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Excessive Borrowing in Debt Policy of the Russian Federation

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ABSTRACT

The **subject of the study** is the debt policy of the Russian Federation in 2001–2023, the replenishment and withdrawal of the National Wealth Fund (NWF), the mechanism of the "fiscal rule". The **purpose** of the study is to discover the real effects of implementation of the fiscal mechanism known as "fiscal rule" as well as evaluation of the real efficiency and potential of the application of the mechanism of NWF as a countercyclical regulation tool. The research used the method of system analysis of the federal budget data, budget balances in the framework of debt policy. The study also used the methodology for calculating excessive borrowings developed by the author for the first time. The **scientific novelty** of the study lies in the fact, which is discovered for the first time, that the increase of the state debt significantly exceeded the real requirement for state borrowings in order to cover the federal budget deficit. Special attention was paid to the budget surplus and the quantitative analysis of the state debt growth in the framework of surplus budgets. The research of a deficit-surplus budget phenomenon, initially described by O. Dmitrieva, is continued in the paper. The cost estimation of the excessive borrowings through the period of 2001–2023 is made. It has been established that the replenishment of the NWF according to the different versions of the "fiscal rule" is the main factor of the excessive borrowings and, consequently, the increasing debt service costs. The share of debt service costs in the federal budget expenses increased from 1.8% in 2009 to 5.33% in 2023. It has been shown that the systemic vices in the section "sources of the budget deficit coverage" creates the opportunity for artificial increase in debt beyond the level of the real requirement for state borrowings, contributing to the state debt growth. In the **conclusion** of the research it is articulated that the NWF does not work and cannot work as a countercyclical regulation tool and an attempt to use it in this capacity leads to an increase in state debt and debt service costs. The **practical significance** of the research lies in the debt police improvement proposals and recommendations for budget classification and have the remarkable practical significance for all countries which have been creating national sovereign funds.

Keywords: state debt; the National Wealth Fund; deficit (surplus) of the Federal budget; debt service costs; fiscal rule; expenses; excessive borrowings; sovereign funds

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INTRODUCTION

The policy of debt policy and the issues concerning the optimal level of government spending are among the most important areas of research in public finance. These questions were thoroughly examined in the works of R. Barro [1, 2], D. Ashauer [3], N. Bose [4], and several other economists [5]. The essence of these studies was that increasing government spending only up to a certain limit and in a specific structure contributes to economic growth. As soon as the growth of government spending encounters the need to raise taxes or borrow (future taxes), such an increase in government spending may serve as a disincentive to economic growth due to the limitation of entrepreneurial activity and demand from households. This thesis has been misinterpreted in Russian budget policy as a ban on the use of tax revenues from the oil and gas sector. Subsequent attempts were made to theoretically substantiate this thesis in the works of A. L. Kudrin [6], A. Knobel [7], and G. Idrisov [8]. Referring to the aforementioned papers, the authors justified the need for artificial constraints on government spending even in cases where their increase is not accompanied by either a rise in the tax burden or an increase in debt. This justification was the basis for the formation of surplus budgets and the limitation on the use of oil and gas revenues for financing budget expenditures. At the same time, it was previously demonstrated in the paper of O. G. Dmitrieva [9] that a surplus budget and the formation of a Stabilization Fund act as an artificial brake on economic growth, and their effect is contrary to that of the Keynesian multiplier [10].

In addition, a theory was developing in parallel that in oil-producing countries, it is necessary to build a system for neutralizing cycles of oil market fluctuations, using the tool of replenishing and utilizing sovereign funds. These theses were substantiated in the works of S. Barnett and R. Ossowski [11, 12]. They were further developed in the works of E. Gurvich and others [13, 14]. The hypothesis of possible counter-cyclical regulation through the immobilization of oil revenues in sovereign funds formed the basis to separate the budget revenues into oil and gas and non-oil and gas categories. The vulgar development of the concept of limiting government expenditures regardless of the conditions of their financing and the necessity of forming the National Wealth Fund (Stabilization Funds) has practically led to further escalation of borrowings directed towards the National Wealth Fund, which resulted in excessive borrowing, an increase in public debt, and service debt costs.

The paper examines the consequences concerning of the implemented budget policy, introduces the concept of "excessive borrowing", describes the methodology for calculating the volume of excessive borrowing, the estimation of the artificial debt and the debt service costs are presented in the paper as well.

BUDGET DEFICIT OR SURPLUS BUDGET, DYNAMICS OF STATE DEBT

The budget of the Russian Federation has been formally and actually surplus for 12 financial years: from 2000 to 2008 inclusive, in 2011, 2018, 2019, and 2021. Four financial years: in 2012–2014 and in 2020, the federal budget was formally in deficit, but in reality, it was in surplus, as a deficit was reported while part of the additional oil and gas revenues was directed to replenish the National Wealth Fund (formerly the Reserve Fund and the Stabilization Fund). And only during 7 financial years in 2009, 2010, 2015–2017, and in 2022–2023 was the federal budget executed with a real deficit (*Table 1*).

The dynamics of budget deficit (surplus) should be compared with the dynamics of public debt. In the period under consideration, two phases of government debt dynamics should be highlighted: 2000–2008, when government debt was reduced due to budget surpluses, and the period starting from 2009, when the growth of state debt occurred both

Table 1

Federal Budget Deficit (–) / surplus (+) in the Russian Federation, Billions Rubles

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Deficit –, Surplus +	150.7	227.6	729.9	1612.9	1994.1	1794.6	1705.1	–2 322.3	–1812.1	442.0	–27.0

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Deficit –, Surplus +	–323.0	–335	–1961	–2956	–1331	2741.0	1975	–4102	524	–3294	–3229

Source: Calculated by the author according to: Conclusion of the Accounts Chamber of the Russian Federation on the report on the execution of the federal budget for 2011. No. ZSP-18/15–10 p. 51; Execution of the federal budget and the budgets of the budgetary system of the Russian Federation in 2011. M: Ministry of Finance of the Russian Federation, 2012. 123 p.; On the execution of the federal budget for the year 2000: Federal Law from 3 April 2002 No. 39; On the execution of the federal budget for the year 2001: Federal Law from 7 June 2003 No. 67; On the execution of the federal budget for the year 2002: Federal Law from 8 May 2004 No. 35; On the execution of the federal budget for the year 2003: Federal Law from 4 April 2005 No. 30; On the execution of the federal budget for 2004: Federal Law from 15 April 2006 No. 52; On the execution of the federal budget for 2005: Federal Law from 9 April 2007 No. 41; On the execution of the federal budget for the year 2006: Federal Law from 3 April 2008 No. 36; On the execution of the federal budget for the year 2007: Federal Law from 3 December 2008, No. 228; On the execution of the federal budget for 2008: Federal Law from 28 December 2009 No. 382; On the execution of the federal budget for the year 2009: Federal Law from 3 October 2010 No. 255; On the execution of the federal budget for the year 2010: Federal Law from 7 October 2011 No. 272; On the execution of the federal budget for 2011: Federal Law from 2 October 2012 No. 151; Operational report of the Accounts Chamber of the Russian Federation "On the progress of the execution of the federal budget for January-December 2012" from 7 February 2013 No. OO-1/15–10, 2013. 130 p.; On the execution of the federal budget for 2013: Federal Law from 4 October 2014 No. 280; On the execution of the federal budget for 2014: Federal Law from 5 October 2015 No. 276; On the execution of the federal budget for 2015: Federal Law from 31 October 2016 No. 377; On the execution of the federal budget for 2016: Federal Law from 16 October 2017 No. 287; On the execution of the federal budget for the year 2017: Federal Law from 11 October 2018 No. 354; On the execution of the federal budget for 2018: Federal Law from 16 October 2019 No. 332; On the execution of the federal budget for 2019: Federal Law from 15 October 2020 No. 314; Operational report of the Accounts Chamber on the execution of the federal budget for January-December 2023 from 15 February 2024. On the execution of the federal budget for the year 2020: Federal Law from 25 October 2021 No. 361; On the execution of the federal budget for 2021: Federal Law from 14 July 2022 No. 249; On the execution of the federal budget for the year 2022: Federal Law from 24 July 2023 No. 329.

during budget surpluses and federal budget deficits (*Table 2*). From 2000 to 2003, the budget surplus was used to pay off external debt, and from 2004, the surplus was directed both towards debt repayment and to replenish the Stabilization Fund. The state external debt decreased from 4 038.1 billion rubles in 2000 to 1 101.6 billion rubles in 2007. At the same time, the early pay off of external debt compared to the original schedule drew criticism, as it diverted funds from investments in the national economy and social expenditures.

In the period from 2018 to 2019, the federal budget had a surplus, however, the increase in state debt during this period amounted to 2 trillion rubles. Even during the years 2000 to 2008, when there were budget surpluses and a reduction in public debt, borrowing was carried out beyond necessary levels. So, in 2005, with a surplus budget, there was no need for loans. Despite the fact that the budget surplus turned out to be 5.8 times larger than planned, or 1 334.8 billion rubles more, the reduction in the volume of net domestic borrowings occurred by only 27 billion rubles. In 2006, against the backdrop of a surplus growth of 1 218.1 billion rubles, there was also an increase in net domestic borrowings. It is precisely this year that fundamentally new trends have emerged in the simultaneous escalation of borrowings amid a surplus

Table 2

State Debt of the Russian Federation on the 1st of January of the Fiscal Year, Billions Rubles

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
4595.6	4478.8	4562.2	4190.2	3944.8	3076.8	2435.3	2402.8	2692.0	3233.1	4158.2	5343.2

2003	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
6519.9	7548.3	10299.1	10951.9	11109.8	11559.7	12591.3	13567.4	18940.4	20921.8	22819.7	25595.1

Source: Calculated by the author according to: Conclusion of the Accounts Chamber of the Russian Federation on the report on the execution of the federal budget for 2011. No. ZSP-18/15–10 p. 51; Execution of the federal budget and the budgets of the budgetary system of the Russian Federation in 2011. M: Ministry of Finance of the Russian Federation, 2012. 123 p.; On the execution of the federal budget for the year 2000: Federal Law from 3 April 2002 No. 39; On the execution of the federal budget for the year 2001: Federal Law from 7 June 2003 No. 67; On the execution of the federal budget for the year 2002: Federal Law from 8 May 2004 No. 35; On the execution of the federal budget for the year 2003: Federal Law from 4 April 2005 No. 30; On the execution of the federal budget for 2004: Federal Law from 15 April 2006 No. 52; On the execution of the federal budget for 2005: Federal Law from 9 April 2007 No. 41; On the execution of the federal budget for the year 2006: Federal Law from 3 April 2008 No. 36; On the execution of the federal budget for the year 2007: Federal Law from 3 December 2008, No. 228; On the execution of the federal budget for 2008: Federal Law from 28 December 2009 No. 382; On the execution of the federal budget for the year 2009: Federal Law from 3 October 2010 No. 255; On the execution of the federal budget for the year 2010: Federal Law from 7 October 2011 No. 272; On the execution of the federal budget for 2011: Federal Law from 2 October 2012 No. 151; Operational report of the Accounts Chamber of the Russian Federation "On the progress of the execution of the federal budget for January-December 2012" from 7 February 2013 No. OO-1/15–10, 2013. 130 p.; On the execution of the federal budget for 2013: Federal Law from 4 October 2014 No. 280; On the execution of the federal budget for 2014: Federal Law from 5 October 2015 No. 276; On the execution of the federal budget for 2015: Federal Law from 31 October 2016 No. 377; On the execution of the federal budget for 2016: Federal Law from 16 October 2017 No. 287; On the execution of the federal budget for the year 2017: Federal Law from 11 October 2018 No. 354; On the execution of the federal budget for 2018: Federal Law from 16 October 2019 No. 332; On the execution of the federal budget for 2019: Federal Law from 15 October 2020 No. 314; Operational report of the Accounts Chamber on the execution of the federal budget for January-December 2023 from 15 February 2024. On the execution of the federal budget for the year 2020: Federal Law from 25 October 2021 No. 361; On the execution of the federal budget for 2021: Federal Law from 14 July 2022 No. 249; On the execution of the federal budget for the year 2022: Federal Law from 24 July 2023 No. 329.

budget, where there is both an increase in the Stabilization Fund and a rise in net domestic borrowings. In 2006, the growth of net domestic borrowings was 1.81 times. In 2007, this trend continued. With a surplus budget, and therefore in the absence of the need for borrowing, net domestic borrowings increased by 20.2%. The phenomenon of rising public debt in the context of a budget surplus was first studied in the paper of O. G. Dmitrieva [15].

In the crisis year of 2008, the budget was executed with a surplus of 1.705 trillion rubles, while a nearly balanced budget had been planned. The increase in expenses over the year amounted to approximately 1 000.6 billion rubles. It is evident that the use of the resources that went into forming the budget surplus could have significantly prevented the severe economic downturn that occurred in 2009. Finally, in 2011, additional revenues amounted to 2 523.1 billion rubles. At the same time, the additional increase in expenses amounted to 267 billion rubles. At the same time, there was a paradoxical situation where, during the transition from a deficit budget to a surplus budget, the volume of borrowings remained virtually unchanged throughout its execution. Thus, a unique situation arises where the state debt is growing despite a

budget surplus and the lack of economic need for loans. So, from 2009 to 2013, the growth of the national debt amounted to 3 trillion 830.6 billion rubles, which completely nullified all efforts to reduce the national debt pyramid that were made in 2001–2007. The withdrawal of funds from the economy in favor of the myth of the necessity for early debt pay off was nullified by the same myth that, despite the objective lack of need for loans, it is essential to take them in order to ensure the country's presence in the debt market.

In the future, this myth transformed into the assertion that one should take loans while they are available, and if the situation changes in the future, there will be no revenues, and loans will become more expensive, then there will be a source in the National Wealth Fund. Thus, Finance Minister A. G. Siluanov stated: "If we do not replenish the National Wealth Fund, which is used, as we mentioned, primarily for the economy now (it goes towards the formation of infrastructure projects, modernization, and technical sovereignty), if we do not do this, then we will not have sources for all these areas of using the National Wealth Funds. This is the first one. The second point is that we are putting ourselves at risk: what if there are no such oil and gas revenues? The market situation will change; if there are no revenues from oil and gas, we will take resources from the National Wealth Fund" (cited from: Transcript of the meeting of the State Duma of the Federal Assembly of the Russian Federation from 15.11.2023. URL: http://transcript.duma.gov.ru/node/6244/ (accessed on 23.05.2024)].

FORMATION OF THE NATIONAL WEALTH FUND

The main factor causing a significant deviation in the dynamics of public debt from the needs to cover the budget deficit is the formation of the National Wealth Fund (formerly — Stabilization Fund, Reserve Fund).

The formation of the Stabilization Fund began in 2004. By 2008, it reached 3 849.1 billion rubles and was divided into the Reserve Fund and the National Wealth Fund. Such rapid growth of the Stabilization Fund is explained both by the mandatory transfer of funds to the Reserve Fund when the price of oil exceeds a certain threshold — $27 per barrel (later referred to as the "budget rule") — and by the fact that the remaining budget funds at the end of the year were directed to the Reserve Fund. These balances represented a significant amount, as the peculiarity of the budget policy was the underestimation of federal budget revenues at the time of their initial approval.

The budget rule, or the division of oil and gas revenues into basic and additional categories, as well as the restrictions on their use for budget expenditures, has been constantly changing; the established limitations have systematically not been met, adjusted, and suspended.

The use of the budget rule for regulating monetary policy in oil-producing countries was based on a misinterpreted policy of counter-cyclical crisis regulation [16, 17]. The essence of this regulation is to ensure that oil and gas revenues during favorable economic conditions are not used for budget expenditures, but rather directed into so-called sovereign funds. In the case of crises and shocks, the funds from these reserves can supposedly be used to stabilize the economic situation. This concept lacked precise economic evidence of its feasibility, and research on sovereign funds by both Russian and foreign scholars was limited to describing the formation of sovereign funds in various countries and the rules for their replenishment and withdrawal [18–20].

In Russian economic policy, the theoretical foundation for using the stabilization fund to regulate the oil cycle has been repeatedly put forward by E. Gurvich [13, 14]. However, the attempt to artificially restrain economic development through the formation of a sustainable budget surplus and capital outflow, as an action contrary to deficit financing of

Table 3

Replenishment (+), Withdrawal (–) of the National Wealth Fund (Stabilization Fund, Reserve Fund), Billions Rubles

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
+541	+812	+1188	+1205	+4004	–3275	–1135	+1100	+723	+1084

2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
+3573	–465.9	–3577	–1539	+287	+3726	+5780	+19.6	–3131	+1530

Source: Calculated by the author according to: Conclusion of the Accounts Chamber of the Russian Federation on the report on the execution of the federal budget for 2011. No. ZSP-18/15–10 p. 51; Execution of the federal budget and the budgets of the budgetary system of the Russian Federation in 2011. M: Ministry of Finance of the Russian Federation, 2012. 123 p.; On the execution of the federal budget for the year 2000: Federal Law from 3 April 2002 No. 39; On the execution of the federal budget for the year 2001: Federal Law from 7 June 2003 No. 67; On the execution of the federal budget for the year 2002: Federal Law from 8 May 2004 No. 35; On the execution of the federal budget for the year 2003: Federal Law from 4 April 2005 No. 30; On the execution of the federal budget for 2004: Federal Law from 15 April 2006 No. 52; On the execution of the federal budget for 2005: Federal Law from 9 April 2007 No. 41; On the execution of the federal budget for the year 2006: Federal Law from 3 April 2008 No. 36; On the execution of the federal budget for the year 2007: Federal Law from 3 December 2008, No. 228; On the execution of the federal budget for 2008: Federal Law from 28 December 2009 No. 382; On the execution of the federal budget for the year 2009: Federal Law from 3 October 2010 No. 255; On the execution of the federal budget for the year 2010: Federal Law from 7 October 2011 No. 272; On the execution of the federal budget for 2011: Federal Law from 2 October 2012 No. 151; Operational report of the Accounts Chamber of the Russian Federation "On the progress of the execution of the federal budget for January-December 2012" from 7 February 2013 No. OO-1/15–10, 2013. 130 p.; On the execution of the federal budget for 2013: Federal Law from 4 October 2014 No. 280; On the execution of the federal budget for 2014: Federal Law from 5 October 2015 No. 276; On the execution of the federal budget for 2015: Federal Law from 31 October 2016 No. 377; On the execution of the federal budget for 2016: Federal Law from 16 October 2017 No. 287; On the execution of the federal budget for the year 2017: Federal Law from 11 October 2018 No. 354; On the execution of the federal budget for 2018: Federal Law from 16 October 2019 No. 332; On the execution of the federal budget for 2019: Federal Law from 15 October 2020 No. 314; Operational report of the Accounts Chamber on the execution of the federal budget for January-December 2023 from 15 February 2024. On the execution of the federal budget for the year 2020: Federal Law from 25 October 2021 No. 361; On the execution of the federal budget for 2021: Federal Law from 14 July 2022 No. 249; On the execution of the federal budget for the year 2022: Federal Law from 24 July 2023 No. 329.

the economy in the form of the Keynesian multiplier, actually acts as a brake on economic growth, but as a tool for smoothing oil risks — it does not work and cannot work.

The base price for oil was initially set at $27 per barrel, in 2008 it was $45–50 per barrel, during the crisis the budget rule was suspended, and then from 2012 it was set at $91 per barrel, while target benchmarks for growth rates and volume as a percentage of GDP for the Reserve Fund and the National Wealth Fund were in place. The changes that came into effect in 2013 did not allow the use of Reserve Fund resources to replace borrowings in the budget execution process. In 2015, the budget rule was once again suspended; however, the absurd restrictions on the use of the National Wealth Fund's resources to replace borrowings were repeated in subsequent versions of the so-called budget rule. In 2017, a new restriction was proposed on the use of oil and gas revenues — $40 per barrel. In 2022, the budget rule was once again suspended. In 2023, a new budget rule was designed with a limit on the use of oil and gas revenues in absolute terms. This budget rule has been adjusted several times over the year, and in fact, the withdrawal and replenishment of the National Wealth Fund has developed arbitrarily. Throughout

Table 4

Characteristics of the Federal Budgets (2000–2023 Years), Billions Rubles

2000–2008	2009–2010	2011	2012–2014	2015–2017	2018–2019	2020	2021	2022–2023
Surplus	Deficit	Surplus	Deficit-surplus	Deficit	Surplus	Deficit-surplus	Surplus	Deficit

Source: Calculated by the author according to the *Table 1–3*.

the year, there were both contributions to and withdrawals from the National Wealth Fund. In 2024, the definition of the budget rule has once again returned to the basic price of oil, which is set at $60 per barrel. The constant change in approaches to defining the boundaries of using oil and gas revenues, along with adjustments throughout the year depending on the prevailing global situation, serves as indirect evidence of the artificiality of this principle, which main task is the imposed restriction on the use of the country's produced GDP.

In the dynamics of the National Wealth Fund in the framework of actual sources of its replenishment, the following options can be identified:

Option 1. The National Wealth Fund with a surplus budget (2004–2008), while the state debt does not increase (*Table 3*).

Option 2. The National Wealth Fund is replenished during budget surpluses (in 2011, 2018, 2019, and 2021), while the state debt increases.

Option 3. The National Wealth Fund is replenished during a budget deficit, and the state debt increases; loans serve both as a source for covering the deficit and as a source for replenishing the National Wealth Fund (2012–2014, 2020, 2023).

Option 4. The National Wealth Fund is shrinking in the face of a budget deficit, with its resources being used as a source to cover the deficit.

In the third scenario, when a budget deficit occurs while simultaneously replenishing the National Wealth Fund, borrowings are made to cover the budget deficit, and sometimes also to replenish the National Wealth Fund. If the amount of funds allocated to replenish the National Wealth Fund exceeds the size of the budget deficit, it should be characterized as a deficit-surplus budget (*Table 4*).

If in 2011 the situation of a deficit-surplus budget arose during its execution, starting from 2012, the simultaneous implementation of borrowings and replenishment of the National Wealth Fund (Reserve Fund) is planned already at the budget approval stage.

Initially, loans are planned for their subsequent placement in the National Wealth Fund (Reserve Fund) and for losses due to interest rate differences. In the process of budget execution, the National Wealth Fund (Reserve Fund) is being replenished to a greater extent than planned, expenses are not increasing or are increasing only slightly, and loans are not being reduced due to additional revenues. In 2012, net domestic borrowings were planned at 1 208.8 billion rubles, while simultaneously replenishing the Reserve Fund by 512.3 billion rubles. During the execution of the 2012 budget, revenues increased by 1 064.8 billion rubles, while expenditures rose by only 215.2 billion rubles. At the same time, the deficit was reduced by 26 billion rubles, while borrowings amounted to 700.2 billion rubles, rather than the expected 833.8 billion rubles. The difference went towards an extraordinary replenishment of the Reserve Fund. As a result of replenishing the Reserve Fund by 1.8 trillion rubles (*Table 4*), a budget deficit was formed, and the increase in debt amounted to 1 trillion rubles. Thus, the law formalizes and prescribes an economically absurd borrowing policy in the context of a surplus budget. However, the most absurd year appears to be 2020, the "pandemic" year, when,

Table 5

State Debt Increase, Federal Budget Deficit (–) / Surplus (+), Replenishment (+), Withdrawal (–) of the National Wealth Fund, Amount of the Excessive Borrowings in 2001–2023 Years, Billions Rubles

Indicator	2001–2007	2008	2009	2010	2011	2012	2013	2014	2015
State debt inctrease	–2193	289	541	925	1185	1177	1028	2751	655
Federal budget deficit (–) / surplus (+)	6501	1705	–2322	–1812	442	–39	–323	–335	–1961
Replenishment (withdrawal) of the National Wealth Fund (stabilization fund)	2618	2771	–2013	–1129	135	970	1184	3573	–466
Excessive borrowing		289	231	242	1185	1177	1028	2751	

Indicator	2016	2017	2018	2019	2020	2021	2022	2023
State debt inctrease	155	450	1031	976	5373	1981	1898	2776
Federal budget deficit (–) / surplus (+)	–2956	–1331	2741	1974	–4102	524	–3294	–3230
Replenishment (withdrawal) of the National Wealth Fund (stabilization fund)	–3577	–1539	287	3726	5780	20	–3331	1530
Excessive borrowing	155	450	1032	976	5373	1981	1898	1076

Source: Calculated by the author according to the *Table 1–3*.

despite a budget deficit of 4 trillion rubles, the replenishment of the National Wealth Fund amounted to 5.78 trillion rubles (*Table 1, 3*), while the increase in state debt was 5.3 trillion rubles (*Table 2*).

EXCESSIVE BORROWING

Excessive borrowing in this paper is defined as financial operations that lead to an increase in public debt, carried out beyond the amounts necessary to cover the budget deficit. Excessive borrowings are identified and assessed during the analysis of the relationship between the size of the budget deficit (surplus), the growth of public debt, and the replenishment of the National Wealth Fund in each financial year. The assessment of excessive borrowings is carried out as follows.

1. In the context of a budget surplus, any increase in public debt is regarded as an amount of excessive borrowing. In 2008, the budget surplus amounted to 1 705 billion rubles, while the replenishment of the National Wealth Fund and the Reserve Fund totaled 2 771 billion rubles, and the increase in debt was 289 billion rubles. The volume of excessive borrowings is estimated at 289 billion rubles. In the context of a surplus budget, the entire increase in debt, that is, the volume of net borrowings that could not serve as a source for covering a deficit due to its absence as such, is regarded as excessive borrowings. A similar calculation of excess borrowings in the context of surplus budgets has been carried out for the years 2011, 2018, 2019, and 2021 (*Table 5*).

2. The volume of excess borrowings in the context of a deficit-surplus budget, provided that the size of the deficit is less than the amount of replenishment of the National Wealth Fund, is defined as the entire increase in debt for the financial year in question. Thus, excessive borrowings were identified in 2012–2014 and 2020, that is, during the periods

Table 6

Surplus (+), Replenishment (+), Withdrawal (–) of the National Wealth Fund, Amount of the Excessive Borrowings in 2001–2023 Years, Cumulative Total, Billions Rubles

Indicator	2001–2023
Increase of the State Debt for the period	21000
Federal budget deficit (–) / surplus (+) (accumulated sum)	–7537
Replenishment (+), withdrawal (–) of the National Wealth Fund (Stabilization Fund, Reserve Fund)	10542
Excessive borrowing	19845.1

Source: Calculated by the author according to the *Table 5*.

Table 7

Increase of the State Debt, Federal Budget Deficit (–), Surplus (+), Replenishment (+), Withdrawal (–) of the National Wealth Fund, Amount of the Excessive Borrowings (2024–2026 Years), Billions Rubles

Indicator	2024	2025	2026	Total for 2024–2026
Increase of the State Debt for the period	6907.3	3373	4212	14493
Federal budget deficit (–) / surplus (+)	–2120.7	–830	–1536	–4486.9
Replenishment (+), withdrawal (–) of the National Wealth Fund	–986	1812	1869	2695.7
Excessive borrowing	5773.6	2543	2676	10992.4

Source: Calculated by the author according to "On the Federal Budget for 2024 and the Planning Period of 2025 and 2026: Federal Law from 27 November 2023 No. 540", "On Amendments to the Federal Law "On the Federal Budget for 2024 and the Planning Period of 2025 and 2026": Federal Law from 12 July 2024 No. 175".

when the execution of federal budgets were characterized as deficit-surplus budgets.

3. In the context of a budget deficit, the volume of excessive borrowings is determined when the amount of withdrawal of the National Wealth Fund exceeds the size of the budget deficit, while there is also an increase in public debt. In this case, the volume of excess borrowings is considered equal to the volume of net borrowings, that is, the volume of debt increase. Such a situation occurred in 2016, 2017, and in 2022. Excessive borrowing occurs in the context of budget deficits, when, in order to cover the budget deficit through borrowing, there is also a simultaneous replenishment of the National Wealth Fund (the situation in 2023), or when borrowing is carried out in an amount exceeding the needs to cover the budget deficit, taking into account the use of National Wealth Fund resources (the situations in 2009 and 2010). In both cases, the volume of excessive borrowings is calculated using the formula:

$$EB = SD + RNWF - |BD|,$$

where EB — the size of excessive borrowings; RNWF — replenishment (withdrawal) of the National Welfare Fund; BD — budget deficit; SD — state debt increase.

Table 8

Federal Budget Flows in the Section "Budget Deficit Coverage"

Receipts	Expenditures	Balance of receipts/expenditures
+ Budget revenues	– Budget expenditures	Deficit (surplus)
+ Deficit	– Surplus	
Sources of deficit coverage		
+ Loans	– Loan repayment	Increase (decrease) of debt
+ Repayment of loans	– Provision of loans	
+ Expenditure of the National Wealth Fund	– Replenishment of the National Wealth Fund	Reduction (increase) of the National Wealth Fund
+ Changes in budget fund balances, others	– Changes in budget fund balances, among others	Reduction (increase) of balances

Source: Compiled by the author on the basis of the current version of the Budget Code of the Russian Federation and regulatory legal acts of the Ministry of Finance governing the issues of budget classification.

The volume of excess borrowing is calculated as the difference between the total increase in debt and the replenishment (withdrawal) of the National Wealth Fund and the scalar size of the budget deficit.

Until this study, there had been no attempts to analyze the net result regarding the budget deficit (surplus), the replenishment of the National Wealth Fund (Reserve Fund and Stabilization Fund), and the increase in public debt. At the same time, such an analysis will allow for the assessment of the effectiveness of debt policy over a long period. For the entire period under consideration, that is, starting from 2000, the net result (deficit, surplus) amounts to a cumulative deficit of 7.8 trillion rubles (*Table 6*). Accordingly, in the absence of such a source for covering the budget deficit as the National Wealth Fund (Stabilization Fund, Reserve Fund), the nominal volume of net borrowings to cover budget deficits during the specified period should not exceed 7.8 trillion rubles in nominal terms. At the same time, the increase in public debt during the specified period amounted to 21 trillion rubles. The volume of excess borrowings for the specified period is calculated as the sum of excess borrowings determined for each financial year (*Table 6*).

The total volume of excess borrowings, as the sum of the estimates of excess borrowings for each year, amounts to 19.8 trillion rubles, which is slightly less than the increase in public debt during the same period. However, such a volume of excessive borrowing indicates that there was no necessity for the increase in public debt during the specified period. The policy of artificial accumulation of public debt and excessive borrowing, judging by the benchmarks set by the adopted law "On the Federal Budget for 2024 and the planned period of 2025 and 2026", will continue in the future (*Table 7*).

A systematic error in estimating budget revenues, the artificial inflation of the budget deficit (understating the surplus) during budget approval leads to excessive borrowing and an increase in public debt, whether in surplus budgets, deficit-surplus budgets, or deficit budgets. Moreover, the imperfect structure of the budget classification in the section "Sources of covering the budget deficit" allows for the artificial increase of public debt in the lack of a need for borrowing as a source of covering the deficit.

The budget classification stipulates that loans should be reflected in the budget as sources of deficit coverage with a positive sign,

Table 9

State Debt Service Costs, Income from Investing NWF Funds (Stabilization Fund, Reserve Fund), Billions Rubles

Indicator	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total 2005–2023
Debt service costs	208.33	172.76	143.09	153.34	176.16	195.03	262.74	320.00	360.30	415.60	518.70	621.3	709.20	806.00	730.8	784.2	1084.2	1330.6	1725.3	10717.67
Income from investing the NWF funds		22.99	151.9	268.5	99.33	71.05	87.33	32.52	39.41	81.80	5.43	87.90	50.84	70.52	95.18	345.34	257.29	52.34	358.35	2178.02
The ratio of debt service costs from investing the NWF funds		7.5	0.9	0.6	1.8	2.7	3.0	9.8	9.1	5.1	95.5	7.1	13.9	11.4	7.7	2.3	4.2	25.4	4.8	4.9

Source: Calculated by the author according to: Conclusion of the Accounts Chamber of the Russian Federation on the report on the execution of the federal budget for 2011. No. ZSP-18/15–10 p. 51; Execution of the federal budget and the budgets of the budgetary system of the Russian Federation in 2011. M: Ministry of Finance of the Russian Federation, 2012. 123 p.; On the execution of the federal budget for the year 2000: Federal Law from 3 April 2002 No. 39; On the execution of the federal budget for the year 2001: Federal Law from 7 June 2003 No. 67; On the execution of the federal budget for the year 2002: Federal Law from 8 May 2004 No. 35; On the execution of the federal budget for the year 2003: Federal Law from 4 April 2005 No. 30; On the execution of the federal budget for 2004: Federal Law from 15 April 2006 No. 52; On the execution of the federal budget for 2005: Federal Law from 9 April 2007 No. 41; On the execution of the federal budget for the year 2006: Federal Law from 3 April 2008 No. 36; On the execution of the federal budget for the year 2007: Federal Law from 3 December 2008, No. 228; On the execution of the federal budget for 2008: Federal Law from 28 December 2009 No. 382; On the execution of the federal budget for the year 2009: Federal Law from 3 October 2010 No. 255; On the execution of the federal budget for the year 2010: Federal Law from 7 October 2011 No. 272; On the execution of the federal budget for 2011: Federal Law from 2 October 2012 No. 151; Operational report of the Accounts Chamber of the Russian Federation "On the progress of the execution of the federal budget for January-December 2012" from 7 February 2013 No. OO-1/15–10, 2013. 130 p.; On the execution of the federal budget for 2013: Federal Law from 4 October 2014 No. 280; On the execution of the federal budget for 2014: Federal Law from 5 October 2015 No. 276; On the execution of the federal budget for 2015: Federal Law from 31 October 2016 No. 377; On the execution of the federal budget for 2016: Federal Law from 16 October 2017 No. 287; On the execution of the federal budget for the year 2017: Federal Law from 11 October 2018 No. 354; On the execution of the federal budget for 2018: Federal Law from 16 October 2019 No. 332; On the execution of the federal budget for 2019: Federal Law from 15 October 2020 No. 314; Operational report of the Accounts Chamber on the execution of the federal budget for January-December 2023 from 15 February 2024. On the execution of the federal budget for the year 2020: Federal Law from 25 October 2021 No. 361; On the execution of the federal budget for 2021: Federal Law from 14 July 2022 No. 249; On the execution of the federal budget for the year 2022: Federal Law from 24 July 2023 No. 329.

Table 10

Share of State Debt Service Costs, Education Expenditures in Federal Budget, %

Indicator	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
The share of debt service costs	2.0	1.8	1.9	2.4	2.5	2.70	2.80	3.32	3.78	4.32	4.82	4.01	3.44	4.38	4.28	5.33
The share of education expenditures	4.79	4.33	4.38	5.06	4.68	5.04	4.34	3.91	3.64	3.75	4.30	4.54	4.19	4.30		4.34

Source: Calculated by the author according to: Conclusion of the Accounts Chamber of the Russian Federation on the report on the execution of the federal budget for 2011. No. ZSP-18/15–10 p. 51; Execution of the federal budget and the budgets of the budgetary system of the Russian Federation in 2011. M: Ministry of Finance of the Russian Federation, 2012. 123 p.; On the execution of the federal budget for the year 2000: Federal Law from 3 April 2002 No. 39; On the execution of the federal budget for the year 2001: Federal Law from 7 June 2003 No. 67; On the execution of the federal budget for the year 2002: Federal Law from 8 May 2004 No. 35; On the execution of the federal budget for the year 2003: Federal Law from 4 April 2005 No. 30; On the execution of the federal budget for 2004: Federal Law from 15 April 2006 No. 52; On the execution of the federal budget for 2005: Federal Law from 9 April 2007 No. 41; On the execution of the federal budget for the year 2006: Federal Law from 3 April 2008 No. 36; On the execution of the federal budget for the year 2007: Federal Law from 3 December 2008, No. 228; On the execution of the federal budget for 2008: Federal Law from 28 December 2009 No. 382; On the execution of the federal budget for the year 2009: Federal Law from 3 October 2010 No. 255; On the execution of the federal budget for the year 2010: Federal Law from 7 October 2011 No. 272; On the execution of the federal budget for 2011: Federal Law from 2 October 2012 No. 151; Operational report of the Accounts Chamber of the Russian Federation "On the progress of the execution of the federal budget for January-December 2012" from 7 February 2013 No. OO-1/15–10, 2013. 130 p.; On the execution of the federal budget for 2013: Federal Law from 4 October 2014 No. 280; On the execution of the federal budget for 2014: Federal Law from 5 October 2015 No. 276; On the execution of the federal budget for 2015: Federal Law from 31 October 2016 No. 377; On the execution of the federal budget for 2016: Federal Law from 16 October 2017 No. 287; On the execution of the federal budget for the year 2017: Federal Law from 11 October 2018 No. 354; On the execution of the federal budget for 2018: Federal Law from 16 October 2019 No. 332; On the execution of the federal budget for 2019: Federal Law from 15 October 2020 No. 314; Operational report of the Accounts Chamber on the execution of the federal budget for January-December 2023 from 15 February 2024. On the execution of the federal budget for the year 2020: Federal Law from 25 October 2021 No. 361; On the execution of the federal budget for 2021: Federal Law from 14 July 2022 No. 249; On the execution of the federal budget for the year 2022: Federal Law from 24 July 2023 No. 329.

while loan repayments should be indicated with a negative sign. The remaining funds of the current year with a negative balance (as repayment), and the remaining funds of the previous year with a positive balance as a source to cover the deficit.

Thus, if we assume that borrowings will continue to increase and that the funds from loans will form the remaining budget resources, the result will be a balanced or even surplus budget alongside the growth of state debt pyramid (*Table 8*). Moreover, the carryover balances from the previous year create a budget deficit, which is covered by these same balances. However, very often the formal deficit that arises from the balances of the previous financial year is perceived as an actual deficit, which provides grounds for new borrowings.

Thus, taking into account the aforementioned factors and a more thorough analysis of the dynamics of budget fund balances at the transition through the beginning (end) of the financial year, the assessment of excessive borrowings and the artificial increase of public debt may be even higher.

GROWTH IN DEBT SERVICE EXPENSES

The policy of excessive borrowing and artificial accumulation of public debt leads to

constant losses from the difference between the income generated by the investment of the National Wealth Fund's assets and the service debt costs. If in 2007–2008 the income from the investment of the Stabilization Fund's assets (the National Wealth Fund and the Russian Federation) exceeded the debt service costs, starting from 2009, the income from the investment of the Reserve Fund and the National Wealth Fund's assets has significantly decreased, with a growing trend in the difference. If in 2009 the service debt costs exceeded the income from the investment of the Reserve Fund and the National Wealth Fund by 1.77 times, by 2013 it was almost 10 times (*Table 9*).

The policy of surplus budgets while simultaneously increasing debt, in addition to the traditional negative consequences of surplus budgets (slowing economic growth, excessive tax pressure, encouraging external private borrowing), is exacerbated by a sharp rise in debt service costs and the growth of the debt itself. Given such a disparity between the service debt costs and the income from the investment of funds in the Reserve Fund and the National Wealth Fund, the policy of increasing debt while simultaneously replenishing the Reserve Fund and the National Wealth Fund appears absurd.

Overall, the share of debt service expenditures increased from 1.8% in 2008 to 5.33% in 2023. The creation of artificial debt diverts budget funds to debt servicing at the expense of other budget expenditures.

In this regard, it is interesting to analyze the dynamics of the ratio of debt servicing expenses to education expenses in the federal budget. If in 2008 the share of debt service expenses was 2.3 times less than the share of education expenses, by 2023 the share of debt service expenses has exceeded education expenses by 1.25 times (*Table 10*). Thus, excessive borrowing leads to excessive expenditures in the federal budget for debt service.

The total debt service expenses, starting from 2005 when the Stabilization Fund was established, amounted to 10 117 trillion rubles. At the same time, the income from the investing of the National Wealth Fund (the Stabilization Fund and the Reserve Fund) during the same period amounted to 2 178 trillion rubles. Thus, the excess of debt service expenses over the income from the investing of the National Wealth Fund's assets during the specified period amounted to 8 539 trillion rubles in constant prices. Excessive borrowing and the formation of the National Wealth Fund result in excessive debt service costs and the diversion of budget funds from traditional budget expenditure items. So, the total expenditures on education from the federal budget from 2005 to 2023 amounted to 11 trillion rubles,[1] that education spending could have been doubled during the same period with a different debt policy. This example shows how artificial debt accumulation hinders economic growth, in this case technological development, as federal spending on education is more than 50% of expenditures on higher education.

CONCLUSIOIN

The policy of surplus budgets amid escalating borrowings and replenishing the National Wealth Fund, the formation of deficit-surplus budgets, as well as excessive borrowings during deficit budgets have all the negative consequences of both surplus and deficit budgets.

Excessive borrowing leads to an increase in the debt service costs, while the formation of the National Wealth Fund, given that the

[1] Calculated based on: Operational report of the Accounts Chamber on the execution of the federal budget for January-December 2023 from 15 February 2024. URL: https://ach.gov.ru/upload/iblock/5ee/zyor1q3va23b4o2y4irx01fq1gc9b56a.pdf (accessed on 23.05.2024); On the execution of the federal budget for 2020: Federal Law from 25.10.2021 No. 361. URL: http://pravo.gov.ru/proxy/ips/?docbody=&firstDoc=1&lastDoc=1&nd=602510648 (accessed on 23.05.2024); On the execution of the federal budget for 2021: Federal Law from 14.07.2022 No. 249. URL: http://pravo.gov.ru/proxy/ips/?docbody=&firstDoc=1&lastDoc=1&nd=603176529 (accessed on 23.05.2024); On the execution of the federal budget for 2022: Federal Law from 24.07.2023 No. 329. URL: http://publication.pravo.gov.ru/document/0001202307240093 (accessed on 23.05.2024).

budget deficit is covered by borrowing, results in a constant growth of the gap between the debt service expenses and the income from the investing of the National Wealth Fund's assets. All of this leads to the actual siphoning of budget funds into the financial and banking sector and underfunding of the social sphere.

The formation of the National Wealth Fund and the investment of these funds over many years as part of the Central Bank's gold and foreign exchange reserves in foreign assets meant an organized capital outflow with all the traditional negative consequences of capital flight, compounded by the expropriation of the Russian Federation's assets in convertible currencies of unfriendly countries in 2023–2024.

Before the sanctions of 2014, such a policy encouraged external borrowing. Moreover, there was an incentive to speculate with credit resources due to the difference in interest rates between the domestic and foreign markets. As a result, there was a rapid increase in external private debt. So, from 2005 to 2009, the external public debt decreased by $73.4 billion, while the external private debt increased by $343.4 billion.

The formation of the National Wealth Fund immobilizes a portion of the produced GDP, which serves as an artificial brake on economic growth. The creation of anti-growth incentives that collectively act on the economy like a Keynesian multiplier in reverse, while also reinforcing raw material dependence, as they prevent the use of available resources for economic diversification. For the first time, the consequences of the formation of the Stabilization Fund (National Wealth Fund, Reserve Fund) were studied by O.G. Dmitrieva [9].

In surplus budgets and deficit-surplus budgets, there are excessive tax withdrawals, which serve as a traditional disincentive for expanding production and developing entrepreneurship.

Unjustified borrowings stimulate the growth of demand for money, creating unnecessary competition for economic entities in the credit resource market. The withdrawal of liquidity through borrowing is accompanied by a simultaneous saturation of bank liquidity through budget resources and the funds of the National Wealth Fund. Thus, excessive operations and intermediaries in the financial sector are stimulated, leading to an increase in the cost of credit and limiting the volume of investments, both public and private.

Moreover, the imperfect structure of the budget classification in the section "Sources of Budget Deficit Coverage" creates the possibility of uncontrolled spending of funds outside the "budget balance" in the sources of deficit coverage. This makes the flow of financial resources opaque and complicates the analysis of the effectiveness of state financial policy.

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Features and Factors of the Implementation of the Function of World Money by Reserve Assets in the Modern GMFS

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ABSTRACT

The article analyzes the functional features of the US dollar as a global reserve currency, the factors weakening its position in the global monetary and financial system (GMFS), as well as the directions and trends in the development of the monetary functions of the Russian ruble in international circulation in modern conditions. The **purpose** of the study is to develop conceptual approaches to the analysis of the functions of money in international circulation in new conditions. The **objectives** of the study are to analyze the factors and consequences of the changed qualitative and quantitative characteristics of the use of the US dollar as the "anchor" of the GMFS, as well as to assess the perspectives of the development of monetary functions and the exchange rate mechanism of the Russian ruble. The **research methodology** includes scientific and methodological approaches to the implementation of monetary functions and the exchange rate mechanism of national currencies, analysis of statistical and analytical information of the Bank of Russia, international financial organizations, official reports of government bodies, scientific monographs and publications of Russian and foreign economists, and periodicals. The authors **conclude** that it is advisable for Russian organizations to use rationally trading currency backed primarily by gold and other strategic goods in settlements with interested partners in foreign economic activity.

Keywords: GMFS; international reserves; reserve asset; US dollar; Russian ruble; gold; monetary functions of currency; currency exchange rate mechanism; international payments; global monetary and financial system

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INTRODUCTION

The processes of structural transformation of the global monetary and financial system (further — GMFS) towards polycentrism and regionalization are largely connected to the modifications in recent years of the qualitative and quantitative characteristics of global reserve currencies (primarily the US dollar as the basic reserve asset), including the decline in the reliability of its backing and, consequently, its ability to fully perform monetary functions in international circulation. As noted by the Russian economist L.N. Krasavina, the role of leading national currencies as global money instead of gold necessitates their distinction as an independent object of analysis, as the concept of "world currency" takes on special significance in the context of economic globalization [1].

The destructive impact of economic and geopolitical factors on GMFS is manifested in the distortion of the functions of the US dollar and the euro in international circulation and the weakening of trust in them as global reserve currencies [2–5]. In the new conditions, analyzing the characteristics, factors, and consequences of the changes in the position of the US dollar as an "anchor" of GMFS becomes particularly relevant, as well as assessing the directions of development of monetary functions and the mechanism of exchange rate formation of the Russian ruble.

FEATURES OF THE IMPLEMENTATION OF THE US DOLLAR AS A GLOBAL CURRENCY AND FACTORS REDUCING ITS ROLE IN MODERN GMFS

The success of using a reserve asset as global money is determined by its stability and predictability in fulfilling all the main monetary functions — as a currency for the exchange rates of other monetary units, a means of circulation, a means of payment and settlement, as well as a means of investment and saving. In the current GMFS, a characteristic feature of the US dollar as a global reserve currency is the growing imbalance in its monetary functions. Alongside the preservation of the leading role of the US dollar in serving as a measure of value for other currencies and as a vehicle currency, there is a noticeable decline in trust towards the American currency. Consequently, its position as an international medium of payment and settlement, as well as an international means of investment and savings, is weakening. The US dollar and the second most important currency, the euro, in international transactions are increasingly being replaced by the Chinese yuan and the currencies of other developing economies, including the Russian ruble. Another important feature and condition for the more reliable performance of a currency as a global money in the new reality is the necessity to transition towards its predominant backing by commodity assets and, to a lesser extent, by financial assets. A special place among high-quality commodity assets is occupied by gold, which organically combines the properties of a commodity as both use value and exchange value. That is precisely why gold, along with global reserve currencies, is included as a universally recognized equivalent of value in the structure of international reserves of central banks in the leading economies of the world [6–10].

The increased distortions in the realization of the U.S. dollar's function as a global currency are due to the growing distrust in it as a world reserve currency, primarily as a result of the exacerbation of the country's debt problem. The gross national debt of the United States increased from 8 533.1 billion dollars at the end of 2005 to 30 887.9 billion dollars at the end of 2022 (an increase of 262%), while the consolidated budget deficit rose from –3.1% to –3.7% of GDP. Key macroeconomic indicators in the U.S. have seriously deteriorated: the growth rate of real GDP, the share of GDP based on purchasing power parity in global GDP, the gross accumulation rate, and inflation rates (see *Table*).

At the beginning of January 2024, the U.S. national debt reached 34 trillion dollars, as noted in the report by Roscongress titled "Key Events — 2024. Geo-economics. Forecasts.

Table

Main Macroeconomic Indicators of the USA in 2005–2022

Indicators	2005	2010	2015	2016	2017	2020	2021	2022
Growth rate of real GDP, %	3.5	2.7	2.7	1.7	2.2	–2.8	5.9	2.1
GDP per capita at constant prices, dollars	50322.5	50523.5	54187.9	54700.3	55572.6	55875.5	59009.9	60007.1
The share of GDP by PPP in global GDP, %	19.0	16.7	16.3	16.1	15.9	15.8	15.7	15.5
Cumulative balance, % of GDP	23.4	18.7	21.2	20.6	20.8	21.1	21.1	21.6
Inflation based on the consumer price index, at the end of the period, %	3.7	1.7	0.7	2.2	2.2	1.6	7.4	6.4
Consolidated budget balance, billion dollars	–400.1	–1652.8	–643.0	–817.6	–935.2	–2949.2	–2709.3	–943.7
Consolidated budget balance, % of GDP	–3.1	–11.0	–3.5	–4.4	–4.8	–14.0	–11.6	–3.7
Gross government debt, billion dollars	8533.1	14317.7	19139.5	20032.9	20686.6	28114.8	29474.1	30887.9
Gross public debt, % of GDP	65.4	95.1	105.1	107.2	106.2	133.5	126.4	121.3
Current account balance, billion dollars	–749.2	–432.0	–408.5	–396.2	–367.6	–597.1	–831.4	–971.6
Current account balance, % of GDP	–5.7	–2.9	–2.2	–2.1	–1.9	–2.8	–3.6	–3.8

Source: World Economic Outlook Database. URL: https://www.imf.org/en/Publications/WEO/weo-database (accessed on 15.01.2024).

Risks". The authors of the report argue, that the growing U.S. national debt and the annual servicing costs of 1 trillion dollars threaten to destabilize the global financial system.[1] The rapidly growing current account deficit is also having a destructive impact on the position of the U.S. dollar in the global economy, which increased from –367.6 billion dollars in 2017 to –971.6 billion dollars in 2022 (see *Table*).

According to R. Triffin's dilemma, when a national currency is used as a global reserve asset, the world economy becomes a hostage to the dynamics of the balance of payments of the country issuing the reserve currency. The significant growing deficit in the current account of the balance of payments of the reserve currency issuing country undermines its status as a stable global asset [11].

[1] The Russian Congress spoke about the main threat to the global economy in 2024. RIA News. 10.01.2024. URL: https://ria.ru/20240110/gosdolg-1920410931.html?utm_source=yxnews&utm_medium=desktop (accessed on 15.01.2024).

The situation in the global economy is being exacerbated by its entry into a recession phase, combined with high inflation rates in most countries. In these conditions, a collision arises in the monetary and financial policies of countries with reserve currencies. On one hand, the U.S. Federal Reserve is compelled to implement a tight monetary policy in order to curb inflation, accelerating the increase in interest rates. From 16 March 2022 to 26 July 2023, the U.S. Federal Reserve raised the federal funds rate 11 times — from 0.25% to 5.5% per annum. Only at the last two meetings of the Federal Reserve on 20 September and 1 November 2023, the interest rate was kept at the same level — 5.5%. On the other hand, the financial authorities in the U.S., alongside restrictive monetary policy measures, are introducing tax incentives for companies and individuals under the Inflation Reduction Act, which came into effect on 1 January 2023, allocating 430 billion dollars for healthcare, combating climate change, and reducing inflation, including 370 billion dollars for clean energy and achieving climate goals.[2]

The escalation of the U.S. national debt and budget deficit issues, the deterioration of key macroeconomic indicators, the strengthening of external imbalances, and the contradictions in the monetary and financial policy of the Federal Reserve weaken the international position of the U.S. dollar, diminishing its role in fulfilling the function of global currency. There is a blurring of the qualitative and quantitative characteristics of the provision of the U.S. national currency as a global reserve asset. At the same time, the dollar remains the benchmark for the value of other currencies and the primary currency for contract pricing due to its dominant role in market pricing on commodity exchanges. At the same time, competition for the dollar is growing from the currencies of leading developing countries in this function, as the number of national exchanges utilizing alternative pricing instruments increases. The U.S. dollar still holds a leading position as the currency for denominating transactions in the global financial market. According to the three-year report by the Bank for International Settlements on the state of the global currency market from 2019 to 2022, as of April 2022, the total daily volume of currency transactions amounted to 7.5 trillion dollar, with the share of the U.S. dollar on one side of the transactions remaining virtually unchanged compared to 2019, at 88.5%.[3]

In other monetary functions, there is a decrease in the share of the U.S. dollar in international circulation. The instability of the dollar's positions in international payments and settlements is increasing, while its role as a global store of value is increasing. According to SWIFT, in February 2022, the share of the U.S. dollar in international transactions decreased by 1.07% compared to January, amounting to 38.85%, only slightly exceeding the share of the euro at 37.79%.[4] In the future, under the influence of the escalating geopolitical situation, the share of the dollar in interbank settlements increased to 41–42%. However, there is a noticeable weakening of the dollar's role as a store of value due to a reduction in foreign investments in U.S. government bonds and Treasury bills. From the end of 2021 to October 2022, foreign investors reduced their investments in U.S. government debt by 238 billion dollars. The share of the U.S. dollar in the foreign exchange reserves of central banks around the world decreased in 2022 from 7.1 trillion dollars to 6.7 trillion dollars in total volume, or to 55%, marking the lowest level since 1995.[5]

[2] Biden signed the law to combat inflation. RIA News. 16.08.2022. URL: https://ria.ru/20220816/zakon-1810114593.html (accessed on 15.01.2024).

[3] Triennial central bank survey of foreign exchange and over-the-counter (OTC) derivatives markets in 2022. 27.10.2022. URL: https://www.bis.org/statistics/rpfx22.htm (accessed on 15.01.2024).

[4] SWIFT reported that the share of the dollar in global transactions decreased to 38.85% in February. 25.03.2022. URL: https://www.banki.ru/news/lenta/?id=10963556 (accessed on 15.01.2024).

[5] The dollar's monopoly has begun to crumble. Vzglyad. 28.10.2022. URL: https://vz.ru/economy/2022/10/28/1184169.html (accessed on 15.01.2024).

RECONCEPTUALIZATION OF SCIENTIFIC AND METHODOLOGICAL APPROACHES TO THE FUNCTIONAL CHARACTERISTICS OF CURRENCIES AS WORLD MONEY

There is a rethinking of the scientific and methodological approaches to understanding the quality of the provision of world money, its functions, and its role in the global economy due to the negative effects on the stability of GMFS caused by the growing financialization of the global economy, the aggravation of the global debt problem, and the declining trust in the U.S. dollar within the international scientific community and business environment [12–14].

In the papers of representatives from scientific and business circles, a vision is emerging for a new, alternative international trade currency to the dollar, backed by commodities [15–18]. According to Z. Pozsar, a former official of the U. S. Federal Reserve and now a financial strategist at the Swiss bank "Credit Suisse", in the process of transitioning to a new version of the world currency system, Bretton Woods III, the main function of the future trade currency, backed by gold and a number of strategically important commodities, will be to facilitate international settlements, as opposed to the reserve currency, which also serves the functions of savings and asset diversification [19].

According to B. Eichengreen, an American economist, the only backing for a trade currency can be gold, valued at market prices, while the U.S. dollar is expected to remain the reserve currency in the near future.[6]

According to F. Giustra, a representative of Canadian business circles, a complex global currency system will emerge in the future, where countries that do not join the new GMFS will trade with the United States in the dollar system, while, for example, trading with China and Russia will be conducted in a trade currency unit backed by gold and other reliable assets [20].

The issue of trust in global currencies has a very important geo-economic and geopolitical dimension. The modern global community is at a complex and contradictory stage of transformation. According to Russian economists V. V. Perskaya and M. A. Eskindarov, Pax Americana (the American world), constructed by the countries of the collective West since the collapse of the socialist bloc and the USSR itself, is facing not so much erosion as de facto destruction [21]. As a result, the destructive impact of economic and geopolitical factors on GMFS and the global economy is intensifying. Foreign economists are also drawing attention to the issue of new challenges in the global economy and trust in the U.S. dollar as the world's currency. Thus, Z. Pozsar in the article "War and Industrial Policy" notes that to contain Russia and China, which challenge the hegemony of the U.S., it is not enough to impose technological sanctions against these countries, as it is impossible to win by merely slowing down progress. In his opinion, to overcome the currently unfolding "Great Crisis of Globalization" and transition to the Bretton Woods Currency System III, the West must make trillion-dollar investments in four types of projects that should have been initiated "yesterday". They include: (1) rearmament (for the protection of the world order); (2) the return of production previously moved abroad (to circumvent the transport blockade); (3) replenishing stocks and investing in trade (goods); (4) transition to new energy sources (energy transition) [22].

The movement of the U.S. towards increasing the role of the commodity component in supporting the U.S. currency has been marked by the implementation of measures under the Inflation Reduction Act, which has been in effect since 1 January 2023. The law provides for the allocation of hundreds of billions of dollars in tax incentives intended for American car manufacturers and

[6] The strengthening of China and the ongoing shift away from the dollar: four conditions to become an international currency. InoSMI. 8.07.2022. URL: https://inosmi.ru/20220708/yuan-254910066.html?utm_source=yxnews&utm_medium=desktop (accessed on 15.01.2024).

the development of green energy. Additionally, the volumes of extraction and production of strategic goods — oil and liquefied natural gas — are also increasing annually. In both product categories, the U.S. has reached first place in the world.

DEVELOPMENT OF MONETARY FUNCTIONS AND THE MECHANISM OF EXCHANGE RATE FORMATION OF THE RUSSIAN RUBLE IN INTERNATIONAL CIRCULATION

In the new realities, there are qualitative changes in the implementation of such an important function of the Russian ruble in international circulation as a means of payment and settlement [23]. This is largely due to the transformations in the exchange rate formation of the Russian ruble. Under the influence of geopolitical risks, currency-financial and trade-economic sanctions, the market exchange rate of the dollar to the ruble is distorted, leading to an artificial sharp weakening or strengthening of the Russian currency. Thus, the sharp depreciation of the Russian ruble in March 2022 to 120 rubles per U.S. dollar was followed by a similarly significant strengthening during the period from June to December of the same year, reaching 60 rubles per U.S. dollar.

Under the conditions of a strict sanctions regime, disconnection from the international financial messaging system SWIFT, and restrictions on Russian residents' access to international financial markets, it has become irrational to accumulate excessive export revenues in U.S. dollars and euros in international currency reserves. Moreover, when assessing the factors influencing the exchange rate of the Russian ruble, it is important to consider the predominant role of export-import operations of Russian organizations in this process compared to operations in the international financial market. The predominance of the role and significance of the trade balance in the overall structure of the balance of payments determines the priority of considering the impact on exchange rate formation of commodity circulation in accordance with the exchange formula M–G–M.[7]

During 2022–2023, the process of transforming the currency structure of settlements for foreign trade operations of Russian export-import organizations is actively developing. From February 2022 to March 2023, the monthly volume of export revenues denominated in Chinese yuan increased 53 times (to 7 billion USD), while revenues denominated in U.S. dollars and euros decreased by 58% and 75% (to 11 billion and 4 billion USD), respectively.[8] At the beginning of 2023, the share of the Russian ruble and the Chinese yuan in export settlements increased to 34% and 16%, respectively, compared to 12% and 0.5% at the beginning of 2022. During the same period, the combined share of the U.S. dollar and the euro decreased from 84% to 48%.[9]

In the future, changes in the currency structure of international settlements and payments in Russian foreign trade will depend on the balance of factors that promote and restrain the use of the yuan and the currencies of other friendly countries. The favorable factors include:

- The growth of distrust in Russia and its trading partner countries towards reserve currencies due to the weakening of their positions in GMFS and sanctions risks;
- The reorientation of the geographical structure of Russia's foreign trade from the West to the East, which entails a corresponding restructuring of the currency structure of payments and settlements;

[7] In the traditional model of international trade, the priority is given to the exchange scheme based on the M–G–M formula, resulting in income from the transaction in US dollars or euros, which are widely, recognized reserve assets that can subsequently be freely used in trade and financial operations.

[8] Review of Financial Stability. 2022. No. 2 (21). Bank of Russia. URL: https://www.cbr.ru/Collection/Collection/File/44007/4q_2022_1q_2023.pdf c. 29 (accessed on 15.01.2024).

[9] Overview of financial market risks. 2023. No. 2(71). Bank of Russia. URL: https://cbr.ru/Collection/Collection/File/46388/ORFR_2023–09.pdf (accessed on 15.01.2024).

- The ability to plan medium-term foreign trade flows in trade with friendly countries using national currencies in calculations;
- The possibility of circumventing sanctions restrictions, including in payments for critical imports.

At the same time, there are limits to the growth of using currencies of friendly countries in mutual settlements:

- The mismatch between the existing payment and settlement infrastructure, the system of correspondent accounts, the transmission of financial messages in national currencies, the mechanisms of currency exchange operations, and the conditions and infrastructure for settlements in the currencies of friendly countries;
- The significant imbalances in the volumes of exports and imports in the trade balance due to the weak development of financial market instruments in the currencies of friendly countries to address these imbalances and to hedge against currency fluctuations;
- The high volatility of the exchange rates of the national currencies of friendly countries.

Given the significant surplus of exports over imports in Russia's foreign trade with China, India, Iran, Turkey, and other friendly countries, substantial excesses of Chinese yuan, Indian rupees, Iranian rials, Turkish lira, and other illiquid currencies are accumulating in the accounts of Russian banks. The heterogeneity and increased exchange rate volatility of these currencies lead to distortions in the objective assessment of the Russian ruble's exchange rate and weaken its position in international circulation. Considering the growing volumes of "soft" currencies accumulated by Russian export organizations and commercial banks, as well as the existing restrictions in several countries on investments in the capital of Indian, Iranian, and companies from other nations, there arises a need to sterilize the excess accumulations of these currencies. According to S. Yu. Glazyev and D.A. Mityaev, the best way to sterilize the excess "soft" currency is to purchase non-sanctioned gold in China, the UAE, Turkey, possibly Iran, and other countries using local currencies, including for use in international settlements and replenishing the gold and foreign exchange reserves of the Bank of Russia [24].

Considering the predominant influence of the export/import ratio of goods and services by Russian organizations on the formation of the national currency's exchange rate, the optimal option for an international asset that can be successfully utilized by Russian participants in foreign economic activity in this capacity is a trade currency with reliable commodity backing. The role of such backing objectively belongs primarily to gold, as well as to a number of strategically important commodities, including platinum group metals, titanium, tantalum, chromium, tungsten, lithium, beryllium, and other rare and rare earth metals.[10]

The consequence of the weakening international position of the U.S. dollar and increasing geopolitical tension is the rising production volumes of gold and the increase in global prices for the yellow metal. The feature of the current situation is that the rise in gold prices is occurring simultaneously with an increase in the yield of U.S. government bonds and a strengthening of the U.S. dollar index. Typically, these financial indicators are inversely correlated with the price of gold. There is also a significant increase in the volume of gold purchases by central banks, thereby confirming the partial preservation of its monetary role in GMFS. According to the report from the World Gold Council, in the first 9 months of 2023, purchases by central banks amounted to 800 tons, reaching the highest level for this period since 2000. The largest gold buyers in the third quarter of 2023 were China (78 tons), Poland (57 tons), and Turkey (39 tons).[11] Recently, there have also been

[10] In the Russian Federation, rare and rare earth metals are included in the list of main types of strategic mineral raw materials (Order of the Government of the Russian Federation from 30 August 2022, No. 2473 "On the approval of the list of main types of strategic mineral raw materials"). URL: https://www.garant.ru/products/ipo/prime/doc/405118925 (accessed on 15.01.2024).

[11] Gold demand trends in the third quarter of 2023. World Gold Council. 31.10.2023. URL: https://www.gold.org/goldhub/research/gold-demand-trends/gold-demand-trends-q3–2023 (accessed on 15.01.2024).

significant changes in Russia's trade policy on the international gold market. Russia, as a recent active seller of gold, is becoming a buyer of the yellow metal on the global market. If in 2021 Russia, according to the Federal Customs Service, sold 302 tons of gold worth 17.6 billion dollars, then in the Q3 of 2023, 3 tons of gold were purchased. The share of gold in the international reserves of the Bank of Russia is significant. According to the Bank of Russia, as of 1 October 2023, in the total volume of international reserves amounting to 569 billion dollars, the share of gold is 24.7% (140.5 billion dollars).[12] Restrictive measures are being implemented on the export of gold from Russia. This includes the proposal initiated by the Federal Customs Service to impose restrictions on the export of gold by individuals,[13] as well as the Order of the Government of the Russian Federation from 31 October 2023, introducing a temporary ban on the export of waste and scrap of precious metals abroad from 1 November 2023 to 30 April 2024.[14]

CONCLUSION

The conducted analysis allows us to draw the following conclusions and generalizations.

1. In the current GMFS, a characteristic feature of the U.S. dollar as a global reserve currency is the growing imbalance in its function as world money: the dollar still remains the "anchor" of the GMFS and a measure of the value of other currencies, even as its share in international transactions and reserves of central banks in other countries significantly declines.

2. The main factors weakening the international position of the U.S. dollar in the current GMFS and decreasing trust in it as a global currency are the exacerbation of the U.S. national debt and budget deficit issues, the increasing imbalance in the trade balance, and the contradictions in the monetary and financial policy of the Federal Reserve.

3. Currently, there is a rethinking of scientific and methodological approaches to assessing the essential characteristics of currencies in the function of world money within the Russian and international expert community. A vision is emerging for a new, alternative international trade currency to the dollar, backed by commodities, including gold.

4. The imperative of reforming GMFS is the creation of an extensive global currency system, in which countries will trade with the U.S. and several other countries using the dollar settlement system, while, for example, trading with China and Russia in monetary units backed by gold and other reliable assets.

5. In the context of the harsh sanctions standoff between Russia and the West, the issue of trust in global currencies has a very important geo-economic and geopolitical dimension. Transformations are occurring in the functional characteristics of the Russian ruble in international circulation. Its role as an international means of payment and settlement in trade with friendly countries is increasing.

6. The prospects for changes in the currency structure of international settlements and payments in the foreign trade of Russian export-import organizations depend on the shifts in the balance of factors that promote and restrain the use of currencies from friendly countries.

7. An urgent task in the new conditions is the formation of methodological approaches to the course formation of the Russian ruble and the enhancement of the reliability of its backing. The role of such provision objectively belongs primarily to gold, as well as a number of strategically important goods, including platinum group metals, titanium, tantalum, chromium, tungsten, lithium, beryllium, and other rare and rare earth materials.

8. In order to mitigate the negative consequences of increased volatility and low liquidity in the currency markets of

[12] International reserves of the Bank of Russia. Bank of Russia. URL: https://cbr.ru/hd_base/mrrf/mrrf_m (accessed on 15.01.2024).

[13] The Federal Customs Service proposed to restrict the export of gold by individuals. Interfax. 1 November 2023. URL: https://www.interfax.ru/russia/928662 (accessed on 15.01.2024).

[14] Order of the Government of the Russian Federation from 31 October 2023. No. 1824. URL: http://publication.pravo.gov.ru/document/0001202310310024 (accessed on 15.01.2024).

friendly countries, it would be advisable for Russian foreign trade organizations to more actively use the excess volumes of export earnings to purchase gold in local markets, with subsequent sales to the central bank to replenish international currency reserves.

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Economic Growth in Russia with the Integration of Cross-Border Payments into the Blockchain Environment

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ABSTRACT

International financial organizations and development institutions agree that the implementation of blockchain technologies (DLT) in the process of cross-border payments will significantly contribute to the development of the global international payment system. In this regard, works devoted to the prospects for the creation of specialized blockchain platforms and international transactions implemented on their basis in the framework of the use of digital currencies are of great interest today. This issue is of particular relevance today for the Russian economy, which is faced with unprecedented sanctions pressure, limiting, in particular, the access of the financial system to international clearing services. The **purpose** of this study is to develop and test methodological approaches to the empirical assessment of the potential GDP growth in Russia in the event of simulating the transition of cross-border payments to a blockchain ecosystem. The research consists of **methods** for systematizing macroeconomic externalities that are formed in the financial system of the national economy in the process of using blockchain in the system of international settlements, as well as correlation and regression analysis, which provides the opportunity to identify the impact of blockchain transactions on the prospects of economic dynamics. The **results** of the study consist in the identified potential for a possible increase in Russia's GDP (+4.0% per year) as part of the use of blockchain in the system for securing international payments. The assessments not only indicate the prospects of using blockchain in the implementation of transnational payments, but also determine the potential for their use in localizing the risks of increasing sanctions pressure, expressed, in particular, in restricting access to international clearing services, payment systems (SWIFT, etc.).

Keywords: blockchain; transnational payment systems; economic externalities; macroeconomic effects; GDP growth; economic security; sanctions pressure; international supply chains; sustainability of the national economy

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INTRODUCTION

Additive technologies, artificial intelligence, digital transformation of the economy, blockchain, and other so-called cross-cutting technologies are today defining new points of economic growth. In this regard, it seems extremely important and relevant to study the macroeconomic externalities generated during the diffusion of technological innovations across all areas of economic activity, including finance. One of the key technologies that has the potential to evolve the Fintech sector is blockchain.

At the moment, the scientific and expert communities are actively and sometimes controversially discussing the prospects of using blockchain (DLT) in the framework of economic relationship building. The question of how in-demand these technologies will be in the process of organizing cross-border payments during the formation of supply chains is equally "acute". Following the fundamental conclusions of foreign and Russian researchers [1–4 and others] and international development institutions (World Economic Forum,[1] Organisation for Economic Co-operation and Development,[2] Bank for International Settlements[3] etc.), DLT technologies hold significant potential for optimizing the financial sector of the economy, including its supranational level. However, how this may impact the development of individual countries and regions integrated into the blockchain ecosystem remains a fairly open question.

The question takes on special significance for the Russian economy, which is facing intense external pressure that has led to restrictions on the access of Russia's financial system to international payment services. This greatly complicates the process of establishing international supply chains, including with friendly countries. In this regard, the question of alternative mechanisms for organizing foreign economic activity and the accompanying cross-border transactions is quite pressing on the agenda of the current day for the Russian economy [5, 6].

Taking into account the highlighted aspects, as well as the rapidly evolving process of studying the prospects for the creation of central bank digital currencies (CBDCs) [7] in many countries around the world, including the Russian Federation, the issue of methodological support for assessing the macroeconomic externalities generated in the context of transitioning cross-border payments to blockchain appears to be extremely relevant. Meanwhile, the solution to this problem is difficult to classify as trivial, especially since this conclusion is clearly substantiated against the backdrop of scientific publications that focus on the use of qualitative, heuristic analysis methods. However, the desire for strict formalization of conclusions based on the study of statistical data and the construction of corresponding models creates a more substantiated foundation for understanding the phenomena or processes being studied. In this regard, the aim of this work is to develop the theoretical and methodological foundations for researching the macroeconomic opportunities emerging in the national economy within the framework of transferring cross-border payments into a blockchain ecosystem. The set goal defined the following key research tasks:

- to develop methodological approaches to assess the impact of blockchain payment systems on the growth prospects of the national economy's GDP;
- to build a forecast of the potential GDP growth of the Russian Federation within the framework of the implemented simulation modeling of blockchain application in the organization of cross-border payments system.

[1] World Economic Forum, 'Windows of Opportunity: Facilitating Trade with Blockchain Technology', WEF White Papers, 2019.

[2] OECD, 'The Policy Environment for Blockchain Innovation and Adoption: 2019 OECD Global Blockchain Policy Forum Summary Report', OECD Blockchain Policy Series, 2019.

[3] Rise of the central bank digital currencies: drivers, approaches and technologies. URL: ttps://www.bis.org/publ/work880.htm (accessed on 28.03.2023).

The research methodology consisted of structural and empirical data analysis, as well as correlation-regression analysis, which justified the potential impact of transnational blockchain transactions on the prospects for macroeconomic growth of the national economy of the Russian Federation. Let's get more detailed on the research methods.

MATERIALS AND METHODS

The solution to the problems involves the need to structure the potential macro effects generated within the framework of international blockchain transactions, with the aim of subsequently determining the methodology for their impact on economic growth. At the same time, this structuring should be formed primarily based on the emerging technological possibilities of blockchain application, as well as on the institutional transformations that are reshaping the existing mechanisms and principles of organizing transnational payments in the context of systemic changes.

Abstracting from the potential risks and threats that may arise during the use of blockchain in the international payment system (money laundering; anonymity of blockchain transactions; potential 51% attacks, etc.), and focusing solely on the opportunities that arise, the algorithm for a formalized study of the aggregated impact of blockchain payment systems on GDP growth prospects can be presented in the following flowchart (*Fig. 1*).

The presented approach to studying the impact of blockchain on the formation of aggregated socio-economic effects resulting from the construction of new-format cross-border digital payment systems justifies a rather complex system for conducting empirical assessments. Their summary is presented in *Table 1*.

RESULTS AND DISCUSSION

Based on the methodological approaches presented above, an attempt has been made to empirically assess the most significant economic effects, in our opinion, arising from the transition of transnational payments to a blockchain ecosystem:

- the localization of the mediation institute in financial, logistical, transportation, trade, and other areas of economic relations;
- the absence of the need to use the financial mechanism of a letter of credit in foreign economic activity (the comprehensive creation of a trust space, and therefore, blockchain can lead to significant transformations in the organization of supply chains, lowering the entry barrier to the global market of goods and services while simultaneously increasing the level of security and reliability of transactions carried out within the ecosystem).

At the same time, it should be noted that, guided by the research algorithm presented above (*Fig. 1*), the spectrum of opportunities that arise in the process of building an international payment system based on blockchain is significantly broader. However, considering the substantial, substantive, and methodological limitations, their evaluation is not presented in this study.

Moreover, it is important to emphasize that macroeconomic externalities in the context of the question posed in this study will be formed not only in the form of positive effects. For a comprehensive understanding and study of the process, it is necessary to systematize other possible consequences, risks, and limitations of applying blockchain in the formation of transnational payments. They can be expressed in:

- technical vulnerabilities of implemented operations and transactions;
- cybercrime;
- data privacy;
- increasing tension in the labor market due to the automation of a number of economic operations;
- various jurisdictions and regulatory frameworks in different countries that

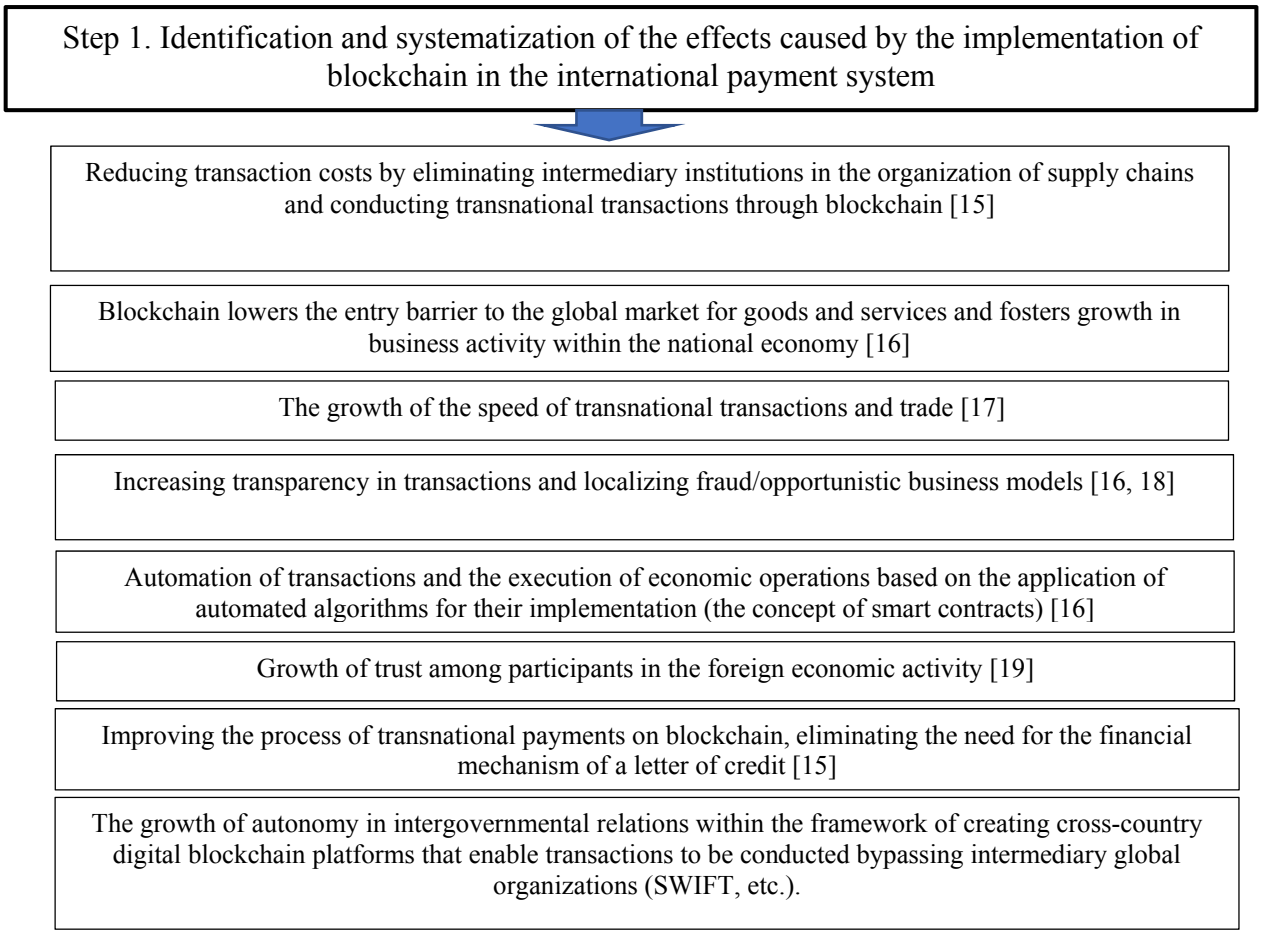

Fig. 1. **An Algorithm for Studying the Aggregate Impact of Blockchain Payment Systems on GDP Growth Prospects**

Source: Compiled by the authors.

govern the digital space and the system of international economic relations;

• differentiated level of development of the digital environment at the country level, which may also limit access of individual states to the digital blockchain ecosystems created (lack of standards and unified ICT-infrastructure);

• technical limitations and the effectiveness of blockchain in the context of large-scale deployment etc.

