Vol. 28, No. 4 | DOI: 10.26794/2587-5671 | ISSN 2587-5671 (Print) ISSN 2587-7089 (Online)

FINANCE: THEORY AND PRACTICE

Scientific and practical peer-reviewed journal
Published since 1997.
Former title: “Bulletin of the Financial University”

Registration certificate:
PI No. FS77-70021 of 31 May 2017

Founder: Financial University under the Government of the Russian Federation, Moscow, Russia

Publication frequency — 6 times a year

The Journal is focused on scientific discussion of topical problems in the sphere of financial economy.

Indexed in databases: Scopus, Russian Science Citation Index (RSCI), CrossRef, DOAJ, Ebsco, Dimensions, EconLit, EconBiz, RePec, eLibrary.ru, Russian Index of Science Citation (RINTs), etc.

A journal included in the first category of the List of VAC’s peer-reviewed scientific publications (K1) on specialties: 5.2.1. Economic theory, 5.2.4. Finance (Economic science).

Each article is assigned a digital object identifier (DOI).

The printed version of the journal is distributed by subscription.
Subscription to the Journal is carried out through the union catalogue “Pressa Rossii”, subscription index – 82140.

The electronic version of the journal in Russian and English is in open access on the website https://financetp.fa.ru/jour

Manuscripts are submitted via the electronic editorial board on the journal's website
https://financetp.fa.ru/jour

Minimum volume of a manuscript to be submitted 4 ths words; optimal — 6 ths words.

The Editorial Board are assessment the peer-review manuscripts meticulously and executes scientific, literary and technical editing of the author's original in the journal.
More information on publishing terms is at: **https://financetp.fa.ru/jour**

FINANCE: THEORY AND PRACTICE

Scientific and practical journal

Vol. 28, No. 4, 2024

Editor-in-Chief —
Marina A. Fedotova
Head of Scientific Journals Editorial Department —
Victor A. Shadrin
Managing Editor —
Irina S. Dovgal
Translator —
Victoria I. Timonina
Bibliographer —
Vasilii M. Alekseev
Proofreader —
Svetlana F. Mikhaylova
Design, make up —
Sergei M. Vetrov

Editorial address:
53, Leningradsky prospekt, office 5.4
Moscow, 125167
tel.: **+7 (499) 553-10-71 (internal 10-79)**
E-mail: **isdovgal@fa.ru**
Site: **financetp.fa.ru**

Subscription in editorial office
tel: **+7 (499) 553-10-71 (internal 10-80)**
e-mail: **sfmihajlova@fa.ru**
Svetlana F. Mikhaylova

Signed for press on 06.08.2024
Format 60 x 84 1/8.
Size 29,75 printer sheets.
Order № 972.
Printed by Publishing House of the Financial University (Moscow, 51, Leningradsky prospekt)

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-6-17
JEL G4, G41

Does the Disposition Effect Justify the Options Traders' Irrationality?

V. Choubey, P.V. Joshi
Symbiosis Institute of Operations Management, Nashik,
Symbiosis International (Deemed) University, Pune, India

ABSTRACT

The options trader's decisions are expected to be rational decisions but an element of irrationality is observed in decision making. The Disposition effect is the behavioral aspect of an investor which explains his irrational decision-making. The disposition effect is the tendency to keep losing positions too long and selling winning positions too early. The present research work studies the disposition effect in options trading. Options are derivatives of underlying assets which give the holder the right to exercise them at a given date and price. In this research work, elements of disposition effect namely, Herding (HE), Mental accounting (MA), Risk Aversion (RA) are studied along with Trade enablers (TE) and Cost consciousness (CC). The data was collected from 250 respondents' trading options on the National Stock Exchange, India. The collected data was analyzed using Structured Equation Modeling (SEM). The results reflected that the disposition effect existed in decision-making by options traders. Trade Enabler consisting of Time decay and Open Interest, and Herding emerged as significant elements of disposition effect for options trading. Mental accounting, risk aversion, and cost-consciousness emerged as less significant elements affecting the disposition effect in options trading.

Keywords: disposition effect; herding; mental accounting; risk aversion; behavioral finance

For citation: **Choubey V., Joshi P.V. Does the disposition effect justify the options traders' irrationality? *Finance: Theory and Practice*. 2024;28(4):6-17. DOI: 10.26794/2587-5671-2024-28-4-6-17**

INTRODUCTION

Derivatives and Disposition in Derivative Trading

The global equity trading volumes have surged from 20 trillion US dollars in the first quarter of 2017 to 41.78 trillion US dollars by the 3rd quarter of 2021.[1] Apart from equity investment, a surge in trading of derivatives (equity, commodity, currency, and index) is observed. An option or derivative is a contract that gives the owner the right to buy or sell the security but not an obligation to execute the contract at a future date based on the strike price (1). However, the increased awareness amongst retailer traders about derivative instruments results in the trading of derivatives (2).

As per the report published by Statista[2] the number of options contracts traded worldwide in 2021 was 33.31 billion, as compared to 29.28 billion contracts in futures. As per the report of CNBC, in 2020, retail participants contributed to more than 25% of traded option contracts. The report further mentioned that the majority of them were making losses [3]. As per the reports by SEBI,[3] 89% of Future and Option traders made losses. Derivatives contracts are different from equity contracts in that they have special attributes such as expiry, premium, lot size, time-decay, high risk, high reward, etc. These attributes complicate the decision-making of the traders and involve them psychologically.

The study of decision-making by investors in the capital market was guided by classical theories. These theories tried to provide a rationale for the decisions made by the investors [4]. The Efficient Market Hypothesis (EMH) is proposed by [5] based on the Expected Utility

[1] Value of global equity trading worldwide from 1st quarter 2017 to 4th quarter 2021. URL: https://www.statista.com/statistics/242745/volume-of-global-equity-trading/ (accessed on 01.03.2022).

[2] Number of futures and options contracts traded worldwide from 2013 to 2022. URL: https://www.statista.com/statistics/377025/global-futures-and-options-volume/ (accessed on 01.04.2022).

[3] Analysis of Profit and Loss of Individual Traders dealing in Equity F&O Segment. URL: https://www.sebi.gov.in/reports-and-statistics/research/jan-2023/study-analysis-of-profit-and-loss-of-individual-traders-dealing-in-equity-fando-segment_67525.html (accessed on 30.01.2023).

