTEMS

Since the rise and fall of a technological innovation system is a dynamically complex phenomenon, it is possible to develop a model using the concept of "system dynamics" that underlies the study of their growth and decline processes. The concept of "system dynamics" allows us to explore a variety of interacting processes and feedbacks, time delays and other non-linear effects. As known, each methodological approach has its advantages and disadvantages, including formal models. First of all, in an attempt to keep the model as aggregated and general as possible, we will present a general model that is not capable of capturing a technology-specific innovation system. In our opinion, this is understandable, given that the systemic approach to technological innovation itself is based on the application of a general concept to study various technological innovations. Secondly, the model assumes a chain connection: "a single technological innovation system" — "a single socio-technical regime". Finally, following the methodology of previous researchers [19, 20] and to improve model performance, we will focus on only one part of the overarching transition dynamics. More precisely, we will aim to replicate the initial growth (and eventual decline) of a technological innovation system in the context of a dominant socio-technical regime (instead of modeling a complete transition from beginning to end). Due to the complexity of the "system dynamics" model, we will restrict ourselves to describing the main postulates (positions) and the results of our study of the dynamics of the model and will not go into a detailed explanation of all equations.

Thus, the main components of "system dynamics" models are stocks, flows and variables. The model recognizes the existence of the four "engines" described above [21], which are sequentially transformed into five "vectors" of feedback. These five cycles consist of seven functions described by A. J. Wieczorek and M. P. Hekkert [15]. In particular, one part represents the development of technology and consists of two feedback "vectors" that balance each other: the "technology creation cycle" and the "knowledge diffusion cycle". Together they form the engine of "scientific and technological development". The other part of the model is mainly related to the development of the market, which consists of three self-reinforcing "vectors" of feedback: the "entrepreneurship engine", the "system formation engine" and the "market engine".

Following the logic of F. Geels and J. Schot [13], we also assume the existence of "regime resistance in relation to the system of technological innovations", i.e. counteracting the self-reinforcing market dynamics of the model.

As for the technological development part of the model, "advanced technological knowledge" and "general technological knowledge" are changed (with a certain delay) as a result of the intervention of external resources (such as public funding or private capital) or after their intervention from internal resources coming from a narrow niche market. Both of these stocks of resources are reduced if their flows are significantly reduced or stopped. Without a steady flow of resources for technological development — as a result of the "resource mobilization" function (a combination of external and internal resources) — there can be no development of a technological innovation system.

In turn, "advanced technological knowledge" and "general technological knowledge" trigger the "search management" function. For example, the successful implementation of a research project that promotes the "development of technological knowledge" and/or the "diffusion of technological knowledge" can lead to inflated expectations, which contributes to the development of the "search management" function [22]. However, we agree with the opinion of A. J. Wieczorek and M. P. Hekkert [15], who believe that "search management [...] is often an interactive and collaborative exchange of ideas between technology producers, technology users and many other participants, in which the technology itself is not a constant, but a variable.

In a number of empirical case studies, "search management" is often a function of government intervention through the implementation of government innovation programs [23]. Consequently, in our model, these trends are reflected in the fact that the function of "search management" is formed not only by the development and diffusion of technologies, but also directly by resources provided from outside (for example, from state innovation programs) and within the country (for example, resources coming from niche markets).

At the same time, it should be emphasized that the key role in the "entrepreneurial motorcycle" is played by the functions "creating the legitimacy of the technological innovation system" and "entrepreneurial activity". The effectiveness of the "creating legitimacy" function depends on both technological and market legitimacy. Technological legitimacy increases as technological knowledge develops and spreads [24]. Market legitimacy increases when the technological innovation system is increasingly institutionalized in relevant categories (such as the development of formal market rules, the creation of intermediary networks, the creation of infrastructure, etc.). In addition, the legitimacy of the market is negatively affected by resistance to the regime (for example, when regime actors try to influence public discourses or lobby to support a system of technological innovations). With regard to the "entrepreneurial driving cycle", we note that a higher level of legitimacy means that entrepreneurs are more likely to operate within a system of technological innovation (not least because this system is perceived as conforming to certain rules and institutions). This leads to a higher level of "entrepreneurial activity". We assume the existence of a curvilinear relationship between the change in the function "creating legitimacy" and the change in the function "entrepreneurial activity". This relationship implies that the higher the legitimacy created, the more entrepreneurs become active, simply because the risk associated with developing such proposals decreases as legitimacy increases, and vice versa [25].

Considering the "system formation engine", we note that here an increase in the "entrepreneurial activity" function leads to a "system formation cycle". More precisely, the strengthening of the "entrepreneurial activity" function involves the development of networks of actors: for example, entrepreneurs

organize themselves by expanding networks and creating intermediaries such as industry platforms, user intermediaries and other interest groups. There is also infrastructural activity and attempts at institutional reconfiguration. The model captures this with the stock/flow indicator of these structures.

We assume that the influence of entrepreneurs on the formation of these structures becomes more significant as the "entrepreneurial activity" function grows, which reflects the need to accumulate a certain critical mass before it can have a significant impact. Thus, we once again note the delayed and non-linear relationship between the function of "entrepreneurial activity" and the structures of the system. The emergence of the structures of a technological innovation system provides real value to the emerging links of the system since it implies an expansion of the circle of participants in the support of the innovation system, which leads to wider public support [26]. Thus, the growth of the structures of the technological innovation system increases the legitimacy of the system itself, which makes the "engine cycle of system formation" amplifying in nature [27].

Finally, with regard to the market engine, one can only note that the growth of the "entrepreneurial activity" function also leads (albeit with some delay) to the growth of the "niche market". However, a "niche market" can only truly develop when the actors of the technological innovation system are successfully oriented in creating the structures of the system itself. Moreover, an innovation system can become self-sufficient to provide all the necessary processes in its system, since the "niche market" is able to generate the "total available resource" necessary for this. In this regard, although all "engines" ("vectors") play an important role in creating a technological innovation system, the "market engine vector" is the most powerful self-reinforcing vector, potentially capable of driving the entire system. Finally, we note that, as in the case of the technological link of the model, all functions (stocks) in the "entrepreneurial", "systems", and "market" engines are reduced if resource flows are significantly reduced or stopped.

EMPIRICAL ANALYSIS

To examine the performance of the model and examine the dynamics of the technological innovation system (growth/stagnation) in the context of different "transition vectors", we applied an experimental model with three variable conditions:

1) landscape time pressure;

2) the type of connection between the technological innovation system and the regime;

3) conditions for the provision of resources.

Under the first condition in our experimental model, the time for landscape pressure to change comes either at the moment when the technological innovation system has already begun to develop due to the provision of external resources or at the moment when it has not yet begun to develop. In the latter case, external resources are provided simultaneously with terrain pressure. This item reflects the first criterion in the typology of "directions of transition" proposed by F.W. Geels and J. Schot [13].

The second variable condition refers to the relationship between the technological innovation system and the regime, which is related to the second criterion proposed by F. W. Geels and J. Schot [13]. Here we observe two different "sailing ship effects" depending on the relationship between the technological innovation system and the regime: one effect occurs when the incumbent regime competes with the technological innovation system, and the other effect occurs when it is interdependent. These "sailing ship effects" differ in effect value (the former is longer) and effect duration (the former is longer). More precisely, we assume that the competitive regime is capable of generating a "sailing ship effect" that increases the "regime resilience to a technological innovation system" by up to 27 percentage points in 205 months; while the codependency regime

causes a 5.4 percentage point increase in the "sailing ship effect" over 15 months.

The third variable condition refers to "resource conditions". Resource conditions refer to the availability of external resources (such as finance or human capital) that a technological innovation system can use. As a rule, we assume a fixed volume of resources that does not change between model runs. However, in our experimental model, we distinguish three types of "resource conditions":

a) technologically driven conditions — refers to a situation where there is significant availability of resources for technological development (for example, in the form of public and private support for R&D or a large engineering labor market), but fewer resources for the development market (for example, subsidies for the purchase of environmentally friendly goods);

b) market conditions — refer to the opposite situation, i.e. there are significant resources for market development, but to a lesser extent for technological development;

c) hybrid conditions — refers to a situation where a technological innovation system may initially use heavily technology-oriented resources, and in later stages of development may use significant market-oriented resources.

Finally, we present the results of testing our model using a fixed volume of external resources over both 10 and 15 years to determine the impact of the length of time that resources become available to a technological innovation system over a relatively shorter or longer time period. These time periods are roughly based on an average estimate of the "neutral lag" — the time required between invention and innovation. Thus, we have considered all three transition modules multiplied by three types of resource conditions, running a total of 9 verification tests.

CONCLUSIONS AND DIRECTIONS FOR FURTHER RESEARCH

In this article, we were faced with the task of exploring how technological innovation systems emerge or fade in the context of various socio-technical transition processes and what methodological principles and mechanisms underlie macro strategic management of the dynamics of technological innovation systems. We believe that we have come as close as possible to the goal, mainly with the help of the "system dynamics" model, which is based on the concept of "innovative engines" used in the methodology of new technical and innovative systems, and the concept of the "three-module transition vector" as an integral element of the theory "sustainable transition". Thus, the scientific and methodological contribution of our article is to improve the existing research methodology by integrating two key approaches, namely the system of technological innovation and "sustainable transition", into one holistic model of system dynamics, which can serve as a basis for future research. To illustrate the dynamics resulting from this combination, we developed and applied an experimental model with three state variables characterized by the influence of exogenous conditions. Since, due to the complexity of the "system dynamics" model, in this article, we limited ourselves to describing the main results of our experimental dynamic model and did not go into a detailed description of all equations, we intend to describe them in detail in subsequent publications, already considering the calibration of the model for a specific innovative system.

Thus, our results show that we can be confident in the overall performance of the model, albeit as close to it as possible. In this regard, our proposed new methodological approach provides an important first step towards the study of more formalized models for studying the dynamics of technological innovation systems.

Based on the work presented by us, various directions can be explored. First, in future research, our approach can be adapted to study and improve innovation systems management strategies, for example, by refining based on the conditions for using

resources on various transition "vectors". Second, in future research, our approach may be extended to include aspects of the interaction between several technological innovation systems occurring in the context of one or more socio-technical regimes.

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Indexation of Pension Payments: Finding a Balance Between Inflation and Wage Changes in the Economy

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ABSTRACT

The objective of the study is to analyze the effectiveness of the principles of regular indexation of insurance pensions practiced in the Russian pension system, as well as their compliance with the existing similar practice in other countries with pension provision and insurance pension systems. In international practice, these principles correspond to the initial belonging of these systems to one of two basic pension models — continental and Danish (Anglo-Saxon). With an annual increase in pension payments, the governments of countries with pension systems of the first model are guided by changes in the average wage in the economy, the second model — by the consumer price index. The aim of the study is to determine the most optimal formula for indexing insurance pensions in the Russian Federation. The authors use general scientific methods: analysis, modeling and comparison. The article analyzes the practice of indexing pensions that has developed in the Russian Federation and provides a calculation of the results of the valorization of such payments in the early 2000s. It also provides a theoretical justification for the need for the transitions to the indexation of pensions in accordance with the wage index in the economy. The study gives a comparative retrospective analysis of the level of indexation of pensions based on the consumer price index and the index of wage changes. This analysis is based on data from official statistical observations of inflation between 2011 and 2021, as well as the growth of income of employees. As a result of the study, the authors conclude that the annual pension indexation scheme adopted in Russia does not correspond to the modality of the domestic pension system and does not allow ensuring the standard replacement rate. The authors propose their own methodology for calculating the indexation coefficient based on the principles of the functioning of the domestic pension system as a continental-type insurance pension system. In addition, the article provides a calculation of the sources of funding for pension indexation in accordance with changes in wages in the economy.

Keywords: pension; indexation; wage; inflation; effective rates of insurance premiums; replacement rate

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INTRODUCTION

For most countries of the world that have their own national systems of pension provision and pension insurance, including Russia, the most important problem is to maintain the purchasing power of pensions and maintain the real income of pensioners at the normative level. The solution to this problem is complicated by the change in the demographic structure of the population and the increase in the proportion of people of retirement age. According to the forecasts of the European Commission, the costs of the EU countries related to social support for the elderly (including the payment of pensions, the provision of treatment, long-term care, as well as transfers related to unemployment and education) for 2035 will amount to 25.8% of GDP, and by 2060–27.8% of GDP[1].

The solution to this problem requires the application of additional measures to balance the income and expenses of pension funds. At the moment, most countries apply either raising the retirement age or reducing or completely refusing to index pensions for certain categories of pensioners. In Russia, both of these measures were applied. The retirement age was raised, and a moratorium was introduced on the indexation of pensions for working pensioners. However, the effectiveness of both these measures was relatively low.

In EU countries, there is an understanding that the vast majority of older people receiving a pension are unable to compensate for the decline in their income by returning to work due to disability. Healthy life expectancy for people over 65 in the European Union is 8.7 years for men and 8.9 years for women. This severely limits the potential for further increases in the retirement age in these countries. A similar situation is observed in Russia, where life expectancy in 2020 decreased to 71.54 years.

It should also be considered that the level of consumption of people of retirement age is a factor in economic development. Thus, the study and evaluation of the effectiveness of the pension indexation mechanisms operating in the world as an important element in improving the efficiency of social insurance systems is an important, albeit still poorly studied, problem. A significant indicator of such efficiency is both the coefficient of replacement of lost earnings by a pension at the time of an individual's retirement, and the value of this coefficient for him during the entire period of receiving pension payments. Older pensioners aged 75 years and older are more at risk of poverty due to the fact that when they were granted a pension, the nominal value of their wages during their working life could be lower than the nominal value of the wages of younger pensioners who were representatives of the same profession or social group. From this, it is concluded that solving the problem of only maintaining the purchasing power of a pension during its indexation may be insufficient and increases the risk of older people falling into poverty.

Economic science, unfortunately, has so far paid little attention to the problem of indexation of pension payments and the methodology for calculating the corresponding indexation coefficients. The mainline of discussion is built around the problem of balancing the costs and incomes of the pension system, as well as moral and ethical principles in determining the parameters for indexing pensions.

V. V. Shushukov and I. R. Topunova in the article "Generalization of the world experience in carrying out pension reforms" state that "the use of a different (non-inflationary) procedure for indexing pensions — based on wages — is unpromising since a retired person does not need to further increase the level of consumption if the costs of treatment are compensated by other social benefits and, thus, do not depend on the change in the average wage in relation to pensions" [1]. Such a view on the principles of indexation is controversial due to the existing ideology

[1] OECD Economic Policy Papers. URL: https://www.oecd-ilibrary.org/economics/fiscal-challenges-and-inclusive-growth-in-ageing-societies_c553d8d2-en; jsessionid=Mp9U 3qDK4CSfl3VYR 4tgJLZL.ip-10–240–5–182 (accessed on 29.05.2021).

of pension insurance. This also contradicts the provisions of the national legislation of individual countries of the world, as well as the very concept of "pension".

If a pension is recognized as part of an individual's earned income (pension insurance system), pension payments should be indexed to changes in wages. And vice versa, in pension systems of the Anglo-Saxon type, focused on providing a living wage for a pensioner, in accordance with the consumer price index.

In his article "Pension Policy and Population Aging", the head of the Economic Expert Group E. T. Gurvich points out that Russia is distinguished by "relatively generous indexation of already assigned pensions" [2]. He draws the corresponding conclusion on the basis of comparing the level of pensions with the subsistence level of a pensioner and calls for "more economical indexation of pensions". However, when comparing the procedure for indexation of insurance pensions in the Russian Federation and similar pension payments in other countries, it is precisely the modest indicators of their increase in Russia in relative terms that catch the eye. Therefore, the procedure for increasing pension payments proposed by the authors of these works can be considered as not taking into account the insurance nature of the domestic pension system and the orientation of the size of the pension on the unearned earnings of a pensioner, and not on the subsistence minimum or purchasing power.

When analyzing the order of indexation of pension payments, domestic researchers pay the most attention to the problem of the annual increase in pensions for the so-called "working pensioners". Its relevance increased significantly after the Government of the Russian Federation singled out this category of pensioners in a separate social group in 2016 and abandoned the annual indexation of their pensions. When analyzing the situation that has developed as a result of this measure, researchers, as a rule, operate with the concept of "social justice", and the discussion itself boils down to a discussion of the question of whether such a refusal is discriminatory in relation to a certain category of citizens. For example, in his article "Indexation of pensions and the principle of social justice" N. D. Gomonov notes the absence of a normative definition of the principle of "social justice" [3]. The inconsistency of this measure with the principles of "social justice" and "formal equality" is indicated in the work of N. L. Zueva [4]. At the same time, the authors do not consider the fact that the very concept of "pension" is associated primarily with disability and only secondarily with a person's age. Therefore, the term "working pensioner" itself is debatable, and not just the procedure for indexing pensions for this category of citizens.

The discussion about the procedure for indexation of pension payments in Russia, as a rule, is in the field of legal analysis of an already existing procedure or changes initiated in it. There is a lack of theoretical understanding of the problem posed from the point of view of social relations of a socio-economic nature. In this regard, the author has set himself two main goals: to analyze the effectiveness of the current mechanism for indexing pensions in the Russian Federation and its compliance with the principle of compulsory pension insurance, as well as to calculate and propose possible changes to this mechanism aimed at increasing the pension coefficient of replacement of lost earnings by a pensioner.

Foreign researchers also pay insufficient attention to the problem of indexation of regular pension payments. Eva Maria Hohnerlein, Professor at the Max Planck Institute of Social Law and Social Policy, in his work "On the issue of indexation of pensions for pensioners — regulatory models and legal standards", indicates that the rules

for indexing pensions in the EU countries are constantly becoming more complicated and the emphasis is on improving the efficiency of public pension schemes in terms of providing them with a guaranteed income in old age and reduce the risk of poverty as a result of retirement. She also points out that most countries of the world are gradually moving away from the practice of annual pension increases taking into account inflation, moving to indexation in accordance with changes in the average level of wages in the economy [5].

Other foreign researchers adhere to a similar point of view. For example, in his work "In the Wake of the Crisis: Pension Reforms in Eight European Countries", University of Bremen Professor Karl Hinrichs notes that since the 2008 global financial crisis, the eight European countries he surveyed (Ireland, Greece, Portugal, Spain, Italy, Hungary, Romania and Latvia) have either suspended or introduced "less favorable pension indexation rules" that have been used to ease the burden of pension obligations on their public finances. However, amendments to national legislation that led to reductions in pension payments in at least three countries (Romania, Latvia and Portugal) were declared unconstitutional [6].

The authors of the Oxford Pension Policy Guide "Defending the Minimum Income in Dynamics", published in 2007, note that the choice of the countries of the continent between indexing pensions to inflation or the dynamics of wage changes is determined by the general ideology of their pension policy and the compliance of pension systems with one of two basic pension models. Accordingly, countries such as Great Britain or Denmark index pensions paid under the patronage of the state at the level of the consumer price index, and, for example, Germany, Austria, or France, depending on the dynamics of wages [7].

Even earlier, in 1998, Ute Klammer, Professor at the Duisburg Institute of Sociology, noted that the latter option for raising the level of pension payments is more consistent not only with the expectations of pensioners themselves but also with the ideology of pension systems based on Bismarck's principles [8].

Thus, the problem of indexation of pensions is connected not only and not so much with the current financial and economic indicators of national pension systems, the balance of their accumulated total pension liabilities and incoming defined contributions, but with the principles of relationships in the employee —employer — state triangle. If a pension is recognized as part of an individual's earned income (pension insurance system), pension payments should be indexed to changes in wages. And vice versa, in pension systems of the Anglo-Saxon type, focused on providing a living wage for a pensioner, in accordance with the consumer price index.

ANALYSIS OF THE MECHANISM OF INDEXATION OF PENSIONS IN RUSSIA AND OTHER COUNTRIES AND THE CONDITIONS OF ITS OCCURENCE

The indexation mechanism for pension payments in the Russian Federation was initially focused on preventing the excess of the pension system's expenses over the amount of insurance premiums it receives annually. The result of this policy was a decrease in the level of pension payments. As the Strategy for the Development of the Pension System of the Russian Federation until 2030 points out, the replacement rate for shortfalls in income by pensions decreased from 34% to 27% from 2002 to 2007. This necessitated a targeted increase in the basic part of the labor pension in 2008–2009 and carrying out in 2010 the valorization of pension rights[2].

From January 1, 2010, the Pension Fund of the Russian Federation made an automatic recalculation (valorization) of the pension rights of citizens who had experience before 2002 (including in Soviet times). The amount

[2] Federal Law No. 166-FZ of December 15, 2001 (as amended on December 22, 2020) "On State Pension Provision in the Russian Federation". URL: http://www.consultant.ru/document/cons_doc_LAW_34419/fd6bbb57443078720f77a8442718f2123ea9a367/#dst100196 (accessed on 17.05.2021).

of pension rights of pensioners who had seniority before 2002 and formed as of January 1, 2002, has been increased by 10 percent. At the same time, for those pensioners who worked before January 1, 1991, another 1% was added to their pension individually for each year of experience acquired during the Soviet period. Thanks to this measure, by 2012 the replacement rate increased to 36.8% [9]. In subsequent years, a gradual decrease in this indicator was again observed. This fact is also explained by the scheme chosen in the domestic pension system for increasing pension payments.