Abstracting from the risks and threats of using blockchain in international transactions and focusing solely on the most significant positive macroeconomic externalities, the main findings of the study are presented below in terms of the effects considered.

1. Assessment of the impact of the elimination of intermediary institutions in the organization of supply chains and the conduct of transnational transactions through blockchain.

Table 1

Methodological Approaches to the Study of the Impact of Blockchain on the Prospects for Building a New System for Organizing Cross-border Payments and Developing the National Economy

No.	The content of the economic effect	Methodological approaches to estimates
1	Reducing transaction costs by eliminating intermediary institutions in the organization of supply chains and conducting transnational transactions through blockchain [8, 9]	Sequence of the evaluation algorithm: 1. Reduction of transaction costs due to lower commission rates (in accordance with the parameters of the EC Roadmap*) for conducting transactions 2. Increase in working capital of economic entities 3. Growth of business and investment activity 4. GDP growth
2	Blockchain lowers the entry barrier to the global market for goods and services and fosters growth in business activity within the national economy [9, 10]	1. Reduction of transaction costs as a result of the localization of the mediation institution 2. Strengthening the integration of small and medium-sized enterprises into international supply chains 3. Growth of business activity in the national economy 4. GDP growth
3	The growth of the speed of transnational transactions and trade [11, 12]	1. Localization of potential economic losses for participants in international transactions due to the reduction of the time lag required for executing transactions in conditions of increased currency volatility (separately for exporters and separately for importers) 2. Growth of financial results of economic entities participating in the foreign economic activity 3. GDP growth
4	Increasing transparency in transactions and localizing fraud/opportunistic business models [13]	1. Localization of potential economic losses for participants in an international transaction due to the elimination of opportunistic business models 2. Decrease in the volume of funds allocated by participants in foreign economic activity within the framework of the open account international trade model, in the context of export credit insurance 3. Growth of financial results of participants in foreign economic activity 4. GDP growth
5	Automation of transactions and the execution of economic operations based on the application of automated algorithms for their implementation (the concept of smart contracts) [14]	The methodological basis for determining the economic effect at the macro level consists of the algorithms for assessing externalities presented in points 1–4. They express the effectiveness of implementing smart contracts in foreign economic activity in an aggregated form
6	Growth of trust among participants in foreign economic activity [14]	The methodological basis for determining the economic effect at the macro level consists of algorithms for assessing externalities, as presented in point 4. They express the growth of trust among participants in foreign economic activity in an aggregated form, which is reflected in the intensification of business activity in the economy
7	Improving the process of transnational payments on blockchain, eliminating the need for the financial mechanism of a letter of credit [14, 15]	1. Localization of bank fees for participants in foreign economic activity regarding the use of the financial instrument of a letter of credit 2. Growth of financial results of participants in foreign economic activity 3. GDP growth

Table 1 (continued)

No.	The content of the economic effect	Methodological approaches to estimates
8	The growth of autonomy in intergovernmental relations within the framework of creating cross-country digital blockchain platforms that enable transactions to be conducted bypassing intermediary global organizations (SWIFT, etc.) [13, 15] Blockchain as a promising technology for international settlements in the context of sanctions and an unfriendly external environment: an economic aspect	1. Assessment of cash flows in the Russian Federation by export/import directions within the framework of the use of transnational payment systems (SWIFT) in a consolidated form and by individual countries and country groups 2. Assessment of the damage to the Russian economy as a result of disconnection from SWIFT 3. Simulation modeling of enhancing the sustainable development of the national economic system of Russia within the framework of building blockchain platforms with a number of friendly countries, bypassing SWIFT

Source: Compiled by the authors.

Note: * Blockchain for supply chains and international trade. Report on key features, impacts and policy options. European Parliamentary Research Service. Scientific Foresight Unit (STOA). PE 641.544. May 2020.

The basis for conducting calculations is data on the movement of export-import flows for the period from 2013 to 2021. An abstract model is accepted as a hypothesis, allowing for a total transition of cross-border payments to blockchain. At the same time, the main effect within the framework of the localization of intermediary institutions in the system of organizing international transactions will be formed within the context of import flows. This is related to the fact that export shipments are paid for by buyers from third countries, and the entire burden of the commission falls on them, which is not within the "scope" of this study.

In accordance with the previously presented arguments, the application of blockchain in the system of organizing international payments will lay the foundation for the localization of commission fees charged for transaction processing. This, in turn, will contribute to the release of capital for economic entities and ensure the growth potential of their working capital and, consequently, their financial results.

In solidarity with position [15], the potential increase in working capital for participants in foreign economic activity — residents of the Russian Federation — is assessed based on the hypothesis that the average commission rate for retail cross-border payments will decrease from 7.45% to 1% with the implementation of blockchain.[4] As a result of calculations modeling the possible increase in working capital for economic entities in accordance with the proposed reduction in the commission level for retail cross-border payments during the transition to blockchain, estimates have been obtained indicating the potential increase in working capital ranging from 15.0 to 19.0 billion USD per year (the calculation is made as the difference between the current gross commission fees for conducting cross-border payments and the projected fees, taking into account the reduction of the commission rate to 1% of the payment amount).

Relying on the identified reserves for the growth of working capital among foreign economic activity participants, further assessments of the potential changes in their financial results have been implemented. The implementation of this research stage was carried out using econometric modeling

[4] Blockchain for supply chains and international trade. Report on key features, impacts and policy options. European Parliamentary Research Service. Scientific Foresight Unit (STOA). PE 641.544 — May 2020.

Table 2

Forecast Estimates of the Increase in the Net Financial Result for the Period from 2017 to 2021

No.	Indicator	2017	2018	2019	2020	2021
1	Predicted value of the net financial result (according to the model), thousand rubles	8 989 335 700	13 823 577 781	15 214 092 358	16 128 138 080	25 367 835 246
2	Predicted value of the net financial result considering the growth of working capital, thousand rubles	9 110 467 363	13 963 547 558	15 335 957 541	16 285 160 727	25 571 741 644
3	Increase in net financial result, thousand rubles (the difference between lines 1 and 2)	121 131 663.4	139 969 777.2	121 865 182.4	157 022 647.2	203 906 397.9

Source: Compiled by the authors.

methods within the framework of constructing a linear regression model that assesses the relationship between the net financial result (endogenous parameter) and the potential change in working capital (exogenous parameter of the model). Statistical estimates and parameters of the obtained model (R2 = = 0.93; t-statistic = 2.25342; P-value for the exogenous factor is 0.037 etc.) allowed for the construction of a forecast for the potential increase in the net financial result, taking into account the current and adjusted (projected) values of working capital (*Table 2*).

The final step in conducting calculations aimed at assessing the macroeconomic effect, expressed in GDP growth as a result of the increase in the net financial result of economic entities, is the construction of an econometric model that evaluates the relationship between the parameters under consideration, formula (1). The calculations were made based on data from 2010 to 2021. Considering the nonlinear nature of the relationship between the factors under study (which aligns with the views of several Russian researchers [16, 17]), appropriate mechanisms for constructing a logarithmic model have been employed.

The equation has the form:

$$LnGDP = Ln\ (103.36) + 1.006 LnNFR \qquad (1)$$

(R2 = 0.83; t-statistics = 6.876; P-value for the exogenous factor is 0.0009 etc.),

where GDP — gross domestic product of the Russian Federation, billion rubles; NFR — net financial result, billion rubles.

Transforming the obtained equation from logarithmic form into a power function, the following logarithmic model has been constructed:

$$GDP = 4.63 * NFR^{1.006}. \qquad (2)$$

This model has made it possible to obtain predictive estimates of Russia's GDP, taking

Table 3

Forecast of GDP Growth in Accordance with the Simulation of the Transition of Transnational Payments for Gross Imports of the Russian Federation to the Blockchain

Year	GDP forecast by model, million rubles	GDP forecast with growth of the net financial result, million rubles	Deviation, million rubles	GDP growth, in %*
1	2	3	4	5
2017	95 891 918.05	96 201 337.75	309 419.7	0.32
2018	104 772 665	105 130 204.8	357 539.9	0.34
2019	109 782 531.6	110 093 825	311 293.3	0.28
2020	101 257 564.5	101 658 664.4	401 099.9	0.40
2021	145 266 626.6	145 787 486.7	520 860.1	0.36

Source: Developed by the authors based on data from EMISS. URL: https://www.fedstat.ru/indicator/38574 (accessed on 12.04.2023).

Note: * calculated as the ratio of column 4 to column 2, in %.

into account current and new values of the net financial result (*Table 3*).

The results of the conducted analysis demonstrate a situation in which the reduction of the cost of transnational payments across the Russian economy can ensure an average GDP growth of 0.4% within the total volume of import flows. This perspective on the effect is largely an abstraction. It's hard to imagine that all partner countries importing goods and services to Russia will switch to blockchain transactions. At the same time, the obtained assessments may reveal hypothetical effects related to the localization of commission costs for servicing and conducting transnational transactions within the transition of international payments to a blockchain ecosystem.

2. Assessment of the impact of the transition of transnational payments to blockchain, eliminating the need for the financial mechanism of letters of credit.

According to the data presented in the GLOBE NEWSWIRE analytical report, the global letter of credit market amounted to 3.9 trillion USD in 2022.[5] At the same time, according to information published at the UN Conference on Trade and Development (UNCTAD), the volume of global trade for that year reached a level of 32 trillion dollars.[6] Thus, it is quite evident that the letter of credit market plays a significant role in servicing global trade.

Using the given relationship between the indicators in question, it seems reasonable to project it onto the Russian national economy. In other words, in the absence of publicly available statistical data on

[5] Insights on the Letter of Credit Confirmation Global Market to 2027 — Demand for Customized Trade Services Presents Opportunities. URL: https://translated.turbopages.org/proxy_u/en-ru.ru.3cc4889d-643910c1-45b8d6bd-74722d776562/https/www.yahoo.com/lifestyle/insights-letter-credit-confirmation-global-095800655.html (accessed on 14.04.2023).

[6] Global trade set a record in 2022. URL: https://kz.kursiv.media/2023-03-24/lgtn-worldtrade/#:~:text=Объем%20мировой%20торговли%20в%202022-м,продаж%20«зеленых»%20(экологически%20чистых)%20товаров (accessed on 14.04.2023).

Table 4

Assessment of the Gross Level of Export Letters of Credit for the Russian Federation

Indicator	2017	2018	2019	2020	2021
Export, million dollars	525 396.58	528 438.54	527 177.33	529 576.6	528 691.72
Volume of export letters of credit in Russia, million dollars	22 592.05	22 722.86	22 668.63	22 771.79	22 733.74

Source: URL: https://translated.turbopages.org/proxy_u/en-ru.ru.3cc4889d-643910c1–45b8d6bd-74722d776562/https/www.yahoo.com/lifestyle/insights-letter-credit-confirmation-global-095800655.html (accessed on 12.04.2023).

Table 5

Forecast of GDP Growth in Accordance with the Simulation of the Transition of Transnational Payments to the Global Blockchain Ecosystem, which Contributes to the Growth of Trust Between the Participants in the Transaction, Million Rubles

Year	GDP forecast by model	GDP forecast with growth of the net financial result	Deviation	Contribution to GDP, in %
1	2	3	4	5
2017	95 891 918.05	98 078 253.78	2 186 335.7	2.70
2018	104 772 665	107 161 481.7	2 388 816.8	2.73
2019	109 782 531.6	112 285 573.4	2 503 041.7	2.71
2020	101 257 564.5	103 566 237	2 308 672.5	3.23
2021	145 266 626.6	148 578 705.7	3 312 079.1	3.46

Source: Developed by the authors based on data from EMISS. URL: https://www.fedstat.ru/indicator/38574 (accessed on 12.04.2023).
Note: * calculated as the ratio of column 4 to column 2, in %.

documentary operations related to foreign economic transactions in the field of foreign economic activity, it is advisable to use this ratio in calculations. It is important to emphasize that in conducting the relevant calculations, all attention is focused solely on export operations. This is due to the fact that import transactions accompanied by letters of credit are not within the "scope" of research attention, as the financial burden falls on the importers. At the same time, considering that the aim of the research is focused on the empirical assessment of macroeconomic externalities in relation to the national economy of the Russian Federation, attention is specifically directed towards export letters of credit that are part of the "burden" of Russian economic entities.

Based on this approach, *Table 4* presents the calculated data assessing the gross level of export letters of credit for the Russian Federation.

Based on the data on the volume of the export letter of credit mar*ket* (*Table 4*), one

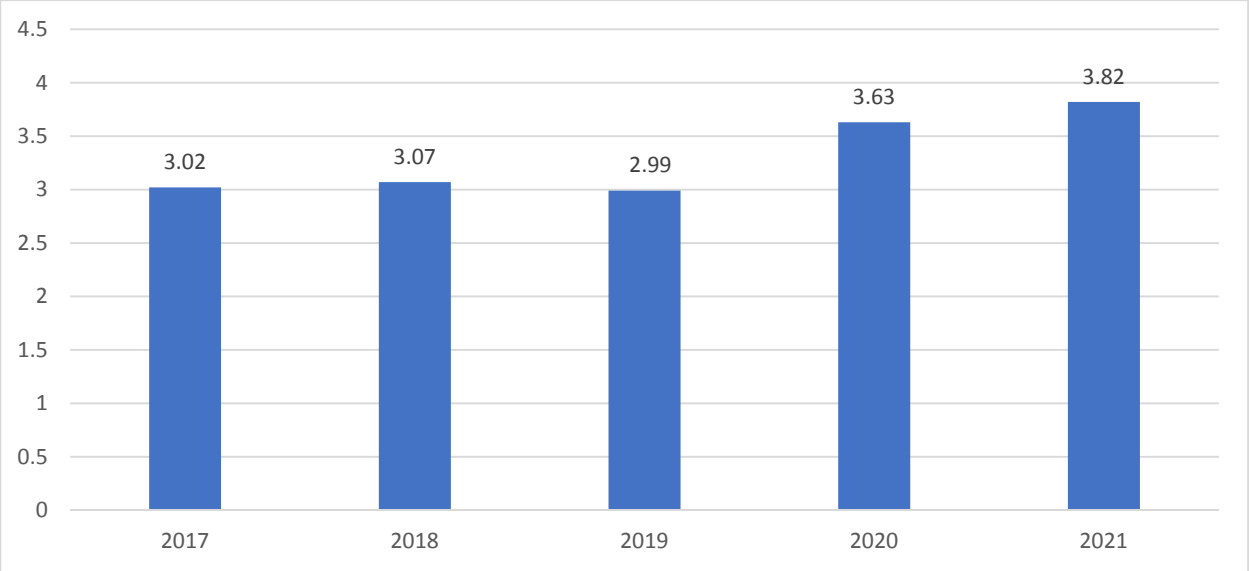

Fig. 2. **The Potential for the Cumulative Increase in the GDP of the Russian Federation as Part of the Transition of Transnational Payments to the Blockchain**

Source: Compiled by the authors.

can assume the potential for growth in the net financial results of economic entities in the Russian Federation in accordance with the level of released costs from documentary operations.

The final step in conducting calculations is the assessment of the macroeconomic effect, expressed in the increase of GDP as a result of the growth in the net financial results of economic entities in the context of the localization of the letter of credit institution. As part of the application of the previously constructed model, formula (1), the results of the calculations are presented in *Table 5*.

Summarizing the effects obtained in terms of potential GDP growth according to the macroeconomic effects arising from the transition of cross-border payments in the Russian Federation to blockchain, *Fig. 4* presents consolidated estimates in the form of the potential increase in the gross domestic product of the Russian Federation.

CONCLUSION

1. The question of justifying the feasibility of transitioning transaction organization processes to a blockchain environment remains an unresolved issue to this day. This is largely due to methodological limitations. This conclusion is justified by the fact that in the realm of scientific and journalistic papers, there are virtually no studies that address the posed question in the context of formalized assessments. The present paper is intended not so much to fill this gap (primarily from a methodological perspective) as to offer the scientific community a discussion on the development of theoretical and methodological approaches to the study of externalities generated for national economic systems in the context of a possible transition of payment systems into the blockchain space.

2. Abstracting from the potential risks of applying blockchain technologies in the organization of international transactions, and relying on the proposed methodological tools for the empirical assessment of macroeconomic externalities related to the most significant effects, predictive estimates have been obtained that characterize the potential GDP growth of the Russian Federation as a result of transferring transnational payments into the blockchain environment. According to them, the potential for the application of DLT-technologies in the system of international transactions is

estimated for the Russian economy at around 4.0% of GDP, which corresponds to 6.05 trillion rubles (75.6 billion dollars).

3. The assessments and conclusions obtained gain particular relevance in the context of the intense external pressure currently exerted on the national economy of the Russian Federation, which limits the potential for maintaining and developing international supply chains and the accompanying international transactions. In this regard, the methodological solutions and justifications presented by the authors in the field of building a new architecture for transnational payment operations could significantly enhance the system of arguments for transitioning international payments to blockchain. The use of these technologies in foreign economic activity will not only facilitate the growth potential of GDP but also ensure the stability of transnational payments with friendly countries in the context of localized access to international clearing services.

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M.R. Safiullin — problem statement, development of the concept of the article, critical analysis of the literature.
L.A. Elshin — development of methodological approaches to assessing the impact of blockchain on the prospects of transnational payments.
R.T. Burganov — macroeconomic assessment of externalities formed as a result of blockchain-based payment systems; development of conclusions.

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"Monetary surprises" and Excess Return of the U.S. Mutual Funds

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ABSTRACT

The **purpose** of this paper is to conduct statistical tests to verify the impact of unexpected monetary policy shocks on the U.S. mutual funds returns over the period from December 2007 to February 2022. The authors have identified the "monetary surprises" of monetary policy shocks for the period under consideration using a high-frequency identification procedure and analyzed the Fed's monetary policy at the current stage. The model, in which excess fund return is a dependent variable, has been designed basing on the panel data on the characteristics of 457 actively managed funds with S&P 500 as a benchmark downloaded from the Bloomberg terminal. The main hypothesis about the significance of "monetary surprises" for actively managed funds performance has been confirmed for the periods 2007–2009 and 2020, when the U.S. economy was in a recession. The robustness has been tested on the models with several specifications. The authors have **concluded** that not only absolute but also relative returns depend on unexpected changes in monetary policy, while an accurate analysis of their direction allows fund managers to increase the alpha of their portfolio significantly. In view of the above, assessing the quality of managing the financial portfolio in order to select a mutual fund to invest in requires considering the fund manager's track record over the entire economic cycle.

Keywords: monetary surprise; mutual funds; active investing; excess return; S&P500 index; monetary policy; the FED; recession

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INTRODUCTION

The mutual fund industry in the United States plays a significant role in the modern financial system, accumulating vast investment resources from private investors, which attracts both practitioners and theorists to its study. However, in the context of the impact of unexpected shocks from the monetary policy of the Federal Reserve System (further — Fed) on the activities of investment funds, this topic remains insufficiently explored. The main difficulty in assessing the implemented policy is related to the problem of endogeneity of factors, as participants in financial markets form their expectations regarding the actions of the regulator. That is precisely why the question of the influence of the actions of monetary regulation bodies on the financial market is a discussion.

A particular interest from the perspective of its impact on the financial market lies in the study and analysis of the so-called "monetary surprises" of monetary policy shocks, which can be interpreted as a change in the key interest rate in the economy that is not factored in by market participants into the prices of derivative financial instruments related to that rate. The assessment of the impact of the "monetary surprises" on financial assets using the high-frequency identification (further — HFI) procedure was first applied by Kuttner [1].

Active portfolio management strategies are employed by managers with the aim of outperforming the returns of the financial market. The search for and evaluation of factors influencing the effectiveness of these funds is a fundamental issue for both representatives of the scientific community and practitioners [2–4]. As statistics show, such institutions do not guarantee stable positive returns in the long term, requiring caution even from experienced investors. On the other hand, there are several studies suggesting that actively managed funds are capable of generating excess returns during periods of heightened turbulence in financial markets [5–7]. In the context of modern macroeconomic instability and the unprecedented measures taken by regulators in monetary policy, the question of the effectiveness of fund portfolio management is relevant.

The analysis of the transmission mechanism channels of central banks' monetary policy has been one of the most popular topics for both academic representatives and market participants for several decades now. However, as noted, the impact of unexpected shocks from monetary policy on the activities of investment funds remains insufficiently studied.

The scientific novelty of this work lies in the fact that, unlike traditional approaches used to assess the impact of regulatory actions on the financial market, the authors analyze the significance of the influence of unexpected changes in the direction of the Fed's monetary policy on the excess returns of U.S. mutual funds during periods of heightened uncertainty, whose managers adhere to active investment portfolio management strategies. The work examines the time intervals from 2007 to 2022, which are selected in accordance with the periods of recessions in the U.S.

REVIEW OF THE LITERATURE

As noted earlier, an innovative approach to analyzing the impact of monetary policy shocks on asset pricing was presented in the paper [1]. The aforementioned study was conducted based on data from the US financial market for the period from 1989 to 2000, during which the impact of Federal Reserve monetary policy shocks on the yields of short-term and long-term Treasury bonds was analyzed. In this case, monetary policy shocks refer to changes in the target federal funds rate. The peculiarity of the approach lies in the fact that the author divides the shocks of monetary policy into two components: the *expected* and the *"surprise"* ones. The unexpected change in the federal funds target rate is calculated as the change in the price of

the interest rate futures contract over a short period of time before and after the statement from the Federal Open Market Committee (further — FOMC) regarding the change in the target rate. The main premise of using futures prices is that futures contracts allow market participants to hedge their risks associated with changes in interest rates and reflect all market participants' expectations regarding the future actions of those conducting monetary policy. Thus, the change in futures prices that occurred after a specific statement regarding the directions of monetary policy, while all other factors remained unchanged, can be interpreted as a "monetary surprises" or an unexpected shock to monetary policy. As a result, it turned out that the response to expected changes in the federal funds rate was quite weak, while the response to unexpected changes was strong and statistically significant.

This approach was further developed in the work [8], which assessed the impact of unexpected changes in the Fed's monetary policy on the U.S. stock market from 1989 to 2002. Researchers have proven that the influence of the "monetary surprises" is negative and significant, while the influence of the expected component is also significant but positive. The authors not only provide a quantitative assessment but also attempt to identify the channels through which this effect arises. The work [9] also concludes that the influence of the "monetary surprises"of the monetary policy shock on the stocks of companies with low capitalization, as well as on the stocks of undervalued companies based on financial indicators, known as "value stocks" is much stronger than on "growth stocks".

Some researchers believe that significant influence on the financial market is exerted not only by the actual actions of monetary regulatory authorities but also by the disclosure of information (known as Forward Guidance) regarding the intentions of the policy conducted by representatives of the Federal Open Market Committee, and that the impact of these factors varies [10].

Moreover, it is important to note that as a result of the introduction of the new monetary policy tool by the Fed — "Forward Guidance" — the uncertainty regarding the direction of monetary policy has significantly decreased compared to the beginning of this century, as the Fed shapes market expectations and investors take this information into account when opening their positions [11]. In the paper [12], the authors also analyze the impact of the Fed's Large-Scale Asset Purchases (further — LSAP) for each meeting of the FOMC Committee from 1991 to 2019.

However, in several scientific articles, the question of the influence of the "monetary surprises" of the Fed's monetary policy shocks is called into question [13, 14]. These works claim that unexpected changes in the target interest rate can be predicted with a high degree of accuracy by analyzing publicly available information about the state of the economy and financial markets prior to FOMC Committee meetings. The paper [15] states that the speeches of the Fed Chair are much more important for financial markets than the statements of the Committee. Therefore, in the paper [16], an attempt is made to take into account the majority of critical remarks regarding the HFI method and the interpretation of the definition of the "monetary surprises" of the Fed's monetary policy shocks, suggesting that attention should be paid to all possible official statements from Fed representatives about the direction of monetary policy.

In this regard, the paper [17] analyzes the impact of the unexpected "tightening" of the Fed's monetary policy (i.e., the increase in the federal funds rate) on the volumes of investments in mutual funds in the U.S., as well as on their returns during the period from 2009 to 2017. It has been concluded that an unexpected increase in interest rates in the economy has a significant impact on the performance of both equity and bond

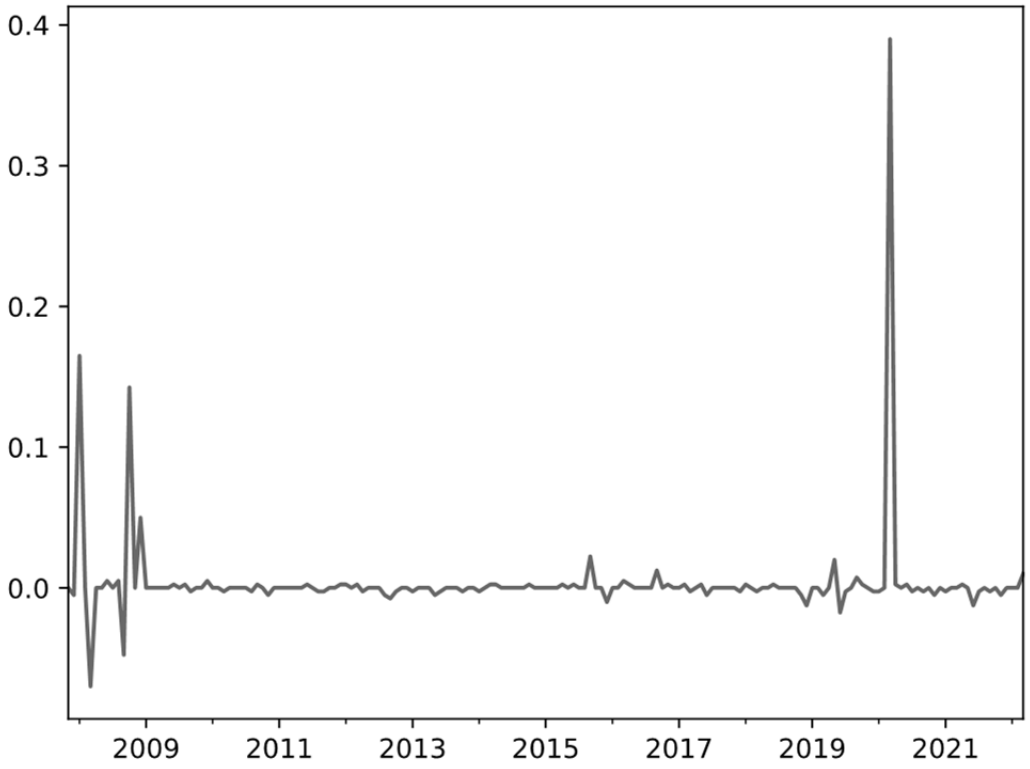

Fig. **"Monetary Surprises" over the Period from December 2007 to February 2022**

Source: Authors' calculations.

funds, leading to a decrease in the returns of these funds and a withdrawal of funds from them. Moreover, the impact of the "surprises" component varies depending on the fund's investment strategy.

In this paper, the authors propose to analyze the impact of the "monetary surprises" of monetary policy shocks on the performance of active mutual funds, with particular attention to periods of heightened uncertainty in financial markets.

EMPIRICAL ANALYSIS: "MONETARY SURPRISES" IDENTIFICATION

U.S. federal funds rate futures are not only a popular derivative financial instrument for hedging and speculation in the financial market, but they also allow for assessing market participants' expectations regarding the direction of the Fed's monetary policy.

This work examines the futures on the U.S. federal funds rate (ticker ZQ) for the current month (spot) for each meeting of the FOMC Committee from December 2007 to February 2022. The "monetary surprises" (S_t) is calculated as:

$$S_t = f_{t,close} - f_{t,open}, \quad (1)$$

where t — day of the FOMC Committee meeting; $f_{t,close}$ — futures price for the current month (spot) on the federal funds rate at the time of closing, i.e., after the FOMC decision announcement; $f_{t,open}$ — futures price for the current month (spot) on the federal funds rate at the time of opening, i.e., before the FOMC decision announcement.

The decision on the target federal funds rate is published immediately after each meeting on the official website of the Federal Reserve. During the corresponding period, 117 meetings of the FOMC Committee were held. Despite the fact that the Fed traditionally holds 8 scheduled meetings of the FOMC Committee each year in different months, there have been instances during the period

in question where the regulator held several meetings in the same month to decide on changes to the federal funds rate. In this case, the "monetary surprises" was summed up for the corresponding month. The following results were obtained (*Fig.*).

The most significant deviations in the prices of futures contracts after the FOMC Committee meeting from the expectations priced in by market participants regarding the interest rate were observed during periods of heightened uncertainty, namely during the global financial crisis from late 2007 to early 2009, during the escalation of competition between the U.S. and China in 2015–2016, and during the COVID-19 pandemic in 2019–2020. During the period of "near-zero" interest rates in the U.S. economy, significant "surprises" are absent. These results are interesting from an empirical perspective and allow us to consider the "monetary surprises" of the Fed's monetary policy shocks as a macro-factor for analyzing its impact on the activities of investment funds in the U.S.

MODEL SPECIFICATION

Investors are showing increasing interest in the selection of investment funds, so the assessment of the factors that allow funds to generate returns above the market is constantly in the spotlight. There are many different approaches to analyzing the effectiveness of portfolio management in an investment fund [18, 19]. However, it is worth noting that factor models, such as the CAPM (Capital Asset Pricing Model) and its subsequent transformations, do not provide a parametric assessment of the impact of macro-factors, which clearly cannot fail to reflect on the returns of actively managed investment funds [20]. Although successful modifications can be found under certain conditions, for example, for Russian mutual funds [21].

In the paper [4], a model was presented where the dependent variable is the excess return of funds, and a number of micro-factors based on the individual characteristics of the funds were chosen as explanatory variables, including the yield spread between long-term and short-term U.S. Treasury bonds, as well as the yield spreads of AAA-rated investment-grade corporate bonds and BAA-rated bonds, which turned out to be significant. The spreads under consideration reflect the sentiments of market participants and serve as a leading indicator for assessing their future economic activity.

Developing this approach to the analysis of macro factors affecting the returns of investment funds, this study introduced a special variable called the "monetary surprises" of shocks in the monetary policy of the Fed.

Specification of the basic panel regression of this paper:

$$\begin{aligned} excess\_return_{i,t} &= \beta_0 + \beta_1 surprise + \beta_2 \Delta^+ \left(spread.tres\right)_t + \\ &+ \beta_3 \Delta^- \left(spread.tres\right)_t + \beta_4 \Delta^+ \left(spread.moodys\right)_t + \\ &+ \beta_5 \Delta^- \left(spread.moodys\right)_t + x_i^{'}\gamma + \mu_i + u_{i,t}, \end{aligned} \quad (2)$$

where

$excess\_return_{i,t}$ — excess return of a mutual fund (the difference between the fund's return and the return of the S&P 500 index);

$surprise$ — "monetary surprises" of the Fed's monetary policy shocks;

$spread.tres$ — yield spread between 10-year and 3-month U.S. Treasury bonds;

$spread.moodys$ — the yield spread between corporate bonds rated AAA and bonds rated BAA according to Moody's classification;

Δ^+ and Δ^- — positive and negative increments over the period, i.e.

$\Delta^+ \left(spread.tres\right) = \max\left(\Delta\left(spread.tres\right), 0\right)$ and $\Delta^- \left(spread.tres\right) = \min\left(\Delta\left(spread.tres\right), 0\right)$;

x_i = (*FundFee, ExpenseRatio, Turnover, Turnover*^{2}*, log(NAV), Objective*);

γ — coefficients of fund characteristics;

μ_i — individual characteristics of the fund;

$u_{i,t}$, — random error.

The main hypothesis of this research is that the "monetary surprises" of the Fed's

Table 1

Descriptive Statistics for Mutual Funds Characteristics

Statistics	Count	Mean	St.Dev	Min	50%	Max
Fund Turnover	439	71.57	157.82	0	29.83	1453
Expense Ratio	449	1.04	0.54	0	0.99	4.07
Fund Mng Stated Fee	457	0.65	0.31	0	0.65	2
NAV	455	40.66	91.48	0.5	24.08	1683.06

Source: Authors' calculations.

monetary policy shocks is a significant factor in assessing the excess returns of mutual funds in the U.S. at the present stage.

DESCRIPTION OF THE DATA

Data from Bloomberg's terminal was extracted for the period from December 2007 to February 2022 for 457 open-end actively managed equity mutual funds registered in the United States, with the S&P 500 index as their benchmark. Index funds, ETFs, and sector-specific funds were excluded from the sample under consideration. The dataset is formed based on the structural characteristics of funds, such as the monthly return of the fund (Total Return), the turnover of capital in the fund's portfolio (Fund Turnover), the fund management stated fee, the expense ratio, the net asset value of the fund (NAV), and the fund's management style. Descriptive statistics on the structural characteristics of the funds are presented in the *Table 1*.

Here and thereafter, all calculations and model constructions are performed in the Python programming language using the Pandas and Linearmodels libraries.

Historical data on daily spot prices of futures for each month when the FOMC meeting took place regarding the federal funds rate was obtained from the Yahoo Finance database. Decisions regarding the target value of the federal funds rate are published on the official website of the Fed.

The return of the S&P 500 index was calculated as the log difference between the closing values on the last day of each month based on daily data from the Yahoo Finance database (ticker ^GSPC).

Historical monthly data on the yields of 10-year and 3-month U.S. Treasury bonds, as well as the yields of corporate bonds rated AAA and BAA by Moody's, were extracted from the Federal Reserve Bank of St. Louis database, Federal Reserve Economic Data (FRED).

EVALUATION OF THE "MONETARY SURPRISES" COMPONENT IMPACT ON THE U.S. MUTUAL FUNDS PERFORMANCE

The basic specification evaluated a random effects panel data model. To account for common external shocks for the funds (cross-correlations of idiosyncratic errors), the estimation of the covariance matrix of coefficients was performed using Driscoll-Kraay double clustering.

The model was evaluated over different time intervals in accordance with the periods of recession in the United States. According to NBER data, recessions were recorded from December 2007 to June 2009, as well as from February to April in 2020. However, for the object of study, namely the examined sample of mutual funds in the USA, the timing of the companies' financial report publication is extremely important. At the end of July 2020, companies began reporting for the second quarter, which coincided with the COVID-19 pandemic. The results turned out to be better

Table 2

Estimation Results for the Main RE Model with Individual Effects for Subperiods (Driscoll-Kraay Robust s.e. in Parenthesis)

Variable	December 2007 — June 2009	July 2009 — January 2020	February 2020 — July 2020	August 2020 — February 2022	Total period
Surprise	0.0959***	0.1247	−0.3461***	−0.3674	−0.0244
	(0.0359)	(0.2010)	(0.0018)	(0.3587)	(0.0470)
Δ^+ (spread. tres)/10^3	4.0568	0.2443	223.10***	11.865	5.1833
	(19.234)	(10.326)	(1.1492)	(13.411)	(6.8610)
Δ^- (spread. tres)/10^2	0.4502	−3.5685***	−12.236***	4.8505**	−2.0418**
	(0.9640)	(0.8020)	(0.0079)	(2.2961)	(0.9181)
Δ^+ (spread. moodys)/10^3	2.5115**	0.5422	0.9503***	25.943***	3.6549**
	(1.0057)	(3.0333)	(0.0026)	(5.0703)	(1.6172)
Δ^- (spread. moodys)/10^3	−1.4373	0.1115	−5.7486***	−2.2018	−2.1969
	(3.1281)	(2.1407)	(0.0144)	(6.3791)	(2.2889)
FundFee/10^2	1.1667*	0.1283	1.2677***	0.0520	0.3041**
	(0.5981)	(0.1633)	(0.2371)	(0.3672)	(0.1539)
ExpenseRatio/10^3	−4.5320***	−3.0836***	−7.4386***	−1.8745	−3.4595***
	(1.7151)	(0.5502)	(1.7937)	(1.6991)	(0.4652)
Turnover/10^5	−3.0595	1.3013**	1.6242	1.2541	0.8445*
	(2.3583)	(0.5498)	(3.0440)	(0.9277)	(0.4959)
Turnover2/10^8	1.3709	−1.1100***	−2.0510**	−0.6965	−0.8462***
	(1.3748)	(0.3795)	(0.9939)	(0.8518)	(0.3021)
log(NAV)/10^3	−5.0393	0.9142	−4.1651**	2.1932**	−0.0415
	(3.9692)	(0.8162)	(1.7787)	(0.9277)	(0.8417)
Objective_Blend/10^3	4.0810	2.7969**	5.9602**	3.0254	3.1440***
	(5.3873)	(1.2412)	(2.8421)	(2.2079)	(0.9814)
Objective_Growth/10^3	1.5428	3.5805**	13.928***	1.3978	3.3653***
	(3.1668)	(1.6023)	(3.6065)	(3.8496)	(1.1081)
Objective_Value/10^3	4.5772	1.5477	−8.0091**	4.9080*	2.1146*
	(6.3385)	(1.2355)	(3.6394)	(2.6362)	(1.1241)
const	0.0179	−0.0069**	−0.0072	−0.0130**	−0.0041
	(0.0154)	(0.0032)	(0.0057)	(0.0066)	(0.0027)
N	7900	46 207	1873	5708	61 688
R^2	0.0277	0.0136	0.0506	0.0269	0.0148
F	17.294	49.139	7.6193	12.128	71.209

Source: Authors' calculations.

Note: * p < 0.1; ** p < 0.05; *** p < 0.01.

than expected, so it seems reasonable to consider this moment as a starting point for analyzing the performance of mutual funds in the context of economic recovery. Taking such adjustments into account, the following periods have been considered:

- December 2007 — June 2009;
- July 2009 — January 2020 r.;
- February 2020 — July 2020;
- August 2020 — February 2022;
- December 2007 — February 2022 (whole period).

The results of the model evaluation are presented in the *Table 2*.

To verify the robustness of the assessment of the impact of the surprise component over various periods, other specifications were also considered. The page with additional materials for the article[1] presents the results of fitting alternative specifications: FE regression, RE regression, and FE regression with squared spreads. It turned out that the significance and the sign of the influence of the surprise component remain.

Thus, the "monetary surprises" of the monetary policy shocks is a significant factor for the excess returns of mutual funds in the U.S. during the subperiods of 2007–2009 and 2020, when signs of recession were observed in the U.S. The results align with the conclusions that during periods of macroeconomic instability, actively managed mutual funds are capable of generating high returns.[2] It is important to note that during the subperiod of 2007–2009, the impact of the surprise component was positive, whereas during the subperiod of February to July 2020, the impact was negative (the period of the COVID-19 pandemic). This can be explained by the fact that at the beginning of 2020, many countries announced the introduction of strict restrictive measures, and by the end of March 2020, the S&P 500 index had fallen by 34% compared to the previous month's figure.[3] In March, the Fed responded with an emergency return to a zero interest rate policy, announcing a series of measures to support national companies and "injecting" money into the financial system. Thanks to the swift response of the regulator and unprecedented fiscal and budgetary stimulus, the recovery of the economy was relatively quick.[4] However, for managers of actively managed funds, the market conditions have turned out to be quite unfavorable overall. The S&P Global SPIVA US Scorecard 2020 states that 57% of all analyzed actively managed mutual funds in the U.S. underperformed the market. It's interesting that growth-oriented funds have shown decent results compared to value-oriented funds, as the Growth segment is dominated by stocks of technology sector companies, which have become beneficiaries of the crisis brought about by the pandemic. In 2020, the return of the S&P 500 Growth market index was 33.5%, while the S&P 500 Value was 1.4%.[5] The current conditions have become difficult for managers of actively managed value funds. Companies in this segment mainly belong to cyclical industries that have been severely affected by supply chain disruptions and restrictive measures.

During the period of low interest rates and relative market certainty from July 2009 to January 2020, the impact of the "monetary surprises" turned out to be insignificant.

The spread between the yields of long-term and short-term U.S. Treasury bonds

[1] URL: http://digitlab.mgimo.ru/artamonov/surprises-and-funds (accessed on 12.02.2024).

[2] Barrons. Active stock-picking strategies gain appeal as markets fluctuate. URL: https://www.barrons.com/articles/active-stock-picking-strategies-gain-appeal-as-markets-fluctuate-51590192074 (accessed on 12.02.2024).

[3] Yahoo Finance. Historical data S&P 500. URL: https://finance.yahoo.com/quote/%5EGSPC/history?p=%5EGSPC (accessed on 12.02.2024).

[4] The New York Times. Where $ 5 Trillion in Pandemic Stimulus Money Went. URL: https://www.nytimes.com/interactive/2022/03/11/us/how-covid-stimulus-money-was-spent.html (accessed on 12.02.2024).

[5] S&P Global SPIVA US Scorecard 2020. URL: https://www.spglobal.com/spdji/en/documents/spiva/spiva-us-year-end-2020.pdf (accessed on 12.02.2024).

represents the yield curve of Treasury securities. The slope of the yield curve indicates investors' risk appetite, which can be seen as another factor influencing the performance of mutual funds. This spread turned out to be a significant factor affecting the activities of mutual funds. At the same time, the positive change in this spread was significant only during the COVID-19 pandemic, while the negative change in the spread was significant in all periods except the first.

The difference between the yields of corporate bonds turned out to be insignificant during the period of relative calm in the financial market from July 2009 to January 2020. The negative change in this spread is significant only during the COVID-19 pandemic, while the positive change in the spread is significant in all periods except the second, which aligns with the understanding of it as an indicator reflecting market participants' risk appetite.

DISCUSSION OF THE RESULTS

Sharp changes in the direction of monetary policy always have a significant impact on the stock market. However, to understand the direction of this influence, one must start from an analysis of the established conditions. Let's consider, for example, a sharp decrease in interest rates. Theoretically, this indicates that the economy is slowing down or even entering a stage of recession. Naturally, all else being equal, this is negative for the stock market. However, on the other hand, a decrease in interest rates leads to lower yields in the bond market, making bonds less attractive. This, in turn, encourages investors to invest in the stock market, which has a positive impact on asset prices. In this regard, the question arises: what is more important for an investor: the slowdown in economic growth and, consequently, the decline in company revenues, or the decrease in yields, which leads to an increase in the fair multiplier for stocks?

If we consider that the stock price is viewed as profit multiplied by a financial multiplier, then in a situation where interest rates sharply decline, one can expect a decrease in profit, but at the same time, an increase in the multiplier. During a recession, the growth of the multiplier becomes more important, and stocks respond positively to a sharp decline in interest rates.

We can suggest two reasons that explain investor behavior. Firstly, the reaction of financial market regulators is always somewhat delayed, and investors understand in advance that the economy is heading towards recession even before the interest rate is lowered (i.e., investors anticipate the decline in income ahead of time). Secondly, company revenues are cyclical, meaning that periods of decline are followed by periods of growth, and interest rates can remain low for much longer than one economic cycle lasts.

As an additional discussion to the analysis of the obtained results, it should be noted that the idea has gained popularity in academic circles that the tools of modern monetary policy are largely ineffective in influencing the real economy. For example, the policy of "interest rates" acts as a catalyst for crises, as it primarily takes into account the interests of participants in the financial market. It is a well-known fact that during a recession in the U.S., the stock market tends to have a relatively good situation. This is explained by the actions of the Fed, which provides support to the financial market through lowering interest rates (although supporting the stock market is not the primary goal of the Fed during a recession). Thus, the policies implemented by regulators at the present stage may pose a threat to macroeconomic stability [22].

CONCLUSION

This work pays special attention to the influence of the "monetary surprises" on the performance of actively managed

mutual funds in the USA during periods of macroeconomic instability and unprecedented measures by the Fed.

The results are valuable not only from a practical standpoint but also from a theoretical perspective, as they contribute to the development of existing approaches to analyzing the transmission mechanism of monetary policy in the current conditions of heightened uncertainty in financial markets and can be integrated into relevant models.

In recent years, there has been a significant increase in the role of large institutional investors, such as investment funds and banks, which have capitalized on the prevailing conditions where new liquidity immediately flows into financial markets, becoming a source of enormous profits for major speculative players. In this regard, there was a particular interest in the opportunity to study and assess the impact of monetary policy shocks on the activities of investment funds. And the hypothesis about the significance of the "surprise" component of the monetary policy shock was confirmed during the recession periods in the USA in 2007–2009 and in 2020.

Thus, taking into account all the above, it is important to note that an unexpected change in monetary policy has a significant impact on the activities of investment funds. This even affects the relative dynamics of the fund's portfolio, as choosing the right direction for monetary policy can significantly improve the fund's performance. However, this does not always fall within the responsibilities of a stock market manager. In this regard, for analyzing the quality of portfolio management of an investment fund, it is important to consider the results over the entire economic cycle: from recovery and growth to a slowdown in economic growth and recession. An investor who chooses a fund or asset manager for themselves expects to profit from the growth of the stock market. The managers take advantage of this and often showcase their results during periods of market growth. However, due to the cyclical nature of the economy, it is important to consider the entire track record of the manager, including during recessions, which are inevitable.

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Prospects for the Financial Instruments System Development for Small and Medium Enterprises

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ABSTRACT

Financial availability for small and medium-sized enterprises is the most important factor for the companies' growth. The current structure of the financial market determines bank lending as the main source of attracting external financing. At the same time, SMEs are in need of alternative financing instruments, including equity financing. The **purpose** of the paper is to assess current changes in the attracted financing structure in the SME segment and determine the development prospects of a system of capital raising instruments. Due the purpose, two **tasks** were defined: to analyze the dynamics of financial availability and the need of target segment in modern convenient financial tools. The following scientific **methods** were used in the study: observation, comparison, retrospective and system-structural analysis, analysis by segments, generalization. The key advantages of individual financial instruments and factors influencing their development are identified. The risks of creating non-competitive conditions for the development of instruments due to different approaches to regulation, as well as the use of preferential lending programs, have been identified. To prove the proposed approach, an analysis of the depth of lending penetration in the micro, small and medium-sized business segments, as well as the dynamics of the involvement of new borrowers, was carried out. The promising role of equity financing is outlined, while the institutional consequences of involving citizens in the development process of Russian companies are highlighted. The risks of the lack of a long-term vision of the financing instruments structure in strategic documents are identified, which does not allow the formation of numerical guidelines for supporting various groups of instruments. The proposed study made it possible to identify a number of significant areas for the development of non-bank financing of SMEs. The work updates: the possibilities of forming a system of debt and equity financing that meets the future needs of the target audience. The author's definition of the prospects for the development of a system of financing instruments for the SME segment is given, which is based on an analysis of the dynamics of individual financial instruments and a study of the long-term need for external financing at various stages of company development.

Keywords: small & medium-sized enterprises; SME; financial affordability; bank lending; microfinancing; crowdfinancing; SME bonds; SME shares; financial instruments system; lending and equity financing

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INTRODUCTION

The issues of improving financial affordability for various groups of the population and businesses are part of the current economic agenda. Small and medium-sized enterprises (further — SME) are a crucial engine for effective economic development, providing employment and economic growth. At the same time, it is precisely this sector of the economy that experiences a need for financial resources for development and remains underfunded in many countries [1–4].

In the Russian Federation, increasing financial affordability, including for small and medium-sized enterprises, is considered one of the key tasks. The activities aimed at addressing it are outlined in strategic and program documents, such as the "Financial Market Development Strategy until 2030",[1] "Strategy for the Development of Small and Medium Enterprises",[2] The national project 'Small and Medium-sized Enterprises and Support for Individual Entrepreneurial Initiative".[3]

In economic science, there are many definitions of financial affordability. A comparative analysis of various approaches to assessing financial affordability, used by international and Russian organizations, including a set of indicator systems, is presented in the work of E.A. Kalacheva and E.A. Kirienko [5].

The International Network for Financial Literacy (OECD) identifies financial literacy, awareness, physical accessibility, and price accessibility as indicators for assessment. The Center for Financial Inclusion considers the quality of financial services, their affordability, convenience, and respect for consumers among its main evaluation criteria.

The authors of the paper [5, p. 133] note that the approach of the Bank of Russia, which assesses financial accessibility through the state of the financial market, providing various economic entities the opportunity to obtain a certain set of financial services; in this context, a separate segment of SMEs is specifically mentioned. The definition of financial accessibility adopted by the Bank of Russia,[4] suggests important criteria:

- the presence of infrastructure for providing financial services;
- the demand for financial services;
- the quality and usefulness of the provided financial services.

The purpose of this study is to assess the current changes in the structure of financing attracted by small and medium-sized enterprises (SMEs) and to determine the prospects for the development of the capital attraction tool system.

This paper attempts to characterize the changes in financial accessibility for SMEs in Russia in terms of the availability and accessibility of financial instruments, their range, and their alignment with the various financial needs of companies at different stages of their operations. During the analysis, hypotheses are tested:

- the criticality of having infrastructure for the provision of financial services;
- the necessity of developing various financial instruments considering the prospects of their demand by the target segment;

[1] Strategy for the Development of the Financial Market of the Russian Federation until 2030. Approved by the Order of the Government of the Russian Federation from December 29, 2022, No. 4355. Collection of Legislation of the Russian Federation, January 2, 2023, No. 1 (Part III), Art. 476.

[2] The strategy for the development of small and medium-sized enterprises in the Russian Federation until 2030. Approved by the Order of the Government of the Russian Federation from June 2, 2016, No. 1083. Collection of Legislation of the Russian Federation from June 13, 2016, No. 24, Art. 3549.

[3] National project "Small and Medium-sized Enterprises and Support for Individual Entrepreneurial Initiative". The project passport has been approved by the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects (protocol from December 24, 2018, No. 16). URL: https://economy.gov.ru as at 15.04.2021 (accessed on 29.02.2024).

[4] Key concepts in the field of financial affordability. URL: http://www.cbr.ru/develop/development_affor/dic/ (accessed on 29.02.2024).

• the possibility of determining the vector for the development of the financial instruments system.

Based on the conducted analysis, the author **concludes** that it is necessary to minimize the risks associated with stimulating the development of certain financial instruments and to form an optimal structure that allows for external financing at different stages of a company's life.

THE ISSUE OF ASSESSING FINANCIAL AFFORDABILITY

The affordability of a financial instrument is confirmed by its demand from consumers (the demand for the service must be identified). At the same time, the affordability of the financial instrument is only possible when the regulatory, economic, infrastructural, and mental prerequisites for offering the service have been established. Professional participants in the financial market should find it beneficial to provide financing services; otherwise, the instrument will be limited in its development.

For the formation of the market for exchange-traded bonds of small and medium-sized enterprises (SMEs), a class of investors must be established who are willing to invest temporarily free funds under certain conditions, understanding and accepting the associated level of risk. It is also necessary to have an exchange platform that provides conditions for interaction with small issuers and small placement volumes. The presence of market infrastructure in the form of organizers, underwriters, auditors, and credit rating agencies is important, as they are willing to engage with issuers for a relatively small absolute amount of compensation for consulting and training services.

An important factor of financial affordability in the modern world is also technological or digital accessibility. Convenience for the consumer, the speed of transactions, the ability to receive standardized services anywhere, regardless of whether there is a financial institution's office nearby — all these advantages are offered by the digitalization of the financial sector, which is built on a developed financial infrastructure based on modern technologies [6].

The analysis of the indicators of financial instrument development, such as the volumes of financing provided, the number of transactions, "depth of penetration", meaning the share of those who have utilized the financial service in the target segment, as well as the presence and quality of infrastructure, allows us to conclude the demand for the financial instrument. Sustained growth in funding volumes over a long period of time, along with an increase in the depth of audience engagement, indicates the presence of demand, the tool's popularity, and, consequently, the growth in the affordability of financing.

At the same time, in addition to the increase in funding volumes, the types of instruments available in the market are also important: whether they are short-term or long-term, whether they provide the opportunity to attract debt financing, or if there are instruments for raising equity capital. It is important whether financial instruments are available for microbusinesses or for businesses that do not have sufficient collateral. Do financial instruments stimulate company growth, or do they lead to over-indebtedness and ultimately bankruptcy?

Some scientific papers [7–10] explore the system of support tools for SMEs, including administrative, tax, consulting, and financial measures. Thus, in article [7], an attempt is made to systematize them using functional and institutional approaches. L. V. Chebukhanova [8] systematizes the financial instruments of small innovative companies based on the company life cycle approach. In the papers of G. N. Kutsuri, K. R. Kostokov [9], and V. I. Abramov, N. O. Bezrukov [10], various tools for supporting SMEs are analyzed in light of the economic situation caused by sanctions and the current economic environment.

The analysis of the scientific literature conducted did not provide an answer to the question of whether the increase in lending volumes to SMEs signifies a real improvement in financial affordability, and to what extent the emergence and development of new financing instruments (often referred to as alternative financing tools) enhance the situation regarding financial accessibility for various segments of SMEs.

At the same time, it is important to define the current structure of financing attracted by the SME segment, to form a forward-looking vision of the needs of the target segment, and to establish benchmarks for a symmetrical offering in the financial market. The target structure will serve as a guideline for the development of relevant financial instruments, which will contribute to a certain degree of financial freedom for companies.

It seems reasonable to ensure equal conditions for the development of instruments, that is, to base it on unified approaches in regulating and protecting borrowers and investors across various financial instruments. At the initial stage, it is also necessary to inform the business about the available opportunities, fully disclosing information about the potential risks and limitations of the tools.

TARGET STRUCTURE OF FINANCING

Over the past decade, the situation with financial instruments for small companies has changed significantly. In 2016, the "Strategy for the Development of Small and Medium Enterprises" (further — Strategy),[5] was adopted, which outlines the main directions for improving financial affordability for the SME segment:

- development of lending with a focus on long-term lending;
- development of microfinance;
- development of the national guarantee system for supporting small and medium-sized enterprises;
- development of securitization, leasing, and factoring;
- development of direct financing tools (venture capital, business-angel investments, hybrid financing);
- development of new financing tools (market financing).

It should be noted that most of the tools listed in the Strategy have found their application in the Russian market. New financing tools have also emerged that are not mentioned in the Strategy.

In addition to the Strategy, several other program documents have been developed. In 2018, the passport of the national project "Small and Medium-sized Enterprises and Support for Individual Entrepreneurial Initiative" was approved, which outlines support measures for financial instruments such as lending, including secured by intellectual property, leasing, microfinancing, securitization, the development of exchange instruments, and crowdfinancing for the SME segment.

At the same time, the document does not outline a vision for the target structure of financing tools for SMEs. The target indicators for the support of financial instruments are defined in absolute values, which allows for the calculation of the market volume that will receive support. However, the lack of a clear definition of the supported (subsidized) market segment prevents us from determining the contribution of the efforts made to enhance financial affordability, as well as assessing the initial and target funding structure of the SME segment.

The roadmap of the Bank of Russia for the development of financing for small and medium-sized enterprises[6] includes specific

[5] The strategy for the development of small and medium-sized enterprises in the Russian Federation until 2030. Approved by the order of the Government of the Russian Federation from June 2, 2016, No. 1083. Collection of Legislation of the Russian Federation. June 13, 2016, No. 24, Art. 3549.

[6] The roadmap of the Bank of Russia for the development of financing for small and medium-sized enterprises. Approved by the order of the Bank of Russia from September 13, 2018,

measures to enhance financial affordability, but it does not provide a targeted vision for the structure of SME financing. "The Strategy for Increasing Financial Affordability in the Russian Federation for the period 2018–2020"[7] sets target guidelines for enhancing the development of alternative instruments to bank lending and for the development of long-term investment financing. Thus, the analysis of all strategic documents does not provide an understanding of the target structure of financial instruments for the SME segment and does not offer guidelines on the criteria for improving financial affordability as a whole.

Let's examine the existing funding structure of the SME segment and assess the dynamics of its changes. Bank lending has traditionally been the most popular tool for attracting financing in the Russian financial market. In the small and medium-sized business segment, bank lending is also the most common tool for attracting external financing.

The development of bank lending to SMEs is supported by the regulatory efforts of the Bank of Russia aimed at stimulating lending. In terms of stimulating regulation, the Bank of Russia has adopted a number of relaxations aimed at reducing costs and simplifying banking procedures for lending to SMEs. The measures of the Bank of Russia aimed at improving financial accessibility are outlined in the Bank of Russia's Roadmap for the Development of Financing for Small and Medium-sized Enterprises, and include:

- regulation that stimulates lending;
- increasing informational openness and transparency, including the publication of statistics and analytics on the Bank of Russia's website;
- digitization of certain compliance procedures;
- providing market creditors with information contained in government agency databases;
- increasing financial literacy;
- developing alternative instruments to bank lending.

The accumulation of experience in lending and data on the SME segment by banks contributes to the ability of credit organizations to adjust internal risk assessment methodologies, build decision-making models, and enhance interaction with small companies. Overall, the increase in the transparency of data about entrepreneurs in government registration systems, the digitalization of reporting, the improvement of inter-agency electronic interaction, and the accumulation of information in credit bureaus have positively impacted the availability of external financing, particularly bank lending.

The government of the Russian Federation, together with the Bank of Russia, is developing and implementing preferential lending programs aimed at addressing specific issues. For example, during the pandemic, preferential lending programs were initiated to support the ongoing activities of SMEs and to preserve employment with a broader reach of companies. In the period of high interest rates in 2022, a revolving credit program was developed, and in 2023, programs aimed at long-term investment lending were introduced.

The increase in the availability of lending is facilitated by the use of credit guarantees, which provide the lender with a partial guarantee of repayment of the loans granted in the event of borrower default. The national guarantee system for supporting small and medium-sized enterprises is reflected in the

No. 2387. URL: http://www.cbr.ru/Content/Document/File/144001/Road_Map_development_2023–24.pdf (accessed on 29.02.2024).

[7] Strategy for Increasing Financial Affordability in the Russian Federation for the Period 2018–2020. Approved by the Board of Directors of the Bank of Russia on March 26, 2018. The document has not been published. Posted on the Bank of Russia's website. URL: http://www.cbr.ru/ and the legal system of Consultant. URL: http://www.cbr.ru/ and the Consultant legal system. URL: https://sconsweb-it01.vip.cbr.ru/cons/cgi/online.cgi?req=doc&rnd=TKVT6w&base=LAW&n=295167#D 8p1zyT2Poj1p4aN 1 (accessed on 29.02.2024).

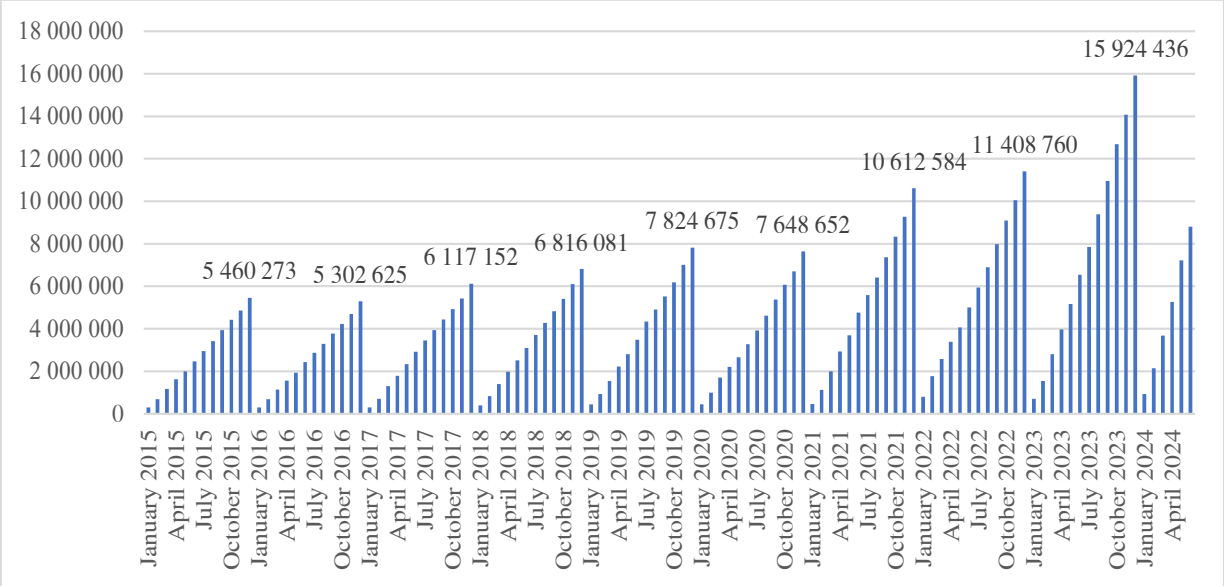

Fig. 1. **Dynamics of SME Loan Volume in the Russian Federation (Cumulative Total in Nominal Prices)**

Source: Based on Bank of Russia data. URL: http://www.cbr.ru/statistics/bank_sector/sors/ (accessed on 29.02.2024).

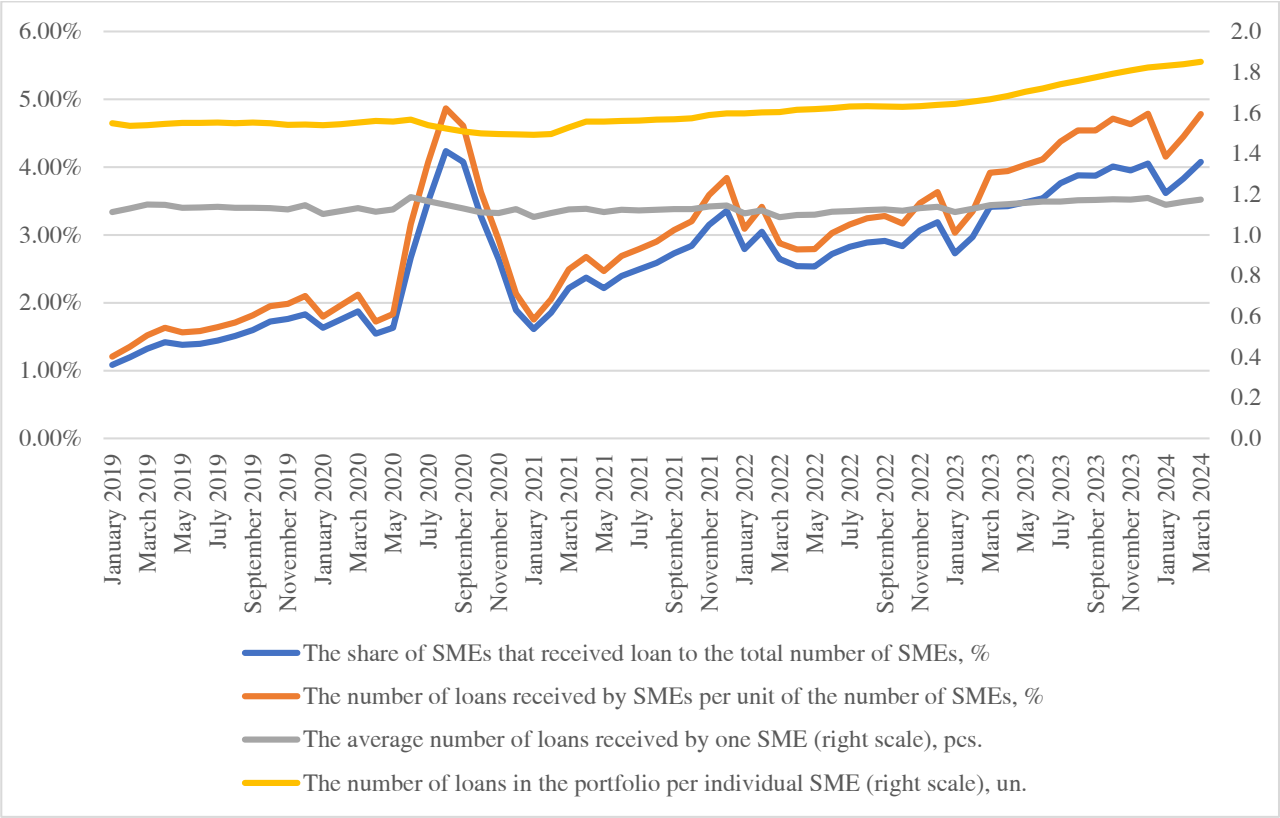

Fig. 2. **Dynamics of Some Indicators of Lending to SMEs**

Source: Compiled by author based on Bank of Russia and Federal Tax Service Data.

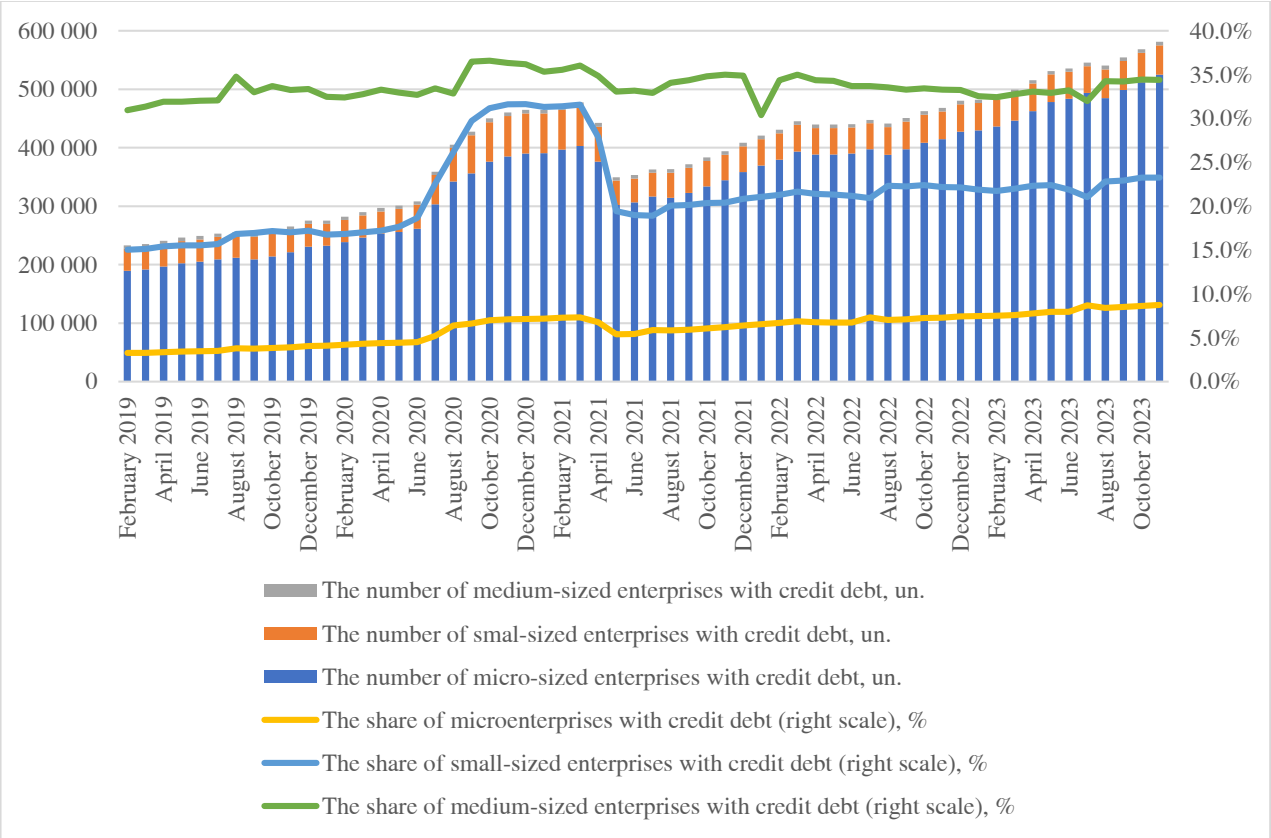

Fig. 3. **Number of SMEs with Credit Debt; their Share of the Total Number of SMEs by Enterprise Size ("Penetration" of Lending), (Right Scale)**

Source: Compiled by author based on Bank of Russia.

Federal Law "On the Development of Small and Medium-Sized Enterprises"[8] (Art. 3, p. 9). Activities for its development and support are outlined in the national project "Small and Medium-Sized Enterprises and Support for Individual Entrepreneurial Initiativ".

The volumes of lending to the SME segment have increased almost threefold in nominal terms from 2015 to 2023 (*Fig. 1*) — from 5.5 trillion rubles to nearly 16 trillion rubles.

Taking into account the preservation of the number of SMEs during the period under consideration, the growth in lending volumes can be seen as a factor improving the availability of credit resources for the SME segment. However, the issue of increasing the accessibility of bank lending remains categories of borrowers. It is possible that the same borrowers are receiving loans and the volume of loans granted is increasing for a specific audience, while the majority are either being denied or not even applying for loans?

PENETRATION DEPTH OF FUNDING

Let's look at the extent of SMEs' participation in lending and how it has changed. Examine the statistical series of the number of loans granted to SMEs for a specific month, in relation to the number of SMEs that received a loan in that month (*Fig. 2*). This indicator shows the number of loans received by a single borrower within a month. During the period from January 2019 to March 2024, the indicator has hardly changed: from 1.11 to 1.17. Considering the possibility of receiving and accounting for tranches within a credit

[8] Federal Law "On the Development of Small and Medium-Sized Enterprises in the Russian Federation" from July 24, 2007, No. 209. Collection of Legislation of the Russian Federation. July 30, 2007, No. 31, p. 4006.

Table

Structure of SME External Financing Tools in Russia for the period 2021–2023

Tool	2020	2021	2022	2023
Lending	7649	10613	11413	15924
Leasing	870.75	1484.3	1425.60	2864.5
Factoring	367	526.7	482	725
Microfinance	52.4	50.5	70	105
Stock Market Bonds	6.4	7.9	6.5	12
Crowdfunding	3.5	9.5	14.3	30.5
Total:	8949	12692	13411	19310

Source: Calculated by author based on Bank of Russia, Association of Factoring Companies, Expert RA data URL: http://www.cbr.ru/Collection/Collection/File/44010/stat_bulletin_lending_23–03_34.pdf; http://www.cbr.ru/analytics/microfinance/2022/; https://asfact.ru/events/itogi-razvitiya-rossiyskogo-ryinka-faktoringa-v-2022-godu/; https://raexpert.ru/researches/leasing/2022; http://www.cbr.ru/Content/Document/File/146720/platform_services_20230515.pdf (accessed on 29.02.2024).

line in statistics, the indicator shows isolated cases of a single borrower obtaining more than one loan in a month.

Let's consider the dynamics of another indicator: the number of loans in the portfolio per borrower with outstanding debt. It can be assumed that the same borrower takes out loans repeatedly throughout the year, while others are unable to obtain credit. During the period under consideration (*Fig. 2*), the indicator has practically not changed: the number of loans per borrower is no more than 1.5 in 2019 and no more than 1.9 at the beginning of 2024. Considering the growth in lending volumes, one can conclude that there is an expansion in the reach of potential borrowers. There is no concentration of loans on the same borrowers; loans are granted not only to "experienced" borrowers but also to "newcomers" in the credit market.

Additionally, one can compare the dynamics of such indicators as the share of SMEs that received loans in the reporting month relative to the total number of SMEs, and the number of loans received by SMEs to the total number of SMEs. During the analyzed period, both indicators increased fourfold: from 1.21% to 4.07% and 4.78%. The graphs clearly show a surge during the period from May 2020 to January 2021, which is attributed to the implementation of anti-crisis programs for preferential lending during the easing of COVID restrictions. During this time, SMEs in priority sectors were able to take out loans at favorable rates and not repay those if certain conditions.

Thus, the analysis of the statistics shows an increase in the availability of funding. At the same time, it is difficult to assess whether such a level of "penetration" of lending in the SME segment is sufficient. An objective criterion could be the comparison of the share of SMEs with credit debt across the micro, small, and medium business segments. This is the approach used by the Bank of Russia[9] (*Fig. 3*).

[9] Analytical review of lending to small and medium-sized enterprises based on the results of 2022. Moscow. 2023. Bank of Russia. URL: http://www.cbr.ru/Collection/Collection/File/45145/inf_material_msp_2022.pdf (accessed on 22.12.2023).

Analysis of the dynamics of credit penetration (*Fig. 3*):

- the number of microenterprises with credit debt has tripled over the past five years; meanwhile, the number of small enterprises with credit debt has increased by only 30%, and the number of medium-sized enterprises has remained virtually unchanged;
- the "penetration" of lending has improved in the segment of micro and small enterprises over the analyzed period: from 3.3% to 8.9% in the micro segment and from 15% to 22.7% in the small business segment.

However, among microenterprises, the share of companies with credit debt is 8.9%, among small enterprises, it is 22.7%, and among medium enterprises, it is 33.5%. Larger companies find it easier to obtain loans and more frequently seek credit. The difference between "penetration" at 33.5% and 8.9% is significant and suggests that with the possibility of comfortably obtaining credit to enhance the accessibility of the lending tool in the SME segment, there is great potential for growth.

ALTERNATIVE FINANCING INSTRUMENTS

The development of other financial instruments, alternative to bank lending, also appears promising. If we examine at the structure of external financing for the SME segment, it has changed little since 2020. Bank lending has been and remains the primary tool for financing businesses in Russia, accounting for about 85% of the total financing for SMEs. As of 2023, his share slightly decreased (82.5%), which is attributed to the growth of other instruments (*Table 1*). Both the overall volume of attracted financing and the share in leasing, exchange financing, and crowdfinancing have increased. The share of microfinancing and factoring has not changed significantly.

The active development of various financing instruments in Russia in 2023 has a positive impact on financial affordability.

The second largest financing instrument for the SME segment is leasing. Leasing serves as a long-term financing investment tool, which is a necessary element for economic development. Leasing companies often have the ability to offer financing on more favorable terms than bank loans, which is due to several factors.

Firstly, the leased item remains the property of the leasing company until the full buyout price is paid, so in the event of the borrower's default, it allows the company to sell it and recover its losses.

Secondly, there are government subsidy programs under which leasing companies receive funding on favorable terms and have the opportunity to offer preferential conditions to lessees.

Thirdly, leasing companies, unlike banks, do not have to comply with regulatory capital and reserve requirements, and therefore have greater financial flexibility.

The volume of financing attracted through leasing by SMEs has increased 3.3 times over three years, while the share of this instrument in the structure of attracted financing has risen from 9.7% in 2020 to 14.8% by the end of 2023. It is difficult to assess the "penetration" of leasing in the SME segment, as there is no official statistics on the leasing industry. Despite the fact that the report from the National Rating Agency (NRA) for the third quarter of 2023[10] estimates the penetration of leasing in the medium-sized enterprises segment at around 45%, and in the small business segment at half that, it is not correct to compare these values with lending due to differing methodologies.

Factoring is a tool for attracting short-term financing secured by the right to claim the delivery of goods or services. Factoring is convenient to use when the client delays

[10] Leasing market: recovery continues, but risks are increasing. National Rating Agency. Analytical review. October, 2023. URL: https://rusbonds.ru/rb-docs/analytics/NRA_Analytics_12_10_2023_1_.pdf?ysclid=lur1bepleh867118978 (accessed on 29.02.2024).

payment for the goods. The volume of financing attracted through factoring has doubled from 2020 to 2023; however, its share in the financing structure remains at 4%.

The "penetration" of factoring in the SME segment is increasing, according to reports from the Association of Factoring Platforms. In 2023, about 10,000 SMEs utilized factoring. This is 32% more than in 2022.[11] The reason for the growing interest in the tool is the active development of online platforms that simplify and reduce the cost of the entire financing process, as well as the overall shift to digital transactions in procurement and contracts.

Factoring, such as leasing, is outside the regulatory perimeter of the Central Bank of the Russian Federation, which is why factoring terms can often be more attractive than those of bank short-term lending. Moreover, factoring companies, by providing financing to SMEs, take on the risk of non-payment by the client. Since the client is usually a large company with a clear reputation and a history of financial transactions, the risks associated with such credit are lower.

Thus, the development of factoring contributes to increasing financial accessibility for small companies, meeting the need for working capital through a technologically convenient tool.

Microfinancing is a tool for providing debt financing to micro and small businesses for both short and long terms. The volumes of microfinancing, just like the volumes of factoring, have also increased, but their share in the structure has remained at the level of 0.5–0.6%. According to the Bank of Russia, the main volume of loans in the SME segment is provided by state microfinance organizations, which, thanks to budget funding, have the opportunity to issue loans on favorable terms. At the same time, commercial microfinance organizations are increasing their activity, mainly providing accessible services and competing with state microfinance organizations in terms of the speed and convenience of loan processing.

Microfinancing can be a convenient financial tool, although its development is hindered by the limited availability of subsidized funding allocated from the budget, without which microfinancing rates are uncompetitive compared to bank lending [11]. The terms for providing loans by commercial microfinance organizations are similar to crowdfinancing rates. At the same time, crowdfinancing offers greater flexibility and provides more options in terms of choosing the term, interest rate, and payment frequency than microfinancing.

On the other hand, the advantage of microfinance organizations lies in their integration into the infrastructure supporting small and medium-sized enterprises,[12] which gives microfinance organizations in entrepreneurial financing an edge over, for example, crowdfunding platforms when participating in government support and development programs for SMEs. Participation in support programs not only allows for preferential funding but also provides marketing advantages, as entrepreneurs receive support and financing in one place.

In addition to the traditional forms of attracting financing, in recent years, so-called alternative financing instruments: crowdfunding and the stock market have been actively developing. Currently, the share of these instruments in the structure of attracting external financing is less than 1%, but their popularity is growing.

The study of crowdfinancing tools has been highlighted in the papers of I.A. Ezangin and A.V. Evstratov [12]. A. Yu. Mezentseva and I.V. Ryndina notes the importance of developing

[11] The factoring market in Russia by the end of 2023. Association of Factoring Companies. Moscow, February 2024. URL: AFC_Stat (asfact.ru) (accessed on 29.02.2024).

[12] Federal Law "On the Development of Small and Medium-Sized Enterprises in the Russian Federation" from July 24, 2007, No. 209. Collection of Legislation of the Russian Federation. July 30, 2007, No. 31, Art. 4006; Art. 15.