Theory, which is widely accepted. These traditional theories are challenged by many researchers, given events like the dot-com crash, subprime crisis, Brexit, and the recent emergence of the Corona Virus pandemic [6]. Theories of behavioral finance are adopted to explain irrational behavior. These basic theories of behavioral finance are based on the concept of "bounded rationality" [7]. It is related to "limitations" associated with decision-making. There are a lot of studies indicating the causes of the irrational behavior of individuals. The landmark work of [8] and [9] on the disposition effect is referred to in this research work to understand irrationality in behavior of option traders. The preliminary observations by researchers, followed by interviews with option traders, revealed that traders are holding losing positions longer and selling winning positions early. This poses the following questions in the minds of the researchers.

RQ 1: Does the disposition effect justify (explain) the irrational behavior of option traders?

RQ 2: which is a significant factor determining the disposition effect in options trading.

Aim and Objectives

The study aims to justify (Explain) the irrational behavior of option traders through the disposition effect. Though there have been studies on the behavior of capital market investors, this paper aims at understanding whether the disposition effect explains the irrational behavior of options traders. The study initially focuses on investigating existing literature and exploring factors affecting disposition effects, with special reference to options trading. Further, the research intends to identify significant factors of disposition effect in options trading.

Specific Contribution of Research Work

The theory of Disposition effect was put forth by [8, 9]. Its applications were mainly identified by several authors. The study of DE in case of IPOs [10] and taxation [11] is observed. Also, studies of DE in the context of demographics are done [10, 11]. This paper studies the applicability of the disposition effect on options traders' behavior, which is lacking in the existing literature. Also, several studies were conducted with respect to individual factors of disposition effect, namely Mental Accounting [12], Herding [13], Risk Aversion. However, no work was observed in above studies to identify the significant factors affecting the Disposition effect in options trading. Further, it was noticed after the initial interaction with the option traders that cost and time value play a vital role in decision making in options trading and trigger the disposition effect. This led to further exploration of the literature, and two factors specific to option trading were proposed, namely Cost Consciousness and Trade Enablers.

THEORETICAL DEVELOPMENT

The pioneering work in understanding the complexity of options was done by [14] based on five factors, namely the strike price of the underlying asset, the current premium price of the option, the maturity date of the option, the risk-free rate in the country, and the volatility of the mark. Despite having relevant information, the majority of retailers are making losses, and this signifies the behavioral aspect of options trading decisions. The present work focuses on Disposition effect.

Disposition Effect (DE)

The disposition effect is an integral part of behavioral finance. It supports explaining the irrational behavior of decision-makers where classical theories have limitations [8, 15]. Traces of DE were observed in the self-justification theory proposed by [16], which explains investors' behavior when they commit mistakes. As a counteraction, the individual tends to invest more resources to rectify the mistakes, attracting additional financial commitments that may lead to financial distress. The literature related to DE was further advanced by contribution of [9]. They criticized the expected utility theory and the prospect theory suggested by them. Similarly, [17] observed that the risk profile is situational. An investor may take a risk in some situations and avoid others. Further inspection of the prospect theory was done by [8]. They concluded that the DE works in real decision-making and can be attributed to mental accounting, loss aversion, avoiding regret, seeking pride, and self-control. The major factors creating DE are discussed further.

Herding

It is irrationally copying the decisions of other investors. The negative news causes more fluctuations in

comparison to positive news [18]. It may be attributed to blindly following the advice of experts [19] or to fashion and fads [20]. Herding is observed very well in a social media environment called social trading [21]. This environment provides information, transparency, and constant reciprocal scrutiny by participants but at the same time drives them in direction. The study by [22] also explains the fear of missing out on patterns in trading, which causes herding. The researcher proposes the following:

H1 — Herding positively affects the Disposition Effect.

Mental Accounting

MA explains that an individual or household decision-maker decides by creating separate considerations called accounts. In the case of financial investments, each security is considered a separate account, and the decisions are not taken based on the whole portfolio altogether [12]. Along the same lines [23], discussing the DE, also considered MA when it was mentioned that the decision-makers do not consider the whole portfolio but individual securities. [24] observed that investors are risk-averse to individual stock losses but do not take into consideration portfolio losses, stressing the presence of MA. The above literature indicates the influence of MA on the DE for various instruments. Based on it, the following hypothesis is proposed to study the relation between MA and DE for options trading:

H2 — MA positively affects Disposition Effect.

Trade Enablers

Trade enablers consist of time-decay (expiration) and open-interest. The importance of the first component of trade enabler, i.e. expiration has been observed by many researchers. The American option value decomposes as it approaches its expiration date [25]. Traders choose not to stay invested in a contract that they do not believe has any chance of becoming profitable. Different observations are made by researchers regarding expiry options. The expiry date is related to return, volatility, and volume in derivatives and their underlying assets [26]. The DE (keeping losers and selling winners) is affected by the above three. It was found that the maturity effect influences the traded volumes but doesn't make the prices volatile [27]. Though volatility remains the same on the expiration day, [28] found that on the expiration day, trading volume fluctuates but prices are not affected. In contrast to this study, it is observed that trading activities are normal on expiry [29]. On the basis of the above, we infer that as the expiry date of options approaches, the probability of price fluctuation reduces, hence the option traders with profitable positions exit from the trade and the option traders with loss making positions continue to hold their positions in expectation of reversal. The second component of the trade enabler, i.e., open interest, is related to the number of un-winded contracts. In the work of [30], the importance of open-interest in predicting is highlighted. They found that increase in put-options open-interest is followed by poor return on underlying. Similarly, an increase in call open-interest predicts good performance by underlying. The options markets show unusual activities in form of open-interest before any significant corporate event [31]. Thus, open-interest can be used as an indicator for predicting the behavior of the market as studied by [32] in the Indian and US markets. The importance of non-price variables, namely open-interest and trading volume, can be seen in the research work of [32]. The common observation was that open-interest predicts the movement of underlying. The authors infer that open-interest is an indication of holding positions (i.e., DE) and intend to hypothesize that open interest increases DE. These two factors — expiry of options and changes in open-interest play an important role in holding a contract. These two factors combined are termed "Trade Enablers" by researchers. To capture the trading behavior related to expiry and open-interest and its impact on disposition, the following hypothesis is framed:

H3 — Trade Enablers positively affect the Disposition Effect.