From 2010 to 2020, Russia had a "tacit" rule for indexing pensions at the level of inflation of the previous year. The indexation coefficient is determined by the government and approved by the State Duma annually when the law on the federal budget is adopted and is tied to the pensioner's subsistence level [10]. In 2021, the legislator established that the living wage for a pensioner in the whole of the Russian Federation to determine the amount of the federal social supplement to a pension is 10,022 rubles per month[3]. At the same time, we make a reservation that the methodology for calculating the subsistence minimum for a pensioner in Russia also requires a more detailed study for its compliance with international practice for calculating similar indicators.

In 2020, an amendment was made to Article 75 of the Constitution of the Russian Federation, according to which the country guarantees a regular increase in payments in the system of compulsory pension insurance. Paragraph 6 of Article 75 of the Basic Law is now formulated as follows: "In the Russian Federation, the system of pension provision for citizens is formed on the basis of the principles of universality, justice and solidarity between generations, and its effective functioning is maintained, and the indexation of pensions is carried out at least once a year in the manner established federal law[4].

Thus, the discussion about the procedure and parameters for indexation of pension payments in Russia is now of a fundamental nature. Now this is connected not only with the issue of social protection of the elderly, but also with the need to exercise their constitutional right to a regular increase in their pension payments [11]. It can be stated that the current practice in Russia of indexing pensions at the level of inflation does not correspond to the declared insurance principles of its pension system.

Russia and its international obligations are required to revise the indexation parameters. For the first time, the International Labor Organization (ILO) made a recommendation to regularly increase such payments in 1944. According to Paragraph 22 of ILO Recommendation No. 67 of May 12, 1944, "benefits should replace lost earnings, taking into account family responsibilities, without, as far as possible, weakening the desire to resume work, if this resumption is possible, and without placing such a heavy burden on the costs of producer groups, that it will hinder output and employment[5]. The minimum standards for the size of pensions were also established in 102 and 128 ILO conventions, which today are the main guideline in determining indexation parameters. Each state that follows this recommendation independently determines both the amount of such payments and their ratio with the pensioner's lost earnings, and the level of indexation of pensions in accordance with the rate of established contributions paid by employers and employees [12].

Legal mechanisms that provide a fixed degree of income for a citizen in retirement exist not only in Russia, but also in almost all coun-

[3] Paragraph 4 of Article 8 of Federal Law No. 385-FZ of 08.12.2020 "On the Federal Budget for 2021 and for the Planning Period of 2022 and 2023". URL: http://pravo.gov.ru/proxy/ips/?docbody=&link_id=4&nd=218003977&intelsearch= (accessed on 17.05.2021).

[4] The Constitution of the Russian Federation (adopted by popular vote on 12.12.1993 with amendments approved during the nationwide vote on 01.07.2020). Article 75. URL: http://www.consultant.ru/document/cons_doc_LAW_28399/4db010c9950baa1d07371f4a0ab352d5a0027d20/ (accessed on 17.05.2021).

[5] Recommendation of the International Labor Organization on Income Security No. 67 as of 12.05.944. URL: http://base.garant.ru/2561770/#friends (accessed on 17.05.2021).

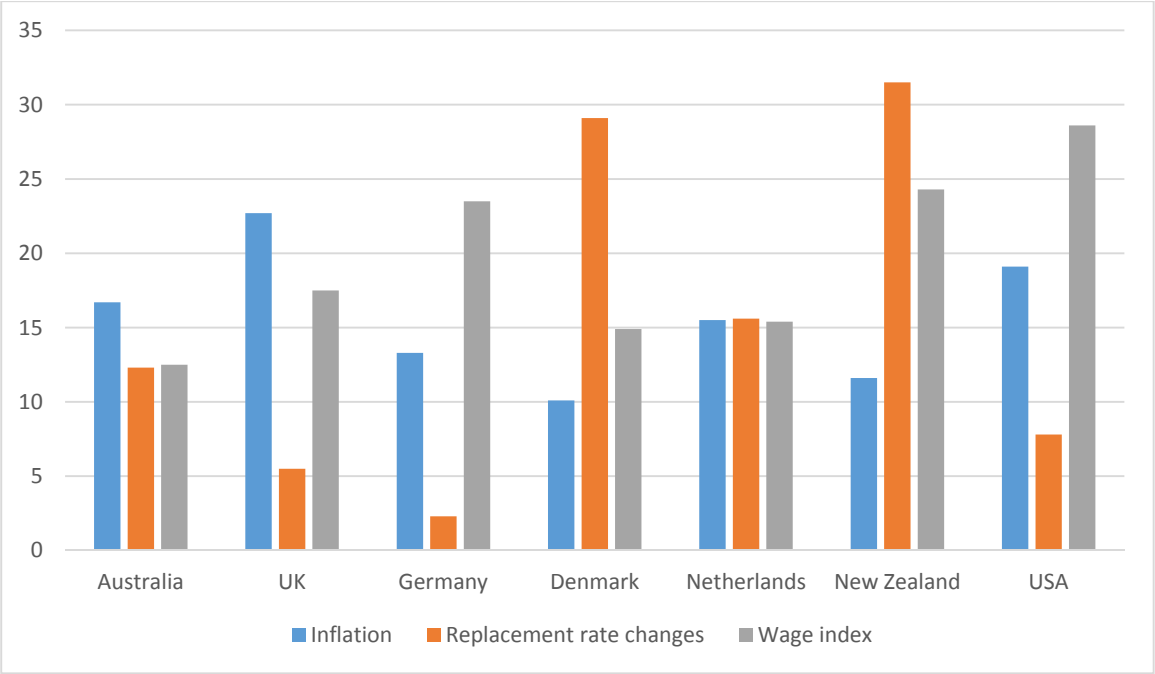

Fig. 1. **Consumer price index, wages and replacement rate change in 2011–2020 in selected countries**
Source: author's calculations based on OECD and IMF statistics.

tries where there are systems of compulsory pension insurance or pension provision [13]. For the first time, a system of regular indexation of pensions was introduced in France in 1940. At the end of the 50s. introduced by Germany and the Netherlands. As of 1975, such rules already existed in 34 countries. The vast majority of them provided for the indexation of pensions at the level of inflation, and in 11 states — at the level of the wage index. During the same period, countries such as Italy, Norway and Uruguay introduced combined normative pension increases that combined both inflation and changes in average wages in the economy [14].

According to the Organization for Economic Co-operation and Development (OECD), the replacement rate increased by 3.4% in Germany between 2015 and 2019, by 2.9% in the US, by 3.1% in the Netherlands and by 6.3% in New Zealand. Such an increase in this indicator is only possible if pensions are indexed to a level that exceeds both the consumer price index and wages[6].

Over a longer period, from 2011 to 2020, in countries such as Germany, the United States and the United Kingdom, we observe a decrease in the replacement rate associated with the lag of pension indexation not only from changes in the average wage in the economy, but also from inflation (*Fig. 1*).

The revision of the parameters of the annual increase in pension payments began in these countries after 2014 and was associated with the need to overcome the trend towards a decrease in the replacement rate [5]. *Fig. 1* shows countries whose national pension systems can be called modal for similar social protection systems in other countries. The pension systems of Germany and the United States can be attributed to the continental basic model of pension insurance, and the pension systems of Australia, Great Britain, Denmark, the Netherlands and New Zealand can be attributed to the so-called Danish (Anglo-Saxon) basic model of pension provision. Their main ideological difference lies in the fact that in the first model the pension is seen as a way

[6] The replacement rate, calculated according to the OECD methodology, is the ratio of the amount of pension rights accumulated by an individual during the period of employment and expressed in monetary units to his last earned income before retirement.

to ensure earnings in case of disability, and in the second — as a tool to combat poverty.

Currently, in most OECD countries, old-age pensions are typically indexed twice a year, with a factor oriented towards either the consumer price index or the wage index, whichever is higher during the indexed time period. The indexation of pensions, focused only on inflation or on an increase in the cost of a pensioner's subsistence minimum, is considered the most conservative in international practice and primarily meets the objectives of budget consolidation, rather than increasing the size of the pension and maintaining the replacement rate at the normative level [15].

Today the Russian government is faced with the task of changing the parameters of the annual increase in pension payments, considering the dynamics of wages in the country and identifying an additional source of financing for such indexation.

The indicated combined indexation coefficient is logical precisely from the point of view of maintaining the purchasing power of the pension and its relation to lost earnings. With low inflation, the orientation of indexation parameters to this indicator stimulates a decrease in the replacement rate. The same situation develops with high inflation, falling incomes of workers and the orientation of pension indexation parameters to indicators of changes in average wages.

Determining the parameters of pension indexation is inextricably linked with the goals of the state pension policy and cannot be reduced to the task of reducing the obligations of the pension system in relation to GDP. It should be aimed both at maintaining the purchasing power of current pension payments, and at their normative relation to the earnings lost by the pensioner [16].

The theoretical justification for the need to move from indexation of pension payments in accordance with inflation to their increase, focused on changes in the wage index, was first given by the German economist Wilfred Schreiber, the founder of the theory of "dynamic pension system", in 1955. He was able to substantiate such a need by analyzing efficiency of the pension insurance system introduced in Germany during the chancellorship of Otto von Bismarck [17][7]. As Schreiber wrote, "The reform of social insurance he proposes is based not on nominal amounts of money, but on the basis of an appropriate "standard of living", which means that the unit of measurement is not the German mark, but the corresponding "average earnings". The rates of fixed contributions to the pension system should be based on this principle, and the system of their collection should ensure the equality of all economic entities".

In the strategy for the development of the pension system of the Russian Federation until 2030, the reason for the decrease in the replacement rate is directly named "the lag in the rate of indexation of labor pensions from the rate of wage growth." It defines the adequate size of the pension as its ratio to the average salary of an employee not lower than 40%[8]. Thus, today the Russian government is faced with the task of changing the parameters of the annual increase in pension payments, considering the dynamics of wages in the country and identifying an additional source of financing for such indexation.

To do this, it is necessary to fix the attitude towards the concept of "pension" as part of the salary of an individual, and not the allowance paid to him upon reaching retirement age, not

[7] "In our proposal, the absolute level of pensions is automatically increased in line with the average labor income, that is, approximately in line with the social product per capita. Thus, each pensioner is guaranteed that his retirement income will be adjusted annually, considering the income of his younger colleagues who are still working." (Schreiber plan).

[8] Government of the Russian Federation. Decree dated December 25, 2012 No. 2524-r.

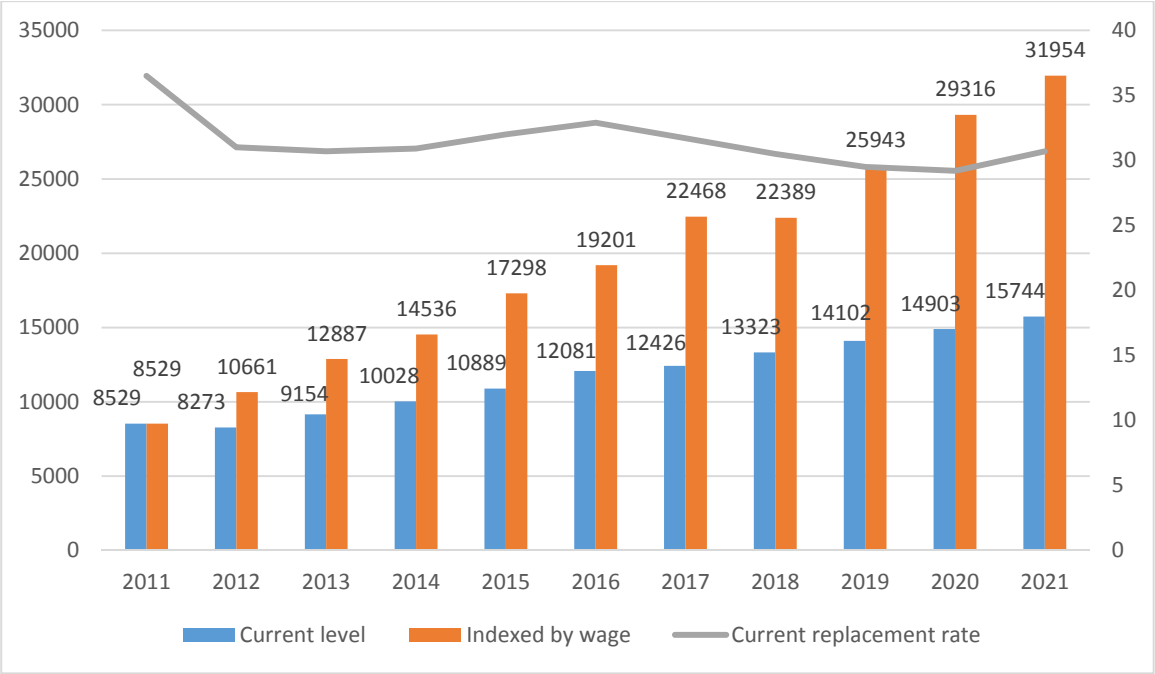

Fig. 2. **Comparison of the level of pension payments in Russia indexed by inflation and by wage index changes**
Source: author's calculations based on official statistics.

only at the legislative level, but also in the main strategic documents of the government. The belonging of the Russian pension system to the continental basic model of pension insurance is evidenced, in particular, by the definition of this concept, which appears in Law No. 400-FZ "On Insurance Pensions". It establishes the following legal definition: "Monthly cash payment for the purpose of compensating insured persons for wages and other payments and remunerations lost by them due to the onset of disability due to old age or disability..."[9]. Such a fixation would be more in line with the socio-economic nature of the domestic pension system. At the same time, it will demand the rejection of entrusting it with the task of combating poverty, which replaces the goal of providing an acceptable replacement for the lost earnings of a pensioner. In the meantime, it should be stated that the current practice of indexing pensions in the Russian Federation is poorly consistent with the principles outlined.

[9] Federal Law No. 400-FZ of December 28, 2013 "On Insurance Pensions".

COMPARATIVE ANALYSIS OF THE EFFICIENCY OF PENSION INDEXATION PARAMETERS IN RUSSIA

To solve the problem of determining the index of the annual increase in pensions, corresponding to the ideology of pension insurance formed in Russia, it is necessary to determine the ratio of pension payments indexed in accordance with the inflation of the previous year and the wage index (*Fig. 2*).

From 2011 to 2020, Russia has seen a steady increase in the nominal amount of pensions paid. Over ten years, in nominal terms, the average pension in Russia increased by 84.6%. At the same time, the level of cumulative inflation for the same period amounted to 112.23%. The size of the annual indexation of pensions during this period was slightly higher or equal to the inflation rate of the previous year. At the same time, the general lag of pension growth over 10 years from 10-year inflation is due to a number of factors. First of all, the state refused to index pensions in 2016 and replaced it with a lump sum payment in the amount of 5 thousand rubles per pensioner.

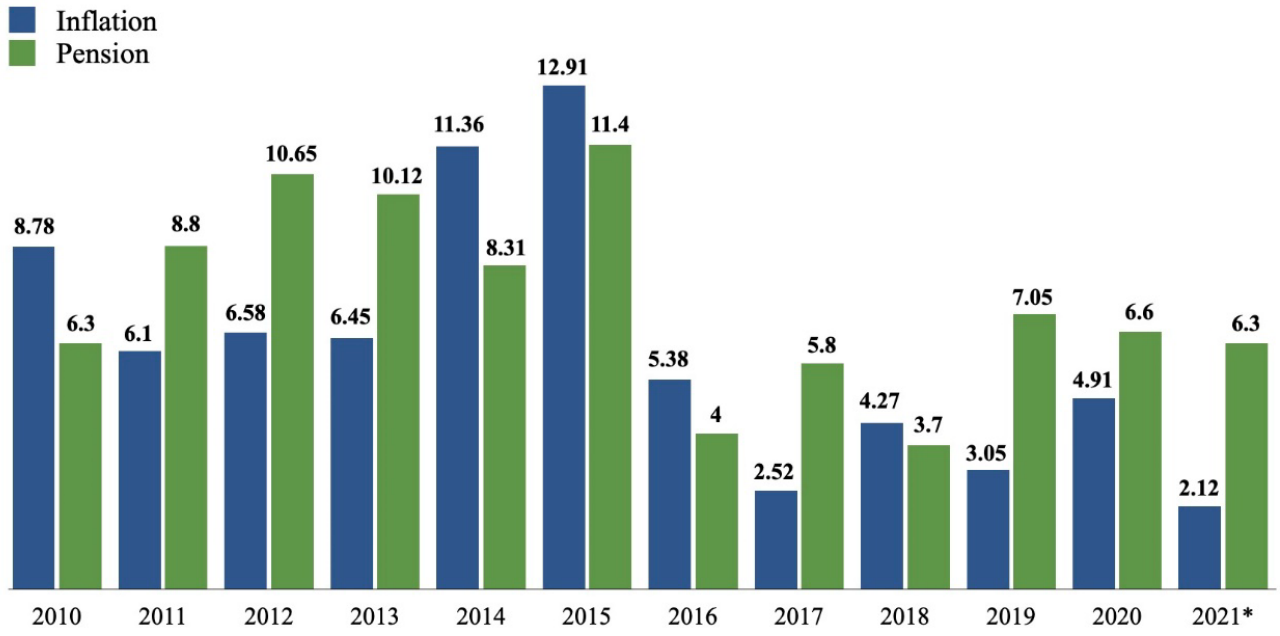

Fig. 3. **Inflation rate and pension indexation in the Russian Federation in 2010–2021, %**

Source: author's calculations based on official statistics.

This has reduced the base for indexation of pension payments since 2016.

Another factor should be considered a temporary discrepancy between the moment of pension increase and the moment of annual inflation fixation. Finally, as a third factor, it should be considered that the current formula for assigning pensions includes the mathematical possibility of an opaque understatement of the level of indexation of pensions by executive authorities. It lies in the right of the Government to set not the relative amount of the increase to the paid pension, but to increase the value of the individual pension coefficient in absolute terms (*Fig. 3*).

Every year, the legislator, when determining the parameters for indexing pensions in the subsequent period, focuses on the inflation of the previous year, and not the current one. Each time, he is forced to compensate for this lag in his calculations by setting the pension increase index a little higher. However, this mathematical action still does not compensate for the result of the time gap described above.

The amount of pension payments in 2015 served as the basis for calculating the parameters of pension indexation in 2017. The one-time pension supplement paid in 2016 cannot be called indexation [18]. As a result, with inflation of 12.91% in 2015 and 5.38% in 2016, indexation of pensions in 2017 not only did not compensate for the purchasing power of pensions lost over two years, but also reduced the level of indexation of pensions in subsequent periods.

The decrease in the replacement rate for shortfalls in income by pensions, judging by *Fig. 1* also resumed in 2016. This figure, which was 36.5% in 2011, decreased to 30.7% by 2021. The decrease in the replacement rate is explained both by the low level of indexation of pensions and by the definition of indexation parameters focused on the consumer price index, and not on wages.

CALCULATION OF THE PENSION INDEXATION INDEX, ORIENTED ON THE DYNAMICS OF WAGES

The next increase in pension payments in the Russian Federation, provided for in Paragraph 6 of Article 75 of the Constitution of the Russian Federation, should focus on two parameters at once: the annual index of wage changes in the economy and the annual consumer price index. Moreover, the last parameter becomes significant only if in some

period of time it exceeds the first parameter in relative terms. The difference arising from the lagging of wage growth behind inflation during indexation of pensions should be compensated from its income by an institution that receives inflationary income (seigniorage) or by the National Wealth Fund (NWF), which is legally entrusted with the task of maintaining a balanced pension system [19]. This combination will help to avoid a situation in which the purchasing power of a pension decreases in the event of high inflation, and to maintain the replacement rate for lost income by a pension at the required regulatory level.

Fig. 2 shows that if pensions had been indexed in accordance with the growth of wages, the average old-age pension in the country should have been 29,316 rubles in 2020 instead of 14,903 rubles per month. At the same time, in 2020, the replacement rate for lost earnings by pension would have been 57.4%. Thus, it would have been almost one and a half times higher than recorded (29.2%). With the number of pensioners in 2020 of 43,546 thousand people, the financial obligations of the pension system would have amounted to 15,319,134 billion rubles per year. This is 7,399,121 million rubles more than the Pension Fund of the Russian Federation (PFR) spent on the payment of insurance pensions in 2020. In other words, the amount of the fund's current pension liabilities should have increased by 48.3%. A closer analysis of the state of the PFR budget shows that this increase in pension spending is not financed from the internal sources of the pension system.

The effective rate of insurance premiums paid by employers to the pension system of the Russian Federation is currently 12.2%. This indicator is obtained by calculation by converting the Nicholas Barr formula, which calculates the rate of defined contributions to the pension system required to fully meet its obligations [20]. Raising the effective rate by refusing to grant benefits to certain business entities, as well as regressing its payment when an employee's wages are above a certain level, will almost double the amount of income received by the pension system. Such a refusal to provide benefits to employers would also mean an end to the practice of subsidizing entrepreneurs at the expense of employees' wages, and not federal budget revenues. It fully complies with the legal nature of the concept of insurance premiums and allows pensions to be indexed in accordance with the index of wage changes in the economy [21].