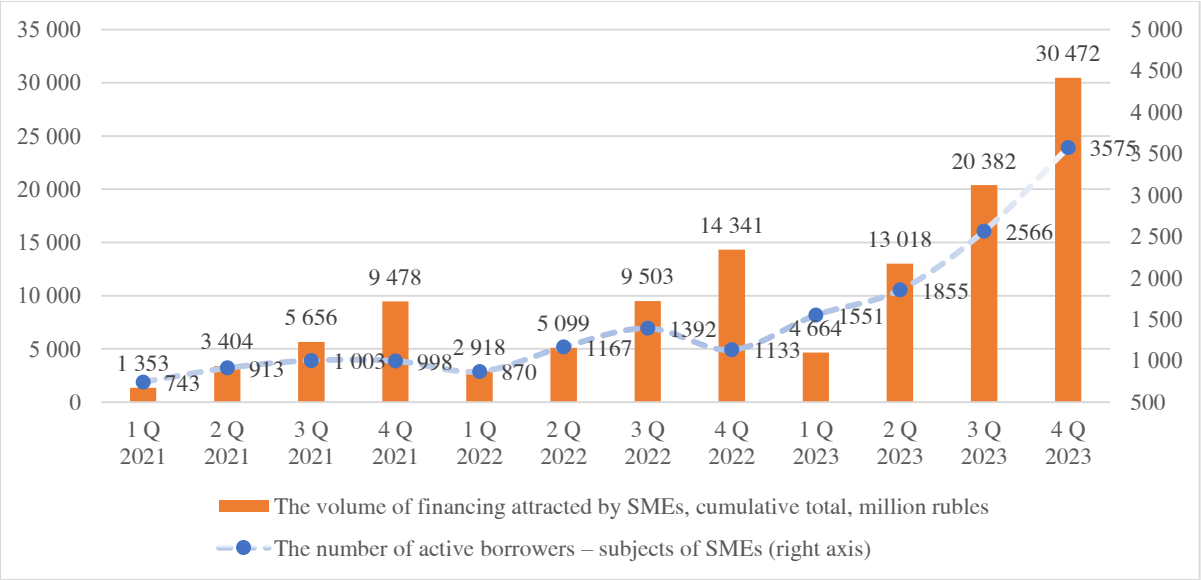

Fig. 4. **Dynamics of SME Crowdfinancing**

Source: Bank of Russia data URL: http://www.cbr.ru/Content/Document/File/120740/press_29112023_2.pdf (accessed on 29.02.2024).

alternative financing tools to overcome sanctions restrictions [13]. The papers of E. S. Materova, M. A. Yubkin, L. N. Saffiullin, R. M. Gayzatullin [14], L. V. Chebukhanova [15], and E. G. Sheina [16] also focus on exploring the possibilities of using crowdfunding and its combination with other financing tools in project implementation. The opportunities for small companies to attract financing on the stock exchange have been examined in the works of I. N. Dzhazovskaya, M. I. Vilkova [17], and A. K. Tanda [18].

The active development of these tools is driven by both objective factors of convenience and expanded opportunities for businesses, as well as the support measures outlined in the national project "Small and Medium-sized Enterprises and Support for Individual Entrepreneurial Initiatives" [13] [19]. In the paper of a collective of foreign authors [20], the possibilities of crowdfunding are compared to over-the-counter initial capital raising for a growing company as a promising tool for alternative financing in the future.

The opportunity to access the open market and attract funding from retail investors by sharing information about their business and projects allows companies not only to secure financing but also enhances their visibility among potential clients, increases transparency in operations, and fosters an investment culture within the small business sector.

Crowdfinancing allows small companies and those recently entering the market to attract debt and equity financing. The active development of the tool was facilitated by the adoption in 2019 of the Federal Law of the Russian Federation from 2 August 2019, No. 259 "On Attracting Investments Using Investment Platforms and Amending Certain Legislative Acts of the Russian Federation".

The law legalized the operation of crowdfinancing platforms, established a circle of individuals attracting funding, and outlined a list of tools through which funding can be raised, introduced regulation and oversight of crowdfinancing by the Bank of Russia.

Since 2020, the crowdfinancing market has grown both in volume and in the number

[13] National project "Small and Medium-sized Enterprises and Support for Individual Entrepreneurial Initiative". The project passport has been approved by the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects (protocol from 24 December 2018, No. 16). URL: https://economy.gov.ru (accessed on 29.02.2024).

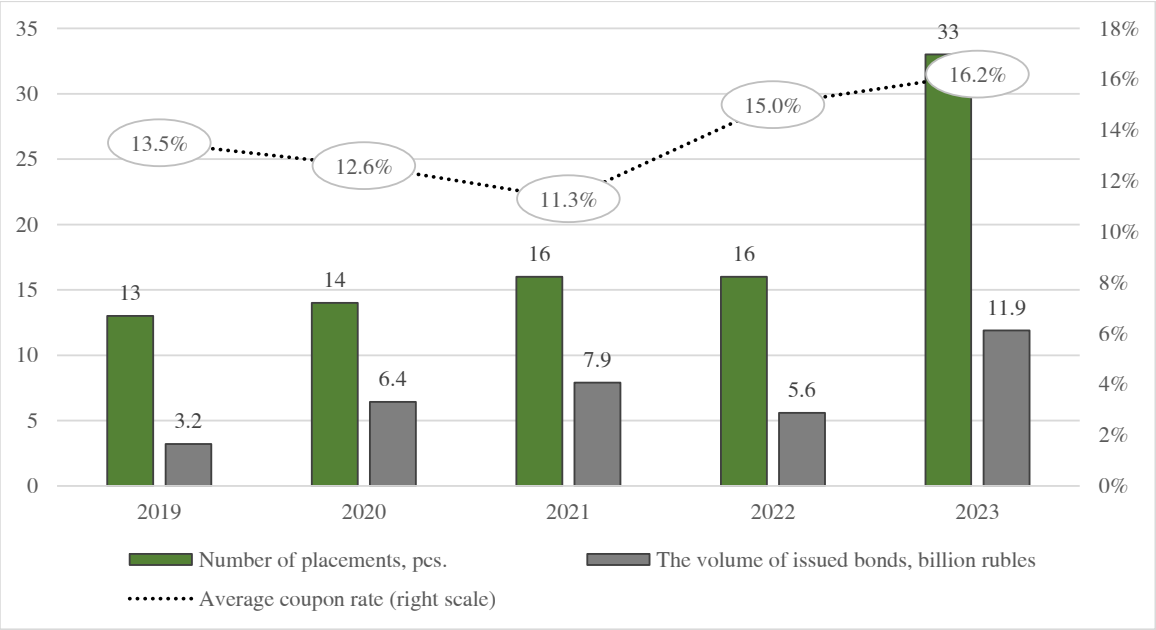

Fig. 5. **Dynamics of SME Stock Exchange Bonds**

Source: Bank of Russia data. URL: http://www.cbr.ru/Content/Document/File/120739/press_29112023.pdf (accessed on 29.02.2024).

of SMEs utilizing this tool (*Fig. 4*). In 2020, the volume of attracted financing (according to surveys conducted by the Bank of Russia) amounted to 3.5–4 billion rubles. In three years, the funding volume has tripled. The number of companies that turned to this service has also increased by 3.5 times.

The crowdfinancing tool is convenient as it provides small companies the opportunity to quickly attract borrowed financing on flexible terms. As a rule, these are short-term loans for working capital replenishment. At the same time, crowdfinancing platforms offer a tool for attracting long-term capital, which is particularly convenient for companies that have significant growth potential (implementing a new project or scaling their operations) but are not ready to go public. In this case, companies can place shares on crowdfinancing platforms and increase their capitalization.

Until recently, stock market instruments were not associated with the possibility of attracting financing for small and medium-sized enterprises. Since the implementation of the national project, thanks to the system of support measures, the active development of market and exchange infrastructure, as well as promotional and educational activities, the listing of small companies on the stock exchange has ceased to be an exotic occurrence [19]. Undoubtedly, the placement of bonds or stocks on the exchange has not become a widespread phenomenon and is more suitable for companies with annual revenue exceeding 120 million rubles,[14] that is, for companies in the small and medium business segment. Nevertheless, in recent years, the volume and number of bond placements by SMEs (*Fig. 5*) demonstrate a growing interest in this instrument.

Stock bonds allow for the attraction of long-term financing, meaning they can fund the implementation of a project or the expansion of a business. The conditions for attracting funds are comparable to bank lending; however, issuing exchange-traded bonds has several advantages, including promoting greater independence for the company.

[14] Requirement of the growth sector of PJSC Moscow Exchange. URL: www.moex.com/s2151 (accessed on 29.02.2024).

CONCLUSION

It should be noted that the growing popularity of alternative financial instruments to bank lending is changing the structure of attracted financing in the SME segment. The main share still consists of bank loans. At the same time, the emergence and development of new financial instruments enhance the opportunities for attracting financing and increase the accessibility of financial resources for small companies.

The further expansion of the financing tool system will depend on economic conditions and regulatory frameworks. To stimulate the development of a financing structure that best meets market needs, it seems important:

1. To identify the prospective needs of the market, such as the proportions of debt and equity financing. The need for equity financing should not be a consequence of high interest rates on loans and credits. On the contrary, the growth of companies' capitalization should be a logical consequence of the company's transition to a stage of sustainable business development. At the same time, the increase in the share of shareholders among citizens has its social consequences. It can be assumed that such a trend is likely to lead to an increase in citizens' responsibility for the development of domestic business, which undoubtedly carries a whole range of global legal and economic consequences.

2. To focus on the promising structure of the capital market when developing government support programs. State support for the banking sector through various preferential programs for citizens and businesses will create the conditions for further strengthening the share of bank lending. At the same time, it is evident that the SME segment demands various financing tools. Therefore, when developing support programs for the SME segment through various financial instruments, it is important to assess the funding capabilities of different instruments and financial institutions. Since competition among financial instruments positively affects financial accessibility, it seems reasonable to reduce support through the banking sector.

3. To support the development of competitive market infrastructure. Accessible and useful financing is formed when market participants compete within clear established rules and conditions. At the same time, a long-term quality supply of financial services is only possible when the economic interests of all participants in the process are respected.

Compliance with the balance of interests of all participants and unified approaches to regulation will contribute to further improving financial affordability for small and medium-sized enterprises.

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Assessment of Blocked Financial Assets in Order to Develop Measures to Support Investors

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ABSTRACT

The rights of Russian investors owning foreign financial assets were violated as a result of the introduction of foreign sanctions, which blocked these securities for an indefinite period. This problem is widely discussed both in the professional environment and at the state level, and a search is underway for ways to solve the current situation. The **purpose** of this paper is to propose specific tools for working with blocked financial assets — assessing their value, profitability of formed portfolios, taking into account risk. The authors have developed a model for assessing blocked foreign securities, taking into account sanctions risk, while this risk is considered a type of credit risk. As a result of implementing the model, the fair value of blocked assets is determined, which can be used to determine the value of portfolios containing blocked securities; when creating special insurance and credit products aimed at protecting the rights and income of investors, as well as when the regulator develops recommendations for assessing blocked assets for further work with them.

Keywords: valuation of financial assets; protection of investors' rights; sanctions; blocked assets; foreign financial assets; investors' risks; mutual insurance; investor support

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INTRODUCTION

After the introduction of international sanctions and restrictive measures by foreign regulators, Russian depositories faced an unprecedented necessity to block their clients' assets. The result is a situation where neither owners nor managers of companies have the ability to dispose, receive coupons or dividends on securities.

Due to the large volume of blocked assets and the resulting restrictions, this problem and possible solutions are being actively discussed in the Bank of Russia and the Russian Ministry of Finance. For example, according to the statement by the First Deputy Chairman of the Bank of Russia, V.V. Chistyukhin, a scheme is currently being developed to create a pool of holders of blocked foreign securities for their buyback, and not at a discount, but at a premium.[1] It was initially assumed that this would be possible using funds from previously established special accounts of type "C", opened by non-residents.[2] It can be assumed that implementing such a method will require an assessment of blocked foreign securities.

In August 2023, Finance Minister A.G. Siluanov announced that the Government of the Russian Federation and the Bank of Russia had prepared a draft decree on the commencement of the exchange of blocked assets of Russian and foreign investors. According to him, currently the assets of more than 3.5 million Russian citizens are blocked, totaling 1.5 trillion rubles. At the same time, the total amount of funds in special accounts of type "C", which include blocked income of non-residents from securities, was over 280 billion rubles at the beginning of November 2022. By the end of the first quarter of 2023, 0.7 trillion rubles had been transferred from this type of accounts from the National Russian Depository to the Deposit Insurance Agency.[3]

Despite the imposed restrictions, a professional securities market participant has a number of obligations to their clients, particularly of a regulatory nature. Funds and trust management strategies require re-evaluation and calculation of net asset value. Currently, there are also offers from brokerage and management companies for the sale and purchase of previously blocked foreign securities. In this regard, there is a need to develop models for assessing securities that are blocked in special sections of depository accounts, as existing models are largely based on the assumption of an efficiently functioning market and free arbitrage, while the sanctions regime undermines these assumptions. The investment community, according to the authors, is in a situation where the regulator should clearly define the approaches to assessing such assets in order to uphold the rights of both investors and professional participants. In this regard, it seems necessary and timely for the Bank of Russia to create recommendations for the assessment of blocked financial assets.

In September 2023, a Decree was signed by the President of the Russian Federation regarding the establishment of a mechanism for the exchange of blocked financial assets between Russian and foreign investors.[4] It

[1] TASS. (June 20, 2023). The Central Bank is working on a scheme for investors to exit blocked securities with a premium. URL: https://tass.ru/ekonomika/18065739?ysclid=lluxit92k0809871949 (accessed on 18.10.2023).

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[3] Interfax. (August 22, 2023). The government and the central bank plan to start exchanging frozen assets of investors. URL: https://www.interfax.ru/business/917365 (accessed on 18.10.2023).

[4] Decree of the President of the Russian Federation from 9 September 2023, No. 665 "On the temporary procedure for the fulfillment of state debt obligations of the Russian Federation, expressed in government securities with a nominal value indicated in foreign currency, and other obligations on foreign securities to residents and foreign creditors". URL: http://publication.pravo.gov.ru/document/0001202309090001?ysclid=loa4juoe5h112646849 (accessed on 18.10.2023).

is proposed to use special accounts of type "I" into which the Ministry of Finance of Russia will transfer payments for Russian eurobonds in rubles. After this, requests will be sent to European depositories for the transfer of equivalent amounts in foreign currency in favor of foreign investors. The funds obtained can be used to make payments to Russian investors in compensation for blocked foreign assets. With the successful implementation of this mechanism, Russian investors will be able to receive payments on securities issued by foreign entities, which are currently unavailable. This justifies the need for assessment tools for such assets, which underscores the relevance of the research topic.

In continuation of the issue regarding blocked assets, in November 2023, a Decree was signed by the President of the Russian Federation, according to which part of the blocked foreign assets may be exchanged for frozen assets of Russian investors held abroad.[5] However, this decree has a number of restrictions, such as a limit on the total initial value of foreign securities being transferred, owned by a single resident, not exceeding 100 thous. rubles, and, crucially, the requirement for the consent of the foreign state to carry out the transaction.

PREREQUISITES FOR ASSET VALUATION MODELS AND INPUTS

Despite the importance of the topic, there is currently a noticeable lack of research on working with blocked assets. Most of the works focus on the impact of sanctions on the economy, countermeasures, mechanisms of state regulation, and the development of possible tools for protecting the rights of investors affected by asset freezes [6–10], or the influence on specific sectors of the economy and pricing [11, 12]. A number of studies focus on analyzing the impact of sanctions and macroeconomic indicators on the financial market, not only the Russian one but also the European and global markets [13–15]. This includes the effects on stock prices, the assessment of returns and risks of securities and stock indices, as well as potential mechanisms for investors to manage blocked assets [16–18]. At this moment, there are no applied studies assessing the value of specific blocked assets. Research focused on the impact of sanctions on the economy and investment activity during earlier periods (anti-Russian sanctions from 2014 to 2022) is also primarily aimed at assessing changes in exchange rates, consequences for specific sectors, and other macroeconomic indicators [19–25]. In addition, the current sanctions differ significantly from those imposed earlier and require further study and the development of practical tools for assessing financial assets, access to which has been restricted for investors.

The classical method in financial theory for determining the value of an instrument that generates future cash flows is based on discounting those flows. However, in the case of blocked assets, there are several restrictions:

- The planning horizon is unknown, which significantly complicates the ability to forecast, for example, dividend payments;
- There is a difficulty in determining the discount rate and the possibility of reflecting in it the probability of sanctions being lifted.

Market participants currently use either a price of zero or the last known price before the asset was blocked to evaluate blocked assets. The existing asset valuation standards do not account for the possibility that ownership of an asset is not lost, but that it is temporarily impossible to manage it. In this regard, the development of methods for assessing the fair value of such assets is relevant.

The proposed method allows for overcoming these limitations. The model is based on the

[5] Decree of the President of the Russian Federation from 8 November 2023, No. 844 "On additional temporary economic measures related to the circulation of foreign securities", 2023. URL: http://publication.pravo.gov.ru/document/0001202311080023?ysclid=lpoqmd3l8t667799701 (accessed on 18.10.2023).

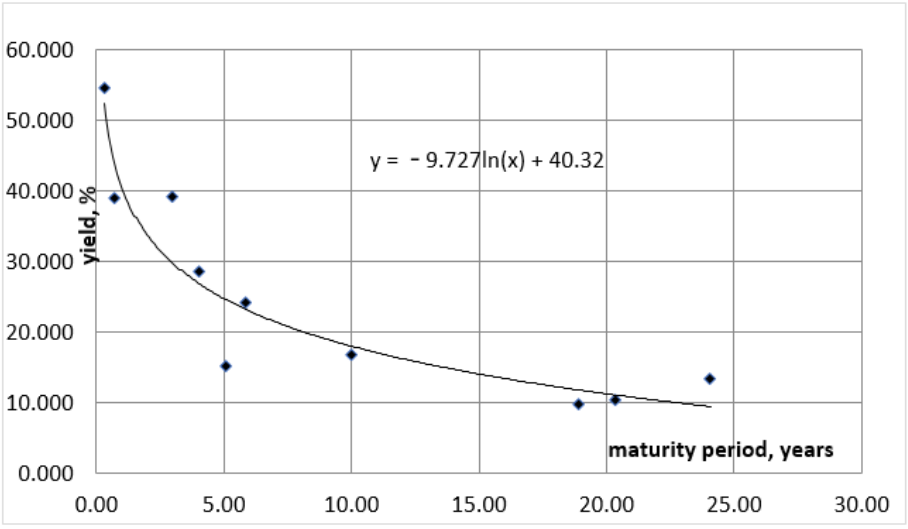

Fig. 1. **Russian Eurobond Curve as of 09.23.2023**

Source: Compiled by the authors based on data from the cbonds.ru

assumption that after some time (within 10 years), sanctions against the Russian stock market and investors will be lifted or significantly eased, or tools will be developed to mitigate their effects. In particular, the assets will be unblocked by Russian depositories, and their owners will be able to receive dividends, coupons, sell them, etc. Accordingly, such assets will be able to generate cash flows for the investor in the future, which means their value cannot be zero. Thus, the inability to generate any cash flow in the present does not rule out the possibility of such an opportunity in the future.

Let's turn our attention to the market of Russian eurobonds. As of September 2023, it has an unprecedented downward shape (the so-called skew curve shape) (*Fig. 1*).

The most intriguing part of the curve is the steep decline in returns, dropping sharply from 50–60% per year to 15–20% over a 10-year horizon. It is precisely in this area that the most interesting market interpretations of sanction risks occur. For comparison, over the next 10 years (on a 10–20 year horizon), the yield loses about 7%.

In addition to the sovereign eurobond curve, a specific benchmark will be needed to distinguish the risk premium for sanctions from the yields of Russian eurobonds. The closest pre-sanction Russian equivalent in terms of economic structure, GDP per capita, and the size of credit spreads can be considered Kazakhstan. In this regard, it seems possible to use the credit default swap curve of Kazakhstan in the calculation model.

IMPLEMENTATION OF THE MODEL

Any point on the curve of Russian eurobonds has a yield that can be represented as three components:

$$RF_{yield} = US_{yield} + CDS_{Kazakh} + PR_{sanct}, \quad (1)$$

where US_{yield} — base rate (US treasuries), CDS_{Kazakh} — credit risk premium, PR_{sanct} — sanctions premium for the Russian Federation. The premium for sanctions is essentially an assessment of country risk.

From formula (1) follows:

$$RF_{yield} - US_{yield} - CDS_{Kazakh} = PR_{sanct}. \quad (2)$$

Calculation of indicators for the 10-year point presented in *Table 1*.

According to formula (2) we get PR_{sanct} = = 12.5%.

Table 1

Calculated Values of the Model for the 10-Year Point of the Russian Eurobond Curve

Indicator	Value of the indicator, %
Cost of a 10-year CDS for Kazakhstan DS_{Kazakh}	1.9
10-year yield US_{yield}	3.7
Yield of 10-year Russian Eurobonds RF_{yield}	18.1

Source: Calculated by the authors based on data from the cbonds.ru

In the model, sanction risk is considered a type of credit risk. The analogy follows from the binomial nature of outcomes:

- In the case of credit risk, the issuer either defaults or continues to service the debt;
- In the case of sanction risk, either there is a change in sanction conditions, or the sanctions continue.

In addition to the two default drivers: the economic ability of the issuer to repay the debt and its willingness to do so, under current conditions, we can speak of a third driver: the technical impossibility of servicing the debt due to imposed sanctions. It is precisely the third indicator that blocks the fulfillment of many obligations by Russian issuers and even by the Russian Federation itself. It is quite possible for a situation to arise where the issuer has all the capabilities and intentions to fulfill its obligations in full, but lacks the technical means to do it. However, for the investor, the essence remains unchanged: a default for any of these reasons makes no difference in terms of the investor's losses.

If the sanctions are not lifted, foreign investors cannot expect any return on their investments, so in this case, the rate of return is zero.

Blocked securities are traded on the same market as traditional bonds, also carry risk premiums, and compete for investors' capital. There is no separate market or segment specifically for sanctioned assets, which must be taken into account when developing valuation models and working with blocked securities.

In this regard, the authors suggest using the following assumptions for building the model:

1. Given the absence of arbitrage opportunities and knowledge about the timing of the removal of imposed restrictions, it seems justified to use risk-neutral default probabilities [26], which reflect both investors' assessment of default probability and their risk preferences.

2. The key uncertainty of the model in question is the timing of the lifting of sanctions. To address this uncertainty and its potential consideration, it is suggested to introduce the concept of credit-equivalent probabilities of sanctions removal by analogy with risk-neutral default probabilities. Such a title reflects the fact that blocked assets are traded in a market where almost all other assets are quoted through credit risk. The authors consider credit risk and credit premium as a common denominator for all bonds (high-quality, pre-default, structured, locked, and any others), allowing investors to compare their risk/return ratios and to build their investment portfolios.

3. Credit-equivalent probabilities of sanctions lifting are not real probabilities of lifting them (and so are risk-neutral default probabilities). Value data — are calculated for the purpose of creating tools for assessing blocked securities.

We model a situation where asset blocking is comparable to placing securities in some low quality depository with high probability

Table 2

Calculated Unconditional Probabilities of Lifting Anti-Russian Sanctions

Period	Unconditional probabilities of lifting sanctions, %
1	76
2	62
3	47
4	41
5	36
6	34
7	33
8	32
9	30
10	29

Source: Calculated by the authors using the default intensity model [27].

Table 3

Marginal Probabilities of Lifting Sanctions

Period	Marginal probability of lifting sanctions, %
1	76
2	–15
3	–15
4	–6
5	–5
6	–2
7	–1
8	–1
9	–1
10	–1

Source: Calculated by the authors.

of bankruptcy. Accordingly, the assets will be returned to the investor only in case the depositary does not go bankrupt. The investor is exposed to credit risk and receives its assets with equal probability of not going bankrupt for the given depositor. At the same time, let's assume that the depository holds bonds offering yields equivalent to those of Russian eurobonds (*Fig. 1*). The probability that the depository will not go bankrupt will be referred to as the credit-equivalent probabilities of lifting sanctions in the model discussed below.

According to the default intensity model [27], it is sufficient to know the size of the spread and the recovery rate of the loan in the event of default to calculate the probability of default. Both of these quantities are known at this stage:

$$\text{Probability of default due to sanctions} = 1-\exp(-12.5\times 10) = 71\% \quad (3)$$

Therefore, the probability of lifting the sanctions is 100% — 71% = 29%. Within the framework of the model, we assume that the lifting of sanctions coincides with the unblocking of assets within Russia.

Similar probabilities can be calculated for the other points on the curve of Russian eurobonds (*Fig. 1*). The probabilities of lifting sanctions against the Russian financial market in the next 10 years are presented in *Table 2*.

As a result of the calculations carried out, a hypothetical probability curve for the lifting of sanctions has been obtained, which at first glance appears paradoxical. For example, it turns out that the probability of lifting sanctions in 10 years is 29%, while in 1 year

Table 4

Cost of Hedging An Investor's Portfolio

Period	Cost of hedging, %
1	–4
2	–17
3	–17
4	–16
5	–16
6	–15
7	–15
8	–15
9	–15
10	–15

Source: Calculated by the authors.

it will be 76%. Although it is generally logical to assume that the relationship should be the opposite: the probability of sanctions being lifted in the near future is relatively low, over time this probability may increase, which is typical for the real world. However, this is not so straightforward for the credit-equivalent conditions being considered.

Let's consider the marginal probabilities of lifting sanctions (*Table 3*), which are equal to the difference between the implied probabilities at neighboring points.

CALCULATION OF THE MODEL FOR THE EVALUATION OF BLOCKED ASSETS

For example, an investor wants to buy a blocked security and hold it for the next 10 years. Let's assume this is a stock of Apple Inc., and its current market price on the NASDAQ is 150 dollar per share.

What discount from the market price is reasonable to request from such an investor?

First and foremost, it is necessary to eliminate market risk by forming a portfolio consisting of the following positions:

- A long position in blocked Apple shares;
- A short position in Apple traded on NASDAQ.

In a short position, the investor will pay the dividend of Apple stock to their broker, who will then pass this dividend on to the investor with a long position, from whom the broker borrowed the stock in a repo.

According to the Capital Asset Pricing Model (CAPM) by Sharpe and Lintner [23, 24],

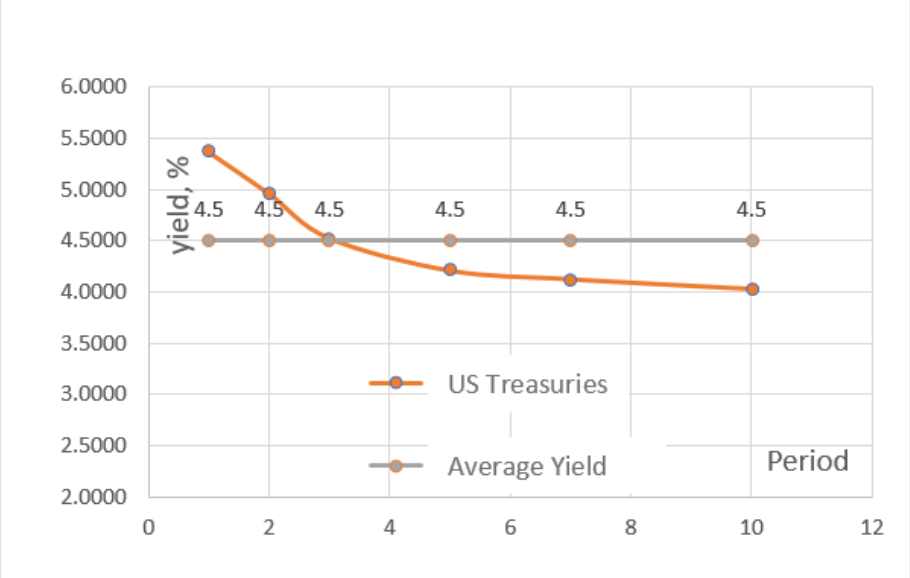

Fig. 2. **Average Yield on US Treasuries Over 1–10 Years**

Source: Calculated by the authors based on data from the cbonds.ru

Table 5

Discounted Value of the Hedge

Period	Discounted Value of the Hedge, %
1	–3.83
2	–15.57
3	–14.90
4	–13.42
5	–12.84
6	–11.52
7	–11.02
8	–10.55
9	–10.09
10	–9.66

Source: Calculated by the authors.

Table 6

Current Value from the Yield of Owning a Hedged Portfolio

Period	Current Cost of Owning a Hedged Portfolio Over a 10-Year Horizon, %
1	96.17
2	81.2
3	69.1
4	59.83
5	52.15
6	46.14
7	41.06
8	36.73
9	33.02
10	29.83

Source: Calculated by the authors.

the expected return on Apple stock, given its level of market risk, will be 15% per annum. This will be the cost of the short position for the investor.

As soon as the stock is unblocked, the investor starts receiving the same 15% annual return from their long position. Since the unblocking process is probabilistic, one can speak of the expected (probability-weighted) return for an investor from a long position in blocked shares. At the same time, the probabilities used to calculate the weighted expected return will be marginal (values are given in *Table 3*).

Thus, under the proposed model, the investor has the following financial result:

1. Pays 15% annually with a probability of 100%.

2. Gets 15% annual bonus if you unlock shares in the relevant period.

For example, in 1 year the investor will pay 15% annual and get profit

$$15\% \times 0.76 = 11\% \ \ per\ annum. \qquad (4)$$

The overall yield of the investor's portfolio for both positions in year 1 is equal to:

$$-15\% + 11\% = -4\% \ per\ annum. \qquad (5)$$

Let's introduce the concept of the cost of hedging into the model — his is the cost of holding a hedged portfolio consisting of a long position in blocked Apple shares and a short position in traded Apple shares, in each considered year (as a percentage per annum for the investor). Applying the same logic as in (5), we obtain results for each year (*Table 4*).

Thus, in the total number of actions performed:

- The portfolio is hedged and is risk-free;
- The costs of owning the portfolio are known;

• There is an opportunity to discount the expected returns on the portfolio at the risk-free rate.

Since the portfolio in question consists of Am erican securities and the American market is being considered, the yield on US Treasuries for a period of 1 to 10 years can be used as the risk-free rate. Their average yield over a horizon of 1–10 years is 4.5%, and it is suggested to consider it as risk-free (*Fig. 2*).

We discount the expected returns from *Table 4* at a risk-free rate of 4.5%, and the results are presented in *Table 5*.

Next, it is possible to calculate how much the investor will pay over 10 years in terms of the current price level (Present Value), with the results presented in *Table 6*. For example, for the point of 2 years:

$$(1-3,83\%)\times(1-15,75\%)=81,20\%. \quad (6)$$

Thus, the investor will pay 1–29.83% = = 70.17%. This will be the fair discount required by the investor for the locked shares of Apple.

As a result, according to the proposed model, we find that the fair price of the evaluated blocked asset is 42.45 dollars, while the market price is 150 dollars.

POSSIBLE PRACTICAL APPLICATION OF THE RESULTS. MEASURES TO SUPPORT INVESTORS

The analysis of the structure of mutual funds showed that a large portion of them consists of equity funds. Market experts note that, based on the results of desk audits of management companies of mutual investment funds conducted by the Bank of Russia, the issue of protecting the rights and interests of shareholders in such funds with blocked assets is the most pressing concern for the regulator. The calculated price of the blocked asset obtained from the presented model can be used as an estimate of the security's value within the framework of a trust management strategy or a mutual investment fund to determine the net asset value. This is more reasonable than using a zero price or the last closing price before asset blocking, and will also help protect the rights of shareholders.

As mentioned earlier, professional appraisers do not have approved methods for valuing blocked assets and also use the last known price at the time of closure before the blocking, or a zero price. There are precedents where an appraiser, in search of such a price, turns to a very niche market, for example, a market created by a specific broker solely for their individual clients. The authors are confident that all these methods suffer from subjectivity and may violate the rights of both investors and professional participants in the securities market.

At the same time, the introduction of amendments to the existing Federal Standard for assessment "Assessment Process (FSO III)",[6] which expand and clarify the list of valuation assumptions regarding the object of valuation by allowing the use of developed models for valuing blocked assets, could enhance the toolkit available to appraisers.

In addition, the obtained price can be used to calculate the insurance value and determine the insurance amount when insuring the financial risks of the investor-owner of the blocked asset. Currently, insurance for financial risks of investors operating in the stock market is virtually nonexistent in the Russian market. For a long time, the possibility of insuring the risks of individual investment account holders was discussed,[7] but this bill was rejected due to a

[6] The Federal Standard for assessment "Assessment Process (FSO III)" was approved by the Order of the Ministry of Economic Development of the Russian Federation on the approval of federal standards for assessment and on amendments to certain orders of the Ministry of Economic Development of Russia regarding federal standards for assessment No. 200 from 14 April 14 2022. URL: https://docs.cntd.ru/document/350260562?ysclid=lsky96nxhc303418874 (accessed on 18.10.2023).

[7] Bill No. 76910–7 of the Federal Law "On the Insurance of Investments of Individuals in Investment Accounts". 2017. URL: https://sozd.duma.gov.ru/bill/76910–7?ysclid=lpkblnh1nt78328965 (accessed on 18.10.2023).

lack of support from the Bank of Russia and professional market participants. Overall, the discussion in such initiatives revolves around insurance in case of bankruptcy of a professional market participant who manages the funds of individual clients. Other risks are usually excluded from insurance coverage due to the complexity of their forecasting and quantitative assessment. The proposed option will cover sanction risks, such as the blocking of foreign assets or significant changes in foreign legislation that lead to losses for the securities owner.

Insuring investors against financial risks may not be profitable for traditional insurers, which makes it reasonable to consider such protection based on the principle of mutual insurance through self-regulating organizations of investors. The legal basis can be found in Article 17 "Compensatory and Other Funds of Self-Regulatory Organizations" and Article 18 "Protection of the Rights and Legal Interests of Individual Investors by Their Public Associations" of the Federal Law "On the Protection of Rights and Legal Interests of Investors in the Securities Market".[8] According to Russian legislation, self-regulatory organizations in the financial market, as well as self-regulatory organizations for individual investors, have the right to create compensation and other funds for the purpose of reimbursing damages incurred by the participants of these organizations. The creation of such compensation funds and mutual insurance for investors will have a generally positive effect on the development of the stock market, contributing to its attractiveness and the attraction of investment funds.

In the development of opportunities for working with blocked assets, it seems feasible to create a preferential lending program for investors with low interest rates secured by these assets. These loans can also be targeted with a specified list of objects for the allocation of borrowed funds. The implementation of this measure is not possible without support from the government and will require additional legislative regulation; at the same time, it will contribute to supporting investment activity and economic development.

CONCLUSION

The obtained model allows for the assessment of the value of currently blocked foreign assets for Russian investors. The model is based on the assumption that during the considered 10-year period, the sanctions regime may change, and there will be an opportunity to manage the assets. At the same time, if the sanctions are not lifted, the financial outcome for the asset owner is equivalent to a default, which provides grounds to use a default intensity model for assessing profitability. As a result, marginal probabilities of sanction cancellation and the weighted expected return of the asset in question have been obtained. When hedging a portfolio, there is an opportunity to discount expected returns at the risk-free rate and determine the fair price of the locked asset, which is likely to differ significantly from the market price.

Given the increasing geopolitical tension in various regions of the world and the popularity of imposing sanctions in financial markets as a mechanism for potential economic and political pressure, one cannot rule out the possibility that the situation currently unfolding in the Russian stock market could occur in other countries as well. In this regard, it seems relevant to create and develop tools for assessing financial assets that have been subjected to international economic sanctions.

The proposed insurance mechanism for the realization of legislative risks and the imposition of sanctions by foreign states

[8] Federal Law "On the Protection of Rights and Legal Interests of Investors in the Securities Market" from 5 March 1999, No. 46 (in the latest edition). URL: http://pravo.gov.ru/proxy/ips/?docbody=&nd=102058488&intelsearch=46-%F4%E 7&ysclid=lpot1cyw2o51724200 (accessed on 18.10.2023).

against the foreign assets of Russian investors is based on the principles of mutual insurance and can be organized through self-regulatory organizations of financial market participants. This will require additional legislative regulation and will contribute to enhancing the level of protection for the rights of private investors. Similarly, the proposed process of preferential lending to investors against blocked assets will require corresponding legislative changes and support from government authorities. Thus, most measures of support and protection of investors' rights are only possible with active interaction among investors, professional participants in the financial market, the Bank of Russia, the Ministry of Finance of Russia, and the Government of the Russian Federation.

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Incorporating CAPM into Capital Structure Theories: Accounting for Business and Financial Risks

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ABSTRACT

In order to create a methodology for assessing the company's main financial indicators, taking into account both business and financial risks, the CAPM and Fama-French models were included in the two main theories of capital structure - the Brusov-Filatova-Orekhova (BFO) theory and the Modigliani-Miller (MM) theory. CAPM takes into account systematic (business) risk, while capital structure theories take into account the financial risk of a specific company, associated with debt financing. As a result, generalized approaches (CAPM-BFO and CAPM–MM) were developed that take into account both types of risk: systematic (business) and financial. The Fama-French model with three and five factors is also considered and included. The latest versions of the two main theories of capital structure (BFO and MM), adapted to the established financial practice of the functioning of companies, are used, taking into account the real conditions of their work, such as variable income, frequent income tax payments, advance income tax payments, etc. Practical calculations have been made. They focus on (1) applying two versions of CAPM (market or industry) to real companies; (2) application to real companies of a new methodology developed by us for assessing the financial performance of a company, taking into account both business (market or industry) and financial risks. The calculations made for three real companies (Apple, Severstal, Polymetal) show that the financial performance of companies is highly dependent on the type of risks taken into account. Sometimes the difference between market and industry cases is small, sometimes it is significant. But the difference in financial indicators, while taking into account simultaneously financial and business risks, is always great. This means that taking into account simultaneously both financial and business risks is important for a correct assessment of the financial performance of companies. The developed approach makes it possible to use the powerful tools of these highly developed theories (BFO and MM) for the correct assessment of the main financial indicators of the company and their forecasting, taking into account both types of risks.

Keywords: business and financial risks; capital structure; Modigliani-Miller (MM) theory; Brusov-Filatova-Orekhova (BFO) theory; risk and profitability; CAPM 2.0; Fama-French model

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INTRODUCTION

In the real economy, financial and business risks exist. Financial risks are related to the use of debt financing and are described by capital structure theories. Business risks are associated with investments in a specific company (and not the entire market (industry)) and are described in CAPM (market or industry version).

Based on the portfolio theory by Harry Markowitz, the Capital Asset Pricing Model (CAPM) was developed independently [1–5] by Jack Traynor (1961), William F. Sharp (1964), John Lintner (1965) and Jan Mossin (1966). Two main capital structure theories, Brusov-Filatova-Orekhova (BFO) [6–7] theory and Modigliani-Miller (MM) theory [8–10] describe financial risks. The Miles-Ezzell model [11–13] offers an alternative approach to the problem of capital structure. This is discussed below, along with some others [14].

Statement of the problem: when assessing the profitability of an asset, take into account both financial and business risks. A fundamentally new approach to assessing the profitability of an asset is proposed. Transition from CAPM, which takes the same risk-free return for all assets as an initial assessment, to a new methodology, in which the average return of an asset, cleared of leverage, with the addition of a premium for business risk (market or industry), is taken as a

seed return, significantly improves the accuracy of the estimate.

The incorporation of the CAPM [1–5] and Fama-French models [15–18] into the theory of capital structure will allow taking into account the business risk taken into account in these models, along with the financial risk taken into account in the Brusov-Filatova-Orekhova (BFO) [6–7] theory and Modigliani-Miller (MM) theory [8–10]. Hamada's attempt to account for the leverage level is discussed [19, 20].

CAPM (CAPITAL ASSET PRICING MODEL)

Market Approach

CAPM is a simple, but widely used, one-factor model that describes the relationship between the expected return on assets (stocks, investments, etc.) and the risk-free rate, taking into account systematic (business) risk. This relationship is described by the equity risk premium, which depends on the asset's beta (which describes the asset's correlation or sensitivity to the market), the risk-free rate (say, the Treasury bill rate or the central bank's key rate), and the expected return in the market.

The following assumptions are made within the CAPM model:

1) All investors are risk averse and have the same time frame to evaluate information.

2) Unlimited capital exists to borrow at the risk-free rate.

3) Investments can be divided into unlimited parts and sizes.

4) Taxes, inflation and transaction costs are absent.

5) Return and risk are linearly related.

CAPM (Capital Asset Pricing Model) describes the profitability of assets and is described by the following formula:

$$k_i = k_f + \beta_i \left(k_m - k_f \right). \quad (1)$$

Here, k_f is risk free profitability, β is the β-coefficient of the company. It shows the dependence of the return on the asset and the return on the market as a whole. The β-coefficient is described by the following formula:

$$\beta_i = \frac{\mathrm{cov}_{im}}{\sigma_m^2} = \rho_{im} \frac{\sigma_i}{\sigma_m}. \quad (2)$$

Here σ_i is the risk (standard deviation) of *i*-th asset, σ_m is market risk (standard deviation of market index), cov_{im} is covariance between *i*-th asset and market portfolio.

An investor invests in risky securities only if their return is higher than the return on risk-free securities, so always $k_i > k_f$ and $k_m > k_f$.

The beta-coefficient of a security, β has the meaning of the amount of riskiness of this security. It follows from formula (1) that:

1) if β = 1 the yield of the security is equal to the yield of the average market portfolio ($k_i = k_f$);

2) if β > 1, the security is more risky than the average on the security market ($k_i > k_f$);

3) if β < 1, the security is less risky than the average on the security market ($k_i < k_f$).

Securities betas are calculated using statistical data on returns on specific securities and the average market returns on securities traded on the market.

Disadvantages of the CAPM model

CAPM has some well-known disadvantages.

1. The CAPM formula only works under the assumption that purely rational players who make decisions that favor only investment returns dominate the market. This, of course, is not always true.

2. CAPM assumes that each market participant acts on the basis of the same information. In reality, relevant information is distributed unevenly among the public, so some participants may make decisions based on information that others do not.

3. Using beta as the main part of the formula. But beta takes into account only changes in the stock price in the market. However, the share price can change for reasons other than the market. Stocks can rise or fall in value for deliberate reasons, not just volatility.

4. CAPM only uses historical data. But historical stock price changes are not enough to determine the overall risk of an investment. Other factors should be considered, such as economic conditions, industry peculiarities and competitor characteristics, and internal and external activities of the company itself.

Another very important shortcoming of CAPM, which is eliminated as part of the new approach is that it assumes the same risk-free return on all assets

as the original valuation. Also, CAPM takes into account the profitability of a particular asset only in the beta coefficient.

The model operates on only one factor that affects the future performance of a stock. In 1992, E.F. Fama and K.R. French [15–18] proved that future returns are also affected by factors such as company size and industry affiliation.

The model has a number of limitations: it does not take into account taxes, transaction costs, non-transparency of the financial market, etc.

Finally, to predict future returns, a retrospective level of market risk is used, which leads to a forecast error.

Industry Approach

CAPM has an alternative approach that refers to the industrial index rather than the market.

$$k_i = k_f + \beta_i \left(k_I - k_f \right). \quad (3)$$

Here, k_f is risk free profitability, is the β-coefficient of the company. In this case it shows the dependence of the return on the asset and the return on the industry as a whole. The β-coefficient now is described by the following formula

$$\beta_i = \frac{\mathrm{cov}_{iI}}{\sigma_I^2} = \rho_{iI} \frac{\sigma_i}{\sigma_I}. \quad (4)$$

Here σ_i is the risk of i-th asset, σ_I is industry risk (standard deviation of industry index), cov_{iI} is covariance between i-th asset and industry index. Note, that the industry approach better describes the return on an asset than the market approach.

The CAPM approach is still evolving and we will describe one of the directions of this development below.

The Symmetric CAPM

The Capital Asset Pricing Model (CAPM) assumes a Gaussian or Normal distribution. In practice, this assumption may be violated. In [21], a symmetric CAPM is proposed, assuming distributions with lighter or heavier tails than the normal distribution. Elliptic distributions (normal, exponential and Student-t) are considered.

In addition, the authors of [21] study the methods of leverage and local impact for diagnostics in a symmetric CAPM. It is concluded that the considered models give better results than the CAPM with Gaussian distribution.

In [22–24], empirical studies were carried out under the assumption that stock returns have distributions with heavier tails than the normal distribution.

The Student-t distribution instead of the normal distribution was considered in [23] and in [25], taking into account the maximum likelihood method for estimating its parameters. Paper [24] concluded that asset valuation should be carried out within the framework of the CAPM and the discounted dividend model.

HAMADA MODEL

The Modigliani-Miller theory, with the accounting of taxes has been united with CAPM (capital asset pricing model) in 1961 by Hamada [19, 20]. For the cost of equity of a leveraged company, the below formula has been derived.

$$k_e = k_f + \beta_U \left(k_m - k_f \right) + \beta_U \left(k_m - k_f \right) \frac{D}{S} (1 - t). \quad (5)$$

The first term represents risk-free profitability k_f, the second term is business risk premium, $\beta_U \left(k_m - k_f \right)$, and the third term is financial risk premium $\beta_U \left(k_m - k_f \right) \frac{D}{S} (1 - t)$.

In the case of an unlevered company (D = 0), the financial risk (the third term) is zero, and its shareholders receive only a business risk premium.

Hamada used an empirical approach in incorporating the level of leverage into the CAPM. One of the main objectives in his research was to distinguish companies without leverage from companies with leverage. The latter make up almost the majority of real companies. In 1972, he surveyed 304 companies, among which he found 102 non-leveraged and 202 leveraged [20]. Comparing the equity returns of two types of companies, he got his formula for the β-factor, which takes into account the level of leverage.

In our approach, we do the opposite thing: we incorporate CAPM and Fama-French models into two main theories of the capital structure — the Brusov-Filatova-Orekhova (BFO) theory and the Modigliani-Miller (MM) theory. In addition, we do this analytically.

Our methodology, developed below, avoids this problem of finding non-leveraged companies (which practically do not exist) by clearing the average return of an asset from leverage using the formula (7), which allows to find k_0 value (cost of equity at zero leverage level).

Equating CAPM formula (1) to the right side of formula (3), one gets:

$$k_f + \beta\left(k_m - k_f\right) = k_f + \beta_U\left(k_m - k_f\right) + \\ + \beta_U\left(k_m - k_f\right)\frac{D}{S}(1-t) \quad (6)$$

or

$$\beta = \beta_U\left(1 + \frac{D}{S}(1-t)\right) = \beta_U\left(1 + L(1-t)\right), \quad (7)$$

where β is beta-coefficient for leveraged company.

The Incorrectness of Hamada's Approximation

The Miles-Ezzell model versus the Modigliani-Miller theory has been discussed in [26, 27] (see below).

If we try to combine the CAPM and MM theory not phenomenologically, like Hamada, but analytically, then the incorrectness of Hamada's approximation becomes obvious [28–31]. Substituting the CAPM formula:

$$k_0 = k_f + \beta_U\left(k_m - k_f\right) \quad (8)$$

into Modigliani-Miller formula for equity cost

$$k_e = k_0 + L\left(k_0 - k_d\right)(1-t), \quad (9)$$

one gets the following result

$$k_e = k_0 + L\left(k_0 - k_d\right)(1-t) = \\ = k_f + \beta_U\left(k_m - k_f\right) + L\left(k_f + \beta_U\left(k_m - k_f\right) - k_d\right)(1-t) = \\ = k_f\left(1 + L(1-t)\right) + \beta_U\left(k_m - k_f\right)\left(1 + L(1-t)\right) - Lk_d(1-t). \quad (10)$$

The second term is the same as in Hamada's formula (7), but the first term is renormalized value of risk-free profitability and the last term, which depends on the cost of debt kd, is missing from Hamada's formula (7).

So the difference with Hamada's formula is:

while in Hamada's formula only beta coefficient is renormalized, in formula (10) the first term (risk-free return) is also renormalized by the same factor $\left(1 + L(1-t)\right)$ and the last term, depending on the cost of debt k_d, appears, which is absent in Hamada's formula. Factor $(1-t)$ (tax corrector) exists due to the tax shield.

The incorrectness of Hamada's approximation becomes obvious.

Note that recently the authors [28–31] for the first time generalized CAPM to take into account both business and financial risks and developed a new model CAPM 2.0. They showed that R. Hamada's attempt to take into account both business and financial risks [19, 20] was untenable, and the formulas he obtained, which are widely used in practice, are incorrect. The authors of [28–31] derived correct formulas that take into account both business and financial risks. The application of the new CAPM 2.0 model to a number of companies is considered, and the difference between the results obtained within the framework of CAPM 2.0 and CAPM is demonstrated.

Disadvantages of Hamada's approach:

Difficulty in finding a non-leveraged company. It is clear that the vast majority of companies are leveraged because they use debt financing.

FAMA-FRENCH MODELS

Fama-French Three-factor Model

Fama-French three-factor model [15–18] takes into account two additional risk factors, namely, size and book-to-market equity along with market beta:

$$k_e = k_f + \beta_U\left(k_m - k_f\right) + s \cdot SMB + h \cdot HML, \quad (11)$$

were *SMB* — the difference between the returns of companies with large and small capitalization; *HML* — the difference between the returns of companies with low and high intrinsic value (indicator B/P).

Fama-French Five-factor Model

$$k_e = k_f + \beta_U\left(k_m - k_f\right) + s \cdot SMB + \\ + h \cdot HML + r \cdot RMW + c \cdot CMA, \quad (12)$$

where *RMW* — return on equity; *CMA* — company capital expenditure.

CAPITAL STRUCTURE THEORIES

Modigliani-Miller Theory

The first quantitative theory of capital structure was the well-known theory of Nobel laureates Modigliani-Miller [8–10]. This theory was based on many restrictions. One of the main limitations of the Modigliani-Miller theory about the eternity of companies was removed by Brusov et al. in 2008 [6–7], and modern theories of the cost of capital and capital structure — the Brusov-Filatova-Orekhova theory (BFO-theory) was created for companies of arbitrary age (BFO-1 theory) and for companies of arbitrary lifetime (BFO-2 theory) [14]. Brusov-Filatova-Orekhova (BFO) theory, has modified the Modigliani and Miller theory with this respect. The authors departed from the Modigliani-Miller assumption about the eternity (infinity of lifetime) of companies and developed an innovative quantitative theory for assessing the main parameters of the financial activity of companies of arbitrary age. The results of the modern BFO theory turn out to be quite different from the results of the Modigliani-Miller theory. They show that the latter, through its perpetuity, underestimates the weighted average cost of capital, the cost of equity of the company, and significantly overestimates the company's value.

Such an incorrect assessment of key performance indicators of companies' financial performance was one of the implicit causes of the 2008 global financial crisis.

Brusov-Filatova-Orekhova (BFO) Theory

In the Modigliani-Miller theory, there is no time factor (time is equal to infinity), which does not allow to study the dependence of the company's financial performance on the time factor. But Brusov-Filatova-Orekhova theory (BFO-theory) was created for companies of arbitrary age and allows to study the dependence of the company's financial performance on the time factor.

Brusov-Filatova-Orekhova and its perpetual limit — Modigliani-Miller (MM) theory — are described by the following formulas for the weighted average cost of capital *WACC:*

$$\frac{1-\left(1+WACC\right)^{-n}}{WACC}=\frac{1-\left(1+k_0\right)^{-n}}{k_0\cdot\left(1-w_d t\left[1-\left(1+k_d\right)^{-n}\right]\right)} \quad (13)$$

$$WACC=k_0\cdot\left(1-w_{\mathrm{d}}t\right), \quad (14)$$

here $w_{\mathrm{d}}=\dfrac{D}{D+S}$ — the share of debt capital; $k_{\mathrm{e}}, w_{\mathrm{e}}=\dfrac{S}{D+S}$ – the cost and the share of the equity capital of the company, and $L=D/S$ — financial leverage; D — the value of debt capital.

Alternative Expression for *WACC*

Alternative formula for the *WACC*, different from Modigliani-Miller one has been derived in [11, 12] from the *WACC* definition and the balance identity:

$$WACC=k_0\left(1-w_d t\right)-k_d t w_d+k_{TS} t w_d, \quad (15)$$

where k_0, k_d and k_{TS} are the expected returns respectively on the unlevered company, the debt and the tax shield.

Some additional conditions are required for equation (13) practical applicability. If the WACC is constant over time, as stated in [11], the levered company capitalization is found by discounting with the WACC of the unlevered company.

In textbooks [32], formulas for the special cases, where the WACC is constant, could be found.

In 1963, Modigliani and Miller assume that the debt value D is constant. Then, as the expected after-tax cash flow of the unlevered firm is fixed, V_0 is constant as well. By assumption, $k_{TS} = k_D$ and the value of the tax shield is $TS = tD$. Thus, the capitalization of the company V is a constant and the alternative formula (13) becomes a formula for a constant *WACC:*

$$WACC=k_0\left(1-w_d t\right). \quad (16)$$

Because the debt k_D and the tax shield k_{TS} have debt nature it seems reasonable that the expected returns on they are equals as suggested by "classical" Modigliani-Miller (MM) theory, which has been modified by Brusov et al. [6, 10, 14] for cases of practical meanings.

The Miles-Ezzell Model Versus the Modigliani-Miller Theory

Denis M. Becker in 2021 discussed [26] the differences between the Modigliani-Miller theory and the Miles-Ezzell model [11–13], which deal with the stochasticity of free cash flows. The author conducts a numerical experiment that allows you to determine the values and discount rates using a risk-neutral approach. He analyzes three formulas:

Modigliani-Miller theory [8–10]

$$WACC = k_0 \cdot (1 - w_d t), \tag{17}$$

Miles-Ezzell model [11–13],

$$WACC = k_0 - t \cdot w_d \cdot k_f \cdot \frac{1 + k_0}{1 + k_f}, \tag{18}$$

I.A. Cooper and K.G. Nyborg [27]

$$WACC = k_0 - k_f \cdot w_d t, \tag{19}$$

where k_f stands for the risk-free rate, which equals the required return of the debt holders.

The author shows that in the Miles-Ezzell model, all cash flows and values depend on the path, in contrast to the Modigliani-Miller theory. Also in the Miles-Ezzell model, all discount rates are time independent, with the exception of the discount rate used to discount tax shields, which depends on the duration of the cash flows. Conversely, in the Modigliani-Miller theory, all discount rates change over time, except for the constant tax shield discount rate. This affects the applicability of the well-known formula for annuities and the development of models for estimating both finite and perpetual cash flows.

In this paper Becker [26] raises the issue of paying the debt body together with payment of interest on the debt. Regarding this issue, we would like to note that in both classical MM and BFO theories, the body of the debt is not paid. In the framework of the Modigliani-Miller theory, such an account is fundamentally impossible, while in the BFO theory it can be done and was done in the framework of the BFO-2 theory, where the amount of debt D decreases with time. This decrease in the value of debt D results in a decrease in the tax shield.

In Brusov-Filatova-Orekhova and its perpetual limit — Modigliani-Miller (MM) theory, one of the most important parameters is the equity cost of an unlevered company k_0. Knowing it, one can evaluate the main financial indicators, such as the cost of capital raised, the discount rates *WACC* and k_e, the value of the company, *V*, the cost of equity capital, k_e, and their dependence on debt financing, taxation, company age, etc.

One way to find k_0 is as follows: if we know *WACC* and *L*, we substitute these values into the formulas for *WACC* (or BFO, or MM) and find k_0 from here.

INCORPORATING CAPM AND FAMA-FRENCH MODELS INTO CAPITAL STRUCTURE THEORIES

If we use the CAPM formula for a company without leverage, then we can use this return value as k_0. If we use the CAPM formula for a leveraged company (Hamada formula), then we should "clear" this formula from leverage and only after that can you use the resulting return value as k_0.

The company's profitability k_i is taken from the company's financial statements either for the year, or for the quarter, or for the month, or for a day. If you need to find out the profitability for several periods, you need to use the following formula:

$$k_i = \prod_{k=1}^{n} (1 + k_{ik}) - 1. \tag{20}$$

Although in the CAPM it is declared that the company profitability k_e is for an unleveraged company, since it is taken from the company's financial statements, it is clear that it is defined for a leveraged company.

Since both theories of capital structure (BFO and MM) use non-leveraged cost of equity as a seed value for the cost of equity, it is necessary to remove k_i from leverage.

The simplest way to do this is to use the MM formula for the cost of equity

$$k_i = k_0 + L(k_0 - k_d)(1 - t), \tag{21}$$

$$k_0 = \frac{k_i + L k_d (1 - t)}{1 + L(1 - t)}. \tag{22}$$

Table 1

Cost of Equity with Non-Zero Leverage and Its Cleaned Value k_0 (GAZP)

Indicator	2021	2020	2019	2018
k_0	3.529%	6.106%	5.587%	4.542%
Leverage level, L	0.500	0.538	0.448	0.486
Debt cost, k_d	0.017	0.021	0.017	0.020
GAZP, average profitability	4.26%	7.83%	6.98%	5.53%
GAZP, standard deviation	0.945%	0.840%	0.415%	0.310%

Source: Compiled by the authors.

Here k_0 is k_i value, cleaned from leverage.

To clean k_f value used BFO theory, one should use formula

$$k_e = WACC(1+L) - k_d L(1-t), \quad (23)$$

but you need to know the value of *WACC* at a specific value of the leverage level L.

We could include a business risk premium at two levels: (1) at market level or (2) at industry level.

To include a market risk premium, one needs to add to k_0 the following term

$$\beta_{im}(k_m - k_F). \quad (24)$$

To include an industry risk premium, one needs to add to k_0 the following term

$$\beta_{iI}(k_I - k_F). \quad (25)$$

To include effects, described by Fama-French model, we should add the following terms:

either two terms within Fama-French three — factor Model

$$s \cdot SMB + h \cdot HML, \quad (26)$$

or four terms within Fama-French Five-factor Model

$$s \cdot SMB + h \cdot HML + r \cdot RMW + c \cdot CMA. \quad (27)$$

As result we get

$$k_0 = k_f + \beta_U(k_m - k_f) + s \cdot SMB + h \cdot HML = \\ = \frac{k_f + Lk_d(1-t)}{1+L(1-t)} + \beta_U(k_m - k_f) + s \cdot SMB + h \cdot HML \quad (28)$$

$$k_0 = k_f + \beta_U(k_m - k_f) + s \cdot SMB + \\ + h \cdot HML + r \cdot RMW + c \cdot CMA = \\ = \frac{k_f + Lk_d(1-t)}{1+L(1-t)} + \beta_U(k_m - k_f) + \\ + s \cdot SMB + h \cdot HML + r \cdot RMW + c \cdot CMA. \quad (29)$$

We use this value k_0 to study the dependence of the company's main financial indicators on debt financing, the cost of debt, taxation, the age of the company etc.

$$k_0 = k_f + s \cdot SMB + h \cdot HML = \\ = \frac{k_f + \beta_U(k_m - k_f) + Lk_d(1-t)}{1+L(1-t)} + s \cdot SMB + h \cdot HML, \quad (30)$$

$$k_0 = k_f + s \cdot SMB + h \cdot HML + r \cdot RMW + c \cdot CMA = \\ = \frac{k_f + \beta_U(k_m - k_f) + Lk_d(1-t)}{1+L(1-t)} + s \cdot SMB + \\ + h \cdot HML + r \cdot RMW + c \cdot CMA. \quad (31)$$

The algorithm for Using this Innovative Technique

1. Take the average return on the asset for the year from statistical data.

2. Clean of it from leverage using equation (9) for k_e.

It can be seen from *Table 1*, that the values of k_0 are always lower than the cost of equity with non-zero leverage, as it should be, given that the cost of equity increases with leverage.

Add a Market Business Risk Premium, or an Industry One

Let us give an example for GAZP company for 2018.

To find premium to k_0, let us calculate Δk_0 within market CAPM approach:

$\beta = 1.16$;

$$k_m - k_f = 12.3\% - 7.75\% = 4.55\%;$$

$$\Delta k_0 = 1.16 \cdot 4.55\% = 5.278\%.$$

Finally, one gets

$$\hat{k}_0 = k_0 + \Delta k_0 = 1.16 \cdot 4.55\% = \\ = 4.542\% + 5.278\% = 9.82\%.$$

It is easy to see, that account of business risk within market CAPM approach change k_0 from 4.542% to $\hat{k}_0 = 9.82\%$.

It is seen, that the use of $\hat{k}_0$, which takes into account the business risk, will significantly change the results of calculation of the financial indicators of the GAZP.

Add Fama-French corrections (use either three factor Fama-French model or five factor Fama-French model.

Now we are ready to use the obtained k_0 value to calculate the main financial parameters of the company: the cost of raising capital, *WACC*, company value, etc. The theory of Brusov-Filatova-Orekhova (BFO) and its eternal limit — the theory of Modigliani-Miller (MM) — have recently been generalized to the established practice of the functioning of companies. This generalization took into account the real conditions of the company's activities, such as variable income, frequent income tax payments, advance income tax payments, etc. This made it possible to investigate the impact of these conditions on its main financial indicators (see Review [14]).

A few practical calculations have been made for real companies (see below in sections 6, 7). They focus on:

(1) applying two versions of CAPM (market or industry) to real companies (PJSC Polymetal and PJSC Severstal);

(2) application to Apple company of a new methodology developed by us for assessing the financial performance of a company, taking into account both business (market or industry) and financial risks.

WACC FORMULAS FOR BRUSOV-FILATOVA-OREKHOVA (BFO) — THEORY AND FOR MODIGLIANI–MILLER (MM) — THEORY

Below we give a summary of the WACC formulas for Brusov-Filatova-Orekhova (BFO) — theory as well as for Modigliani-Miller (MM) — theory (see Review [14]).

Variable Income Case

Income tax payments at the ends of periods

BFO:

$$\frac{1-\left(\frac{1+g}{1+WACC}\right)^n}{WACC-g} = \frac{1-\left(\frac{1+g}{1+k_0}\right)^n}{(k_0-g)\cdot\left(1-w_d t\left[1-(1+k_d)^{-n}\right]\right)}, \quad (32)$$

MM: $$WACC = (k_0 - g)\cdot(1 - w_d t) + g. \quad (33)$$

Advance Income Tax Payments

BFO:

$$\frac{1-\left(\frac{1+g}{1+WACC}\right)^n}{WACC-g} = \frac{1-\left(\frac{1+g}{1+k_0}\right)^n}{(k_0-g)\cdot\left(1-w_d t\left[1-(1+k_d)^{-n}\right]\cdot(1+k_d)\right)}. \quad (34)$$

MM: $$WACC = (k_0 - g)\cdot\left(1 - w_d t\cdot(1+k_d)\right) + g. \quad (35)$$

Frequent Income Tax Payments

Income Tax Payments at the Ends of Periods

BFO:

$$\frac{1-(1+WACC)^{-n}}{WACC} = \frac{1-(1+k_0)^{-n}}{k_0\cdot\left(1-\frac{k_d w_d t}{p}\frac{\left[1-(1+k_d)^{-n}\right]}{(1+k_d)^{1/p}-1}\right)}, \quad (36)$$

$$\text{MM: } WACC = k_0 \cdot \left(1 - \frac{k_d w_d t}{p \cdot \left[\left(1+k_d\right)^{1/p} - 1\right]}\right). \quad (37)$$

Advance Income Tax Payments

BFO:

$$\frac{1-\left(1+WACC\right)^{-n}}{WACC} = \frac{1-\left(1+k_0\right)^{-n}}{k_0 \cdot \left(1 - \frac{k_d w_d t}{p} \frac{\left[1-\left(1+k_d\right)^{-n}\right] \cdot \left(1+k_d\right)^{1/p}}{\left(1+k_d\right)^{1/p} - 1}\right)}, \quad (38)$$

$$\text{MM: } WACC = k_0 \cdot \left(1 - \frac{k_d w_d t \cdot \left(1+k_d\right)^{1/p}}{p \cdot \left[\left(1+k_d\right)^{1/p} - 1\right]}\right). \quad (39)$$

Simultaneous Accounting of Variable Income in Case of Frequent Income Tax Payments

Income Tax Payments at the Ends of Periods

BFO:

$$\frac{1-\left(\frac{1+g}{1+WACC}\right)^n}{WACC-g} = \frac{1-\left(\frac{1+g}{1+k_0}\right)^n}{\left(k_0-g\right) \cdot \left(1 - \frac{k_d w_d t}{p} \frac{\left[1-\left(1+k_d\right)^{-n}\right]}{\left(1+k_d\right)^{1/p} - 1}\right)}, \quad (40)$$

$$\text{MM: } WACC - g = \left(k_0 - g\right) \cdot \left(1 - \frac{k_d w_d t}{p \cdot \left(1+k_d\right)^{1/p} - 1}\right). \quad (41)$$

Advance Income Tax Payments

BFO:

$$\frac{1-\left(\frac{1+g}{1+WACC}\right)^n}{WACC-g} = \frac{1-\left(\frac{1+g}{1+k_0}\right)^n}{\left(k_0-g\right) \cdot \left(1 - \frac{k_d w_d t}{p} \frac{\left[1-\left(1+k_d\right)^{-n}\right] \cdot \left(1+k_d\right)^{1/p}}{\left[\left(1+k_d\right)^{1/p} - 1\right]}\right)}, \quad (42)$$

$$\text{MM: } WACC - g = \left(k_0 - g\right) \cdot \left(1 - \frac{k_d w_d t \cdot \left(1+k_d\right)^{1/p}}{p \cdot \left(1+k_d\right)^{1/p} - 1}\right). \quad (43)$$

APPLICATION OF TWO VERSION OF CAPM (MARKET AND INDUSTRY) TO REAL COMPANIES

Estimation of the Cost of Equity of PJSC Polymetal for the Period 2018–2022 by CAPM Capital Asset Pricing Model (Ticker PJSC Polymetal on the Moscow Exchange is POLY)

In *Table 2* below the summary of indicators for Polymetal shares, the RTS mining and metal index and the MICEX index in the period 2018–2022 are shown

This *Table 3* gives:

(1) the company's average annual return;

(2) the company's profitability with an industry risk premium;

(3) profitability of a company with a market risk premium

Estimation of the Cost of Equity of PJSC Severstal for the Period 2018–2022 by CAPM Capital Asset Pricing Model (Ticker PJSC Severstal on the Moscow Exchange is CHMF)

The last three lines in *Table 4* give:

(1) the company's average annual return;

(2) the company's profitability with an industry risk premium;

(3) profitability of a company with a market risk premium

APPLICATION OF NEW METHODOLOGY FOR ASSESSING THE COMPANY'S FINANCIAL PERFORMANCE

Below we apply the developed by us new methodology for assessing the company's financial performance, taking into account both business (market and industry) and financial risks to the Apple company in 2019–2021.

As Market we take S&P 500; as Industry (sector): S&P500 Information Technology and we consider period 2019–2021.

The Collection and Processing of Statistical Data About the Company, Industry and Market and Two Versions of CAPM (Market and Industry)

Below in *Table 5* the collection and processing of statistical data about the company, industry and market and two versions of CAPM (market and industry) are shown.

Comments

The following formulas were used to calculate the company's profitability using the CAPM model:

For calculation by industry (sector): $\mu_i = \mu_F - \beta_{iI}\left(\mu_I - \mu_F\right)$, where μ_i — average annual return per share; μ_F — US market risk free rate; β_{iI}

Table 2

Summary Table of Indicators for Polymetal Shares, the RTS Mining and Metal Index and the MICEX Index in the Period 2018–2022

Year	2018	2019	2020	2021	2022
Company level (Polymetal)					
Profitability actual	3.48%	32.80%	78.71%	–24.39%	–71.71%
Standard deviation	0.304	0.242	0.454	0.264	0.705
Average debt cost	3.52%	4.89%	4.00%	2.88%	3.28%
Leverage level	4.78	3.41	1.57	0.54	1.6
Industry level (RTS mining and metal index)					
Profitability actual	2.11%	40.20%	56.08%	12.37%	–9.80%
Standard deviation	0.233	0.144	0.390	0.230	0.580
Average leverage level	0.408	0.370	0.351	1.128	0.818
Beta with Polymetal	0.208	0.107	0.436	0.349	0.250
Profitability (industry CAPM)	6.79%	11.07%	27.97%	9.10%	4.96%
Correlation with Polymetal	0.27	0.18	0.51	0.40	0.30
Market level (Moscow Exchange index MICEX)					
Profitability actual	18.15%	36.24%	22.57%	3.25%	–16.78%
Standard deviation	0.167	0.120	0.271	0.163	0.497
Beta with Poly	0.443	0.189	0.516	0.307	0.508
Profitability (market CAPM)	12.51%	12.99%	14.67%	6.09%	–3.68%
Correlation with Polymetal	0.24	0.09	0.31	0.19	0.36

Source: Compiled by the authors.

Table 3

Actual and Projected Returns Based on CAPM Models for Polymetal Shares in the Period 2018–2022

Profitability actual	3.48%	32.80%	78.71%	–24.39%	–71.71%
Profitability (industry CAPM)	2.11%	40.20%	56.08%	12.37%	–9.80%
Profitability (market CAPM)	12.51%	12.99%	14.67%	6.09%	–3.68%

Source: Compiled by the authors.

Table 4

Estimation of the Cost of Equity of PJSC Severstal for the Period 2018–2022 by CAPM

Indicators		2018	2019	2020	2021	2022
μ_F		8.02%	7.59%	6.27%	7.34%	9.87%
Company PJSC	μ_i	6.23%	–0.53%	41.01%	21.27%	–43.66%
	L	1.21	1.75	1.51	1.37	–
	k_d	3.77%	3.98%	3.38%	3.36%	–
	σ_i	0.24	0.19	0.26	0.28	0.53
Industry	μ_I	8.71%	10.68%	47.75%	7.37%	–46.96%
	L	0.41	0.81	0.66	0.68	0.64
	σ_I	0.19	0.11	0.24	0.17	0.45
	$\beta_{i,I}$	0.40	–0.19	0.91	1.42	1.10
Market	μ_m	12.20%	28.58%	8.06%	15.08%	–43.10%
	σ_m	0.17	0.11	0.26	0.16	0.52
	β_{im}	0.77	–0.73	0.69	0.85	0.94
μ_i		**6.23%**	**–0.53%**	**41.01%**	**21.27%**	**–43.66%**
μ_i **CAPM (Industry)**		**8.29%**	**6.99%**	**44.22%**	**7.38%**	**–52.55%**
μ_i **CAPM (market)**		**11.22%**	**–7.64%**	**7.51%**	**13.93%**	**–40.11%**

Source: Compiled by the authors.

industry beta (sector); μ_I – average annual return of the sector (S&P500 Information Technology)

For calculation by market: $\mu_i = \mu_F + \beta_{im}(\mu_m - \mu_F)$, where μ_i — average annual return per share; μ_F — US market risk free rate; β_{im} — market beta; μ_m — average annual market return in the market (S&P500)

The average yield of 10-year US Treasury boxes was taken as the risk-free rate in the US market.

Data on daily market quotes, as well as daily quotes of the S&P500 index and the S&P500 Information Technology sector are taken from a specialized Internet resource https://ru.investing.com/.

For calculations, μ_i was taken — the average annual return on shares. To calculate the average annual return, it was first necessary to find the average daily return. The average daily return was calculated using the logarithmic return formula:

$\mu_d = \ln\frac{P_t}{P_{t-1}}$, where μ_d — daily yield; P_t — share price on date t; $P_{(t-1)}$ — share price on date t – 1.

The values obtained using this formula were averaged for each study period (year). The average daily returns were then converted to annual averages

Table 5

Results for Parameters of Company, Industry (Sector) and Market

Index	Unit	Source	2019	2020	2021
Average annual return per share (Apple)	**%**	**Authors's calculation**	**90.04**	**71.87**	**37.36**
Average annual market return (S&P 500)	%	Authors's calculation	28.86	16.18	26.88
10–year US Treasuries	%	Investing.com	3.75	3.75	3.75
Standard deviation of stock return (Apple)	%	Authors's calculation	1.66	2.94	1.58
Standard Deviation of Market Returns (S&P 500)	%	Authors's calculation	0.79	2.19	0.83
Beta	x	Authors's calculation	1.57	1.12	1.31
Expected stock return	**%**	**Authors's calculation**	**43.13**	**17.68**	**34.07**
Average annual return of the sector (S&P500 Information Technology)	%	Authors's calculation	48.00	41.98	33.33
10–year US Treasuries	%	Investing.com	3.75	3.75	3.75
Standard deviation of stock return (Apple)	%	Authors's calculation	1.66	2.94	1.58
Sector Return Standard Deviation (S&P500 Information Technology)	%	Authors's calculation	1.14	2.57	1.23
Beta	x	Authors's calculation	1.22	1.04	1.06
Expected stock return	**%**	**Authors's calculation**	**57.57**	**43.65**	**35.00**
Interest expenses	mln $	Apple Annual Report 2019 Apple Annual Report 2020 Apple Annual Report 2021	3.58	2.87	2.65
Total debt	mln $	Apple Annual Report 2019 Apple Annual Report 2020 Apple Annual Report 2021	102.07	107.44	118.72
Debt cost	**%**	**Authors's calculation**	**3.50**	**2.67**	**2.23**
Total debt	mln $	Apple Annual Report 2019 Apple Annual Report 2020 Apple Annual Report 2021	102.07	107.44	118.72
Equity value	mln $	Apple Annual Report 2019 Apple Annual Report 2020 Apple Annual Report 2021	90.49	65.34	63.09
Leverage level	**x**	**Authors's calculation**	**1.13**	**1.64**	**1.88**

Source: Compiled by the authors.

Table 6

Results for Three Values of k_0

Indicator	Unit	2019	2020	2021
μ_i	%	85.99	80.21	33.80
μ_0	%	46.86	36.16	14.83
k_0 (1st value)	%	46.86	36.16	14.83
k_0 (2nd value)	%	100.69	76.06	46.08
k_0 (3 rd value)	%	86.24	50.09	45.15

Source: Compiled by the authors.

using the following formula: $\mu_i = (1 + \mu_d)^n - 1$, where n — number of trading days on the exchange.

The beta coefficient was found using the following formulas:

For the industry (sector): $\beta_{iI} = \frac{\text{cov}_{iI}}{\sigma_I^2}$, where cov_{iI} — covariance between returns on stocks and returns on the industry (sector) under study; σ_I^2 — sector variance.

For market: $\beta_{im} = \frac{\text{cov}_{im}}{\sigma_m^2}$, where cov_{im} — covariance between stock returns and market returns; σ_m^2 — market variance.

Also, the beta coefficient was calculated using the standard deviation, the results agreed with the previous calculations (for more details, see the Excel table).

For Apple, the cost of debt and financial leverage ratio were also calculated.

The cost of debt was calculated using the formula: $k_d = \frac{IE}{D}$, where I is the cost of debt, IE is the interest expense for the period, D is the debt value, on which interest is charged.

The leverage level was calculated as the ratio of debt (total liabilities) to the company's equity capital.

The data for the calculations above were taken from Apple's annual reports for 2019–2021.

CALCULATIONS

Comparing the average annual return of the Apple stock with the average annual returns of the market (S&P500) and the sector (S&P500 Information Technology), we can say that the company's shares show more profitability, but at the same time more volatility, and therefore riskiness.

Table 7

Dependence of *WACC* on Leverage Level L, *WACC* (*L*) for 2019–2021 Years

	2019			2020			2021		
L	*WACC1*	*WACC2*	*WACC3*	*WACC1*	*WACC2*	*WACC3*	*WACC1*	*WACC2*	*WACC3*
0	46.86%	100.69%	86.24%	36.16%	76.06%	50.09%	14.83%	46.08%	45.15%
1	42.18%	90.62%	77.62%	32.54%	68.46%	45.08%	13.35%	41.47%	40.63%
2	40.61%	87.26%	74.74%	31.34%	65.92%	43.41%	12.85%	39.94%	39.13%
3	39.83%	85.58%	73.30%	30.73%	64.65%	42.57%	12.61%	39.17%	38.38%
4	39.36%	84.58%	72.44%	30.37%	63.89%	42.07%	12.46%	38.71%	37.92%
5	39.05%	83.91%	71.87%	30.13%	63.39%	41.74%	12.36%	38.40%	37.62%
6	38.83%	83.43%	71.46%	29.96%	63.02%	41.50%	12.29%	38.18%	37.41%
7	38.66%	83.07%	71.15%	29.83%	62.75%	41.32%	12.23%	38.02%	37.25%
8	38.53%	82.79%	70.91%	29.73%	62.54%	41.18%	12.19%	37.89%	37.12%
9	38.43%	82.56%	70.72%	29.65%	62.37%	41.07%	12.16%	37.79%	37.02%
10	38.34%	82.38%	70.56%	29.58%	62.23%	40.98%	12.13%	37.70%	36.94%

Source: Compiled by the authors.

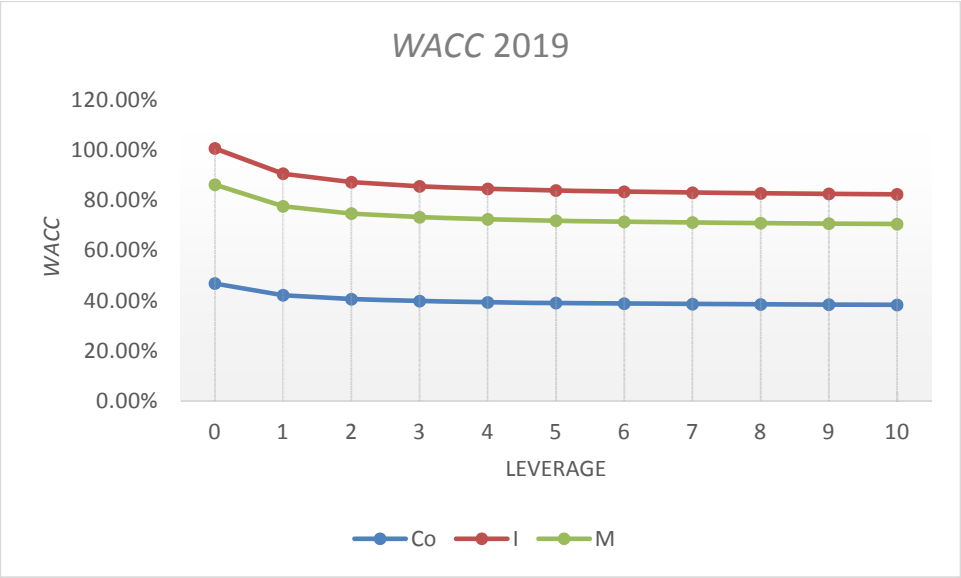

Fig. 1. **Dependence of *WACC* on Leverage Level *L*, *WACC* (*L*) for 2019 Year**

Source: Compiled by the authors.