Risk Aversion

Risk Aversion and DE are studied by many researchers. Investors' decisions are based on their economic outlook and expected utility from the investment, and they always look for value in the opportunity [8]. The expected returns vary proportionately with the risk involved in the investment. RA is a major cause of the DE and it is because of this RA that decision-makers tend to sell their winning positions too soon. However, the term asymmetric RA is used to indicate that the decision-maker is risk-averse only in a winning position but becomes a risk-taker when in a loss [33].

The paper researched the impact of only RA on the DE on the investors and concluded that the RA alone is insignificant in explaining the DE in the case of winners but is significant in the case of losing investments [34]. The previous research works reflect a relationship between RA and DE. The following hypothesis is proposed for studying the decision-makers in options trading:

H4 — Risk Aversion positively affects Disposition Effect.

Cost-Consciousness

The term cost-consciousness though is a widely used term in scientific literature, but the concept lacks clarity and is vague [35]. Cost-consciousness is looked at from different points of view, like cost reduction, operations and economic efficiency [36]. This paper intends to use the term from the capital market point of view. In this research work, the term cost consciousness is used to represent two vital and concerning elements of option trading, i.e. the transaction costs and taxes involved. The transaction cost is a major element determining efficiency and ultimately influences the decisions of stock market traders [37]. In an experiment [38], it was found that of the major factors affecting the DE, transaction cost was found to be a significant factor. On similar lines, observations were made by [39]. It is found that the DE is sensitive to taxes and the decisions of traders are affected by the rate of taxes [40]. In this context [41], observed the impact of security transaction taxes and inferred that it has an adverse impact on stock market participants and reduces profitability. Studies by [42] reveal that to reduce tax liabilities, traders wind up their winning positions as the year approaches. This indicates that decisions made are affected by taxes. The research [43] studied the impact of taxation on the trading behavior of private investors. They concluded that taxes have a major impact on the decision-making of traders. Discontinuity of taxes increases the trading volume of buying and selling of positions in case of gains as well as losses. Hence, the researchers are interested in understanding the existence of the following relationship:

H5 — Cost-consciousness positively affects the Disposition Effect.

Looking at the literature and research work available, applications of DE have been studied by many authors, like in taxation [10], IPO [41], or demographics [11]. Also, several studies were conducted with respect to individual factors of disposition effect namely Mental Accounting [12]; Herding [18]. Risk Aversion [33]. However, no work was observed in the above studies to identify the significant factors affecting the Disposition effect in options trading. Further, it was noticed after the initial interaction with the option traders that cost and time

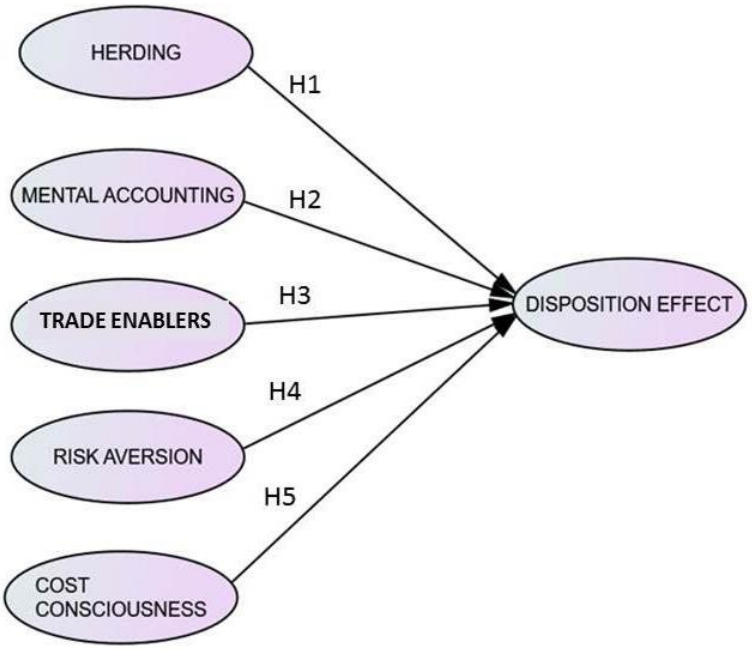


Fig. 1. **Proposed Model for DE in Options Trading**

Source: Compiled by authors.

value play a vital role in decision making in options trading and trigger disposition effect. This led to further exploration of literature and two factors specific to option trading were proposed, namely Cost Consciousness and Trade Enablers. Based on the detailed literature review, the model is proposed as in *Fig. 1*.

RESEARCH METHODOLOGY

Instrument Development

The disposition effect is studied based on five factors: Herding, MA, Trade Enablers, Risk Aversion, and Cost-Consciousness. *Table 1* depicts the sources of items for various constructs (factors).

These items from various sources were adapted for the current study. The items, related to Trade Enablers and Cost-Consciousness, were developed by researchers on suggestions of experts. The validity of an instrument is the appropriateness by which it measures what is required to measure [47]. The Content Validity of these items was judged by the expert panel of 10 judges from Industry and Academia. Items having 75% consensuses were used for data collection. Out of 22 items, seventeen were validated by a panel of judges. Items **DE4 and DE 5, TE2 & TE3, CC2** were dropped based on the judges' opinion. The final instrument was presented to respondents and responses were collected on a five-point Likert scale with Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1).

Sample and Data Collection

The data was collected from individual options traders on the National Stock Exchange, India. Responses were collected from 315 option traders using the judgment sampling method. A self-administered questionnaire was used for this purpose. The response rate was 79% (approx.), and 250 valid and complete responses were used for further analysis. The respondents' profile is given in the *Table 2*.

RESULTS

Common Method Bias and Normality

Common method bias was observed using Harman's single-factor test. The maximum variance for a single factor was 43.5%. These rules out biasedness in the given data. The data was found in the normal range of +/−2 for skewness and kurtosis. This ensures the normality of the data [48].

Validity

Convergent validity: Composite Reliability (CR), factor loadings, and Average Variance Extracted (AVE) were used for establishing convergent validity. An acceptable range for CR above 0.7 and AVE above 0.5 for convergent validity [49]. Factor loading above 0.5 is acceptable. Cronbach Alpha is above 0.60 for all the constructs and is within an acceptable range [49]. The findings are presented in *Table 3*.

Discriminant validity: the discrimination in latent value is understood by discriminant validity. The square root value of AVE for each construct should be greater than the correlation coefficient it has with other constructs. *Table 4* indicates the presence of discriminant validity as the AVE square root was greater than the correlation coefficient.