Due to the established paradigm of economic policy aimed at increasing the competitiveness of domestic sectors of the economy by reducing their costs in the production of goods and services, and not by increasing the capacity of the domestic market, such a refusal to provide benefits to certain industries and shift the main burden of subsidizing them from the employee to the state is possible only for a long period of time [22]. On the other hand, given the high share of pensioners' spending on consumer goods, this will mean an increase in the level of consumer demand in the economy. According to the author's forecasts, based on an analysis of the share of household expenditures in GDP, as well as the structure of expenditures of the elderly, the indexation of pensions in accordance with the annual change in the wage index will increase domestic demand by at least 1 trillion rubles annually. At the same time, additional revenues of the consolidated budget from consumption taxes will amount to at least 330–350 billion rubles per year.

Thus, the transition to the indexation of pensions in accordance with the annual change in wages in the economy will not only help overcome the existing pension crisis by increasing the replacement rate of lost earnings with pensions above the standard mark of 40%, but will also create additional incentives for economic growth by expanding domestic demand.

CONCLUSIONS

The nature of indexation of pensions in the country is a clear indicator that reflects both the current ideology of the state's social policy and the direction of its

economic policy. An increase in pension payments, oriented to the consumer price index and not considering the growth of nominal wages in the economy, can be seen as evidence of the government's desire to increase the competitiveness of the economy by reducing the cost of labor, rather than increasing its productivity. This practice is more typical either for countries with developing economies, which, as a rule, do not have universal pension systems, or for countries with pension systems of the Danish (Anglo-Saxon) basic pension model. In Russian conditions, the increase in pensions, oriented towards the level of inflation, is exacerbated by the vicious practice of providing benefits for the payment of established (insurance) contributions to individual business entities.

The obligation of the Russian state, enshrined in the Constitution, to conduct annual periodic indexation of insurance pensions, sets the task for the Government of Russia to determine the most fair and expedient form of such an increase in pensions, corresponding to the nature of Russian pension insurance. Obviously, we are talking about the indexation of pension payments in accordance with changes in wages in the economy. This will make it possible to maintain the replacement rate for shortfalls in income with pensions at the required normative level. The source of financing for such indexation should be the refusal to provide benefits for the payment of insurance premiums to individual business entities, as well as the refusal to regress when calculating the defined payment rate to the pension system itself. The continuation of this practice should be seen as an attempt to subsidize employers by lowering the wages of workers.

The calculations made by the author show that the indexation of pensions in accordance with changes in wages in the economy will not require an increase in the current rate of insurance premiums even in the face of a worsening demographic situation in the Russian Federation and an increase in the life expectancy of pensioners themselves. Changing the parameters of pension indexation will also not require an increase in subsidies to the pension system from the federal and regional budgets and will not lead to an increase in the deficit of the Pension Fund of the Russian Federation associated with the payment of pensions. On the other hand, this practice can become a more effective tool for stimulating economic growth in the country than simply stimulating individual industries and even individual economic entities.

When developing parameters for the annual indexation of insurance pensions, one should consider the hypothetical possibility of a situation in which, in a certain period of time, inflation may be higher than the wage index. At the same time, in order to maintain the purchasing power of pensions, they should be indexed in accordance with the consumer price index, and the difference between it and the wage index should be repaid at the expense of the National Wealth Fund, which has the function of maintaining a balanced pension system by virtue of the current Budget Code of the Russian Federation. Another source of repayment of this difference may be additional income received by the Bank of Russia as a result of an increase in the consumer price index.

The topic under study is considered for the first time in the scientific community of the Russian Federation and can later be used in the development of textbooks and scientific papers.

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ORIGINAL PAPER

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International Experience in Financing Self-Employed Pensions

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ABSTRACT

The rapid development of modern self-employment, the massive transition from employment to self-employment and vice versa is a challenge for traditional pension systems. The Organisation for Economic Co-operation and Development (OECD) responded by adopting compulsory state pension schemes for the self-employed shared with employees. Russia following global trends with a small-time lag, unlike others, provides an unconditional guarantee of social pensions. It is all the more important to study the advanced international experience in attracting the self-employed to pension insurance. This is **the aim** of the study. Research **tasks** are as follows: to identify different approaches to organizing pension insurance for the self-employed across OECD countries, to examine the mechanisms and factors arising, and to evaluate their performance. **The research method** is cluster analysis of the generated self-employed pensions parametric indicators database according to OECD data (2019–2021) (18 indicators as part of clustering, architecture, finance, performance factors) for 28 countries. The study identifies 3 clusters (approaches) to the organization of pension provision for the self-employed: 1 — employee-like mandatory contributions to state pension schemes; 2 — mandatory contributions with advantages; 3 — voluntary pension contributions with advantages. In general, none of the approaches can be called "the best". The effectiveness of pension decreases with any form of low-income self-employed inclusion in income-based pension schemes, as well as dependent self-employment. The author **concludes** that for Russia alternative options for self-employed pensions are quasi-mandatory pension insurance, self-employed employee-like participation in voluntary funded pension schemes only, state co-financing, practical training in financial literacy without going into the depth of financial knowledge. Discussion for **further research** is a detailed study of the application of the results into self-employed pension insurance practice in Russia.

Keywords: self-employed; pension financing; cluster analysis; parametric characteristics; minimum income; theoretical pension; relative pension level; contribution rate

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INTRODUCTION

The rapid development of self-employment, as well as non-standard forms of employment, is a challenge for traditional pension systems built on the stability of contributions. The dominant trend has been the transition of the self-employed to the same mandatory public pension schemes as employees.

The earnings of a self-employed person (full-time worker) are lower than those of an employee.[1] The transition to the status of self-employed reduces the future pension [1]. The incomes of the self-employed differ: instability, unverifiable, less dependence on the profession and level of education [2].

The situation is aggravated by the growth of self-employment without employees [1, 3], which is often considered as an intermediate form between employment and unemployment [4, 5]. A large review of the literature on the issues of single forms of self-employment is given in the works of Van Stel and De Vries [6]. Their detailed analysis after 2020 is presented by T. Boeri [4].

Comprehensive studies of the organization of pension provision for the self-employed are presented in two works: "A look at pensions" by the OECD 2019,[2] as well as "The policy of social protection of the self-employed" by S. Spasova [7].

The study of self-employment in Russia is focused on the issues of its legalization [8, 9]. There is an opinion about a small number of self-employed for a noticeable impact on the Russian pension system [10].

The study of the pension provision of the self-employed in Russia has not yet been formed as a separate area and is considered in the system of wages, incomes, taxation and social insurance (V. D. Roik, A. K. Soloviev, O. N. Grabova, M. E. Dmitriev A. N. Pokida, O. V. Sinyavskaya, V. E. Gimpelson, R. I. Kapelyushnikov, E. N. Tikhonova, etc.).

The authors note "a complex of institutional and parametric problems of the state pension system" [11, p. 188], in which the involvement of the self-employed is impractical due to the discrepancy between pension rights and state obligations [11, p. 188; 12, p. 227].

The task is not to expand the coverage of the self-employed (prevails abroad), but to ensure a decent level of their pensions [13, p. 121]. Although it is noted: unacceptably low coverage of the self-employed by pension insurance — 15–20% (40–60% in developed countries), the risk of poverty for older people [13, p. 122], the forced nature of self-employment in Russia [9].

On the one hand, mandatory pension insurance contributions in Russia retain the features of a tax and are paid by employers. The size of the solidarity tariff has little effect on the size of the future pension [14]. A minimum fixed contribution based on the minimum wage for individual entrepreneurs (and voluntarily self-employed) is "not beneficial" for the pension system [15].

On the other hand, the low-income level of the self-employed does not arouse their interest in pension insurance [16]. A large burden falls on the system of social pensions and the state budget.

Russia may have its own pension system for the self-employed. At the same time, there is no doubt about the rapid spread of self-employment against the background of low incomes of the population [17, p. 517], job cuts in the economy [18, p. 24]. It is all the more important to study the advanced foreign experience of attracting the self-employed to pension insurance and correctly apply it to Russian conditions.

The aim of the article is to generalize the international practice of organizing pension provision for the self-employed. The author set **the task** of identifying common approaches in OECD countries to involving the self-employed in pension insurance, factors related to them; assessment of the effectiveness of approaches, including for Russia.

The article developed and prepared a database of parametric characteristics of pension systems with the participation of the self-

[1] OECD (2019), Pensions at a Glance 2019: OECD and G20 Indicators, OECD Publishing, Paris, chapter 2. URL: https://doi.org/10.1787/b6d3dcfc-en (accessed on 14.09.2020).

[2] See above.

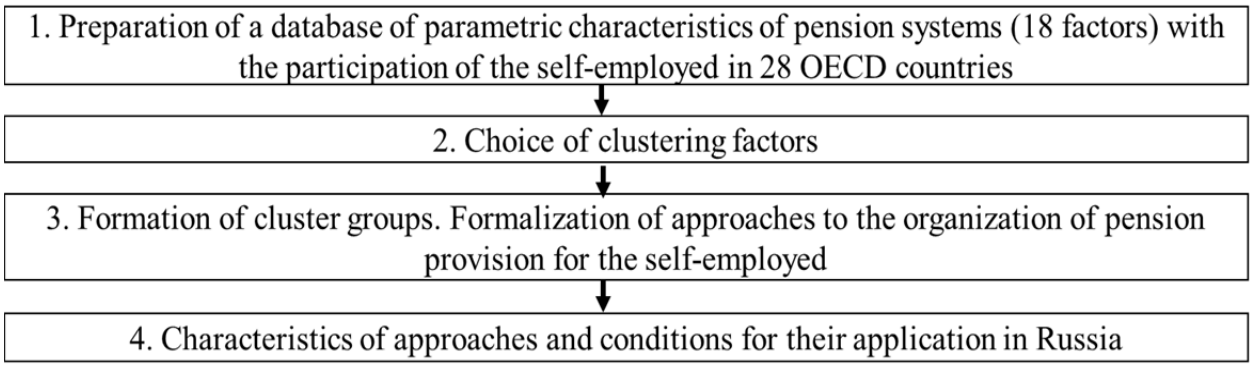

Fig. 1. **Research method**

Source: author's approach.

employed, identified 3 approaches (cluster) to the organization of pension provision for the self-employed in the OECD. A comparative analysis of these approaches was carried out as part of cluster-forming factors, factors of the architecture of pension systems, financial factors and cluster performance factors (18 indicators). Attention is paid to the mechanisms for improving the conditions of participation for the self-employed. An approach has been systematized within which it is possible to organize the provision of pensions for the self-employed in Russia. Separate effective tools and mechanisms for involving the self-employed in pension insurance in Russia will be presented in the next article.

MATERIALS AND METHODS

The practical basis of the study was the database of parametric characteristics of pension systems by 18 indicators with the participation of the self-employed in 28 OECD countries: Austria, Belgium, Great Britain, Hungary, Germany, Greece, Denmark, Ireland, Iceland, Spain, Italy, Canada, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovenia, USA, Turkey, Finland, France, Czech Republic, Switzerland, Sweden, Estonia (presented on an external electronic resource [19]). The base was formed using OECD statistics on self-employment rates,[3] as well as data for the Pensions at a Glance report, Part 2,[4] data from national agencies. The cluster analysis method was used (*Fig. 1*).

RESULTS AND DISCUSSION

1. Base of parametric characteristics of pension systems with the participation of the self-employed

A database of parametric characteristics for 28 OECD countries for 2019–2020 has been prepared (presented on an external resource [19]). A system of 9 qualitative and 9 quantitative indicators was used as part of clustering factors, architecture, financial factors, and performance indicators of pension systems with the participation of the self-employed (*Table 1*).

2. Choice of clustering factors

Factors A1 and A2 (*Table 1*) are defined as cluster-forming.

1. The evolution of approaches went from denying the need to resolve this issue to mandatory participation in pension insurance for all categories of the self-employed in general schemes with employees (*Table 2*).

2. Combinations of factors A1 and A2 make it possible to distinguish three approaches (clusters) to the organization of pension provision for the self-employed (*Table 3*).

A separate study is required for the self-employment scale (B4) and the income level of the self-employed (B5).

[3] OECD (2020), Self-employed without employees (indicator). URL: https://doi.org/10.1787/5d5d0d63-en (accessed on 14.09.2020).

[4] OECD (2019), Pensions at a Glance 2019: OECD and G20 Indicators, OECD Publishing, Paris, chapter 2. URL: https://doi.org/10.1787/b6d3dcfc-en (accessed on 14.09.2020).

Table 1

System of self-employed pensions parametric indicators

	A. Qualitative indicators*		B. Quantitative indicators*
Clustering factors	**A1** — Compulsory or voluntary participation of the self-employed **A2** — Equality of insurance rates for self-employed and employees or lower rates for self-employed	Cluster performance factors	**B1** — The size of the theoretical pension of the self-employed as % of the theoretical pension of the employee **B2** — The size of the average self-employed pension as % of the average employee pension **B3** — Volume of self-employed contributions relative to the share of self-employed in the employed population, %
Architecture factors	**A3** — Architecture of pension systems with the participation of the self-employed **A4** — Coverage of all self-employed or their individual categories **A5** — Presence or absence of benefits compared to employees	Architecture factors	**B4** — Share of self-employed without employees in the employed population, % **B5** — The level of income of the self-employed relative to the average income of an employee, %
Financial factors	**A6** — Contribution base **A7** — Discrete base A6 **A8** — The presence of a minimum income for calculating contributions **A9** — The presence of requirements for minimum income and (or) the number of working hours for the appointment of a pension	Financial factors	**B6** — Tariff for calculating contributions **B7** — Income levels of the self-employed for the calculation of contributions (in the case of a discrete approach) **B8** — Minimum income for calculating contributions **B9** — Frequency of calculation and payment of contributions

Source: author's approach.

Comments to Table 1:

A1, A2 — *clustering factors*. The position of countries relative to the evolutionary trend *architecture factors* (A3 — A5, B4 — B5).

A3, A4, A5 — a set of pension subsystems with the participation of the self-employed. They differ: in the form of ownership — public or private; by coverage — general or professional, for all self-employed or individual categories; basic income or tax-financed; shared with employees or separate schemes, distributions or savings; with the presence of benefits for the self-employed or with their absence (link with B4).

B4, B5 — quantitative characteristics of self-employment. Determine the place of the self-employed in the economy, their income potential. *Financial factors* (A6 — A9, B6 — B9).

A6, B 6 — *contribution calculation base*. For the employee, part of the contribution (or the entire contribution) is paid by the employer, the tariff is applied to income minus income tax. The self-employed person (usually) pays the full rate in relation to gross income himself. Mechanisms that reduce the contributory base can be used to level the playing field for the self-employed (link to B4).

A7, B 7 — *discreteness of the contribution calculation base*. Calculation of the contribution not from real income, but from its established general limits (optional) or using fixed contributions (link to B4).

A8, B 8 — *the presence of an established minimum income for the calculation of contributions*. In income-based pension schemes, the participation of the self-employed with incomes below a certain level is inappropriate. The options are: accrual all the same from the minimum level (minimum contribution concept) or transition from mandatory to voluntary participation or withdrawal (participation suspension) from the pension scheme.

A9 — *the presence of requirements for a minimum income and (or) the number of working hours for receiving a pension*. As a rule, reduces the coverage of the self-employed with pension insurance.

B9 — *frequency of calculation and payment of contributions (*monthly, quarterly, annually). Less frequency = more accommodation to the unstable income of the self-employed.

Cluster performance factors (B1 — B4).

B1 — *theoretical pension* — the calculated value of the pension of a self-employed person with a regular income equal to the average salary in the country from the age of 22 to retirement age, as% of the employee's theoretical pension.[1]

B2 — *the size of the average pension of a self-employed person,* as% of the average pension of an employee. Calculated according to state pension schemes.[2]

B3 — an indicator of the share of financial participation of the self-employed in state pension schemes, considering the spread of self-employment in the country's economy.

B4 — *the share of self-employed without employees in the employed population,%*. Self-employment indicator in modern forms, separately for men and women.[3]

[1] OECD (2019), Pensions at a Glance 2019: OECD and G20 Indicators, OECD Publishing, Paris, chapter 2. URL: https://doi.org/10.1787/b6d3dcfc-en (Fig. 2.13) (accessed on 14.09.2020).

[2] Там же, Fig. 2.6.

[3] OECD (2020), Self-employed without employees (indicator). URL: https://doi.org/10.1787/5d5d0d63-en (accessed on 14.09.2020).

Table 2

The evolution of self-employed pensions

I stage (until the 1970s)	II stage (the 1970s to the 1990s)	III stage (the 1990s to the 2010s)	IV stage (the 2010s to present)
Without the participation of the state. Without incentive mechanisms	From the state — a basic minimum, subject to certain conditions. Stimulation of voluntary participation of the self-employed in non-state pension plans [20, Table 1]	Active reform of pension systems. Selective compulsory participation of the self-employed in income-based pension schemes. Without special adaptation mechanisms. At the same time, insurance rates increased. Pension schemes were formed for self-employed certain professions (by 2000, 12 countries: Spain, Austria, Belgium, Finland, France, Germany, Greece, Italy, Japan, Korea, Poland, Turkey (the last 6 for farmers) [20, Table 2]	Focus on mandatory participation of the self-employed in income-based public pension schemes, together with employees Adapting conditions for the participation of the self-employed

Source: analysis results.

Table 3

Cluster analysis results

Cluster No.	Cluster 1	Cluster 2	Cluster 3
Countries *	13 countries out of 28: HU, GR, IS, ES, CA, LT, LU, PL, SL, US, TU, CZ, EE	11 out of 28: AT, BE, GB, IT, IR, LV, NL, NO, PT, FI, SE	4 out of 28: DE, DN, FR, CH
Clustering factors (A1, A2)	Mandatory participation of the self-employed in public pension schemes (A1) with rates equal to those of employees (A2)	Mandatory participation of the self-employed in public pension schemes (A1) with lower rates than for employees (A2)	Voluntary participation of the self-employed in pension insurance (A1) with lower tariffs than for employees (A2)

Source: Self-employed pensions parametric indicators database [19].

Note: * — a list of countries by the international standard code ISO 3166–1 alpha-2.

***Impact of self-employment* (B4)**

An analysis of data on the share of the self-employed without wage labor in the employed population by country only partially confirms the impact of the scale of self-employment on the organization of pension systems. Countries with voluntary pension insurance for the self-employed are concentrated in the zone of low self-employment. Countries with mandatory participation both on preferential and general terms (by tariffs) are evenly distributed among the zones of low, medium and high self-employment (*Fig. 2*).

Impact of self-employed income levels

An analysis of the income level of the self-employed (16 OECD countries) does not reveal the desired pattern. Countries with mandatory participation of the self-

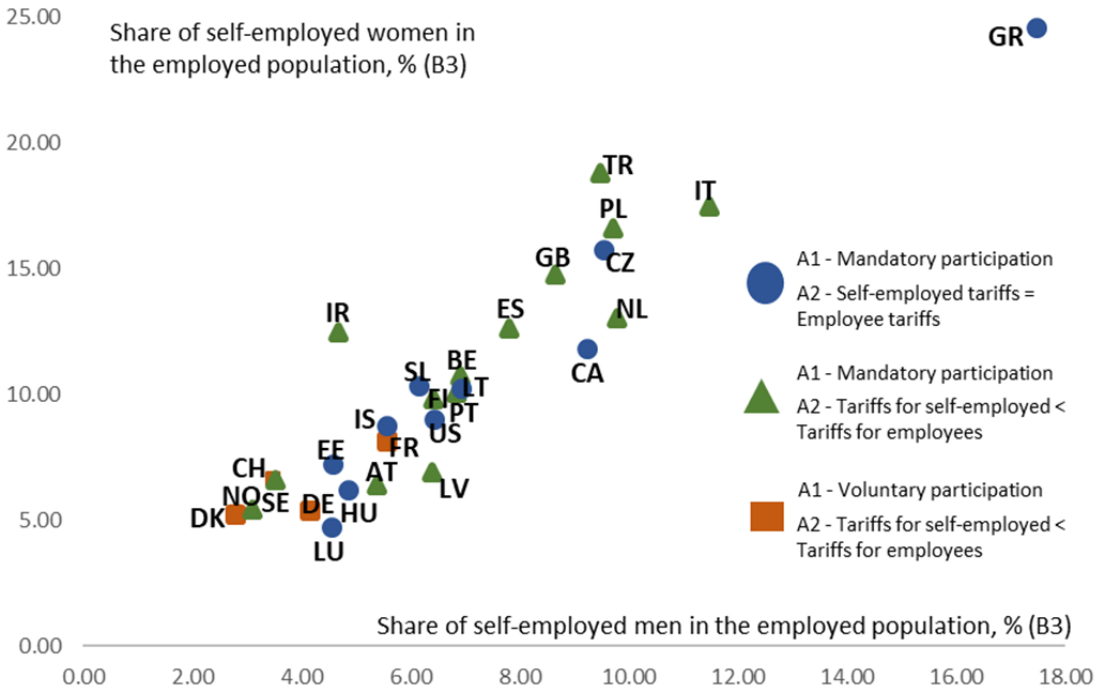

Fig. 2. **The share of self-employed without employees and clustering factors in OECD countries***

Source: Table 3, OECD (2020), Self-employed without employees (indicator). URL: https://doi.org/10.1787/5d5d0d63-en (accessed on 14.09.2020).