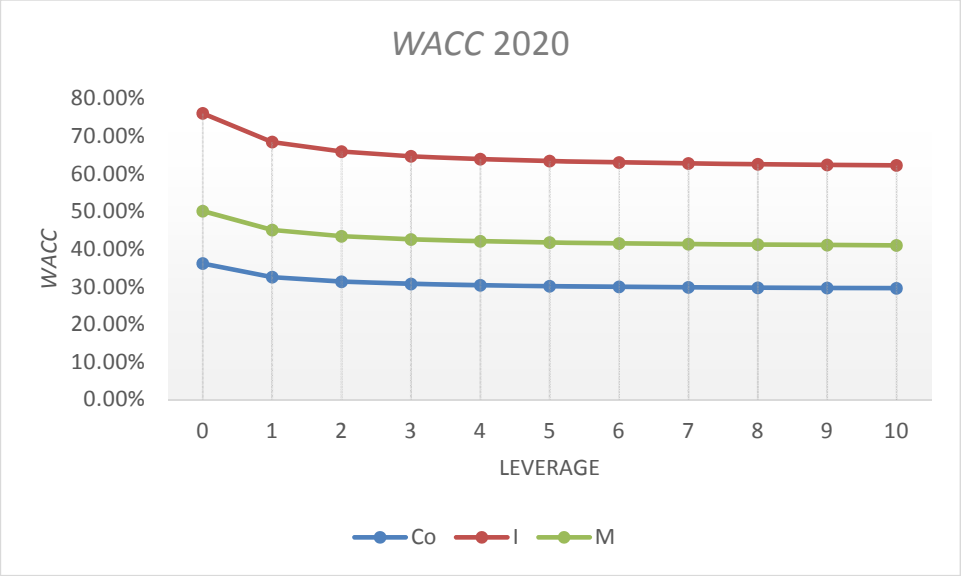

Fig. 2. **Dependence of *WACC* on Leverage Level *L*, *WACC* (*L*) for 2020 Year**

Source: Compiled by the authors.

The standard deviation of the return on Apple stock is at the level of 2–3%. Which is higher than the values for the sector and the market by ~ 1 p.p. At the same time, there is a sharp increase in 2020, which may be due to the COVID-19 pandemic.

It is important to analyze the average annual return of Apple stock with expected returns under the CAPM model. The model is considered relative to the S&P500 market and the S&P500 Information Technology sector.

Beta coefficients were calculated for both models. In all options, the coefficients turned out to be greater than one, which indicates a correlation between the price dynamics of Apple's stock and the dynamics of the market and the sector, but at the same time, the volatility of the shares is higher, which means that the risks are higher. At the same time, it should be noted that the beta calculated for the sector is close to 1, which indicates a higher correlation than for the market (the company's shares follow the sector's trend, the company's risks are almost equivalent to the sector-wide ones).

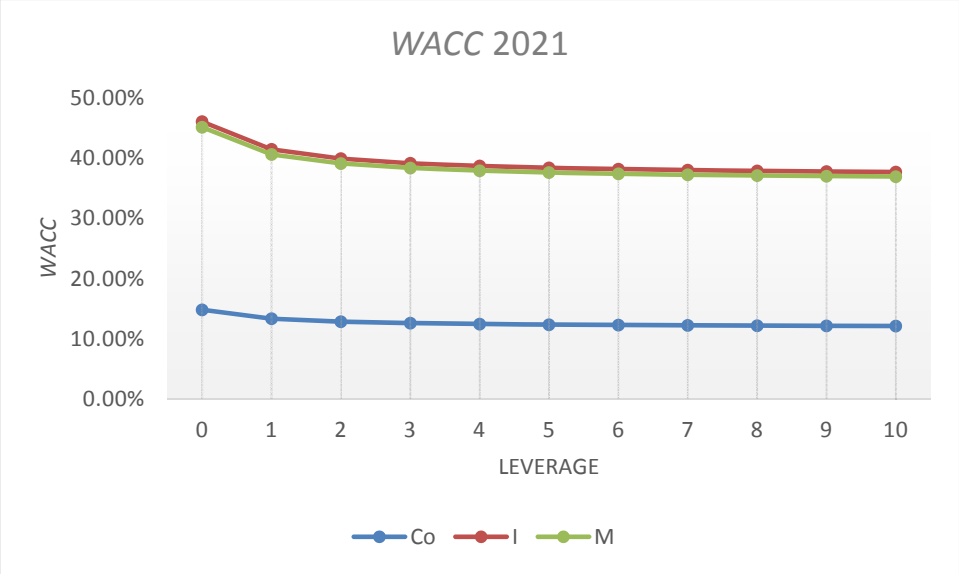

Fig. 3. **Dependence of *WACC* on Leverage Level *L*, *WACC* (*L*) for 2021 Year**

Source: Compiled by the authors.

Table 8

Dependence of Company Value, V on Leverage Level L, V(L) for 2019–2021 Years

	2019			2020			2021		
L	*V*1	*V*2	*V*3	*V*1	*V*2	*V*3	*V*1	*V*2	*V*3
0	166.70	77.59	90.58	235.52	111.96	170.02	864.59	278.25	284.00
1	185.22	86.21	100.65	261.69	124.40	188.92	960.66	309.16	315.55
2	192.35	89.52	104.52	271.75	129.18	196.18	997.61	321.05	327.69
3	196.12	91.28	106.57	277.08	131.72	200.03	1017.17	327.35	334.11
4	198.45	92.37	107.84	280.38	133.29	202.41	1029.28	331.25	338.09
5	200.04	93.11	108.70	282.62	134.35	204.03	1037.51	333.90	340.79
6	201.19	93.64	109.33	284.25	135.12	205.20	1043.47	335.82	342.75
7	202.06	94.05	109.80	285.48	135.71	206.09	1047.99	337.27	344.24
8	202.75	94.36	110.17	286.44	136.17	206.79	1051.53	338.41	345.40
9	203.30	94.62	110.47	287.22	136.54	207.35	1054.38	339.33	346.34
10	203.75	94.83	110.71	287.86	136.84	207.81	1056.73	340.08	347.11

Source: Compiled by the authors.

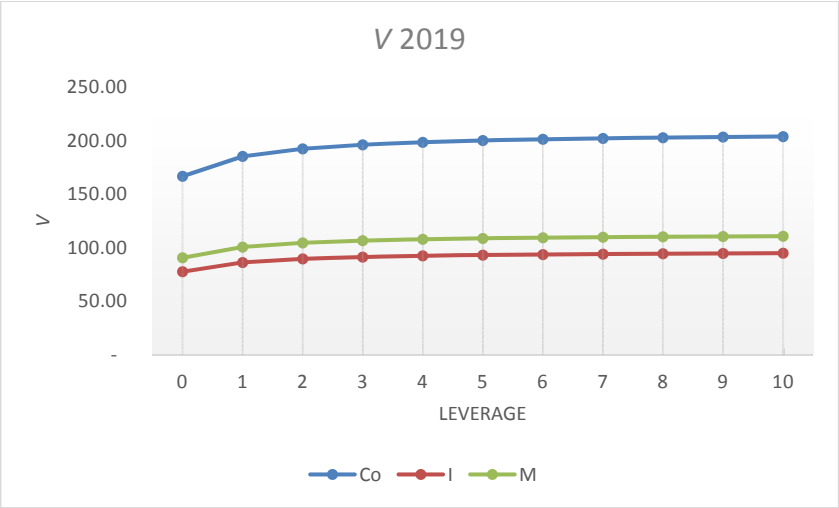

Fig. 4. **Dependence of Company Value, *V* on Leverage Level *L*, *V*(*L*) for 2019 Year**

Source: Compiled by the authors.

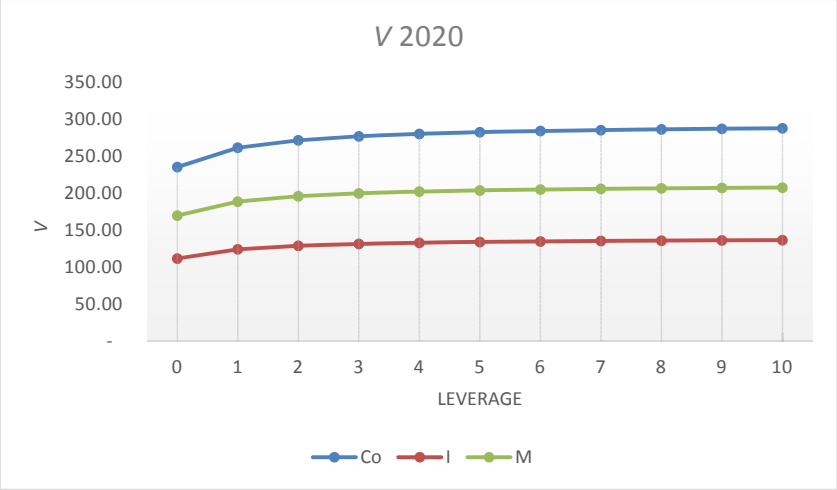

Fig. 5. **Dependence of Company Value, *V* on Leverage Level *L*, *V*(*L*) for 2020 Year**

Source: Compiled by the authors.

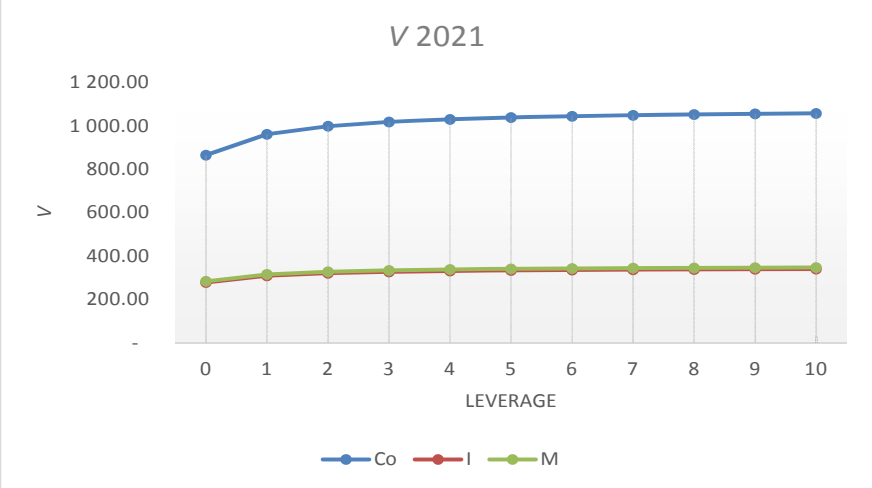

Fig. 6. **Dependence of Company Value, *V* on Leverage Level *L*, *V*(*L*) for 2021 Year**

Source: Compiled by the authors.

Table 9

Dependence of Cost of Equity k_e on Leverage Level L, k_e (L) for 2019–2021 Years

	2019			2020			2021		
L	k_e 1	k_e 2	k_e 3	k_e 1	k_e 2	k_e 3	k_e 1	k_e 2	k_e 3
0	46.86%	100.69%	86.24%	36.16%	76.06%	50.09%	14.83%	46.08%	45.15%
1	81.55%	178.43%	152.43%	62.95%	134.77%	88.02%	24.91%	81.16%	79.48%
2	116.24%	256.18%	218.62%	89.73%	193.48%	125.95%	34.99%	116.24%	113.82%
3	150.92%	333.93%	284.81%	116.52%	252.19%	163.88%	45.07%	151.33%	148.16%
4	185.61%	411.67%	351.00%	143.31%	310.90%	201.81%	55.16%	186.41%	182.49%
5	220.30%	489.42%	417.19%	170.09%	369.61%	239.74%	65.24%	221.49%	216.83%
6	254.99%	567.17%	483.38%	196.88%	428.32%	277.67%	75.32%	256.57%	251.16%
7	289.67%	644.91%	549.57%	223.67%	487.03%	315.60%	85.40%	291.65%	285.50%
8	324.36%	722.66%	615.76%	250.46%	545.74%	353.53%	95.48%	326.74%	319.84%
9	359.05%	800.40%	681.95%	277.24%	604.46%	391.46%	105.56%	361.82%	354.17%
10	393.74%	878.15%	748.14%	304.03%	663.17%	429.39%	115.65%	396.90%	388.51%

Source: Compiled by the authors.

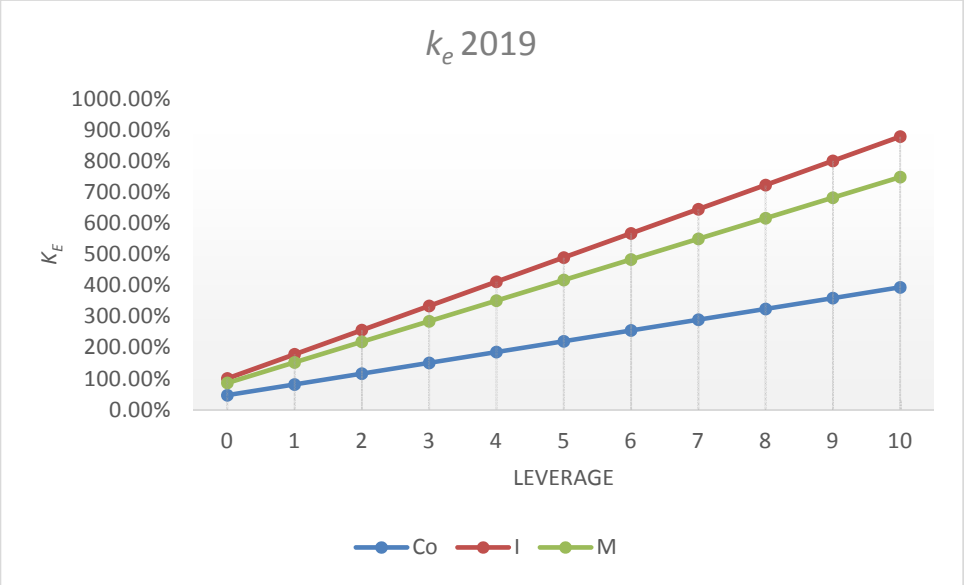

Fig. 7. **Dependence of Cost of Equity ke on Leverage Level L, ke (L) for 2019 Year**

Source: Compiled by the authors.

This can be explained by the fact that only companies from the IT sector are represented in the S&P500 Information Technology sector, while several industries are represented in the S&P500 market.

In general, comparing the expected returns under the CAPM model and the real average annual return of the Apple stock for the period 2019–2021, it can be observed that the forecast indicators for the sectoral CAPM model are closer to real values

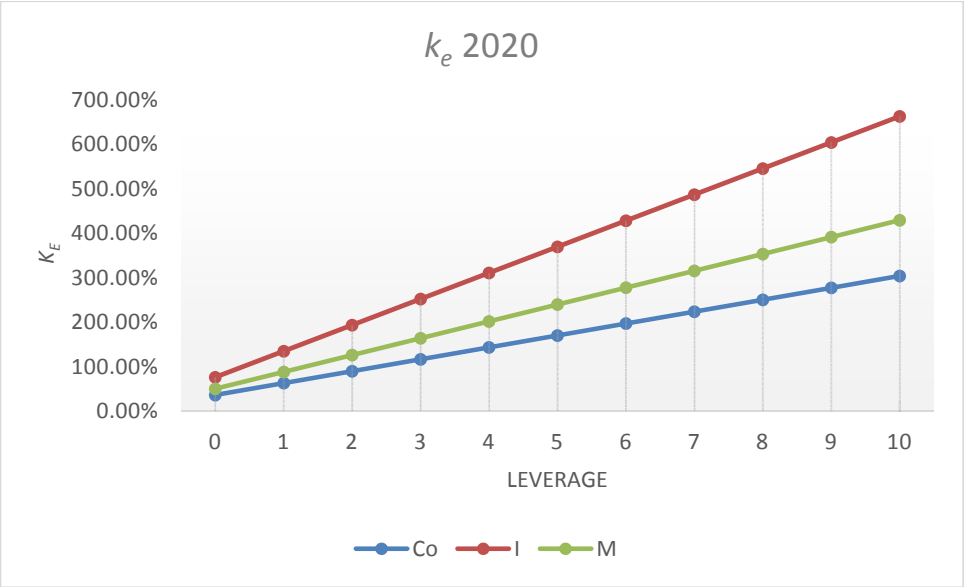

Fig. 8. **Dependence of Cost of Equity ke on Leverage Level *L*, k_e (*L*) for 2020 Year**

Source: Compiled by the authors.

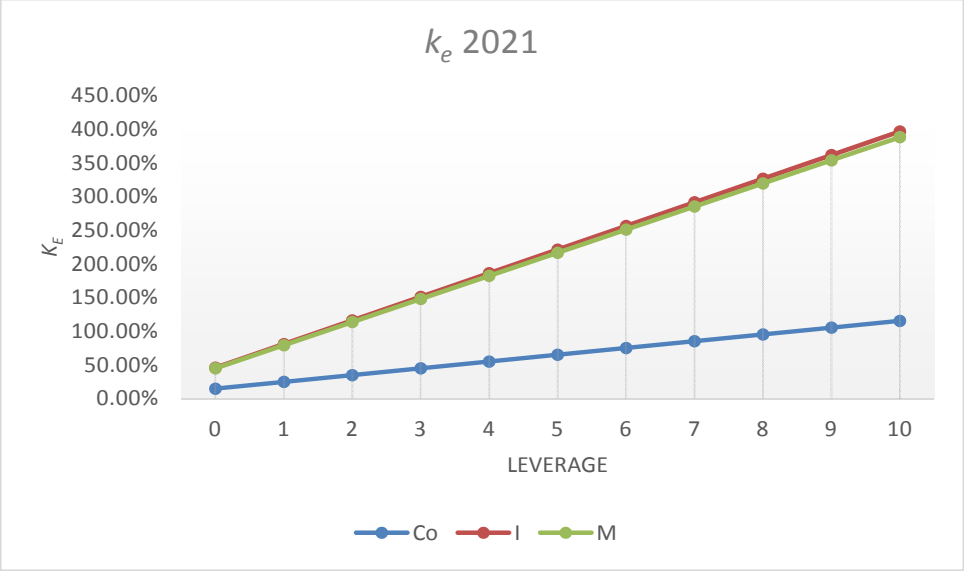

Fig. 9. **Dependence of Cost of Equity k_e on Leverage Level *L*, k_e (*L*) for 2021 Year**

Source: Compiled by the authors.

than for the market model, which is explained by a higher correlation. At the same time, the real values of Apple's average annual return are higher with positive values and lower with negative ones, which indicates increased volatility and riskiness of the security. Apple's leverage ratio is below 2, which may indicate that the company is funded largely by equity.

Three Values of k_0 (see *Table 6*).

For further calculations, μ_i was taken — the average annual return on shares. To calculate the average annual return, it was first necessary to find the average daily return. The average daily return was calculated using the logarithmic return formula:

$$\mu_d = \ln \frac{P_t}{P_{t-1}}, \text{ where } \mu_d \text{ — daily yield; } P_t \text{ — share price on the date } t; \ P_{t-1} \text{ — share price on the date } t-1.$$

The values obtained using this formula were averaged for each study period (year). The average

Table 10

Dependence of WACC on Leverage Level L, *WACC* (*L*) for 2019–2021 Years

	2019			2020			2021		
L	*WACC1*	*WACC2*	*WACC3*	*WACC1*	*WACC2*	*WACC3*	*WACC1*	*WACC2*	*WACC3*
0	46.86%	100.69%	86.24%	36.16%	76.06%	50.09%	14.83%	46.08%	45.15%
1	43.24%	92.91%	79.58%	33.67%	70.84%	46.65%	13.88%	43.18%	42.31%
2	42.04%	90.32%	77.36%	32.85%	69.10%	45.50%	13.57%	42.22%	41.36%
3	41.43%	89.02%	76.25%	32.43%	68.23%	44.93%	13.41%	41.73%	40.89%
4	41.07%	88.24%	75.58%	32.18%	67.70%	44.58%	13.32%	41.44%	40.60%
5	40.83%	87.72%	75.14%	32.02%	67.35%	44.35%	13.25%	41.25%	40.41%
6	40.66%	87.35%	74.82%	31.90%	67.11%	44.19%	13.21%	41.11%	40.28%
7	40.53%	87.07%	74.58%	31.81%	66.92%	44.07%	13.17%	41.01%	40.18%
8	40.43%	86.86%	74.40%	31.74%	66.77%	43.97%	13.15%	40.93%	40.10%
9	40.35%	86.69%	74.25%	31.69%	66.66%	43.89%	13.13%	40.86%	40.04%
10	40.28%	86.54%	74.13%	31.64%	66.56%	43.83%	13.11%	40.81%	39.98%

Source: Compiled by the authors.

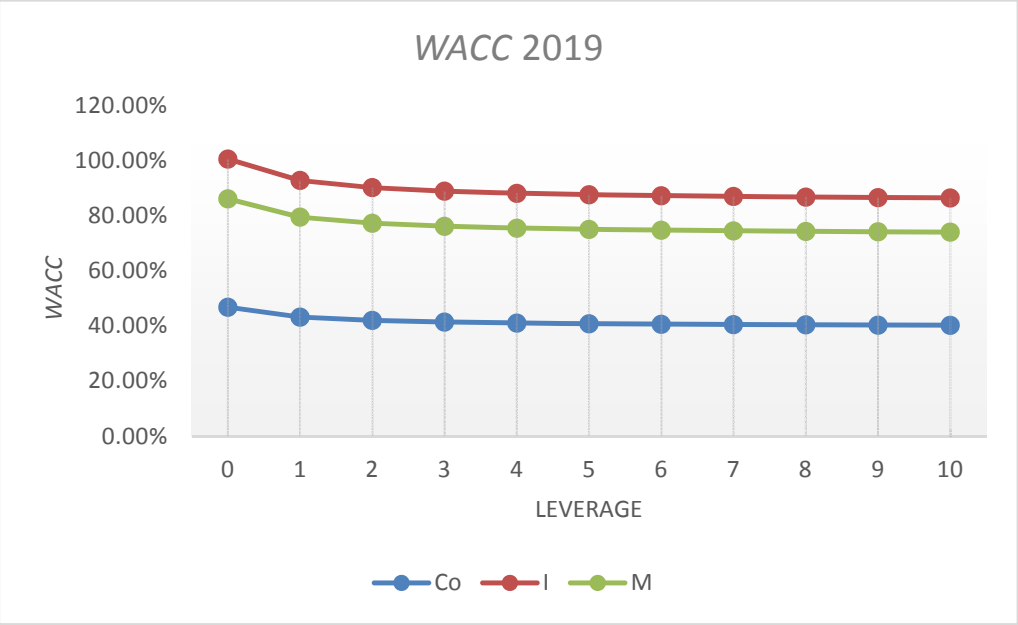

Fig. 10. **Dependence of *WACC* on Leverage Level *L*, *WACC*(*L*) for 2019 Year**

Source: Compiled by the authors.

daily returns were then converted to annual averages using the following formula: $\mu_i = (1 + \mu_d)^n - 1$, where n — number of trading days on the exchange.

Next, μ_0 was found by the formula:

$$\mu_0 = \frac{\mu_i + L k_d (1-t)}{1 + L(1-t)},$$ where L — leverage level;

t — income tax rate). After that, k_0 was calculated according to three conditions:

$$k_0(1) = \mu_0, \quad (44)$$

$$k_0(2) = \mu_0 + \beta_{iI} (\mu_I - \mu_F) \text{ for industry,} \quad (45)$$

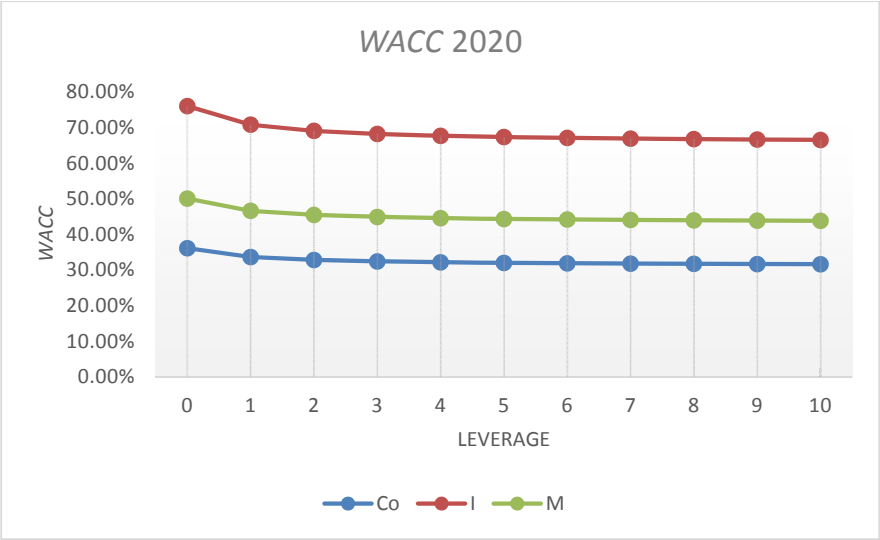

Fig. 11. **Dependence of *WACC* on Leverage Level *L*, *WACC* (*L*) for 2020 Year**

Source: Compiled by the authors.

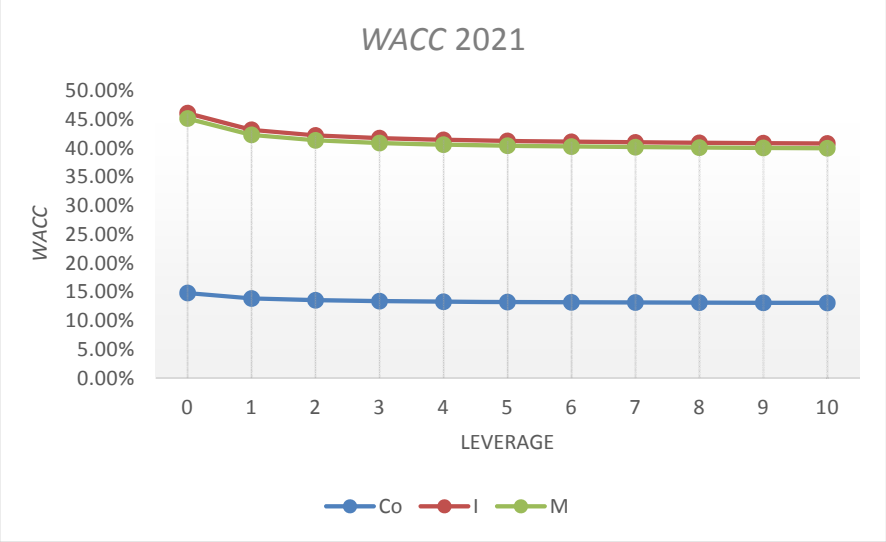

Fig. 12. **Dependence of *WACC* on Leverage Level *L*, *WACC*(*L*) for 2021 Year**

Source: Compiled by the authors.

$$k_0(3) = \mu_0 + \beta_{iM}\ (\mu_M - \mu_F) \text{ for market.} \quad (46)$$

Based on the data obtained, indicators were calculated for two models: the Modigliani-Miller and the Brusov-Filatova-Orekhova theories.

It was found the dependence of WACC, V, ke indicators on the level of leverage (change in leverage from 0 to 10).

Calculations of Indicators for the Modigliani-Miller — CAPM Model

The following formulas were used to calculate the indicators:

$$WACC = k_0(1 - w_d t);\ w_d = \frac{L}{L+1};\ V = \frac{CF}{WACC},$$

$$CF = EBITDA;\ k_e = k_0 + L(k_0 - k_d)(1 - t). \quad (47)$$

The results obtained are presented in *Tables 7–9* of dependencies of the values of indicators (*WACC, V,* k_e) on the level of leverage for each year for three values of k_0, as well as in figures.

Here and below in the *Fig. 1–9*: Co means company; I means industry (sector); M stands for market.

Table 11

Dependence of Company Value *V* on Leverage Level *L*, *V*(*L*) for 2019–2021 Years

	2019			2020			2021		
L	*V*1	*V*2	*V*3	*V*1	*V*2	*V*3	*V*1	*V*2	*V*3
0	166.70	77.59	90.58	235.52	111.96	170.02	862.88	278.25	284.00
1	180.66	84.08	98.17	252.89	120.22	182.56	920.80	296.92	303.06
2	185.84	86.50	100.99	259.26	123.25	187.16	941.87	303.72	309.99
3	188.55	87.76	102.46	262.57	124.82	189.55	952.77	307.24	313.58
4	190.21	88.53	103.36	264.60	125.78	191.02	959.44	309.38	315.78
5	191.34	89.05	103.97	265.97	126.43	192.00	963.93	310.83	317.26
6	192.15	89.43	104.41	266.95	126.90	192.72	967.17	311.88	318.32
7	192.76	89.72	104.75	267.70	127.26	193.25	969.61	312.66	319.12
8	193.24	89.94	105.01	268.28	127.53	193.67	971.52	313.28	319.75
9	193.63	90.12	105.22	268.75	127.76	194.01	973.05	313.77	320.26
10	193.94	90.27	105.39	269.13	127.94	194.29	974.30	314.18	320.67

Source: Compiled by the authors.

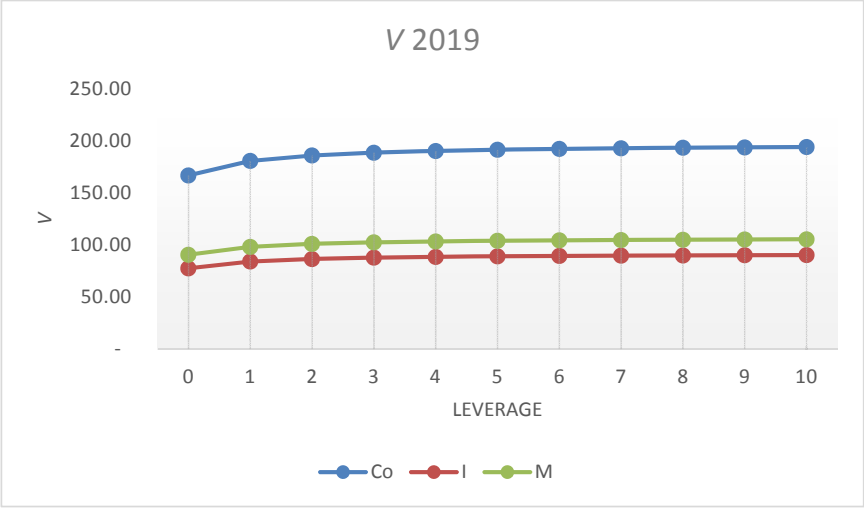

Fig. 13. **Dependence of Company Value *V* on Leverage Level *L*, *V*(*L*) for 2019 Year**

Source: Compiled by the authors.

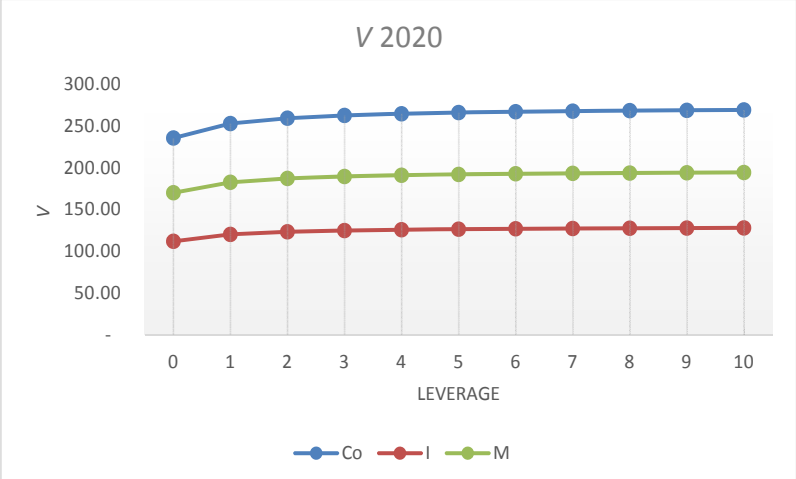

Fig. 14. **Dependence of Company Value *V* on Leverage Level *L*, *V*(*L*) for 2020 Year**

Source: Compiled by the authors.

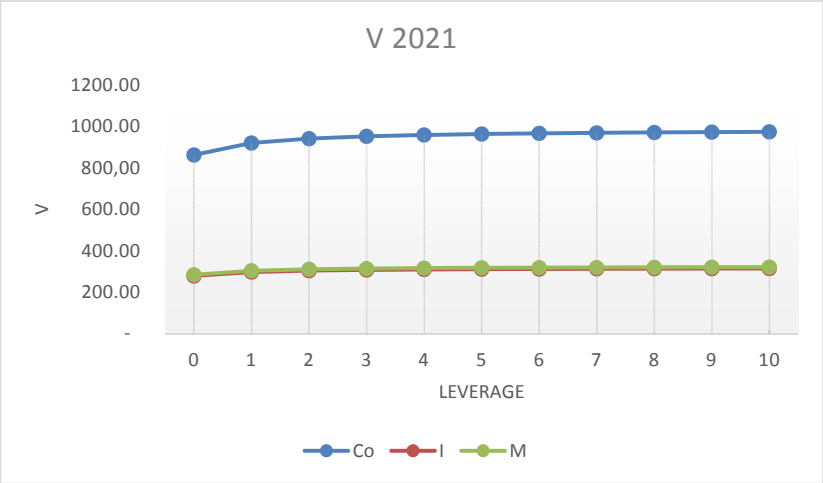

Fig. 15. **Dependence of Company Value *V* on Leverage Level *L*, *V*(*L*) for 2021 Year**

Source: Compiled by the authors.

Table 12

Dependence k_e (*L*); 2019–2021 Years

	2019			2020			2021		
L	k_e 1	k_e 2	k_e 3	k_e 1	k_e 2	k_e 3	k_e 1	k_e 2	k_e 3
0	46.86%	100.69%	86.24%	36.16%	76.06%	50.09%	14.83%	46.08%	45.15%
1	83.68%	183.01%	156.35%	65.21%	139.54%	91.15%	25.99%	84.58%	82.83%
2	120.50%	265.34%	226.47%	94.26%	203.01%	132.22%	37.14%	123.08%	120.52%
3	157.32%	347.67%	296.58%	123.31%	266.48%	173.29%	48.30%	161.58%	158.21%
4	194.14%	429.99%	366.69%	152.36%	329.96%	214.35%	59.45%	200.09%	195.89%
5	230.96%	512.32%	436.81%	181.42%	393.43%	255.42%	70.60%	238.59%	233.58%
6	267.78%	594.65%	506.92%	210.47%	456.91%	296.49%	81.76%	277.09%	271.26%
7	304.60%	676.98%	577.04%	239.52%	520.38%	337.55%	92.91%	315.59%	308.95%
8	341.42%	759.30%	647.15%	268.57%	583.85%	378.62%	104.06%	354.09%	346.63%
9	378.24%	841.63%	717.26%	297.62%	647.33%	419.69%	115.22%	392.59%	384.32%
10	415.05%	923.96%	787.38%	326.67%	710.80%	460.75%	126.37%	431.09%	422.01%

Source: Compiled by the authors.

CALCULATIONS OF INDICATORS FOR THE BRUSOV-FILATOVA-OREKHOVA – CAPM MODEL

To calculate indicators according to the BFO model, it is necessary to take into account the duration of the company's operation

Date Apple was founded: 04/01/1976.

The duration of the company's operation (n) is calculated by the formula: $n = t_1 - t_0$, where t_1 is the current year, t_0 is the year the company was founded.

The following formulas were used in the calculations:

$$\frac{1-(1+WACC)^{-n}}{WACC} = \frac{1-(1+k_0)^{-n}}{k_0\left(1-w_d t\left[1-(1+k_d)^{-n}\right]\right)}, \quad (48)$$

$$V = \frac{CF}{WACC}\left(1-(1+WACC)^{-n}\right), \quad (49)$$

$$k_e = WACC(1 + L) — Lk_d(1 — t). \quad (50)$$

WACC was found using Excel's "Search for Solution" function.

It was considered how the *WACC, V,* k_e indicators change relative to the change in the level of leverage (change in leverage from 0 to 10).

Let's move on to the results: the paper presents *Tables 10–12* of indicator values (*WACC, V,* k_e) for each year in three versions (depending on k_0), as well as *Fig. 10–18* of these indicators.

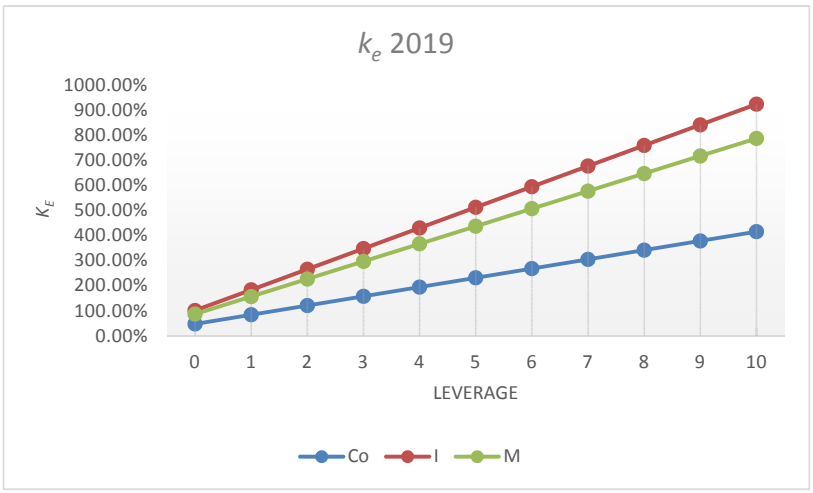

Fig. 16. **Dependence $k_e(L)$; 2019 Year**

Source: Compiled by the authors.

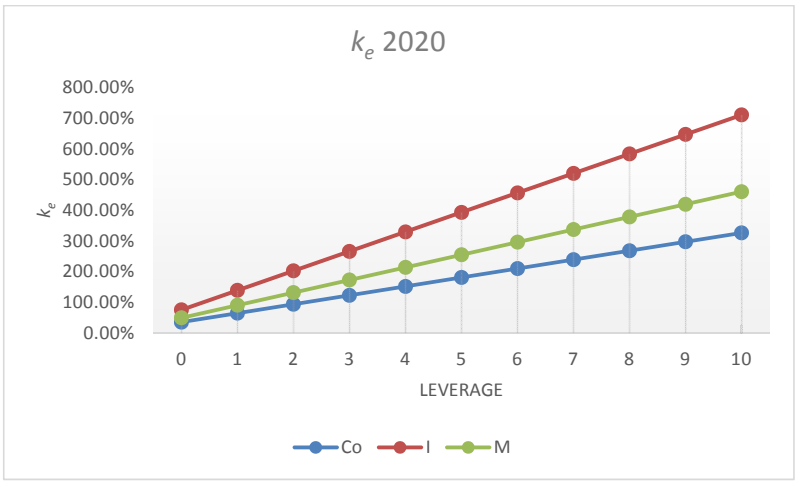

Fig. 17. **Dependence $k_e(L)$; 2020 Year**

Source: Compiled by the authors.

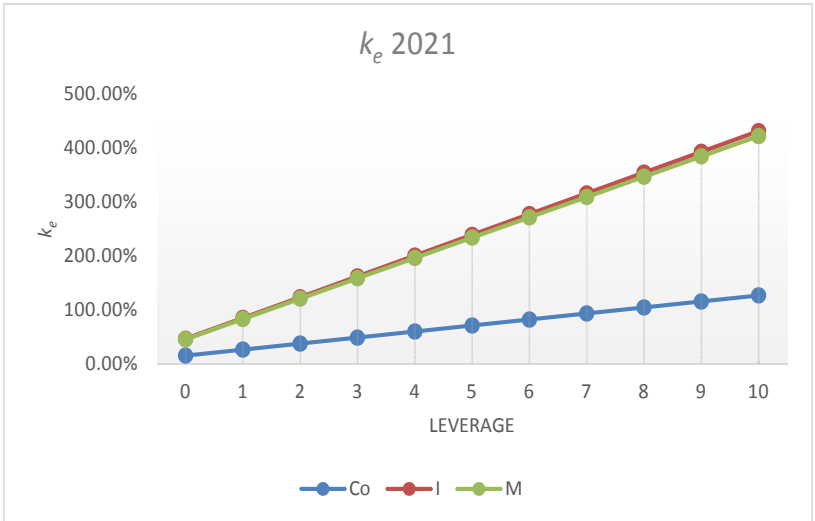

Fig. 18. **Dependence $k_e(L)$; 2021 Year**

Source: Compiled by the authors.

CONCLUSIONS

A fundamentally new approach to assessing the profitability of an asset is proposed. Transition from CAPM, which takes the same risk-free return for all assets as an initial assessment, to a new methodology, in which the average return of an asset, cleared of leverage, with the addition of a premium for business risk (market or industry) is taken as a seed return, significantly improves the accuracy of the estimate. A methodology has been developed for assessing the profitability of assets, taking into account both business (systematic) and financial risks. For this purpose, the CAPM and Fama-French models were incorporated in two main theories of the capital structure — the Brusov-Filatova-Orekhova (BFO) theory and the Modigliani-Miller (MM) theory. The developed approach makes it possible to use the powerful tools of these highly developed theories for the correct assessment of the main financial indicators of the company and their forecasting, taking into account both types of risks. The dependences of these indicators on debt financing, leverage level, taxing, company age, debt cost can be studied. The latest versions of the BFO and MM theories of capital structure, developed by authors and adapted to the established financial practice of the functioning of companies, are used, taking into account the real conditions of their work, such as variable income, frequent income tax payments, advance income tax payments, etc.

The example for GAZP, given by us, shows that account of business risk within market CAPM approach change k_0 from 4.542% to $k_0' = 9.82\%$. This will significantly change the results of calculation of the financial indicators of the GAZP.

Detailed practical calculations for real companies (Apple, Severstal, Polymetal) have been made. They focus on (1) applying two versions of CAPM (market or industry) to real companies; (2) application to real companies of a new methodology developed by us for assessing the financial performance of a company, taking into account both business (market or industry) and financial risks. These calculations show that the financial performance of companies is highly dependent on the type of risks taken into account. Sometimes the difference between market and industry cases is small — sometimes it is significant. However, the difference in financial indicators, while taking into account simultaneously financial and business risks, is always large with respect to accounting for a single risk. This means that taking into account simultaneously both financial and business risks is important for a correct assessment of the financial performance of companies. Three changes to the current methodology significantly improve the accuracy of the estimate: (a) the use of a sectoral approach in CAPM; (b) the use of a new methodology in which the average return on the asset, net of leverage, with (c) the addition of a business risk premium (market or industry), is taken as the initial return. The new methodology opens up new horizons and opportunities in business valuation, corporate finance, investments, ratings, etc.

The significant novelty of the article is as follows: For the first time, we correctly took into account financial and business risks, proving the incorrectness of Hamada's model, and included CAPM in the theories of capital structure (both MM and BFO), which opens up great prospects for assessing the financial performance of companies.

The limitations of the proposed methodology are partly related to the limitations of its components: CAPM, capital structure theories, in particular, with the reliability of the WACC approximation.

In the future, it is planned to (1) improve and clarify the methodology for collecting and processing information about the company, industry, and market; (2) improve the use of MM and BFO models adapted to the real conditions of the functioning of companies.

Abbreviations

CAPM: Capital Asset Pricing Model

MM: the Modigliani-Miller theory;

BFO: Brusov-Filatova-Orekhova theory;

WACC: the weighted average cost of capital;

SMB — the difference between the returns of companies with large and small capitalization;

HML — the difference between the returns of companies with low and high intrinsic value (indicator B/P);

RMW — return on equity; *CMA* — company capital expenditure.

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V.L. Kulik — validation, formal analysis, investigation.

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Increasing the Budget Sustainability of Regions within the Trends of the Economic Development in the Russian Federation (at the Example of the Republic of Karelia)

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ABSTRACT

The **relevance** of the study is determined by the need to ensure the budgetary sustainability of the country's regions and the importance of state regulation in this process. The **purpose** of the paper is to test the hypothesis about the positive impact of the applied instruments of state tax regulation on the level of ensuring budgetary sustainability in the region under consideration. The **objective** of this study is to analyze the instruments of government regulation in order to ensure fiscal sustainability in a particular region in the context of transformation of the global economy. The main **methods** used in this study include the collection and processing of statistical data, their comparative analysis, the study of the regulatory framework for tax regulation and other documents related to ensuring the budgetary sustainability of territorial units. The **scientific novelty** of the conducted research lies in the formation of an approach to the selection of optimal government regulation instruments to ensure the balance of regional budgets. As a **result** of the study, tax incentive measures were identified as the most effective among other government support measures aimed at achieving the sustainability of the budgets of the constituent entities of the Russian Federation. The proposed approach allows us to identify tax preferences that, given their temporary nature, will help expand the tax base in the future due to the growth of organizations' revenues and an increase in the number of taxpayers. It is **concluded** that it is necessary to use government support instruments that will help unlock the regional tax potential of the Republic of Karelia. The paper's **significance** in practice is its development of a set of specific recommendations for a deliberate transformation of the relevant regional tax laws in the Russian Federation.

Keywords: budget sustainability; government regulation; tax regulation; territorial unit; government support measures; subsidies; tax base; balanced budgets

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INTRODUCTION

In recent years, a clear trend in the global economy has been the redistribution of a portion of market assets from the West to the East, characterized not only by the increasing share of the economies of Asian and Middle Eastern countries within the total global GDP but also by the expansion of economic unions through new market participants. One such example can be seen in the BRICS alliance, which has expanded by five new countries over the past year, including Egypt, Iran, the UAE, Saudi Arabia, and Ethiopia.

Moreover, this redistribution of power has led to changes in the development of new logistics infrastructure, which would be capable of attracting new participants in the global trading community under conditions of equal participation in various projects. One of these major Eurasian projects is the Silk Road trade initiative "One Belt, One Road", which includes support for more than 35 countries around the world. Another equally important project is the Northern Sea Route, where Russia continues to play a key role in its development, attracting additional resources from friendly partner countries, including China, Saudi Arabia, the UAE, and others.

Another important aspect of the global transformation of world trade has been the gradual shift from the use of a single global currency, primarily the US dollar, to national currencies, which has allowed for greater participation of more countries and their currencies in the process of trade exchange. Thus, a gradual de-dollarization of the global economy has been launched in parallel.

All these aspects have led to a profound restructuring of the market, involving the waging of trade wars between countries, as well as the transformation of existing global value chains, which has directly influenced the formation of new networks of interaction among countries and the regionalization of the entire world economy.

In this regard, Russia has had to undergo a serious transformation of its entire national economy and redirect its main trade flows from the West to the East over the past few years, thus following the current trends of the global economy. A large amount of government investment has been spent on the development of modern logistics infrastructure in the Far East and the Murmansk region, so that Russia can become part of key logistics routes within the global economy. Some Russian regions have received additional subsidies to enhance their activity in trade interactions with China, including, among other things, the construction of railways (Krasnoyarsk), the development of high-tech equipment (Novosibirsk and Tomsk regions), and the increase of capacities in the field of machine engineering (Chelyabinsk region).

The most challenging situation is observed in the border regions of the western part of Russian territory, which over the past 30 years have contributed to the local budget by exporting the majority of their products to European Union countries. One such region is the Republic of Karelia, which has been engaged in trade interactions with the Republic of Finland for many years. For example, in 2021, the trade turnover between the two republics amounted to over 13 billion dollars, while in 2022 it decreased by more than half[1].

Thus, such Russian territories require additional support from the state in terms of diversifying production capacities in the region, as well as attracting new trading partner countries to ensure regional budget stability.

The budgetary sustainability of a subject of the Russian Federation is achieved through the effectiveness of the tax policy implemented, which ensures sufficient and stable revenues; the optimal size of expenditure obligations in terms of the ability to cover them with own resources;

[1] URL: https://karelia.rbc.ru/karelia/27/04/2022/626966e99a79471ccb08428a (accessed on 05.12.2023).

and the alignment of the debt burden with the region's solvency. The goal of ensuring budgetary sustainability is to stimulate the socio-economic development of the region.

The tools of regional tax policy are regulated at the federal level. The tax powers of the subjects of the Russian Federation are limited to the ability to set rates for taxes on property of organizations, on transportation, and on gambling businesses, while their limits are established in the Tax Code of the Russian Federation. Regional authorities can also introduce additional benefits at the federal level for the aforementioned taxes within their territory[2]. Furthermore, the Tax Code of the Russian Federation establishes the right of the subjects of the Russian Federation to reduce the corporate income tax rate, which is allocated to the regional budget, for certain categories of taxpayers[3].

The budget legislation establishes both tax and non-tax sources of income for entities[4], as well as regulates the standards for the balance of regional budgets[5] and the maximum amount of their borrowings[6].

LITERARY REVIEW

The area of budgetary sustainability of regions is one of the key issues in state regulation, which is why it receives significant attention from both foreign and Russian researchers. There are completely different approaches to achieving financial sustainability in regions. Considering some of them allows for a more comprehensive analysis of the current situation regarding budget sustainability in the regions of Russia and highlights the most effective methods of state tax regulation at the level of the subjects of the Russian Federation.

The budget sustainability of regions was examined from the perspective of various approaches and methods, including the Bona test, which is based on the idea that a strictly positive and statistically significant response of the primary budget balance to changes in debt is a sufficient condition for budget sustainability [1].

Many researchers have emphasized methods that contribute to the long-term sustainability of regions and have clustered regions based on this indicator [2, 3]. For example, E. G. Kiseleva in her research assesses the debt sustainability of the budgetary system of the regions of the Northwestern Federal District of the Russian Federation by determining a differentiated level of budgetary constraints [4].

Overall, the stability of budget revenues has been examined in the works of M. Yu. Malkina, A. V. Minakov, A. A. Mikhailova etc. [5–8]. Moreover, A. A. Mikhailova and E. N. Timushev proposed the concept of vertical imbalance in the analysis of budget sustainability at the regional level [9].

Russian researchers have been engaged, among other things, in assessing the financial stability of the regional budget using a methodology for determining its stability based on certain indicators [10]. M. N. Solomko identified the dependence of budget sustainability and the dynamics of economic development in regions [11], while P. V. Stroeva and O. V. Pivovarova were able to identify regions with low financial stability and propose approaches to stimulate their development [12].

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[2] Art. 12 Tax Code of the Russian Federation. URL: https://www.consultant.ru/document/cons_doc_LAW_19671/25937e403c030708de5a6ac9aea5952f23649ca8/ (accessed on 05.12.2023).

[3] Art. 284 Tax Code of the Russian Federation. URL: https://www.consultant.ru/document/cons_doc_LAW_28165/eb9180fc785448d58fe76ef323fb67d1832b9363/ (accessed on 05.12.2023).

[4] Chapter 8 Budget Code of the Russian Federation. URL: https://www.consultant.ru/document/cons_doc_LAW_19702/864e59f04324c21269bc47af4d5c9d0c3b68207e/ (accessed on 05.12.2023).

[5] Art. 92.1 Budget Code of the Russian Federation. URL: https://www.consultant.ru/document/cons_doc_LAW_19702/6f11e8bb720f79997a479fc6c1e98b78f23c3755/ (accessed on 05.12.2023).

[6] Art. 106 Budget Code of the Russian Federation. URL: https://www.consultant.ru/document/cons_doc_LAW_19702/6e48b1d00db0df46678514c0f9d3dd364e9dacf9/ (accessed on 05.12.2023).

It is important to emphasize the analysis of subnational budget rules, taking into account both Russian and foreign experience. A. L. Kudrin and A. N. Derugin distinguish flexible embedded mechanisms of modern budget rules for regions in global practice, which allow them to quickly adapt to external and internal shocks without making critical changes [13].

As for foreign experience, researchers here place a greater emphasis on achieving budgetary sustainability in regions based on government programs. Thus, methods are being developed that contribute not only to state goal-setting but also to the sustainable development of regions. So, Anders Björn analyzes the methods for assessing the achievement of budget sustainability in regions while simultaneously developing tools for environmental protection [14–16]. This issue has been addressed, among others, by Chinese researchers in China [17–19], as well as by Italian colleagues in Italy and British researchers in the UK [20, 21].

Other foreign colleagues conducted an experiment on the localization of relevant indicators for regional budget sustainability, concluding that a centralized approach to all regions is effective, thereby identifying the strongest and weakest aspects of each [22].

Thus, the issues of budget sustainability in regions are a critically important aspect for the further development not only of individual agglomerations but also of economies as a whole, considering the current trends of fragmentation in the global economy and the transformation of global markets, which directly affects the level of economic growth in countries one way or another.

METHODOLOGY

The object of the research is to analyze the tools of state regulation in order to ensure budgetary stability in a specific region amid the transformation of the global economy.

The subject of the research is the Republic of Karelia. Consequently, the subject of the research is the measures of state regulation aimed at ensuring budgetary stability in this region.

The purpose of this study is to test the hypothesis regarding the positive impact of the applied tools of state tax regulation on the level of budget sustainability in the region under consideration.

The main methods used in this research include the collection and processing of statistical data, comparative analysis, examination of the regulatory framework for tax regulation, and other documents related to ensuring the budgetary stability of territorial units.

The budgetary provision of the region is determined in accordance with the procedure established by the Methodology for the Distribution of Subsidies for Equalizing the Budgetary Provision of Subjects of the Russian Federation, by dividing the tax potential index by the budget expenditure index. The aforementioned indices are calculated according to the same methodology[7]. The average budget provision indicator across the regions of the Russian Federation is 1.

To assess financial stability, a coefficient was used that is calculated as the proportion of tax revenues to the total income of the budget of the region.

RESULTS AND DISCUSSION

The Republic of Karelia is located in the northwest of Russia and is part of the Northwestern Federal District of the Russian Federation. The western border of Karelia borders the Republic of Finland and stretches for 798 kilometers. Such a geographical position has naturally led to active interaction with Finland in various sectors of the economy.

Karelia has a rich mineral and raw material base, including 494 explored

[7] Order of the Government of the Russian Federation from 22 November 2004 No. 670 "On the Distribution of Subsidies for Equalizing the Budgetary Provision of the Subjects of the Russian Federation". URL: https://base.garant.ru/187556/ (accessed on 03.02.2024).

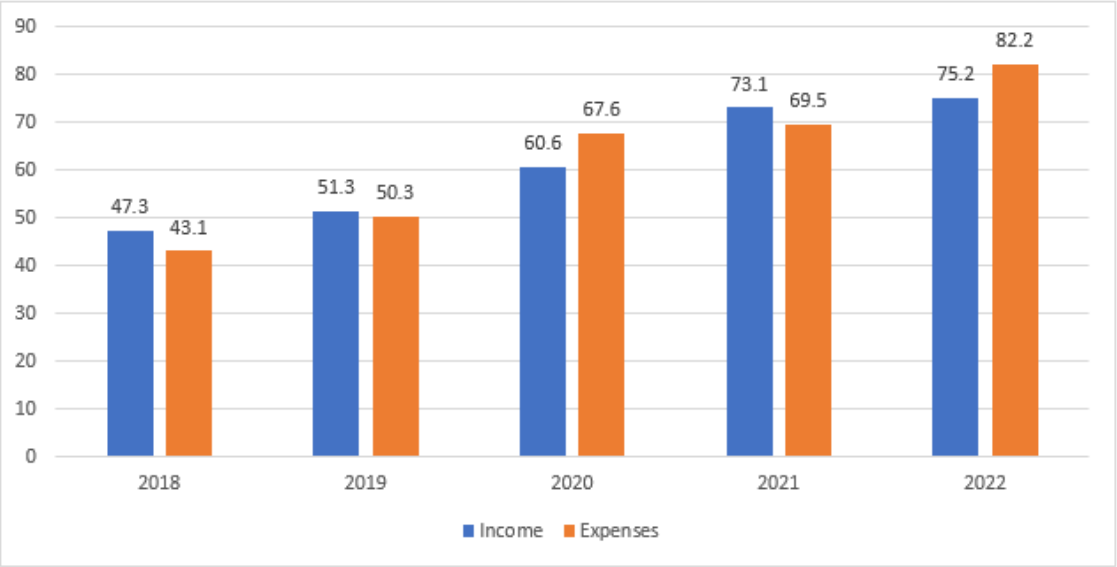

Fig. 1. **Dynamics of Budget Balance Indicators of the Republic of Karelia, Billion Rubles**

Source: Unified portal of the budget system of the Russian Federation. URL: https://budget.gov.ru/%D0%91%D1%8E%D0%B4%D0%B6%D0%B5%D1%82/%D0%A1%D0%B1%D0%B0%D0%BB%D0%B0%D0%BD%D1%81%D0%B8%D1%80%D0%BE%D0%B2%D0%B0%D0%BD%D0%BD%D0%BE%D1%81%D1%82%D1%8C-%D0%B1%D1%8E%D0%B4%D0%B6%D0%B5%D1%82%D0%B0?regionId=04000000 (accessed on 05.12.2023).

deposits, 386 peat deposits, 28 underground water deposits, 3 mineral water deposits, and 1 deposit of therapeutic mud. The republic is rich in various bio resources, including berries, 150 species of medicinal plants, and large reserves of forested areas. It is worth emphasizing the industrial fishing in this region, which was one of the key products for export to European countries, primarily to Finland. In Karelia, about 70% of all Russian trout is cultivated, around 30% of iron ore pellets are produced, as well as 20% of paper and 15% of wood pulp. Until 2022, the largest trading partners of Karelia were Finland (20% of the region's total trade turnover), Turkey, the United Kingdom, the Netherlands, and Germany. Their total share in the turnover was 46%[8].

At the present time, the Republic of Karelia has managed to redirect its production and, consequently, its exports to countries in Asia and the Middle East, including Turkey, China, India, the UAE, and others. It is worth noting that the republic's exports grew by 7.6% last year, and the total volume increased by $ 1.36 billion compared to 2021[9].

Nevertheless, possessing vast internal resources, it is important to understand the strategic significance of transitioning the region to a new level of interaction both with the internal regions of the country and with external partner countries. In order to ensure budgetary sustainability, it is necessary to establish local production in the region to transition from exporting natural resources to supplying products of a complete manufacturing cycle.

To assess the stability of the budget of the Republic of Karelia, we will analyze the basic parameters of this region (*Fig. 1*). The data indicates a budget deficit that occurred in 2020 and 2022.

The analysis of the structure of the revenue part of the budget (*Fig. 2*) allows us to conclude that there is a severe shortfall in own

[8] URL: https://export10.ru/karelia/ (accessed on 05.12.2023).

[9] URL: https://tass.ru/ekonomika/17571267?utm_source=google.com&utm_medium=organic&utm_campaign=google.com&utm_referrer=google.com (accessed on 05.12.2023).

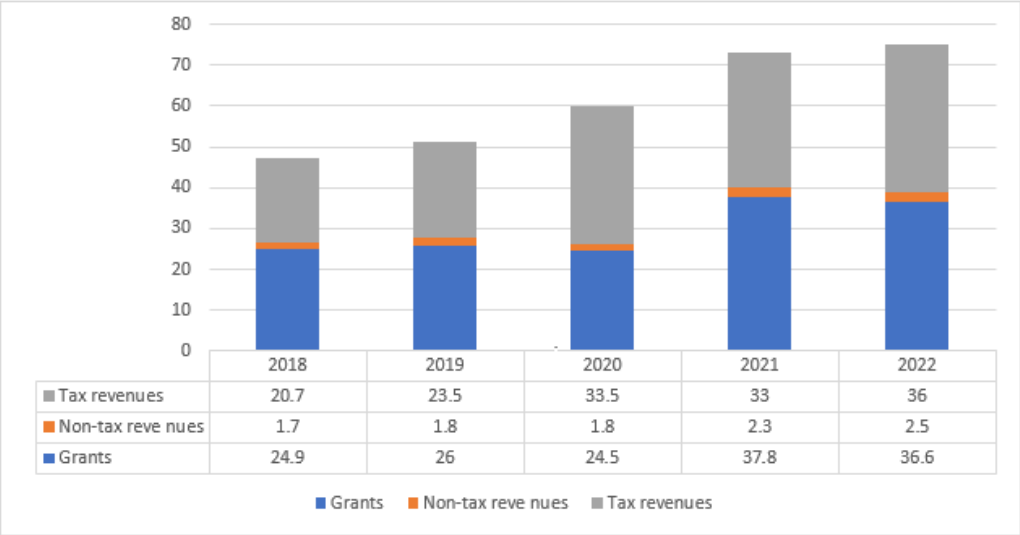

Fig. 2. **Structure of Budget Revenues of the Republic of Karelia, Billion Rubles**

Source: Единый портал бюджетной системы РФ / Unified portal of the budget system of the Russian Federation. URL: https://budget.gov.ru/%D0%91%D1%8E%D0%B4%D0%B6%D0%B5%D1%82/%D0%94%D0%BE%D1%85%D0%BE%D0%B4%D1%8B/%D0%98%D1%81%D0%BF%D0%BE%D0%BB%D0%BD%D0%B5%D0%BD%D0%B8%D0%B5-%D0%B1%D1%8E%D0%B4%D0%B6%D0%B5%D1%82%D0%B0-%D0%BF%D0%BE-%D0%B2%D0%B8%D0%B4%D0%B0%D0%BC-%D0%B4%D0%BE%D1%85%D0%BE%D0%B4%D0%BE%D0%B2?regionId=86000000 (accessed on 05.12.2023).

sources for financing regional expenditure obligations. So, in 2020, the share of non-repayable receipts was 56% (of which transfers from the federal budget accounted for 96.6%); in 2021, it was 45.1% (of which transfers from the federal budget accounted for 94.2%); in 2022, it was 47.9% (of which transfers from the federal budget accounted for 92.3%)[10]. That is, in recent years there has been an unstable but noticeable trend towards a reduction in the share of external sources.

Based on the data from the revenue structure of the budget of the Republic of Karelia, we will calculate the financial stability coefficient of this region (*Table 1*), which will aid in conducting a qualitative analysis of the effectiveness of tax policy instruments. The higher this indicator, the more stable the budget is in terms of being supported by its own tax revenues.

In the territory of the Republic of Karelia, there are 3 territories of advanced social and economic development (TASED), one of the main incentives of which is tax benefits for residents for a certain period of time. The introduction of preferential regimes is always associated with a loss of budget revenue. But subsequently, losses should turn into an increase in tax revenues due to the expansion of the tax base and the gradual abolition of benefits. This pattern is precisely reflected in the data of *Table 1*. The TASED "Kondopoga" was established in December 2017, TASED "Nadvoitsy" in September 2016, and TASED "Kostomuksha" in February 2019.

The debt burden of the Republic of Karelia is presented in *Table 2*. This indicator is calculated by dividing the regional government debt by the actual revenue performance of the entity, excluding non-repayable receipts. The presented values of this indicator require measures aimed at increasing regional tax and non-tax revenues,

[10] Calculated by the authors based on data from the Unified Portal of the Budgetary System of the Russian Federation. URL: https://budget.gov.ru/%D0%91%D1%8E%D0%B4%D0%B6%D0%B5%D1%82/%D0%94%D0%BE%D1%85%D0%BE%D0%B4%D1%8B/%D0%98%D1%81%D0%BF%D0%BE%D0%BB%D0%BD%D0%B5%D0%BD%D0%B8%D0%B5-%D0%B1%D1%8E%D0%B4%D0%B6%D0%B5%D1%82%D0%B0-%D0%BF%D0%BE-%D0%B2%D0%B8%D0%B4%D0%B0%D0%BC-%D0%B4%D0%BE%D1%85%D0%BE%D0%B4%D0%BE%D0%B2 (accessed on 05.12.2023).

Table 1

Financial Stability Coefficient of the Budget of the Republic of Karelia

Financial Stability Coefficient	2018	2019	2020	2021	2022
	0.526	0.507	0.404	0.517	0.487

Source: Calculated by the authors based on the data in *Fig. 1* and *2*.

Table 2

Debt Burden of the Republic of Karelia, %

Debt Burden	December 2018	December 2019	December 2020	December 2021	December 2022
	79.8	68.5	76.6	50.1	64

Source: Единый портал бюджетной системы РФ / Unified portal of the budget system of the Russian Federation. URL: https://budget.gov.ru/%D0%91%D1%8E%D0%B4%D0%B6%D0%B5%D1%82/%D0%93%D0%BE%D1%81%D1%83%D0%B4%D0%B0%D1%80%D1%81%D1%82%D0%B2%D0%B5%D0%BD%D0%BD%D1%8B%D0%B9-%D0%B4%D0%BE%D0%BB%D0%B3/%D0%93%D0%BE%D1%81%D1%83%D0%B4%D0%B0%D1%80%D1%81%D1%82%D0%B2%D0%B5%D0%BD%D0%BD%D1%8B%D0%B9-%D0%B4%D0%BE%D0%BB%D0%B3-%D1%81%D1%83%D0%B1%D1%8A%D0%B5%D0%BA%D1%82%D0%BE%D0%B2-%D0%A0%D0%A4 (accessed on 05.12.2023).

as well as optimizing expenditures to enhance budget sustainability.

The budget provision level of the Republic of Karelia before the distribution of subsidies from 2020 to 2022 was, respectively, 0.589; 0.575; and 0.578. After the infusion of the corresponding funds from the federal budget, the values of the indicators increased to 0.722, 0.71, and 0.701[11], respectively. There is an opinion among domestic scholars [23] that subsidies are not an effective instrument for increasing budgetary security. As follows from the analysis of the provided data, there is no improvement in the dynamics of the indicator after the distribution of subsidies, despite the increased amounts.

In our opinion, the reserve for growth in self-financing lies in the tax potential of the region. In the tax revenues of the studied entity of the Russian Federation, the main role belongs to the corporate profit tax and the personal income tax (PIT), but their share in the total volume is gradually decreasing (*Fig. 3*). Therefore, the most effective measures will be economic incentives aimed at expanding the tax base by increasing the turnover of companies and their numbers. The increase in the number of employed individuals consistently leads to an improvement in the collection rates of personal income tax.

About 40% of the territory of the Republic of Karelia is located in the Arctic zone, where both federal and regional fiscal preferences apply to residents. Thus, at the federal level, residents of this territory benefit from a zero corporate income tax rate, reduced insurance contribution rates to extrabudgetary funds, as well as tax incentives for mineral extraction tax. The region also offers benefits on corporate income tax and property taxes for a period of 5 to 10 years. In addition, reduced rates apply under the simplified taxation system (STS), which increase after 5 years, but

[11] Data from the Unified Portal of the Budgetary System of the Russian Federation. URL: https://budget.gov.ru/%D0%A0%D0%B5%D0%B3%D0%B8%D0%BE%D0%BD%D1%8B/%D0%91%D1%8E%D0%B4%D0%B6%D0%B5%D1%82%D0%BD%D0%B0%D1%8F-%D0%BE%D0%B1%D0%B5%D1%81%D0%BF%D0%B5%D1%87%D0%B5%D0%BD%D0%BD%D0%BE%D1%81%D1%82%D1%8C-%D1%81%D1%83%D0%B1%D1%8A%D0%B5%D0%BA%D1%82%D0%BE%D0%B2-%D0%A0%D0%A4 (accessed on 08.12.2023).

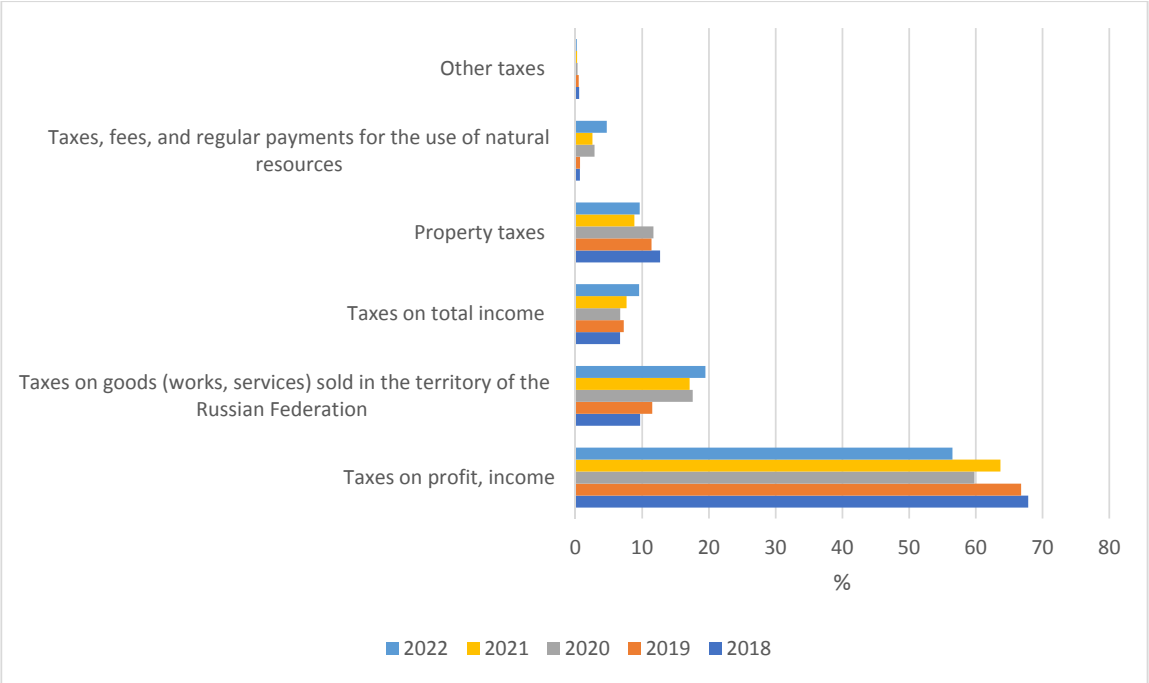

Fig. 3. **Structure of Tax Revenues of the Budget of the Republic of Karelia, %**

Source: Unified portal of the budget system of the Russian Federation. URL: https://budget.gov.ru/%D0%91%D1%8E%D0%B4%D0%B6%D0%B5%D1%82/%D0%94%D0%BE%D1%85%D0%BE%D0%B4%D1%8B/%D0%98%D1%81%D0%BF%D0%BE%D0%BB%D0%BD%D0%B5%D0%BD%D0%B8%D0%B5-%D0%B1%D1%8E%D0%B4%D0%B6%D0%B5%D1%82%D0%B0-%D0%BF%D0%BE-%D0%B2%D0%B8%D0%B4%D0%B0%D0%BC-%D0%B4%D0%BE%D1%85%D0%BE%D0%B4%D0%BE%D0%B2?regionId=86000000 (accessed on 05.12.2023).

still remain at a level that is half that of other taxpayers[12].

The mechanism of the investment tax deduction for corporate profit tax is applied in the territory of the studied subject of the Russian Federation concerning organizations engaged in land and pipeline transportation, scientific research, waste disposal, as well as those related to manufacturing industries. The established restrictions on the use of this benefit, such as the absence of tax debt and compliance with a certain legislatively defined minimum level of accrued employee wages, enhance the effectiveness of tax regulation. However, the maximum amount of the deduction established by the Law of the Republic of Karelia No. 384 is only 50% of the corresponding expenses.

The aforementioned benefits contribute to creating a favorable tax climate for potential investors. The effect of these preferences extends to priority areas and is time-limited (5–10 years). These circumstances provide grounds to believe that after the grace period, tax revenues should increase.

In addition, *Fig. 3* shows an increase in the share of the tax on total income. Therefore, measures to promote the development of small businesses that use the simplified tax system and the tax on professional income are promising.

Throughout almost the entire study period, the share of taxes on goods (works, services) sold in the territory of the Russian Federation has been increasing (*Fig. 3*). These are excise taxes on alcohol, tobacco, and gasoline, as it is specifically for this group of goods that they are allocated to the regional budget[13]. In this

[12] Law of the Republic of Karelia from 30 December 1999, No. 384 "On Taxes (Tax Rates) in the Territory of the Republic of Karelia". URL: https://www.nalog.gov.ru/rn10/about_fts/docs/6413540/ (accessed on 11.12.2023).

[13] Art. 56 Budget Code of the Russian Federation. URL: https://www.consultant.ru/document/cons_doc_LAW_19702/0f3dd11480b2a82098ac79197ac977ee50a2f983/ (accessed on 08.12.2023).

case, the health of the nation should take precedence over budgetary interests.

The data from *Fig. 3* also indicate a gradual decrease in the value of property taxes. This is primarily due to the increase in revenue from the corporate property tax, as the collection of the transportation tax, on the contrary, is decreasing[14]. The potential for growth here lies both in the expansion of the property complex of organizations and in the improvement of the administration of the transport tax. Moreover, it makes sense to conduct an inventory of regional benefits for these taxes. The cancellation of ineffective preferences will lead to an increase in budget revenues. Regional preferences for property tax for organizations are granted not only to residents of territories of advanced development but also to other organizations implementing investment projects in the Republic of Karelia, for the period of payback, but not exceeding 5 years. At the same time, this category of taxpayers is not exempt from the transport tax.

Resource payments of the Republic of Karelia consist of the mineral extraction tax and fees for the use of wildlife and aquatic biological resources. These payments demonstrate the highest growth[15] and dynamics of the increase in their share of the total revenues of the studied regional budget. The budgets of the federal subjects primarily receive revenue from the mineral extraction tax on commonly used minerals, as well as a 60% rate on hydrocarbon raw materials and ores, provided certain conditions are include[16]. The Republic of Karelia is rich in wildlife resources, which attract hunters to the region and could serve as a stimulus for tourism development with the appropriate provision of a developed infrastructure.

CONCLUSION

As already mentioned earlier, the use of tax regulation tools, in our opinion, is the most promising for achieving budget sustainability in the Republic of Karelia. In order to attract investors and expand the tax base in the future, a number of tools have already been employed in regional tax policy, as mentioned earlier. To enhance their effectiveness and broaden the range of potential users of the preferences, it is advisable to make the following clarifications in the regional tax legislation:

- To increase the size of the investment tax deduction for profit tax from 50% to 90% of current period expenses;
- To provide the opportunity to apply the investment tax deduction on corporate income tax to companies engaged in mineral extraction (section B of the OKVED), considering the priority of the industry for the Republic of Karelia;
- To introduce an additional condition for the application of regional property tax benefits for organizations in the form of the requirement to maintain minimum employee payments at a level not lower than the federal minimum wage, increased by the coefficients applied in the regions of the Far North;
- To allow organizations implementing investment projects in the Republic of Karelia to be exempt from paying transport tax for the period of payback, but not exceeding 5 years.

[14] Data from the Unified Portal of the Budgetary System of the Russian Federation. URL: https://budget.gov.ru/%D0%91%D1%8E%D0%B4%D0%B6%D0%B5%D1%82/%D0%94%D0%BE%D1%85%D0%BE%D0%B4%D1%8B/%D0%98%D1%81%D0%BF%D0%BE%D0%BB%D0%BD%D0%B5%D0%BD%D0%B8%D0%B5-%D0%B1%D1%8E%D0%B4%D0%B6%D0%B5%D1%82%D0%B0-%D0%BF%D0%BE-%D0%B2%D0%B8%D0%B4%D0%B0%D0%BC-%D0%B4%D0%BE%D1%85%D0%BE%D0%B4%D0%BE%D0%B2 (accessed on 08.12.2023).

[15] Data from the Unified Portal of the Budgetary System of the Russian Federation. URL: https://budget.gov.ru/%D0%91%D1%8E%D0%B4%D0%B6%D0%B5%D1%82/%D0%94%D0%BE%D1%85%D0%BE%D0%B4%D1%8B/%D0%98%D1%81%D0%BF%D0%BE%D0%BB%D0%BD%D0%B5%D0%BD%D0%B8%D0%B5-%D0%B1%D1%8E%D0%B4%D0%B6%D0%B5%D1%82%D0%B0-%D0%BF%D0%BE-%D0%B2%D0%B8%D0%B4%D0%B0%D0%BC-%D0%B4%D0%BE%D1%85%D0%BE%D0%B4%D0%BE%D0%B2 (accessed on 05.12.2023).

[16] Art. 56 Budget Code of the Russian Federation URL: https://www.consultant.ru/document/cons_doc_LAW_19702/0f3dd11480b2a82098ac79197ac977ee50a2f983/ (accessed on 08.12.2023).

The approach proposed in the study is applicable to other regions of the Russian Federation and involves analyzing the effectiveness of tax incentives by calculating the financial stability coefficient and subsequently comparing the changes in this indicator with the periods during which tax preferences were in effect. The effectiveness of the implemented tax policy is confirmed by the initial decline in this indicator (immediately after the introduction of benefits), followed by a gradual increase.

Moreover, in order to reduce the debt burden on the regional budget, it seems necessary to expand the practice of replacing commercial loans with budgetary ones. Such an opportunity is provided for in the Budget Code of the Russian Federation following the amendments made by Federal Law from 28 June 2021 No. 228[17]. Budget loans can be used both for repaying commercial debts and for financing infrastructure projects.

[17] Federal Law from 28 June 2021 No. 228 "On Amendments to the Budget Code of the Russian Federation and on the Suspension of Certain Provisions of the Budget Code of the Russian Federation". URL: http://publication.pravo.gov.ru/Document/View/0001202106280034 (accessed on 01.02.2024).

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M.E. Kosov — setting the goals and objectives of the study, development of the hypothesis of the article and its confirmation on the basis of the obtained data.
E.V. Golubtsova — analysis and description of the obtained results in terms of fiscal sustainability of the region considered in the article.
E.S. Novikova — literature review on the issues under study, research of current problems and challenges in terms of fiscal sustainability both at the level of the country and one region.

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Fintech Sector in the Context of Financial Development and Problems of its Measurement

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ABSTRACT

Over the last 10 years, financial development has been technologically advanced, and trends in this area are linked to the fintech phenomenon. The **purpose** of this paper is to develop theoretical provisions regarding trends and patterns of penetration of fintech into the financial system and the methodological basis for assessing the development potential of fintech at the country level in the context of financial development and economic growth. To achieve this goal, the paper analyzes data on fintech across 150 countries, presented by the Statista global data platform. Using theoretical **methods** of systematization and generalization, as well as empirical statistical methods, the geography of the spread of fintech was analyzed, identifying the factors of country leadership, and the areas of penetration of fintech were considered. As a result of the study, it was revealed that the modern methodology for monitoring and analyzing the development of fintech does not meet the requirements for analyzing the impact of this segment on financial development. In this regard, the article presents a system of indicators for assessing the development of fintech at the country level, and also explains the reasons why measuring the fintech market and dynamically assessing its development is still difficult in practice. Taking into account the identified shortcomings of the existing system of the fintech development indicators, additional indicators for measuring the development of the fintech sector at the national level are proposed, corresponding to the standard for assessing financial development. A study of Russian experience based on available data showed a high level of innovation in the payment sector and insurance. At the same time, the need to expand the implementation of domestic fintech solutions in the areas of asset management, Regtech and blockchain technologies was identified.