Structural Model

SPSS Amos version 25 was used to conduct SEM. The values indicate the adequate fit of the proposed

Table 1

Instrument Development Sources

Construct (factors)	Source
Disposition Effect (DE1, DE2, DE3, DE4, DE5)	[44]
Herding (HE1, HE2, HE3)	[45]
MA (MA1, MA2, MA3)	[45, 46]
Risk Aversion (RA1, RA2, RA3, RA4)	[46]
Trade Enablers (TE1, TE2, TE3, TE4)	Suggested by experts
Cost-Consciousness (CC1, CC2, CC3)	Suggested by experts

Source: Compiled by authors.

Table 2

Respondents' Profile

Description	Category	Number
Gender	Male	174
	Female	76
Age Group	21 to 35	122
	36–50	81
	Above 50	47
Educational Qualification	Undergraduate	71
	Graduate	133
	Post Graduate	36
Annual Income	Up to 0.25 mln	46
	0.25 mln – 0.5 mln	113
	Above 0.5 mln	91

Source: Compiled by authors based on data collection.

model. The values were within the acceptable range, as suggested by [49]. Normed $\chi 2 = 1.821$, CFI = 0.974, IFI = 0.974, TLI = 0.966 and RMSEA = 0.057).

Path Analysis

The following *Table 5* presents the results of hypotheses H1 to H5 at a 0.05 level, showing a significant positive relation between DE and Herding (H1), DE, and Trade-Enablers (H3). However, no significant positive relationship was observed between, the DE and Mental-Accounting (H2); DE and Risk-Aversion (H4); DE and Cost-Consciousness (H5). The predictive validity can be assessed through estimates. The Herding and Trade Enablers were significant predictors at p-value of 0.05 level (*Table 5*). The model is presented in *Fig. 2*.

DISCUSSION

The research aimed at studying the Disposition effect in option trading. Disposition is selling winning positions too early and keeping losing positions for too long [8]. Options trading was studied in light of five dimensions related to disposition. Herding, MA and RA constructs were obtained from the literature review, whereas TE and CC were added as per the expert's opinion. Responses obtained from the options traders in the NSE were run through the SEM to identify the relationship between the constructs and disposition effect. The results are discussed further.

Herding is the mentality of following others [50]. Irrespective of the individuals' ability to trade, the traders get influenced by others' opinions and ultimately end up trading irrationally [19]. In this study, it was observed that the traders normally follow the trends while dealing with options. The high volatility in the prices of options also causes traders to depend on others. It was also revealed that opinions expressed on social media play a major role in determining option traders' decisions. Based on the outcome of SEM, it was found that herding supports the disposition effect in options traders. MA is an individual's or household's decision to create separate considerations for different investments [12]. MA was not observed as a significant factor in determining DE. Option traders apply multiple trading strategies that involve creating simultaneous positions in multiple contracts. Here, the net returns are considered as the outcome of the strategy, wherein these multiple trades are interrelated and not separated by mental accounts. Thus, MA doesn't contribute significantly to the DE. Cost-consciousness is the impact of transaction costs and taxes paid by the trader on trading behavior [37]. Though the transaction costs and taxes are high, the options traders compare them with the expected returns from the trade and are thus willing to take up the costs. The options traders are aware of the transaction charges and taxes they incur, and they devise their risk-reward ratios accordingly, thus, cost-consciousness is found to be a non-significant element. It

Table 3

Construct — Standardized Factor Loading, AVE, SCR, and Cronbach's Alpha

Construct	Item Code	Indicator	Standardized Factor Loading	Scale composite reliability	Average Variance Extracted	Cronbach Alpha
Mental Accounting	MA1	"You tend to treat each element / account in your trading portfolio separately"	0.864	0.900534	0.751	0.901
	MA2	"You take separate actions for losing and winning positions"	0.869			
	MA3	"You ignore the connection between different trading possibilities"	0.867			
Herding	HE1	"Other investors' decisions of buying and selling stocks impact my investment decisions"	0.926	0.877221	0.710	0.843
	HE2	"I usually react quickly to the changes in other investors' decisions and follow their reactions to the stock market"	0.930			
	HE3	"I follow social blogs / forums / news / YouTube before making the stock a purchase/sale"	0.638			
Disposition Effect	DE1	"I will keep holding stocks even though they are losing and will never think about selling the stocks until they balance the losses"	0.674	0.774849	0.535	0.751
	DE2	"I usually sell profitable stocks to realize gains first when I am in want of money. I buy other stocks and keep holding them to wait for the price of unprofitable stocks to go up"	0.768			
	DE3	"There is profit from several share transactions for me at times, which could not compensate for one loss"	0.749			
Cost-Consciousness	CC1	"I quickly sell profitable positions after covering up the transaction charges"	0.877	0.873423	0.775	0.873
	CC3	"I quickly sell profitable positions after covering up the taxes"	0.884			
Risk Aversion	RA1	"You sell a position that has increased in value faster"	0.877	0.910954	0.719	0.91
	RA2	"You avoid selling positions that have decreased in value"	0.847			
	RA3	"You feel more sorrow about holding losing positions too long"	0.832			
	RA4	"You feel more sorrow about selling winning positions too soon"	0.835			
Trade Enablers	TE1	"I quickly sell winning positions nearing expiry (time-decay)"	0.581	0.729907	0.586	0.694
	TE4	"I sell losing positions with decreasing Open interest"	0.914			

Source: Authors' calculations.

Table 4

Discriminant Validity

Correlations						
	HE	MA	DE	CC	RA	TE
HE	.842					
MA	.841**	.866				
DE	.309**	.428**	.731			
CC	.833**	.864**	.441**	.881		
RA	.771**	.834**	.409**	.830**	.848	
TE	.239**	.152*	–.157*	.194**	.097	.766

Source: Authors' calculations.