Note: * — the blue circle indicates the country's membership in the group with mandatory participation of the self-employed in pension insurance (A1) with rates equal to those of employees (A2);

– a green triangle indicates that the country belongs to the group with mandatory participation of the self-employed in pension insurance (A1) with rates less than those of employees (A2);

– the orange square indicates the country belongs to the group with voluntary participation of the self-employed in pension insurance (A1) with rates lower than those of employees (A2).

employed, both on preferential and general terms with employees, as well as countries with voluntary participation, are evenly distributed among low-, medium- and high-income zones. However, most countries with mandatory participation of the self-employed on preferential terms are in the middle-income zone (*Fig. 3*).

Factors B4 and B5 were not considered as cluster-forming. They are included in the parametric characteristics of pension systems with the participation of the self-employed to analyze the clustering results.

3. Cluster Analysis

There are 3 clusters (approaches) to the organization of pension provision for the self-employed on the basis of: mandatory or voluntary participation of the self-employed (A1); equality or lower insurance rates for the self-employed compared to employees (A2) (*Table 3*).

The boundaries of the clusters are outlined quite clearly: by factors of the architecture of pension systems for the self-employed (*Table 4*), by financial factors (except for A6 — the contribution base and A7 — the discreteness of the base) (*Table 5*), by cluster efficiency factors (except for B2 — self-employed pensions; and B3 — the number of countries in which self-employed contributions are less than 50% of their share in the employed population) (*Table 6*).

Architecture factors of pension systems

The transition from Cluster 1 to Cluster 3 is from the main public system of

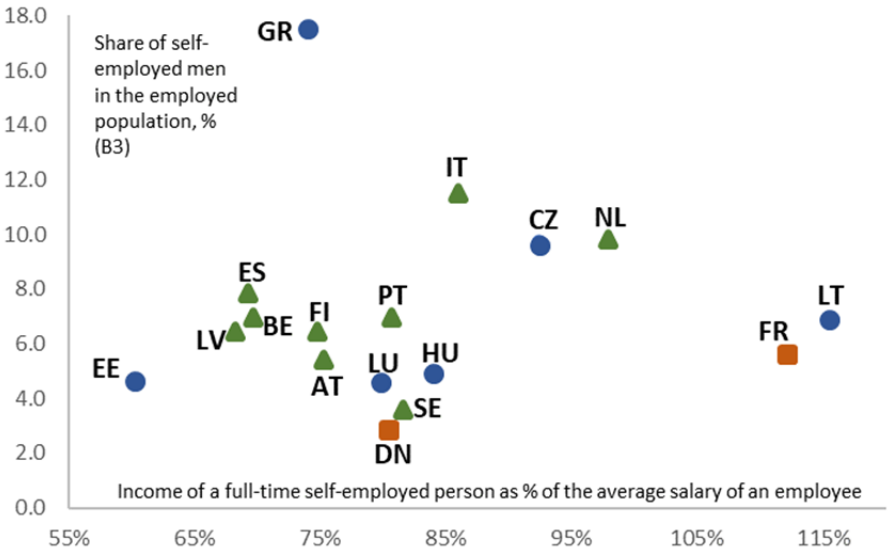

Fig. 3. **The share of self-employed without employees and income of self-employed in OECD countries***

Source: Table 3, Self-employed without employees (indicator). URL: https://doi.org/10.1787/b6d3dcfc-en; Pensions at a Glance 2019: OECD and G20 Indicators, OECD Publishing, Paris, chapter 2. URL: https://doi.org/10.1787/b6d3dcfc-en (Fig. 2.3) (accessed on 14.09.2020).

Note: * — see above *Fig. 2*.

mandatory pension insurance to equivalent pension schemes, including private funded and professional (A3); from mandatory participation of all self-employed to coverage of large professional categories (A4); from the absence of benefits to their large number (A5) (*Table 4*).

Peculiarities of architecture of pension systems by Cluster 1

The core of the cluster (61%) is made up of countries with a strong public mandatory pension insurance system, which can be represented by one (Hungary, Slovenia, Turkey) or several (Estonia, Czech Republic) pension schemes. The self-employed are usually given the right to choose between pension schemes (Canada, Poland) (*Table 4,* A3).

The mandatory pension insurance covers all self-employed in Hungary, Canada, Estonia, Poland, Slovenia.[5] The Czech Republic and Lithuania exclude temporary self-employed and part-time workers. In Greece, Spain, Iceland, Luxembourg, all self-employed persons are covered by the mandatory pension insurance system plus one or more major professional programs. In the USA, voluntary schemes of equal importance operate with the basic scheme, covering the main categories of the self-employed (*Table 4*, A3). In Turkey, the mandatory participation of the self-employed is limited by a high minimum income threshold (A4).

The conditions for self-employed and employees are equalized by the discreteness of the calculation base (fixed or declared income) in Hungary, Iceland, Lithuania, Poland, Turkey, Spain, Slovenia. Reducing coefficients to the calculation base are used by the Czech Republic, Slovenia, Lithuania. All together — 62% of countries. 23% of countries apply benefits (tax deductions, exemptions, reduced tariffs) (Canada, Luxembourg, USA) — *Table 4*, A4. In Greece and Estonia there is no equalization and benefits.

Cluster 1 includes countries with a high share of the self-employed in the employed population (*Table 4*, B5). The gap with the wages of employees among the self-employed is smaller than in other clusters (B6).

[5] The self-employed are covered by professional categories, but their list is consistently expanding.

Table 4

Pension system architecture factors

Factors	Characteristics of factor	Cluster 1	Cluster 2	Cluster 3
	Countries*	**13:** HU, GR, IS, ES, CA, LT, LU, PL, SL, US, TU, CZ, EE	**11:** AT, BE, GB, IT, IR, LV, NL, NO, PT, FI, SE	**4**: DE, DN, FR, CH
A3	1. Shared with employees, the state income scheme is the main one for the self-employed. It can be represented by several schemes in the mandatory pension insurance system. Private and/or professional schemes are small or non-existent	**8 countries (61%):** **HU, CA** (choice of 2 schemes), **CZ** (basic and solidarity), **EE** (solidarity and funded), **LT, PL** (choice of 2 schemes: only solidarity or funded and solidarity), **SL**, **TU**	**4 countries (36,4%):** LV (conditionally funded and funded), PT, FI, SE	-
	2. Shared with workers (or separate but equivalent) mandatory government income-based scheme provides most of the retirement income. A smaller but significant part is provided by private and/or professional schemes	**4 countries (31%):** **GR, ES** (+ funded scheme for farmers), **IS** (+ professional schemes), **LU** (+funded schemes for "liberal professions"	**4 countries (36.4%):** **AT** (several schemes with a plan to combine until 2050 into a common one with employees + scheme for farmers) **IT** (DB scheme for freelancers), **BE, NO** (+ professional schemes)	**2 countries (50%):** DN, CH (general scheme with employees + voluntary professional and private schemes)
	3. General state mandatory insurance establishes a minimum pension income. Other equal participation of several separate pension schemes (often on voluntary terms)	**1 country (8%):** **US** (basic + equitable voluntary pension schemes, incl. occupational)	**3 countries (27.2%):** UK and IR (mandatory basic scheme + voluntary funded and professional), NL (the same + mandatory funded for a number of professions)	**2 countries (50%):** FR, DE (separate compulsory professional schemes)
A4	1. All categories of self-employed are included	**9 countries (68%):** **HU, GR, IS, ES, CA, EE, LU** and **SL** (not all, but coverage is expanding) **PL (**auto-subscribe)	**4 countries (36.4%):** **LV, NO, PT, SE** (+ professional schemes — 28% coverage)	-
	2. Not all are included, but the main professional categories (except for temporary self-employed, part-time workers)	**3 countries (23%):** **US, LT** (except temporary), **CZ** (part-time — voluntary)	**3 countries (23.4%):** **AT, BE** (not covered by low-paid platform self-employed), **IT**	-
	3. Limited participation (high mandatory participation threshold)	**1 country (8%):** TU	**4 countries (27.2%):** **UK, IR, FI**	**4 countries (100%):** FR, DE (general compulsory participation in plans), DN, CH
A5	1. No significant benefits	**2 countries (15%):** GR, EE	-	-
	2. Benefits for the settlement base (discreteness, reducing coefficients to the settlement base, reduced tariffs (the latter — for clusters 2 and 3)	**8 countries (62%):** HU, IS, LT, PL, TU, CZ, ES, SL	**5 countries (45%):** AT, BE, IT, LV, NL	-
	3. Significant tax benefits and preferences (deductions, exemptions from contributions, conversions), in addition to benefits on the calculation base	**3 countries (23%):** CA, US, LU,	**6 countries (54%):** UK, IR, NO, PT, FI, SE	**4 countries (100%):** FR, DE, DN, CH

Table 4 (continued)

Factors	Characteristics of factor	Cluster 1	Cluster 2	Cluster 3
	Countries*	**13:** HU, GR, IS, ES, CA, LT, LU, PL, SL, US, TU, CZ, EE	**11:** AT, BE, GB, IT, IR, LV, NL, NO, PT, FI, SE	**4**: DE, DN, FR, CH
4	Average share of self-employed without employees in the employed population, % (by clusters)	female **7.9**; male **12.0** (extremum: GR — 17.5 and 24.5)	female **6.7**; male **10.3**	female **4.0**; male **6.3**
B5	Average income level of self-employed relative to the average income of an employee, % (by clusters)	***84*** *(for 7 known indicators: HU, ES, PL, LT, CZ, EE)*	***76*** *(for 7 known indicators: AT, BE, IT, LV, PT, FI, SE*	***112*** *(FR data)*

Source: Self-employed pensions parametric indicators database [19].

Note: * — a list of countries by the international standard code ISO 3166–1 alpha-2.

Peculiarities of architecture of pension systems by Cluster 2

The architecture of self-employed pension systems in Cluster 2 is shifting towards more supplementation of the mandatory pension insurance system with large occupational schemes (Austria, Italy, Belgium, Norway), often equivalent in size (UK, Ireland, the Netherlands). For the latter, the mandatory pension insurance is limited to the basic minimum pension scheme. In total together — 63.6%. Countries in which the main mandatory pension insurance is shared with workers account for 36.4% (Latvia, Portugal, Finland, Sweden) (*Table 4,* A3).

Latvia, Norway, Portugal, Sweden (27.2%) cover all self-employed people with pension insurance. In Austria, Italy, specific professional categories are covered by a wide range. Belgium excludes the low-paid self-employed of the platform economy (23.4% of countries). In the UK, Ireland, Finland (27.2%), all categories are covered, but with a high entry threshold (work for a certain number of months a year, income above the minimum level) (*Table 4*, A4).

The self-employed persons in Cluster 2 receive more benefits. All have discounted rates. 54% of countries (Great Britain, Ireland, Norway, Portugal, Finland, Sweden) have tax benefits, deductions (*Table 4*, A5). Cluster 2 is characterized by a smaller share of the self-employed in the employed population (*Table 4*, B5) and lower incomes of the self-employed compared to employees than in Cluster 1 (B6).

Peculiarities of architecture of pension systems by Cluster 3

Cluster 3 is represented by Germany, Denmark, France, Switzerland. These are differentiated, predominantly voluntary pension systems with preferential rates, tax breaks and preferences. They are distinguished by a smaller share of the self-employed in the employed population (*Table 4*).

Public schemes provide a basic minimum pension income (in Denmark and Switzerland). To receive a higher pension, it is important to participate in voluntary professional schemes, private savings schemes. In Denmark, the public scheme has a zero contribution. In Switzerland, mandatory contributions to the public system start at age 20 at a lower rate for the self-employed. With an annual income below the established level, the rate is significantly reduced.[6]

[6] 1st pillar: OASI/DI/APG. SME Portal for small and medium-sized enterprises. URL: https://www.kmu.admin.ch/kmu/en/home/concrete-know-how/personnel/personnel-management/employers-obligations/social-insurance/1st-pillar.html (accessed on 31.01.2021).

In Germany, the participation of a part of the self-employed (teachers, craftsmen, nannies, etc., dependent self-employed) is mandatory. In France, there are separate compulsory schemes for self-employed persons in certain professions. These countries are planning to switch to a mandatory scheme with workers.

Financial factors

General — use gross income as the basis for calculating contributions (except US — net income). Transition from Cluster 1 to Cluster 3:

- from the use of mechanisms for adjusting the contribution calculation base (discreteness, reduction factor) to the absence of such mechanisms (*Table 5*, A6, A7, B7);
- from strict conditions for calculating the contribution (for incomes below the minimum level — the contribution is still calculated from the minimum base) to soft conditions (for incomes below the minimum level — transition to voluntary participation) or to the absence of a minimum income level (*Table 5*, A8);
- from the absence of requirements for the appointment of a pension to the requirements for the established level of income and the number of hours worked (*Table 5*, P9);
- from a higher insurance rate to a lower one with an increase in the spread of values (*Table 5*, B6) and from a higher minimum income for calculating contributions to a lower one (*Table 5*, B8);
- from monthly to annual frequency of contributions (*Table 5*, B9).

Financial factors by Cluster 1

In Cluster 1, the conditions for calculating contributions are determined by mechanisms for equalizing the conditions of the self-employed with employees by adjusting the calculation base (part of the contribution is paid by the employer, part of the employee's tariff is applied to income after mandatory payments):

- application of the tariff only to a part of the base for calculating contributions (reducing factor) — Czech Republic, Slovenia, Lithuania (*Table 5*, A6);
- granting the right to the self-employed to independently choose a fixed level of the base for calculating contributions (Poland, Iceland, Turkey). The more the base — the more the pension, but 70% choose the minimum base for accrual. In Hungary, Lithuania, Slovenia, this mechanism is applied to certain categories of self-employed with special taxation schemes (self-employed without employees — Hungary,[7] 7 professional categories — Lithuania,[8] small businesses and traders — Slovenia[9]).

All countries (except Iceland) set a minimum income for the calculation of contributions, of which 50% of countries with incomes below the minimum contribution are still calculated from the minimum level (Hungary, Greece, Lithuania, Luxembourg, Poland).

Insurance rates for the self-employed are the same as for employees (with employer's contribution). Their size is on average higher than in other clusters with a smaller spread of values. There are no requirements for granting a pension (A9) (except for Canada and Turkey). Fees are calculated and paid on a monthly basis (except for Canada and the USA) (*Table 5*).

Financial factors by Cluster 2

The Cluster 2 main advantage for the self-employed is lower wages compared to employees. At the same time, the mechanisms for lowering the calculation base are applied to the same extent as in Cluster 1 (fixed assessment bases: Great Britain, Ireland, Latvia, Portugal, Finland) (*Table 5*, A6, A7, B7).

Most countries (except the Netherlands, Portugal) set a minimum income for the

[7] Review of the Hungarian tax system. The Ministry of Interior. URL: http://eugo.gov.hu/doing-business-hungary/taxation#Fixed-Rate%20Tax%20of%20Low%20Tax-Bracket%20Enterprises%20(KATA) (accessed on 03.02.2021).

[8] Contribution rates for the self-employed. The State Social Insurance Fund Board. URL: https://www.sodra.lt/en/benefits/contribution-rates/contribution-rates-for-the-self-employed (accessed on 05.01.2021).

[9] Browne J., Bachelet M., Immervoll H., Neumann D., Daniele P., Rastrigina O. The OECD Tax-Benefit Model for Slovenia. Description of Policy Rules for 2018. OECD. URL: http://www.oecd.org/els/soc/Slovenia-2018.pdf (accessed on 13.02.2021).

Table 5

Financial factors of pension systems

Factors	Characteristics of factor	Cluster 1	Cluster 2	Cluster 3
	Countries*	**13:** HU, GR, IS, ES, CA, LT, LU, PL, SL, US, TU, CZ, EE	**11:** AT, BE, GB, IT, IR, LV, NL, NO, PT, FI, SE	**4**: DE, DN, FR, CH
A6	1. Gross income before taxes with the application of the tariff to the entire base, taking into account additional conditions (see A7)	**8 countries (62%):** HU GR, CA, LU, TU, EE, US, ES (net income)	**6 countries (55%):** AT, BE, IT, NL, NO, SE	**4 countries (100%):** FR, DE, DN, CH
	2. With the application of the tariff to a part of the base for calculating contributions (50–90%)	**3 countries (28%):** CZ (50%), SL (75%), LT (90%)	–	–
A7, B 7	1. No discreteness of the calculation base	**6 countries (46%):** GR, CA, LU, US, CZ, EE	**6 countries (55%):** AT, BE, IT, NL, NO, SE	**4 countries (100%):** FR, DE, DN, CH
	2. Discreteness of the calculation base for certain categories of self-employed	**3 countries (23%):** HU, LT, SL	–	–
	3. Discreteness of the calculation base for all self-employed persons	**4 countries (31%):** IS, ES, PL, TU	**5 countries (45%):** UK, IR, LV, PT, FI	–
A8	1. The minimum income (base) for calculating contributions, if the income is lower — the calculation of the contribution from the minimum base	**6 countries (46%):** HU, GR, LT, LU, PL (with income below — reduction of the base for calculation), EE (contributions below — not included in the length of service)	**2 countries (18%):** AT, LV (below the minimum income — at a reduced rate)	–
	2. Minimum income for the calculation of contributions, with income below — voluntary participation	**6 countries (46%):** ES, CA, SL, TU, US, CZ	**7 countries (64%):** BE, UK, IR, IT, NO, FI, SE	**2 countries (50%):** DE, CH
	3. No minimum income (base) for calculating contributions	**1 country (8%):** IS	**2 countries (18%):** NL, PT	**2 countries (50%):** FR, DN
A9	1. No requirements for a pension	**11 countries (85%):** IS, ES, PL, TU, HU, GR, IS, ES, LT, LU, PL, SL, US, CZ, EE	**6 countries (55%):** BE, IT, LV, NL, PT, SE	–
	2. Income requirements	**2 countries (15%):** CA, TU	**4 countries (36%):** AT, UK, IR, FI	**2 countries (50%):** FR, CH
	3. Requirements for the number of hours worked	-	**1 country (9%):** NO	**2 countries (50%):** DE, DN
B 6	Average rate for calculating contributions (by cluster), %	**18.75** (extremum: CZ — 28, LT — 9)	**17.43** (extremum: IT — 29.1, IR — 4)	**17.13** (extremum: DN — 0 (basic scheme), FR — 24.9%)
B 8	The amount of the minimum income for calculating contributions (converted at the exchange rate of the ruble to the national currency of the corresponding country at the exchange rate as of 08.01.2021), rubles per month	**11 946.6** (extremum: LU — 43553, CA — 1840)	**10 902.9** (extremum: IT — 34 591.9, IR — 1 513.3)	**4 954.7** (CH)
B 9	1. Payment of contributions monthly	**11 countries (85%):** HU, GR, IS, ES, LT (or annually, choice), LU, PL, SL, TU, CZ, EE	**4 countries (36%):** AT, BE, UK (weekly), PT	**1 country (25%):** FR
	2. Payment of contributions annually	**2 countries (15%):** CA, US	**7 countries (64%):** IR, IT, LV, NL, NO, FI, SE	**3 countries (75%):** DE, CH, DN

Source: Self-employed pensions parametric indicators database [19].

Note: * — a list of countries by the international standard code ISO 3166–1 alpha-2.

calculation of contributions, of which only Austria and Latvia calculate the contribution from the minimum level for incomes below the minimum. In the rest of the countries (64%), there is a transition to voluntary participation (*Table 5*, A8).

Russia, there are no opportunities for a differentiated approach to the creation of private and professional pension plans for the self-employed.

Softer conditions for calculating contributions (preferential rates, the possibility of reducing the accrual base) are expressed in a smaller amount of incoming contributions, which is offset by more stringent conditions for assigning a pension (in 45% of countries: Austria, Great Britain, Ireland, Finland, Norway). Another feature compared to Cluster 1 is the predominance of the annual frequency of payment of contributions (Ireland, Italy, Latvia, the Netherlands, Norway, Finland, Sweden) (*Table 5*), indicators B8, B9.

Financial factors by Cluster 3

The minimum income for calculating contributions is either not set (France, Denmark), used to exclude low contribution participants (Switzerland), or applied to a scheme mandatory for some categories of self-employed (Germany). In case of income below — voluntary participation (*Table 5*). The benefits are accompanied by the introduction of conditions for the appointment of a state pension: the minimum number of hours worked (Denmark), the minimum income threshold (Switzerland).

Performance factors

The efficiency of clusters is determined by the size of the theoretical pension of the self-employed as a percentage of the employee's theoretical pension. This is the estimated value of a pension with a regular income equal to the average salary in the country, from 22 years to retirement age and payment of only mandatory contributions.

The mandatory pension insurance system, which covers all categories (Cluster 1), makes it possible to receive a high pension income (on average 89% of an employee's theoretical pension). In Cluster 2, the average theoretical pension is below 83.5% (more benefits for more countries). Cluster 3 is distinguished by a low value of the theoretical pension of the self-employed — 59.3% (all countries provide wide benefits to the self-employed (*Table 6*, B1, for comparison — A5).