Keywords: financial sector; financial technologies; fintech payments; fintech insurance; blockchain; Regtech; cybersecurity

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INTRODUCTION

The financial and economic crisis that shook the world from 2007 to 2009 revealed the scale of global imbalances, the foundation of which is fundamentally linked to pervasive financialization [1]. The growth of financial market depth, the reformatting of the organization of various goods markets into a stock exchange model, the involvement of currency markets into this orbit, and the emergence of interest rate derivatives markets — all these phenomena and innovations, while promising significant benefits for the economy, did not necessarily guarantee their immediate realization. On the contrary, it could not be excluded that the rapid pace of ongoing innovations creates inefficiencies that threaten the functions of resource redistribution and productivity growth. These inefficiencies manifested in the non-linearity of the relationship between financial deepening and economic growth, increasingly noted by researchers in the 21st century [2].

This context, associated with the increased financial instability of the 2010s, served as a basis for the criticism of existing institutions and models in the financial sector [3]. The course of subsequent events showed that the progress of the financial sector will occur along the path of increasing technological sophistication, with players striving to leverage the latest technologies, transforming them into expanded financial inclusion and their own profit. It is important to note that the internet, smartphones, big data, and neural networks, which are the foundation for advancing greater financial accessibility, presumably also help to mitigate the adverse effects of financial depth, allowing for a better allocative effect of transforming savings into investments [4].

The processes currently occurring in the financial sector, associated with fintech, are bringing new players into the orbit of financial markets, who do not necessarily possess licenses of financial organizations. This results in increased competitive pressure on incumbent banking businesses and the wealth management industry, stimulating their efficiency. Thus, the emergence and expansion of fintech should be viewed as a logical outcome of the failures in financial development over the past decades and as a response to the demand for more efficient institutions and mechanisms of economic interaction in the financial sector [5, 6].

TRENDS IN FINTECH DEVELOPMENT

The absence of a strict definition of the concept of "fintech" does not hinder its use in academic literature and in regulatory documents. As a working definition, the following can be proposed: *fintech* — it is the synergy of advanced information technologies (including data management) and technologies related to hardware development, within the realm of interaction among financial market participants, shaping the landscape of financial services and products. The power of modern technologies has defined the breadth of areas affected by fintech — payments, loans, insurance, cryptocurrencies, capital management, Regtech, cybersecurity and etc. [3, 7–9]. The assessment of fintech penetration in these areas is carried out using the indicator of investment inflow [10].

Fintech in payments is the leader in this regard. The current trends: (1) new B 2B payment solutions; (2) fintech analog of BNPL ("buy now, pay later"), evolving towards the creation of platforms that connect lenders and borrowers; (3) shifting focus from attracting new clients to deepening engagement with them; (4) reduction of transaction costs and services for the end consumer. Despite the unstable global macroeconomic conditions that led to a decline in investments across various sectors and markets in 2020 and 2022, the payment industry continues to see a significant volume of investment deals, promising growth in innovation.

The field of fintech insurance (InsurTech) is attractive to innovators [11]. Due to the economic instability of recent years, large investments in fintech solutions are being attracted by insurance companies with a high level of projected profitability. The following

areas of InsurTech development are highlighted: (1) the provision of SaaS solutions (Software as a Service) by insurers, which provide access to software through which insurance services are offered and which is serviced by fintech companies; (2) acquisition of startups that could strategically fit into the business system of insurers; (3) the growth of fintech startups focused on electronic technologies (for example, policies issued and distributed through chatbots).

Investments in Regtech are showing steady growth. With the increase in the volume of financial operations and digital transactions, as well as the complexity and variability of regulatory legislation, the demand for Regtech is growing, promising a reduction in compliance costs as a barrier to enhancing the profitability of financial organizations [12, 13]. The trends in the development of Regtech include: (1) the enhancement of technological capabilities for the operational processing of regulatory changes across multiple jurisdictions (Basel IV, ESG standards, the Digital Services Act, etc.); (2) the application of machine learning and artificial intelligence technologies to create AML/CFT solutions; (3) the use of AI for the collection and processing of information on current and forecasted financial risks.

A promising direction for the development of fintech in the world is *asset management*. The leading trends in this segment are: (1) promotion of electronic banking through applications, social networks, and messengers; (2) providing clients with targeted personalized information through the active use of artificial intelligence; (3) development of solutions and products for clients with varying levels of wealth; (4) expansion of offerings for access to ESG tools [14, 15].

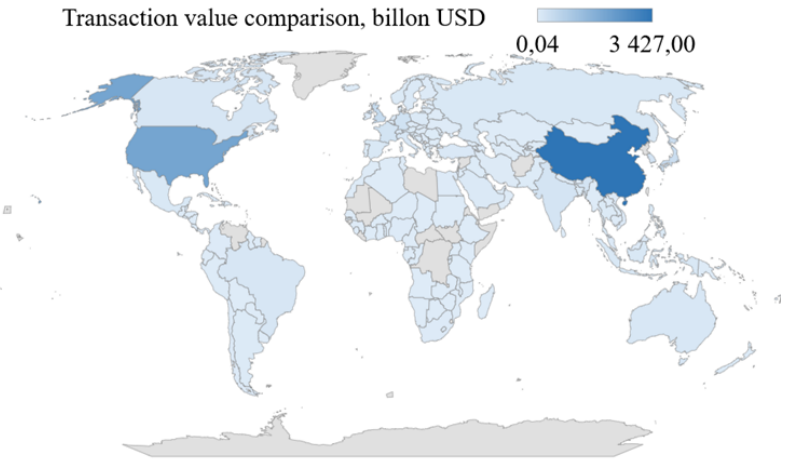
Active development affects the sphere focused on the use of *blockchain*. Among the innovative solutions are asset tokenization, optimization of cross-border payments, and real-time settlement. The main trends include: (1) the expansion of solutions in the field of decentralized finance (DeFi); (2) the creation of stablecoins and CBDCs; (3) the development of solutions for financing small and medium-sized enterprises (SMEs) [14].

Thus, modern fintech is transforming the financial sector, laying the groundwork for more powerful and efficient financial development, which brings numerous secondary positive effects for the economy. This aspect defines the *strategic role of fintech* and the competition among countries for leadership in relevant technologies and solutions. For example, the most advanced area of fintech is payments and transfers, and its high strategic role has led to a technological race that has resulted in the creation of a number of technologically advanced solutions in various countries today: SBP (Russia), The Single Euro Payments Area (European Union), FedNow Service (USA), Faster Payments (United Kingdom), Internet Banking Payment System (China), Immediate Payment Service (India), PromptPay (Thailand), and others. This process determines the relevance of cross-country analysis of fintech development.

INTERCOUNTRY ANALYSIS OF FINTECH DEVELOPMENT

The balance of advantages and vulnerabilities in the development of fintech, along with the conditions prevailing in different countries, determines the differences in its dynamics and depth of penetration. The cross-country analysis of fintech development today is based on a still imperfect measurement system [16, 17]. It shows not only the unevenness of fintech penetration into the economic life of different countries but also that this unevenness varies depending on the area of fintech (*Fig. 1–3*).

According to *Fig. 1*, China is the leader in the fintech payment industry. Let us point out three groups of reasons related to this: socio-demographic, regulatory, and economic. The Chinese market benefits from a large number of consumers (for fintech services, this includes smartphone users, who make up 68.4% of the country's population [15]). The development of the legal framework for innovations in



Top 5 (2023), billion USD:

China	**3 427.00**
U.S.	2 041.00
UK	445.10
Japan	375.50
Germany	270.00

Fig. 1. **Digital Payments Value, Billion USD**

Source: Compiled by the authors based on Statista. URL: https://www.statista.com/outlook/fmo/wealth-management/digital-investment/worldwide#assets-under-management-aum (accessed on 10.01.2024).

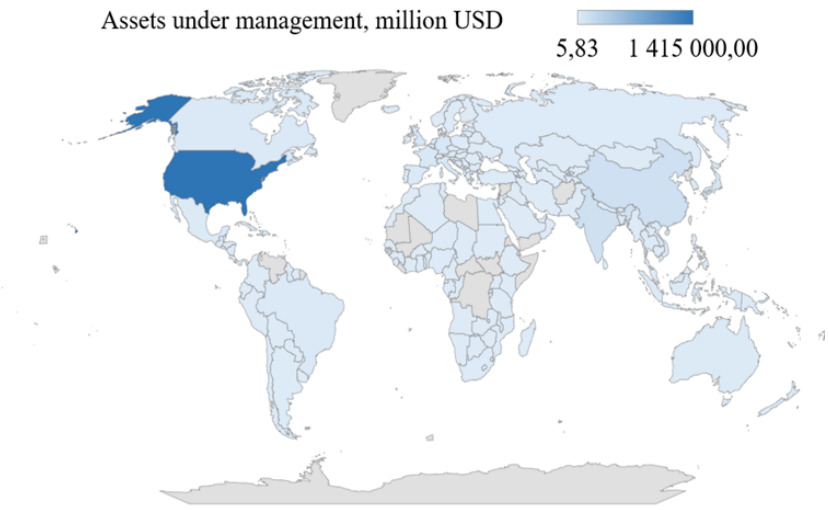
the financial sector is supported by the People's Bank and the Government of China, which are creating regulatory sandboxes for testing innovations and encouraging the development of RegTech [18]. The development of fintech services helps players become more attractive to young, tech-savvy consumers, expand the liabilities of the financial system, and increase investments in innovation [19]. Foreign investments played a significant role in the development of fintech in China [20].

The successes in the development of fintech in the payment sector are also evident in the U.S. They account for about 40% of global investments in fintech. This factor of successful fintech development is characteristic of the UK and developed countries in Europe, although the capitalization of fintech companies in these countries is significantly lower than in the U.S. In 2022, the UK ranked second in the world after the U.S. in the number of "fintech unicorns".

The development of fintech in Japan should also be recognized as successful. Tokyo has identified the digitization of finance as one of the key measures to achieve its goal of becoming a global financial center. This underscores the need to engage fintech companies and promote cashless payments through the use of innovations. The largest fintech companies in Japan are Rakuten and Z. Holdings, offering payment services PayPay and Line based on smartphones, reaching a vast circle of customers worldwide.

Russia is also among the top twenty countries leading in fintech development in the payment sector, holding the 13th position in the ranking. The success of payment fintech development in Russia is determined by the activity of the largest players in the payment market (Sber, Alfa-Bank, Tinkoff, etc.), as well as the proactive policy of the state, including in the area of payment infrastructure development.

The U.S. is far ahead in the development of digital investments. This leadership is due to the high level of development of the American stock market, which serves as a center for capital redistribution not only at the national level but also globally. The U.S. government is paying close attention to the development of fintech in the investment sector. The Strategic Center for Innovation and Financial Technologies (FinHub) of the U.S. Securities and Exchange Commission is engaged in coordinating and overseeing the implementation of new technologies in areas such as distributed ledger technology, automated investment advice, digital market

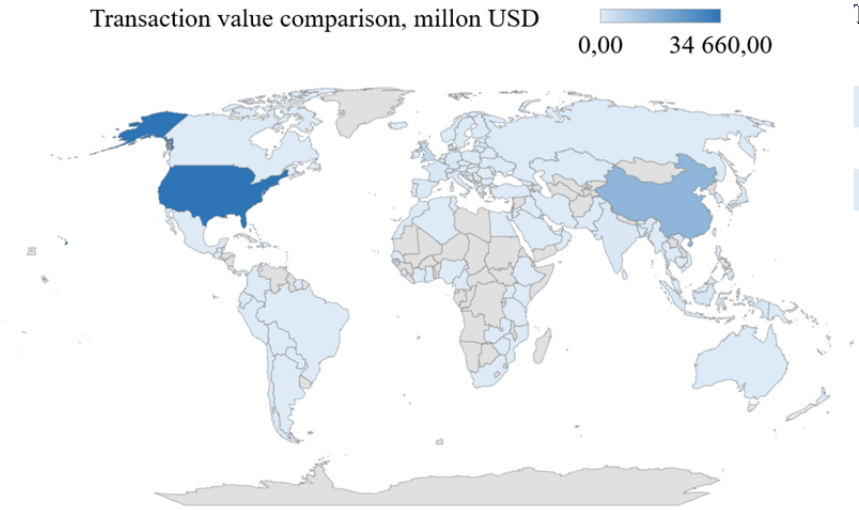


Top 5 (2023), million USD:

U.S.	**1 415 000**
China	132 600
India	121 600
UK	61 930
Japan	54 890

Fig. 2. **Digital Investment: Assets under Management, Million USD**

Source: Compiled by the authors based on Statista. URL: https://www.statista.com/outlook/fmo/wealth-management/digital-investment/worldwide#assets-under-management-aum (accessed on 10.01.2024).



Top 5 (2023), million USD:

U.S.	**34 660**
China	15 570
UK	4 692
Indonesia	1 180
Italy	1 006

Fig. 3. **The Volume of Raised Capital on Digital Platforms, Million USD**

Source: Compiled by the authors based on Statista. URL: https://www.statista.com/outlook/fmo/wealth-management/digital-investment/worldwide#assets-under-management-aum (accessed on 10.01.2024).

financing, and artificial intelligence (machine learning).[1]

Russia ranks 20th in the development of digital investments, significantly lagging behind the top five leaders: the volume of assets under management in Russia is more than six times smaller than that of Japan, which holds the 5th position. This lag behind leading countries is related to the banking model of financing in Russia and the still low level of development of the stock market compared to developed countries.

In terms of the volume of raised capital on digital platforms, the U.S. also leads, which is facilitated by a high level of development in the venture industry and SMEs in this country, in addition to the previously mentioned advantages. A trend in the development of the capital attraction market is the convergence

[1] Strategic Hub for Innovation and Financial Technology (FinHub). URL: https://www.sec.gov/finhub (accessed on 10.01.2024).

Table 1

Indicators for Assessing Fintech Development at the Country Level

Group	Indicators and subcategories	Description	Source
Indicators of fintech companies' development	The significance of the industry index of the stock market, for the calculation of which representatives of the fintech sector have been selected	For the calculation of the index, companies listed on the stock exchange that provide products and services in the areas of payments and clearing, online loans, and other financial sectors using big data, artificial intelligence, and blockchain are selected	Y.Yinhong, J. Li, X. Sun [15]
	The share of intermediate consumption of information and communication technology (ICT) products and services	The share of ICT products and services in the overall intermediate consumption of financial companies	R. Chaudron [21]
	The number of fintech companies	The number of all fintech companies by main business segments: loans, payments, investments, etc.	L.A. Maza, A. Moreno [17]
	The volume of fintech market assets	The total assets of companies engaged in financial activities using digital innovations	I.A. Sedykh [19]
Indicators of development of services and products in the fintech sectors	Digital payment market indicators	Payments for goods and services made online, mobile payments at points of sale (POS) through smartphone applications, and cross-border money transfers conducted over the Internet. They include transaction volumes; the average transaction cost per user; and the user penetration rate	Statista (information platform)
	Cryptocurrency market indicators	Trading volumes of cryptocurrencies; exchange rates in relation to fiat currencies	U. Kochanska, V. Papaefthymiou [22]
	The volume of loans and borrowings issued by fintech and big tech companies relative to GDP	Loans provided by fintech companies and large tech companies over the calendar year, normalized by nominal GDP	G. Cornelli etc. [16]
	Crowdfunding development indicators	Annual interest rates for P2P lending for small and medium-sized enterprises; crowdfunding volume; number of crowdfunding deals	I. Abarca [23]
	Digital investments: the volume of assets under management	It encompasses automated investment services (robot-advisors) and online trading services (online brokers). It implies the use of digital platforms, mobile trading applications, and other technologies to facilitate the buying and selling of financial assets. Includes client income, assets under management; average income per client; average income per client; user penetration rate	Statista (information platform)

Source: Compiled by the authors.

of traditional finance and digital platforms. This involves partnerships between existing financial institutions and digital platforms for capital raising, aimed at offering new products and services, as well as the development of hybrid models that combine the advantages of traditional financing with the speed and accessibility of digital platforms.

Russia ranks 15th in the world for the indicator in question, which is a high position and reflects the development of the use of digital capital attraction platforms, linked to the proactive state policy in the digitalization of the financial system.[2] At the same time, further growth in the volume of attracted capital on digital platforms in Russia may be achieved as financial literacy increases among both the population and entrepreneurs.

DEVELOPMENT OF METHODOLOGICAL SUPPORT FOR FINTECH ASSESSMENT

Three indicators used to assess the fintech sector at the national and international levels have been commented on above. As interest in the fintech has been steadily growing lately, the range of the fintech development indicators is constantly expanding. The study of this issue has revealed more than a dozen such indicators used in academic works and categorized them into two groups (*Table 1*).

Despite the presence of some indicators of fintech development, measuring this market and assessing the dynamics of its growth in practice is still challenging. This can be explained by the following reasons:

- The concept of "fintech" does not have a universally accepted definition and is interpreted differently in literature, including documents and reports from international organizations;
- There are differences in the identification of fintech and big tech companies, as well as innovative financial services in the legislation of different countries; a number of countries do not provide for separate accounting for fintech companies;
- There is a lack of uniformity in data collection across countries over time and in relation to the indicators proposed in theory;
- Fintech solutions and investments in fintech focus on different market sectors that are under the jurisdiction of various regulators.

All of this complicates the comparison of data across countries and the assessment of fintech progress on a broader scale. Moreover, we consider that in order to conduct a thorough and relevant assessment of the development of the global fintech market in the context of financial development, it is necessary to monitor and disclose a number of additional indicators, among which we consider the most important to be:

- The volume of assets of fintech and big tech companies to GDP;
- The cost of fintech services provided to the population and the real sector of the economy relative to GDP;
- The volume of investments in fintech (in total and by individual sectors) relative to GDP;
- The share of active users of fintech services (individuals) in total and by specific sectors (of the adult population);
- The share of active users of fintech services (entities of small and medium-sized enterprises) both in total and broken down by specific sectors.[3]

The availability of a statistical database on these indicators for countries around the world would allow for a deep analysis of the development of the global fintech market, including a more comprehensive comparison of the level of Russian fintech with the

[2] The main directions for the development of the financial market of the Russian Federation in 2024 and the period of 2025 and 2026. URL: https://cbr.ru/Content/Document/File/155957/onrfr_2024–26.pdf (accessed on 10.01.2024).

[3] The selection and design of the proposed indicators align with the methodology of the World Bank, implemented in the construction of the Global Financial Development Database. URL: https://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database (accessed on 10.01.2024).

Table 2

Characteristics of the Reception of Digital Technologies in the Russian Financial Market

Sphere	Characteristics of the development of the Russian market	Subjects of technological changes
Fintech in payments	National payment card system "World" as an alternative to foreign payment card systems is created In order to ensure the possibility of transmitting financial messages within the country in the event of disconnection from SWIFT, a Financial Reporting System (FRS) is established Startups offer innovative services for the payment and administration of customs duties, international money transfer services, payment services through voice assistants, and other payment services using biometric technologies; Fintech companies, in addition to services for individuals and non-financial organizations, are actively developing specialized solutions for banks, the most relevant of which is an open banking platform with a catalog of API methods	– Bank of Russia; — Credit institutions; — Payment service providers; — Fintech startups
InsurTech	Startups offer technological services for corporate medical care; online insurance in the fields of auto insurance, corporate insurance, and sports insurance; services for automatic insurance compensation payments for flight delays or cancellations A number of startups (Mainslab, A1 Platform, Insurion, etc.) are developing and offering innovative solutions to insurance companies, including SaaS solutions, which allows for the automation of insurance service delivery	Insurance companies; Fintech startups
Regtech	The system of external information security audits is being improved, the assessment of the active market is being automated, stress testing platforms for banks are being developed, and compliance with regulatory requirements is being automated	Bank of Russia; Credit institutions
Cybersecurity	A pool of companies developing cybersecurity services for organizations is being formed: Cybertonica, Safetech, Sumsub, Whyhappen, Multifactoring Solutions are proposed to protect electronic document management systems and remote banking from financial and cyber fraud, to safeguard the data of financial companies, and to monitor and assess payment data for risk	Financial organizations; Fintech startups
Blockchain	Based on blockchain technologies, the Bank of Russia has developed and tested a technology for the implementation of the digital ruble as a new form of money Blockchain technologies are developed and used to create and implement business solutions. Since 2020, Masterchain has been providing opportunities for the creation of business applications that facilitate interactions among economic entities, including participants in the financial market	Bank of Russia; Fintech startups

Source: Compiled by the authors.

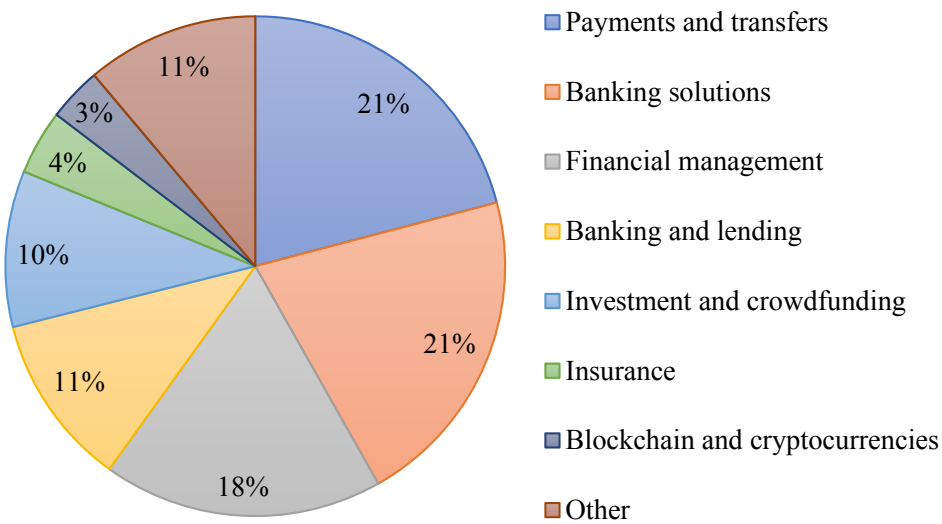


Fig. 4. **Breakdown of Fintech Sectors by Number of Companies in Russia**

Source: Compiled by the authors based on Rusbase data. URL: https://rb.ru/fintech/#startlogo (accessed on 15.04.2023).

advancement of this segment in other countries, the incorporation of metrics related to fintech into the matrix of financial development indicators, and a comprehensive analysis of the interrelationship between financial development, including the fintech sector, and economic growth.

ASSESSMENT OF THE POTENTIAL FOR USING DIGITAL TECHNOLOGIES IN THE RUSSIAN FINANCIAL MARKET

The development of the Russian financial sector follows a trajectory similar to the global one, increasingly relying on the use of digital technologies. The analysis of this process is presented in the *Table 2*.

In terms of the number of participants involved, digitalization in payments and fintech solutions for banks are leading in Russia (*Fig. 4*).

The analysis of this structure indicates that a significant portion of innovative companies consists of fintech startups offering services in the fields of banking and asset management. This is due to the established banking model of financing in Russia: the demand for banking and credit services among Russians exceeds the demand for investment services. Moreover, primarily banks in Russia invest in fintech, offer platforms for piloting solutions, organize expert support, allocate information resources, and establish sales channels. Consequently, the development of financial innovations is determined by the evolution of the banking model of the financial system in the country.

In order to ensure conditions for sustainable financial development in Russia, the following priority areas for promoting fintech and digital technologies in the financial sector can be highlighted:

- identification of fintech companies in Russian legislation with the aim of ensuring the existence of a unified comprehensive classification of financial institutions, as well as to protect the interests of consumers of fintech services;
- decentralization of Regtech development and blockchain technologies, along with increasing the engagement of participants in the banking system in this process, will have a positive impact on the growth of asset profitability and the equity capital of credit institutions;
- acceleration of the implementation of APIs that allow for a more even distribution of the benefits of digitalization and encourage competition in the Russian financial market;

• extension of the implementation of domestic IT solutions in Russian financial sector with the aim of reducing dependence on foreign software and operating systems;

• scaling up the use of distributed ledger technologies and smart contracts to reduce explicit and transactional costs for players and consumers in the financial sector.

These directions will contribute to overall economic growth through channels of capital turnover and liquidity, financial inclusion that ensures deeper public engagement and an increase in the savings rate, as well as through the channel of effective allocation in the process of transforming savings into investments.

CONCLUSION

In the context of rising inter-country competition, the presence of positive effects from financial and technological innovations encompassed by the concept of "fintech" on financial development should be viewed as an important aspect that determines the priority of technological dominance in the modern development of the financial sector. This conclusion is based on the positive transmission of financial development to economic growth observed by researchers.

The analysis of the spheres of fintech penetration determines the necessity of using the following topology for its research by sectors: fintech payments, fintech insurance, Regtech, fintech asset management, capital raising through investment platforms, fintech cybersecurity, and the crypto industry. The identified trends in each sector highlight the significant potential impact of fintech on financial development.

The conducted analysis of the global and domestic fintech services market reveals an overall strong position for Russia in this field. This is determined by a number of factors: the state's involvement in the digitalization of the financial sector contributes to the creation of a legal environment and the development of internal financing for fintech; the level of domestic specialists allows for the creation of innovations, effectively utilizing existing resources; the development of financial technologies in the country meets the growing demand for them from the population and businesses, encouraging healthy competition among players. However, conclusions regarding the level and success of fintech development in Russia or other countries are complicated by the imperfections of the monitoring and measurement system. The proposed additional indicators for measuring fintech at the national level, in line with the World Bank's financial development indicator standards, will contribute to a clearer understanding of a country's positioning in the competition within this sector. They will also enable more qualitative cross-country studies aimed at identifying the externalities of fintech growth for the economies of various countries.

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Financial and Investment Model for Social Security and Sustainable Economic Growth

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ABSTRACT

The **subject** of the study is the models of social security of the population. The **relevance** of the research is derived from the fact that states are increasingly faced with global problems requiring more government funding and restricting how much social risk is covered by state social security mechanisms and models. The **purpose** of the study is to form a financial and investment model of social security that promotes sustainable economic growth. The task is to systematize the aspects of the formation of an optimal financial and investment model of social security. The authors use the methodology of the analysis of the functioning environment (DEA) and the methods of neo-institutionalism, which is the most promising and complete concept for studying structural changes and investment strategies. The main results of the study show that inflation can have a negative impact on the social protection system. An optimal model of social security is proposed to stimulate economic growth. It is **concluded** that regardless of the division of the social security system into the state and non-state sectors, the proposed model of social security will achieve a synergistic effect and can have a positive impact on the quality and life expectancy of the population, which will favorably affect the indicators of economic activity and economic growth.

Keywords: social security models; sustainability; economic growth; neo-institutionalism

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INTRODUCTION

The system of benefits and other social payments provides financial support to the population in various situations, such as unemployment, disability, the death of a breadwinner, and the birth of a child. It can vary depending on the country and region. The insurance coverage system provides financial support for workers who have been harmed as a result of their professional activities.

The system of medical and pharmaceutical provision, as well as sanatorium-resort treatment, ensures the accessibility and quality of medical services and medications for the population. It can include various types of health insurance, coverage for medication expenses, and spa and resort treatment.

The system of social indicators provides the population with access to various types of social services, such as assistance in caring for the elderly and support for those raising one to three children. It can include various types of social insurance, as well as government support for providing social services [1].

The subject of the research is the selection of the most effective model of social security. A hypothesis has been put forward that the income level of the population is an important factor influencing the approaches to the formation of financial and investment models for both state and non-state social security. For many years, discussions on this topic have been ongoing among leading Russian researchers. The greatest contribution to the formation of the mechanism for state and financial regulation of the social sphere was made by Z.A. Arsakhanova [2].

The novelty of this research lies in the systematization of the aspects of forming an optimal financial and investment model for social security. The relevance of the research is determined by the need to reform the social security system in Russia.

The methodological basis of the research is data envelopment analysis (DEA) of social security and the theory of sociological institutionalism.

Sociological institutionalism is a subtype of new institutionalism that examines how institutions give meaning to individuals. It is believed that institutions developed similarly across all organizations, even though they evolved differently. Institutions are seen as crucial for maintaining and disseminating cultural norms.

At the same time, there is the concept of new institutional economics. This is an economic perspective that focuses on the social and legal norms and rules underlying economic activity. This is an attempt to take economic theory beyond the confines of earlier institutional economics and neoclassical economics by expanding its scope. It differs from functionalist theories and approaches to rational choice in that it emphasizes that many outcomes are possible, small events and coincidences can have significant consequences, actions taken once are difficult to reverse, and results may be ineffective.

BENCHMARK OF SOCIAL SECURITY

Next, we described the methodological foundations of the functioning of benchmark models of social security in more detail.

Bismarck model is based on the principle of equality, which means that all citizens have the right to social protection and benefits, regardless of their social status or income [2]. Employers and employees share a common responsibility for funding social funds. Employers pay contributions for their employees, while workers' pay for themselves. The state controls and regulates the activities of social funds, ensuring social protection for all citizens, including pensions, unemployment benefits, health insurance, and social benefits (*Table 1*).

In the *Beveridge model*, the state invests in education, science, infrastructure, and other public goods. These investments create a favorable environment for the development of the private sector, which begins to produce more goods and services. State support for

Table 1

Bismarck Model Mechanism

Mandatory social insurance>	Employees and employers >
State regulation>	Principles of the model>

Source: Compiled by the authors.

Table 2

Beveridge Model Mechanism

Government is investing >	Increase in tax revenues to the budget >
< Development of the private sector	<Growth in production and income

Source: Compiled by the authors.

Table 3

Social Support Model Scheme

State funds		Social Fund of Russia	Government, Social Fund of Russia
Financing >	Investment in social program	Management	Supervision and control
Non-state funds		Non-state social protection funds	Auditor

Source: Compiled by the authors.

all citizens means that every citizen has the right to a certain level of social protection, regardless of their income or status. The state provides a minimum income for all citizens, allowing them to cover basic expenses for housing, food, and other essential needs.

The growth of production and income in the private sector leads to an increase in tax revenues to the state budget [3, 4]. The government uses these tax revenues for the further development of public goods and investments in the economy. Thus, the Beveridge model suggests that the state and the private sector interact with each other, creating a favorable environment for economic growth and an increase in the standard of living for the population [5, 6] (*Table 2*).

At the same time, there are also alternative models of social security. For example, the model of the social security system in the USSR (*USSR model*) was based on the principles of state social protection and equality of citizens and included the following elements:

1. State social insurance includes insurance for workers against workplace accidents, illnesses, disabilities, and pension provision.
2. State social security implies government assistance to low-income citizens, including children, pensioners, disabled individuals, and other categories of the population.
3. Public healthcare includes medical institutions, treatment, and disease prevention.
4. Public education. Education in the USSR was state-run and free for all citizens. The education system included schools, vocational schools, technical colleges, universities, and other educational institutions.
5. Public housing. Housing provision in the USSR included government support for housing construction and the provision of housing on preferential terms. [7–10].

The mechanism of functioning of the *financial and investment model of state and non-state social security* includes the following elements (*Table 3*):

1. Financing. State social security is funded from the state budget, while non-state social security is financed through contributions from employers and employees, as well as donations and charitable contributions [11, 12].
2. Investing. Market pension funds invest in production and other projects, then receive interest, which goes towards pension payments [13, 14].
3. Management. Financial and investment management is carried out by specialized institutions established for this purpose. For example, these can be state social insurance funds or non-state social protection funds [15, 16].
4. Control. The control over the use of funds and the effectiveness of programs is carried out by government bodies and independent auditing firms [17, 18].

METHODOLOGY

The DEA methodology [19, 20] includes a basic DEA model focused on optimizing input parameters. (1–4). Formulas (1, 2) represent an input-oriented model with constant returns to scale (CRS), based on which a piecewise linear boundary of relative efficiency is formed:

$$\tau_x\left(x^0,y^0\right)=\min_{\theta,\,\lambda}(\theta) \tag{1}$$

$$\begin{cases} \sum_{j=1}^{N}\lambda_j y^j \geq y^0; \\ \sum_{j=1}^{N}\lambda_j x^j \leq \theta x^0; \\ \lambda \geq 0; \\ j=1,2,\ldots,N \\ \theta\in[0;1] \end{cases} \tag{2}$$

The article employs an input-oriented model with variable returns to scale (VRS), which creates a convex frontier of relative efficiency (3), (4):

$$\tau_x\left(x^0,y^0\right)=\theta^*, \text{where } \theta^*=\min_{\theta,\lambda}(\theta) \tag{3}$$

$$\begin{cases} \sum_{j=1}^{N}\lambda_j y^j \geq y^0; \\ \sum_{j=1}^{N}\lambda_j x^j \leq \theta x^0; \\ \sum_{j=1}^{N}\lambda_j = 1; \\ \lambda \geq 0; \\ j=1,2,\ldots,N \\ \theta\in[0;1] \end{cases} \tag{4}$$

Output-oriented constant returns to scale (CRS) model, on the basis of which a piecewise linear boundary of relative efficiency is formed (5), (6):

$$\tau_y\left(x^0,y^0\right)=\frac{1}{\varphi^*}, \text{ where } \varphi^*=\max_{\theta,\varphi}(\varphi) \tag{5}$$

if

$$\begin{cases} \sum_{j=1}^{N}\lambda_j y^j \geq \varphi y^0; \\ \sum_{j=1}^{N}\lambda_j x^j \leq x^0; \\ \lambda \geq 0; \\ j=1,2,\ldots,N \\ \theta\in[0;1] \end{cases} \tag{6}$$

A results-oriented model with variable returns to scale (VRS), which creates a convex frontier of relative efficiency (7), (8):

$$\tau_y\left(x^0,y^0\right)=\frac{1}{\varphi^*}, \tag{7}$$

where $\varphi^*=\max_{\theta,\varphi}(\varphi)$,

if

$$\begin{cases} \sum_{j=1}^{N} \lambda_j y^j \geq \varphi y^0; \\ \sum_{j=1}^{N} \lambda_j x^j \leq x^0; \\ \sum_{j=1}^{N} \lambda_j = 1; \\ \lambda \geq 0; \\ j = 1, 2, \ldots, N \\ \theta \in [0;1] \end{cases} \quad (8)$$

where θ — input-oriented DEA model parameter;

$\frac{1}{\varphi^*}$ — parameter of the output-oriented DEA model;

x^j — parameter of the input variable vector;

x^0 — object's input parameter;

y^j — parameter of the output variable vector;

y^0 — object's output parameter;

λ_j — constant constraint in VRS models.

The DEA methodology appears to be the best approach for evaluating the effectiveness of investments in social security and financial models in terms of their complexity and the ability to utilize multiple factors. As part of economic-mathematical modeling using the input-oriented DEA model with the aim of optimizing budget expenditures. The volume of budget expenditures on social policy directly depends on the decisions and effectiveness of the government, as well as on the efficiency of the financial and investment model of social security. Conducting a comparative analysis using the DEA model allows for obtaining data on the efficiency (economic and effective) use of budgetary funds to address the issues of poverty and income inequality, as monetary indicators of the effectiveness of social policy. The DEA methodology can be expanded within the framework of cross-country analysis by including a more extensive list of socio-economic indicators, for example, by adding the income loss substitution rate, the average annual return on pension asset management, physical morbidity indicators, specific poverty rates (families with children), the level of population coverage by social services in various sectors of social protection, and unemployment. Conducting an inter-country analysis will allow for a comparison of all sources of funding for national models, including state, extrabudgetary, and non-governmental sources, with the indicators of the country's socio-economic development.

The econometric analysis of panel data is applied at each of the two stages of the main phase of the research. In the previous paragraph, it was noted that in some studies this method is used as a supplement to DEA analysis in the form of Tobit regression, a censored regression where specific constraints will be imposed on performance indicators, for example, to filter out the most efficient (benchmark) objects of the study. The panel regression format is also possible, but for performance indicators using the DEA method, a model with constant returns to scale is the most suitable (9).

$$y_{i,t} = \alpha + x_{i,t}^{'}\beta + z_i^{'}\gamma + c_i + u_{i,t}, \quad (9)$$

where $z_i^{'}$ — parameter vector; c_i and $u_{i,t}$ — random variables; $E(c_i) = 0, E(u_{i,t}) = 0$; in random effects models assumes that $E(c_i \mid z_i^{'}, X_i) = 0$; in fixed effects models, it is allowed that $E(c_i \mid X_i) = 0$; depends on X_i; fixed effects model does not allow to evaluate α and γ; in the through regression assumes that $c_i = 0$. Before conducting the regression analysis, we ensured that the data series under examination are stationary using the Dickey-Fuller test.

RESULTS. FORMATION OF A FINANCIAL–INVESTMENT MODEL OF SOCIAL SECURITY THAT CONTRIBUTES TO SUSTAINABLE ECONOMIC GROWTH

The directions of social security system development can be explained from the

Table 4

Sources of Financing for Financial and Investment Models of Social Security for the Population

Government funding sources	Social sphere	Non-government funding sources
Federal budget	Social policy	Private pension funds
Regional budget	Health	Private insurance funds
Local budget	Education	Non-profit organizations
Extrabudgetary funds	Culture	Population, enterprises

Source: Compiled by the authors.

perspective of neo-institutionalism. The systems of social security institutions are an important element of public life in most countries around the world. They are the foundation for providing various social services, social protection measures, and financial assistance to the population in the following areas [5–7]:

Old age — pension payments, assistance with household tasks and care;

- disabled population (due to disability or illness) — disability benefits (sick leave), home assistance and care;
- unemployed — benefits, early retirement;
- family — benefits (one-time payment, monthly allowance, payments to a single parent), paid maternity leave;
- healthcare — the provision of medications for treatment and prevention, and the delivery of medical assistance;
- housing — benefits, subsidies (for rent, utility payments) and others.

A methodologically sound approach to the formation of a financial-investment model should take into account the requirement for its long-term financial sustainability; therefore, the volumes of social services and financial assistance provided must be aligned with the sources of funding. In accordance with the Federal Law "On the Basics of Social Services for Citizens in the Russian Federation", there are four main sources of funding for the social security system for the population:

- funds from various levels of the budget system;
- charity and voluntary contributions;
- funds provided by the recipient for the provision of social services;
- income from the activities of organizations engaged in social services.

The state also employs various administrative levers (setting insurance contribution rates) and social incentives (higher returns compared to state benefits) to influence employers' participation in the development of the country's social policy and to enhance the economic and social independence of households for their self-sufficiency.

The scale of state social support directly depends on the capabilities of the state budget. Developed countries have a higher quality social protection system, and the government is more capable of influencing the development of financing mechanisms [18].

In the broadest sense, the financing mechanism of the social security system can include sources from both the public and private sectors of the economy (*Table 4*).

State funding for social welfare in European countries is more developed compared to other regions of the global economy. In Europe, all programs are provided to some extent through state mechanisms and are funded by the state budget (*Table 5*).

The "other" section typically includes three types of programs, among which are programs

Table 5

Volume of Social Security Programs in Various Regions of the World Economy

Field	Europe		America		Asia and Oceania		Africa	
	Total	Other	Total	Other	Total	Other	Total	Other
Pension benefits	100% (45)	–	100% (38)	–	98% (50)	–	100% (50)	–
Sickness benefits	100% (45)	–	100% (38)	11% (4)	88% (45)	45% (23)	92% (46)	64% (32)
Maternity benefits	100% (45)	–	95% (36)	3% (1)	90% (46)	37% (19)	98% (49)	34% (17)
Medical benefits	100% (45)	–	89% (34)	–	96% (49)	4% (2)	82% (41)	8% (4)
Payments related to workplace injuries	100% (45)	16% (7)	100%	24% (9)	92% (47)	37% (19)	100% (50)	28% (14)
Unemployment benefits	100% (45)	–	42% (16)	3% (1)	49% (25)	–	20% (10)	2% (1)
Family benefits	98% (44)	–	71% (27)	8% (3)	61% (31)	2% (1)	62% (31)	2% (1)

Source: Compiled by the authors [2].

Table 6

Comparative Characteristics of Social Security Models

No.	Name	Activity
1	Social security insurance model	Based on the principle of compulsory insurance, where employer and employee contribute to a social fund which is then used for pensions, benefits and other social benefits
2	Social security investment model	Involves investing social fund funds in various financial instruments such as stocks, bonds, real estate. This model allows to increase the return of the social fund and ensure its financial sustainability in the long-term
3	Social partnership model	Based on the cooperation of the state, employers and unions in solving social security issues. This model involves the establishment of special commissions and councils that are responsible for developing and implementing social programmes
4	Income redistribution model	Suggests the use of a tax system to redistribute income to the most needy. This model allows social justice and reduces social inequality
5	Capitalization model	The funds collected from taxes and contributions are invested in various financial instruments such as stocks, bonds and real estate. Income from these investments is used for pensions and other social benefits
6	Hybrid model	The funds collected from taxes and contributions are invested in various financial instruments, but also used for immediate payment of pensions and other social benefits. This model combines the advantages of capitalization and distribution models
7	Individual account model	Each employee has his or her own personal account to which his or her contributions are credited. These funds are invested in various financial instruments and retirees receive payments from their individual accounts. This model allows employees to control their savings and choose investment strategies

Source: Compiled by the authors.

Table 7

Methodological Features of Social Security Models for the Population

Model/Criterio	Russian model	USSR model	Bismarck model	Beverage model
The principle of determining the size of benefits	At the expense of the minimum subsistence level	At the expense of the minimum subsistence level	At the salary and insurance volumes	At the expense of the minimum subsistence level
Categories of recipients of social support measures	Whole population	Working population	Working-age population	Whole population
Source of funding	Government budget and funds	State budget	Social contributions	State budget

Source: Compiled by the authors [2].

provided by financial intermediaries, reserve funds, and exclusively by employers. These types of programs are based on private mechanisms for funding social security and are not sponsored by the government. In other words, "others" reflects the number of countries where certain social programs are provided solely through private initiatives.

For the countries of Africa, Asia, and the Pacific region, particularly for programs related to sickness and/or maternity benefits, as well as compensation for work-related injuries, the situation is completely different compared to Europe. The governments of most countries in these regions do not have sufficient funding sources, which is why a significant number of programs are supported solely by private companies [5–7].

Unemployment benefits are a category of social payments that are less represented in the analyzed regions, with the exception of European countries.

The methodological aspects of choosing a specific form of financial-investment model for constructing the sectoral components of the social security system depend on a multitude of different factors, most of which are related to the country-specific characteristics of the economy, the size and demographic composition of the population, the economic potential of the country within the system of international division of labor, the extent of coverage of the population by types of social protection, and the peculiarities of financing social services (*Table 6*).

Initially, the foreign state social security mechanism was based on one of two benchmark financial-investment models of social security — the continental Bismarck model and the Atlantic Beveridge model. The methodological approach to building financial and investment models of the Bismarck type is based on the implementation of the principle of mutual assistance and insurance for employed citizens who have stable jobs and labor income. The methodological basis for constructing financial and investment models, such as the Beveridge model, was based on supporting the least advantaged segments of the population and ensuring a minimally acceptable standard of living for all citizens, regardless of their labor income.

USSR model and Russian models of social protection have some differences from the benchmark models of Bismarck and Beveridge (*Table 7*).

The social system in the Soviet Union established a number of important standards and basic principles that became the foundation for the further development of the domestic social protection system. In the modern world, pure models of Beveridge and Bismarck do not exist. Countries are shaping social security models that combine features of both benchmark systems, endowing them

with certain unique characteristics, traits, and traditions that have developed over a long period of time within these nations.

Despite the fact that the systems of many countries originated from one of two models — Bismarck or Beveridge — the modern practical experience of their application varies significantly: in some countries, a substantial share of social benefits is guaranteed by the state, while in others, private sources of funding are well-developed. To some extent, this is related to the characteristics, history, and individual traditions of nations, as well as the worldview and beliefs of the population, but the most important role is played by macroeconomic factors, the development of the economy, and the government's efforts to enhance welfare.

The development of effective financial and investment models for state and non-state social security should be carried out with consideration of the following recommendations.

1. Ensuring stability and financial sustainability. Social security systems may face the issue of insufficient financial sustainability if their obligations to the population exceed the available funding sources over the long term. This problem is characteristic of the models of modern developed countries that excessively use debt financing to address current social welfare issues.

2. Assessment of the financial needs of social security. At this stage, an assessment of the financial needs of social security is conducted, which must be met to achieve the established goals and objectives.

3. Focus on all layers of society. The model must be inclusive — it is essential to take into account the characteristics of specific groups of people and the presence of difficult life circumstances. The level of coverage by social support measures for the population is one of the key indicators of the effectiveness of the social security system in contemporary conditions.

4. Availability of financial incentives. To increase the scale of using the financial-investment model, it is necessary to develop financial incentives. The characteristics of financial incentives should reflect the needs and savings capabilities of different subgroups of the population.

5. Establishing a basic investment strategy, the principle of financing — accumulation. Social strata that do not want or cannot choose an investment strategy within the model should receive a basic strategy in accordance with the goals of the social security system.

6. Definition of a fixed lifetime income level as the default value for payment. Lifetime income can be secured through annuities with guaranteed or non-guaranteed payments — as agreed. Flexibility can be achieved through a partial, deferred lifetime income combined with the option to withdraw funds for immediate use.

7. The model parameters should incorporate relevant and regularly updated assumptions about mortality and birth rates that take into account future improvements in life expectancy. Government authorities should regularly update data on natural population growth and loss.

8. Providing the opportunity for consultation on the possibilities of conducting operations within the framework of the model. Establishing effective, personalized, regular, consistent, and impartial communication. Comparison tools for various investment and savings programs should provide standardized information that allows users to compare performance, costs, investment allocation, and possibly other parameters, such as ESG factors.

9. Transparency and openness. Ensuring oversight of compliance with legislation regarding the use of funds within the framework of the model.

10. The flexibility of the system and its ability to adapt to various shocks and changing external conditions. Social security systems may be insufficiently flexible, which

can lead to an inability to adapt to changing conditions.

11. A sufficient level of financial literacy, trust, and engagement among the population. Social security systems play an important role in societal development and provide social protection and assistance to the population in various areas of life. It is important to continue research and develop effective social welfare models, taking into account the changing needs and demands of the population. It is important to collaborate with society and take into account the opinions of the population, as well as to ensure a high level of governance and control over social welfare systems.

CLASSIFICATION OF PARAMETRIC FEATURES OF FINANCIAL–INVESTMENT MODELS OF STATE AND NON-STATE SOCIAL SECURITY

The parameters of the social security model include various quantitative and qualitative characteristics of its functioning mechanism, which can be assessed using typical social security indicators, such as the parameters of financial-investment models in different countries.

There are many factors that influence the functioning of the social protection system. These factors can be exogenous and endogenous. Exogenous (external) factors, such as international trade, can have a significant impact on the social protection system. If a country actively participates in international trade, it can boost economic growth and improve conditions for social protection. Endogenous (internal) factors, such as the demographic situation and income levels in the economy, can also have a significant impact on the social protection system. If there is a large number of unemployed people in the economy, it can lead to a decrease in the financial resources available for social protection.

The income level of the population is also one of the key factors influencing the approaches to the formation of financial and investment models for both state and non-state social security. In high-income countries, government social security systems typically provide a wide range of services and benefits, including pensions, health insurance, and unemployment benefits. In these countries, there are also non-governmental social security systems, such as private pension funds and health insurance companies.

The criticism of social welfare models in low-income countries is that government social security systems can be limited and unable to provide a wide range of services and benefits. In these countries, non-governmental social security systems may be more developed, as they provide services and benefits that government systems are unable to offer. Thus, the income level of the population is an important factor that influences the approaches to the formation of financial and investment models for both state and non-state social welfare. In high-income countries, government social security systems are usually more developed, while in low-income countries, non-governmental social security systems may be more advanced [7–10].

CONCLUSION

The research includes several points of scientific novelty: a systematization of the aspects of forming an optimal financial-investment model for social security has been conducted. The results of the study show that inflation can have a negative impact on the social protection system. The level of income in the economy can be of great importance for the social protection system. If there is a high level of income in the economy, it can contribute to improving the conditions for social protection of citizens. Various cultural and social factors can influence the demand for social protection and the availability of social services. The results show that neo-institutionalism methods are the most

promising and comprehensive concept for studying structural changes and investment strategies.

The article confirms the thesis that the income level of the population is an important factor that influences the approaches to the formation of financial and investment models for both state and non-state social security.

Further research could focus on current trends in the formation of financial and investment models for social security in BRICS countries.

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J. An — methodology.
A. Yu. Mikhaylov — writing original paper.
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ORIGINAL PAPER

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Statistical Analysis of Stable Distribution Application in Non Life Insurance

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ABSTRACT

In recent years, the theory of stable variables has seen many exciting developments, due to the fact that it is a very rich class of probability laws able to represent different asymmetries, and heavy tails, so modelling complex phenomena; unlike normal law, which very often underestimates extreme events. α-stable distributions are a class of heavy-tailed distributions. For that, we will start in this paper by presenting a review of graphical tests, which will help us to verify if we are in the presence of data with infinite variance or not, and more precisely of stable distribution. Then we will apply these tests to real data representing car claim amounts, allowing us to assume that our sample follows a stable distribution. In order to confirm this hypothesis, we will therefore estimate the four parameters of the distribution using the McCuloch method, as well as the Koutrouvelis method in order to be able to make the diagnosis with Kernel Densities, and finally we will demonstrate that α-stable distribution is better fitted to the car claim amount data by using the Kolmogorov test.

Keywords: stable distribution; infinite variance; simulation; statistical test

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INTRODUCTION

For any company, it's often essential to develop adequate strategies for efficient portfolio management to deal with probable risks. To do this, it is often sought to develop representative mathematical models, to be used as tools for analysis, forecasting and simulation for decision support. The choice of model is very important and as we know, Gaussian processes and variables have been studied for a long time and their usefulness in stochastic and statistical modelling is well accepted. However, they don't allow for large fluctuations and may sometimes be inadequate for modelling high variability. That's why it's important to focus on other families of laws and processes, such as stable random variables and processes, which naturally appear as alternative modeling tools. In recent years, the theory of stable variables has seen many exciting developments, due to the fact that it is a very rich class of probability laws able to represent different asymmetries, and heavy tails, so modelling complex phenomena.

α-stable distributions are a class of heavy-tailed distributions, this class was characterized by [1], in his paper the sum of independent and identically distributed variables. This class has a great importance in the theory of extreme values, because stable distributions can be characterized from the Generalized Central Limit Theorem given by Gnedenko and Kolmogorov (1954) [2] and indicates that if the condition of finite variance is not respected, the only possible limit law of the sum of n random variables (*iid*) is a Stable law. For all these reasons, we have chosen to focus on stable distribution for fitting claims amounts of car insurance.

HEAVY-TAILS DISTRIBUTION

In this section, we present briefly the notion of heavy-tailed distribution and various classes of such distributions. It is not easy to define heavy tails distribution precisely, but several definitions have been associated with such distributions according to classification criteria. The easiest characterization is based on the comparison with the normal law [3]. The distribution of a *r.v* X with mean μ and variance σ^2 and is said to have a heavy tail if:

$$\frac{E\left[(X-\mu)^4\right]}{\sigma^4} > 3. \quad (1)$$

This is equivalent to saying that a distribution is heavy-tailed if and only if its kurtosis (the 4th central moment) is higher than the normal distribution (for which it's equal

to 3), this indicates high peaks and fat tails (leptokurtic). Kurtosis less than three (<3) indicates lower peaks. The criterion, given by equation (1) is very general and can't be applied if the 4th moment of a random variable doesn't exist.

Unfortunately, it is not easy to define heavy tails precisely, and there is no criterion to classify all distributions relative to the right tail. We present in this section five classes of heavy-tailed distributions, borrowed from [4]:

- Distributions with no exponential moments (E);
- Subexponential distributions (D);
- Distributions with regular variations (C);
- Distributions with Pareto behaviour (B);
- α -Stable distributions with $\alpha < 2$ (A).

For these classes we have the following relationships:

$$A \subset B \subset C \subset D \subset E$$

These classes of distributions are nested, the broadest class E encompasses all distributions with $E\left(e^X\right) = \infty$. All distributions of class E are heavy-tailed with respect to the normal distribution (the tail probability $P(X > x) = 1 - F(x)$ of the normal distribution declines faster than exponentially).

ALPHA-STABLE DISTRIBUTION

The class of stable distributions is defined by means of their characteristic functions. With very few exceptions, no closed-form expressions are known for their densities and cumulative distribution functions, see [5] or [6, 7].

Definition: A random variable X is said to have a stable distribution, $X \in S_\alpha(\beta, \mu, \gamma)$ if its characteristic function $\phi_X(t) = Ee^{itX}$ has the following form:

$$\phi_X(t) = \exp\left\{i\mu t - \gamma^\alpha |t|^\alpha \left(1 - i\beta sign(t) W(\alpha, t)\right)\right\},\ t \in IR, \quad (2)$$

where

$$W(\alpha, t) = \begin{cases} tan\dfrac{\alpha\pi}{2} & if \quad \alpha = 1 \\ -\dfrac{2}{\pi} log|t| & if \quad \alpha \neq 1 \end{cases}$$

and

$$sign(t) = \begin{cases} 1 & if \quad t > 0 \\ 0 & if \quad t = 0 \\ -1 & if \quad t < 0 \end{cases}$$

The stable laws are described by four parameters:

- *Index of stability* $0 < \alpha \leq 2$: determines the rate at which the tails of the distribution taper off. When $\alpha = 2$, the Gaussian distribution results, when $\alpha < 2$, the variance is infinite and the tails are asymptotically equivalent to a Pareto.
- *Skewness parameter* $\beta \in [-1, 1]$: when β is positive (negative), the distribution is skewed to the right (left), when $\beta = 0$, the distribution is symmetric about the location parameter μ. As α approach 2, β loses its effect and the distribution approaches the Gaussian distribution regardless of β.
- *Location parameter* $\mu \in IR$: determines the shift of the mode (the peak) of the density.
- *Scale parameter* $\gamma > 0$: determines the width, when $\gamma = 1$ and $\mu = 0$ the distribution is called standard stable.

STATISTICAL TESTS FOR STABLE LAW

In this section, we describe two graphics tests that may allow us to know if we are in the presence of an infinite variance law or not [8, 9]. For this, we suppose that we have a sequence of observations $(x_1, \ldots, x_n)$.

Test 1:

This first test is the simplest and most used, it's decomposed into two parts:

- Calculate the variance for different values of n:

$$S_n^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2. \quad (3)$$

- Draw the graph $\left(n, S_n^2\right)$

Distribution has finite variance, then there exists a finite constant c, such as:

$$S_n^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2 \to c \text{ as } n \to \infty \text{ Almost surely,}$$

and vice versa.

When n increases and when the variance is finite, the plot must converge (see *Fig. 2* for $\alpha = 2$); On the contrary, if we are in the presence of a law with infinite variance, the plot diverges, and does not especially grow exponentially, as some received ideas suggest.

Test 2:

This second test is based on the fact that stable distributions have asymptotically the same behaviour as a Pareto distribution:

$$\lim_{t\to\infty} t^{\alpha} P\left(|X|>t\right)=\gamma C(\alpha) \quad (4)$$

So in $+\infty$ we have $\dfrac{d\log P\left(|X|\right)>t}{d\log t}$

$\dfrac{d\log IP\left(|X|>t\right)}{d\log t}$ $\dfrac{d\log IP\left(|X|>t\right)}{d\log t}$ is equivalent to α

Also here we have two steps:

- Fix t and calculate $g(t)=log\left(\dfrac{1}{n}\sum_{i=1}^{n}1_{|x_i|>t}\right)$
- Draw the graph $\left(\log t, g(t)\right)$ and see if the slope is finite from some value of t.

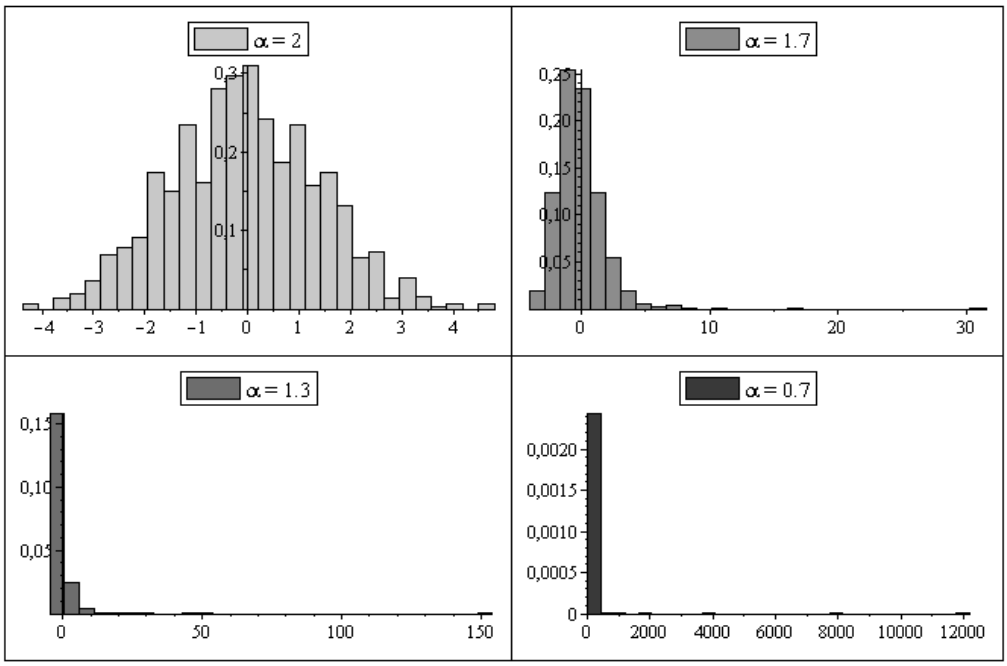

Fig. 1. **Histogram of** $S_{\alpha}(1,0,1)$

Source: Compiled by the authors.

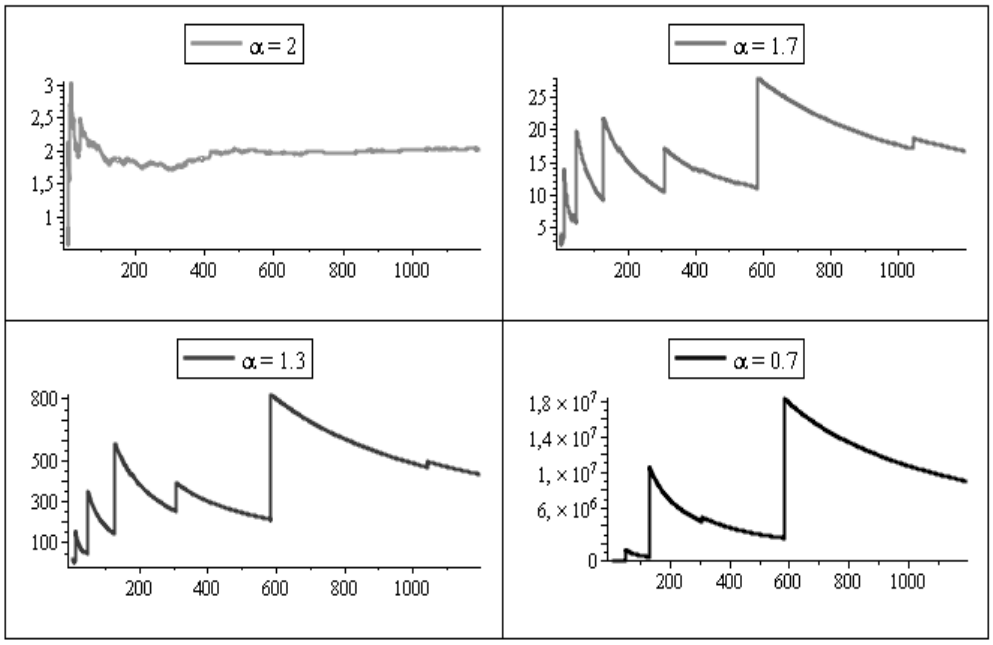

Fig. 2. **Test 1 for** $S_{\alpha}(1,0,1)$ ***r.v***

Source: Compiled by the authors.

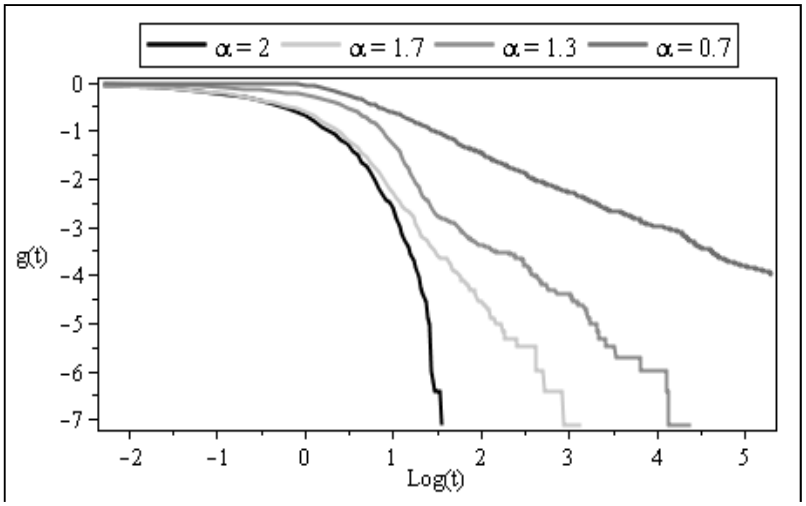

Fig. 3. **Test 2 of $S_\alpha(1,0,1)$ *r.v* for Different Value of α**

Source: Compiled by the authors.

EXAMPLES OF GRAPHICS TESTS

For understanding the previous tests, we simulated by Chambers, Mallows and stuck methods [10, 11] many sequences of α-stable *r.v* for different values of α : 0.7, 1.3, 1.7 and $\alpha = 2$, with $\beta = 1$, $\mu = 0$ and $\gamma = 1$. The r.v. is $S_\alpha(1,0,1)$, for this, the distribution is skewed to the right. In first, we present the histogram of stable distribution for different values of α in *Fig. 1*.

As shown in *Fig. 2*, for a population with finite variance (like Gaussian distribution for $\alpha = 2$), the partial variance soon settles down close to the population variance (converges to a constant). For a population with an infinite variance, we see jumps up in the partial variance followed by slow declines until the next very large value appears in the sample. When n increases, the series of empirical variance not only diverges, but also oscillates with a high frequency for < 2. But when $\alpha = 2$ the series of variances no longer varies and becomes stable, and in *Fig. 3*, only the case $\alpha = 2$ gives a finite slope (the slope is a vertical line when $n \to \infty$).

APPLICATION IN NON-LIFE INSURANCE

Standard Mathematical Model

In the most general case a risk process $R(t)$ representing the behaviour of an insurance company is described by the following equation:

$$R(t) = u + ct - S(t). \quad (5)$$

Where u is the initial capital, c is the constant premium rate and $S(t)$ is the claim process defined by:

$$S(t) = \sum_{i=1}^{N(t)} X_i \quad (6)$$

$\{X_i\}_{i\geq 1}$ Sequence of independent, positive, identically distributed *r.v*, which represent claim severities.

N_t : Number of claims in (0, *t*], we assume that X_t and N_t are independent.

This model is known as the classical risk process or Cramér-Lundberg model [12], where $S(t)$ is a compound Poisson.

As we can see, the aggregate claim amount $S(t)$ is a random sum of random variables. And for good risk management of the insurance company, it needed to have good modelling of this sum (claim process), which depends essentially of claims amounts and their frequencies. To do this, we must examine sequences of real data to have the best estimate of the claim amount distribution.

Statistical Analysis of Real Data

For a good modelling of the risk, it's important to know the distribution of claim amounts. For this, we propose to study the daily real data from an insurance company over a period of one year (2017 and 2018) using Matlab R 2021a. *Fig. 4* and *Fig. 5* give us the behaviours of claims amounts.

It's clear that there is considerable jump in the claims amount, especially in 2018.

In *Fig. 6*, we can see that we have the asymmetric leptokurtic features, that is, the claim distribution is skewed to the right, and has a higher peak and heavier tail than those of the normal distribution.

Histograms of our data are similar to the histogram of α-stable distribution for $\alpha < 2$ (see *Fig. 1*), which is skewed right. So, the α-stable distribution can be seen as a useful tool to capture the asymmetric leptokurtic features of the claim amount, which is confirmed in *Fig. 7* and *Fig. 8* corresponding to the results of tests 1 and 2 for real data.

Through *Fig. 7* and *Fig. 8*, we can see that the behavior of our data sample is closer to the stable law. The empirical variance of all our data sets (*Fig. 7*) oscillates with a high frequency, and the slope of our data sets is not finite (*Fig. 8*).

TEST AND DIAGNOSTICS

α -Stable Parameter's Estimation

There are different methods for estimation of the stable distribution parameters; we will only define the two methods used in this work.

Quantile Method:

McCulloch [13] generalized the sample quantile methods for symmetric stable laws $(\beta = 0, \mu = 0)$ with $\alpha > 1$ of Fama and Roll (1971) [14] and provided consistent estimators of all four stable parameters (with the restriction $\alpha > 0.6$. He uses five sample quantiles (with q = 0.05, 0.25, 0.5, 0.75, 0.95) and matches the observed quantile spread with the exact quantile spread in stable distributions, for more details see [15] or [16].

Empirical Characteristic Function Method:

Koutrouvelis [17] presented an accurate regression-type method which starts with an initial estimate of

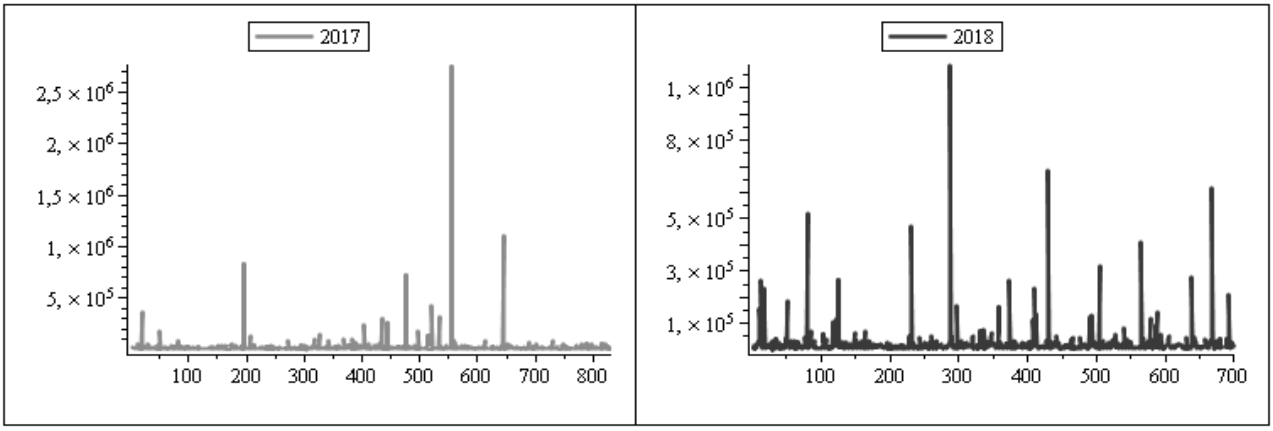

Fig. 4. **Claims Amount**

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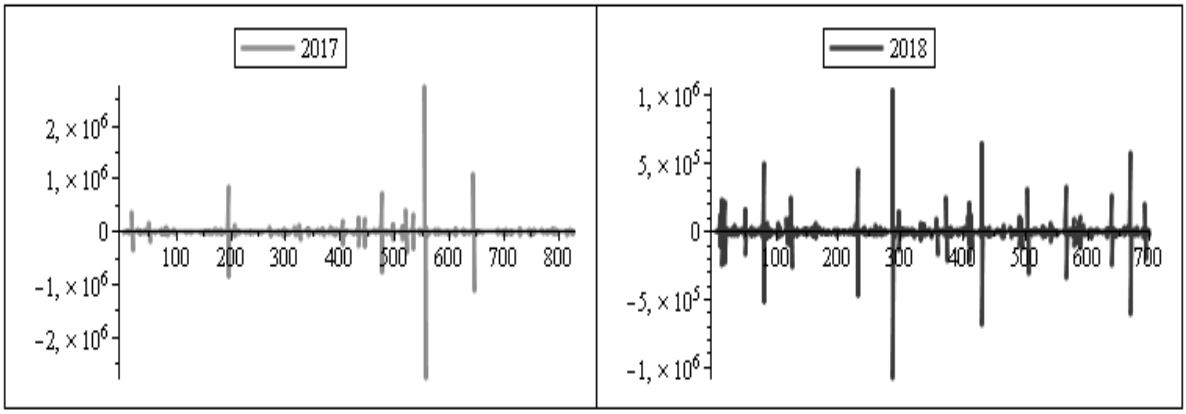

Fig. 5. **Increment of Claims Amount** $(X_{i+1} - X_i)$

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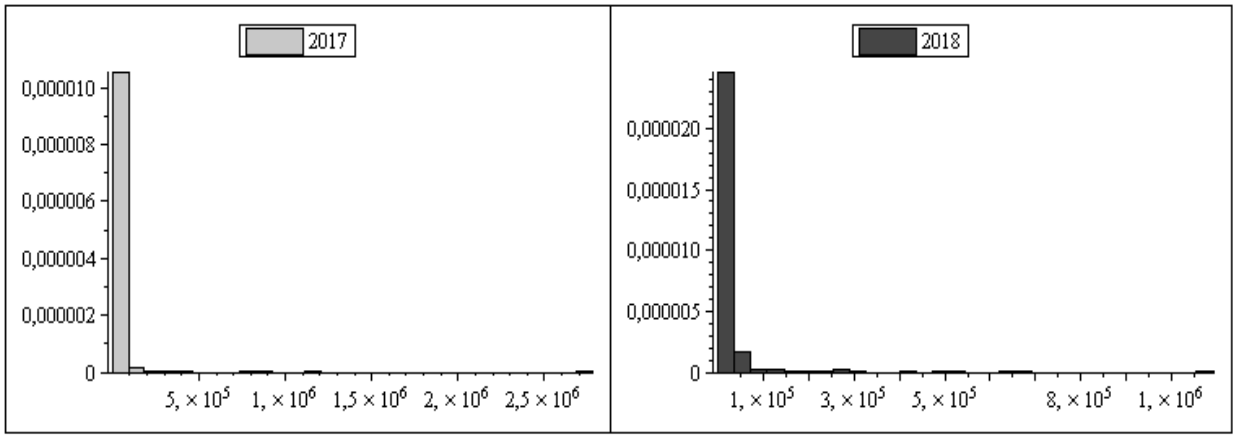

Fig. 6. **Histogram of Real Data**

Source: Compiled by the authors.

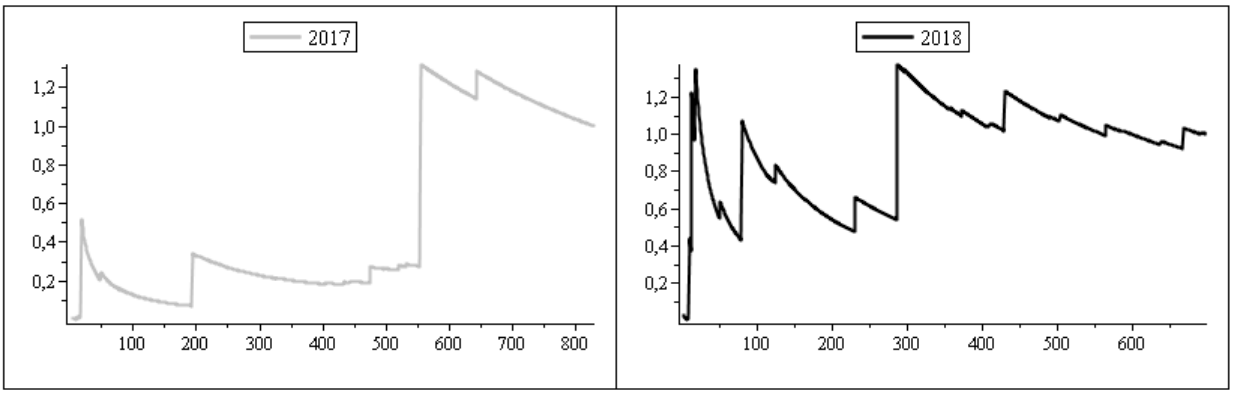

Fig. 7. **Test 1 for Real Data**

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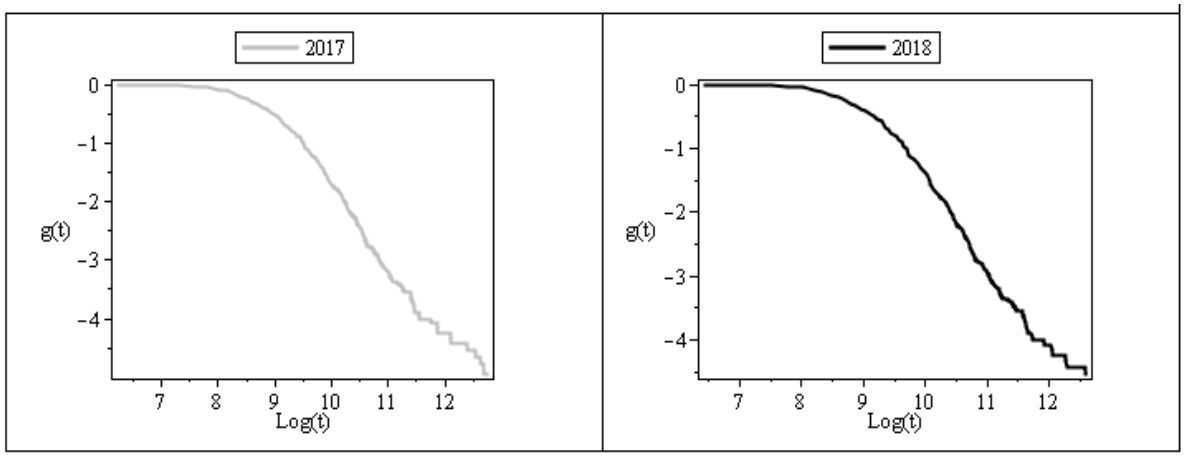

Fig. 8. **Test 2 for Real Data**

Source: Compiled by the authors.

the parameters and proceeds iteratively until some prespecified convergence criterion is satisfied. The regression method is based on empirical Characteristic Function [16].

For our estimation, we used stbl code of M. Veillette [18]. stbl is a free MATLAB library for working with alpha stable distributions. The results obtained for 2018 are summarized in the *Table 1*.

Table 1

Parameter's Estimation of Real Data of 2018

Estimation methods	α	β	γ	μ
Koutrouvelis	1.0571	1	5.7990e+03	7.2869e+04
McCulloch	0.9563	0.9836	4.9322e+03	-6.1482e+04

Source: Compiled by the authors.

Diagnostic with Kernel Densities and Cumulative Distribution Function:

First, we use the diagnostic with Kernel densities to verify whether or not the stable fit describes the claim's amount data well. This consists in making a smoothed density plot of the real data, then comparing it to the density plots of a stable law with the parameters estimated previously. If there are clearly multiple gaps in the media, the data cannot come from a stable distribution.

In *Fig. 9* we can observe that, the claim's amount is distributed similarly to α-stable distribution and in *Fig. 10*, how give us, a comparison among the empirical cumulative distribution function CDF built from claim's amount data set and α-stable distribution CDF, we can show clearly that there are almost identical.

For confirmation of our hypothesis, we used the Kolmogorov test, how is based on the maximum distance between these curves (ECDF and CDF).

Kolmogorov Test

This test is used as a test of goodness of fit. It compares the empirical cumulative distribution function $F_n(x)$ for a variable with a CDF of specified distribution $F(x)$.

$H_0 : F_n(x) = F(x)$ Against all of the possible alternative hypotheses

$$H_1 : F_n(x) \neq F(x).$$

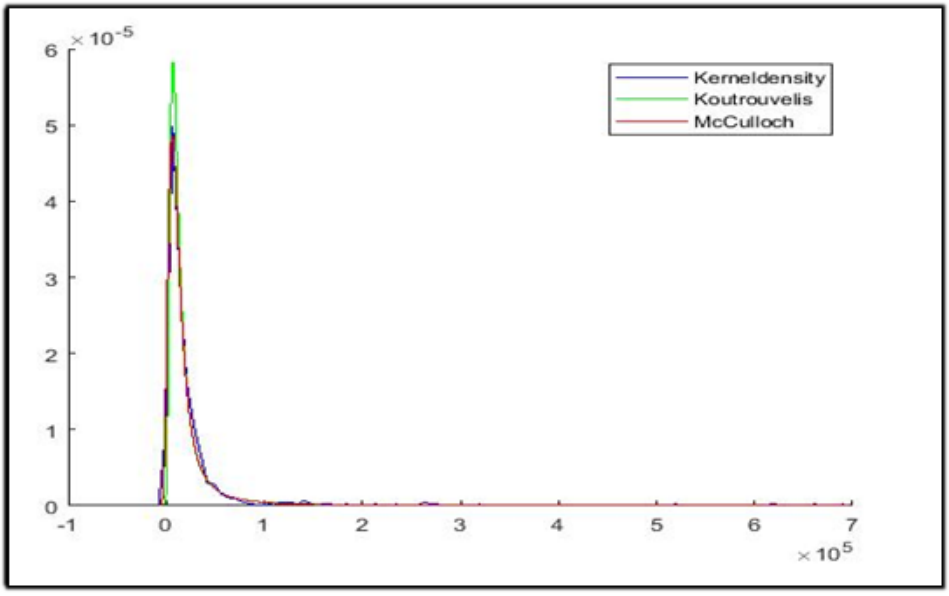

Fig. 9. **Kernel Density Estimation**

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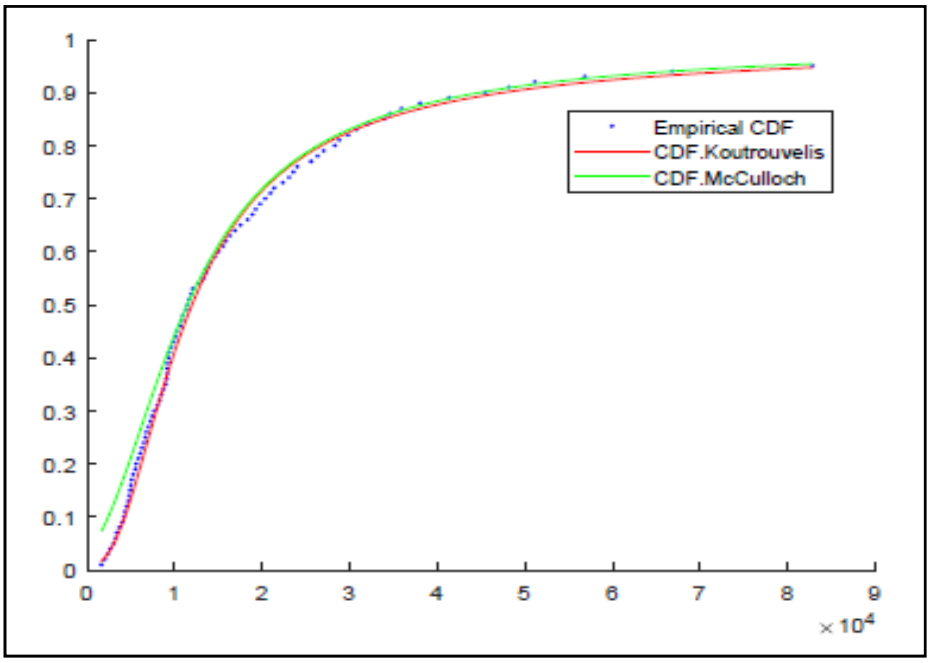

Fig. 10. **Comparison between ECDF and Stable CDF**

Source: Compiled by the authors.