Table 5

Path Analysis

Hypothesis	Path	Estimate	Standardized path coefficient	t-value	p-value	Supported/Not Supported
H1	DEЯ	0.474	0.854	2.264	.024	Supported
H2	DEЯ	.037	0.054	0.043	.966	Not supported
H3	DEЯ	1.263	0.341	2.746	.006	Supported
H4	DEЯ	.300	0.410	0.904	.366	Not supported
H5	DEЯ	.376	1.853	1.112	.266	Not supported

Source: Authors' calculations.

is also observed by [40] that the effect of taxes and other costs is significant when the financial year ends, but short term option trading doesn't get affected by these costs. Risk-aversion was found to be an insignificant contributor to the DE in the decision-making of options traders. Risk-aversion is the tendency to prefer guaranteed outcomes over probabilistic ones [33]. The investors in capital markets judge their win or loss with a reference point like their purchase price and the current price of the stocks or any other financial asset [9]. However, when it comes to options trading, the reference point phenomenon becomes insignificant because the instrument traded is not an asset but underlying security and thus has no purchase price of its own. The premium involved in options is volatile and simply moves based on multiple external factors apart from the market price of the underlying asset. Due to the phenomenon of time decay, even without any change in the price of the underlying asset, the premium involved is bound to be zero. Thus, riskiness is an underlying attribute of option trading. Thus, the options trader accepts the risk involved while entering into any position, and so risk aversion is a less significant factor for disposition effect in the case of options traders. Trade-enablers influence options trading by holding losing positions longer and selling winning positions early. It was found from the results that TE significantly influences DE in options trading. It comprises two factors, time-decay, and open interest. Options are instruments that give traders the right to trade at a paid premium, which is usually less than the actual value of the asset. However, latent costs are involved as a time factor. Due to time decay, the premium approaches zero at expiry and it creates a sense of urgency in traders to wind up positions before expiry. This results in a DE. On the other hand, if the trade has moved in the loss-making territory, traders avoid winding up positions for two reasons. Firstly, there is the there is the expectation that trade will take a favorable turn and they will end up making profits. Secondly, nearing expiration, the premium has already decayed substantially, resulting in the recovery of minimal investment. Thus, the traders remain invested

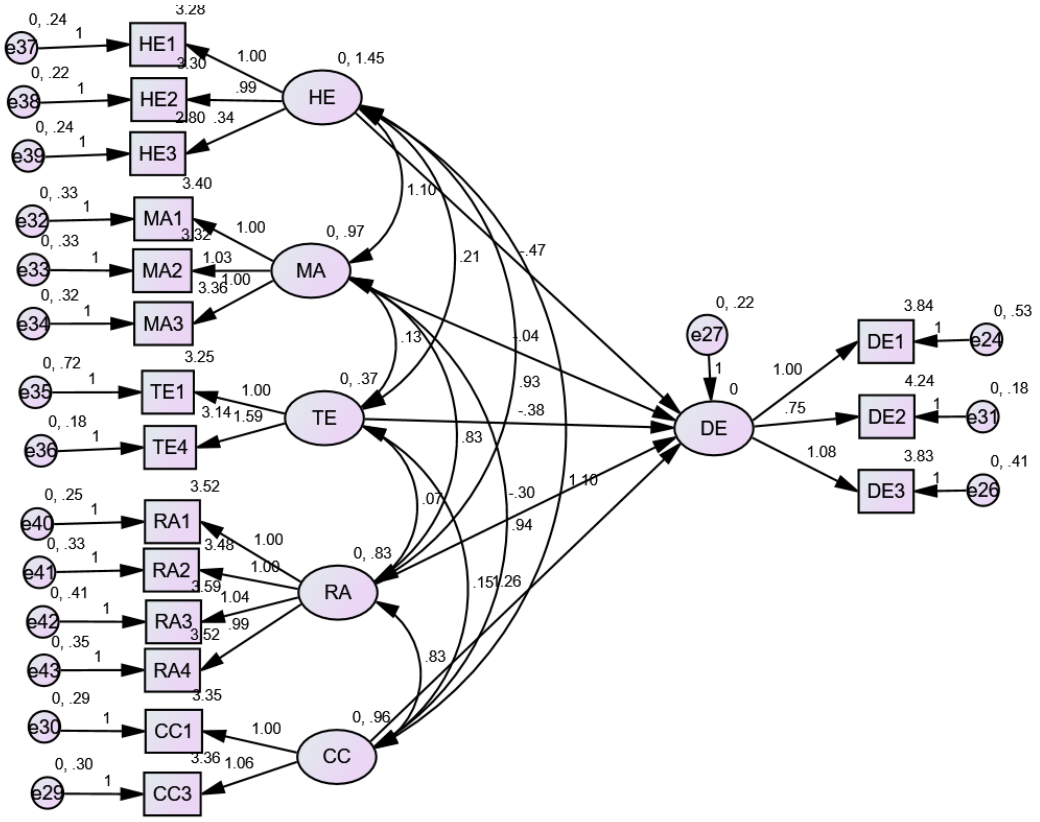


Fig. 2. **Structural Model**

Source: Model based on authors' calculation.

and DE comes into play. Open interest is the number of positions that are not un-winded by traders. This sets the trend for traders. Most of the researchers found open interest to be an important factor in influencing trading behavior [31]. Based on a number of calls or put positions held in the market, traders make decisions about the prevalent trend in the market. Thus, winding up positions on the basis of open interest causes traders to sell winning positions early with the changes in open interest. On the other hand, for losing positions, traders are found waiting for an open interest rate change in their favor. Further, the model studied the covariance among the multiple factors. All the factors showed positive covariance with each other. Thus, the factors have a positive impact on the trading behavior of option traders. However, no covariance was observed between HE and CC. This implies that covariance amongst factors augments to disposition effect.

CONCLUSION

The study was conducted with the objectives of investigating irrationality in option trading and identifying elements of Disposition Effect. The study initiated with review of extant literature related to disposition effect and found, Herding Mental Accounting, Risk Aversion, Trade Enablers and Cost-Consciousness as important elements of DE. To further achieve the objectives of identifying important elements producing a disposition effect, a model was developed to test hypotheses. Responses were collected from 250 stock market participants trading in derivatives. Structural Equation Modelling was used to validate the model. It can be concluded that DE does exist in option trading and leads to irrationality. Trade Enabler consisting of Time-decay and Open-Interest, and Herding emerged as significant factors affecting DE for options traders. The factors not significantly affecting DE in options trading were MA, risk-aversion, and cost-consciousness. The research paper is intended to understand the DE in options trading. The research work contributed by explaining the existence of the DE in options trading. The study is the first of its kind to study option derivatives as trading instruments by retail traders. The research can be of use to the individual traders in devising trading strategies. The

traders would better understand the causes of their irrational behavior and may try to avoid or alter their behavior. The research is also of value to regulators and policymakers, as it will help them devise proper policies that may discourage irrational behavior.