The values of the average pension of a self-employed person compared to the average pension of an employee are given considering state pension schemes for those countries for which data are available (Table 6, B2). The gap varies by country, regardless of their cluster membership. Countries with a gap of up to 10% [Denmark (2%), Switzerland (4%), Czech Republic (9%)] differ in the state basic pension system, covering all self-employed persons, but with the conditions for granting a pension.

The basic scheme in Denmark is zero-contributory, with pensions tied to exceeding a minimum service level. In Switzerland, the basic state pension is granted to persons with incomes above the threshold level (*Table 4*, P3) with mandatory contributions throughout their working life. As a result, indicator B2 includes the self-employed with higher incomes. At the same time, Switzerland is among the 9 OECD countries where self-employed contributions in relation to the share of self-employed in the employed population is less than 50% (*Table 6*, B3).

The Czech Republic has a strong public pension system with basic and income-based pensions. The latter have a pronounced distributional effect: for incomes below the established minimum, the replacement rate for lost profits is 100%, for incomes in the average established range — 30%, for incomes above — 10%.[10]

[10] Pension System in Czech Republic. Pension Funds online. URL: https://www.pensionfundsonline.co.uk/content/country-profiles/czech-republic#:~:text=The%20contribution%20

Table 6

Pension system performance factors

Factors	Characteristics of factor	Cluster 1	Cluster 2	Cluster 3
	Countries*	**13:** HU, GR, IS, ES, CA, LT, LU, PL, SL, US, TU, CZ, EE	**11:** AT, BE, GB, IT, IR, LV, NL, NO, PT, FI, SE	**4**: DE, DN, FR, CH
B 1	B 1 — the size of the theoretical pension of the self-employed, as% of the theoretical pension of the employee	**88.9** (extremum: HU — 128). Without ES (42). PL (59), TU (52) — **100.8**	**83.5** (extremum: AT — 111, NL — 39). Without NL **— 88.4**	**59.3** (extremum: FR — 83, CH — 50)
B 2	B 2 — the size of the average pension of the self-employed, as% of the average pension of the employee	LU — 62, PL — 63, ES — 76, SL — 81, GR — 82, CZ — 91	BE — 75, AT — 78, SE — 87, BT — 98	DE — 51, FR — 66, CH — 96, DN — 98
B 3	B 3 — the size of self-employed contributions relative to the share of self-employed in the employed population,%. Reported as the number of countries with a specified indicator value < **50%**	**4 countries (31%):** HU, CA, SL, TU	**4 countries (36%):** IR, LV, PT, SE	**1 country (25%):** CH

Source: Self-employed pensions parametric indicators database [19].

Note: * — a list of countries by the international standard code ISO 3166–1 alpha-2.

The largest gap in the average pension between self-employed and employees is in Germany (49%), Luxembourg (38%), Poland (37%), France (34%).

Germany and France are characterized by low coverage of the self-employed persons by compulsory schemes (different for different categories). In Germany, there is an option to exit compulsory schemes after 18 years of participation, with income below the minimum — a 50% tariff. France has significantly lower rates for the self-employed in the main occupational categories.[11] Prospects are outlined for combining individual schemes for the self-employed into a general scheme with employees.

The pension systems of Poland and Luxembourg are characterized by a large general mandatory income-based pension scheme. They are characterized by a high coverage of the self-employed with the possibility of reducing the calculation base. In Poland — the choice of a fixed minimum base, its significant reduction with incomes below the minimum.[12] In Luxembourg — a system of exemption from the payment of contributions.[13]

rate%20for%20the,whole%2028%25%20of%20their%20earnings.&text=The%20base%20on%20which%20pensions,and%2010%25%20above%20this%20sum (accessed on 25.01.2021).

[11] For artisans and merchants: Years 1 and 2 — fixed income, then — 17.75% of annual income up to 39,732 euros + 0.6% from excess. For self-employed "liberal" professions — 8.23% of annual income up to 39,732 euros + 1.87% in the range of 39,732–198,660 euros (for employees — 28%) (OECD (2019), Pensions at a Glance 2019: OECD and G20 Indicators, OECD Publishing, Paris, chapter 2. URL: https://doi.org/10.1787/b6d3dcfc-en (Fig. 2.12) (accessed on 03.02.2021).

[12] In Poland, the minimum income for calculating contributions is 60% of the average monthly income (Social Security Programs Throughout the World: Europe. Wash.: U.S. Social Security Administration. Office of Retirement and Disability Policy, ISSA. URL: https://www.ssa.gov/policy/docs/progdesc/ssptw/ (accessed on 03.02.2021). Below income, the calculation base is reduced to 30% of the minimum wage or 60% of the average wage for 3 years every 5 years. (OECD (2019), Pensions at a Glance 2019: OECD and G20 Indicators, OECD Publishing, Paris, chapter 2. URL: https://doi.org/10.1787/b6d3dcfc-en) (accessed on 03.02.2021).

[13] In Luxembourg, the minimum income for contributory purposes is equal to the minimum monthly social wage (40% of the average wage in 2019). (OECD (2019), Pensions at a Glance 2019: OECD and G20 Indicators, OECD Publishing,

4. Alternative pension options for the self-employed and proposals for Russia

The approaches to the provision of pensions for the self-employed identified in international practice are not yet implemented in Russia. Mandatory participation of the self-employed is effective at incomes equal to or higher than those of employees. The provision of benefits reduces the average pension. In Russia, there are no opportunities for a differentiated approach to the creation of private and professional pension plans for the self-employed.

Most countries apply mechanisms that equalize the position of employees and the self-employed in general pension insurance schemes.

What are the alternatives? First, these are quasi-mandatory participation options. For example, the introduction of the obligation of a person engaged in labor activity, regardless of employment status, to be a member of any pension insurance system of their choice. Related conditions: freedom to convert contributions from one pension scheme to another.

Secondly, the development of pension insurance for the self-employed in general schemes with employees in terms of not the entire mandatory pension insurance, but only the voluntary funded component. In Russia, discussions on the Guaranteed Pension Product (GPP) project, as well as the draft law of the Ministry of Finance on voluntary pension contributions, provide opportunities for this.

The potential of the funded system is the young population, able to form pension savings sufficient to receive a funded pension larger than the social one. Numerous surveys among young people show their interest: in greater independence in the disposal and management of pension savings, in self-registration in the system, in choosing the contribution rate (fixed, as a percentage of income), in the possibility of using part of the savings in certain life situations, in choosing ways savings management.

Thirdly, under Russian conditions (savings in social pension payments, incentives for the self-employed to leave the informal zone), co-financing of contributions from the state is justified.

Fourthly, increase the financial literacy of the population. Abroad, special pension products are being designed for the self-employed. For Russia (an emerging financial market), it is important to create resources that are easy to understand:

- online pension calculators that use forecasting tools to calculate pensions in the conditions of expected retirement that are relevant for the future pensioner;
- development of mobile technologies for accessing and managing one's pension account through a single software.

This will create strong incentives and opportunities for the self-employed (and not only) to master the financial aspects of participating in pension products.

In Russian conditions, it is important to create conditions for the growth of the participation of the self-employed as their income increases and they come out of the "shadow". It is promising to use separate mechanisms for providing pensions to the self-employed from international practice. Their detailed presentation is proposed in a subsequent article based on a study of the quantitative and qualitative characteristics of Russian self-employment.

CONCLUSIONS

In the organization of pension provision for the self-employed, 3 clusters have been identified. The differences are determined to a greater extent by the architecture of pension

Paris, chapter 2. URL: https://doi.org/10.1787/b6d3dcfc-en (Fig. 2.12) (accessed on 03.02.2021). Benefits in the nationwide scheme: State participation, exemption from contributions for project implementation (3 months a year); in the mandatory accumulative professional scheme for persons of "free" professions — a tax deduction of 20%.

systems and to a lesser extent by the size and income of the self-employed.

Mandatory participation of all self-employed people in the state system of public pension systems common with employees and on equal terms with them (Cluster 1) can provide a higher pension for the self-employed, but if people with incomes above the minimum predominate in their structure and with a high distribution potential of the public pension system.

Compulsory participation provides a greater ratio of the theoretical self-employed pension to the employee's pension (Cluster 1 — an average of 89%, Cluster 2–84%, Cluster 3–59%, *Table 5*, B1).

The actual ratio is lower due to the low incomes of the self-employed. The self-employed pays contributions without the help of an employer, his rate is applied (as a rule) to gross, and not to net income, as for employees. Most countries apply mechanisms that equalize the position of employees and the self-employed in general pension insurance schemes. This is the use of its fixed levels instead of the actual amount of income (as a rule, an acceptable minimum is chosen); reduction factors — 30–40% to the calculated base (*Table 5*, A6, A7).

Providing benefits for the self-employed: reduced tariffs, tax deductions, exemptions on contributions, etc. (Cluster 2) does not improve the coverage of the self-employed and their retirement income. Differentiation of pension systems [high importance of professional and private pension schemes (Cluster 3) with voluntariness and benefits leads to lower self-employed pensions. Their coverage does not exceed 30% of the self-employed in OECD countries[14]].

The amount of the pension is reduced when the self-employed with an income below the minimum level are included in the pension schemes:

- when establishing unprecedented benefits on contributions for the self-employed with income below the established minimum level (Germany, Latvia);
- if contributions from incomes below the minimum are allowed while maintaining the insurance period (Spain, partly countries where the participation of the self-employed in income schemes with income below the minimum becomes voluntary — more than 50% of countries, *Table 5*, A8);
- with special pension regimes for low-paid categories and dependent self-employed (France, Latvia — contributions up to 4 times lower; Hungary, Latvia, Slovenia — minimum fixed contributions for almost 50% of the self-employed; Spain, Portugal, Italy, Germany — low rates and obligation dominant clients to pay part of the pension contributions for dependent self-employed[15]).

The size of the average pension depends on the availability of separate schemes for farmers (special treatment, benefits, state subsidies). Example — Poland, partly — Austria, Finland, France, Germany, Greece, Spain. The inclusion of temporary self-employment, part-time work has an impact.

None of the approaches gives a noticeably better result in the provision of pensions for the self-employed. At low incomes, a convincing factor in the success of pensions (the fight against pension poverty) is inclusion in large-scale mandatory public schemes with a high distributional effect. Increasing the level of their coverage with professional pensions and private pensions can be called a factor in the growth of self-employed pensions.

For Russia, alternative options for providing pensions to the self-employed are relevant — conditionally mandatory participation, association with employees not of the mandatory pension insurance, but of the voluntary funded component. At the same time, two directions can give a good return: state co-financing and the practical development of financial literacy, without going into the depths of financial knowledge.

[14] OECD (2019), Pensions at a Glance 2019: OECD and G20 Indicators, OECD Publishing, Paris, chapter 2. URL: https://doi.org/10.1787/b6d3dcfc-en (Fig. 2.6) (accessed on 14.09.2020).

[15] More than 50% of their income depends on one or more large clients.

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Insurance Industry and China's Regional Economic Development

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ABSTRACT

With the development of the financial industry market, China's attention has been drawn to the role of insurance and economic development in the insurance industry. **The aim** of the paper is to determine the impact and development of the insurance industry of the regional economy; formulate an appropriate policy for the insurance industry. **The tasks** of the study are to analyze the contribution of the insurance industry to the economic development of China and the impact of property and life insurance on economic growth in the region. The author applies **methods** such as literature analysis and empirical research. Reference samples selected for the study form a theoretical basis. The paper defines the study model, study variables, and statistics. Based on the research on the economic growth theory, the author uses the endogenous economic growth model to conduct empirical research and test the data of various regions in China from 2013 to 2019. The author uses statistics to conduct empirical analysis and report research findings and interprets empirical results using comparison methods and graphs. The study reveals that life insurance and property insurance are conducive to the steady growth of China's economy, reduce economic risks, promote the development of investment and exports, and promote economic growth. The development of the insurance industry has realized the collection of funds and supported the development of regional industries, and has improved the efficiency of the use of funds. The author concludes that the development of policies of the insurance industry in different regions and the development of the adaptive insurance business are more conducive to economic stability and growth. The findings of the study can be applied to countries with different economic development by region, such as Russia.

Keywords: regional economy; the insurance industry; insurance level; property insurance; life insurance; regional differences; the structure of the insurance industry

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INTRODUCTION

The Chinese insurance market has experienced long-term rapid growth since the recovery and has become the most dynamic and highly competitive insurance market in the world with a high degree of marketability. The insurance industry has become a pillar of the financial industry and the national economy and has a huge impact on regional financial stability and economic development [1]. The number of insurance companies has grown from one in 1980 to 239 in 2021.[1] The changes are shown in *Fig. 1*.

Among them, there are 12 insurance groups, 1 insurance holding company, 86 property insurance companies, 93 life insurance companies, 14 reinsurance companies, 29 asset management insurance companies, 5 other types of insurance companies, and 119,058 insurance practitioners. Total assets increased from less than 4 billion rubles to 23,298.4 billion rubles.[2] The average growth rate exceeded 15%.[3] Since 2011, China's premium income has continued to grow, reaching 452.57 billion rubles in 2020.[4] Despite the impact of the pandemic, premium income has increased significantly

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[3] Iresearch (2021). China Insurance User Demand Trend Insight Report May. 24, 2021. URL: https://www.jiemian.com/article/6137035.html (accessed on 04.10.2021).

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compared to 2019. The insurance density has increased from 0.47 yuan/person in 1980 to 3460 yuan/person in 2020.[5] The insurance depth in China's insurance market, from 0.01% in 1980 to 4.5% in 2020 [2].

Despite the rapid development of the insurance industry, it is unevenly distributed in the regional economic belt, and the difference in its contribution to economic growth is gradually decreasing [3]. Even within the economic zone, there is a significant imbalance in the development of the insurance industry between the provinces.

LITERATURE REVIEW

Insurance companies interact with other economic sectors through investment activities to ensure the sound development of the national economy [4]. As a strategic sector, insurance companies have made contributions to sustainable development [5]. Insurance has the functions of economic compensation, financing, and social management [6]. The economic compensation function helps to stimulate consumption and promote technological innovation. The insurance business collects the premium, the capital pool formed and the time difference of compensation make the insurance company obtain a large amount of continuous and stable capital flow.

Insurance companies can use large-scale funds for investment activities to support the development of other economies. The coordination of insurance funds and banking funds is conducive to improving the regional investment system [7].

The social management function in insurance coordinates social and economic life, guarantees social and economic order and increases the efficiency of social operations. This reduces friction between people, enterprises and government and ensures the stability of the social environment for regional economic development within certain limits [8]. Local insurance organizations are one of the main factors in the economic development of developing countries, but the oligopoly also harms the development of the insurance market, which, in turn, affects its economic driving role [9].

Based on the study of time-series data and the model of joint integration, it was found that there is no absolute causal relationship between insurance and economic growth, and significant differences between countries are obvious [10]. At the same time, studies based on cross-country data have shown that life insurance contributes to economic growth [11].

Based on the empirical findings of the Solow growth model, the positive impact of the period of interaction between the banking industry and the insurance industry on economic growth is higher than the impact of the banking industry or the depth of insurance [12]. Analyze the impact of the development of the insurance industry on the consumption level of residents. The development of the insurance industry has significantly improved the consumption level of residents and promoted economic growth [13]. The development of insurance markets in both industrialized and developing countries has had a positive and significant causal effect on economic growth [14]. There is a long-term, two-way causal relationship between the life insurance industry and economic growth. The life insurance industry in high-income countries plays a more important role in promoting economic growth [15]. The relationship between the insurance industry and economic growth varies considerably due to the social, cultural, economic, and legal systems of different countries [16]. There is a non-linear relationship between GDP growth and the development of the life insurance industry, and there is an optimal threshold level between them [17].

Different types of grouped countries have different degrees of dependence between indicators of economic growth and the development of indicators of the insurance market, which is determined, not least, by historical, economic, spatial, geographical, and geopolitical characteristics [18]. Empirical analysis of the relationship between the development of the insurance industry and regional economic growth is mainly based on the model of endogenous economic growth. By adding the insurance industry to the endogenous growth model of overlapping generations, analyzing the equilibrium pathway affecting economic growth, it was found that a positive secondary impact of the insurance industry leads to endogenous economic growth [19].

The economic growth mechanism based on the modified Solow-Swan model confirms that insurance affects production activities through investment, which in turn affects economic growth, and the

[5] School of Finance (2021). Zhongnan University of Finance and Economics. China Insurance Development Report 2021. URL : https://mp.weixin.qq.com (accessed on 03.11.2021).

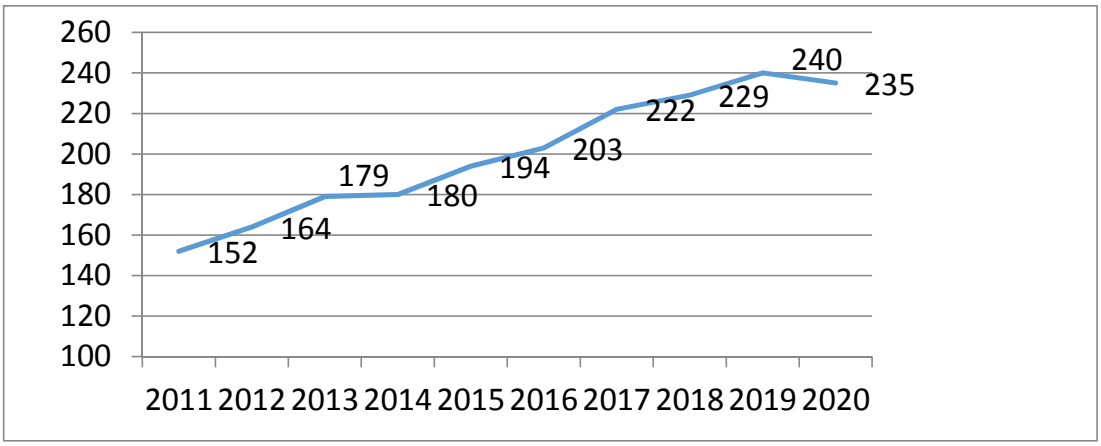

Fig. 1. **Number of insurance companies in China's insurance market from 2011 to 2020**
Source: compiled by the authors.

process of promoting economic growth strictly depends on technological progress [20].

The insurance industry has a positive impact on GDP, mainly through risk management, savings substitution and investment promotion. The insurance industry provides business entities with risk transfer and loss compensation services, provides protection against risks and plays a positive external effect, maintaining financial stability, reducing economic fluctuations and hedging economic losses [21]. Shao Quanquan added the development of the insurance industry and the structural variables of property and life insurance into the nonlinear dynamic system model of economic growth and urban-rural income gap, reflecting that the development of life insurance will restrict economic growth and widen the urban-rural income gap. The development of property insurance will promote economic growth and narrow the income gap between urban and rural areas [22]. If the property insurance industry is expanded compared to the life insurance industry, it will narrow the income gap between urban and rural areas and contribute to economic growth.

FORMULATION OF THE PROBLEM

The insurance market is characterized by interconnection with other components of the country's economy. It has a significant impact on the development of the economy of the country and individual regions. At the same time, the level of economic development and social sphere stimulates the growth and development of the insurance market [23]. Past research has shown that the insurance industry is a guarantee of China's economic growth and stability. With the development of the insurance market, functions such as transfer of insurance risks and compensation, as well as the influence of the structure and functions of the insurance market on regional economic growth, also began to attract more attention [24].

So, what is the internal relationship between the rapid development of the insurance industry, sustainable and stable economic growth in various regions of China, and the gradual improvement in the quality of economic growth? How to play a role in the process of regional economic growth? When formulating economic or financial policies, how should we take into account the sustainable development of the insurance market and limit the volatility of the insurance market?

MODELS, METHODS AND RESULTS

To explain the impact of the insurance industry on the development of the regional economy, research results in the reference literature modify the Cobb-Douglas function and introduce financial variables into the function to analyze the contribution of the Chinese financial industry to economic growth [11, 12, 25]. Assuming that the financial industry satisfies Hicks' neutral premise of constant return, we created an economic growth model:

$$Y(t) = Z(t)A(t)K(t)^{\alpha} L(t)^{1-\alpha}, 0 < \alpha < 1, \quad (1)$$

Among them, $Y(t)$ is the economic output at t, $A(t)$-technical productivity changes and the exogenous

growth rate g is constant, $A(t) = A(0)\, egt$, $K(t)$ — capital at t, $L(t)$ — labor force at t. $Z(t)$ is a financial variable, including banking and insurance.

$$Z(t) = Z(0)\exp(Bank_t + PI_t + LI_t), \quad (2)$$

In this model, capital and labor are equally diminishing marginal, because

$$\frac{\partial Y}{\partial L} > 0, \frac{\partial Y}{\partial K} > 0, \frac{\partial^2 Y}{\partial^2 L} < 0, \frac{\partial^2 Y}{\partial^2 K} < 0, \quad (3)$$

Assuming that technology and labor are fixed constants, take the logarithm of expression (1) and add control variables to get the panel data model:

$$\ln(GDP)_{it} = M_0 + M_1 PI_{it} + M_2 LI_{it} + \\ + M_3 X_{it} + P_{it} + \xi_{it}, \quad (4)$$

GDP_{it} — *GDP* of province i for period t, the only explanatory variable in the model, reflects the regional economy. PI_{it} and LI_{it} — are property insurance, life insurance. X_{it} — is the control variable, other variables related to the research include the value of exports, investment in fixed assets, household consumption index, etc., P_{it} — are other unobservable factors, ξ_{it} — it is an element of random disturbance.