The null hypothesis assumes no difference between the observed and theoretical distribution and the value of test statistic ' D_K ' is calculated as:

$$D_k = \mathrm{Sup}_{x \in \mathrm{IR}} \left\{ F_n(x) - F(x) \right\}.$$

H_0 is rejected if $D_K > D_\alpha(n)$. Where $D_\alpha(n)$ is the critical values, of the maximum absolute difference between sample $F_n(x)$ and $F(x)$.

We recall that there is no formula for the stable law distribution function, so we have estimated by using Stblcdf code of Veillette M [18].

We have $D_K < D_\alpha(n)$, so we accept H_0. Conclusion, the claim's amount can be well captured by an α-stable distribution (*Table 2*).

CONCLUSIONS

In this paper, we have reviewed the different technical diagnostics to verify and show that some data with heavy tails are well described by stable distributions, because they can model large fluctuations. We have shown through the empirical study and the diagnostics with Kernel densities that the stable distribution gives a perfect fit of the claim's amounts of car insurance; this result is very important and can help an insurer and an actuary to develop adequate strategies for risk management. In our future study, we will be interested by minimizing the ruin probability, as well as the estimation of the Lundberg coefficient for stable distributions of car claim's amount.

Table 2

The Results of Kolmogorov Test

Level of significance α **Level of significance α**		**5%**	**1%**
Critical values $D_\alpha(n)$		**0.140**	**0.167**
Statistic of Kolmogorov D_k	Koutrouvelis	0.031	
	Mc-Culoche	0.077	

Source: Compiled by the authors.

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K. Boukhetala — was involved in writing (review and editing), supervision, assisted with formal analysis.
R. Sabre — assisted with formal analysis.

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Stock Return and Investor's Strategies to Firm Specific Announcements: A Study of S&P BSE SENSEX

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ABSTRACT

The **objective** is to investigate the effect of news on stock behaviour in terms of price and volume traded. Further, it is intended to explore the strategies adopted by the investors for various type of news items. **Methods** included collection of 18,014 news items from BSE website and classify as financial and non-financial news. Using paired t-test, the news further classified as good, bad, or indifferent. The effect of news on stock price and volume are found and the scrip return, risk and volatility are also computed pre- and post- announcement. **Findings** reveal that news has always affected the scrip volume traded on BSE, Mumbai. Non-financial news whether good, bad, or indifferent, has resulted in holding of the shares. It is **Concluded** that Financial bad news has resulted in holding of the shares except for earnings announcements. **Novelty** is effect of news on stock market based on news classified as good, bad, and indifferent or financial and non-financial. The effect of various types of news in stock market is also found along with the combined effect. The **implications** are helpful to the corporates, fund managers and individuals to time the information dissemination followed by strategizing trade.

***Keywords*:** stock prices; risk; return; investors; strategies

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INTRODUCTION

It is widely acclaimed by many researchers (for example, T.G. Andersen et al. [1]) that news affects the behaviour of stock prices and determines price. Investment decisions are affected by companies' announcements (C.S. Woodruff and A.J. Senchack [2]). A rational investor prefers the information available to formulate his/her investment strategy to gain profit (U. Bhattacharya [3]). Today investors obtain the timely information necessary for investment (S. Patil and V. Bagodi [4]).

A. Neuhierl et al. [5] classified news into financial and non-financial. Financial news such as earning announcements, stock splits, and dividends significantly impact stock prices (J. Aharony and I. Swary [6]). Non-financial news strongly impacts stock price behaviour (A.C. Filip et al. [7]). The impact of news should not be judged by stock price alone, the trading volume is positively correlated. C.M.C. Lee and B. Swaminathan [8] asserted that high-volume stocks experience more momentum due to the news.

Literature measures the inherent risk in stocks using standard deviation (E. Errais and D. Bahri [9]) to decide between safe and unsafe investments (F.K. Reilly [10]). It is one of the oldest approaches to studying riskiness (J. Lakonishok and A.C. Shapiro [11]). Impact of general financial news on stock price is short-lived (P.C. Tetlock et al. [12]). R.P. Schumaker and H.A. Chen [13] studied news impact on stock price with a time interval of 20 minutes. Q. Li et al. [14] assert that 3 to 6 days is a reasonable time for the news to impact the market. Studies reported that news impacted one day prior to the news event to five days after the news (A.C. Filip et al. [7]).

The authors have attempted to analyse information reflection on stock trading followed by strategies adopted during trading. Five years' data of BSE 30 companies, available on the BSE website, consisting of 18,014 news stories, has been systematically analysed. The return, risk, and volatility are computed to ascertain the potential impact on stock behaviour. The news collected is classified based on the content of the information. Based on post-announcement return, using a one-sample t-test, the news is classified as good, bad, and indifferent. The effect of each type of news on stock price and volume traded is elaborated in this paper.

LITERATURE REVIEW

Early studies of the efficient market (F.E. Fama [15]) propose that markets are driven by information. For example, (T.G. Andersen et al. [1]) confirmed that stock price behaviour was due to news. The investors exhibit their trading strategies considering news (P.C. Tetlock et al. [12]). The information hypothesis reveals that an informed trader benefits from an uninformed trader and, thus, engages in searching the news. The internet is a dominant information source with wide acceptability. The studies explored that investors trade on sentiments rather than fundamentals to generate excess returns. The studies highlighted that investors are more responsive to negative news than positive. The returns are lower when investors lower their sentiment, resulting in a sell-off, while bullish sentiment lowers the volatility, increasing the returns (S. Subramaniam and M. Chakraborty [16]).

The above studies lack in classifying which type of information has resulted in an increase in volatility or return. Further, there is a gap in which strategy can be adopted during these times in emerging markets like India, which is unexplored by earlier studies. The study also included consideration of volume that supports price action, which is found to be absent in many studies. Many researchers (J. Aharony and I. Swary [6]) found that financial news affects stock prices. Latent literature reported that non-financial news also impacts share prices. The underlying link between stock price and factors is discussed below:

Earnings Announcement

Managers communicate their earnings through public announcements, which investors find since they carry inside information (J. Aharony and I. Swary [6]). When made public, non-available information causes stock price movement. Higher earnings have led to higher returns, while lower earnings have the opposite effect. Significant excess return is found on the announcement day or during the announcement week.

Capital Structure

Capital structure refers to a combination of equity and debt. The firm's profitability is greatly affected by the employment of debt capital (U. Menon [17]). The capital structure affects stock prices (J. Singh [18]). The stock price reacts negatively to announcements relating to the issue of equities for debt.

Payout

The payout refers to cash (dividend) and non-cash (bonus) payments to the investors. A dividend reduces reserves and surplus, whereas a bonus is just a book entry (C. Adaoglu and M. Lasfer [19]). The dividend is an important decision for investors and companies as well. It increases the income of the investors while showing the company's future financial planning. Payout news makes stock prices move, resulting in gains (K.H. Al-Yahyaee [20]).

Corporate Strategy and Performance

Corporate strategy is the organization's capability to overcome difficulties to achieve profit and competitive advantage through diversification or multi-business (G. Hubbard and P. Beamish [21]). These strategies affect multiple areas like accounting, operations, HR, marketing and strategic management, thereby improving the organization's performance and leading to affecting the stock prices (L.V. Bernard [22]) positively.

Legal Settlement and Exchange

The companies are responsible for the product malfunctioning or an act. It might result in altering the company's product portfolio or payment of fines. A statistically significant negative abnormal return was observed during filing that disappeared after a short period (M. Klock [23]). The study also highlighted that financial firms in the service sector are more affected than non-financial service firms. These acts affect the future cash flows and current stock prices of the company demonstrating a steep price decline resulting in negative results.

Corporate Actions and Management Changes

These refer to various actions of management that either directly or indirectly affect the shareholders' value. Corporate actions are essential for any organization's survival, growth, and development. It includes decisions related to dividend payment, bonuses, and stock splits that affect the present and future cash flows (D. Lazar and G. Pramod, [24]). The

entry or exit of the CEO (I.F. Kesner and T.C. Sebora [25]), CFO, or COO indicates the company's operational changes. Management changes result in negative returns to the extent of 55%.

Development and Recognition

New product development is key to success. The R&D demands initial cash outflow, resulting in lesser income to shareholders leading to negative price performance. But, once the product is successful and ready to enter the market, it is expected to increase shareholders' value. Such an announcement sends a positive signal to the investor regarding short- and long-term returns. The stock price reactions around such announcements are abnormal and positive (C.M. Crawford [26]).

Recognition and awards, on the one hand, promote a good culture within organizations and, on the other, build a competitive market. The companies are felicitated for their outstanding contributions in many areas like new products, quality and excellent business models. They confirm stock price increases after receipt of recognition or award by companies.

Meetings and Events

Meetings or events refer to unusual happenings or important. In an organization, these are related to the scheduling of financial outcomes and investor meetings. These are the next largest amount of information the companies disseminate. They found a negative cumulative abnormal return to the extent of –0.021% during the company-sponsored event, whereas it is 0.03% and 0.06% for the industry events and investor meets, respectively.

DATA COLLECTION AND ANALYSIS

Data Collection

The scope of the study is limited to BSE SENSEX 30 listed companies on the Bombay Stock Exchange five-years data (www.bseindia.com). No repetitive announcements were considered. In all, 18,014 news items were found during the study period. Further authors have classified news as "financial" and "non-financial" and, at last, "good", "bad", and "indifferent". The stock return, risk, and volatility are computed pre- and post-announcement.

Data Analysis

The 30 listed companies, along with the number of news stories, are presented in *Table 1*. It can be observed that financial news items were only 10.70% while the non-financial news items were 89.30%. The non-financial news dominates the announcements.

To examine changes in the price levels, volatility, and volume in the stock price, there is a necessity of one value that acts as a standard to measure against the price and volume changes. Depending on the dissemination of news timing, a reference value is selected. Then it is used in performing one sample t-test. The results of the t-test are presented in *Tables 2* and *3*.

It is evident from *Table 4* that most of the announcements pertain to capital structure (61%), followed by meetings and events (16%). Payout news is least at 1%. Earning announcements have more effect on stock price, as 62% have been either good or bad. Payouts' also have affected share price for about 56% of the time. Corporate strategy and performance (53%) and corporate actions and management changes (51%) have affected the share price more. The effect of legal settlement and exchange, development and recognition, and meetings and events have the same effect on the stock price.

For 18,014 news volume ratios (stocks traded before the announcement to stocks traded after the news), scrip return, scrip risk and volatility, market return, and market risk and volatility (pre- and post-announcement), respectively, were computed as follows:

Table 1

Financial and Non-Financial News

Company Code	Company	Financial News	Non-Financial News	Total News Items
1	APSEZ	40	179	219
2	APL	38	527	565
3	ABL	195	804	999
4	BAL	28	200	228
5	Airtel	43	302	345
6	CL	33	260	293
7	CIL	32	202	234
8	RLL	55	369	424
9	GAIL	32	204	236
10	HDFCB	48	2331	2379
11	HML	29	209	238
12	HDFCL	173	909	1082
13	HUL	55	155	210
14	ICICI	321	269	590
15	INFY	50	456	506
16	ITC	61	1274	1335
17	L&T	31	426	457
18	LL	128	2218	2346
19	M&M	37	836	873
20	MSIL	22	265	287
21	NTPC	39	269	308
22	ONGC	38	253	291
23	PGCI	30	201	231
24	RIL	67	780	847
25	SBIN	41	216	257
26	SPIL	25	419	444
27	TML	30	435	465
28	TSL	25	246	271
29	TCS	40	631	671
30	WL	148	235	383
Total				18 014

Source: Authors compilations.

Table 2

News Classification

Company code	Type	Good	Bad	Indifferent
1	F	14	17	9
	NF	47	85	47
2	F	8	21	9
	NF	158	267	102
3	F	35	90	70
	F	146	367	291
4	F	11	15	2
	NF	47	102	51
5	F	7	18	18
	NF	78	151	73
6	F	10	7	16
	NF	64	116	80
7	F	13	14	5
	NF	49	108	45
8	F	10	26	19
	NF	121	169	79
9	F	4	16	12
	NF	35	119	50
10	F	15	20	13
	NF	560	1262	509
11	F	9	12	8
	NF	57	82	70
12	F	36	90	47
	NF	200	468	241
13	F	14	27	14
	NF	51	74	30
14	F	66	165	90
	NF	54	140	75
15	F	14	15	21
	NF	116	214	126
16	F	17	31	13
	NF	367	669	238
17	F	11	10	10
	NF	105	205	116
18	F	45	66	17
	NF	604	1173	441
19	F	12	13	12
	NF	179	462	195
20	F	7	7	8
	NF	69	152	44
21	F	8	18	13
	NF	57	149	63
22	F	7	20	11
	NF	65	132	56
23	F	6	16	8
	NF	45	106	50
24	F	15	32	20
	NF	156	398	226
25	F	6	17	18
	NF	55	103	58
26	F	10	10	5
	NF	123	206	90
27	F	12	10	8
	NF	155	189	91
28	F	9	9	7
	NF	73	106	67
29	F	10	8	22
	NF	178	318	135
30	F	41	73	34
	NF	53	130	52

Source: Authors compilations.

Note: F = Financial and NF = Non-Financial.

Table 3

Classified News

News Classification	Financial News Items	Non-Financial News Items	Total
Good	482	4068	4550
Bad	558	3791 (23.57%)	4349
Indifferent	892	8223	9115
Total	1932	16 082	18 014

Source: Authors compilations.

Table 4

News Composition

Type of News	Good	Bad	Indifferent	Total
Earning announcements	177	194	228	599
Capital structure	2745	2555	5654	10954
Payout	47	78	98	223
Corporate strategy and performance	209	205	365	779
Legal settlement and exchange	176	157	354	687
Corporate actions and management changes	363	350	690	1403
Development and recognition	125	110	264	499
Meetings and events	708	701	1461	2870
Total	4550	4350	9114	18,014

Source: Authors compilations.

$$\text{Scrip Trade Volume Ratio (STVR)} = \frac{Volume\,traded\,before\,announcement}{Volume\,traded\,\,post\,announcement}, \quad (1)$$

$$\text{Scrip Return (SRe)} = \frac{\left(Today's\,price - Yesterday's\,price\right)}{Yesterday's\,price} * 100, \quad (2)$$

$$\text{Scrip Risk } (\sigma)\ (\text{SRi}) = \sqrt[2]{\frac{\left(Return - Mean\,return\right)^2}{}}, \quad (3)$$

$$\text{Scrip Volatility } (\beta)\ (\text{SV}) = \frac{n\left(\Sigma x * y^5 - \Sigma x * \Sigma y\right)}{\left(n\left(\Sigma x 2\right) - \left(\Sigma x\right) 2\right.}, \quad (4)$$

where x — Market return, y — Company return, n — Number of observations (5).

$$\text{Market Return (MRe)} = \frac{(\textit{Today's closing points} - \textit{Yesterday's closing points})}{\textit{Yesterday's closing points}} * 100, \quad (5)$$

$$\text{Market Risk (MRi)} = \sqrt[2]{\frac{(\textit{Market return} - \textit{Mean market return})^2}{5}}. \quad (6)$$

Earnings Announcements

The analysis for earning announcements is presented in *Table 5*.

Capital Structure

Financial

The analysis is presented in *Table 6*.

Non-financial

Table 5

Earning Announcements Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV (β)	Pre: 0.97 & Post: 0.82 (Relatively stable stock; less volatile and riskier than the market)					
STVR	0.95 (5.26% Selling)		0.92 (8.70% Selling)		1.02 (1.96% Holding)	
SRe	0.01%	0.64%	–0.03%	–0.70%	0.05%	–0.02%
Sri	1.97	2.09	1.85	2.02	2.03	2.08
Announcement Outcome	More return, more risk		Less return, more risk		Less return, more risk	
MRe	0.01%	0.10%	–0.01%	–0.17%	0.01%	–0.01%
MRi	0.86	0.91	0.82	0.86	0.86	0.91
Announcement Outcome	More return, more risk		Less return, more risk		Less return, more risk	
Strategy	Profit booking		Stop loss		Wait and watch	

Source: Authors compilations.

Table 6

Capital Structure (Financial) Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 0.80 & Post: 0.95 **(Relatively stable stock; less volatile and riskier than the market)**					
STVR	1.28 (21.88% Holding)		0.92 (8.70% Selling)		1.02 (1.96% Holding)	

Table 6 (continued)

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SRe	–0.07%	0.59%	–0.03%	–0.70%	0.05%	–0.02%
SRi	1.71	1.62	1.85	2.02	2.03	2.08
Announcement Outcome	More return, less risk		Less return, more risk		Less return, more risk	
MRe	0.02%	0.27%	–0.01%	–0.17%	0.01%	–0.01%
MRi	0.95	0.80	0.82	0.86	0.86	0.91
Announcement Outcome	More return, less risk		Less return, more risk		Less return, more risk	
Strategy	Partial profit booking		Stop loss		Wait and watch	

Source: Authors compilations.

The analysis is presented in *Table 7*.

Table 7

Capital Structure (Non-Financial) Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 0.87 & Post: 0.84 **(Relatively stable stock; less volatile and riskier than the market)**					
STVR	1.14 (12.28% Holding)		0.92 (8.70% Selling)		1.02 (1.96% Holding)	
SRe	0.11%	0.55%	–0.03%	–0.70%	0.05%	–0.02%
SRi	1.47	1.42	1.85	2.02	2.03	2.08
Announcement Outcome	More return, less risk		Less return, more risk		Less return, more risk	
MRe	0.07%	0.20%	–0.01%	–0.17%	0.01%	–0.01%
MRi	0.93	0.88	0.82	0.86	0.86	0.91
Announcement Outcome	More return, less risk		Less return, more risk		Less return, more risk	
Strategy	Partial profit booking		Stop loss		Wait and watch	

Source: Authors compilations.

Table 8

Payout Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 1.11 & Post: 1.09 **(Risky investment; higher than the average risk)**					

Table 8 (continued)

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
STVR	0.95 (5.26% Selling)		1.00 (Unchanged trading)		1.02 (1.96% Holding)	
SRe	0.08%	0.55%	0.15%	–0.73%	0.05%	–0.02%
SRi	1.93	2.27	1.78	2.01	2.03	2.08
Announcement Outcome	More return, more risk		Less return, more risk		Less return, more risk	
MRe	0.10%	0.10%	0.08%	–0.18%	0.01%	–0.01%
MRi	1.01	0.95	0.92	0.94	0.86	0.91
Announcement Outcome	Less risk		Less return, more risk		Less return, more risk	
Strategy	Profit booking		Stop loss		Wait and watch	

Source: Authors compilations.

Payout

The analysis is presented in *Table 8*.

Since there is a higher return due to payouts in the form of dividends, the investors must have sold the shares.

CORPORATE STRATEGY AND PERFORMANCE (CSP)

Financial

Computations about CSP are presented in *Table 9*.

Table 9

CSP (Financial) Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: –0.21 & Post: 0.32 **(Relation with market has reversed; relatively stable)**					
STVR	0.79 (26.58% Selling)		1.51 (33.77% Holding)		1.03 (2.91% Holding)	
SRe	–0.78%	0.84%	–0.38%	–0.96%	–0.23%	0.28%
SRi	1.81	1.84	1.57	1.79	1.48	1.70
Announcement Outcome	More return, more risk		Less return, more risk		More return, more risk	
MRe	0.14%	–0.06%	0.59%	0.30%	0.04%	–0.02%
MRi	1.03	0.86	0.56	0.87	1.01	0.96
Announcement Outcome	Less return, less risk		Less return, more risk		Less return, less risk	
Strategy	Profit booking		Wait and watch		Wait and watch	

Source: Authors compilations.

Non-financial

Computations about CSP are presented in *Table 10*.

Table 10

CSP (Non-Financial) Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 0.89 & Post: 0.92 **(Relatively stable; less volatile and riskier than the market)**					
STVR	1.06 (5.66% Holding)		1.06 (5.66% Holding)		1.19 (15.97% Holding)	
SRe	0.10%	0.51%	0.15%	−0.67%	0.10%	−0.02%
SRi	1.79	1.72	1.57	1.68	1.75	1.72
Announcement Outcome	More return, less risk		Less return, more risk		Less return, less risk	
MRe	0.07%	0.13%	0.06%	−0.25%	0.03%	0.01%
MRi	0.92	0.88	0.77	0.88	0.88	0.95
Announcement Outcome	More return, less risk		Less return, more risk		Less return, more risk	
Strategy	Partial profit booking		Wait and watch		Wait and watch	

Source: Authors compilations.

LEGAL SETTLEMENT AND EXCHANGE (LSE)

Financial

The financial news was good, and the SV was found to be 2.16 and −2.28 pre- and post-announcement. The STVR was found to be 1.12, meaning more holding. The SRe pre and post were found to be −0.22% and 0.47%. Since the news was good, there must be a return rise. SRi pre and post were 0.85 and 1.03, indicating an increase in risk. Maybe, "more the return, more the risk" situation prevailed. MRe pre and post were 0.02% and 0.44%, indicating a rise in the MRe. MRi has increased marginally from 0.25 to 0.28.

Non-financial

Computed values presented in *Table 11*.

Table 11

LSE (Non-Financial) Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 0.91 & Post: 0.94 **(Relatively stable stock; less volatile and riskier than the market)**					
STVR	1.20 (16.67% Holding)		1.14 (12.25% Holding)		1.18 (15.25% Holding)	
SRe	−0.08%	0.74%	−0.04%	−0.57%	−0.04%	0.04%
SRi	2.01	1.79	1.76	2.16	1.85	1.91
Announcement Outcome	More return, less risk		Less return, more risk		More return, more risk	
MRe	−0.01%	0.23%	−0.01%	−0.08%	−0.02%	0.05%
MRi	0.99	0.88	0.93	0.98	0.92	0.93

Table 11 (continued)

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
Announcement Outcome	More return, less risk		Less return, more risk		More return, more risk	
Strategy	Partial profit booking		Wait and watch		Wait and watch	

Source: Authors compilations.

CORPORATE ACTIONS AND MANAGEMENT CHANGES (CAMC)

Financial

Computed values are presented in *Table 12*.

Table 12

CAMC (Financial) Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 0.99 & Post: 1.03 **(Scrip has become riskier)**					
STVR	1.54 (35.06% Holding)		1.23 (18.70% Holding)		1.42 (28.58% Holding)	
SRe	0.01%	0.37%	0.61%	–0.34%	–0.26	–0.03%
SRi	1.77	1.83	1.52	1.57	1.74	1.64
Announcement Outcome	More return, more risk		Less return, more risk		Less return, less risk	
MRe	–0.02%	–0.14%	0.22%	0.13%	0.06%	0.01%
MRi	0.82	0.74	0.68	0.78	0.89	0.84
Announcement Outcome	Less return, less risk		Less return, more risk		Less return, less risk	
Strategy	Partial profit booking		Wait and watch		Wait and watch	

Source: Authors compilations.

Non-financial

Computed values are presented in *Table 13*.

Table 13

CAMC (Non-Financial) Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 0.91 & Post: 0.89 **(Relatively stable stock; less volatile and riskier than the market)**					
STVR	1.19 (15.97% Holding)		1.11 (9.91% Holding)		1.18 (15.25% Holding)	
SRe	–0.05%	0.57%	0.07%	–0.60%	0.03%	0.04%
SRi	1.70	1.68	1.70	1.67	1.64	1.67
Announcement Outcome	More return, less risk		Less return, less risk		More return, more risk	
MRe	0.05%	0.22%	0.06%	–0.18%	0.04%	0.03%
MRi	0.92	0.89	0.86	0.90	0.90	0.93

Table 13 (continued)

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
Announcement Outcome	More return, less risk		Less return, more risk		More return, more risk	
Strategy	Partial profit booking		Wait and watch		Wait and watch	

Source: Authors compilations.

DEVELOPMENT AND RECOGNITION

Computed values are presented in *Table 14*.

Table 14

Development and Recognition Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 0.67 & Post: 0.68 **(Relatively stable stock; less volatile and riskier than the market)**					
STVR	1.50 (33.33% Holding)		1.11 (9.91% Holding)		1.17 (14.53% Holding)	
SRe	−0.14%	0.44%	0.12%	−0.51%	0.07%	0.01%
SRi	1.37	1.20	1.62	1.52	1.44	1.51
Announcement Outcome	More return, less risk		Less return, less risk		Less return, more risk	
MRe	−0.04%	0.13%	0.06%	−0.17%	−0.01%	−0.06%
MRi	0.85	0.82	0.93	1.00	0.85	0.93
Announcement Outcome	More return, less risk		Less return, more risk		Less return, more risk	
Strategy	Partial profit booking		Wait and watch		Partial profit booking	

Source: Authors compilations.

MEETINGS AND EVENTS

Financial

Computations are presented in *Table 15*.

Table 15

Meeting and Events (Financial) Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 0.15 & Post: 0.19 **(Relatively stable stock; less volatile and riskier than the market)**					
STVR	1.16 (13.79% Holding)		1.14 (12.28% Holding)		0.83 (20.48% Selling)	
SRe	0.12%	0.43%	0.36%	−0.34%	−0.31%	−0.14%
SRi	1.54	1.44	1.21	1.26	1.60	1.53
Announcement Outcome	More return, less risk		Less return, more risk		Less return, less risk	
MRe	0.12%	0.14%	0.34%	0.12%	−0.17%	0.06%

Table 15 (continued)

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
MRi	0.99	0.86	0.96	0.58	1.30	1.19
Announcement Outcome	More return, less risk		Less return, less risk		More return, less risk	
Strategy	Partial profit booking		Wait and watch		Stop loss	

Source: Authors compilations.

Non-financial

Computations are presented in *Table 16*.

Table 16

Meeting and Events (Non-Financial) Tabulation

Particulars	Good		Bad		Indifferent	
	Pre	Post	Pre	Post	Pre	Post
SV	Pre: 0.87 & Post: 0.86 **(Relatively stable stock; less volatile and riskier than the market)**					
STVR	1.14 (12.28% Holding)		1.08 (7.41% Holding)		1.25 (20.00% Holding)	
SRe	0.01%	0.57%	0.09%	–0.61%	0.03%	0.04%
SRi	1.63	1.64	1.70	1.71	1.69	1.68
Announcement Outcome	More return, more risk		Less return, more risk		More return, less risk	
MRe	0.03%	0.23%	0.06%	–0.20%	0.03%	0.04%
MRi	0.93	0.90	0.87	0.95	0.95	0.95
Announcement Outcome	More return, less risk		Less return, more risk		More return, no change in risk	
Strategy	Partial profit booking		Wait and watch		Wait and watch	

Source: Authors compilations.

RESULTS AND DISCUSSIONS

Based on the literature, announcements are classified under eight headings and further as financial and non-financial. Of them, earning announcements and payouts are purely financial news, while development and recognition are purely non-financial news. The other five types have both financial and non-financial news. Each news item is further classified as good, bad, and indifferent to understand the investors and market behaviour.

Earning announcements, financial news, are important to investors as they provide highly informative contents. These announcements post news resulted in a decline in volatility. Our results are consistent with other studies (A. Eilifsen et al. [27]). When the news is good (return change: 0.01% to 0.64%), trading of the shares has increased. Since the returns have increased, the investors "booked the profit". When the news is bad, trading of the shares has further increased compared to good news, as documented in the literature (W.M. Cready and D.N. Hurtt [28]). The market return has decreased and investors have resorted to the "exit and re-entry" strategy. Scrip returns and market risks have decreased, and increased respectively. A. Gupta [29] found similar results that the price reaction in the case of bad news is much larger than that of good news.

Capital structure financial announcements have resulted in an increase in volatility. As found by resulting in a reduction of shares traded. The good news has resulted in increase in scrip return with decrease in risk as evidenced (J.K.S. Pynnönen [30]). The investors have opted for "growth and income" or "uncommon profit" strategies. The market has also exhibited the same behaviour. Bad news resulted in lesser trading. But, this trading is higher than when the

news is good. In such instances, the scrip returns decreases and hence, the investors may have opted for "limiting the risk" strategy.

Capital structure non-financial announcements have resulted in a decline in volatility, indicating lesser fluctuations than the SENSEX. The trading of shares post "good" announcements is less. The announcements have resulted in increase in scrip returns and decrease in risk. It appears that the investors resort to "uncommon profit" under such situations. Bad news has resulted in less trading. Scrip return has decreased and risk has remained almost the same. The investors must have applied a "wait and watch" strategy. Market return has declined and risk has marginally increased. The indifferent news announcements have resulted in less trading. Scrip and market returns have declined with marginal increases in risk. The investors must be waiting for "trend reversal".

Payout announcements have decreased the scrip volatility, indicating lesser fluctuations in scrip return compared to SENSEX in line with major studies (C. Carroll and H. Manakyan, [31]). Good news items have resulted in more trading post announcement with an increase in risk. The investors have 'booked the profit'. This could be due to an increase in wealth. The volume of trading has remained unchanged post bad announcements, similar to other findings. The scrip and market return have decreased with the increase in risk, as documented by (R. Mestel and H. Gurgul [32]). Indifferent announcements have resulted in holding, unlike the bad and good news. Scrip return has decreased with marginal increase in risk, while market return has decreased with marginal decrease in risk.

Corporate strategy and performance financial announcements increased volatility, indicating increased fluctuation in scrip returns. Post good news announcements, return increases (R. Reed and R.J. DeFillipi [33]) and the trading of the shares increases with a marginal increase in risk. The investors "booked the profit". Market loss has decreased with decrease in risk. With bad announcements, the trading decreased by 35%. Investors adopted the "averaging" strategy. Indifferent news resulted in lesser trading, higher returns, and higher risk. Investors adopted an "aggressive" strategy.

Corporate strategy and performance non-financial news has resulted in a marginal increase in volatility, indicating an increase in scrip return. Good news items have resulted in lesser trading with a lower scrip risk. Investors adopted a "partial profit booking" strategy. Market return has increased with a decrease in risk. Trading volume decreased in case of bad news also. Scrip return has decreased, resulting in loss with an increase in risk. "Averaging" strategy employed by investors. Market return has decreased with higher risks. Indifferent news has resulted in lesser trading, decrease in returns with a marginal decrease in scrip risk. A "wait and watch" strategy is employed here. Market return has decreased with increase in risk.

Legal settlement and exchange financial news resulted in higher volatility and in the opposite direction of the market. Good financial announcements have resulted in lesser trading with higher returns and risk. Legal settlements have a positive impact on the stock price movement, as studied by (D.P. Francis and K. Schipper [34]). "Partial profit booking" strategy has been employed. Market returns and risks have increased. During the study period, no bad or indifferent news was announced.

Legal settlement and exchange non-financial news resulted in marginal increase in volatility. Good news items resulted in lesser trading with higher returns and lower risks. Our results on volatility, trading, returns, and risks are consistent with other. "Profit booking" strategy is employed. Bad announcements have resulted in lesser trading. The losses increased with higher risk. Indifferent news resulted in lesser trading with higher returns and risk. Market returns increased with marginal increase in risk.

Corporate actions and management changes financial news resulted in increase in volatility indicating more scrip return volatility than the market. Scrip trading after good news decreased by 35%. Scrip returns increased with increase in the risk (M. Jensen [35]). "Wait and watch" strategy is adopted by investors. Bad news reduced trading activities by about 20%. Scrip returns decreased and has resulted in loss with marginal increase in risk. Investors adopted "Limiting risk" strategy. Indifferent news has reduced the trading by about 30%. The scrip return has increased and risk has reduced. It appears that the investors have adopted "averaging" strategy. Market return and risk have decreased.

Corporate actions and management changes non-financial news observed decrease in volatility. Good news has decreased trading by 16%. Scrip return has increased from loss to profit with marginal decline in risk. It appears that the investors have adopted "partial profit booking" strategy. Market return has increased with marginal decrease in risk. Bad news has also reduced the trading

activities by 10%. The return has decreased with marginal decrease in risk. It appears that the investors have adopted "averaging" strategy. Market return has decreased with marginal increase in risk. Indifferent news has reduced the trading activities by 16%.

Development and recognition non-financial news has increased volatility marginally. It has reduced the trading activities by 34%. The return has increased and the risk has decreased (K.B. Hendricks and V.R. Singhal [36]). The investors' strategy could be "uncommon profit". Bad announcements have also reduced trading activities. Scrip returns and risk have decreased. Investors must have adopted "wait and watch" strategy. Market return has decreased with increase in market risk. Indifferent news has also reduced the trading activities. These announcements have resulted in decreased return with increase in risk. "Averaging" probably the strategy adopted by investors.

Meeting and events financial news has resulted in increase in volatility. Good news has reduced the trading activities with increase in return and decrease in risk. "Partial profit booking" might have been adopted by investors. Market returns has increased with decrease in market risk. Bad announcements have resulted in reduction in trading activities. The return has declined and resulted in losses. The risk has increased. "Wait and watch" probably has been employed by investors. Market return and risk have decreased. Indifferent announcements increased the trading activities while the return has decreased but still in losses. Decrease in scrip risk is also noticed. "Buy on dips" strategy has been employed by investors.

Meeting and events non-financial news has not affected the volatility. Good news has reduced the trading with increase in return and marginal increase in risk. "Partial profit booking" must have been employed by investors. Market return has increased with marginal decrease in risk (K. Shruthi, and S. Patil, [37]). Bad news has reduced the trading activities. Return has declined and resulted in losses. The risk has marginally increased. "Averaging" probably the strategy adopted by investors. Lesser Market return resulted in losses with rise in risk. Indifferent has also declined trading activities. There is marginal increase in return and marginal decrease in risks. "Wait and watch" probably has been employed by investors.

CONCLUSIONS

From the analysis of 18,014 news items spread over 5 years, it can be asserted that news has always affected the scrip volume traded on BSE, Mumbai. Of them, non-financial news was 89.30% while financial news items were only 10.70%. 50% of the news items don't have any significant effect on the stock price. The financial news has more negative effect on the stock price than the positive effect. But, non-financial news has more positive effect than the negative effect. The investors in 5 days follow different strategies. When news is good investors were found to adopt "partial profit booking" strategy and expect the prices to soar further, as news is favourable. For bad news investors have limited the losses by adopting "stop loss" or took time to decide and employed "wait and watch" strategy. When news lacks in providing direction of the price change i.e., indifferent, the investors took time to decide and follow "wait and watch" strategy.

Theoretical Implications

The classification of published news in eight heads and further classification as "good", "bad", and "indifferent" is a novel contribution of the study. Further, the strategies adopted by the investors in such phenomenon is not evidenced in the literature. Study enriches the present literature and fills the gap thereby contributing to niche body of knowledge in the area of stock prices and strategies adopted by the investors.

Managerial Implications

This will help the corporates to time the information dissemination. Further, the fund houses existing traders and prospective investors who are new to the stock market would also be benefited in strategizing the trade that aims at minimum losses and higher gains.

Limitations and Scope for Future Research

Stocks that are listed on BSE SENSEX — 30 companies.

Micro-economic news items considered.

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IPO Market Dynamics: Geographical and Sectoral Dimensions

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ABSTRACT

The IPO (Initial Public Offering) is a widely used financing tool worldwide, but the scientific community has not extensively analyzed the dynamics of the IPO market. **The purpose** of the paper is to identify the absence of clustering in certain industries during "hot" IPO markets from January 1990 to December 2022, as well as to identify IPO waves in the Chinese market. The research **methodology** included analytical methods for collecting and processing information, comparative and graphical analysis of an author-collected database covering over 16,000 IPO transactions with a placement size of over 50 million USD. The study includes a comparison of IPO transactions in China and the rest of the world, as well as an industry and geographical analysis, with explanations for differences in dynamics. The paper also illustrates IPO waves on the analyzed horizon and explains why they formed. Companies globally raised over 5 trillion dollars through IPO transactions during the analyzed period, with developed countries raising the majority of funds. However, the dynamics of the IPO market show a significant increase in China's and developing countries' share in the last decade. During this period, five IPO waves occurred, characterized by significant growth in placement volumes and first-day trading returns. It has been **concluded** that clustering in the IPO market was not specific to certain sectors, but coincided with the global increase in the number of transactions and IPO returns, while clustering in the Chinese IPO market coincided with the dynamics of the global IPO market.

Keywords: Initial Public Offering (IPO); IPO cycles; IPO Waves; IPO clustering

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INTRODUCTION

The initial public offering (IPO) is an important tool for managing capital structure and a significant milestone in the development of a company. Moreover, IPO deals are of great interest to both retail and institutional investors, as the first-day returns of an IPO can sometimes reach several dozen, and at times even hundreds, of percent.

The IPO market has undergone significant changes over the past 30 years — following the acceleration of globalization since the 1990s, emerging economies have begun to play an increasingly important role in the IPO market. China has become the largest financial center in the Asian region, and in certain years, the share of Chinese companies in the IPO market exceeded 50% in terms of raised funds. Moreover, the rapid development of technology has also significantly affected the structure of the IPO market — the share of companies in the technology sector has steadily increased for funds raised.

The number of companies listing their shares on the stock exchange, as well as the total amount of funds raised, has been steadily increasing and reached a record size of 600 billion USD in 2021. This article focuses on a critical analysis of the dynamics of the IPO market from 1990 to 2022. In addition, the formation of the so-called "hot" IPO markets during this period is examined separately.

Various aspects of the IPO market have been addressed by several economists, such as F. Bancel [1], J. Brau [2], and S. Benninga [3]. However, the issue of analyzing the overall dynamics of the IPO market in the contemporary context has received very little attention, despite the record volume of the IPO market in recent years, with the focus being directed towards regional IPO markets.

REVIEW OF RESEARCH

Attracting additional capital to finance the company's activities or providing current shareholders with the opportunity to exit the company's capital may not be the only motives for conducting an IPO. According to a study by F. Bancel and U. Mittoo conducted among financial directors of European companies, factors such as increased brand recognition and prestige of the company, as well as financing growth projects, are the most common goals for conducting an IPO. It is worth noting that depending on the size of the company and the country of operation, the motivation of companies may vary. For example, managers of large European companies highlight external monitoring of the company's activities by analysts and investors as the main advantage of being listed on the stock exchange, while smaller firms go public primarily to attract capital for development. It is noteworthy that company leaders in the U.S. consider that external monitoring is not an advantage, but a fundamental cost of being listed on the stock exchange. Moreover, financial directors point out benefits of listing, such as the opportunity for current shareholders to exit the company's capital, as well as reducing the cost of the company's debt financing [1].

J. C. Brau, P. A. Ryan, and I. DeGraw, in which the authors attempted to uncover the motivations of companies for going public, conducted a similar study. In their paper, they conduct a survey of 380 financial directors of companies that listed their shares on the stock exchange between 1996 and 2002. Based on the survey results, a list of the main reasons for going public was compiled, among which the authors highlight two key factors: the desire to increase transparency and improve the company's reputation, as well as the presence of the right timing for entering the market. In other words, the management of companies made the decision to go public based on the presence of a "hot" market and the opportunity to place the company's shares at the highest price [2].

However, it is worth noting that a number of studies have shown that the need for capital is often not the primary reason why companies decide to go public. S. Benninga, M. Helmantel and O. Sarig in their research demonstrate that the need to raise funds for financing capital expenditures is often not a sufficient reason for a company to list its shares on the stock exchange [3]. The conclusions drawn in the paper of W. Kim and M. S. Weisbach also support this hypothesis: companies are often inclined to go public not to raise funds for investment projects, but to take advantage of market conditions in order to sell their shares at an inflated price [4]. A. Alti draws similar conclusions. The author's research results confirm the fact that companies entered the market to take advantage of the favorable moment for attracting financing on advantageous terms during a "hot" market [5].

However, despite all the mentioned advantages of conducting a listing on the stock exchange, this process is also associated with significant direct and indirect costs.

Direct costs include commission fees for placement organizers (investment banks, legal consultants, auditors, etc.); listing fees; costs for the technical preparation of the company for listing (preparation of special reports, establishment of an investor relations department, attracting independent directors, etc.).

Indirect costs include the time of top management spent on preparing for the IPO, the undervaluation of the company's shares upon going public.

The costs that the company incurs after going public include: expenses related to interactions with minority shareholders (potential lawsuits, "investment activism"); exchange fees; costs for the IR department; and the time spent by top management interacting with investors. Moreover, it is worth considering that a lengthy preparation process for an IPO does not guarantee its successful execution.

R. G. Ibbotson and J. F. Jaffe were the first to notice the clustering of transactions in the

market for initial public offerings of companies. The authors define a "hot" market as a situation in which the average return of stocks from companies that have gone public in the first month of trading is abnormally high compared to the overall market return [6].

In the scientific literature, significant attention is given to the issue of "hot" IPO waves; however, there is still no consensus on the reasons for their occurrence. Numerous studies are dedicated to the relationship between "hot" IPO markets and stock market dynamics. For example, L. Pastor and P. Veronesi attempted to explain the change in the number of IPOs based on stock market returns and company profitability. The authors concluded that "hot" IPO waves are preceded by higher stock market returns compared to cold periods in the IPO market [7]. The paper of F. Batnini and M. Hammami confirms the positive relationship between stock market dynamics and the number of IPO transactions — a rise in the stock market over a period of 6 months positively influences the decision-making process regarding preparing a company for an IPO [8].

Another important variable, the influence of which on the IPO market has also been studied quite frequently, is the dynamics of economic growth. The main hypothesis that the authors sought to substantiate and test was that during periods of high economic growth, companies require additional financing and use the issuance of shares on the stock market as a source of funds to expand their production capacities. In his paper, M. Lowry analyzes the relationship between the number of IPOs, GDP dynamics, the growth of real investments, changes in the number of companies, and the real average growth rate of revenue. According to the research findings, these factors are significant in explaining the dynamics of IPO volumes [9].

Many researchers on the topic of IPO market cyclicality associate the formation of "hot" markets with an increased risk appetite among investors [8, 10–12]. The increase in first-day returns during "hot" markets is an indirect confirmation of a higher risk appetite among investors. Moreover, the successful placement of one company may encourage other companies in the sector to go public [13].

IPO MARKET DYNAMICS

To conduct a detailed analysis of the market for initial public offerings, the author has created a database that includes key information about the transactions carried out: the name of the company, the date of the transaction, the geographical location of the company, the economic sector, the size of the offering, and the first-day return. The database includes IPOs with a placement size of over 50 million dollars. The sources of information were the Bloomberg Terminal system and the PREQVECA database. The total number of transactions in the utilized database amounted to 16000, with a total value of 5.376 trillion USD.

During the analyzed period, the market experienced 5 "hot" IPO waves — periods when the volume of raised funds and the number of IPO deals significantly increased compared to previous periods (*Fig. 1*). The average duration of such "hot" IPO waves was 2 years. Variables such as first-day return and the average size of IPO deals also tended to increase during "hot" markets (*Fig. 2*).

The analysis of the data used indicates that the correlation between the volume of raised funds and the average first-day return stands at 32%, which does not allow for a definitive relationship between these variables. However, graphical analysis shows a clear increase in the average first-day return during 4 out of 5 "hot" IPO waves in the analyzed period (*Fig. 3*).

During the analyzed period, five IPO waves were observed — 1999–2000, 2005–2007, 2010–2011, 2013–2016, and 2020–2021. The first IPO wave during this period was driven by the excitement among investors in the Internet company market. The investors' risk appetite during this period was at a record high, as evidenced by the average first-day IPO return, which soared to 45% in 2000 — an

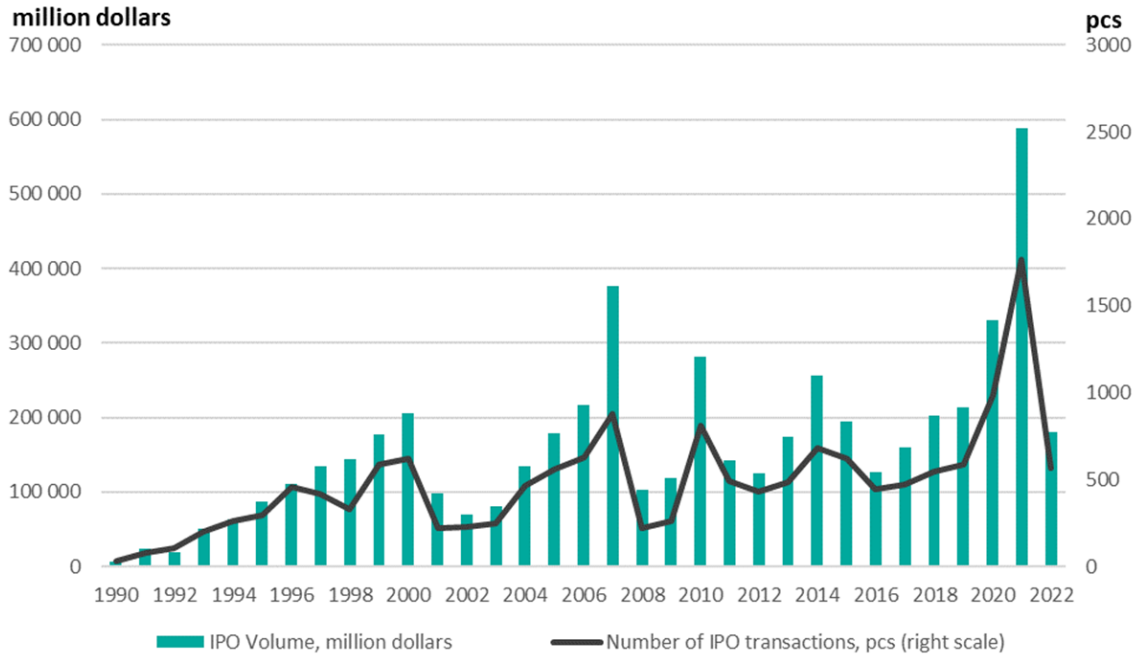

Fig. 1. **IPO Volume and Number of IPO Transactions**

Source: Bloomberg Terminal, PREQVECA.

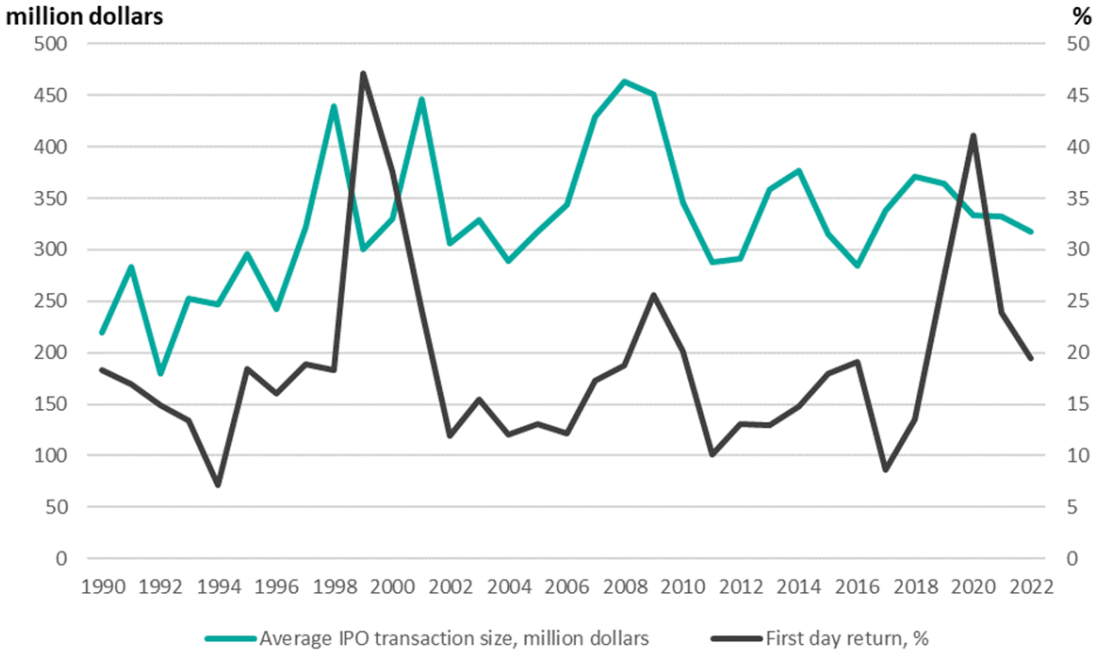

Fig. 2. **First-Day Return and Average IPO Transaction**

Source: Bloomberg Terminal, PREQVECA.

absolute record for the IPO market (*Fig. 3*). It is worth noting that the volume of the IPO market during this period increased not as significantly as the average returns or the number of IPO deals, which doubled during this time — reaching 600 deals per year compared to an average of 300 before the onset of the IPO wave. The main share of companies in the IPO market was represented by issuers from the U.S. (39%) and Europe (35%), which together raised

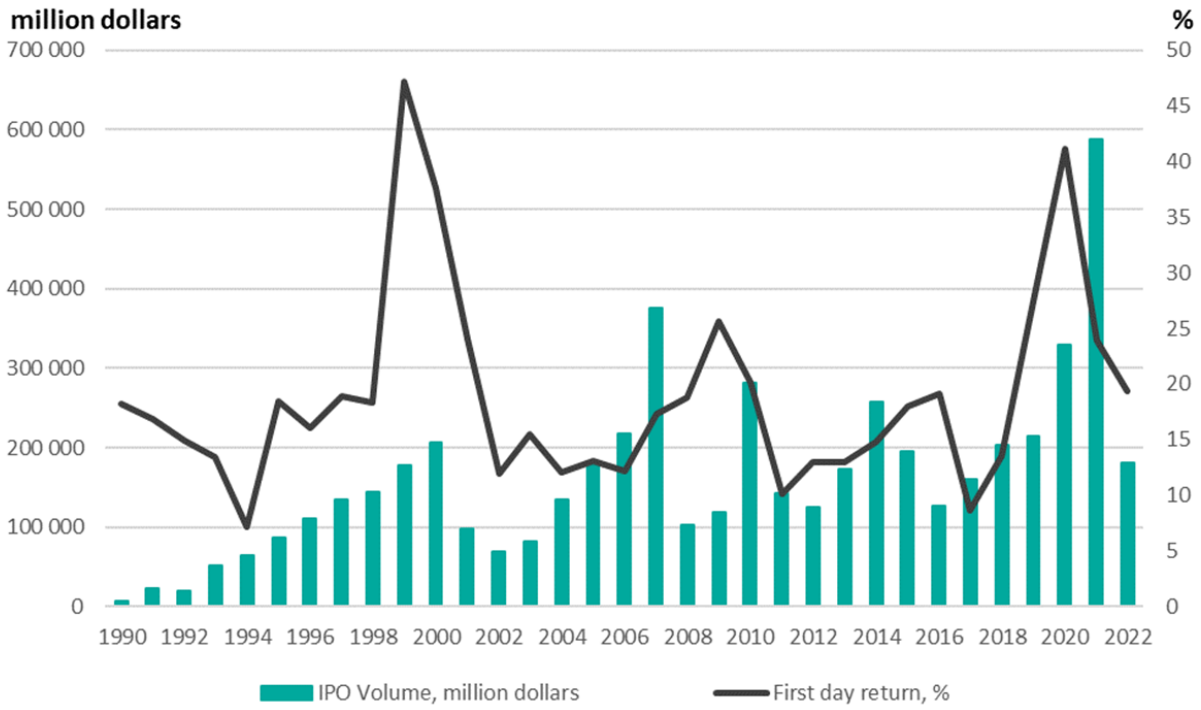

Fig. 3. **IPO Volume and First-Day Return**

Source: Bloomberg Terminal, PREQVECA.

284 billion USD — 74% of the total IPO volume during that time. This wave was accompanied by a significant increase in the NASDAQ index — from 1999 to September 2000, the index rose by 128%. The "hot" wave of IPOs ended with the onset of the dot-com crisis, when the NASDAQ index plummeted by 77% from its peak values in September 2000 over the course of two years due to the overvaluation of internet-related companies and inflated expectations for rapid revenue growth. Many of these companies did not have real business models and could not ensure sustainable profits.

The next wave of IPOs from 2005 to 2007 became the record-breaking period for the IPO market in its history up to that point. Among the main reasons for the formation of the IPO wave was the increased risk appetite of investors due to the global economic upturn, largely driven by the double-digit growth rate of the Chinese economy, as well as a number of successful large placements. Primarily of Chinese banks (China Construction Bank at 9 billion dollars in 2005 and Industrial & Commercial Bank of China at 19 billion dollars in 2006). During this period, the Russian IPO market was also at its record highs — in 2007, during the IPOs of Sberbank and VTB, they collectively raised over 16 billion dollars.

It is worth noting that during this period, there was a significant increase in the average size of IPO deals, largely due to a number of mega-deals by banks from China — 3 Chinese banks (Industrial & Commercial Bank of China, China Construction Bank, China CITIC Bank) raised a total of over 43 billion dollars. The average deal size in the world increased during this period to 420 million dollars compared to 300 million dollars before the start of the IPO wave. The average first-day IPO return has also increased to 20% compared to 12% before the start of the "hot" market. This wave ended due to the onset of the global financial crisis, triggered by the bankruptcy of several American banks and the rapid decline of the stock market — the S&P 500 index fell by 37% in 2008, with a minimum drop of 53%, forcing many companies to postpone their IPOs to a later date.

The improvement of the macroeconomic situation following the acute phase of the

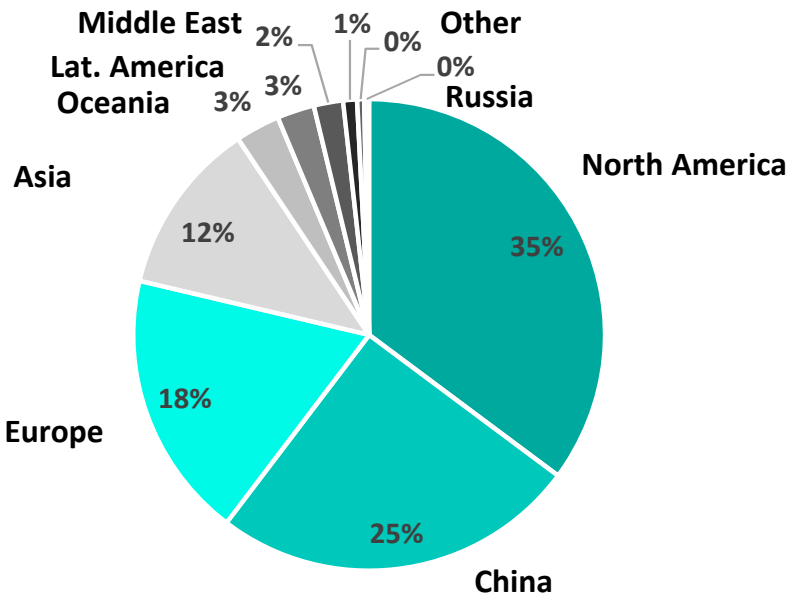

Fig. 4. **Number of IPO by Country in 1990–2022**

Source: Bloomberg Terminal, PREQVECA.

global financial crisis and the return of leading economies to a growth trajectory led to the third wave of IPOs, which occurred in 2010–2011. The volume of attracted funds increased by 2.5 times, and the number of deals increased by 4 times compared to the crisis period for the IPO market in 2008–2009. During this period, the mega-placement by the Chinese bank Agricultural Bank of China played a significant role again, attracting a record-breaking 19.2 billion dollars at that time. This wave of IPOs lasted only one year and ended due to events such as the debt crisis in Greece, the acute phase of the military conflict in Libya, and the accident at the nuclear power plant in Japan [14].

The third IPO wave took place from 2013 to 2016, and it was initiated by the successful placement of shares by the Chinese company Alibaba, which raised a record 25 billion dollars during its IPO. It is worth noting that this wave of raised funds was smaller in volume than the wave of 2005–2007, primarily because a number of significant geopolitical events that reduced investors' risk appetite accompanied this period. For example, the UK's exit from the EU, the slowdown in China's GDP growth, the collapse of oil prices, and the presidential elections in the U.S.

The wave of IPOs in 2020–2021 turned out to be the largest in the history of the IPO market in terms of the raised funds and the number of conducted IPOs. In total, over the course of two years, nearly 1 trillion dollars was raised in the IPO market, and more than 2 700 companies conducted their initial public offerings. The return on the first day of trading was also significantly higher than the average values of previous periods, reaching 41% in 2020, which is only slightly below the record set in 1999. This wave of IPOs coincided with the COVID-19 pandemic, which was accompanied by a significant decline in industrial production and a stock market crash — the S&P 500 index plummeted by 33% in just one month, from February to March 2020. However, the emergency measures taken by central banks, primarily the Federal Reserve, led to a significant increase in market liquidity, which provided substantial support to financial markets. The lowering of key interest rates worldwide during this period, aimed at supporting business, has also increased investors' risk appetite, leading them to prefer participation in IPOs in search of higher-yield investments. The acceleration of inflation against the backdrop of problems in global

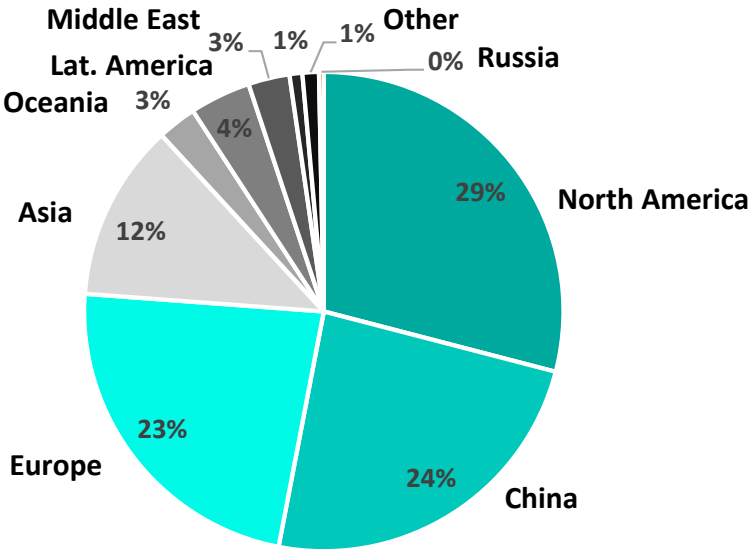

Fig. 5. **IPO Volume by Country in 1990–2022**

Source: Bloomberg Terminal, PREQVECA.

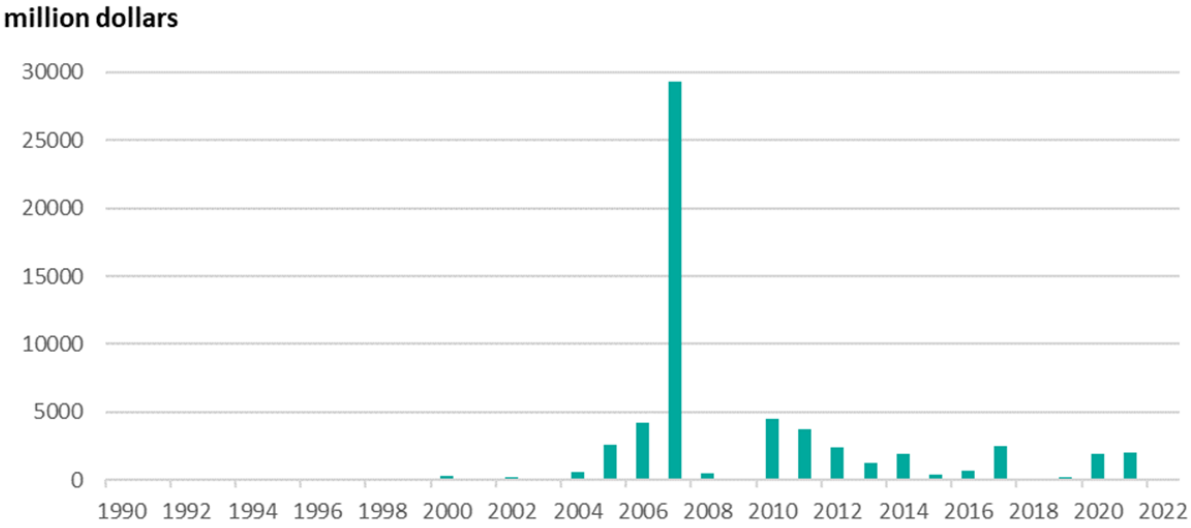

Fig. 6. **IPO Volume in Russia 1990–2022**

Source: Bloomberg Terminal, PREQVECA.

supply chains, as well as the beginning of tightening monetary policy by central banks to combat inflation, has led to a decrease in investors' risk appetite and the end of the "hot" IPO market.

In geographical terms, companies from the U.S., China, and Europe dominated the IPO market (*Fig. 4, 5*). The U.S. holds a leading position both in terms of raised funds and the number of IPOs conducted. It is worth noting that the share of the U.S. in the number of IPOs is greater than its share in the volume of raised funds, which indicates that the average size of an IPO deal in the U.S. was lower compared to the global average — 152 million USD versus 336 million USD. The opposite situation is observed for IPO deals in Europe, where the size of IPO deals was larger than the global average (424 million USD). The large number of IPO deals in the U.S. may be due to a simpler process for companies going public and a liquid market compared to other regions.

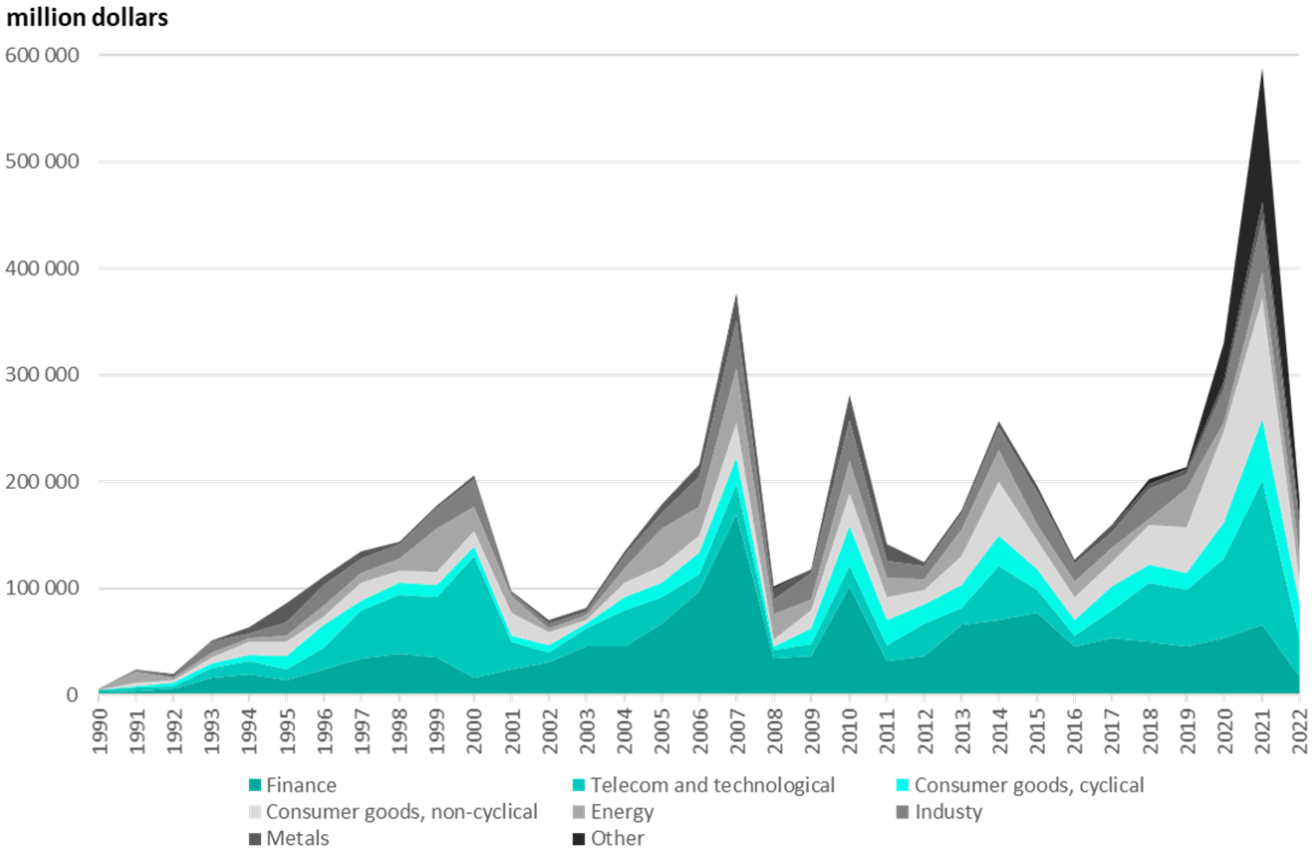

Fig. 7. **IPO Volume by Sector 1990–2022**

Source: Bloomberg Terminal, PREQVECA.

During this period, companies from Russia conducted 77 IPO deals with raised capital exceeding 50 million dollars, which accounts for less than 1% of the total number of deals. However, in terms of the total amount of funds raised, Russian companies attracted just over 1%, as the average deal size was 776 million dollars, significantly higher than the global average. This dynamic is explained by the large placements of shares of Sberbank and VTB in 2007. This year has turned out to be the most successful for the Russian IPO market; at other times, the volume of shares raised by Russian companies did not exceed 5 billion dollars per year (*Fig. 6*). It is worth noting that a number of Russian "blue chip" stocks (Gazprom, Rosneft, etc.) did not conduct an IPO in the classical sense of the word; instead, the shares of these companies began trading on the stock exchange in the mid-90s through direct listing.

The analysis of the dynamics of attracted funds across different sectors of the economy is of significant interest. Companies from the financial sector, mainly banks, attracted the largest share of funds during the analyzed period. In total, financial institutions attracted 1 470 trillion USD, or 27% of the overall IPO market. It is worth noting the pronounced increase in the volumes of funds attracted by financial institutions during three out of the five observed waves of IPOs, as well as the weak dynamics during the "hot" market periods of 1999–2000 and 2020–2021. The relatively low volume of raised funds during the IPO wave of 2020 can be explained by the fact that the banking sector was receiving a significant amount of cheap liquidity from central banks, which meant that financial institutions did not require additional financing. On the other hand, during the COVID pandemic, banks tightened their requirements for borrowers due to the increased global uncertainty regarding economic prospects, which negatively affected forecasts for the profitability of the financial

sector. Moreover, insurance companies found themselves in a difficult position, as a number of costly risks materialized during this period, which also significantly worsened the profit outlook for this sector [15, 16].

The technology sector, in turn, demonstrated strong dynamics during the "hot" markets of 1999–2000 and 2020–2021 (*Fig. 7*). If the boom of internet companies drove the first IPO wave during the COVID-19 pandemic, companies in the technology sector once again actively entered the IPO market, as the demand for a number of IT products significantly increased due to the urgent transition of most companies to remote work. Investors were willing to pay substantial premiums for these companies, which provided shareholders and management of technology firms with an excellent opportunity to attract funding on favorable terms. The first-day return during the period of 2020–2021 for technology sector companies was 37% compared to 21% for all other sectors. In total, the technology sector attracted 20% of the overall IPO market volume during the analyzed period, or 1,047 billion USD. Unlike the financial sector, technology companies have not conducted their initial public offerings as consistently during this period.

In the paper of J. Helwege and N. Liang, the authors analyze the IPO market from 1975 to 2000 and conclude that there are no signs of clustering in certain sectors of the economy. In other words, during a "hot" market, companies from all sectors of the economy strive to go public, even though investors may prefer companies from specific sectors [11]. The empirical data used by the author indicates that during the IPO wave of 1999–2000, technology sector companies attracted 44% of the total volume of the primary public offerings market, while the dynamics of the amounts raised by companies from other sectors grew only slightly. A similar situation was observed in the IPO market from 2005 to 2007, when the financial sector accounted for 42% of the total IPO market during that period; however, the dynamics of funds raised by companies from other sectors also significantly increased. For example, the volume of funds raised by companies in the energy sector increased from 14 billion USD at the beginning of the IPO wave in 2003 to 51 billion USD at the peak of the "hot" market in 2007. A similar trend was observed in later IPO waves. Thus, the author's data confirms the hypothesis of J. Helwege and N. Liang regarding the absence of pronounced clustering in the IPO market during "hot" waves in certain sectors of the economy. Companies from several sectors can indeed attract the majority of the overall IPO market volume; however, companies from other sectors are also inclined to conduct listings during these periods.

IPO MARKET IN CHINA

From the era of Deng Xiaoping's, China has set a course for attracting foreign investments into the country. The Chinese economy has undergone a process of gradual liberalization and integration into the global economy. After China's accession to the WTO in 2001, this process significantly accelerated, as did the influx of foreign direct investment into the economy — from 40 billion USD in 2000 to over 100 billion USD in 2010.[1] Accession to the WTO also imposed certain obligations on China, such as reducing tariff barriers on imports of goods and services, decreasing government support for exports, expanding access for foreign companies to the Chinese market, and so on. Moreover, one of the important conditions was to increase the transparency of the banking sector in China and to expand foreign banks' access to the local market.

The Chinese government has made significant efforts to reform the banking sector — a bad asset fund was created to which the problematic loans of the largest state banks were transferred, and the banks themselves were recapitalized (1 180 billion yuan in 2004–2005 and 30 billion dollars for the Agricultural Bank of China in 2009). China has used the IPO tool

[1] China Statistic Yearbook, 1979–2010. URL: http://www.stats.gov.cn/sj/ndsj/2010/left_.htm (accessed on 16.05.2023).

Fig. 8. **IPO Volume in China and RoW, Share of China**

Source: Bloomberg Terminal, PREQVECA.

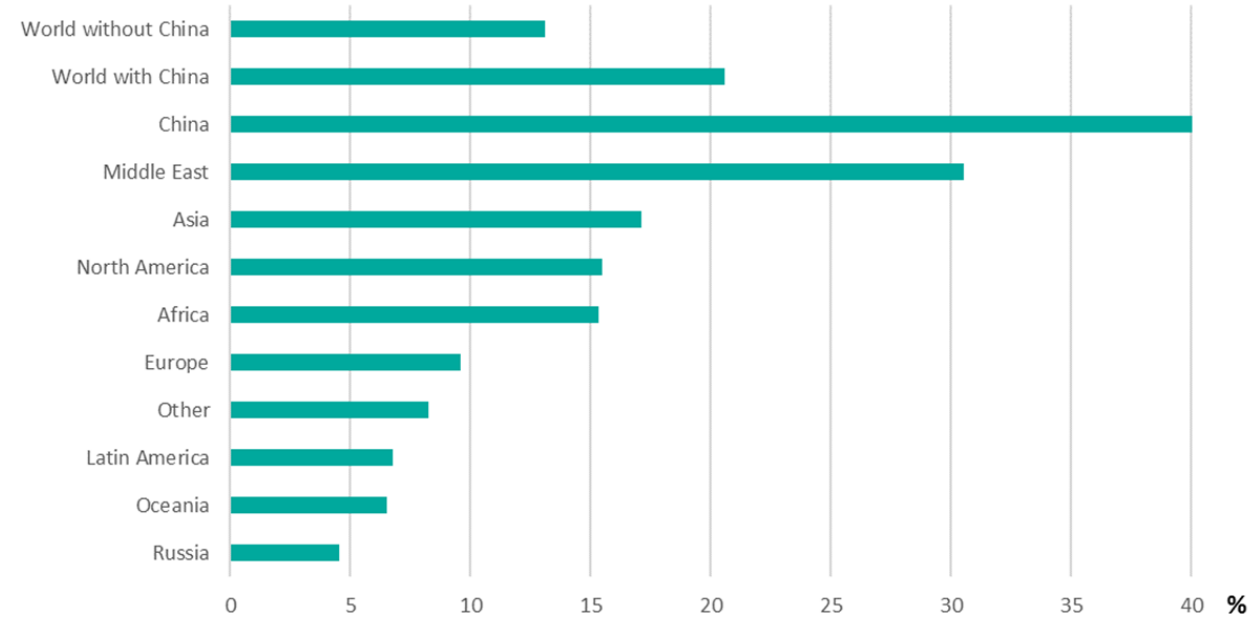

Fig. 9. **Average First Day Return by Country**

Source: Bloomberg Terminal, PREQVECA.

as an effective way to reduce the state's share in the banking system, increase transparency, and attract new resources for the sector's development. The initial public offerings of the largest state-owned banks in China have become the main driver of the local primary public offering market, and besides the banks, the government has privatized stakes in other assets through IPOs [17–19].

The Chinese IPO market demonstrated rapid growth in its volume, with the share of Chinese companies in the total IPO market approaching 50% in 2009 and 2010, and in 2022, it even surpassed this mark (*Fig. 8*). If in the period from

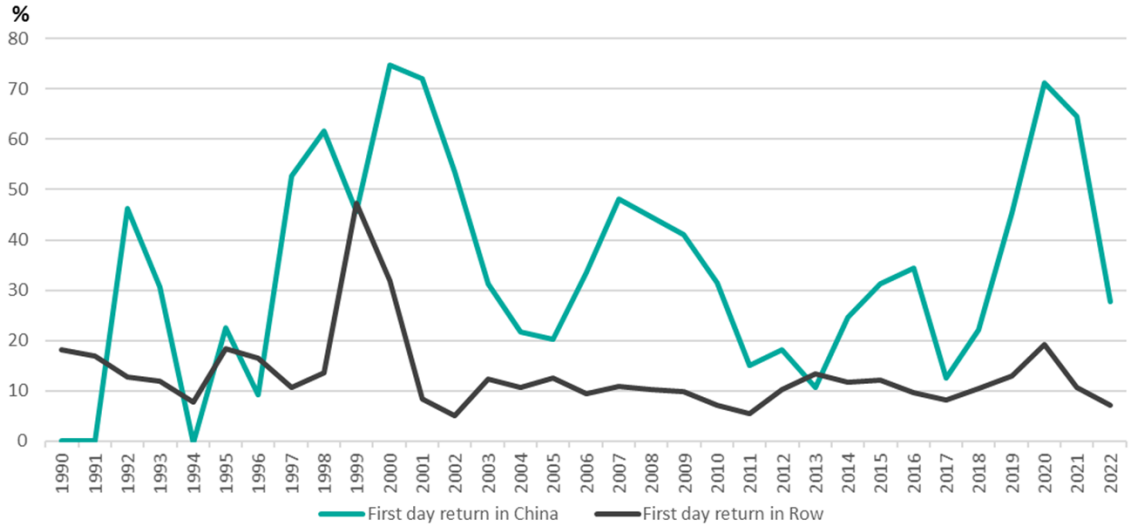

Fig. 10. **First-Day Return in China and RoW**

Source: Bloomberg Terminal, PREQVECA.

1990 to 2000, China's share was only 5% of the IPO market volume during that time, then from 2000 to 2010 it increased to 25%, and in the period from 2010 to 2022, it reached 29%.

It is important to emphasize that, despite the fact that the main demand for the placements of Chinese companies on local platforms comes from local investors, Chinese companies tend to follow global trends and prefer to go public during "hot" market periods (*Fig. 8*). Moreover, it is worth noting that China's share in the IPO market has significantly increased during periods of "hot" markets, which indicates a high sensitivity of the Chinese IPO market to sentiments in global financial arenas.

However, it is worth noting that the Chinese IPO market has a number of distinctive features, one of which is the high first-day return on offerings (*Fig. 9, 10*). Researchers link this phenomenon to the characteristics of state regulation of the process of preparing and conducting IPOs, which affects the placement price of companies. A lower level of unsuccessful IPOs compared to the rest of the world attracts investors to participate in new offerings with the aim of achieving high returns with minimal risk. At the same time, the long-term dynamics of the stocks of companies going public in China remain negative [20, 21]. According to the author's database, the share of IPOs of Chinese companies with negative first-day returns is 18% compared to 26% for companies from the rest of the world. For example, in Europe, the share of IPOs with negative first-day returns is 27%, while in the U.S. it is 24%.

As noted, the average return on investments in China is significantly higher compared to the rest of the world, and this trend continues to this day. The process of companies going public in China has undergone a series of regulatory changes that have directly impacted the first-day returns of Chinese companies listed on local exchanges. According to the research by A. Azevedo, Y. Guney, and J. Leng, China underwent a gradual transition from a fixed-price share allocation mechanism to book building, which ultimately reduced first-day returns in the local market. The authors also provide data indicating that the first-day returns of companies with state participation are higher compared to private companies conducting IPOs in China. The authors explain this phenomenon by stating that maximizing the placement price for the state is often not the primary goal of conducting an IPO, unlike private companies. The quota system also had a significant impact on the Chinese IPO market, where the China Securities Regulatory Commission (further CSRC) determined which companies in each province should go public.