Limitations and Scope

The research was conducted on the behavioral responses of 250 option traders on the National Stock Exchange India. The biases in responses may affect the study. The study opens vistas of research wherein the behavioral responses can be validated by actual trades. The analysis can also be based on demographic attributes. Investment size is another important factor that can be considered for future research. Covariance among factors can be taken into account in future studies to elaborate on the on the disposition effect.

Implications

The research can be of use to individual traders in devising trading strategies. The traders would better understand the causes of their irrational behavior and may try to avoid or alter their behavior. The traders are required to overcome the hype or hoax created and should be able to judge the real and panicky movement. The open interest and time decay observed with trade enablers calls for emotional control while trading in options.

The research is also of value to the regulators and policy makers as it will help them to devise proper policies that may discourage the irrational behavior.

REFERENCES

1. Hull J.C. Fundamentals of futures and options markets. Sydney, NSW: Pearson Higher Education AU; 2013. 577 p.
2. Igwilo J.I., Sibindi A.B. ICT adoption and stock market development: Empirical evidence using a panel of African countries. *Risks*. 2022;10(2):25. DOI: 10.3390/risks10020025
3. Li Y. Options trading activity hits record powered by retail investors, but most are playing a losing game. CNBC. Dec. 22, 2021. URL: https://www.cnbc.com/2021/12/22/options-trading-activity-hits-record-powered-by-retail-investors.html (accessed on 15.06.2022).
4. Kumar S., Goyal N. Behavioural biases in investment decision making — a systematic literature review. *Qualitative Research in Financial Markets*. 2015;7(1):88–108. DOI: 10.1108/QRFM-07–2014–0022
5. Fama E.F. Efficient capital markets: A review of theory and empirical work. *The Journal of Finance.* 1970;25(2):383–417. DOI: 10.2307/2325486
6. Sharma A., Kumar A. A review paper on behavioral finance: Study of emerging trends. *Qualitative Research in Financial Markets.* 2020;12(2):137–157. DOI: 10.1108/QRFM-06–2017–0050
7. Simon H.A. Bounded rationality. In: Eatwell J., Milgate M. Utility and probability. London: Palgrave Macmillan; 1964:15–18.
8. Shefrin H., Statman M. The disposition to sell winners too early and ride losers too long: Theory and evidence. *The Journal of Finance.* 1985;40(3):777–790. DOI: 10.1111/j.1540–6261.1985.tb05002.x
9. Kahneman D., Tversky A. Prospect theory: An analysis of decision under risk. *Econometrica*. 1979;47(2):263–292. DOI: 10.2307/1914185
10. Weber M., Camerer C.F. The disposition effect in securities trading: An experimental analysis. *Journal of Economic Behavior & Organization*. 1998;33(2):167–184. DOI: 10.1016/s0167–2681(97)00089–9
11. Da Silva P.P., Mendes V. Exchange-traded certificates, education and the disposition effect. *Journal of Behavioral and Experimental Finance.* 2021;29:100456. DOI: 10.1016/j.jbef.2020.100456
12. Thaler R.H. Mental accounting matters. *Journal of Behavioral Decision Making.* 1999;12(3):183–206. DOI: 10.1002/(SICI)1099–0771(199909)12:3<183:: AID-BDM318>3.0.CO;2-F
13. Spyrou S. Herding in financial markets: A review of the literature. *Review of Behavioral Finance.* 2013;5(2):175–194. DOI: 10.1108/RBF-02–2013–0009
14. Black F., Scholes M. The pricing of options and corporate liabilities. *Journal of Political Economy*. 1973;81(3):637–654. DOI: 10.1086/260062
15. Ahn Y. The anatomy of the disposition effect: Which factors are most important? *Finance Research Letters*. 2022;44:102040. DOI: 10.1016/j.frl.2021.102040