The model comprehensively considers the control variable X_{it}, which affects economic growth: fixed assets, government spending, total imports and exports, investment in fixed assets, and inflation. These five variables are used to measure actual and human capital investment, trade imports and exports, government intervention, and macroeconomic stability.

To facilitate research, real estate investments are used as fixed capital investments, the financial institution's loan balance at the end of the year is used as bank data, and the CPI is used to measure changes in inflation.

To test the contribution of the development of the regional insurance industry to regional economic growth, we selected 30 provinces in China as the subject of our study according to the division of China's economic regions and re-subdivided the three provinces in the northeast into different economic regions according to their economic level. The data for the period 2013–2019 was selected as a research sample.

As shown in *Table 1*, the observation patterns are evenly spaced over time. We predict that the development of the insurance market and economic development in different regions are closely related, but the contribution of different types of insurance to GDP growth is different.

We selected 7-year variable data for 30 provinces and regions in China from 2013 to 2019. Then the variable data is logarithmized, and the logarithmic value of the variable is described and analyzed. The results of descriptive data analysis are presented in *Table 2*.

In order to determine the model used for sample analysis, we tested the data. According to the results of the Hausman test in *Table 3*, the sample data is suitable for the selection of the individual analysis of the fixed-effects model.

EMPIRICAL RESULTS AND EXPLANATIONS

Using GDP as a variable, property insurance, life insurance, etc. as explanatory variables and using "region" as a cluster variable, stable standard deviation, regression analysis with a fixed effect was performed. From the analysis results in *Table 4*, it can be seen that a total of 210 samples participated in the regression analysis with fixed effects. In the model Overall r-squared = 0.966, $F > P = 0.000$, the model is very significant.

In the model group, R-squared within = 0.935, indicating that the explained change within one is 93.5%. R-squared between = 0.967, indicating that the Inter-Unit Interpretation Rate is 96.7%.

Overall model = 0.966, indicating that the overall coefficient of explanatory change is 96.6%. This shows that the model has good explanatory power. During the analysis, SD dependent var = 0.998, indicating that the variance of the composite disturbance term is mainly due to individual effects rather than changes over time. According to the regression results in *Table 4*, we can get the regression model:

$$gdp = 0.152\, pi + 0.297\, li + 0.002\, bank + \\ + 0.303\, gov + 0.112\, \exp o + 0.042\, fai - 2.83 \quad (5)$$

The results of regression analysis show that the coefficients of all independent variables are positive, and the variety of property insurance, personal insurance, import and export, government expenditure,

Table 1

Panel data structure

Region: 1, 2,..., 30							*n* = 30, *T* = 7	
Year: 2013, 2014,..., 2019 Delta (year) = 1 unit Span (year) = 7 (region*year uniquely identifies each observation)								
Distribution of Ti:	min	5%	5%	25%	50%	75%	95%	max
	7	7	7	7	7	7	7	7
Freq.	Percent		Cum.		Pattern			
30	100.00		100.00		1111111			
30	100.00				XXXXXXX			

Source: compiled by the authors.

and price index are all significant at the 0.01 level. Fixed asset investment is significant at the 0.05 level.

Table 5 tests the joint significance of the dummy variable coefficients on the basis of regression. The model uses 2013 as the base period to test the data from 2013 to 2019. It should be noted that year1 is not included in the construction of the two-way fixed-effects model, because year1 is regarded as the base period, which is the constant term in the model. Therefore, the 6-year test results are shown in the table. It can be found that all the test values are 0, and the test accepts the initial hypothesis that there is no time effect, which verifies the conclusion that the model does not need to include the time effect.

The regression coefficients of life insurance and property insurance are positive and have passed the significance test. The empirical results are consistent with the empirical conclusions of scholars such as Rudra P. Pradhan that the growth of the insurance business is conducive to China's risk prevention and thus makes a positive contribution to its economic development [26].

The influence coefficient of the banking industry is positive, but it fails the significance test. This is because China's financial market is a debt-based market and banks' higher funding costs. There is a substitution effect and a competitive relationship between the insurance industry and the banking industry. The development of the insurance industry is more conducive to reducing the cost of capital. The joint development of the insurance industry and banks is more conducive to regional economic growth [27]. For the same reason, China has changed its financial supervision model to meet the needs of economic development. This model, based on specialization and differentiation of regulated objects, seems to be outdated due to the obvious tendency towards universalization of the functions of financial intermediaries, leading to the creation of large financial groups [28]. In 2018, the Chinese government merged the regulatory agencies of the banking and insurance industries, changing from separate supervision to consent supervision. The newly established China Banking and Insurance Regulatory Commission guide the mixed operation of banking and insurance promotes the development of financial conglomerates.

In the 1980s, for economic reform and opening up, during the Seventh Five-Year Plan period, China adopted the economic region division method. According to the differences in the natural conditions, economic resources, economic development level, transportation conditions, and economic benefits of each region, the country was divided into There are three major economic zones in the east, middle and west. From the perspective of economic development level, economic benefit level of production and construction, infrastructure, science, technology, and operation and management, it is generally high in the eastern region, and low in the western region, decreasing from east to west.

According to the level of national economic development, China is divided into three economic zones: eastern, central and western. There are obvious differences between them in terms of geographic location, economic level, distribution

Table 2

Results of descriptive analysis of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	210	25 412.344	21 019.223	828.2	107 986.9
LI	210	271.369	203.195	7.96	1071.14
PI	210	651.617	586.533	3.47	3041.09
Bank	210	3584.529	3495.782	27	22 125
Gov	210	2804.264	2332.795	95.02	12 654.53
Expo	210	8821.992	15 886.019	29.266	83 277.453
Fai	210	3462.51	2782.606	9.68	15 852.16
CPI	210	102.955	2.449	100.6	112.2
gdp	210	9.757	0.998	6.719	11.59
li	210	5.273	0.928	2.074	6.976
pi	210	5.973	1.235	1.244	8.02
gov	210	7.58	0.944	4.554	9.446
expo	210	7.859	1.741	3.376	11.33
fai	210	7.735	1.114	2.27	9.671
cpi	210	4.634	0.023	4.611	4.72

Source: China National Bureau of Statistics, China Banking and Insurance Regulatory Commission, wind.

Table 3

Hausman test result

Variable	(b) fe	(B) re	(b – B) Difference	sqrt (diag (Vb – VB) S. E.
pi	0.166	0.152	0.014	0.010
li	0.280	0.297	–0.017	0.016
bank	0.001	0.002	–0.001	0.010
gov	0.289	0.302	–0.136	0.022
expo	0.110	0.112	–0.003	0.012
fai	0.036	0.043	–0.006	0.006
cpi	1.44	1.423	0.015	0.147
–cons	–2.271	–2.830	0.124	0.620
b = consistent under Ho and Ha; obtained from xtreg *B* = inconsistent under Ha, efficient under Ho; obtained from xtreg Test: Ho: difference in coefficients not systematic				
chin2 (8) = (b – B)' [(Vb – VB)^(–1)] (b – B) = 14.72, Prob > chi2 = 0.0649				
Vb-VB is not positive definite				

Source: compiled by the authors.

Table 4

Regression results

gdp	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
pi	0.152	0.043	3.53	0	0.068	0.237	***
li	0.297	0.077	3.84	0	0.145	0.449	***
bank	0.002	0.009	0.22	0.822	−0.016	0.02	
gov	0.303	0.071	4.29	0	0.164	0.441	***
expo	0.112	0.016	7.20	0	0.082	0.143	***
fai	0.042	0.023	1.87	0.062	−0.002	0.087	*
cpi	1.423	0.398	3.58	0	0.644	2.202	***
Constant	−2.83	1.974	−1.43	0.152	−6.699	1.039	
Mean dependent var		9.757	SD dependent var			0.998	
Overall r-squared		0.966	Number of obs			210	
Chi-square		2977.394	Prob > chi2			0.000	
R-squared within		0.935	R-squared between			0.967	
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$							

Source: compiled by the authors.

of population resources and various methods of economic development. There are differences in the contribution of the insurance industry to economic growth in different economic zones. The contribution of property and life insurance to development varies by economic zone. Based on this assumption, we divide the data sample by region and analyze it from a regional point of view. To ensure the continuity of research, the aforementioned measurement models and research methods are still used for data processing. Re-analyze the variable data from 2013 to 2019 according to the division of China's economic zones and subdivide the regions.

From the above regression results, it can be seen that there are significant differences in the contribution of property insurance and personal insurance to the economic development of various regions. In the eastern and western regions, the contribution of property insurance and personal insurance to economic development is significant, and the regression coefficient in the western region is higher than that in the eastern region from the regression coefficient, which shows that the development of the insurance industry is more conducive to the development of economically backward regions.

Table 5

Time effect test results

(1)	Year 2 = 0
(2)	Year 3 = 0
(3)	Year 4 = 0
(4)	Year 5 = 0
(5)	Year 6 = 0
(6)	Year 7 = 0
$F(6,29) = 6.48$, prob > $F = 0.002$	

Source: compiled by the authors.

From the three tables above, it can be seen that life insurance makes a significant contribution to the economic development of various regions. In China, life insurance has a greater impact in terms of the scale and rate of growth, as well as spillovers and the impact of large-scale development on economic growth. The development of life insurance contributes to the distribution of residents' incomes between consumption and savings, increases the marginal propensity of residents to consume and helps to stimulate domestic demand. At the same time, it

promotes the allocation of savings among various investments, realizes the efficient allocation of capital and provides low-cost capital support for economic growth, and also expands the scale of cost-effective capital.

In *Table 7*, the correlation coefficient of property insurance in the central region did not pass the significance test, indicating that the development of property insurance in the central region did not contribute significantly to economic growth. This is because the economic growth of central China, mainly relies on the development of secondary industries and infrastructure investment, and government bonds and bank provisions are the main providers of economic development funds. Although property insurance premiums have increased rapidly, the use of funds is insufficient and investment channels are insufficient. The impact of property insurance on economic growth through economic compensation is negligible, and the financing function of the insurance industry does not really play a role.

In the eastern and western regions, banks' regression coefficients did not pass the significance test, indicating that the insurance industry is making a relatively high contribution to economic growth here. It also shows the competition and the substitution relationship between the insurance industry and the banking industry. Currently, most banks are also actively expanding their insurance activities for reasons of profit and scale. today practically all types of insurance are sold through bank sales channels. Despite the fact that property insurance, protection against financial risks, accidents and life insurance are most successfully sold in addition to retail loans, a significant share in the package of bank insurance sales belongs to non-credit insurance. Bank insurance will gradually replace the unified banking business model. This relationship is more evident in economically developed regions.

QUESTIONS DISCUSSIONS

The contribution of insurance to economic growth varies with the degree of regional economic development. The developers of the digital economy and the popularization of mobile terminal equipment have overturned the traditional development model of the insurance industry. Advances in insurance technology have enabled insurance companies to provide insurance services and products for individuals, breaking through the limitations of regional space [29]. Insurance will be able to better adapt to the development needs of various economic regions and enter a wider range of fields. The research on the contribution of the insurance industry to regional development needs to consider the impact of the digital transformation of the insurance industry. This is also the direction of continued research in the future.

CONCLUSION

Through data model analysis, *Table 4* proves that the development of the insurance industry is conducive to the growth of China's regional economy. The regression coefficients of property insurance and life insurance are 0.166 and 0.28, respectively, which have a significant role in promoting China's regional economic growth. From a national perspective, life insurance has a greater contribution to economic growth than property insurance [24]. However, in different economic zones, the development of property insurance has significant differences between regions. *Tables 6* and *Tables 8* confirm the contribution of property insurance to economic growth. In the economically developed eastern region (0.191) and the economically backward western region. The region (0.195) is more prominent, significantly higher than the central region (0.038).

In China's three economic zones, life insurance has a positive effect on economic growth. Comparing the empirical results, the regression coefficients of life insurance in the three major economic zones in the east, middle and west are: 0.229, 0.305, 0.402. Obviously, the contribution of life insurance to regional economic growth increases from the east to the west. The development of life insurance is more conducive to the economic development of economically underdeveloped regions.

It should be noted that the imbalance in the regional economic development of China has led to an imbalance in the insurance market, and there are significant differences in the level of development and development structure of the insurance industry. The contribution of the development of the insurance industry to the economic growth of the region depends on the structure of the development

Table 6

Regression results in the eastern region

gdp	Coef.	St. Err.	*t*-value	*p*-value	[95% Conf	Interval]	Sig
pi	0.191	0.058	3.32	0.002	0.076	0.307	***
li	0.229	0.116	1.97	0.054	−0.004	0.463	*
bank	0.015	0.02	0.76	0.448	−0.025	0.055	
gov	0.33	0.1	3.30	0.002	0.129	0.531	***
expo	0.19	0.09	2.10	0.04	0.009	0.371	**
fai	−0.034	0.052	−0.65	0.516	−0.138	0.07	
cpi	−0.237	1.344	−0.18	0.86	−2.934	2.459	
Constant	4.484	6.047	0.74	0.462	−7.645	16.614	
Mean dependent var		10.373	SD dependent var			0.838	
R-squared		0.910	Number of obs			70	
F-test		76.885	Prob > F			0.000	
Akaike crit. (AIC)		−205.251	Bayesian crit. (BIC)			−187.263	
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$							

Source: compiled by the authors.

Table 7

Regression results of the central region

gdp	Coef.	St. Err.	*t*-value	*p*-value	[95% Conf	Interval]	Sig
pi	0.038	0.059	0.65	0.517	−0.08	0.157	
li	0.305	0.1	3.04	0.004	0.103	0.508	***
bank	0.027	0.013	2.07	0.045	0.001	0.053	**
gov	0.366	0.077	4.77	0	0.211	0.521	***
expo	0.097	0.041	2.40	0.021	0.015	0.179	**
fai	0.04	0.039	1.04	0.306	−0.038	0.118	
cpi	2.774	0.86	3.23	0.002	1.038	4.511	***
Constant	−8.839	4.004	−2.21	0.033	−16.926	−0.752	**
Mean dependent var		9.952	SD dependent var			0.513	
R-squared		0.973	Number of obs			56	
F-test		214.815	Prob > F			0.000	
Akaike crit. (AIC)		−234.070	Bayesian crit. (BIC)			−217.867	
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$							

Source: compiled by the authors.

Table 8

Regression results in the western region

gdp	Coef.	St. Err.	*t*-value	*p*-value	[95% Conf	Interval]	Sig
pi	0.195	0.04	4.85	0	0.115	0.275	***
li	0.402	0.075	5.36	0	0.252	0.552	***
bank	−0.006	0.008	−0.82	0.417	−0.021	0.009	
gov	0.086	0.084	1.03	0.307	−0.081	0.254	
expo	0.098	0.017	5.84	0	0.064	0.131	***
fai	0.057	0.022	2.59	0.012	0.013	0.1	**
cpi	2.256	0.475	4.75	0	1.308	3.203	***
Constant	−5.87	2.316	−2.54	0.014	−10.495	−1.246	**
Mean dependent var		9.115	SD dependent var			0.994	
R-squared		0.970	Number of obs			84	
F-test		298.646	Prob > F			0.000	
Akaike crit. (AIC)		−320.246	Bayesian crit. (BIC)			−300.800	
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$							

Source: compiled by the authors.

of the insurance industry.[6] In various regions, it is necessary to develop targeted regulatory policies based on the characteristics of regions' economic growth so that the insurance function can be fully utilized and ensure sustainable growth of the regional economy.

Thus, changes in regional economic policy and the economic environment will affect the development of the insurance industry. In the process of development, insurance companies need to consider whether property insurance products can adapt to the characteristics of regional economic development in order to adjust their development [30]. As a strategy, you can use the insurance function so that the regional economy of the country grows constantly.

Whether the additional effects and substitution effects of the banking and insurance industries have an impact on the development of the regional economy, and how the insurance industry can play a more significant role in the process of regional economic growth, cannot be expressed in the model and needs to be investigated further. The structure of the insurance industry affects economic growth in different ways [31]. There are differences in the functions of economic management, risk compensation and social management in insurance at different levels of economic zones, and differentiated insurance policies need to be developed.

[6] Prospective Research Institute. Analysis of the development status and industrial structure of China's insurance industry in 2021. 13. 03.021. URL: https://www.qianzhan.com/analyst (accessed on 04.10.2021).

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Current Ways to Protect the Rights and Ensure the Economic Security of Russian Individuals and Legal Entities in the Context of International Economic Sanctions

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ABSTRACT

Restrictive measures, or so-called "sanctions", were introduced by the countries of the European Union against the Russian Federation, its citizens, and legal entities in 2014. The introduction of restrictive measures was initially seen as a threat to Russia's economic security and sovereignty, so the Russian authorities were forced to respond by introducing retaliatory measures, or counter-sanctions. The **subject** of this article is the various possibilities for defending or challenging the imposed restrictive measures provided for by the legislation of the European Union and its member States, as well as the most famous and significant cases of appealing against these sanctions. The **aim of the study** is to systematize various ways of challenging restrictive measures in the bodies of the European Union, to develop a mechanism for such a challenge, as well as to collect statistical information on completed cases in which sanctions against certain persons were successfully challenged, or the lifting of restrictive measures was refused. The **relevance of the topic** is expressed in the unrelenting pressure of foreign states on the sovereignty and economic security of Russia. The **scientific novelty** is due to the lack of systematic research on the mechanisms for challenging sanctions. The authors apply descriptive, historical, and comparative analysis **methods**. The authors identified a certain mechanism of opportunities and tools for challenging restrictive measures in the bodies of the European Union, as well as defined a chain of actions to launch an appeal mechanism for certain restrictive measures. The authors **conclude** that stakeholders should initiate and participate in sanctions appeal procedures as there is good practice in lifting restrictive measures.

Keywords: economic security; financial security; financial institutes; financial services; sanctions; restrictive measures; European Union; challenge; appeal; Russian Federation; Council of the European Union; Court of Justice of the European Union

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INTRODUCTION

The mechanism for the introduction of restrictive measures by some states against others has long been known to world history. In particular, in the second half of the twentieth century, various restrictions were imposed on the countries of the socialist camp (primarily the USSR), motivated by political reasons [1]. However, the term "sanctions" again acquired its relevance in the context of international politics and law in 2014, when the United States (which is the leading state in terms of the number of cases of sanctions against other states [2]), and then the European Union imposed them against the Russian Federation, individual sectors of the country's economy, as well as individuals and legal entities registered in Russia, a number of measures restricting their rights and freedoms [3].

It should be noted that the introduction of restrictive measures into the system of the modern world economy, as well as the expansion of international cooperation, can be regarded as a threat to the economic security of the state, against whose citizens and legal entities sanctions have been imposed. The specified state begins to lose its positions in international trade, politics and may become dependent on other states and supranational entities, which ultimately is an indirect encroachment on state sovereignty.

At the moment, a number of individuals and legal entities are limited in capacity on the territory of European states, their financial assets and property are "frozen" for an indefinite period. Opportunities for international trade and economic cooperation have been significantly reduced as the sanctions imposed on so-called "dual-use" goods affect many types of equipment widely used for peaceful purposes. Commercial enterprises, both in Russia and in the EU countries, suffer significant losses due to these circumstances.

The inexorable pressure of restrictive measures, the lack of dialogue on their possible cancellation or mitigation, the widely publicized initiatives to introduce new sanctions make us look at the mechanisms available in the EU legislation to counter such sanctions from the parties concerned. In this article, the authors consider the reasons, the procedure for introducing various sanctions within the European Union, and also analyze in detail the possible ways to challenge the already introduced restrictive measures. Thus, the procedure for submitting a request for the revision of restrictive measures to the Council of the European Union is considered, as well as many practical examples of judicial appeal of sanctions. The authors conducted an extended analysis of both the theory of appealing against restrictive measures and the practice of using such mechanisms, which made it possible to form a certain map of actions of persons interested in the abolition of the restrictive measures imposed on them and who wish to challenge the EU acts on the introduction of such sanctions.

I. EU SANCTIONS

General description of EU restrictive measures

Consideration of the sanctions imposed by the EU seems most appropriate to start with a brief analysis of the legal framework governing their imposition. Thus, the basis for the introduction of restrictive measures is Article 29 of the Treaty on European Union (hereinafter referred to as the "TEU")[1] and Article 215 of the Treaty on the Functioning of the European Union (hereinafter referred to as the "TFEU").[2] These norms give the Council of the EU the right to determine the policy of the entire organization on certain issues, which may include a complete or partial restriction of relations with third countries. If such a decision is taken by a qualified majority, the Council of the EU notifies the European Parliament and receives the right to impose sanctions on persons representing these states. As noted on the official website of the EU on sanctions,

[1] Article 29 of the Treaty on European Union. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012M%2FTXT (accessed on 15.04.2021).