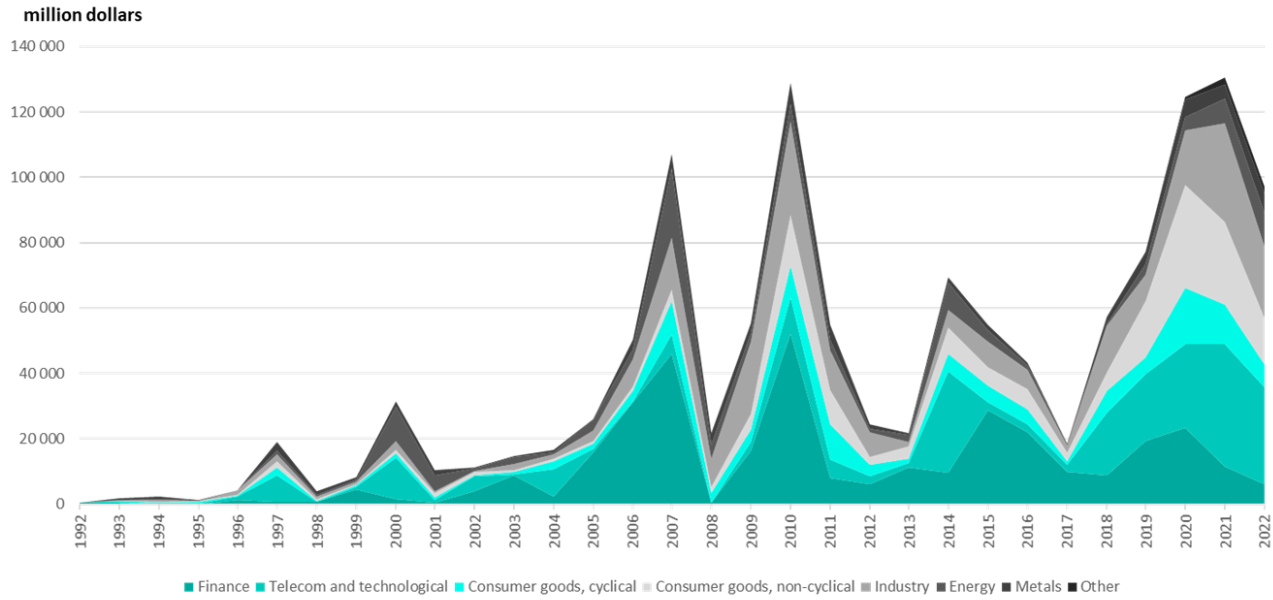

Fig. 11. **IPO Volume in China by Sector**

Source: Bloomberg Terminal, PREQVECA.

However, within this system, the demand for shares of these companies typically far exceeded the supply, leading to high first-day trading returns [22].

It is noteworthy that the Chinese IPO market followed global trends in initial public offerings even before the country joined the WTO — as seen in *Fig. 11*, there is a clear increase in the volume of raised funds during the "hot" IPO market of 1999–2000. However, a large part of this increase in the volume of attracted funds is explained by the successful placement of the Chinese telecommunications company China Unicom on the Hong Kong and New York stock exchanges, during which the company raised a record 10.5 billion USD at that time for the Chinese market.

It is also worth noting that the Chinese IPO market demonstrated significant resilience during the global financial crisis of 2008, and the subsequent wave of IPOs in the market in 2010–2011 turned out to raise even more funds for the Chinese market than the IPO wave of 2006–2008. This phenomenon is explained by the weak impact of the global crisis on the Chinese economy compared to the rest of the world — China's GDP growth in 2008 was 9.7%, slowing down from 14.2% in 2007, and in 2010 it returned to double digits, increasing to 10.6%.[2]

As mentioned above, the financial sector played a leading role in the development of the IPO market in China during the period from 2000 to 2010 — this sector accounted for 38% of the total raised volume, while from 2010 to 2022, the share of the financial sector was 28%. The share of industrial companies has always remained stable at around 19%, while the share of technology companies has significantly increased: from just 11% before 2010, it grew to 21% from 2010 to 2022. As in the rest of the world, the technology sector experienced the highest growth during the IPO wave of 2021–2022, when the demand for the services of these companies significantly increased against the backdrop of the COVID-19 pandemic.

Given the slowdown in China's economic growth to 5% in recent years, as well as the increased geopolitical risks and the associated rise in sanctions and restrictions from the US and Europe, which complicate access for Chinese companies to global financial markets.

[2] World Bank database. URL: https://datacatalog.worldbank.org/search/dataset/0037712 (accessed on 16.05.2023).

It can be assumed that this may have a negative impact on the Chinese IPO market in the medium-term. In addition, the unpredictable policies of the Chinese regulator regarding local companies planning to conduct an initial public offering (IPO) are often a highly negative factor for the development of the local IPO market. For example, the investigations surrounding the planned IPO of Ant Group in 2020, the ban on registering new users for Didi after its listing on the NYSE in 2021, etc.

Taking into account the changes in the industry structure of the Chinese IPO market, one can assume that in the next decade, technology companies will dominate the market rather than those from the financial sector. The Chinese banking sector has been the driving force of the IPO market for the past 20 years, marked by a number of record-breaking fundraising deals. However, nearly all of China's largest banks have already gone public, and the potential for further growth in IPO volumes in the sector is limited. Traditional financial institutions in the IPO market may be replaced by financial technology companies (such as the already mentioned Ant Group, which planned to raise a record 34.5 billion USD in 2020). The Chinese economy is transitioning from extensive to a more qualitative development, and we can expect that the structure of the IPO market will also shift towards more technological companies. This trend is also confirmed by empirical data — the share of Chinese technology companies in the structure of raised capital in IPO markets has been steadily increasing over the past 10 years (*Fig. 11*).

CONCLUSION

The analysis of the database collected by the author confirms the absence of clustering in certain sectors during "hot" IPO markets. In other words, this paper confirms the hypothesis of J. Helwege and N. Liang at a new time horizon — during "hot" IPO markets, companies from various sectors strive to list their shares on the exchange.

Another important conclusion of the work is the illustration of the high correlation between the global and Chinese IPO markets during "hot" waves. The author's data also shows the increasing share of Chinese companies in the total amount of funds raised in the initial public offering market. The IPO waves in the Chinese market coincided with the global dynamics of initial public offering markets.

The presence of Chinese banks has provided significant support to the global IPO market over the past 20 years. However, considering that nearly all of China's largest banks have already listed their shares on the stock exchange, along with a shift away from extensive economic development, the industry structure of China's IPO market is expected to change towards technology companies in the next 10 years.

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Transformation of the Theory of Financial Recovery of the Organization as a Factor in Improving the Rehabilitation Effectiveness of Bankruptcy Procedures

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ABSTRACT

The **purpose** of the study is to change the current methodology for identifying the fundamental aspects of an organization's financial recovery by analyzing the elements that are needed for the theory of financial recovery to change under current conditions. **The subject** of the study is the financial and economic mechanisms for the settlement of overdue debts of insolvent organizations in out-of-court and judicial (under bankruptcy procedures) regimes within the framework of financial relations with creditors. The **relevance** of the work is due to theoretical and practical problems. The strengthening of the factors of the business crisis against the background of a high debt burden and low economic growth significantly increases the risks of mass bankruptcies of organizations, which requires the improvement of financial recovery tools. However, the existing paradigm of the theory of financial recovery is focused on preventing threats to the property interests of the owners of the debtor organization — this reduces the rehabilitation potential of such a theory. Analysis of the implementation of bankruptcy procedures in Russia shows the inefficiency of rehabilitation and liquidation procedures, which in most cases end in the liquidation of the organization and the separate sale of its assets in parts. Using logical research **methods** (analysis, synthesis, induction), economic analysis of judicial statistics on bankruptcy in Russia and the USA, methods of economic comparison and the provisions of the systematic approach, the theory of corporate reorganization of L. Bebchuk, the contract theory of the firm O. Hart and the theory of crisis management of socio-economic systems, the original results of the study were obtained. The article proposes to change the object composition of the processes of financial recovery: to shift the emphasis from protecting the property interests of the debtor organization to preserving its business from destruction. The change in the object composition provides, among other things, a solution to the key strategic problem of the institution of bankruptcy — finding a balance between rehabilitation and liquidation procedures, preventing the preservation of inefficient and liquidation of effective debtors. The orientation of financial recovery tools to preserve businesses from destruction allows us to develop provisions on the risk of bankruptcy of organizations and increase the rehabilitation potential of bankruptcy liquidation procedures, which determines the novelty of the study.

Keywords: financial recovery; credit relations; insolvency; financial stability; bankruptcy procedures; business preservation from destruction; bankruptcy risk; threat to property interests; ways to preserve business from destruction

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INTRODUCTION

The constant crisis-driven development of the economy (regardless of the nature of the crisis factors), the high level of debt burden in the corporate sector that emerged after the coronavirus pandemic, and the low growth rates of the global economy (*Fig. 1*) necessitate the development and improvement of the theory of financial rehabilitation of organizations to prevent their mass bankruptcies.

The need to improve the theory of financial rehabilitation is also driven by the low effectiveness of bankruptcy procedures in Russia regarding business recovery and their liquidation-oriented nature: from 2003 to 2022, the share of rehabilitation procedures in bankruptcy cases for organizations, which essentially serve as tools for financial recovery, does not exceed an average of 4.6% of the total number of bankruptcy procedures (whereas, for example, in the U.S., this share exceeds 30.4%). The rehabilitation effectiveness of the bankruptcy institution for legal entities in Russia averages 3.1% (out of 100 organizations for which bankruptcy proceedings have been initiated, only one in three organizations, which have restored their solvency, remains after all bankruptcy procedures are completed) (*Fig. 2*).

The potential for the rehabilitation of organizations within the framework of bankruptcy rehabilitation procedures in Russia is also quite low. The analysis of the activities of organizations whose solvency was restored during bankruptcy rehabilitation procedures (financial recovery, external management) from 2010 to the first half of 2023 showed their low survival rate: after exiting bankruptcy procedures, every fifth organization continued its activities (out of 3 504 organizations that underwent financial rehabilitation or external management, 748 organizations remained operational, not in a state of bankruptcy, liquidation, or reorganization, which constitutes 21% of the total number mentioned). At the same time, among the organizations that continued their activities, only every third one is financially stable (assessment based on the consolidated risk indicator of loss of financial stability from Spark-Interfax).[1]

The issues of low effectiveness in the rehabilitative aspect of the bankruptcy institute in Russia have been sufficiently studied [1–3], however, there is hardly any attention paid to the improvement of the theory of financial rehabilitation of organizations. This theory is relatively young in our country; its development is linked to the establishment of a market economy and the formation of the bankruptcy institution. For this reason, there are currently no systematic studies and theoretical developments in the field of financial rehabilitation of organizations in Russia. In most cases, existing approaches to studying the theory of financial rehabilitation are narrow in scope, defining the essence of financial rehabilitation as one of the bankruptcy procedures [4], or only considering the accounting and analytical aspects of financial rehabilitation [5]. At the same time, the subject composition targeted by the financial recovery processes is limited to organizations only.

A comprehensive approach to the development of the theory of financial recovery is found in the research of S.E. Kovan [6] (a representative of the scientific school of the Financial University "Crisis Management", to which the author of the paper also belongs). However, the essence of the financial recovery of an organization in the paper of S.E. Kovan is limited solely to protecting the interests of the owners of the debtor organization. At the same time, this scholar developed a universal systemic theory of anti-crisis management for socio-economic systems [7], the fundamental principles of which can serve as the foundation for the theory of financial

[1] Yukhinin A. Statistics of Rehabilitation Procedures. Is there reliable information? Practicum of a bankruptcy lawyer, 2023. Corporate lawyer. URL: https://korpurist.life/bankrotstvo/23/art.php?id=3 (accessed on 28.11.2023).

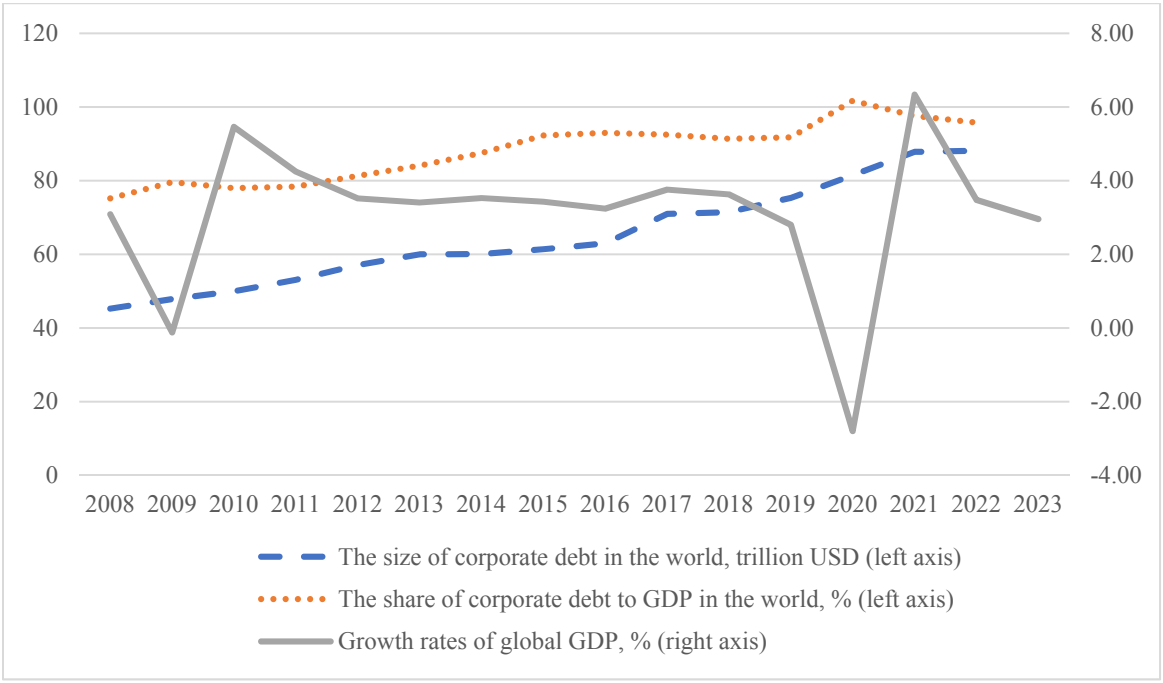

Fig. 1. **Dynamics of the Global Volume of Corporate Debt and the Rate of Change in Global GDP**

Source: Author's calculations on the basis of data from the Bank for International Settlements, the International Monetary Fund. URL: https://www.statista.com; https://www.statista.com (accessed on 12.11.2023).

recovery of organizations. The main idea of this theory is to consider the business itself as the object of crisis management, rather than the organization.

Abroad, the development of the theory of financial recovery of businesses does not occur as an independent scientific field. The existence of various names for this theory (corporate turnaround [8], corporate recovery,[2] corporate financial restructuring [9]) indicates that the theoretical foundation of the science is not yet fully developed. A large part of the research examines the essence of financial rehabilitation, as in Russia, in connection with bankruptcy procedures regarding reorganization [10–13], debt restructuring, and preventive restructuring[3] (high risks of restoring solvency are noted [14]). Thus, the foreign approach to the financial recovery of an organization is defined by two modes of such recovery: extrajudicial and judicial.

At the same time, financial rehabilitation as a tool is associated with financial (determined by financial factors) rather than economic (determined by economic factors) bankruptcy [15, 16]: a debtor facing financial reasons for bankruptcy has a high likelihood of reorganization based on agreements with creditors, whereas in the case of economic reasons for bankruptcy, the debtor will be liquidated.

The portable forms of financial rehabilitation deserve special attention when studying the essence of financial recovery, as they allow for the preservation of the debtor's business from destruction even in the event of its liquidation. The simplest mechanism for portable financial rehabilitation is the sale of the debtor's enterprise without its debts; a

[2] Strategic Crisis Management: OECD Risk Management. OECD. 2013. URL: https://www.mmc.com/content/dam/mmc-web/Files/Strategic-Crisis-Management-paper-July-2013.pdf (accessed on 18.10.2021).

[3] Directive (EU) 2019/1023 of the European Parliament and of the Council of 20 June 2019 on preventive restructuring frameworks, on discharge of debt and disqualifications, and on measures to increase the efficiency of procedures concerning restructuring, insolvency and discharge of debt, and amending Directive (EU) 2017/1132 (Directive on restructuring and insolvency), Official Journal of the European Union. 26.06.2019. L 172.

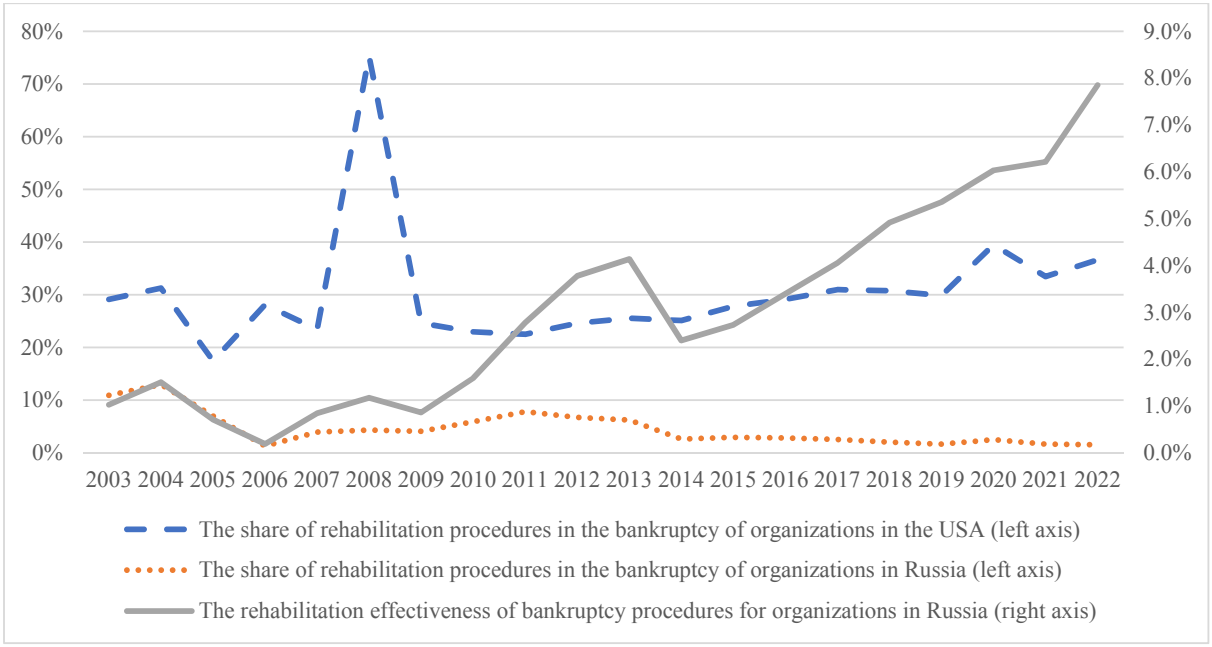

Fig. 2. **Rehabilitation Effectiveness of Bankruptcy Procedures of Organizations in Russia and the USA**

Source: Author's calculations based on judicial statistics on bankruptcy of legal entities in Russia and the USA. URL: http://www.cdep.ru; https://www.uscourts.gov (accessed on 12.11.2023).

Note: for Russia, the indicators are calculated as follows: the share of rehabilitation bankruptcy procedures of organizations – as the ratio of the sum of the number of bankruptcy cases of organizations in respect of which financial rehabilitation or external management or a settlement agreement has been introduced to the total number of all bankruptcy cases; rehabilitation effectiveness of bankruptcy procedures of organizations – as the ratio of the number of rehabilitation bankruptcy procedures in which the solvency of the organization has been restored to the total number of bankruptcy cases. For the United States, the share of rehabilitation bankruptcy procedures of organizations is calculated as the ratio of the number of bankruptcy cases in accordance with Chapter 11 "Reorganization" of the U.S. Bankruptcy Code to the total number of bankruptcy cases (including Chapters 7 "Liquidation" and 11 of the U.S. Bankruptcy Code).

more complex mechanism is the formation of a new corporation (joint-stock company) based on the debtor's assets, unencumbered by the debts of previous creditors. The most popular "portable" financial recovery has become in Belgium, England, Germany, the U.S.,[4] and France [17, 18]. In France, for example, the mechanism of portable financial recovery must necessarily meet three conditions simultaneously: 1) the continuation of economic activity on the debtor's assets; 2) the preservation of jobs; 3) the maximum satisfaction of creditors' claims [17].

In the European Union, a directive has been adopted in bankruptcy law aimed at developing preventive restructuring of overdue debts in member states to save the debtor's business.[5] In Russia, the current bankruptcy legislation[6] provides for such forms (sale of the enterprise, asset replacement), but they have not gained widespread adoption. The use of this form of financial rehabilitation allows for the identification of a rehabilitative function even within the liquidation procedures of

[4] Paragraph 363 of Chapter 11 of the U.S. Bankruptcy Code provides a mechanism for the sale of a debtor's assets, allowing them to quickly sell assets free from all other claims.

[5] Rescue of Business in Bankruptcy Law: Report of the Institute of European Law / trans. from English. M: Statute; 2021. 604 p.

[6] Federal Law from 26 October 2002 No. 127 "On Insolvency (Bankruptcy). A new draft federal law "On Amendments to the Federal Law "On Insolvency (Bankruptcy)" and Certain Legislative Acts of the Russian Federation" (developed by the Government of the Russian Federation in 2021 and submitted to the State Duma of the Russian Federation) URL: https://sozd.duma.gov.ru/bill/1172553-7.) provides for mechanisms of "transferrable" financial recovery.

bankruptcy. It has been proven that the mechanism of portable financial rehabilitation has a positive impact on ensuring the financial stability of a business [18].

When examining the essence of financial rehabilitation, the contentious issues are maintaining a balance between liquidation and rehabilitation procedures in bankruptcy and defining the objective function of the bankruptcy institution. On one hand, the liquidation of an organization during bankruptcy proceedings can have positive effects on the macroeconomic: bankruptcy allows for the redistribution of inefficiently used assets for more productive utilization (the so-called "creative destruction" effect) [19]. On the other hand, financial rehabilitation may lead to the preservation of inefficient organizations due to conflicts of interest and agency problems between the debtor and creditors, which prevents the effective redistribution of assets [11].

From the perspective of this contradiction, the bankruptcy institution should provide a mechanism that allows for the rehabilitation of economically viable businesses while simultaneously ensuring the liquidation of unproductive ones (at the same time, it is important to consider the negative market effects (information asymmetry, conflicts of interest between the debtor and creditors) that significantly reduce the effectiveness of rehabilitation within bankruptcy procedures). As a tool to overcome the conflict of interest between the debtor and the creditor, the conversion of debts into equity in the debtor's business is proposed. This ensures the possibility of preserving the ongoing business within bankruptcy procedures by creating incentives for creditors to be interested in the development of such a business [13].

The uncertainty in establishing a unified goal for bankruptcy institutions has led to the formation of two bankruptcy systems in the world: the creditor-friendly system (UK) and the continuation-oriented system (France, U.S.), the effectiveness of which is a subject of ongoing debate. Research shows that in insolvency systems focused on protecting creditor interests, insolvent organizations lose significantly more capital value than in continuation bankruptcy systems aimed at ensuring the survival of organizations and their businesses [20]. The analysis of foreign experience in bankruptcy regulation shows that many European countries (for example, Germany, France, Italy, and Spain) have reformed their bankruptcy legislation to enhance its rehabilitative component, ensuring the preservation of the debtor's business [21]. Overall, the mechanism of financial rehabilitation, as the goal of bankruptcy procedures, should ensure their ex post effectiveness, which consists of maximizing the value of the debtor's business [12]. This allows for the fullest possible satisfaction of creditors' claims and helps preserve the business from destruction.

Thus, there is currently an urgent need to develop the theory of financial rehabilitation of organizations in both extrajudicial and judicial regimes, and to improve the practice of implementing bankruptcy procedures based on it. This will significantly enhance the efficiency of bankruptcy procedures for legal entities.

The **purpose** of the study is to determine the essence of financial recovery for an organization based on the formation of a mechanism to protect the business from destruction due to the negative factors of a crisis, which serves as the fundamental goal of such recovery.

Let's formulate the research hypotheses: 1) the composition of the objects targeted by financial rehabilitation processes determines the objectives of such processes and the temporal nature of their progression; 2) the primary goal of an organization's financial rehabilitation is to prevent the threat of business destruction, rather than the threat of bankruptcy; 3) liquidation procedures for bankruptcy can have a rehabilitative character

when using mechanisms of "transferred" financial rehabilitation.

RESEARCH MATERIALS AND METHODS

The theoretical basis of the research was based on domestic and foreign scientific works on the issues of bankruptcy theory, reorganization, and restructuring of organizations, as well as the peculiarities of legal regulation of national insolvency regimes. The practical component of the research is based on the analysis of judicial data in the field of bankruptcy procedures in Russia and abroad, as well as other analytical collections dedicated to the issues of legal regulation of bankruptcy procedures in foreign countries.[7]

To achieve the set goal and to prove the formulated hypotheses, the article employed research methods: analysis of statistical data on organizational insolvency issues, logical methods (analysis, synthesis, induction) using methods of economic comparison and a systemic approach. This approach, viewing the enterprise, business, and organization as socio-economic systems of different levels unified into one system, allows for the definition of the essence of "transferrable" financial rehabilitation of a business, according to which a business can be preserved as operational even during the liquidation of the organization.

The theoretical basis of the research is grounded in S. E. Kovan's theory of crisis management in socio-economic systems, as well as the theories of L. Bebchuk and O. Hart regarding approaches to corporate reorganization, which essentially justify the feasibility of applying "transferrable" financial rehabilitation to protect an organization's business from destruction (only within the framework of the existing organization by converting creditors' debt claims into shares (stakes) of the debtor). However, within the framework of this research, the data of the theory have been expanded by providing the opportunity to preserve the debtor's business within the newly created separate legal entity without transferring its previous obligations.

RESULTS OF THE RESEARCH AND THEIR DISCUSSION

Based on the results of the conducted research, the following outcomes have been achieved.

1. Through the object composition, the content of the financial recovery of the organization, its types, and goals have been defined in relation to the stages of crisis development.

The foundation of financial rehabilitation as a science is the theory of crisis management of socio-economic systems, according to which the goal of such management is to ensure the well-being of higher-level systems (the external environment): there is a shift in the system of values and priorities from the organization towards ensuring the interests of the external environment [7]. This is due to a chain reaction of negative consequences from the crisis of organizations: in the event of its occurrence, the damage is inflicted not only on the organization itself but also passes along the chain to all entities interconnected with it (in the scientific literature, this phenomenon is referred to as "indirect costs of bankruptcy").

It is logical that in such a case, it is important to preserve the business as a socio-economic system at a lower level than the organization. In resolving an organizational crisis, issues of ownership are secondary; the main thing is that the object of management (the business) can continue to operate effectively and meet the needs of the external environment. At the same time, conducting business is only possible with the preservation of the business-forming assets that constitute the enterprise as a property complex. Thus, one can consider an organization, business,

[7] Reports of the American Bankruptcy Institute. URL: https://www.abi.org (accessed on 28.11.2023). German Institute for Small and Medium-sized Business Research IfM Bonn. URL: ifm-bonn.org (accessed on 28.11.2023).

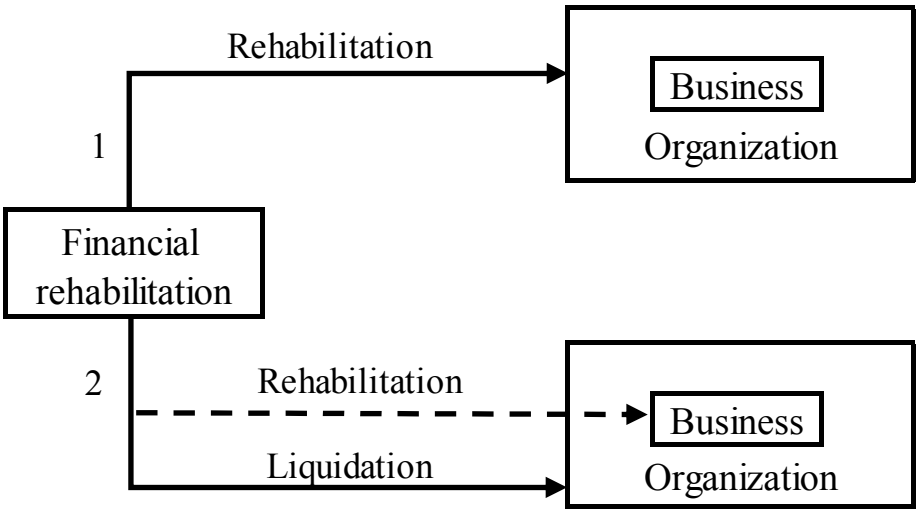

Fig. 3. **Objects of Financial Recovery**

Source: Compiled by the author.

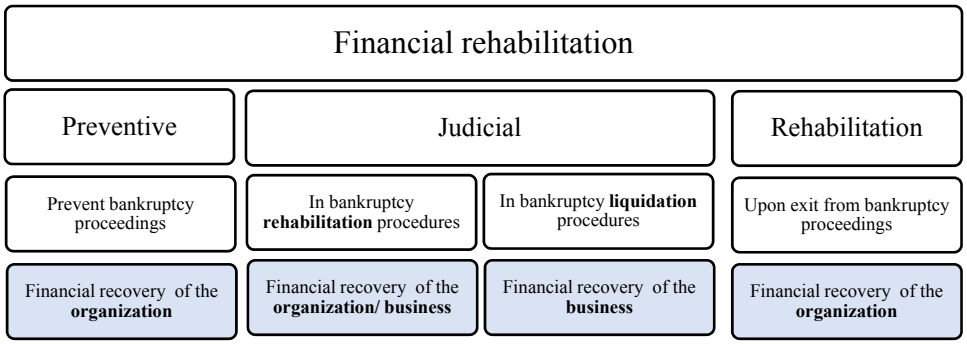

Fig. 4. **Types of Financial Recovery of an Organization and Business**

Source: Compiled by the author.

and enterprise as systems of different levels in relation to each other.

The proposed approach allows for the definition of the essence of financial recovery as a scientific and practical direction of the theory of crisis management in socio-economic systems, which involves the application of various measures concerning insolvent organizations with the aim of preserving their business from destruction. The main differences between the proposed definition and existing ones lie in the transformation of the goals of financial recovery from restoring solvency to preserving the business from destruction, the expansion of tools (preserving the business through the application of "transferred" rehabilitation), and the focus on ensuring the interests of the external environment (regardless of the current owner of the organization).

The use of "portable" financial rehabilitation tools allows businesses to be preserved even within the framework of liquidation procedures during bankruptcy, thereby revealing their rehabilitation potential. Consequently, the financial recovery of the organization can lead to the financial rehabilitation of the organization itself or its business (*Fig. 3*). Sometimes, for the financial recovery of a business, it is beneficial to liquidate the organization (in most cases, under an ineffective previous owner).

The composition of the entities and the regime of financial rehabilitation, depending on the organization's special legal status

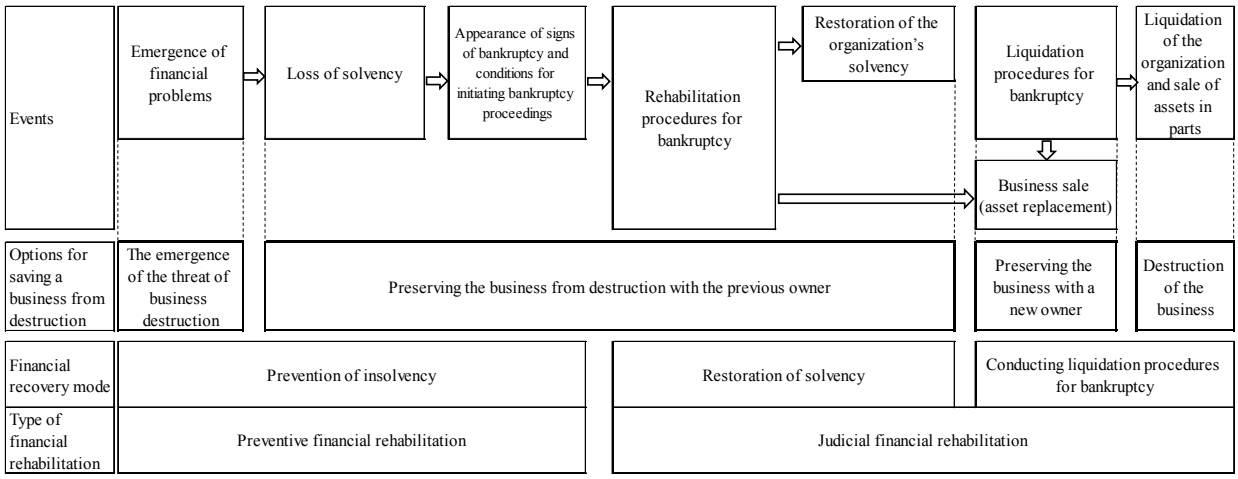

Fig. 5. **Ways to Save a Business from Destruction During Financial Recovery**

Source: Compiled by the author.

(bankruptcy proceedings initiated), determine the types of such rehabilitation (*Fig. 4*).

Preventive financial recovery is aimed at preventing insolvency and avoiding the initiation of bankruptcy proceedings as a threat to the destruction of the business. This type of financial rehabilitation is aimed at restoring the organization, as the risk of bankruptcy is minimal. Judicial financial recovery is carried out within the framework of bankruptcy procedures, and depending on the category of these procedures, it can be of two subtypes: rehabilitation within either rehabilitative or liquidation bankruptcy procedures.

If financial recovery occurs during the rehabilitation procedures of bankruptcy, both an organization and a business can serve as the subject. The last one will serve as the subject of financial rehabilitation if measures for "transitional" financial rehabilitation are implemented. Within the framework of bankruptcy liquidation procedures, financial rehabilitation is only possible for the business in the event of its realization (sale of the enterprise, replacement of assets).

Rehabilitation financial recovery is intended to ensure the viability of the organization (including based on the rehabilitated business during bankruptcy procedures) after exiting bankruptcy proceedings. To ensure strategic development prospects, the business needs to restore its financial stability.

2. The main ways to preserve a business within the framework of financial recovery have been identified.

The preservation of a business from destruction as a goal of financial recovery can be achieved either within the framework of the existing debtor organization or through the liquidation of the organization in several ways, the specifics of which are determined by the regime and type of financial recovery (*Fig. 5*).

Threats to business destruction arise in the presence of financial problems, which subsequently lead to the emergence of the organization's insolvency. Preserving a business from destruction with the previous owner is possible through financial rehabilitation within the framework of bankruptcy rehabilitation procedures, where the debtor continues its operational activities. Business can also be saved from destruction (not owned by the previous owner) within the framework of bankruptcy liquidation procedures through its sale or in the case of its sale during rehabilitation procedures of bankruptcy. This is possible when there are prospects for the development of the allocated business or its high socio-economic

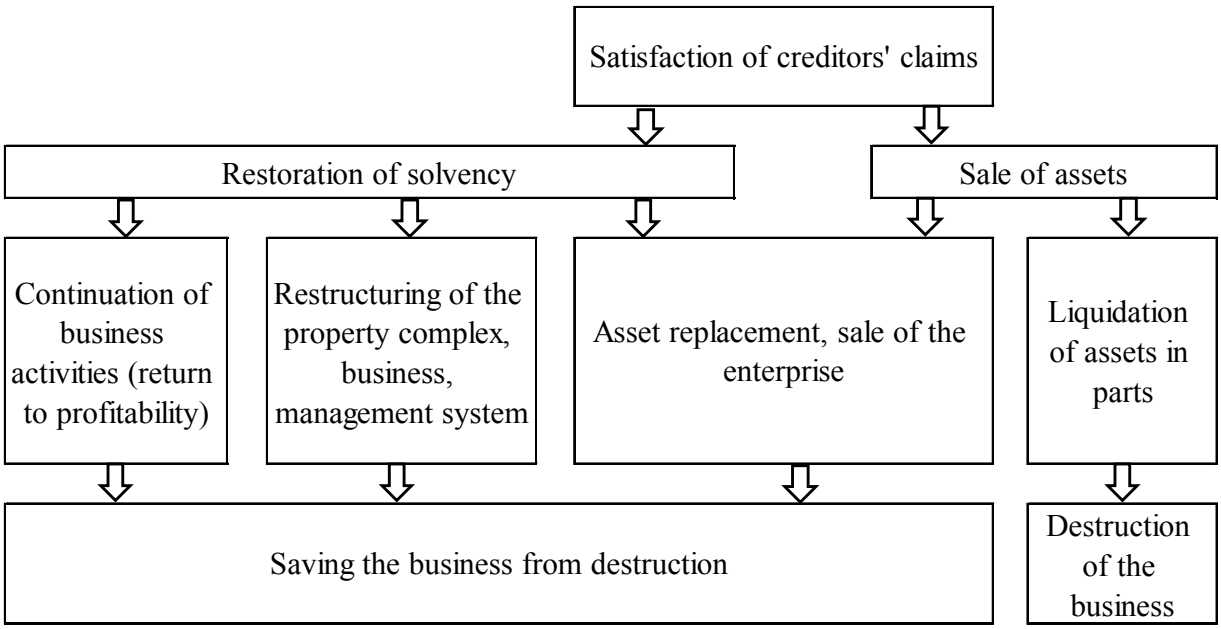

Fig. 6. **The Relationship Between Ways to Save a Business from Destruction and Satisfy Creditors' Claims in the Process of Financial Recovery**

Source: Compiled by the author.

significance. The sale of the debtor's assets in parts during bankruptcy proceedings signifies the complete destruction of the business.

The proposed methods for preserving a business from destruction simultaneously ensure the satisfaction of creditors' claims within the framework of bankruptcy procedures (*Fig. 6*). This fact proves the assumption about the influence of the targeted function of financial recovery on its essence.

3. The nature of the risk of bankruptcy threats to an organization has been studied in the context of its financial recovery.

The financial rehabilitation of a business is closely linked to the organization's solvency, the loss of which leads to the emergence of a bankruptcy threat[8] in the event of bankruptcy proceedings being initiated against it. The latter is complex and involves two threats: the threat to the property interests of the organization's owners and the threat of business destruction. All the mentioned threats are related to the onset of the organization's insolvency. In the event of insolvency, the activities of creditors are activated, and their actions become factors that increase the threat of bankruptcy.

The threat to the property interests of a business owner arises when bankruptcy proceedings are initiated: the property may be seized and sold to satisfy the claims of creditors against the owner's will. The fate of the debtor is determined by the creditors, who choose the option that will satisfy their claims in the shortest possible time.

The threats under consideration develop synchronously up to a certain point and cannot be separated from each other in the absence of financial recovery measures (*Fig. 7*). The sharp increase in the likelihood of these types of threats occurs after insolvency sets in.

The implementation of financial recovery measures reduces the level of these threats (as shown in *Fig. 8* through the comparison of the levels of each threat on a comparable scale); however, considering the possibility of business recovery even in the context of bankruptcy liquidation procedures (through its

[8] Under threat, the likelihood of a risk occurring is understood, which leads to negative consequences for the organization and business in terms of their viability.

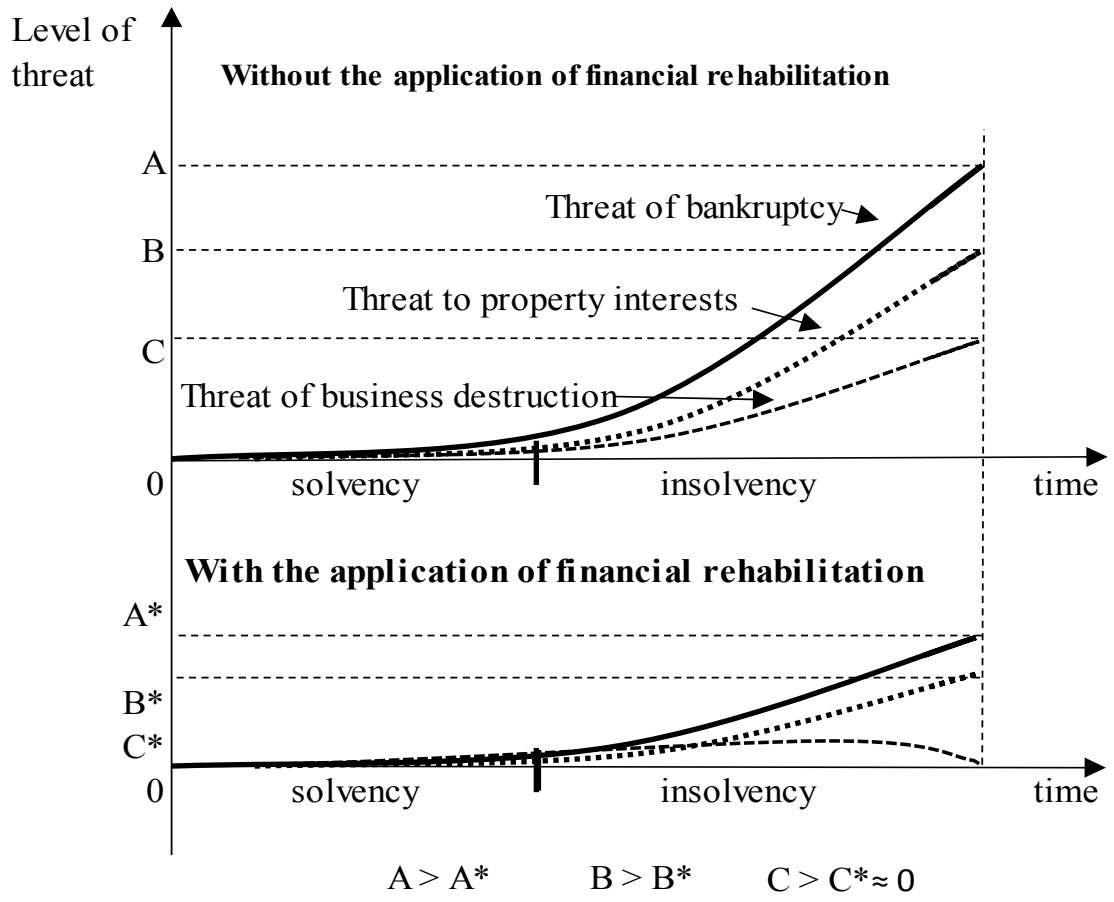

Fig. 7. **Dynamics of Development of Threats to Bankruptcy, Property Interests and Business Destruction**

Source: Compiled by the author.

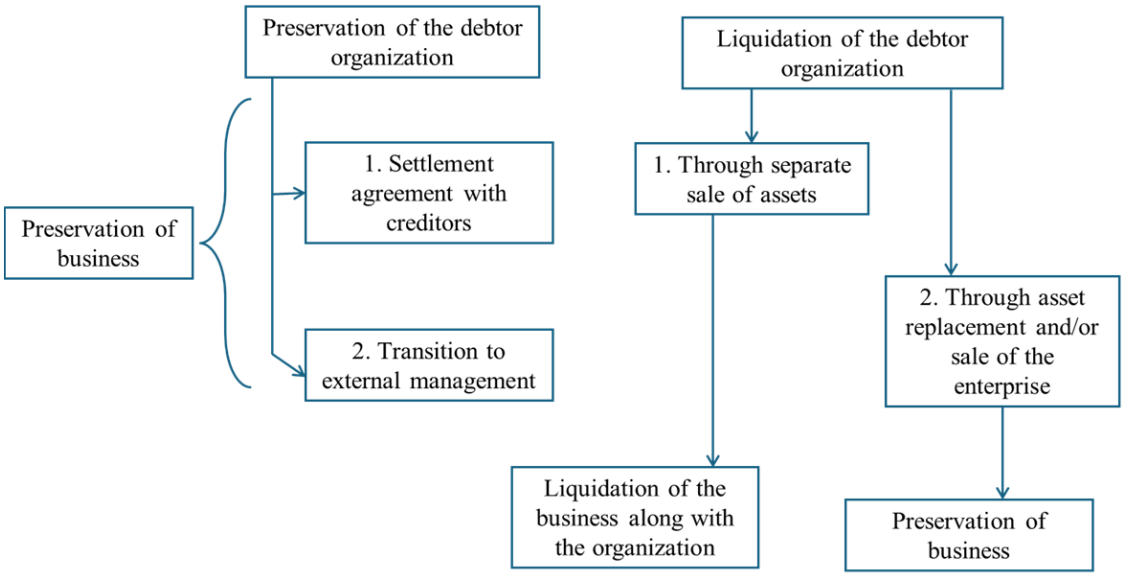

Fig. 8. **Economic Content of Bankruptcy Proceedings from the Point of View of Financial Recovery of the Organization and Business**

Source: Compiled by the author.

sale to another owner when there are prospects for development or due to high socio-economic significance), financial recovery can prevent the key threat to business — its destruction. But the other threats will still be carried out.

Thus, financial rehabilitation may not always prevent the emergence of bankruptcy threats and the property interests of the owners of an insolvent organization, but at the same time, it allows for the elimination of the threat of business destruction.

4. The rehabilitative potential of bankruptcy liquidation procedures has been proven in the case of applying "transferred" financial recovery.

The bankruptcy proceedings, despite their liquidation nature defined by bankruptcy legislation, allow for the financial rehabilitation of businesses and organizations (*Fig. 8*). On one hand, the bankruptcy proceedings can ensure the preservation of the debtor organization through the conclusion of a settlement agreement or transition to external management, while simultaneously protecting the business from destruction. On the other hand, during the liquidation of an organization within the framework of bankruptcy proceedings, it is possible to preserve the business by applying measures of "transferrable" financial rehabilitation.

CONCLUSION

In the course of the research, the formulated hypotheses have been proven. It has been established that changing the composition of objects within the framework of financial rehabilitation theory allows for increased effectiveness in the practical application of the corresponding tools. The orientation of financial recovery processes towards preserving the business of the debtor organization, rather than the organization itself, expands the possibilities of such a process: it allows for the rehabilitation of the business even in the event of the liquidation of the organization as a legal entity. At the same time, financial rehabilitation can be carried out both concerning the organization itself within the framework of bankruptcy rehabilitation procedures (provided there is an effective owner) and regarding the business even in the context of bankruptcy proceedings. The results of the study are based on the concept of "transferrable" financial recovery, which has proven effective abroad. The nature of the risk of bankruptcy threats has been further explored, and the composition of its elements has been expanded. It has been proven that financial rehabilitation does not fully eliminate the risk to the property interests of the debtor's owners.

The results contribute to the development of the theory of financial recovery of organizations and the formation of prerequisites for enhancing the rehabilitation potential of the bankruptcy institution in Russia, including its liquidation procedures.

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ORIGINAL PAPER

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JEL G14, G32

Do Permanent and Temporary Cash Flows Affect Corporate Buybacks?

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ABSTRACT

Equity buyback decisions are critical commitments, depending on the cash position of a firm. The **purpose** of this study was to examine the effects of cash flow volatility on the buyback decisions of Indian corporate firms. The sample comprised 132 Indian companies listed on the Bombay Stock Exchange from 2012–2019. The selected firms had non-significant abnormal returns (after buyback announcements) that aroused the inquisitiveness to explore the real motivation behind repurchases across firms with permanent and volatile cash flows. The results of ordinary least squares regression suggested that large cash holdings were unrelated to the buybacks with coefficient values –0.02 and 0.01 for firms with permanent and volatile operating cash flows, respectively. Firms with considerable cash flows exhibited a low tendency to buy back their shares. The repurchases served mostly as signaling tools meant to enhance the value of stocks that were potentially undervalued. Thus, the undervaluation of stocks (with a beta of –0.38) seemed to have significantly affected the repurchase decision in association with the constant or volatile cash flows of the firms. Further, small firms appeared to engage more frequently in buybacks given their lower market-to-book ratios.

Keywords: free cash flow; stock repurchases; India; undervaluation; market-to-book ratio; firm size; firm age; leverage

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INTRODUCTION

A varied range of financial options are used by the firms to benefit shareholders, which has led to the dominance of using alternative mechanisms of cash disbursement [1]. Generally, large cash holdings are associated positively with the buybacks [2] and equity buybacks are considered a flexible way of distributing cash to the shareholders [3]. Firms may buy back their shares using either of the two routes: fixed price tender offer or open-market proposal.

The tender offer method is resorted to in a scenario of large buybacks, whereas, open-market method is used in the case of relatively small buybacks. Among several buyback hypotheses tested in the past, those on free cash flows and stock undervaluation have been extended the greatest attention. Free cash flow theory proposes that firms with considerable cash flows prefer to use funds for unproductive investments and shareholders gain benefits from buybacks instead of wasting their funds elsewhere [4]. Hence, buybacks are generally considered to increase shareholder wealth through the distribution of free cash flows.

In the Indian business context, a significant increase in the number of buybacks has occurred in the past few years, yet the initial reaction to buyback announcements has been biased and inadequate [5]. Moreover, a number of studies that focused on buyback announcements indicated weak signalling effects[1] on the prices of stocks [6–11]. These developments highlighted an important question: if buyback announcements reflect non-significant abnormal returns, then what factors influence firms to make buyback decisions? The recent study of V. Bhama [12] indicated less encouraging results of repurchase announcements in terms of return creation in the Indian context. S. Jena et al. [13] noticed that Indian firms with large cash pile up and low investment opportunities have more buybacks.

The observations described above called attention to a vital aspect of the relevance of cash flow volatility to the repurchase decision of Indian firms. This issue stimulated an examination of the nature of cash holdings, which shapes buyback decisions. Many times, companies have continuous or permanent free cash funds, whereas in other instances, they might be in

situations of volatile or temporary cash flows. The purpose stresses the need to distinguish firms with permanent positive operating cash flows and firms with volatile operating cash flows having repurchases, while previous studies tend to put all firms together in a single set to determine the factors affecting equity buybacks [14–16].

Correspondingly, the main objective of this study was to determine the motivational factors for repurchases across Indian firms with permanent and temporary free cash flows. This matter is particularly important given that the majority of empirical research concentrated on controlling factors for an entire set of firms [14, 15, 17–19]. The present study deviated from this orientation by fundamentally focusing on the cash flow division and accordingly classifying firms into those with permanent and volatile cash flows to derive deep insights related to the motivations behind the behaviors of Indian enterprises.

Previous evidence indicated weak signalling impact of buyback announcements on the prices of the stock [20]. Furthermore, these returns sustained for a very short time, i.e., generally for 1–2 days in the majority of the evidences. A large number of studies reported that the positive returns have been realized in the pre-offer period [21, 22]. Post-buyback announcement, the results of various studies indicated no significant improvement in the operational performance of firms [2].

Using the above rationale, the study tries to understand the nature of cash holdings that shapes buyback decisions by bifurcating firms into two sets, i.e., permanent and volatile cash flow firms. For the purpose, predictors like market-to-book ratio, profitability, dividend payments, leverage, cash, asset size, and firm age have been used for both sets of groups. These key variables help to identify significant contributory factors that frame motivation for repurchases in each group.

The present study makes a significant contribution to the repurchases and excess cash flow literature, especially, in the Indian context. First, the major focus of Indian studies has been on the repurchase announcements capturing the signaling effect[1] [6–11]. The present work particularly emphasizes the role and nature of cash flows in shaping buyback decisions. The findings would help academicians and practitioners in understanding how cash flow presence builds up the motivation for repurchases. Second, S. Jena et al. [14] tested different theories related to buybacks using a whole set of firms in the Indian context. However, the study deviates with a core focus on the cash flow division of firms, which provides deep insights related to the motivational behavior of Indian firms.

The remaining part of the study has been covered in the following sections. Section 2 discusses the relevant literature in the given context. Section 3 covers the data and methodology. Descriptive and empirical evidence have been indicated in Section 4. Section 5 covers the conclusion and implications of the study.

LITERATURE REVIEW

Generally, large cash holdings are associated positively with the buybacks [2], thus indicating the presence of excess cash within firms having share repurchases. More frequent repurchases are preferred by companies with large cash piles but low investment opportunities [13]. There are two rationales behind excess cash distribution: first, firms release surplus cash to reduce agency problems and second, firms allocate impermanent cash funds through buybacks [23]. Firms having a higher amount of permanent operating cash flows prefer paying dividends, while, the substantial amount of temporary non-operating cash flows is utilized for share repurchases. Moreover, a higher volatility in cash flows can be observed in firms that opt for buybacks [16].

Ample evidence was accumulated in the past with respect to equity buybacks and the free cash flow hypothesis. The literature has reported various financial options used by firms to benefit shareholders, thereby leading to the dominance of alternative mechanisms of cash disbursement [1, 24–26]. A. Drousia et al. [27] found that diverse companies have different reasons for

[1] Previous evidences indicated weak signalling impact of buyback announcements on the prices of the stock [20]. Furthermore, these returns sustained for a very short i.e. generally for 1–2 days in majority of the evidences. Large number of studies reported that the positive returns have been realized in the pre-offer period [21, 22]. Post buyback announcement, the results of various studies indicated no significant improvement in the operational performance of firms [2].

repurchasing equity. Equity buybacks are considered a flexible approach given the significance of cash disbursement to shareholders [3]. Substantial cash reserves and significant cash flows, along with the availability of fewer investment opportunities, may also persuade firms to engage in equity buybacks [13]. Examples are companies with volatile cash flows and strong growth opportunities that possess high cash reserves [28]. The findings of J. Evans et al. [29] likewise support the idea that free cash flow is a key driver of equity repurchase. Because large cash holdings are associated positively with the buybacks [2], firms with high cash flows tend to buy back shares.

Contrary to the above-mentioned results, K. Chan et al. [3] found that the major reason for repurchase is the mispricing of stock value. Buybacks serve as a signaling tool that enhances the efficient valuation of stocks [30]. Generally, repurchase decisions are undertaken when stock returns are small, regardless of robust operating performance [31]. Numerous repurchases are considered favorable by the market, but it views occasional buybacks much more strongly [19, 32]. The aforementioned findings stimulated our interest in exploring which factor (free cash flow or stock undervaluation) dominates in the Indian context.

Apart from the factors identified above, certain other motivational determinants affect buyback decisions. For example, repurchase decisions are influenced by the intention to manage earnings per share [33], and such decisions are made to signal the market about future expectations regarding stock and its undervaluation [34, 35]. Similarly, liquidity in the stock market plays an important role in buyback initiation and, managers consider these decisions in situations of appropriate market liquidity [36]. The repurchase price paid by firms is low in comparison to the price paid by investors, thereby reducing liquidity in the market [37]. R. Dixon et al. [38] noted that capital adjustments through share repurchase act as another value-enhancing driver of undervalued and low-leverage firms, thus prompting companies to engage more frequently in buybacks [39]. S. Aramonte [40] observed that companies extensively engage in buybacks to meet debt targets; therefore, to achieve an optimal capital structure, repurchasing firms mostly maintain low debt ratios [31].

A few other researchers observed additional factors, such as firm size, firm age and dividends, that affect equity buyback decisions. For instance, D. Andriosopoulos & H. Hoque [17] reported that firm size, cash dividends and ownership structure substantially affect buyback announcements. U. Varma et al. [18] uncovered a positive association between firm size and the repurchase motives of firms. Large companies that repurchase stock issue substantial dividend payments owing to the low volatility of their operating incomes. Small firms engage infrequently in buybacks because they experience more variations in their operating incomes, they have lower market-to-book ratios and they grapple with higher information asymmetry [19, 41]. Yet another driver of repurchase among small firms is undervaluation, but this also applies to companies with high book-to-market ratios [27]. In a similar vein, low stock valuation motivates buybacks in growing enterprises [42]. Conversely, mature firms make the decision to repurchase as a means of distributing surplus cash funds.

Despite the insights derived from previous research, the literature has been silent and has presented inconclusive results on the significance of buybacks, especially among Indian firms with constant and volatile cash flows. This deficiency is addressed in the current work through an analysis of various predictors, namely, stock undervaluation, earnings, dividend, leverage, firm size and age across both types of firms. The study explores the major forces determining repurchase decisions among corporate firms with fixed or volatile cash flows.

MATERIALS AND METHODS

Data and Statistics

The sample comprised repurchase announcements from 132 Indian companies, specifically those related to non-significant abnormal returns post-buyback; these negligible returns motivated the current examination of the extent to which cash flows affect repurchase decisions. The data were extracted from the Prowess database of the Centre for Monitoring Indian Economy. Initially, the study considered 180 repurchases made from 2012 to 2019 by the firms listed on the Bombay Stock Exchange (BSE). Prior to this period, the number of successful buybacks in India was negligible and the data was also incoherent. Using the filtering criterion related to announcements, 136 firms were selected, but four

Table 1

Permanent vs Temporary Operating Cash Flows

	Permanent operating cash		Temporary operating cash	
Indicator	**Operating Cash**	**Non-operating cash**	**Operating Cash**	**Non-operating cash**
Mean	0.12	–0.11	0.02	–0.01
Median	0.11	–0.10	0.01	–0.01
Min	0.00	–0.47	–0.28	–0.45
Max	0.47	0.12	0.47	0.41
SD	0.08	0.09	0.15	0.15

Source: Compiled by the author.

Note: The values indicate an average of last three years.

companies were excluded because of missing values in relation to a few key variables. This left a final group of 132 firms, representing 73% of the buybacks occurring during the examination period.

As the entire study was oriented towards a cash-based firm setup, the cash flow statements of the companies were evaluated. Operational cash flow was derived from the net cash flow from operating activities. Non-operational cash was defined as the sum of net cash flows from investment and financing activities. Further, the values of operating and non-operating cash flows were taken as a fraction of total assets. Each year, these fractional values for the last three years of operating and non-operating cash flows were used to divide firms into two groups: those with permanent operating cash flows and others with volatile/temporary operating cash flows. Each year, companies with continuous positive operating cash flows in the last three years were assigned to group 1, and those with volatile operating cash flows in the last three years were classified under group 2. Among the selected companies, 91 reported positive operating cash flows in the last three years and 41 indicated having volatile operating cash flows.

Operating and non-operating cash flows are scaled using total assets. *Table 1* provides the descriptive statistics of the operating and non-operating cash flows. The mean values indicated that the average permanent operating cash flow in the previous three years was 0.12, which is more substantial than the temporary operating cash flows, which had a negligible mean value of 0.02. Interestingly, the non-operating cash flows were substantial (with a mean value of –0.11) in firms with permanent operating cash flows. This finding corroborated the assertion that the net cash availability in both groups of firms left a negligible amount of net cash, with a mean value of 0.01. Therefore, it would be interesting to explore the options taken by the two groups of companies in increasing buybacks under volatile cash flows.

Methodology

Following the methodology of A. Dittmar [15], the present study tested buyback proposition using an ordinary least squares (OLS) regression model for the given repurchase year. The OLS model is expressed as follows:

$$REP_{it} = \alpha_{it} + \beta_1 MKBK_{i(t-1)} + \beta_2 EARNINGS_{i(t-1)} + \\ + \beta_3 DPR_{i(t-1)} + \beta_4 LEVERAGE_{i(t-1)} + \beta_5 CASH_{i(t-1)} + \\ + \beta_6 LOG\ AGE_{i(t-1)} + \beta_7 LOG\ ASSETS_{i(t-1)} + e_{it}, \quad (1)$$

where *i* represents the year at which a firm engages in buybacks, *t* denotes the time measured on the basis of the firm's financial year-end. *REP*, the dependent variable, is the Rupee volume of repurchases divided by the market value of equity in the previous year. To obtain robust results, repurchase values were set to zero for firms under a repurchase value of less than 1% of the market value of equity.[2]

The various predictors given in Equation (1) were

[2] L. Bagwell, J. Shoven [1] used 0.5%, and A. Dittmar [15] used 1% of equity market value.

used to test the repurchase proposition. These variables were controlled due to various repurchase hypotheses (undervaluation hypothesis, excess capital hypothesis, optimal leverage ratio hypothesis and management incentive hypothesis) tested in the literature. In order to validate the results in this paper, these variables were necessary to study. For instance, to test the premise regarding valuation as a driver of repurchases, $MKBK_{i(t-1)}$, the market-to-book ratio of a firm *i* at the end of the year prior to repurchase, was included in the examination of stock valuation. $EARNINGS_{i(t-1)}$ refers to the profits to assets of a firm *i* and $CASH_{i(t-1)}$ stands for the cash and cash equivalent to assets of the firm at the end of the year prior to repurchases; earnings and cash were expected to be positively associated with repurchase for firms intending to distribute excess capital. Up to 2018, the Indian government charged fewer taxes on repurchases than on dividends. If companies intend to reduce their tax burdens, they substitute repurchases for dividends. For this purpose, $DPR_{i(t-1)}$ (dividend payout ratio), the ratio of dividend payments to net profits in the year before repurchase, was included in the analysis. Companies with high repurchases were expected to pay few dividends.

The leverage hypothesis maintains that firms tend to buy back equity when leverage ratios are low. To look into this issue, $LEVERAGE_{i(t-1)}$, the total debt-to-asset ratio in the year prior to repurchase, was incorporated into the analysis. The other predictors considered were $LOG\ AGE_{i(t-1)}$ which was measured by the natural log of the number of years elapsed from the date of a firm's incorporation, and $LOG\ ASSETS_{i(t-1)}$, which was measured by the natural log of total assets at the end of the year prior to buyback. Owing to information asymmetry issues, small and growing firms were expected to have undervalued stock and thus prefer to repurchase such an asset.

RESULTS & DISCUSSION

The descriptive statistics of the two company groups are shown in *Table 2*. The mean repurchase amount, market-to-book ratio, profitability, and leverage were statistically significant in the companies with constant and volatile cash flow firms. Note that the firms with volatile cash flows had almost double the amount of repurchases made by the companies with continuous positive cash flows, thereby confirming the argument that the former intended to engage in buybacks upon experiencing volatility in their cash flows. Thus, instead of making continuous dividend payments, the firms distributed cash through a repurchase mechanism. The companies were driven to increase buyback activities also because of the undervaluation of their stocks; the mean volatile cash flows of the firms were 1.12 and 2.32 under positive cash flows.

Table 3 reflects statistical differences across the subsets. The values corresponded to statistically significant variances between companies with permanent operational cash flow and those with temporary cash flow firms. Service firms had higher consistent cash funds than manufacturing firms. The findings with respect to growing firms were more similar than those involving mature enterprises.

This similarity signifies that small, growing service-oriented firms had more cash funds, which motivated the companies to make repurchase decisions. Volatile cash flows were non-significant across all sets.

Figures 1 and *2* illustrate cash patterns with respect to repurchases among firms. As seen in *Fig. 1*, under constant cash flows, the level of repurchase increased with the enhancement in cash funds. However, the level of buybacks was moderately volatile and, on average, did not exceed 3% of the market value of equity. In contrast, *Fig. 2* shows greater volatility in repurchase amounts vis-à-vis cash flows. Higher volatility in cash flows was observed in firms that opted for buybacks [16]. Thus, they seemed to have allocated impermanent cash funds through repurchases [23]. The buybacks, on average, amounted to nearly 4 percent. These findings substantiated the assertion that inconsistent cash funds more strongly led to repurchase decisions than the payment of dividends.

Tables 4 and *5* show the correlation among the variables. The values indicated no multicollinearity issue, as the correlation value did not exceed 50% in any of the cases. Furthermore, the correlation values were significant at the 1% level for the market-to-book ratio with repurchases under permanent operational cash flows. The results are similar for firms with volatile operational cash flows. An equally interesting finding is that cash had no significant relationship with repurchases in either group of firms, reflecting that undervaluation was the dominating factor for repurchases among the examined companies.

Table 2

Descriptive Statistics

Indicator	Mean	Median	Minimum	Maximum	SD	T- stat
Repurchases						
Firms with permanent cash	0.07	0.04	0.00	0.54	0.08	−3.24 (0.00)***
Firms with volatile cash	0.13	0.08	0.00	0.46	0.14	
MKBR						
Firms with permanent cash	2.32	1.51	0.20	12.28	2.22	3.27 (0.00)***
Firms with volatile cash	1.12	0.67	0.13	5.43	1.19	
Profitability						
Firms with permanent cash	0.11	0.10	0.01	0.57	0.08	5.58 (0.00)***
Firms with volatile cash	0.03	0.02	−0.20	0.20	0.08	
Dividend						
Firms with permanent cash	0.35	0.32	0.00	1.95	0.33	0.916 (0.36)
Firms with volatile cash	0.29	0.13	0.00	1.65	0.41	
Leverage						
Firms with permanent cash	0.11	0.09	0.00	0.46	0.11	1.78 (0.08)*
Firms with volatile cash	0.08	0.06	0.00	0.38	0.09	
Cash						
Firms with permanent cash	0.01	0.00	−0.09	0.23	0.05	−0.88 (0.382)
Firms with volatile cash	0.02	0.00	−0.11	0.39	0.09	

Source: Compiled by the author.

Note: *** and * indicate statistical significance at 1 and 10 percent.

The regression results are presented in *Table 6*. The coefficient values conveyed the statistical influence of market-to-book ratio on firm repurchases; the value was −0.38 for both groups. Stock undervaluation was the key determinant of repurchase decisions, irrespective of whether the firms had constant or volatile cash flows. The results contradict those derived by G. Grullon and R. Michaely [2], who found a positive association between large cash holdings and buybacks. In the current study, cash seemed to have had no statistical significance in the repurchase decisions. Thus, the real motivation behind the buybacks among firms with permanent and temporary cash flows was the undervaluation of stocks. Moreover, firm age appeared to have had no negative relationship with firms that had permanent operational cash flow firms, as evidenced by the value of −0.28. Smaller firms with consistent cash funds more strongly tended towards repurchase. Correspondingly, such companies engaged in buybacks because of their low market-to-book ratios and high information asymmetry [19].

DISCUSSION

The study showed that buyback decisions of Indian firms varied significantly. According to the excess cash hypothesis, when firms have positive cash flows, or, in other words, when a firm's capital exceeds its investment opportunities, firms may distribute it to the shareholders. Repurchase is one of the methods of using excess cash. However, the present study noted that large cash holdings were inversely associated with buybacks, supporting the argument

Table 3

T-stat of Permanent and Temporary Cash Flow Firms Across Different Sets

Indicator	Variables	Manufac-turing	Service	T-stat	Open Market	Tender offer	T-stat	Small firms	Large firms	T-stat	Growing firms	Mature	T-stat
Permanent operating cash	Operating Cash	0.11	0.14	0.832 (−3.657)***	0.11	0.13	4.74 (−1.352)	0.13	0.11	0.334 (2.076)**	0.13	0.11	0.422 (3.712)***
	Non-operating cash	−0.09	−0.13	0.043 (3.751)***	−0.10	−0.12	0.200 (2.153)**	−0.12	−0.10	0.493 (−1.322)	−0.12	−0.10	0.001 (−2.872)***
Temporary operating cash	Operating Cash	0.02	0.02	6.530 (0.177)	0.00	0.04	0.038 (−1.453)	0.01	0.03	0.561 (0.455)	0.03	0.02	5.653 (0.330)
	Non-operating cash	−0.02	−0.01	2.351 (−0.332)	0.00	−0.04	0.940 (0.732)	0.00	−0.03	0.000 (0.997)	−0.02	−0.01	0.494 (−0.754)

Source: Compiled by the author.

Note: *** and * indicate statistical significance at 1 and 10 percent.

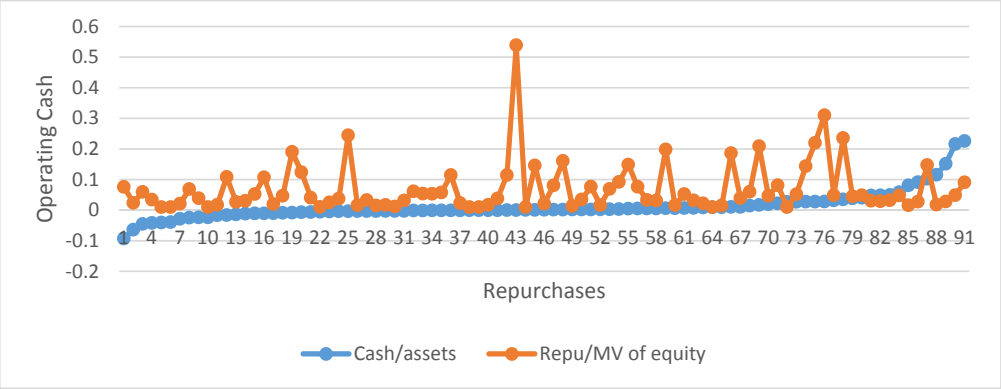

Fig. 1. **Cash to Asset and Repurchases to Equity of Permanent Operational Cash Flow Firms**

Source: Compiled by the author.

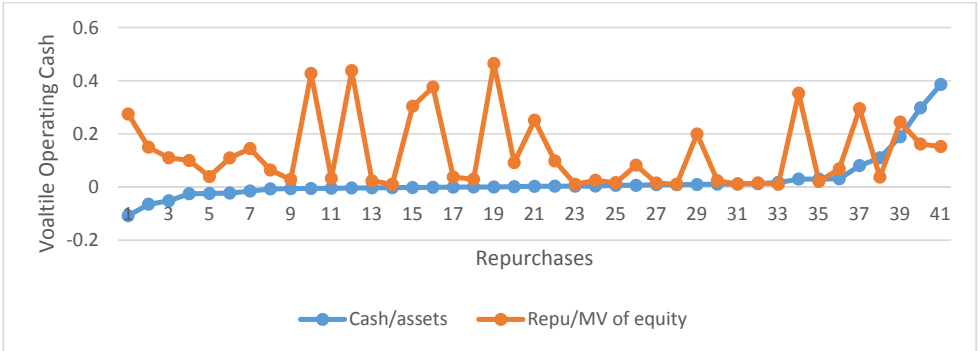

Fig. 2. **Cash to Asset and Repurchases to Equity of Volatile Operational Cash Flow Firms**

Source: Compiled by the author.

Table 4

Correlation Matrix of Permanent Operating Cash Flow Firms

Variables	Repurchase	MTB	Earnings	Dividend	Leverage	Cash	Age
MTB	−0.370 (0.000)***						
Earnings	−0.171 (0.106)	0.606 (0.000)***					
Dividend	0.015 (0.890)	0.009 (0.930)	0.036 (0.735)				
Leverage	0.038 (0.718)	−0.232 (0.027)**	−0.394 (0.000)***	0.111 (0.294)			
Cash	0.035 (0.743)	−0.057 (0.594)	−0.004 (0.968)	−0.128 (0.228)	−0.063 (0.554)		
Age	0.129 (0.224)	−0.253 (0.025)**	−0.225 (0.032)	0.055 (0.603)	0.213 (0.043)**	−0.067 (0.529)	
Assets	−0.268** (0.010)	0.055 (0.606)	0.025 (0.816)	0.226 (0.032)	0.178* (0.091)	−0.177 (0.093)	0.174 (0.099)

Source: Complied by the author.

Note: *** indicates significance level at 1 percent.

Table 5

Correlation Matrix of Volatile Operating Cash Flow Firms

Variables	Repurchase	MTB	Earnings	Dividend	Leverage	Cash	Age
MTB	−0.389 (0.012)***						
Earnings	−0.149 (0.354)	0.014 (0.931)					
Dividend	−0.252 (0.117)	−0.071 (0.664)	0.165 (0.307)				
Leverage	−0.148 (0.355)	−0.008 (0.961)	−0.272 (0.086)	0.168 (0.299)			
Cash	0.044 (0.785)	0.049 (0.762)	−0.088 (0.585)	−0.056 (0.732)	0.072 (0.655)		
Age	0.104 (0.516)	−0.041 (0.799)	0.034 (0.832)	−0.183 (0.257)	0.244 (0.124)	0.053 (0.740)	
Assets	−0.336 (0.032)**	0.298* (0.058)	0.098 (0.542)	0.319** (0.045)	0.485 (0.001)***	−0.264 (0.096)*	0.080 (0.617)

Source: Complied by the author.

Note: *** indicates significance level at 1 percent.

Table 6

Regression Results

Variables	Permanent Operating cash Flow	Volatile Operating cash flow
Intercept	0.117 (0.106)	0.168 (0.408)
MKBK	−0.388*** (0.002)	−0.380** (0.030)
Profitability	0.094 (0.470)	−0.158 (0.352)
Dividend	0.071 (0.484)	−0.186 (0.281)
Leverage	0.006 (0.956)	−0.160 (0.434)
Cash	−0.021 (0.830)	0.016 (0.924)
Log assets	0.102 (0.323)	0.085 (0.603)
Log age	−0.288 (0.007)***	−0.074 (0.734)
R square	0.22	0.28
No of observations	91	41

Source: Complied by the author.

Note: *** and ** indicate statistical significance at 1 and 5 percent.

that companies with high cash flows exhibit a low tendency to buy back shares. These results contradict the findings presented by L. Bagwell & J. Shoven [1], N. Vafeas & O. Joy [24], D. Ikenberry et al. [25]; N. Vafeas [26]. Thus, free cash flow theory was not supportive in the Indian case. Equally interesting is the similarity in findings pertaining to permanent as well as temporary cash flows. This gave rise to the point that there are other dominating factors that motivate firms to pursue buyback decisions.

The examination of other contributory variables indicated that the major driver of repurchase by enterprises with permanent and volatile cash flows was the low valuation of stocks. The descriptive findings convey that the key characteristics of buyback firms vary considerably depending upon free cash flow availability, which suggests that firms with positive operating cash flow and volatile operating cash flow might be in different situations when they decide equity buybacks. Buybacks merely served as a signalling tool designed to enhance the value of stocks that are potentially undervalued. Small firms engaged in buybacks because they had low market-to-book ratios and higher information asymmetry. Capital structure adjustments did not persuade the companies to make these decisions.

The discussion above brings an interesting element to light-that stock undervaluation is the prominent driver of buyback across firms but that there is a weak signalling effect in the case of repurchase, as evidenced in the literature. The undervaluation hypothesis states that information asymmetry between insiders and shareholders may cause a firm to be misvalued [15]. The positive stock price reaction on the announcement corrects the valuation. However, Ikenberry et al. [25] noted that the price increase may not be sufficient to correct the price since the firms get abnormal returns late post buyback announcement. Likewise, Indian firms are also motivated by the desire to improve

the valuation of stock through repurchases, but reactions in the market are not encouraging. Cash enrichment in firms is again not the motivational factor for repurchase. In this regard, further studies can focus on the sectoral effects of excessive or low cash reserves on buybacks among Indian firms.

CONCLUSION

The present study examines the relevance of cash flow volatility to the repurchase decisions of Indian firms. The issue stimulated an examination of the nature of cash holdings, which shapes buyback decisions. Therefore, the study tries to understand the nature of cash holdings that shapes buyback decisions by bifurcating firms into two sets, i.e., permanent and volatile cash flow firms. This research probed into the real motivation and major forces behind buybacks among Indian firms with permanent and temporary cash flows.

The findings indicated that firms with continuous and volatile operating cash flows intended to buy back shares, but they might have been experiencing different situations when they decided to opt for equity repurchase. Large cash holdings were not positively associated with the buybacks. Hence, firms with high cash flows had a low tendency to buy back shares. In the Indian setting, the results do not support the free cash flow-based argument that considerable cash reserves and volatile cash flows persuade firms to increase their repurchases. Among the varying factors affecting the buyback decisions of firms, stock undervaluation seemed to have had a stronger effect on repurchase rationale, regardless of whether the firms had constant or volatile cash flows. Thus, the real motivation behind buybacks among firms with permanent and temporary cash flows was the undervaluation of stocks. Small firms with consistent cash funds have a higher tendency to opt for repurchases.

The findings would help academicians and practitioners understand how cash flow presence builds up the motivation for repurchases. The study is important to the investors while making their decisions for buying back shares. It is equally important to the corporations in their managerial decisions on the repurchases.

Limitations of the Study

The study is limited to a number of firms in the Indian context. The study has considered a limited number of factors to find the impact of buyback whereas considering more number of factors could have different findings.

Scope of Further Research

Future work may extend this study to cross-country comparison in the context of emerging and developed countries. This will also increase the number of firms which provides validation of results. Research can also be enhanced by bifurcating firms into age and size since the present study has important findings in the context of small firms.

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Board Gender Diversity and Financial Performance in Developing Countries: Evidence from the Ethiopian Banking Sector

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ABSTRACT

The topic of board gender diversity has drawn the attention of academics, organizations, and regulators alike. Such heightened awareness of the subject has produced a favorable atmosphere for gradual growth in women's participation in boardrooms worldwide. Countries have even taken the initiative to legalize boardroom quotas to increase the proportion of females in the boardroom of organizations. The current study investigated the effect of women's boardroom representation on the financial well-being of banks. The study considered fourteen commercial banks in Ethiopia as a sample. The study period ran from 2013 to 2020. The study employed OLS and fixed effect regression for analysis and found out that the representation of women in the boardroom of banks pays off. The result is robust for alternative measures of financial performance. The outcome of the study has far-reaching implications for policymakers and managers of financial institutions. Ethiopia's financial regulators should push for legislated boardroom quotas to enhance the representation of women in the boards of banks. Additionally, banks should make the appointment of additional female board members a priority. The study also contributes new insights to the body of knowledge already available on the subject.

Keywords: gender diversity; boards; women board room representations; financial performance

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INTRODUCTION

Board gender diversity has been a topical issue for academic researchers, organizational managers, regulatory agencies and international NGOs [1, 2]. And firms worldwide are facing growing pressure to rectify the gender gap in top positions [3]. As a result, some nations, including Norway, France, and Italy in Europe, as well as Kenya and South Africa in Africa, have taken steps to adopt "legislated boardroom quotas", which require companies to maintain a specific gender balance in their boardrooms.[1] Part of the rationale for board gender diversity's significance is that many stakeholders recognize that it is just as crucial for meaningful boardroom discussions as it is for profitability.[2]

Organizations with a gender diverse boardroom are associated with superior corporate governance, a high level of societal engagement, and quality products[4]. In addition, there is now ample evidence that women's representation in corporate board rooms is: an enabling factor for good governance [5, 6]; reduces the possibility of exposure to "bankruptcy risk" [7] enhances the overall efficiency of firms and expedites the strategic change process [8]; leads to enhanced financial management practice [9]; and contributes to a decline in the variation of returns [10].

Most board gender diversity studies focus on organizations in developed countries. However, there is an apparent difference in the level of government intervention, ownership structure, the efficiency of financial markets and legal framework, and most importantly, the level of women's representation in the workforce between developed and developing countries (11).

[1] a) African Development Bank. Where are the women: inclusive boardrooms in Africa's top listed companies? 2015; b) ILO. Women on Boards: Building the female talent pipeline. International Labour Organization. 2016. URL: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31480/11–745-women-on-boards.pdf (accessed on 01.02.2023).