16. Festinger L. A theory of cognitive dissonance. Palo Alto, CA: Stanford University Press; 1957. 291 p.
17. Puppo B., Leles M., Mozelli L., Sbruzzi E. A multicriteria decision trading system based on prospect theory: A risk return analysis of the TODIM method. *Processes*. 2022;10(3):609. DOI: 10.3390/pr10030609
18. Samineni R.K., Puppala R.B., Muthangi R., Kulapathi S. Expiration-day effects on index futures: Evidence from Indian market. *Journal of Asian Finance Economics and Business*. 2020;7(11):95–100. DOI: 10.13106/jafeb.2020.vol7.no11.095
19. De Bondt W.F.M., Forbes W.P. Herding in analyst earnings forecasts: Evidence from the United Kingdom. *European Financial Management*. 1999;5(2):143–163. DOI: 10.1111/1468–036X.00087
20. De Long J.B., Shleifer A., Summers L.H., Waldmann R.J. The survival of noise traders in financial markets. *The Journal of Business*. 1991;64(1):1–19. DOI: 10.1086/296523
21. Gemayel R., Preda A. Does a scopic regime produce conformism? Herding behavior among trade leaders on social trading platforms. *The European Journal of Finance*. 2018;24(14):1144–1175. DOI: 10.1080/1351847X.2017.1405832
22. Gupta S., Shrivastava M. Herding and loss aversion in stock markets: Mediating role of fear of missing out (FOMO) in retail investors. *International Journal of Emerging Markets*. 2022;17(7):1720–1737. DOI: 10.1108/IJOEM-08–2020–0933
23. Toma F.-M. Behavioral biases of the investment decisions of Romanian investors on the Bucharest Stock Exchange. *Procedia Economics and Finance*. 2015;32:200–207. DOI: 10.1016/s2212–5671(15)01383–0
24. Barberis N., Huang M. Mental accounting, loss aversion, and individual stock returns. *The Journal of Finance*. 2001;56(4):1247–1292. DOI: 10.1111/0022–1082.00367
25. Kim I.J., Yu G.G. An alternative approach to the valuation of American options and applications. *Review of Derivative Research*. 1996;1(1):61–85. DOI: 10.1007/BF01536395
26. Gurgul H., Suliga M. Impact of futures expiration on underlying stocks: Intraday analysis for Warsaw Stock Exchange. *Central European Journal of Operations Research* 2020;28(3):869–904. DOI: 10.1007/s10100–018–00606–9
27. Alkebäch P., Hagelin N. Expiration day effects of index futures and options: Evidence from a market with a long settlement period. *Applied Financial Economics*. 2004;14(6):385–396. DOI: 10.1080/09603100410001673612
28. Karolyi G.A. Stock market volatility around expiration days in Japan. *The Journal of Derivatives*. 1996;4(2):23–43. DOI: 10.3905/jod.1996.407969
29. Mahalwala R. A study of expiration-day effects of index derivatives trading in India. *Metamorphosis: A Journal of Management Research*. 2016;15(1):10–19. DOI: 10.1177/0972622516629029
30. Fodor A., Krieger K., Doran J.S. Do option open-interest changes foreshadow future equity returns? *Financial Markets and Portfolio Management*. 2011;25(3):265–280. DOI: 10.1007/s11408–011–0164-z
31. Jayaraman N., Frye M.B., Sabherwal S. Informed trading around merger announcements: An empirical test using transaction volume and open interest in options market. *The Financial Review*. 2001;36(2):45–74. DOI: 10.1111/j.1540–6288.2001.tb00010.x
32. Srivastava S. Informational content of trading volume and open interest — an empirical study of stock option market in India. *SSRN Electronic Journal*. 2003. DOI: 10.2139/ssrn.606121
33. Prates W.R., da Costa N.C.A., Dorow A. Risk aversion, the disposition effect, and group decision making: An experimental analysis. *Managerial and Decision Economics*. 2017;38(7):1033–1045. DOI: 10.1002/mde.2843
34. Jiao P. Belief in mean reversion and the disposition effect: An experimental test. *Journal of Behavioral Finance*. 2017;18(1):29–44. DOI: 10.1080/15427560.2017.1274754
35. Velasquez S., Suomala P., Järvenpää M. Cost consciousness: Conceptual development from a management accounting perspective. *Qualitative Research in Accounting & Management*. 2015;12(1):55–86. DOI: 10.1108/QRAM-07–2013–0029
36. Nor-Aziah A.K., Scapens R.W. Corporatisation and accounting change. The role of accounting and accountants in a Malaysian public utility. *Management Accounting Research*. 2007;18(2):209–247. DOI: 10.1016/j.mar.2007.03.003
37. Gomes C., Waelbroeck H. Transaction cost analysis to optimize trading strategies. *The Journal of Trading*. 2010;5(4):29–38. DOI: 10.3905/jot.2010.5.4.029
38. Iturbe-Ormaetxe I., Ponti G., Tomás J. An experimental analysis of the disposition effect: Who and when? *Journal of Behavioral and Experimental Economics*. 2019;81:207–215. DOI: 10.1016/j.socec.2019.06.011

39. Dai M., Jiang Y., Liu H., Xu J. A rational theory for disposition effects. *Review of Economic Dynamics*. 2023;47:131–157. DOI: 10.1016/j.red.2021.11.003
40. Bazley W.J., Moore J., Murren Vosse M. Taxing the disposition effect: The impact of tax awareness on investor behavior. *Journal of Financial and Quantitative Analysis*. 2022;57(7):2724–2765. DOI: 10.1017/S 0022109022000564
41. Agustina L., Gunawan Y., Chandra W. The impact of tax amnesty announcement towards share performance and market reaction in Indonesia. *Accounting and Finance Research.* 2018;7(2):39–47. DOI: 10.5430/afr.v7n2p39
42. Kaustia M. Prospect theory and the disposition effect. *Journal of Financial and Quantitative Analysis*. 2010;45(3):791–812. DOI: 10.1017/S 0022109010000244
43. Buhlmann F., Doerrenberg P., Voget J., Loos B. How do taxes affect the trading behavior of private investors? Evidence from individual portfolio data. ZEW Discussion Paper. 2020;(47). URL: https://www.econstor.eu/bitstream/10419/225078/1/1735550132.pdf
44. Goo Y.-J., Chen D.-H., Chang S.-H., Yeh C.-F. A study of the disposition effect for individual investors in the Taiwan stock market. *Emerging Markets Finance and Trade.* 2010;46(1):108–119. DOI: 10.2753/REE 1540–496X460110
45. Baker H.K., Kumar S., Goyal N. Personality traits and investor sentiment. *Review of Behavioral Finance.* 2021;13(4):354–369. DOI: 10.1108/RBF-08–2017–0077
46. Jain J., Walia N., Kaur M., Singh S. Behavioural biases affecting investors' decision-making process: A scale development approach. *Management Research Review.* 2022;45(8):1079–1098. DOI: 10.1108/MRR-02–2021–0139
47. Saunders M., Lewis P., Thornhill A. Research methods for business students. Harlow: Prentice-Hall; 2007. 652 p.
48. George D., Mallery P. SPSS for windows: Step by step. New Delhi: Pearson; 2011. 386 p.
49. Hair J.F., Black W.C., Babin B.J., Anderson R.E. Multivariate data analysis: A global perspective. 4th ed. New Delhi: Pearson India; 2016. 734 p.
50. Welch I. Herding among security analysts. *Journal of Financial Economics*. 2000;58(3):369–396. DOI: 10.1016/S 0304–405X(00)00076–3

ABOUT THE AUTHORS

Vardhan Choubey — PhD, Assist. Prof., Symbiosis Institute of Operations Management, Nashik, Symbiosis International (Deemed) University, Pune, India
https://orcid.org/0000-0002-2124-9759
Vardhan.choubey@siom.in

Prasad Vasant Joshi — PhD, Assist. Prof., Symbiosis Institute of Operations Management, Nashik, Symbiosis International (Deemed) University, Pune, India
https://orcid.org/0000-0002-7198-4786
Corresponding author:
joshi.prasad@siom.in

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 05.07.2023; revised on 15.08.2023 and accepted for publication on 26.08.2023. The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-18-32
JEL G4, G40, G41

Role of Personality Traits and Perceptive Factors in Determining Stock Market Investment Intentions

C. Gautam[a], R. Wadhwa[b], T.V. Raman[c]
[a] Management Education and Research Institute, New Delhi, India;
[b] Amity Business School, AUUP, Noida, India;
[c] Birla Institute of Management and Technology, Greater Noida, India

ABSTRACT

The present study intends to comprehend the stock market investment intention among individuals. The **purpose** of the study is to assess the role of perceptive factors, including subjective norms, attitudes and perceived behavioural control, in relation to individual personalities and the theory of planned behaviour. In this regard, the study adopts a quantitative approach with the help of the PLS-SEM technique to predict relationships between variables. The responses were collected through a structured questionnaire from individuals with or without trading experience in the stock market. The key findings indicate a positive impact of perceptive factors on individual investment intentions. Furthermore, it was found that personality characteristics influence individual investment intentions, while gender and age moderately influence the relationship of intuitive factors and personality traits with investment intent. Overall, the study contributes to the individuals' perception regarding Indian stock market investments. Hence, the findings are crucial for governments, investment businesses and financial intermediaries to propel stock market participation and investment.