[2] Article 215 of the Treaty on the Functioning of the European Union. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012E%2FTXT (accessed on 15.04.2021).

these restrictions are introduced to protect the goals of the creation of the EU (enshrined in Articles 3 and 21 of the TEU), to ensure peace, support the principles of democracy, the rule of law, human rights and international law, as well as conflict prevention and ensuring international security.[3]

An important feature of restrictive measures in the practice of the EU is the possibility of choosing specific types of sanctions, depending on the stated purpose of their introduction and potential effectiveness.

In Article 14 of the Guidelines for the Application and Evaluation of Restrictive Measures (Sanctions) in the Framework of the Common Foreign and Security Policy of the European Union (hereinafter referred to as the "CFSP") (hereinafter referred to as the "Guidelines") provides an open list of existing restrictions, including:

The introduction of restrictive measures into the system of the modern world economy, as well as the expansion of international cooperation, can be regarded as a threat to the economic security of the state, against whose citizens and legal entities sanctions have been imposed.

- "freezing" of funds and other assets;
- a ban on the provision of financial services;
- a ban on the provision of financial services;
- other export-import restrictions;
- a ban on the organization of air transportation.[4]

The freedom to choose specific sanctions is also regulated by the provisions of Article 29 TEU, therefore, each case of imposition of restrictions by the EU deserves separate consideration to determine the validity and proportionality of the sanctions applied to the objectively existing degree of threat of a particular subject to the provisions of the CFSP.

In fact, sanctions are the key instrument of the CFSP. Their effect can be described by the formula "through the private to the public" since in the vast majority of cases specific restrictions are imposed precisely on citizens and organizations of the target state. At the same time, Appendix 1 to the Guidelines states that sanctions are a non-punitive measure of restraint.[5] It should be noted that this statement must be interpreted taking into account the provisions of Article 13 of the Guidelines, according to which restrictive measures should be directed at entities responsible for the implementation of state policy or actions (as well as their support and receiving any dividends from them) that led to the decision to impose sanctions on the part of the EU.[6]

Thus, in order to impose sanctions, appropriate actions are required on the part of a particular entity, which must be justified when making an appropriate decision, and preventive action is seen as preventing further illegal behavior and minimizing its negative consequences for the EU and its member states.

When characterizing the restrictive measures, one should also mention the guarantees provided by the EU legislation to protect the rights and legitimate interests of the entities subject to sanctions. Such guarantees, in addition to the aforementioned obligation of the EU Council to provide a full and appropriate

[3] Sanctions: how and when the EU adopts restrictive measures. URL: https://www.consilium.europa.eu/en/policies/sanctions/ (accessed on 15.04.2021).

[4] Article 13 of Guidelines on implementation and evaluation of restrictive measures (sanctions) in the framework of the EU Common Foreign and Security Policy (doc. 5664/18). URL: https://data.consilium.europa.eu/doc/document/ST-5664–2018-INIT/en/pdf (accessed on 15.04.2021).

[5] Annex I: Recommendations for working methods for EU autonomous sanctions to Guidelines on implementation and evaluation of restrictive measures (sanctions) in the framework of the EU Common Foreign and Security Policy (doc. 5664/18). URL: https://data.consilium.europa.eu/doc/document/ST-5664–2018-INIT/en/pdf (accessed on 15.04.2021).

[6] Article 13 of Guidelines on implementation and evaluation of restrictive measures (sanctions) in the framework of the EU Common Foreign and Security Policy (doc. 5664/18). URL: https://data.consilium.europa.eu/doc/document/ST-5664–2018-INIT/en/pdf (accessed on 15.04.2021).

justification for imposing a sanction against each person, should include compliance with international law when introducing restrictive measures (Article 9 of the Guidelines), compliance with international obligations of the EU and its member states (Article 11 of the Guidelines), limiting the possibility of applying the decision to minor family members (Article 18 of the Guidelines) and the temporary nature of the sanctions (Article 31–37 of the Guidelines).[7] The obligation of the Council of the EU to constantly monitor the situation and amend its decisions in the event of a change in the political situation can be illustrated, among other things, by the example of anti-Russian sanctions, decisions on the extension of which are made on a regular basis from the moment they were introduced.[8]

At the same time, EU legislation provides the authorities with a sufficient degree of freedom in deciding whether to impose sanctions on specific entities and allows them to extend their effect to a de facto unlimited circle of persons whose influence on decision-making at the state level can vary significantly. This approach leads to a significant number of cases challenging decisions to impose sanctions, which are discussed in more detail in the second section of this article. The analysis of law enforcement practice is preceded by a brief review of the current EU sanctions policy.

Countries and organizations which are currently subject to EU restrictive measures

As of the end of March 2021, the EU directly imposed sanctions on 19 states: the Republic of Belarus, Bosnia and Herzegovina, Burundi, Venezuela, Haiti, Guinea, Zimbabwe, Iran, China, Libya, Moldova, Myanmar, the Russian Federation, Syria, the United States, Tunisia, Turkey and Ukraine. In addition, there are 4 "reasons" for the introduction of restrictive measures of an extraterritorial nature: the commission of terrorist acts and aiding terrorism, the development and use of chemical weapons, and the organization of cyber attacks that threaten the information security of the EU and its Member States, as well as serious human rights violations.[9] In relation to a number of states, sanctions were imposed by the EU jointly with the United Nations (UN) in pursuance of resolutions adopted by the UN Security Council (in particular, a ban on the satisfaction of claims under transactions and contracts was introduced, the execution of which became impossible as a result of the adoption in 1992 of the Resolution UN Security Council No. 757[10]). In addition, the Council of the EU has the right to apply the sanctions imposed by the UN directly, supplementing them with its own restrictive measures: in particular, these include measures aimed at ending the armed clashes in the Central African Republic.[11] It should be noted that some restrictive measures are de facto permanent and not subject to revision: for example, the arms embargo against China was introduced in 1989 after the events in Tiananmen Square and is still in effect.[12]

The most stringent restrictions affecting the interests of the entire state, and not just individual citizens and/or organizations, are currently in effect in relation to Iran, North Korea, Libya, the Russian Federation and Syria. The reasons for the imposition of sanctions

[7] Guidelines on implementation and evaluation of restrictive measures (sanctions) in the framework of the EU Common Foreign and Security Policy (doc. 5664/18). URL: https://data.consilium.europa.eu/doc/document/ST-5664–2018-INIT/en/pdf (accessed on 15.04.2021).

[8] "The EU summit announced a six-month extension of sanctions against Russia". URL: https://tass.ru/mezhdunarodnaya-panorama/10227579 (accessed on 15.04.2021).

[9] EU Sanctions Map. URL: https://www.sanctionsmap.eu/ (accessed on 15.04.2021).

[10] Council Regulation (EC) No. 1733/94 of 11 July 1994 prohibiting the satisfying of claims with regard to contracts and transactions the performance of which was affected by the United Nations Security Council Resolution No. 757 (1992) and related resolutions. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AL%3A1994%3A182%3ATOC (accessed on 15.04.2021).

[11] Council Regulation (EU) No. 224/2014 of 10 March 2014 concerning restrictive measures in view of the situation in the Central African Republic. URL: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2014:070:0001:0009:EN:PDF (accessed on 15.04.2021).

[12] Declaration of European Council made in Madrid, 27 June 1989. URL: https://www.consilium.europa.eu/media/20589/1989_june_-_madrid__eng_.pdf (accessed on 15.04.2021).

differ significantly: for example, in the case of Iran[13] and North Korea,[14] the restrictions are related to accusations of state leaders of producing weapons of mass destruction, while the Syrian government is accused of large-scale human rights violations and the destruction of its own population.[15] At the same time, it is rather difficult to assess the effectiveness of EU sanctions in these cases: given that the main indicator of achieving the stated goals of introducing restrictive measures is their gradual reduction or cancellation based on the results of the next analysis of the situation by the EU Council, the long-term persistence of sanctions indicates a very limited level of their actual impact on the political situation in a particular region.

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Among the EU sanctions, it is worth highlighting the "sleeping" sanctions against the United States, introduced in 1996 by the so-called "Blocking Statute".[16] This act was adopted as a retaliatory measure after the US imposed its own sanctions against Cuba, Iran and Libya, which could have a negative impact on economic ties between the EU and these states. Despite the fact that the parties managed to achieve a peaceful settlement of the situation, no one canceled the act, and in 2018 it was revised after the US withdrew from the Joint Comprehensive Action Plan (JCPOA) to resolve the situation around the Iranian nuclear program.[17] The new version of the document directly prohibits European organizations from following US sanctions in their activities and also obliges them to report to the European Commission on all cases of damage to their interests by these sanctions. Despite the fact that the "Blocking Statute" can give rise to a sufficient number of legal conflicts, it is primarily seen as a political statement on the independent foreign trade policy of the EU, clothed in a legal form [4]. At the same time, three years after the adoption of the new version of the Blocking Statute, no real measures were taken against the United States by the EU, which indicates the declarative nature of the adopted act.

As a separate group of restrictive measures, sanctions should be singled out that are only formally directed against third countries: they, in particular, include actions to freeze the assets of ex-leaders of a number of states (for example, Tunisia[18] and Ukraine[19]), accusations of embezzlement of budget funds, as well as sanctions against persons suspected

[13] Council Regulation (EU) No. 267/2012 of 23 March 2012 concerning restrictive measures against Iran and repealing Regulation (EU) No 961/2010. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AL%3A2012%3A088%3ATOC (accessed on 15.04.2021).

[14] Council Regulation (EU) No. 2017/1509 of 30 August 2017 concerning restrictive measures against the Democratic People's Republic of Korea and repealing Regulation (EC) No. 329/2007. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2017:224:FULL&from=LT (accessed on 15.04.2021).

[15] Council Decision 2013/255/CFSP of 31 May 2013 concerning restrictive measures against Syria. URL: https://eur-lex.europa.eu/search.html?whOJ=NO_OJ%3D147%2CYEAR_OJ%3D2013&DB_COLL_OJ=oj-l&lang=en&type=advanced&qid=1621882322198&SUBDOM_INIT=ALL_ALL (accessed on 15.04.2021).

[16] Council Regulation (EC) No. 2271/96 of 22 November 1996 protecting against the effects of the extra-territorial application of legislation adopted by a third country, and actions based thereon or resulting therefrom. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AL%3A1996%3A309%3ATOC (accessed on 15.04.2021).

[17] Statement on the Reimposition of United States Sanctions With Respect to Iran of August 6, 2018. URL: https://www.govinfo.gov/content/pkg/DCPD-201800523/html/DCPD-201800523.htm (accessed on 15.04.2021).

[18] Council Regulation (EU) No. 101/2011 of 4 February 2011 concerning restrictive measures directed against certain persons, entities and bodies in view of the situation in Tunisia. URL: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:031:0001:0012:EN:PDF (accessed on 15.04.2021).

[19] Council Regulation (EU) No. 208/2014 of 5 March 2014 concerning restrictive measures directed against certain persons, entities and bodies in view of the situation in Ukraine. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2014:066:FULL&from=EN (accessed on 15.04.2021).

of committing war crimes. Such restrictions may continue after the lifting of the arms embargo, as in the case of the remaining at large participants in the armed uprising in Guinea in 2008[20] and the only defense company currently subject to restrictions by Zimbabwe.[21] These examples demonstrate the key role of the political component of EU sanctions: if the political regime in a third country, which is unfavorable for this international organization, remains or undergoes minor changes, restrictive measures will remain indefinitely. At the same time, for states whose economic and political situation does not imply active integration with the EU, the mere fact of the imposition of sanctions can hardly be considered significant: the overthrow of undemocratic regimes in African states occurs for reasons unrelated to the consequences of the introduction of restrictive measures. In many respects, this is precisely why cases of appealing against sanctions on their part are rare enough to be used in the analysis of existing methods for protecting the national interests of the Russian Federation in relations with the EU. The next section of this article will be devoted to a more detailed consideration of the procedures for appealing against decisions of the EU Council on the introduction of restrictive measures.

Reasons for restrictive measures imposition

Sanctions against Russia began to be introduced against the background of the prevailing opinion of foreign leaders about the interference of the Russian authorities in the internal politics of Ukraine and, as a result, Russia's significant role in destabilizing the situation on the territory of Ukraine [5].

The first country to start the so-called "sanctions wave" was the United States of America, which adopted the first sanctions (the so-called "Magnitsky act") in 2012. If we talk about the events of 2014, then at the first stage the sanctions were not specified and referred to an indefinite circle of persons who could carry out "undermining democratic processes and institutions in Ukraine".[22] In the future, the list of US sanctions has repeatedly increased, new categories, regulation and adoption mechanisms have appeared, the list of individuals and legal entities included in the sanctions lists has grown and continues to grow.

Initially, the first US sanctions list included 11 people who are citizens of Russia and Ukraine. At the time of writing, various US restrictive lists already included more than 200 individuals and more than 350 legal entities, as well as several aircraft and watercraft.[23]

According to some authors, the United States, in addition to imposing its own sanctions, initiated the introduction of restrictions by other countries, including the EU countries. For this, various mechanisms of economic and political pressure on the leadership of these countries were used.[24] Thus, by the Decision of the EU Council of March 17, 2014, sanctions were imposed on 21 individuals who are citizens of Russia and Ukraine. In particular, persons included in the list were prohibited from any entry into the territory of the EU, and assets located on the territory of EU member states were frozen.[25] Later, the EU sanctions were also repeatedly expanded and supple-

[20] Council Regulation (EU) No. 1284/2009 of 22 December 2009 imposing certain specific restrictive measures in respect of the Republic of Guinea. URL: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:346:0026:0038:EN:PDF (accessed on 15.04.2021).

[21] Council Regulation (EC) No. 314/2004 of 19 February 2004 concerning restrictive measures in view of the situation in Zimbabwe. URL: https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:32004R 0314 (accessed on 15.04.2021).

[22] Executive Order — Blocking Property of Certain Persons Contributing to the Situation in Ukraine Archived 23 January 2017 at the Wayback Machine The White House, 6 March 2014. URL: https://obamawhitehouse.archives.gov/the-press-office/2014/03/06/executive-order-blocking-property-certain-persons-contributing-situation (accessed on 15.04.2021).

[23] US Sanctions on Russia Report. URL: https://fas.org/sgp/crs/row/R45415.pdf (accessed on 15.04.2021).

[24] Die Wirtschaftsverbände haben versagt. Handelsblatt. 24.09.2014. URL: https://www.handelsblatt.com/meinung/kolumnen/100-prozent-grupp-die-wirtschaftsverbaende-haben-versagt/10744018.html (accessed on 15.04.2021).

[25] Council Decision 2014/145/CFSP of 17 March 2014 concerning restrictive measures in respect of actions undermining or threatening the territorial integrity, sovereignty and independence of Ukraine. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D 0145&rid=1 (accessed on 15.04.2021).

mented, as detailed in the previous section. Currently, 177 individuals and 48 legal entities are subject to various EU sanctions.

From an economic point of view, there is no doubt that sanctions are not beneficial to either Russia or the EU member states, however, the current political conditions do not allow even a significant easing of the sanctions regime by both the European Union and Russia.

When analyzing the development of the institution of anti-Russian sanctions, the following official reasons and conditions for imposing sanctions by the European Union can be distinguished as follows[26]:

- general influence on the political situation and internal politics of Ukraine;
- recognition of the results of the referendum on the entry of the Republic of Crimea into Russia;
- construction of various infrastructure facilities, as well as doing business in the Republic of Crimea and Sevastopol (for example, the construction of the Kerch bridge);
- measures to "isolate" the Republic of Crimea from the territory of Ukraine;
- alleged support for militias in eastern Ukraine;
- difficulties in investigating the Malaysian Airlines Boeing-777 crash in the Donetsk region in 2014, in which some politicians tend to see the so-called "Russian trace".

At the same time, unofficially, both the EU itself, through its officials, and member states have repeatedly spoken about the negative impact of sanctions on the domestic economy, as well as the lack of economic benefits from the introduction of the sanctions regime. Thus, the volume of trade between the Russian Federation and the Netherlands for the period from 2014 to 2017 decreased by more than 8 times, with Italy — by 6.6 times, with Germany — by 5.5 times [6].

The issue of at least partial lifting of sanctions has been repeatedly raised at various levels of the EU member states. Many arguments have been made to support the need for easing sanctions and the possible benefits of such easing. At the same time, it has not been possible to reach a consensus on this issue to date, so a significant easing of sanctions today is unlikely.[27]

When considering the issue of the conditions for the emergence of sanctions, one should not forget about the so-called "counter-sanctions" (or Russian embargo) imposed by Russia in response to the first US and EU sanctions.[28] According to the Decree of the President of Russia dated August 6, 2014 "On the application of certain special economic measures to ensure the security of the Russian Federation", the import of certain types of agricultural products, raw materials and food produced by the state that imposed sanctions against Russia is prohibited on the territory of Russia. At the same time, the competence of the Government of Russia includes the adoption of a list of specific items and types of products prohibited from import.[29]

In fact, the EU member states suffer great losses due to the above-mentioned sanctions. Every year, the countries of the European Union lose about 21 billion euros of lost profits. According to a study by the Düsseldorf Chamber of Commerce and Industry, the manufacturing industry, mechanical engineering, automotive and chemical industries suffer

[26] EU restrictive measures in response to the crisis in Ukraine. URL: https://www.consilium.europa.eu/en/policies/sanctions/ukraine-crisis/ (accessed on 15.04.2021).

[27] Sanctions against Russia: Kept cannot be canceled. URL: https://www.rbc.ru/opinions/politics/13/05/2016/57348a109a7947b86854fc0b (accessed on 15.04.2021).

[28] Decree of the President of the Russian Federation of November 21, 2020 No. 730 "On the extension of certain special economic measures to ensure the security of the Russian Federation". URL: http://www.consultant.ru/document/cons_doc_LAW_368336/ (accessed on 15.04.2021).

[29] Decree of the President of the Russian Federation of August 6, 2014 No. 560 "On the application of certain special economic measures to ensure the security of the Russian Federation". URL: http://www.kremlin.ru/acts/bank/38809 (accessed on 15.04.2021).

the most from sanctions.[30] From an economic point of view, there is no doubt that sanctions are not beneficial to either Russia or the EU member states, however, the current political conditions do not allow even a significant easing of the sanctions regime by both the European Union and Russia.

Restrictive measures implementation

Based on a systematic analysis of documents such as the Treaty on the Functioning of the European Union, as well as Council Regulation No. 833/2014 of July 31, 2014, liability for violation of the sanctions regime is determined by the internal legislation of the Member States.[31]

Thus, each Member State independently determines the authorized body, which should control and be responsible for the following aspects of the application of sanctions:

- determining liability measures for violation of restrictive measures;
- granting exceptions;
- obtaining information from business entities and interacting with them (for example, banks and other credit institutions);
- reporting to the Commission on their implementation;
- engaging with UN Security Council Sanctions Committees on specific requests for removal from the UN sanctions list.

Thus, each member state independently develops a system of fines and punishments, which, in the opinion of this state, are capable of ensuring the effective implementation of the sanctions regime. In addition, states independently issue methodological recommendations and instructions that allow individuals and legal entities to navigate the existing restrictions and comply with them. Depending on a number of factors, including the nature and extent of the violation, quantitative and qualitative characteristics, which are also determined by each Member State, a person who violates sanctions may be subject to administrative, civil or criminal liability.[32]

In Germany, for example, liability for violation of the sanctions regime is regulated by the Law on Foreign Trade and Payments Act dated June 6, 2013.[33] According to this document, the following types of punishments are possible for various violations of sanctions:

- criminal liability in the form of imprisonment for a term of 3 to 5 years (for intentional violation of the sanctions regime);
- criminal liability in the form of a fine of up to 500 thousand euros (violation of the sanctions regime due to negligence);
- administrative liability for various types of offenses in the field of sanctions with a fine of up to 500 thousand euros for individuals and up to 10 million euros for legal entities.

The above provisions of the legislation do not "sleep", the law enforcement practice of bringing to responsibility is already being formed.

In March 2021, it became known that for the supply of dual-use goods (equipment applicable not only for peaceful purposes but also suitable for the production of weapons), a 41-year-old businessman from Germany was sentenced to 9 months in prison. The legal entity headed by the defendant was engaged in the supply of metal-working machine tools, which can be used, among other things, in military missile technology programs. In total, the court concluded that the accused was guilty of 7 episodes from 2015 to 2018.[34]

Thus, the applicability of EU sanctions in practice cannot be underestimated. The above

[30] IHK Düsseldorf stellt Studie vor. URL: https://www.duesseldorf.ihk.de/presse/aktuell/ihk-duesseldorf-stellt-studie-vor-4978772 (accessed on 15.04.2021).

[31] Council Regulation (EU) No. 833/2014 of 31 July 2014 concerning restrictive measures in view of Russia's actions destabilising the situation in Ukraine. URL: https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:32014R 0833 (accessed on 15.04.2021).

[32] EU Sanctions Enforcement. Global Investigations Review. URL: https://www.lexology.com/library/detail.aspx?g=e642c1a2–4d48–454c-8767–6d7b26914ba3 (accessed on 15.04.2021).

[33] Foreign Trade and Payments Act (Außenwirtschaftsgesetz — AWG). URL: https://www.gesetze-im-internet.de/englisch_awg/englisch_awg.html (accessed on 15.04.2021).