[2] Deloitte. Women in the boardroom: A global perspective (Fifth Edition). Deloitte Global Center. 2017. URL: https://www2.deloitte.com/content/dam/Deloitte/my/Documents/risk/my-risk-sdg5-women-in-the-boardroom-a-global-perspective.pdf (accessed on 03.01.2023).

The relationship between financial performance and gender diversity depends on institutional and country-specific contexts [12]. In countries with a favorable attitude towards women at work, the effect of board gender diversity on financial performance is magnified [13]. Such differences might affect the nature of the relationship between board gender diversity and financial performance. Added to this, most gender-related studies in developing countries mainly focus on social, psychological and economic issues. As a result, matters like gender-based violence, participation of women in household decision making, economic empowerment of women etc. have gained wider popularity among researchers.

Previous research on gender diversity also focused mainly on the non-financial sector, and the results seem to be inconclusive. The banking sector, due to its opacity and high regulation, differs from firms in other sectors [11]. This implies that more research is required to address the issue in the context of the banking sector.

The study contributes to the existing literature by unraveling the relationship between gender diversity and financial performance in developing countries. The study also contributes to knowledge in the area by investigating the issue in the context of the banking sector, where there is a relative paucity of research.

This study focuses on investigating the issue in the context of the Ethiopian banking sector. Studies conducted by [14] & [15] indicate the presence of the underrepresentation of women in managerial positions of various organizations in Ethiopia.

The rest of the article proceeds as follows: The theoretical underpinnings and the study's hypotheses are presented in the next section. After that, the methods used are described. The findings are then presented and discussed. The final segment concludes the research.

THEORY AND HYPOTHESIS DEVELOPMENT

Theoretical Framework

The theoretical groundwork supporting the link between board gender diversity and organizational performance is extensive. Agency theory is one of the most often used in this area. Separation of ownership and management characterizes corporations. And as a result, it is difficult to expect that the agents (managers) will fully commit themselves to serving the owners' interests. Such divergence of interest between agents and principals is the primary source of agency problems [16], which opens room for management to engage in "self-serving behavior" [17]. Corporate governance arrangements relating to the board, like board gender diversity, can be utilized to reduce the occurrence of the agency problem and align managers' interests with those of the owners [1, 18].

Gender diversity on boards creates an enabling environment for effectively supervising and controlling managers [19]. The enhancement of board supervision and control due to gender diversity comes from "(a) expanding the perspectives around the table, (b) increasing board independence, (c) eroding the male groupthink phenomenon, and (d) improving the attendance behavior of the board" [20, p. 4]. Women are more likely to ask tough questions, challenge the existing norm, and see fresh possibilities. In addition, hiring women from various racial, age, and national backgrounds can instantly extend the monitoring process's purview [21, 22]. Women directors also have unique leadership qualities and a high level of commitment (2) and, as a result, are critical players in the "operational" and "strategic" control process [23]. This translates into better performance [24].

The other prominent theory used to justify board gender diversity in organizations is the resource dependency theory. According to RDT, organizations are part of a broader system and depend heavily on the resources of the external environment for their continued survival. The theory has it that "organizations that cope better with uncertainty and can reduce uncertainty for their stakeholders and which have control over scarce resources and the substitutability of their controlled resources, have a competitive advantage" [25, p. 427]. The resource dependency hypothesis acknowledges the significance of external influences on organizational behavior. Despite their limits, boards of directors and management can take actions to reduce risk and dependency [26].

The board of directors provides four benefits to businesses: "(a) information in the form of guidance and counselling, (b) access to information channels between the firm and environmental contingencies,

(c) preferential access to resources, and (d) legitimacy" [27, p. 145].

Considerable empirical evidence supports these anticipated advantages. A diversified boardroom, where more women are represented, can link organizations to the external environment [28]. According to the resource-based view, board gender diversity is a valuable mechanism that can boost a company's productivity, creative ability, and critical decisions by expanding the range of accessible skills, viewpoints, knowledge, and social networks [29].

The other perspective used as an alternative in the debate is based on critical mass theory. The proponents of the theory [30] argue that mere representation of women in the boardroom may not bring meaningful change. The author indicates that as long as women are not represented in a particular proportion, they remain considered "tokens" with no significant contribution to boardroom decision-making [30, 31]. They propose three women inside a boardroom for the magic of "critical mass" to work. Three women in the boardroom can change the dynamics of the board and can equally participate in the decision-making process [32]. This happens because "first, multiple women help break the stereotypes that solo women are subjected to. Second, a critical mass of women helps to change an all-male communication dynamic. Third and finally, research on influence and conformity in groups indicates that three may be somewhat of a ''magic number'' in group dynamics, which suggests that having three women may be particularly beneficial for creating change" [33].

Hypothesis Development

Board Gender Diversity and Financial Performance

Companies with a diverse board of directors perform well because they anticipate market demands, have a highly "creative and innovative" workforce, and project a favorable image [34]. Board diversity can take different forms. The presence of skilled and experienced women in the boardroom is one way to demonstrate it. Women may follow a unique decision making procedure that boosts financial performance [35]. They may also be better at identifying, perceiving and controlling risk [36]. And this leads to better decision making and improved performance. The presence of more women in the boardroom may also contribute to more transparency and accountability, leading to enhanced decision-making quality [37]. More to this, [38] argue that women better understand the needs of customers and other stakeholders. These factors enable women to be more effective in dealing with business difficulties, particularly finance and personnel [39].

The evidence linking gender diversity and financial performance is equivocal. A systematic literature review of more than ninety articles from greater than sixty journals made by [40] proved that the finding regarding the two variables is inconclusive.

A study undertaken by [41] aimed to relate board diversity with the performance of a sample panel of French-listed firms during the 2009–2011 period. The researchers discovered that gender diversity on boards has a deleterious influence on financial performance [39]. In a study conducted by considering a large sample over eight years, they also indicated that gender diversity has a significant negative relationship with performance.

An investigation on the effect of board gender diversity on financial performance was made by [42] on a sample of 112 big US public firms. The firms belonged to various categories like financial services, manufacturing, and other industries. Two measures of board diversity were used, ethnic diversity and gender diversity. Financial performance was measured using ROA and ROI. Results of the study reveal that board diversity positively and significantly affects firm performance. A similar type of finding was reported by [43] after studying the effect of corporate governance structure (measured using board size, board composition, internal board committee, and board gender diversity) with the financial performance of banks. The sample consisted of selected commercial banks in Zimbabwe.

The effect of board gender diversity on the performance of banks was also investigated by [44]. The study was undertaken to assess the effect of gender diversity on financial performance and risk and extend the literature by providing evidence of the issue from developing countries. The data for the study was obtained from 10 listed Tunisian banks for the period 2005–2018. The author found a significant and positive relationship between gender diversity and financial performance (measured using ROA and ROE). A similar finding is reported by [45], who conducted a study to investigate the relationship between board gender diversity and

firm performance using five-year data of the listed entities on the stock market. Results indicate that gender diversity measured at three levels (a dummy variable, proportion of female directors on board, and an index) is significantly and positively related to performance.

A study by [46] investigated the impact of board diversity on the performance of Kenyan commercial banks. In contrast to the conclusions of the previous authors, the results of their analysis show that gender diversity (as assessed by female presence in the boardroom and the proportion of female to total board members) had no meaningful impact on bank financial performance.

The findings of some authors indicate that, although there exists a favorable link between the two variables, the attitude that people have towards working women tends to moderate the relationship. For example, [13] empirically investigated the effect of board gender diversity on the financial performance of a sample of Asian firms from Hong Kong, South Korea, Malaysia, and Singapore. The finding of the study indicates that board gender diversity has a positive and significant impact on performance. The study results further suggest that the relationship between board diversity and performance tends to be stronger in countries where women can participate in leadership roles. They also discovered that the relationship tends to deteriorate in nations where women's participation in labor is discouraged.

Other studies report a non-linear relationship and argue that without a "critical mass", female boardroom representation is only symbolic. For instance, [20] studied the relationship between board gender diversity and financial performance in Fortune 500 firms using seven years of panel data. The result indicated that there exists a non-linear link between the two. Further, and most importantly, the authors found out that women's size should be at least 30% for a meaningful effect on performance.

The current study bases its claim on agency and resource dependency theory and puts forth the following hypothesis:

H_a: The presence of women in board room has a favorable effect on the financial performance[3] of banks.

[3] There are various proxy indicators of financial performance. The current study, following the footsteps of previous researcher, measures financial performance using return on equity (ROE).

DATA AND VARIABLES

The study included fourteen commercial banks that are operating in Ethiopia. The emergence of modern banking in Ethiopia dates back to 1905, when the first bank, Bank of Abyssinia was established. Currently, there are more than 18 banks operating throughout the country. The banks that were selected as a sample for the study are mostly established from the year 1994 onwards. Thirteen of the sample banks are privately owned local banks. The fourteenth bank included in the study is a publicly owned bank whose establishment goes back to the year 1963. In terms of size, although the private banks are showing a remarkable growth, the publicly owned bank is the dominant one. The banks included in the study were purposefully selected based on the fulfilment of relevant criteria. To be included in the study, first, the banks should be in operation in all the study periods (2013–2020). Secondly, they should report female boardroom representation, the board size, and financial performance-related data. Data for the study was solicited from the annual reports of the banks. Previous researchers used a similar approach (see, for example, [18]).

Measurement of Variables and Econometric Specification

There were three groupings of variables in the study: dependent, independent, and control factors. The study's independent variable is financial performance, as defined by the degree of return on equity. Financial performance was measured using accounting-based figures. Previous researchers have also used a similar procedure (see, for example [4, 47, 48]). Market-based data was not used as there is no active stock market in the country.

The board's gender diversity is the dependent variable. It is measured as a dummy variable with a value of "1" indicating the presence of women in the boardroom and "0" indicating their absence. The same approach was followed by [49, 50].

In addition, the study considers board size, business size, leverage, bank age, and deposit size. Previous researchers used similar control variables, see, for example [28, 52, 53]. The detailed description and measurement of the variables are presented in the *Table 1*.

Table 1

Variable Description

Variable abbreviation	Measurement	Supporting literature
Dependent variable		
ROE	**Return on equity (ROE)** refers to the profit generated by a bank's shareholders for each dollar invested in the bank's stock. The net income to average equity ratio is used to calculate it	[4, 47, 48]
Independent variable.		
FDR	**Female director board room representation:** relates to the representation of women in boardrooms. It is measured as a dummy variable with a value of "1" indicating the presence of women in the boardroom and "0" indicating their absence	[49–51]
Control factors		
BZ	**Board size:** refers to the total number of board members in a given year. The logarithmically converted value of the counted size of boardroom members is used to calculate it	[28, 52, 53]
SZ	**Firm size:** refers to the size of the banks as measured by the logarithmically transformed value of the total asset of each bank	
LVER	Refers to the level of debt in the capital structure of the banks. It is measured by scaling total debt to the total asset of the banks	
Ag	**Age:** refers to the number of years that have elapsed from the official establishment of each bank. The age of each bank is logarithmically transformed value	
DEP	**Size of deposit:** refers to the size of operation (in terms of level of deposit) for each bank. It is simply the logarithmically transformed value of total deposit in the balance sheet of each bank	

Source: Compiled by the author.

The regression model used in the study is specified as follows:

$$ROE_{it} = \beta_1 FDR_{it} + \beta_2 \lg BZ_{it} + \beta_3 \lg SZ_{it} + \\ + \beta_4 lver_{it} + \beta_5 \lg AG_{it} + \beta_6 \lg DEP_{it+}\varepsilon_{it},$$

where *ROE* — refers to the return on owners' equity for bank *i* at time *t; FDR* — refers to the representation of female director in the boardroom of for bank *i* at time *t*; *lgBZ* — refers to the logarithmic transformed value of the board size of bank *i* at time *t*; *lgSZ* — refers to the logarithmic transformed value of the total asset of bank *i* at time *t*; *Lver*, refers to the leverage of bank *i* at time *t*; *lgAG* — refers to the logarithmic transformed value of the age of bank *i* at time *t*; *lgDEP* — refers to the logarithmic transformed value of the total deposit of bank *i* at time *t*.

RESULTS AND DISCUSSIONS

The following section presents the result obtained from the analysis and discusses its implications. As shown in *Table 2* below, the average value of

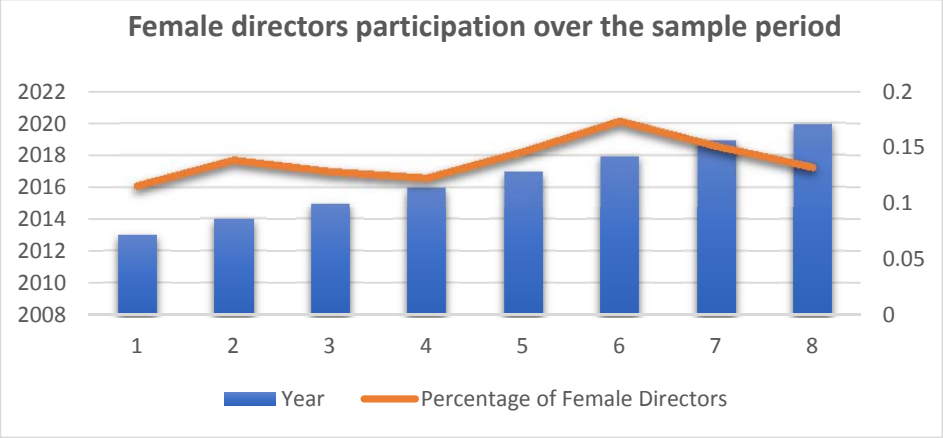

Fig. **Percentage of Female Directors over the Years**

Source: Authors computation.

Table 2

Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.
ROAE	0.154528	0.138187	0.494012	0.019351	0.072246
FDR	0.776786	1	1	0	0.418272
LGBS	2.315212	2.302585	2.639057	1.94591	0.162246
LGTASS	23.56272	23.51082	27.42503	20.63572	1.29294
LEV_	0.862064	0.867445	0.958134	0.740482	0.041372
LGAG	2.585453	2.639057	4.343805	0.693147	0.729962
LGDE	1.880789	1.878556	3.130523	1.048475	0.378502

Source: Authors computation.

the return generated on equity investment of the banks' shareholders is 15.4%, and there is a small deviation among the selected banks. In terms of female boardroom representation, more than 77% of the banks included in the sample have at least one female member on their boards. However, this value shows a more significant deviation among the banks. The logarithmic values of the board size, age and deposit of the banks have a mean value of 2.3, 2.58 and 1.88. The deviations for age and deposit level are somewhat higher among the selected banks. The average level of debt to the asset (referred to as leverage) is found to be 86%.

Female directors' engagement in the banking sector has increased from 11% to 17% over the sample period, as shown in *Fig.* This is mainly due to a shift in attitudes toward women in positions of leadership. It also means that the number of qualified and competent women on the job market is growing.

The result summarized in *Table 3* relates to the regression output for the OLS and fixed-effect models. Before running the regression, the researcher first made sure that the model fulfilled all the assumptions of OLS. Then, the four requirements (normality, multicollinearity, autocorrelation and heteroskedasticity) were checked using various statistical procedures. First, normality was checked using the Jarque-Berra procedure.

The output from both the OLS ($\beta = 0783793$ & $p < .05$) and fixed effect regression ($\beta = 0.017632$ & $p < .01$) revealed that female boardroom representation (FDR) has a significant and favorable effect on the financial performance. The result implies that our hypothesis can be accepted. It also indicates that female board members,

Table 3

OLS and Fixed Effect Regression Output

Dependent Variable ROE		
Variable	OLS	Fixed Effect
C	–.344201	**2.742102*** **
	(.3842722)	(0.599141)
FDR	**.0783793****	**0.017632****
	(.0258851)	(0.007295)
LGBS	**–.0997376***	**–0.076204****
	(0552961)	(0.034961)
LGTASS	**–.0646139*****	**–0.029296*****
	(.0244387)	(0.007094)
LEV_	.9822398	– 3.289473
	(.568385)	(0.877746)
LGAG	**.0986853*****	**0.067074*****
	(.0317585)	(0.016918)
LGDE	**.1599713***	0.493292
	(.0687203)	(0.112203)
Adjusted R-squared	0.5089	0.554278
F-statistic	4.61	8.264948
Prob (F-statistic)	0.000000	0.000000
Durbin-Watson stat	1.699501	1.606075

Source: Authors computation.

Notes: In the above Table FDR represents inclusion of female board members in the board room; LGBS refers to the logarithmic transformed value of board size; LGTASS pertains to the logarithmic transformed value the total asset of the banks; LEV_ relates to the leverage of the banks: LGAG refers to logarithmic transformed value the total age of the banks counted from the year of establishment; LGDE represents logarithmic transformed value the total deposit of the sampled banks. Robust value of standard errors is reported in the parenthesis.

although their representation is lower, are dedicated enough to properly supervise and control managers for the benefit of the shareholders. It can also mean that women in the boardroom might have used their knowledge, expertise, and external connections to secure competitive advantages for their banks. The result of the study conforms with the findings reported by [54, 55].

The findings of the study also conform with the result reported by [48]. Women, according to these researchers, appear to supplement the inadequate institutional and corporate governance systems in developing nations.

The result conforms to the assertion of agency theory, which claims that women board members are better at aligning managers' interests with shareholders' value. The result also discovered evidence to support resource dependency theory, which claims that women are better at leveraging their external relationships and networks to improve their organization's success.

In terms of control variables, it was found that board size has an inverse and significant impact on performance. This indicates that the potential benefits of increasing board members' size might be outweighed by its harmful repercussions. An increase in size is

Table 4

Fixed Effect Regression Output

Dependent Variable NIM	
Variable	Coefficient
C	–0.088905
	(0.057191)
FDR	**0.004656*** **
	(0.001424)
LGBS	–0.007454
	(0.005394)
LGTASS	0.016413***
	(0.001693)
LEV_	–0.306649***
	(0.070919)
LGAG	–0.008513**
	(0.002943)
LGDE	0.026499**
	(0.009736)
Adjusted R-squared	0.819694
F-statistic	27.55901
Prob (F-statistic)	0.000000
Durbin-Watson stat	1.711589

Source: Authors computation.

Notes: In the above table FDR represents inclusion of female board members in the board room; LGBS refers to the logarithmic transformed value of board size; LGTASS pertains to the logarithmic transformed value the total asset of the banks; LEV_ relates to the leverage of the banks: LGAG refers to logarithmic transformed value the total age of the banks counted from the year of establishment; LGDE represents logarithmic transformed value the total deposit of the sampled banks. Robust value of standard errors is reported in the parenthesis.

mainly related to possible disagreement among large members who can't come to terms and the accompanying protracted decision-making procedure. The size of banks had an inverse and significant relationship with performance. And it was also found that an increase in the age of banks is associated with better performance.

Robustness Test

The robustness of the result was tested by employing an alternative measure of financial performance (see *Table 4*). The variable net interest margin (the difference between interest revenue and expenses scaled by average interest-earning asset) was selected to measure financial performance. The results indicated that the primary independent variable (FDR) is still positive and economically significant.

CONCLUSIONS

The study's goal was to see how women's representation in corporate boardrooms affected the performance of selected banks in Ethiopia. Data was collected from annual reports of the selected banks over eight years (2013–2020). The results indicated that women's participation in the boardroom has immense economic benefits. The study's findings have implications for policymakers as well as banks. For example, female quotas in bank boardrooms might be mandated by policymakers, such as the national bank, which currently regulates the financial sector.

A legally mandated board quota requirement has been shown to be effective in many countries. And it may be emulated in Ethiopia. The national bank may also make it mandatory for banks to declare gender diversity initiatives, targets, and achievements in their annual reports. Banks should also rethink their board member recruitment and placement procedures to ensure the inclusion of educated and capable women on their boards.

The current study is limited in many ways. It only focused on diversity in terms of women's representation. Other aspects of board diversity were not investigated. Future research can broaden and extend the findings by including the multiple dimensions of diversity. Future research can also explore the effect of boardroom composition by assessing the effect of the inclusion of independent external women directors in the boardroom. The study only focused on banks. The result cannot be generalized to organizations in other

sectors. Researchers can consider the issue by drawing a sample from various organizations. The current study only assessed the representation of women in the boardroom. Further studies can determine how financial performance gets improved at different levels of female boardroom representation. It may also be possible for profitable banks to selectively hire resourceful and capable women. Future researchers, in this regard, should investigate the possibility of reverse causation between the two variables.

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Smartphone Banking Applications and Digital Financial Inclusion Barriers Mitigation: The Moderating Role of Behavioral Intentions (The Case of Iraq)

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ABSTRACT

In adopting digital financial inclusion using digital apps in the Iraqi banking sector, users' behavioral intentions and acceptance of digital apps are critical considerations to mitigate financial inclusion barriers. This study **examines** and discusses the role of smartphone banking technology as a new trend for extending financial inclusion by testing the impact of clients' behavioral intentions (as a modified variable) on the part of smartphone banking apps in mitigating the digital financial inclusion barriers in the Republic of Iraq. The study used two models: the unified theory of acceptance and use of technology (UTAUT) model to determine essential constructs of technology use and a second model, a multidimensional index of financial inclusion (focusing on the dimension of the barriers). The main objective is to enhance understanding of how smartphone apps mitigate barriers to digital financial inclusion. The researchers collected survey data from 338 participants of Iraqi bank clients in the Baghdad governorate. After excluding 10 invalid responses, 328 (92%) were tested and analyzed using **SPSS** software. **Results** of the two hypotheses emphasize that the respondents believe four critical constructs of the UTAUT model (PE, EE, SI, and FC) are key to digital financial inclusion and mitigate its barriers. Besides that, the positive of bank clients' Baghdad governorate behavioral intentions to use digital apps play a vital role in improving the effectiveness of smartphone banking apps to mitigate digital financial inclusion barriers. Therefore, the study **recommends** that Iraqi banks with smartphone banking apps must develop and improve those apps to extend and diversify their operations on mobile platforms to enable more comprehensive categories of Iraqi society and motivate them to use the bank apps to purchase products and implement transactions.

Keywords: UTAUT model; digital financial inclusion; barriers to financial inclusion; smartphone banking apps; behavioral intentions

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INTRODUCTION

Information and communication technologies have shown a significant potential to contribute to financial inclusion; giving birth to digital financial inclusion (DFI) [1], in general, the vast developments in smartphone technology, in particular, help the transformation of all economic sectors toward digital business, especially the banking sector. Furthermore, the progress of smartphone technology has motivated customers who rely on mobile devices to purchase banking services and products compared with face-to-face services [2] because these devices are the most widespread in the community and the easiest and most effortless to use. Mobile technology developments forced banks to update and adapt their operations and product structure with smartphone apps. In the context of the digital financial inclusion philosophy, they provide different channels for banks to deliver services and products to all society members.

Financial inclusion philosophy has become a considerable and growing interest because it is vital for economic growth and poverty alleviation (World Bank).[1] Financial inclusion is described as a state in which everyone in society (particularly people with low income) can access a range of high-quality financial services and reasonable prices in conjunction with the comfort and protection of customers [3]. Financial inclusion becomes one of the significant challenges for all-global institutions,

[1] World Bank, Global Financial Development Report 2014: Financial Inclusion. Washington, DC, 2014. DOI: 10.1596/978–0–8213–9985–9

decision-makers, central banks, financial and banking institutions, and governments because it impacts business sustainability in companies because they help promote and market products and thus increase market share [4]. Therefore, one of the strategies to mitigate financial inclusion barriers is making policies that support the extension of the digital financial and banking sector to include unbanked people from individual or country levels because government support positively correlates with digital technology adoption [5, 6].

Based on the aforementioned, smartphone banking apps are considered one of the most exciting channels for supporting digital financial inclusion and mitigating inclusion barriers because they will provide society with a better way to access and use financial and banking activities, whether from the formal or informal financial system. It imposes the banks to design and provide suitable infrastructure to all community segments to satisfy their needs for products and services efficiently and at affordable costs.

However, more than smartphone apps are required to support digital financial inclusion because clients' behavioural intentions to use these apps must be considered considerably. These intentions are affected by the four critical constructs of technology acceptance (performance expectancy, effort expectancy, social influence, and facility conditions) [7, 8]. These intentions motivate the positive behaviour of clients to contribute to mitigating financial inclusion barriers and disseminating the digital financial inclusion culture [9, 10].

In the Iraqi Republic, smartphone apps are a new Fintech concept and emerging trends toward financial inclusion. However, they need help with operating conditions, community culture, banking habits, and available efficient facilities. The decision-makers of the Iraqi central bank put forward a national strategy (2020–2023) to enhance financial inclusion and digitalism in the payment system (Central Bank of Iraq).[2] Besides that, they direct the financial and banking sector to provide its activities and products to all segments of Iraqi society by using all new Fintech ways and devices, including mobile banking apps. However, 66.5% of the Iraqi community is still unbanked (Iraqi Private Banks League),[3] and faces many barriers to accessing banking facilities and services because of poverty or financial problems. Moreover, the financially excluded society suffers from a lack of financial literacy and a weak banking habit.

The current study problem focuses on how Iraqi banks adapt their digital activities and products to smartphone apps that are affordable, flexible, and easy to access that suit all segments of Iraqi society, wherein the Iraqi banking sector faces complex challenges regarding the weak network internet, telecom quality drops, and high costs. Besides that, the Iraqi community suffers from economic volatility and problems, weak law rule, a gap in income inequality, inadequate social awareness, and regulatory constraints that led to increasing and extended financial inclusion barriers in the Iraqi banking sector. Thus, based on these problems, the study attempts to answer the below two questions and examine the factors of using smartphone apps that contribute to mitigating the digital financial inclusion barriers in Iraq.

Are critical constructs of the smartphone banking technology helping the Iraqi banking sector to contribute to the spreading of digital financial inclusion? Are the behavioural intentions of clients moderate the combined effect of key constructs of smartphone app acceptance on mitigating digital financial inclusion barriers in Iraq?

THEORETICAL FRAMEWORK

E-banking Mobile: Concept and Advantages

The mobile technology development and its apps have accelerated transforming the financial and banking environment toward digitalism and changed the banking industry model from traditional operations to digital transactions. As a result, smartphone banking technology has become one of the main active channels of bank digitalism, contributing to delivering products and banking services and conducting banking transactions regardless of time and place [11], including balance checking, money transfer, check deposit, stock trading, and other financial or non-financial banking services [12, 13].

Smartphone banking apps provide multiple advantages for clients and banks. Clients help accessibility to banking services with high flexibility and proliferation and create interaction and comprehensive coverage for banks [14], helping them reduce their front-end and back-end costs [15]. Banks do not need physical branches, fewer employees, and a lower total cost. In addition, conducting

[2] Central Bank of Iraq, the second Strategic Plan 2021–2023. URL: https://n9.cl/t6j3f5 (accessed on 18.01.2023).

[3] Iraqi Private Banks League, 2022. URL: https://www.ina.iq/165270–335.html (accessed on 18.01.2023).

a comparison and analysis, automatically extracting results, and sending them to the clients if requested is much easier than doing it manually. Therefore, although in the short term, they spend more on electronic devices, networks, and software, in the long term, they can maximize the return and deliver various products to all clients to achieve financial inclusion [16]. The new option to sustain client relationships is the shift toward digitalism to implement financial activities and deliver banking products through information technology applications and communications [17]. It contributes to sustaining financial services and makes it a wideness because the smartphone is the most widespread tool among members of society and the easiest to use compared with other digital devices. It is preferred to get services for face-to-face banking.

Financial Inclusion (FI) Philosophy Framework

Financial inclusion means how financial services are characterized by ease, reduced costs, and availability to all companies and individuals, regardless of their net wealth and business size [18], to ensure that low-income groups have access to appropriate, timely, and affordable financial and credit services [19]. The concept of financial inclusion goes beyond single indicators, such as the percentage of bank accounts and loans or the number of automated teller machines (ATMs) and bank branches [20].

According to the perspective of exclusion, the financial inclusion target group is considered financially excluded if it cannot reach official necessary financial services such as bank accounts, insurance, credit facilities, and payment facilities [21], i.e., those that do not have access to the financial and banking institution. Beck [22] explains the unbanked population of individuals or businesses as those that do not have access to the financial institution. Unbanked individuals are often associated with the lower-income population segment, whereas unbanked businesses do not get credit and other banking services to sustain funding their projects [23]. Financial inclusion is described as a state in which everyone can access a range of high-quality financial services and reasonable prices in conjunction with the comfort and protection of customers [24]. Based on those mentioned above, financial inclusion is a humanistic and socialistic activity that strives to access all community segments to provide comprehensive financial services, achieve financial stability and economic growth, enhance competition, and provide protection [15, 25–27]. It can be a tool for promoting and executing the principles of sustainable development [28]. The financial inclusion philosophy is multidimensional and constantly evolving by providing financial services designed to meet the needs of all segments of society to achieve multiple goals regarding economic and social well-being [29]. Besides that, it is essential for ending poverty, enhancing competition between financial banking institutions, and diversifying the services offered at low cost and high quality [30]. However, this philosophy varies in different countries and geographical regions, depending on the level of social development, economic, financial technology level, and market share in the banking sector. Therefore, core and headline indicators place a given population along a continuum of access, various financial services, and functional perspective depending on its usage of formal, semi-formal, and informal financial services and those excluded from the use of financial services [31].

Multidimensional Index of Financial Inclusion

The growing interest in financial inclusion measurement has given birth to many indexes to determine the degree of financial inclusion collected and formulated as a model called the multidimensional financial inclusion index, as follows in *Fig. 1* [20] (GPFI).[4]

Based on *Fig. 1*, the usage dimension is correlated to creating banking accounts by people, holding at least one of the financial and banking services, and enabling them to execute banking transactions by smartphone apps (for example, e-payments, e-purchases, e-transfer money, deposits, and credit accounts). In comparison, the access dimension is measured by the number of bank branches for every 10 000 adults at each governorate, ATMs, and agents for 1000 km^2. In this context, smartphone technology will encourage voluntary or self-exclusion and involuntary exclusion to connect with banks because smartphone banking apps will help to mitigate the distance between banks, branches or selling points, and clients.

Furthermore, if financial inclusion is considered a behavioural issue, clients must decide whether or not to use smartphone apps to access banking services. Mostly, self-exclusion is of cultural reasons, lack of income, or

[4] GPFI, G20 Basic set of Financial Inclusion Indicators, 2016. URL: https://2u.pw/BtdxWO (accessed on 18.01.2023).

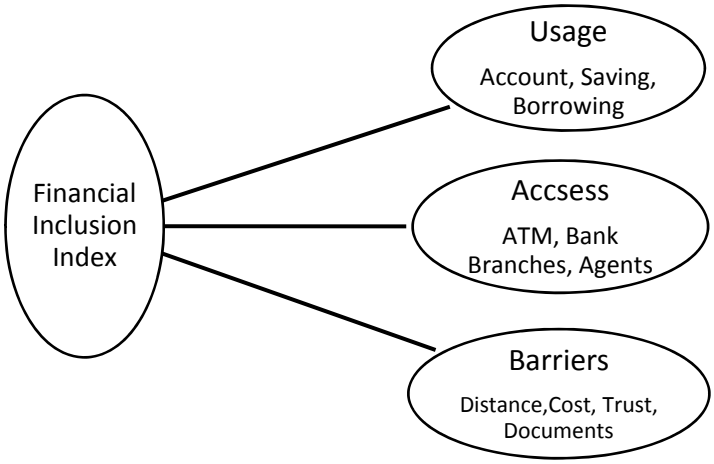

Fig. 1. **Multidimensional Financial Inclusion Index**

Source: Authors compilations.

lack of awareness of the benefits of available products and services that do not satisfy their needs and wants. Trust in the banking system may not exist owing to a lack of essential information regarding the banking sector that imposes clients to pay a high cost to get products or services.

Financial technology (Fintech) can reduce financially excluded persons and increase financial inclusion among community members [32, 33] by bridging unbanked people to financial services, reducing transaction costs, and unbundling services to provide products that fit customers' needs [34]. Mobile technology and its apps are changing the banking services structure and birthing a new financial inclusion model built on the fast, low-cost, mobile delivery of digital financial and banking services. Therefore, digitalization is considered the active involvement of new digital and trending technologies in the business context to increase revenue and opportunities for ongoing projects [35].

Smartphone Banking Apps and Digital Financial Inclusion Barriers Mitigation

The main obstacles to reaching financial inclusion are the absence of geographical access, the high costs of using products and services, the need for appropriate financial products, and financial illiteracy [36]. Nevertheless, digital technology and financial innovation have strong channels for a new financial inclusion model. Therefore, integrating digital apps and financial and banking services is vital in resolving financial exclusion and mitigating its barriers. Smartphone technology has revolutionized the banking delivery chain [15]. It bridges clients and banking service providers to achieve wider interconnections between people and the place that underlines financial exclusion.

Therefore, these apps will enable the banks to deliver their services and products to all community segments securely, enhance client trust safely, and reduce front-end costs significantly to mitigate cost barriers. When everyone has a smartphone and banking operations and products are digital, every phone will become a digital bank, every person will be accessible at a low cost, every financial service will be just a digital app, and every person will have access to the financial system and gain services or products with high performance and few efforts. Besides that, clients can get technician facilities from the bank or/and their friends or families to executive banking transactions (social influence and facility conditions).

The process of digital financial inclusion begins with the assumption that the excluded and underserved population has some formal bank account and needs digital access to enable them to carry out basic financial transactions remotely [37]. In this sense, the contribution of smartphone banking technology to financial inclusion has given birth to what has been called DFI, an extension of financial inclusion where all financial operations are performed in a cashless mode [38]. Thus, DFI defines digital access to formal financial services as a sector of vulnerable populations that traditionally remained excluded [1]. DFI is the implementation and execution of FI; it is faster, more efficient, and cheaper and enables the sustainability of financial products provided to customers

at an affordable cost [39]. Digital financial inclusion involves providing access to affordable formal financial services to the excluded population using existing digital technologies [40].

Based on those mentioned above, the theoretical underpinnings for the positive effect of smartphone banking apps on mitigating the barriers of digital financial inclusion are based on the fact that a large amount of the excluded population owns a mobile phone and that the provision of financial services via mobile phones can improve access to the financial excluded members of the community, considering the behavioral intentions of individuals to use this technology.

Smartphone-Banking Technology Acceptance and Clients' Behavioral Intentions (CBI)

Fishbein and Ajzen's Theory of Reasoned Action (1975) confirmed that the individual's behavioral intention is determined by the individual's attitude toward the behavior and the normative pressures that the individuals experience [41]. The normative force or the subjective norm directly affects the individual's behavioral intention [42, 43] because others may influence individuals to use technology. Therefore, the clients' behavioral intention to use smartphone-banking apps is subject to their attitude toward usage, which would be conditioned by critical constructs. UTAUT summarized the constructs of technology acceptance after reviewing eight popular theories that are related to information systems (TRA, TAM, MM, TPB, MPCU, IDT, SCT, and TAM-TPB) [44–46].

1. Performance expectancy (PE): Davis [47] argues that a system's overall perceived usefulness can be explained as the degree to which people believe that new technology utilization will improve the overall performance of a specific task. In this context, the study adapts the concept of PE based on [48], which is defined as the degree to which people maintain that smartphone app utilization will enhance daily activities and job performance with efficiency and effectiveness and then will contribute to mitigating the barriers of financial inclusion.

2. Effort expectancy (EE): Venkatesh et al. [49] define EE as "the degree of ease associated with the use of the system". Individuals who hold this belief will have positive attitudes toward m-banking utilization because services on mobile devices can be viewed as complicated and tedious owing to the various physical constraints associated with digital banking, such as difficulties inputting information or the small screen display [45].

3. Social influence (SI): SI refers to "the extent to which an individual perceives those important others believe he or she should use the new system" [49]; it is described as an individual's belief concerning whether other people maintain that an individual should become involved in the activity [50]. Therefore, SI is believed to impact consumers' intention significantly to utilize m-commerce, as highlighted by [51]. In the context of this study, Iraqi banks must consider smartphone-banking apps as a part of their financial inclusion plans to avoid the client dimension distance barriers between banks and society members, enhance trust and healthy documentation, and deliver affordable products and services.

4. Facilitating conditions (FC) consider the extent to which an individual believes that a technical and organizational framework is present to support system utilization [49]. Several technology scholars [52, 53] found that the facilitating conditions positively affect actual use. Therefore, simplifying the smartphone-banking apps will motivate banks to make those apps a part of their financial inclusion concept, which helps to mitigate the barriers to accessing the society members of services and bank products.

PREVIOUS STUDIES

M-banking technologies are gaining the interest of researchers, especially in developing countries; most studies focus on individuals' behavioral intentions to use information technology and the adoption of the attitude toward the sustainability of its use [7, 54]. Riffai et al. [55] found that performance expectancy, effort expectancy, entertainment factor, and website design profile are significant indicators that affect Omani consumer behavioral intentions. Martins, Oliveira, and Popovič [56] concluded that banks' customers focus on three constructs to using technology: performance expectancy, effort expectancy, and social influence. Bruhn and Love [57] explain that public access to the formal financial sector positively correlates to creation, economic growth, and poverty reduction. Bongomin et al. [58] stated that social capital significantly mediates the relationship between financial intermediation and financial inclusion. Bongomin and Munene [59] showed that cultural norms have an essential and positive mediating role in the

relationship between the adoption and use of mobile money and financial inclusion in micro and small enterprises in developing countries. Morgan and Trinh [60], and Jünger and Mietzner [61] agreed that financial literacy is positively associated with Fintech adoption. Singh et al. [62] explained that PU has a significant relationship with technology adoption, including Fintech. Anouze and Alamro [9] stated that several major factors, including perceived ease of use, perceived usefulness, security and reasonable price, stand out as the barriers to intention to use e-banking services in Jordan.

Bongomin et al. [63] concluded that the adoption of the doctrine of hedonism leads to the improvement and use of money via mobile phones, which in turn affects financial inclusion. Vyas and Jain [64] found a complete mediation of the technology acceptance model on the relationship between the digital economy and financial inclusion. Which [10] stated that perceived usefulness and social influence are the most influential factors in the behavior intention of young customers toward adopting mobile banking services in Vietnam with the TAM model? Ahmad et al. [65] examined digital financial inclusion concerning economic growth. Baker [66] and Ji et al. [67] conclude that inclusive digital finance can significantly converge the urban-rural income gap. Wang and Fu [68] found the effect of DFI on poverty reduction. Ahmed and Al-Nuaimi [69] analyzed indicators of financial depth and financial inclusion in the Arab banking sector (Qatar and Saudi Arabia). They stated that financial depth in both countries plays a significant positive role in achieving financial inclusion. Nathan et al., [23] concluded that government support and the financial industry's initiatives would lead to greater financial inclusion of low-income communities and potentially lead to poverty alleviation among these communities. Karunakaran and Gopinathan [35] concluded that the awareness of banking-related applications is increasing and that these applications are accessible on smartphones. Based on previous studies, hypotheses were developing as follows:

H_1: There is a positive combined effect of the key constructs of smartphone-banking app acceptance in digital financial inclusion barriers mitigation.

H_2: There is a moderating effect of the client's behavioral intentions on the combined effect of the key constructs of smartphone-banking app acceptance in digital financial inclusion barriers mitigation.

Study Contributions

Financial inclusion can be considered a local challenge. However, this issue is more complex in Iraq because of the high rate of financial exclusion and the low-income level of most Iraqi society members, in addition to the volatile economic situation and specific cultural perceptions about mobile banking technology. This study contributes to the richness of the literature on adopting smartphone-banking technology by providing a more comprehensive view of the importance of smartphone banking apps and explaining their role in mitigating financial inclusion barriers. Furthermore, the study delivered a new trend of digital inclusion by exploring the moderating effect of Iraqi clients' behavioral intentions on the combined effect of four key constructs of the UTAUT model to mitigate the digital financial inclusion barriers. Besides that, the study shows the banking policymakers' view that increasing financial inclusion must be based on mitigating the inclusion barriers and adopting new smartphone technology trends to extend digital financial inclusion.

RESEARCH DESIGN

Study Model

Figure 2 displays the constructs of the study model. The model includes the independent variables that represent the acceptance factors of smartphone apps, which are selected based on the four primary constructs of the UTAUT presented by Venkatesh et al. [44]. The dependent variable includes the components of the financial inclusion barriers, which determine them according to the multidimensional financial inclusion index [20].

Study Population and Sample

The study population includes all clients of local Iraqi banks in the Baghdad governorate. Given that determining the study population precisely is challenging, the study sample size was determined based on the rule of 100 individuals [70]. The researchers distributed 356 questionnaires using a simple random sampling method; 338 responses were redeemed. After excluding 10 invalid responses, 328 responses were subjected to testing and analysis, which represented 92% of the study sample.

Measurements

The questionnaire uses a five-point Likert scale to measure the Smartphone-banking apps and

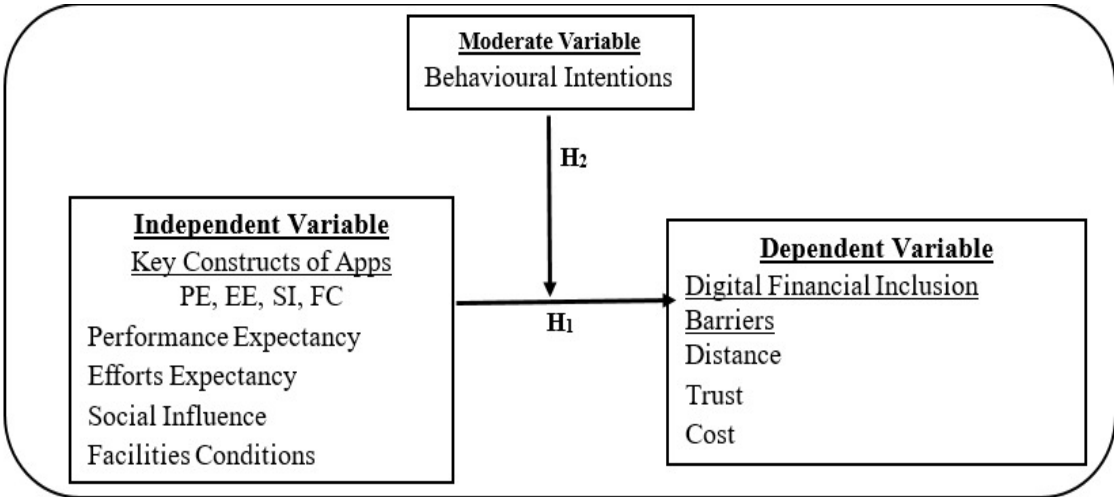

Fig. 2. **The Research Model**

Source: Authors compilations.

digital financial inclusion variables (study model constructs). The questionnaire was formulated based on the UTAUT theory by Venkatesh et al. [49] and the multidimensional financial inclusion index [20]. The questionnaire included three sections. The first is regarding the respondent's demographic characteristics, and the second includes questions to measure the independent variables (performance expectancy, effort expectancy, and social influence and facility conditions). The third focused on measuring digital financial inclusion barriers (distance, trust, cost, and documents). *Table 1* displays the demographics of participants.

Validity and Reliability

The questionnaire was subjected to 10 academic referees in management information systems and finance and banking experts to verify scientific integrity and the extent to which the questions belong to a questionnaire and then modified based on the referees' observations to ensure consistency with the study goals. Moreover, the researchers conducted the Cronbach alpha test to examine the internal consistency coefficient of the questionnaire components, wherein its value is acceptable whenever it exceeds (0.70 up to 1) to check that the internal consistency is high [71, 72].

Table 2 signed that the Cronbach alpha value (0.884–0.725) is acceptable and confirms that the questionnaire is valid to test. Moreover, the values of the arithmetic mean, standard deviation, and the relative importance of the study variables show that the participants believed the critical constructs of smartphone banking apps have positive features that will motivate the behavioral intentions of members of Iraqi society to use these apps to access banking services and products. Therefore, banking digitalized becomes one of the key tools to achieving financial inclusion goals and mitigate its barriers to spreading digital inclusion.

DATA ANALYSIS AND HYPOTHESES TESTING

Person Correlation

Table 3 shows Pearson's correlation coefficient matrix between the independent variables inside and the dependent variable on the other side. It shows that all variable's coefficients are positive and statistically significant at the 1% level. Furthermore, their values did not exceed the permissible percentage (80%) according to the assumptions adopted in the field of statistics. This result confirms the validity of the absence of the multiple linear correlation between the independent variables.

Tolerance and Variance Inflation Factor

Table 4 indicates that a tolerance value is more than 0.2 and no multicollinearity problem is found between the independent study variables. Moreover, all VIF values are under five and within the permissible limits.

HYPOTHESES TESTING

First hypotheses Testing Result:

Table 5 shows the results of testing the study's first hypothesis before sharing the modified variable (behavioral intention of the clients) to verify the

Table 1

Demographic Characteristics

Variable	Category	Frequency	Percentage (%)
Gender	Male	145	44.2
	Female	183	55.8
	Total	328	100%
Age	20–30	89	27.1
	31–40	114	34.8
	41–50	76	23.2
	Over 50 years old	49	14.9
	Total	328	100%
Qualifications	Diploma	12	3.7
	Bachelor	187	57
	Postgraduate	129	39.3
	Total	328	100%
Account	Yes	277	84.5
	No	51	15.5
	Total	328	100%
Smartphone	Constantly	119	36.3
	Sometimes	92	28
	Rarely	70	21.3
	Never	47	14.3
	Total	328	100%

Source: Compiled by the authors.

combined effect of key constructs of smartphone-banking apps to mitigate the financial inclusion barriers.

Table 5 indicates that the beta coefficient of all independent variables is positive and significant based on t-calculated, and the combined effect of the four key constructs is statistically significant at 0.05 based on F calculated and has an explanatory power of R^2 29.5% in mitigating the barriers of digital financial inclusion. Therefore, the first study hypothesis is accepted based. A positive combined effect of the key constructs of smartphone-banking application acceptance in mitigating the barriers to digital financial inclusion was observed.

Second Hypotheses Testing Result

Table 6 refers to testing the second hypothesis after introducing the modified variable, which is the behavioral intentions of Iraqi clients toward using smartphone-banking applications to access services and products. *Table 6* shows that the modified variable contributes to increasing the explanatory power of the first model from R^2 29.5% to R^2 35.1%.

This result led to the interpretation that the behavioral intentions modify the combined effect of critical constructs of the smartphone banking applications acceptance toward digital financial inclusion barriers mitigation by 5.6% from the first model, as shown in *Table 5*.

In addition, the combined effect of key constructs of smartphone banking application acceptance is statistically significant. Accordingly, the second hypothesis is accepted to confirm that the second model is better than the first.

Table 2

Mean, S.D and, Reliability

Cronbach's Alpha	Level	S.D	Mean	Questions	Variable	
0.884	High	0.847	3.93	PE1	Performance Expectancy (PE)	Independent Variable: Factor Acceptance of Smartphone Apps (Behavioural Intention)
	High	0.899	4.05	PE2		
	High	0.858	3.92	PE3		
	High	0.900	3.95	PE4		
	High	0.945	3.91	PE5		
	Moderate	0.975	3.63	PE6		
0.870	High	0.773	3.91	EE1	Efforts Expectancy (EE)	
	Moderate	0.986	3.52	EE2		
	High	0.873	4.01	EE3		
	Moderate	0.922	3.61	EE4		
	Moderate	0.937	3.55	EE5		
	High	0.928	3.88	EE6		
0.808	High	0.773	3.91	SI1	Social Influence (SI)	
	Moderate	0.986	3.52	SI2		
	High	0.873	4.01	SI3		
	Moderate	0.922	3.61	SI4		
	Moderate	0.937	3.55	SI5		
	High	0.928	3.88	SI6		
0.837	High	0.915	4.02	FC1	Facilities Conditions (FC)	
	Moderate	0.978	3.63	FC2		
	Moderate	0.976	3.64	FC3		
	Moderate	0.924	3.59	FC4		
	High	0.914	3.84	FC5		
	High	0.945	3.76	FC6		
0.725	High	0.955	3.82	BI1	Behavioural Intention (BI)	Moderate Variable
	High	0.957	3.77	BI2		
	High	0.855	3.98	BI3		
	High	0.998	3.71	BI4		
	High	0.728	4.09	BI5		
	High	0.986	3.71	BI6		
0.772	High	0.797	3.90	FIB1	Digital Financial Inclusion Barriers (DFIB)	Dependent Variable
	High	0.816	4.04	FIB2		
	High	0.826	3.85	FIB3		
	High	0.904	3.75	FIB4		
	High	0.885	3.88	FIB5		
	High	0.973	3.75	FIB6		

Source: Compiled by the author.

Note: Means description (1–2.33 low, 2.34–3.67 Moderate, 3.68–5 high), Sources: SPSS Output.

Table 3

Person Correlation Matrix

Variable	PE	EE	SI	FC	DFIB	BI
PE	1	0.670**	0.654**	0.627**	0.547**	0.105
EE	0.670**	1	0.623**	0.639**	0.617**	0.023
SI	0.654**	0.623**	1	0.766**	0.538**	0.039
FC	0.627**	0.639**	0.766**	1	0.617**	0.044
DFIB	0.547**	0.617**	0.538**	0.617**	1	0.070
BI	0.105	0.023	0.039	0.044	0.070	1

Source: Compiled by the author (SPSS Output).

Note: **. Correlation is significant at the 0.01 level (2-tailed).

Table 4

Tolerance and VIF

Variable		Tolerance	VIF
Independent Variable	Performance Expectancy (PE)	0.396	2.523
	Efforts Expectancy (EE)	0.377	2.652
	Social Influence (SI)	0.328	3.048
	Facilities Conditions (FC)	0.319	3.130
Moderate Variable	Behavioural Intention (BI)	0.699	1.46

Source: Compiled by the authors.

RESULTS AND DISCUSSION

Implementing M-Banking is not feasible unless customers widely adopt smartphone banking application technologies as natural alternatives for human encounters [73]. The literature and previous studies referred to banking institutions adopting mobile banking apps owing to their role in the in the spread of digital financial inclusion. Thus, this study discussed and examined the new trends in financial inclusion and factors influencing smartphone banking acceptance as an innovative solution for increasing digital financial inclusion and mitigating barriers in the Republic of Iraq.

The Iraqi banking sector strengthens efforts toward spreading digital financial inclusion despite many institutional and environmental barriers. The result of the hypotheses of this study confirmed that the four constructs (PE, EE, SI, and FC) are drivers of smartphone banking app acceptance in the Iraqi banking sector because they help to do banking transactions successfully, stream information about transactions, and make it easy to manage accounts with high performance and a little effort. Besides that, the technical facilities may motivate the Iraqi client's behavioral intentions to adopt these apps to access the informal and formal financial system. Therefore, the key constructs of smartphone technology acceptance represent innovative solutions to mitigating the digital financial inclusion barriers for downsizing the financial exclusion of some community segments.

In contextualizing smartphone banking apps in Iraq, the growth of the use of mobile banking apps is primarily supported by the IT adoption theories/perspectives, such as the technology acceptance models in general and the UTAUT model in particular, which validate and support the assertion that clients adopt technology because of performance expectancy, effort expectancy, social influence, and facility conditions.

Table 5

First Hypotheses Testing Result

First Model: Before the Moderating Effect				
Dependent Variable: Digital Financial Inclusion Barriers (DFIB)				
Independent Variables	(PE)	(EE)	(SI)	(FC)
B	0.165	0.361	0.041	0.160
Std. Error	0.076	0.085	0.016	0.078
Beta	0.145	0.289	0.120	0.135
T. Calculated	2.165	4.245	2.484	2.053
Sig	0.031	0.000	0.014	0.041
R	R 2	Durbin-Watson	F. Calculated	Sig
0.543	0.295	2.049	33.795	0.000

Source: Compiled by the authors.

Table 6

Second Hypotheses Testing Result

Second Model: After the Effect of the Moderating Variable (Behavioral Intention)					Moderating Variable
Dependent Variable: Digital Financial Inclusion Barriers (DFIB)					
Independent Variables	(PE)	(EE)	(SI)	(FC)	BI
B	0.195	0.354	–0.083	0.227	0.025
Std. Error	0.073	0.082	0.028	0.076	0.005
Beta	0.172	0.283	–0.245	0.192	0.426
T. Calculated	2.656	4.320	–2.931	2.994	5.248
Sig	0.008	0.000	0.004	0.003	0.000
R	R 2	F. Calculated	Durbin-Watson	Sig	
0.592	0.351	34.767	2.051	0.000	
0.049	0.056	Change			

Source: Compiled by the authors.

CONCLUSION AND RECOMMENDATION

a) Smartphone banking technology may act as a tool to overcome financial inclusion barriers and provide a platform to help clients directly access financial services and products with easy steps and affordable costs.

b) A second model is better and has stronger explanatory power than the first to mitigate the barriers to digital financial inclusion. The positive client's behavioral intentions improve the combined effect of the key constructs' technology acceptance.

c) Client's behavioral intentions play a vital role in disseminating digital banking culture in Iraqi to access services and purchase products. In addition, these intentions will contribute to the increased use of digital bank apps and motivate the extension of digital financial inclusion.

d) Digital financial inclusion would make society members aware of banking services and products and adopt tangible procedures to mitigate the current and expected barriers to enhancing inclusive growth policies.

e) The study recommends that Iraqi banks adopt and promote smartphone apps to mitigate the financial exclusion of Iraqi society members and enable them

to access the financial and banking systems because it represents an innovative solution to extend the inclusion ratio.

f) The study recommends that Iraqi banks with smartphone banking apps must develop to extend and diversify their operations on mobile platforms to enable more comprehensive categories of Iraqi society and motivate them to use the bank apps to purchase products and process transactions.

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The Impact of Financial Literacy on the Choice of Financial Instruments by Private Investors in Russian Conditions

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ABSTRACT

The paper examines the impact of financial literacy, risk tolerance and expectations on the choice of financial instruments by private investors using data from the 5th wave of the All-Russian household survey on consumer finance, conducted in 2022 at the request of the Bank of Russia. This is the first time such an analysis using Russian data has been carried out. The **purpose** of this study is to determine the role of financial literacy in making individual investment decisions. The results of logit- and tobit-regression estimation show that the investments of Russian citizens in stocks, bonds and mutual funds are mainly limited by a high degree of financial risk aversion, and not by an insufficient level of financial literacy. Expectations do not affect the choice of financial instruments. The refusal of individuals with low tolerance for possible losses to invest in securities market instruments and the preference for bank deposits is a reasonable and rational decision in case of the absence of deep financial competencies. At the same time, this creates unfavorable conditions for the implementation of the long-term savings program developed by the Ministry of Finance of Russia and attracting long-term investment resources by Russian companies in the real sector of the economy in the context of closed access to global financial markets. The active acquisition of cryptocurrencies by respondents with high self-esteem of their own financial competencies, but low incomes and low financial literacy ratings, calculated on the basis of answers to test tasks, generates increased risks of not achieving financial goals. Therefore, it is necessary to pay special attention to the risks of transactions with cryptocurrencies as a part of the implementation of initiatives promoted by the Moscow State University and the Bank of Russia to improve the level of financial literacy and financial culture of Russian citizens. It is proposed to include questions that allow assessing advanced financial competencies and forming the values of variables that can act as instruments for the level of financial literacy in subsequent waves of the survey to develop the information base for further research.

Keywords: household savings; private investors; financial behavior; stock market; bank deposits; cryptocurrencies; financial literacy; risk tolerance; All-Russian household survey on consumer finance

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INTRODUCTION

In recent years, a trend has emerged towards increasing the role of securities market instruments in the organization of savings placement for Russian citizens. The introduction of a tax on interest income from deposits (given the existence of financial market instruments that allow one to avoid it with long-term ownership — individual investment accounts and mutual investment funds, along with the development of information technologies that have significantly simplified transactions with securities for private investors, has led to a partial shift of funds from bank deposits into stocks, bonds, and mutual funds.

Despite the significant losses incurred by Russian investors following the start of the special military operation and the subsequent harsh sanctions imposed by unfriendly states, interest in securities market instruments remains. By the end of 2023, the number of individuals with brokerage accounts reached 29.7 million, and the total amount of their assets amounted to 9.2 trillion rubles[1]. At the same time, the most popular savings instrument for the population remains bank deposits, the volume of which

[1] Bank of Russia website. URL: https://www.cbr.ru/Collection/Collection/File/48976/review_broker_Q4_2023.pdf (accessed on 10.05.2024).

amounted to 30.5 trillion rubles as of 01.03.2024[2].

At the same time, the influence of financial literacy, risk appetite, and expectations regarding the prospects of the country's economic development on the choice between bank deposits and securities market instruments for individuals' savings in Russian conditions remains unexplored. The degree to which private investors base their practical decisions about where to spend their funds on a theoretical understanding of personal finance management is of particular interest. In this regard, the **purpose** of this study is to determine the role of financial literacy in making individual investment decisions using data from the fifth wave of the All-Russian Household Survey on Consumer Finances, conducted in 2022 at the request of the Bank of Russia[3].

LITERATURE REVIEW

Even in countries with a long history of stock market development, not all individuals use securities and mutual funds to invest even a small share of their savings, although from a financial theory perspective, this is irrational (for example, according to the capital asset pricing model, a private investor should allocate funds between a risk-free asset and a market portfolio that includes securities traded on the stock market [1]). In foreign literature, this phenomenon is referred to as the "stock market participation puzzle" [2, p. 1070]. His explanation is linked both to objective factors — high transaction costs associated with obtaining and processing information about securities and their issuers [3], lower returns adjusted for risk compared to alternative investments [4], and poor regulation of the activities of professional participants in the financial market [5–7], as well as to subjective factors — high risk aversion and a desire to completely eliminate the possibility of losses [2, 8], low self-assessment of financial literacy [9], and unfavorable expectations regarding the country's economic development prospects [10–12]. A special role among these factors is played by financial literacy, which A. Lusardi and O. Mitchell define as "the ability of individuals to process economic information and make informed decisions regarding financial planning, asset accumulation, debt obligations, and retirement savings" [13, p. 6].

The life cycle theory [14] and the capital asset pricing model [1] suggest that individuals are capable of performing complex financial calculations and possess deep competencies to operate in the financial market. A. Lusardi, T. Michaud, and O. Mitchell [15], as well as T. Jappelli and M. Padula [16], developed theoretical models of intertemporal portfolio choice, suggesting that investing in human capital in the form of increasing financial literacy allows individuals to reduce entry costs to the stock market and transaction costs associated with financial operations. These models suggest that an increase in financial literacy should lead to a higher likelihood of participation in the stock market and an increase in the share of securities market instruments in the total volume of savings. Testing the hypotheses arising from these theoretical models requires quantitative measurement of investors' financial literacy levels.

According to A. Lusardi and O. Mitchell, the fundamental financial competencies underlying saving and investment decisions include the ability to perform calculations related to compound interest, an understanding of inflation, and an awareness of the importance of diversifying investment risks [13, p. 10]. To measure these competencies, three standard questions were developed, which, with minor adjustments for national specifics, are used in surveys of consumer finances not only in the USA but

[2] Bank of Russia website. URL: https://www.cbr.ru/statistics/bank_sector/review/ (accessed on 10.05.2024).

[3] Bank of Russia website. URL: https://www.cbr.ru/ec_research/vserossiyskoe-obsledovanie-domokhozyaystv-po-potrebitelskim-finansam/ (accessed on 10.05.2024)

also in Europe (Germany, Switzerland, the Netherlands) and Asia (China, Thailand). In most surveys, basic questions are supplemented with more complex questions that allow for an assessment of respondents' understanding of the characteristics of various financial instruments, primarily stocks, bonds, and mutual funds.

The analysis of the results of the conducted surveys shows that the level of financial literacy is quite low. More than 50% of respondents, including in the United States, make mistakes in their answers even to the simplest basic-level questions [13, 17–22]. The results of the responses to more complex advanced-level questions indicate a weak preparedness of the respondents to carry out operations in the securities market. For example, only 21% of respondents in the U.S. are aware of the inverse relationship between bond prices and interest rates [13, p. 12]. This strongly contradicts the assumptions of theoretical models that assume private investors have complete information and act rationally. Thus, a low level of financial literacy can both hinder private investors from making transactions and expose them to unwarranted risks if they choose to operate in segments of the financial market that they do not understand.

In addition to objective assessments of financial literacy, which are based on summarizing responses to questions that measure the level of financial competencies, international practice widely employs self-assessment results, where respondents determine their own level of financial literacy.

The results of empirical studies from various countries around the world indicate that the level of financial literacy significantly and positively influences both the decision-making process regarding the opening of positions in securities and mutual funds, as well as the proportion of funds allocated to stock market instruments [9, 12, 18, 21–25]. The author was unable to find studies examining similar effects using Russian data, although the impact of financial literacy on the use of bank accounts and bank loans [26], as well as services of non-state pension funds [27] in Russian conditions has already been assessed. Research using foreign data also reveals a positive correlation between the level of financial literacy and wealth [28–30].

Alongside specialized knowledge, characterized by objective and subjective assessments of financial literacy, the level of formal education received significantly influences the use of securities market instruments, as it also helps to overcome barriers related to the need for analyzing financial information when making and implementing investment decisions [31, 32]. Important factors in the selection of financial instruments by individuals are their attitude towards risk [2, 23, 33, 34] and their expectations regarding the prospects for the country's economic development [12].

The analysis of the results of foreign studies allows us to propose the following hypotheses for testing using data from the All-Russian Household Survey on Consumer Finances:

H1: The increase in objectively measured financial literacy is accompanied by a heightened use of securities market instruments.

H2: A high subjective confidence in one's level of financial literacy is accompanied by an increased use of securities market instruments.

H3: An increase in risk appetite is accompanied by a growing role of stock market instruments and cryptocurrencies in the structure of financial assets.

H4: Pessimistic expectations regarding the prospects for the development of the Russian economy are contributing to a decrease in the share of risky assets.

FINANCIAL LITERACY, RISK TOLERANCE, AND EXPECTATIONS IN RUSSIAN CONDITIONS

In our research, we use data from the fifth wave of the All-Russian Household Survey on Consumer Finances, conducted in 2022 at the

request of the Bank of Russia, which involved 12 162 respondents.

Despite the active opening of brokerage accounts by Russian citizens in recent years, securities market instruments still make up a small share of the financial assets of the respondents who participated in the survey. The vast majority (60.74%) of respondents use bank deposits to place their savings. Only a few respondents invest in stocks (0.79%), bonds (0.21%), mutual funds (0.19%), and cryptocurrency (0.20%). Such a conservative approach to choosing savings instruments significantly differs not only from the situation in the country with the most developed stock market — the USA, where 53% of respondents in a similar survey invest in stocks and 8% in bonds [12], but also in China, where 10% of respondents have stocks in their portfolio and 5% have mutual funds [23], and in Thailand, where 9% of respondents have stocks or equity funds in their portfolio and 10% have bonds or bond funds [22].

The share of bank deposits in the overall structure of respondents' financial assets is 93.38%, while securities market instruments account for 5.16%, of which 3.83% are in stocks, 0.86% in bonds, and 0.47% in mutual funds. The remaining share is accounted for by precious metal accounts (0.28%) and cryptocurrencies (1.18%).

In the "financial literacy" section of the survey, questions are included that allow for the establishment of respondents' subjective perception of their financial literacy, as well as providing an objective assessment based on the results of their answers to test tasks. Only 10.67% of respondents rate their knowledge and skills in financial literacy as good or excellent, while 43.5% critically note that they are unsatisfactory or completely lacking. At the same time, 43.13% of respondents consider their knowledge and skills to be satisfactory.

As in similar foreign studies, the test questions allow for the assessment of respondents' understanding of the algorithm for calculating compound interest and inflation. However, the key question from the perspective of A. Lusardi and O. Mitchell [13, p.10] regarding the comparative level of risks between investing in single stock and diversified mutual fund was not included in the survey conducted by the Bank of Russia, nor were advanced-level questions about the characteristics of stocks, bonds, and mutual funds (for example, about the nature of the relationship between interest rates and bond prices). At the same time, unlike foreign surveys, the Russian poll pays special attention to the respondents' awareness of the characteristics of the Russian deposit insurance system.

Based on the results of the test answers that assess the understanding of compound interest calculation techniques and the effects of inflation, it can be concluded that the level of financial literacy among Russians (65% correct answers on questions about compound interest and 57% correct answers on questions regarding the effects of inflation) is lower compared to citizens of the U.S. (76% and 81%) [12], Germany (78% and 82%) [19], Switzerland (78% and 79%) [20] and the Netherlands (77% and 85%) [18], but higher compared to citizens of China (57% and 50%) [21]. Unfortunately, other questions for testing financial literacy are not comparable to those used in foreign surveys.

To obtain an objective rating of financial literacy, we summed up the number of correct answers to questions that characterize the ability to calculate compound interest, knowledge of the effects of inflation, understanding the relationship between return and risk, knowledge of the parameters of the deposit insurance system, awareness of the key interest rate, and the ability to calculate discounts. On average, respondents answered correctly 5.4 test questions out of 9, which are taken into account when calculating the financial literacy rating, with a median value of 6.

Both subjective self-assessment and objective financial literacy ratings are higher

among respondents with higher education. With increasing age, financial literacy initially rises, but then begins to decline. The highest level of self-assessed financial literacy is demonstrated by respondents around the age of 30, which aligns with the findings of the study by O.V. Kuznetsov and co-authors [35], while the objective rating of financial literacy is shown by respondents aged 40. Unlike foreign studies, the dependence of financial literacy on gender is not observed in Russian data.

70.3% of respondents reported their complete unwillingness to take on financial risks. Only 7.3% of respondents showed a willingness to take substantial and significant risks in order to achieve higher profits.

If respondents assess the economic conditions in Russia as unfavorable over a 2-year horizon, many expect an improvement in the economic situation over a longer period (over a 5-year horizon). 38.1% of respondents consider that the prospects for the Russian economy are poor over the next 2 years, but when considering a 5-year horizon, the share of pessimist's decreases to 27.9%. And if only 13.0% of respondents consider the prospects of the Russian economy good over a 2-year horizon, then over a 5-year horizon, the share of optimists rises to 20.4%.

METHODOLOGY

To test the proposed hypotheses, models of binary choice were evaluated, explaining the inclusion of various financial assets in the respondent's portfolio, as well as Tobit models, explaining the shares of different financial assets in the respondent's portfolio. Since our main interest lies in explaining the structure of financial assets of individuals, only data from respondents who reported having any financial assets (60.89% of the sample) were used in the estimation of the regression models.

To analyze the factors determining the use of various financial assets by respondents, models were estimated:

$$Pr(ai_{ki} = 1) = F(b_0 + b_1 lo_i + b_2 ls_i + b_3 rt_i + b_4 ex_i + b_5 fe_i + b_6 age_i + b_7 he_i + b_8 ln(inc_i) + e_i), \quad (1)$$

where ai_{ki} — a binary variable indicating whether financial asset k is present in the portfolio of respondent i; lo_i — an objective assessment of the respondent's level of financial literacy based on their answers to test questions; ls_i — subjective self-assessment of financial literacy level; rt_i — the respondent's willingness to take financial risks; ex_i — the respondent's expectations regarding the prospects for the development of the Russian economy over the next 5 years; fe_i — female indicator; age_i — age; he_i — indicator of higher education availability; inc_i — annual income; F — logistic function.

Model (1) was estimated for all investments in securities market instruments (stocks, bonds, and mutual funds), as well as for investments in stocks, bonds, mutual funds, cryptocurrencies, bank deposits, and precious metal accounts.

To analyze the factors determining the shares of the respondent's investments in financial asset k, Tobit model (2)—(4) was estimated:

$$as^*_{ki} = b_0 + b_1 lo_i + b_2 ls_i + b_3 rt_i + b_4 ex_i + b_5 fe_i + b_6 age_i + b_7 he_i + b_8 ln(inc_i) + e_i; \quad (2)$$

$$as_{ki} = as^*_{ki}, \text{ if } as^*_{ki} > 0; \quad (3)$$

$$as_{ki} = 0, \text{ if } as^*_{ki} \leq 0, \quad (4)$$

where as^*_{ki} — the latent variable of the share of financial asset k in the portfolio of respondent i; as_{ki} — the factual share of financial asset k in the portfolio of respondent i; the other variables correspond to those used in the model (1). It was assumed that the random error e_i is normally distributed.

RESULTS

Table 1 presents the coefficients for the explanatory variables in equation (1), where the dependent variable is an indicator of the

Table 1

Estimation of the Impact of Financial Literacy on the Inclusion of Various Financial Instruments in the Portfolio

Variables	Securities market instruments	Stocks	Bonds	Mutual funds	Cryptocurrency	Deposits	Precious metal accounts
Constant	−13.213*** (2.030)	−12.828*** (2.151)	−21.103*** (4.165)	−11.405*** (4.256)	−12.502*** (3.729)	9.186* (5.177)	−3.555 (3.341)
Financial literacy rating	0.161** (0.066)	0.173** (0.075)	0.402** (0.161)	0.086 (0.127)	0.172 (0.146)	−0.043 (0.184)	0.120 (0.159)
Financial literacy self-assessment	0.075 (0.131)	0.333** (0.148)	0.002 (0.251)	−0.403 (0.271)	0.710** (0.303)	−0.101 (0.390)	0.035 (0.340)
Willingness to take risks	0.723*** (0.137)	0.671*** (0.152)	0.719*** (0.275)	0.953*** (0.263)	1.100*** (0.266)	−1.192*** (0.343)	0.645** (0.323)
Expectations of the changing economic situation	0.070 (0.137)	0.084 (0.151)	−0.141 (0.276)	0.024 (0.297)	−0.145 (0.310)	0.364 (0.431)	0.635* (0.368)
Female	0.182 (0.226)	0.219 (0.252)	0.826* (0.473)	0.626 (0.516)	−1.907** (0.772)	0.231 (0.671)	−0.084 (0.573)
Age	0.001 (0.007)	−0.008 (0.008)	−0.024 (0.017)	0.007 (0.015)	−0.026 (0.021)	−0.012 (0.021)	−0.041* (0.022)
Availability of higher education	0.962*** (0.247)	0.858*** (0.274)	1.598** (0.652)	1.340** (0.538)	−0.482 (0.563)	−1.285* (0.759)	1.504** (0.653)
Income log	0.463*** (0.150)	0.386** (0.160)	0.879*** (0.299)	0.252 (0.314)	0.280 (0.282)	0.021 (0.380)	−0.380 (0.246)
McFadden R2	0.102	0.112	0.193	0.087	0.231	0.112	0.133

Source: Author's calculations.

Note: ***. **. * — the coefficient is statistically significant at the level of 1. 5 and 10%. respectively. Standard errors are given in parentheses.

presence of the corresponding financial asset for the respondent.

The results of the estimations show that an increase in the financial literacy rating, based on responses to test questions, enhances the tendency of respondents to include securities market instruments — bonds and stocks — in their portfolios. Moreover, this effect is more pronounced for bonds, meaning that financially literate investors in Russian conditions perceive bonds as an instrument with an optimal balance between return and risk. In the equation for bank deposits, the coefficient for the variable of financial literacy rating is negative, which indicates the rationality of the financial behavior of Russian citizens. *Those who lack a deep understanding of the functioning of financial markets make a reasonable choice in favor of the most conservative instrument.*

When including the variable of the objective financial literacy rating in the equation, the effect of subjective self-assessment of financial literacy on the decision to include securities market instruments in the portfolio is statistically insignificant. However, this effect is revealed in relation to specific financial instruments — stocks and cryptocurrencies. The effect of increased interest among financially literate respondents in including mutual funds that provide broad investment diversification in their portfolio, as discovered in the data from China [23], is not observed in the Russian data.

As expected, respondents who are not willing to take financial risks choose the most conservative instrument — bank deposits. A high willingness to take risks encourages respondents to include alternative financial instruments in their portfolio — stocks, bonds, mutual funds, cryptocurrencies, and precious metal accounts.

Table 2

Estimation of the Impact of Financial Literacy on the Share of Various Financial Instruments in the Portfolio

Variables	Stock Securities market instruments	Stocks	Bonds	Mutual funds	Cryptocurrency	Deposits	Precious metal accounts
Constant	−7.025*** (1.221)	−6.559*** (1.227)	−4.015*** (0.998)	−6.347** (2.468)	−7.210*** (2.399)	1.062*** (0.020)	−3.137* (1.647)
Financial literacy rating	0.071** (0.034)	0.074** (0.036)	0.072** (0.030)	0.022 (0.061)	0.086 (0.080)	−0.001 (0.001)	0.061 (0.069)
Financial literacy self-assessment	0.045 (0.069)	0.167** (0.074)	−0.015 (0.045)	−0.216 (0.142)	0.394** (0.184)	−0.003** (0.001)	0.015 (0.141)
Willingness to take risks	0.414*** (0.087)	0.344*** (0.088)	0.149*** (0.056)	0.518*** (0.181)	0.612*** (0.190)	−0.013*** (0.002)	0.209 (0.154)
Expectations of the changing economic situation	0.016 (0.074)	0.027 (0.075)	−0.004 (0.049)	−0.003 (0.147)	−0.007 (0.155)	−0.002 (0.002)	0.261 (0.160)
Female	0.033 (0.120)	0.054 (0.124)	0.107 (0.086)	0.282 (0.253)	−0.871** (0.383)	0.001 (0.003)	−0.030 (0.238)
Age	0.001 (0.004)	−0.002 (0.004)	−0.004 (0.003)	0.005 (0.007)	−0.011 (0.010)	0.000 (0.000)	−0.016* (0.009)
Availability of higher education	0.520*** (0.134)	0.435*** (0.135)	0.286** (0.113)	0.619** (0.288)	−0.235 (0.285)	−0.011*** (0.003)	0.552* (0.290)
Income log	0.205*** (0.078)	0.166** (0.076)	0.155*** (0.056)	0.112 (0.155)	0.115 (0.141)	−0.003 (0.002)	−0.088 (0.430)

Source: Author's calculations.

Note: ***, **, * — the coefficient is statistically significant at the level of 1, 5 and 10%, respectively. Standard errors are given in parentheses.

Thus, the risk profile aligns quite well with the asset choices made by the respondents, indicating the rationality of their financial behavior.

Unlike in the U.S., in Russia, there is no statistically significant relationship between expectations regarding the country's economic development prospects and decisions to include various financial instruments in the portfolio. It is possible that this is due to the fact that the composition of the respondents' portfolios was primarily determined by decisions made before the start of the special military operation and the subsequent harsh sanctions imposed by unfriendly states. Additionally, the changes in asset structure were influenced not only by expectations regarding the prospects for economic development in the coming years but also by assessments of the justification for the scale of the decline in Russian securities prices in February-March 2022.

There are no significant differences in the financial behavior of Russian men and women, although women tend to include bonds in their portfolios slightly more and cryptocurrencies slightly less. Contrary to expectations, no connection was found between the age factor and decisions regarding the inclusion of various financial instruments in the portfolio, including when testing the quadratic dependence of financial decisions on age.

Respondents with higher education are more likely to open positions in securities market instruments, including mutual funds. As expected, the likelihood of including stocks and bonds in the portfolio is higher among respondents with high incomes.

The factors considered in choosing financial instruments a similar impact on the shares of various financial assets in investors' portfolios (*Table 2*). Respondents who rate their own level

of financial literacy highly are characterized by a lower proportion of savings placed in bank deposits and a higher proportion of savings invested in cryptocurrencies and stocks. As expected, respondents who are not inclined to take financial risks place almost all of their savings in bank deposits, while respondents with a high tolerance for financial risks actively utilize securities market instruments and cryptocurrencies.

In response to expectations, forecasts regarding changes in the economic situation in Russia do not play a statistically significant role in determining the structure of respondents' financial assets, although one might have expected a higher share of stocks in the asset structure of optimists and a higher share of precious metal accounts in gold in the asset structure of pessimists. This may be explained by the fact that some pessimists use bars and investment coins for gold investments instead of precious metal accounts, the data on which is not presented in the survey by the Bank of Russia. Among stock investors, there is a significant proportion of those who consider that Russian stocks are undervalued even in the context of the anticipated deterioration of the economic situation in Russia.

At the same time, socio-demographic variables influence the structure of the respondents' financial assets. Women are less likely than men to invest in cryptocurrencies. Individuals with higher education are more likely to allocate a larger share of their savings to securities market instruments by reducing the share of savings placed in bank deposits. High-income individuals are actively investing in the stock market.

CONCLUSION

Data from the Bank of Russia indicates that the level of financial literacy among Russians, although lower than in the U.S., Germany, Switzerland, and the Netherlands, is higher than in China. The investments of Russian citizens in securities market instruments are primarily limited not by a lack of financial literacy, but by a high degree of aversion to financial risks. In the absence of deep financial competencies, the refusal of individuals characterized by low tolerance for potential losses to invest in securities market instruments and their preference for bank deposits is a completely rational and justified decision. At the same time, this creates unfavorable conditions for the implementation of the long-term savings program developed by the Ministry of Finance of Russia and for attracting long-term investment resources by Russian companies in the real sector of the economy amid the closure of access to global financial markets.

At the same time, the active acquisition of cryptocurrencies by individuals with a high self-assessment of their financial competencies, but with low incomes and financial literacy ratings based on test responses, as well as a lack of higher education, creates increased risks of not achieving financial goals due to potential declines in cryptocurrency values and account freezes by cryptocurrency exchanges. This also reduces the share of savings used for investment to support the development of the Russian economy. Therefore, within the framework of the initiatives promoted by Lomonosov Moscow State University and the Bank of Russia to enhance the financial literacy and financial culture of Russian citizens, it is essential to pay special attention to the risks associated with cryptocurrency transactions.

Further research on the impact of financial literacy on the choice of financial instruments by Russian citizens requires an expansion of the representation in the sample of respondents engaged in securities market operations, as well as adjustments to the composition of the survey questions. To ensure comparability with the results of international surveys in subsequent waves, it makes sense to adjust and supplement the set of questions posed to respondents (for example, to include a question on understanding the benefits of diversifying investment risks in the block of questions assessing financial literacy, as well as advanced-level questions, and to consider

the fund's profile by investment object when collecting data on investments in mutual funds). To address potential issues related to the endogeneity of financial literacy, it would be beneficial to include questions in the survey whose answers could be used as instrumental variables (for example, regarding whether respondents were taught financial planning by their parents during childhood and whether they had a bank account before the age of 18).

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