[34] Germany convicted of violating EU sanctions on Crimea. URL: https://www.dw.com/ru/v-germanii-vnov-vynesen-obvinitelnyj-prigovor-za-narushenie-krymskih-sankcij-e/a-56776693 (accessed on 15.04.2021).

example clearly shows that not only large multinational corporations but also small and medium-sized businesses, which very often underestimate the risks of being held accountable for sanctions violations, can fall under EU sanctions. Often, sanctions can be absurd and violate the free enterprise rights of individuals and legal entities that are not involved in politics and are not controlled by political activities, so the imposition of sanctions against them is not always justified. We will consider in detail the possible ways to protect rights under the current sanctions in the next section.

II. LEGAL ACTION AGAINST EU SANCTIONS

Applying for restrictive measures lifting to the Council of the European Union

The first way to protect the rights of sanctioned persons is to submit a request for a review of the sanctions against a specific person to the Council of the EU.

According to the notice No. 2021/C 74/01 dated March 3, 2021 (hereinafter referred to as the "Notice"), posted on the official website of the EU legal information, persons under various sanctions have the right to apply for a review of the sanctions imposed on them in the Council of the EU.[35]

It should be noted that this document refers to all persons subject to all possible sanctions regimes within the EU (for example, for violation of human rights), i.e. mechanism is universal.

If a person is on the sanctions list but believes that his rights have been violated, and the decision to impose restrictions on him is subject to review, such a person has the right to submit a request (application) to the EU Council for consideration on October 31, 2021 documents confirming the requirements of such a person.

At the same time, according to Article 10 EU Council Decision No. 2020/1999, the restrictive measures introduced must be subject to constant review, considering newly discovered and emerging circumstances.[36] For these purposes, as indicated in the Notice, interested persons may apply for a review of the restrictive measures imposed on them.

In addition, the Notice reminds interested persons (subject to sanctions) that, in accordance with Council Decision No. 2020/1998, a person whose assets are frozen can also apply to the competent authority of a Member State with a statement on the use of blocked funds on urgent needs or certain urgent expenses.

Due to the relative novelty of the mechanism discussed in this subparagraph, it is difficult to judge its applicability in cases of appeals against Russia-related sanctions. In addition, due to the relative novelty of this procedure, it is difficult to judge the practical side of the application of revocable declarations, as well as the Council's reaction to such declarations.

It appears that this procedure is a simple assessment of the evidence presented by the person concerned, and that reconsideration of decisions to impose sanctions on a particular person is possible only in the presence of serious factual errors. According to the authors, the tool under consideration can hardly be considered effective in the light of challenging the so-called "anti-Russian" sanctions, but for the sake of completeness of the study, it was also worth considering.

Reasons for lifting sanctions in the EU court decisions

According to Article 263 TFEU, the Court of Justice of the European Union is empowered to review the legality of legislation passed by the

[35] Notice for the attention of persons subject to the restrictive measures provided for in Council Decision (CFSP) 2020/1999, as amended by Council amending Decision (CFSP) 2021/372 and in Council Regulation (EU) 2020/1998, as implemented by Council Implementing Regulation (EU) 2021/371 concerning restrictive measures against serious human rights violations and abuses 2021/C 74/01. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021XG0303%2801%29&qid=1621501261224 (accessed on 15.04.2021).

[36] Council Decision (CFSP) 2020/1999 of 7 December 2020 concerning restrictive measures against serious human rights violations and abuses. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.LI.2020.410.01.0013.01.ENG&toc=OJ%3AL%3A2020%3A410I%3ATOC (accessed on 15.04.2021).

Council of the EU, the European Commission and the European Central Bank, which create legal effects for third parties.[37] At the same time, in accordance with Article 275 TFEU, the powers of the Court of Justice of the European Union to consider complaints against acts adopted under the CFSP are significantly limited: this body has the right to check the legality of only those acts that impose restrictions on certain individuals and legal entities.[38] However, as rightly noted by domestic researchers [4], the most significant in terms of their negative economic consequences are precisely the sanctions against public entities — states that individuals cannot appeal on the basis of the current norms of European law because of the imposed on the basis of Article 263 TFEU burden of proving the exclusive focus of the relevant restrictive measures on this individual. At the same time, such a subject has the right to appeal against an act adopted within the framework of the CFSP, which directly imposes restrictive measures on it, which significantly limits the regulatory monopoly of the EU Member States in this area [7].

In addition to applying to the Court of Justice of the EU, it is necessary to mention the possibility of lifting sanctions by the Council of the EU out of court as a result of the termination of liability for unlawful behavior by the subject. An example of such a decision is the gradual lifting of sanctions against Belarus in 2014–2016. Restrictive measures were introduced against the leadership of the state, as well as individuals and legal entities in connection with the use of repression against the political opposition and civil society during the 2010 presidential elections.[39] After the release of the arrested citizens of the European Union, it was decided to ease the sanctions in 2014 [8], and two years later they were lifted from 170 subjects (including the President of the Republic of Belarus A. G. Lukashenko). In its decision, the Council of the EU noted the positive dynamics in the development of bilateral relations between the EU and Belarus, as well as the active role of the state in the Eastern Partnership initiative.[40] At the same time, in February 2021, large-scale sanctions were re-imposed on senior officials and a number of large enterprises of the military-industrial complex, which indicates a reassessment of the EU policy towards the leadership of the Republic of Belarus after the next presidential elections.[41]

We should agree with the position of V. Yu. Slepak and K. I. Trubacheva: the lifting of sanctions extrajudicially seems possible only if the subject of sanctions actually recognizes the unlawfulness of his behavior and readiness to cooperate with the EU authorities [9], which in the context of this study cannot be recognized as an effective way to protect the rights of Russian citizens and organizations.

Currently, the scientific literature highlights a limited number of grounds on which the decision of the EU Council to impose sanctions can be canceled in court [10]. Analyzing these grounds, it seems possible to draw a conclusion about their procedural nature: the abolition of restrictive measures in court is possible if violations of EU law are detected in the course of their adoption.

First of all, such grounds should include the prosecution of a private person in the absence of evidence of his involvement in the actions that led to the imposition of sanctions. The most significant case is the *Bank Mellat v. Council of the European Union,* during the consideration of which the European Court

[37] Article 263 of the Treaty on the Functioning of the European Union. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012E%2FTXT (accessed on 15.04.2021).

[38] Article 263 of the Treaty on the Functioning of the European Union. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012E%2FTXT (accessed on 15.04.2021).

[39] Council Implementing Regulation No. 84/2011 of 31 January 2011 amending Regulation (EC) No. 765/2006 concerning restrictive measures against President Lukashenko and certain officials of Belarus. URL: https://service.betterregulation.com/sites/default/files/celex_32011r0084_en_txt.pdf (accessed on 15.04.2021).

[40] Council Conclusions on Belarus. URL: https://www.consilium.europa.eu/en/press/press-releases/2016/02/15/fac-belarus-conclusions/ (accessed on 15.04.2021).

[41] Council Decision (CFSP) 2021/353 of 25 February 2021 amending Decision 2012/642/CFSP concerning restrictive measures against Belarus. URL: https://eur-lex.europa.eu/eli/dec/2012/642/ (accessed on 15.04.2021).

of General Jurisdiction made a key conclusion that the burden of proof of guilt in the course of the adoption of the act imposing restrictive measures on the Council of the EU. The commercial bank Bank Mellat, along with other banks of the Islamic Republic of Iran, was subject to sanctions in connection with allegations of supporting the nuclear program of this state in 2010.[42] In 2013, representatives of the bank applied to the European Court of General Jurisdiction with a request to cancel the decision taken against the organization, substantiating their complaint, including the lack of evidence of the bank's participation in financing state programs related to uranium enrichment. In fact, the accusation against Bank Mellat was built solely on the basis of its belonging to the state, against which an active sanctions policy was carried out. In its decision on the case, the European Court of General Jurisdiction not only pointed to the distribution of the burden of proof in this category of disputes, but also noted that the absence of evidence of guilt of a private person cannot be used against him, and the position of the EU Council on the need for a bank to provide evidence of its innocence contradicts EU legislation.[43] In itself, this circumstance indicates the need to cancel the contested act, which led to the consideration and satisfaction by the European Court of General Jurisdiction of a number of similar complaints from other Iranian organizations providing financial, insurance and other services. In particular, when considering the case of *Persia International Bank v. the Council of the European Union,* the Court of Justice of the EU noted that the mere fact that 60% of the authorized capital of this bank belongs to the previously mentioned Bank Mellat cannot be considered grounds for imposing sanctions against it due to lack of evidence of Iran's direct involvement in the nuclear program.[44]

Disagreeing with the decision in *Bank Mellat v. Council of the European Union* the Council of the European Union appealed to the European Court of Justice, which upheld the decision of the court of first instance. In the reasoning part of the decision, the court noted that bringing the "parent" company to responsibility solely in connection with the accusations of the "subsidiary" organization cannot be considered sufficiently justified. In addition, the court rejected the argument of the representative of the EU Council on the confidentiality of information about the bank's participation in the financing of the Iranian nuclear program, which could be violated if the sources of this information were disclosed during the adoption of the act or court session, since this statement was already made during the consideration of cases in the court of appeal.[45] In addition to the direct annulment of the Council of the EU act, the court concluded that it was necessary to pay compensation to the Bank Mellat in connection with the illegal suspension of operations on bank accounts during the 6 years that had passed from the moment the sanctions were imposed until the day the final decision was made on the case. It should be noted that the right to compensation for the imposition of unlawful restrictive measures against Iranian organizations has previously received judicial protection: in the course of the *Safa Nicu Sepahan Co. v. Council* case, the court considered the error made by the Council of the EU when adopting the sanctions act "enough" to partially satisfy the stated claims for damages to the applicant's business reputation.[46]

[42] Council Decision of 26 July 2010 concerning restrictive measures against Iran and repealing Common Position 2007/140/CFSP. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AL%3A2010%3A195%3ATOC (accessed on 15.04.2021).

[43] Judgment of the General Court T-496/10 Bank Mellat v. Council of the European Union. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62010TJ0496 (accessed on 15.04.2021).

[44] Judgment of the General Court T-493/10 Persia International Bank v. Council of the European Union. URL: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:62010TJ0493 (accessed on 15.04.2021).

[45] Court of Justice of the European Union Press Release No. 14/16 Luxembourg, 18 February 2016 Judgment in Case C-176/13 P Council v Bank Mellat. URL: https://curia.europa.eu/jcms/upload/docs/application/pdf/2016–02/cp160014en.pdf (accessed on 15.04.2021).

[46] Judgment of the General Court T-384/11 Safa Nicu Sepahan Co. v. Council of the European Union. URL: https://curia.europa.eu/juris/liste.jsf?num=T-384/11&language=EN (accessed on 15.04.2021).

It should be noted that in a number of cases related to the introduction of anti-Iranian sanctions, the EU Court confirmed the legitimacy of the introduction of restrictive measures. For example, following a complaint reviewed by another bank, Bank Melli Iran, it was found that this organization incurred expenses to finance the educational programs of the Atomic Energy Organization of Iran already after the UN Security Council imposed sanctions against it, which indicates the bank's support for the Iranian nuclear program and thus confirms the validity of the decision of the Council of the EU to impose sanctions.[47]

Analyzing the entire set of court cases challenging the restrictive measures by Iranian individuals, it should be noted that the Court of Justice of the EU respected the rule of law and the right to an independent judiciary, guaranteed by Article 6 of the European Convention for the Protection of Human Rights and Fundamental Freedoms (ECHR), which, among other things, led to the independent consideration of each dispute, regardless of the general direction of the sanctions.

Another notable jurisprudence case is *Tay Za v. Council*, according to which the applicant, a citizen of Myanmar, asked to be removed from the sanctions lists since a family member of a businessman could not have any influence on national policy in the field of protecting the rights of citizens. The European Court, considering the case in the appellate instance, sided with the applicant and lifted sanctions from him, pointing out the lack of connection between the behavior of this category of subjects and the lack of progress in the field of democratization of political regime in the country.[48] This position is confirmed by the words of the Advocate General of the European Court, Paolo Mengozzi, who, in one of his dissenting opinions, noted the need to adhere to the concept of "targeted sanctions", which may be less effective, but at the same time more fair in terms of the possibility of protecting the interests of individuals.[49] Despite the fact that Article 215 TFEU provides for a procedure for circumventing this principle by adopting a special act of the EU Council on the introduction of restrictive measures against individuals and legal entities, as well as their groups and non-state entities, this guarantee is still reflected in the acts of the Court of Justice of the European Union.[50]

In addition, the absence of an appropriate evidence base confirming the fact that the subject committed an offense may serve as a basis for lifting preventive measures. For example, in 2015, complaints were filed against the inclusion in the sanctions lists of a number of citizens of Ukraine, including former Prime Minister N. Ya. Azarov, suspected of embezzling funds from the state budget and transferring them to accounts in foreign banks. The issue of applying restrictive measures was decided by the Council of the EU due to the lack of a complete evidence base and was initiated on the basis of a statement by the Prosecutor General of the Republic of Ukraine, which did not contain information about specific illegal actions. committed by these individuals. Based on the results of the consideration of complaints, the sanctions were lifted only in relation to the son of N. Ya. Azarov,[51] while the issue of "unfreezing" the cash accounts of Azarov himself and the ex-Minister of Energy and Coal Industry E.A. Stavitsky was allowed only in 2020.[52]

[47] Judgment of the Court of First Instance T-390/08 Bank Melli Iran v. Council of the European Union. URL: https://curia.europa.eu/juris/liste.jsf?language=en&num=T-390/08 (accessed on 15.04.2021).

[48] Court of Justice of the European Union Judgment in Case C-376/10 P Tay Za v. Council. URL: https://curia.europa.eu/juris/liste.jsf?num=C-376/10&language=EN (accessed on 15.04.2021).

[49] Opinion of Advocate General Mengozzi delivered on 29 November 2011. URL: https://eur-lex.europa.eu/legal-content/HR/TXT/?uri=CELEX:62010CC 0376 (accessed on 15.04.2021).

[50] See, for example, Judgment of the Court of First Instance T-407/13 Al Assad v. Council. URL: https://curia.europa.eu/jcms/jcms/P_106312/en/ (accessed on 15.04.2021).

[51] Judgment of the Court of First Instance T-332/14 Oleksii Mykolayovych Azarov v. Council. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=ecli%3AECLI%3AEU%3AT%3A2016%3A48 (accessed on 15.04.2021).

[52] See, for example, Judgment of the Court (Seventh Chamber) C-416/18 P Mykola Yanovych Azarov v Council of the European Union. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62018CJ0416 (accessed on 15.04.2021).

As another reason for the cancellation of the decision to impose sanctions, which occurs in the case-law of the Court of Justice of the EU, it is necessary to highlight the violation of the right of subjects to effective legal protection. This right includes, among other things, the following powers:

The only possible way for Russia to develop under the pressure of sanctions is large-scale investment in human capital.

• the right to receive timely information about the reasons for imposing penalties on this person and the evidence available against him in the case. This information must be sent directly to the subject, and its publication in the official source of the publication of EU acts is recognized as insufficient to ensure the effective protection of the rights and legitimate interests of such a subject, including by preparing a reasoned appeal to the EU court with a corresponding complaint;[53]

• the right to submit objections on the merits of the charges brought, which may be submitted in writing without the need for a full meeting with the participation of the party.[54]

At the same time, it should be noted that this right can also be limited in accordance with Article 52 of the EU Charter of Fundamental Rights (hereinafter referred to as the "Charter"), which establishes as principles for the implementation of such exceptions the necessity and action in the general interest. In fact, this tool allows the EU Court of Justice to justify the violation of the right of individuals to fully protect their interests, which hardly contributes to the unification of judicial practice and inevitably increases the level of legal uncertainty when considering homogeneous categories of cases.[55]

The aforementioned provision significantly reduces the possibility of applying the third ground for contesting acts on the imposition of sanctions related to the violation of the fundamental rights and freedoms of individuals. These include, in particular, the right to life (Article 2 of the Charter, Article 2 of the European Convention for the Protection of Human Rights and Fundamental Freedoms, hereinafter referred to as the "ECHR"), the right to respect for private and family life (Article 7 of the Charter, Article 8 of the ECHR), the right to property (Article 17 of the Charter), the right to free enterprise (Article 16 of the Charter) and other material rights. The general objectives of the EU, which may be subject to the application of Article 52 of the Charter, are understood quite broadly and are not limited to those enshrined in Article 3 of the Treaty on European Union: they may also include a national security clause, enshrined in Article 346 of the TFEU [11]. According to the legal positions of the Court of Justice of the European Union, fundamental rights are not absolute and can be limited in order to use the negative consequences of their restriction as a mechanism to influence the subjects of illegal activities that have become the basis for the application of sanctions.[56]

Thus, an analysis of the practice of the Court of Justice of the European Union allows us to identify several possible grounds for challenging decisions to impose sanctions. As the most significant feature of such grounds, one should single out their focus on protecting the rights of individuals affected by the introduction of restrictive measures against a public legal entity — a foreign state.

[53] Judgment of the Court of First Instance T-390/08 Bank Melli Iran v. Council of the European Union. URL: https://curia.europa.eu/juris/liste.jsf; jsessionid=9ea7d2dc30db55dfd3e5bd614f28893af16f7b7146aa.e34KaxiLc3qMb40Rch0SaxqTbNb0?num=T-390/08&language=en (accessed on 15.04.2021).

[54] Judgment of the Court of First Instance T-256/07 People's Mojahedin Organization of Iran v. Council. URL: https://curia.europa.eu/juris/liste.jsf?language=en&num=T-256/07 (accessed on 15.04.2021).

[55] See, for example, Joined Cases C-584/10 P, C-593/10 P and C-595/10 P Commission and Others v. Kadi. URL: https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:62010CJ0584 (accessed on 15.04.2021).

[56] Judgment of the General Court T-434/11 Europaisch-Iranische Handelsbank v. Council of the European Union. URL: https://curia.europa.eu/juris/liste.jsf?num=T-434/11&language=EN (accessed on 15.04.2021).

At the same time, EU legislation provides the necessary set of legal instruments to limit the possibility of repeal of such acts if this affects certain areas (for example, CFSP) or is in the general interest of EU Member States. In fact, this circumstance is intended to push the addressee of sanctions to change the political course, which in most cases is an undesirable, if not impossible, scenario. Under these conditions, the real set of ways to protect the rights and legitimate interests of Russian organizations and citizens seems to be quite limited to ensure the fulfillment of its goal. In fact, the main way to overcome the EU sanctions remains the search for new partners in the geopolitical arena for the implementation of joint projects and initiatives (for example, within the framework of BRICS and the EAEU) [12, 13]. Since a number of states initially refused to impose sanctions against Russia, strengthening economic ties with them will inevitably entail losses for individual EU member states, which, in turn, will become an incentive for the leadership of these countries to abandon restrictive measures [14] or even introduce countermeasures aimed at limiting the extraterritorial nature of the imposed sanctions [15].

The novelties of the procedural legislation of the Russian Federation should not be omitted: in particular, granting sanctioned companies the right to transfer disputes to Russian courts actually limited the possibility of recognizing and enforcing foreign court decisions in relation to persons on the sanctions lists [16].

CONCLUSIONS

Based on the results of the study, it seems possible to conclude that there are legal mechanisms to challenge the restrictive measures introduced by the EU, which at the same time are very limited in their effectiveness. Despite the appearance in the practice of the Court of Justice of the European Union of decisions to lift the imposed sanctions against individuals (in particular, financial organizations of the Islamic Republic of Iran), the application of a similar approach to organizations and citizens of the Russian Federation included being included in the sanctions lists seems unlikely due to the invariance of the general foreign policy of the state.

The restrictive measures imposed on the Russian Federation exacerbated the existing internal problems associated with a focus on the export of raw materials to a greater extent than on the development of the manufacturing industry and high-tech enterprises. Together with a number of unresolved institutional difficulties (including the low efficiency of the bureaucracy and the insufficient level of the legal protection of the rights and legitimate interests of individuals in relation to government agencies), this circumstance significantly reduces the level of attractiveness of Russia for foreign investors (despite certain exceptions described in Western literature confirming the general rule [17, 18]). Ultimately, these circumstances may become prerequisites for the emergence of even more large-scale crisis phenomena both in economic systems of various levels and in the system of international relations, which should be considered as a serious risk factor for national economic security. At the same time, in this regard, one can look at the rapidly developing financial technologies from a different angle [19]: the use of payment functions of digital financial assets (subject to proper control by the state) based on distributed ledger technology seems to be a worthy response to the threat of disconnection of the Russian Federation from SWIFT [20].

In our opinion, the only possible way for Russia to develop under the pressure of sanctions is large-scale investment in human capital. This will allow to form a mass of highly qualified specialists fundamental for a modern developed economy, as well as provide a base of consumers capable of working in a digital economy.

In addition, individuals and legal entities under sanctions have and must use every opportunity to appeal and cancel them ahead

of schedule. Despite the fact that, according to the authors, the decisions of the EU bodies in such cases are more of a political nature, it is necessary to seek justice using all available mechanisms.

As the practice outlined in this article shows, disputes about the lifting of restrictive measures are not always lost for the interested parties, against whom sanctions are applied. That is why both practicing lawyers and those interested in the theory of EU law should pay closer attention to the possibilities of challenging the sanctions described in this article.

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