Keywords: personality traits; big-five; theory of planned behaviour; investor behaviour; stock market investment

For citation: **Gautam C., Wadhwa R., Raman T.V. Role of personality traits and perceptive factors in determining stock market investment intentions. *Finance: Theory and Practice.* 2024;28(4):18-32. DOI: 10.26794/2587-5671-2024-28-4-18-32**

INTRODUCTION

The constantly changing scenario in global financial markets has changed individual investors' outlook on traditional finance. Fama [1] discussed that traditional finance operates on the efficient market hypothesis, presuming information-efficient financial markets and rational investors. However, in reality, investors follow the rule of thumb instead of optimization [2]. This contradiction created a revolutionary shift in research and practice, where conventional finance took a leap to behavioural finance. Behavioural finance focuses on individuals' irrational behaviour in the market owing to the concepts and myths of traditional finance, psychology, and neuroeconomics [3].

Financial markets are competitive, offering flexible investing options among various financial assets and obtaining liquefiable returns from the invested capital [4]. However, stock market investment has always been a challenging decision which demands a rational thought process [5, 6]. Hoffman and Post [7] found that individual investors struggle to align their anticipated returns with their risk tolerance. Nearly 30% of investors think they can make prudent decisions yet fall short of achieving their investment objectives [8]. Hence, it is essential to comprehend what influences their investment intentions in the stock market. The discussion concerning individual investment decisions has been polarized by numerous scholars [9–13]. However, limited studies have been done on Indian investors' intentions to invest in financial markets [14, 15].

It has been noted that despite the advancements in the financial markets, most Indian consumers have significantly less stock market participation [16]. According to 2021 World Bank data, India is the top 20 saver nation, with a 30% savings rate as a percentage a percentage of GDP, the majority of which is accumulated in bank deposits, physical assets, and currency [17]. In a survey sponsored by the Securities and Exchange Board of India [18] on investment and savings behaviour, it was found that 15% of the total urban Indian households only invested in securities markets, and the remaining are more inclined towards less risky assets like bank deposits, post office schemes, insurance, etc. It has also been observed that the major roadblock is a lack of awareness among investors regarding key instruments. Thus, it becomes more important to study the rationale behind this context. The present study attempts to comprehend investor intentions in the Indian financial

markets, one of the largest developing economies. In addition, with the aim of understanding the investor behaviour in stock markets, this research also studies those individuals who can be potential investors. This research is an extension to understand the relationship between perceptive factors and social traits and the individual intention to invest [14, 19, 20].

LITERATURE REVIEW

Investment Intentions and Perceptive Factors

According to I. Ajzen [21], the theory of reasoned action asserts that behavioural intentions are insightful and can predict an individual's inclination to behave in a particular manner. The theory of planned behaviour extends the theory of reasoned action, which states that intentions and perceived behavioural control can predict an individual's behaviour [22, 23]. Behavioural intentions work with three critical, independent conceptual frameworks: attitude, subjective norms, and perceived behavioural control [24]. The theory of planned behaviour (TPB) proposes that individual intention precedes behaviour and has been widely used in studies related to behavioural domains [25].

Subjective Norms

The theory of planned behaviour postulates that individuals who are likely to invest in stock markets are influenced by their close peers or family [26]. Further, it creates social pressure on an individual to perform or not perform a specific behaviour in a given situation [22]. While understanding financial choices in family firms, family norms for external debt and equity positively and significantly affect behavioural intentions [27]. Social investors find a stock market investment more attractive when their peers participate [28]. While studying Indian stock markets, it was found that subjective norms show a weak positive effect on investment intention [29]. Thus, the perceptive factor, a subjective norm springing from acquaintances, influences the investment intention of an individual, proposing the following hypothesis:

H1: Subjective Norm positively impacts individual investment intentions towards the stock market.

Attitudes

Attitude is an individual's psychological and cognitive behaviour while assessing a particular aspect and evaluating the favourable or unfavourable outcomes [30]. A positive attitude will lead to a stronger behavioural inclination, whereas a negative attitude will provide a weaker preference [15]. Sin-Hui et al. [31] identified attitude as the most substantial TPB variable to describe the intentions of accounting practitioners concerning earning management. Attitude towards risk impacts investment behaviour, creating specific behavioural aspirations for different risk-intolerant levels [32]. Further, while studying the theory of planned behaviour in the Indian stock market, investors' attitudes partially mediate the relationship between financial knowledge and investment intentions [33]. Based on the arguments, the attitude of individual investors influences their investment intentions, proposing the following hypothesis:

H2: Attitude positively affects individual investment intentions towards the stock market.

Perceived Behavioural Control

The theory of planned behaviour presumes that perceived behavioural control explains the perception of whether an individual has possession of the required resources, ability, or opportunity to perform a behaviour [34]. Various studies were done under the pretext that perceived behavioural control influences the behavioural intentions of individual investors [35, 36]. Mahastanti & Hariady [37] identified perceived behavioural control and risk preference as influencing the intent of potential female investors to purchase financial products. While understanding the factors influencing the adoption of future products, perceived behavioural control indicates a strong association with investment intentions [38]. Thus, the study proposes the following hypothesis:

H3: Perceived Behavioural Control (H1c) positively impacts individual investment intentions toward the stock market.

Subjective Norms and Attitude

Various studies have found a direct influence of subjective norms on the attitude of individual investors [39, 40]. Shanmugham and Ramya [41] identified a significant effect of various social factors, including media, the Internet and social interactions, on the attitudes towards trading. This research

evaluates the individual investment intentions in the Indian stock market, where most individual investors are easily affected by others' opinions and the media. In India, the stock market is widely discussed across various media channels, which descriptively provide knowledge and analysis of the stock market. The opinions of peers and financial professionals will influence whether investing or not in stocks is a wise decision for an individual. Thus, the study proposes the following hypothesis:

H4: Subjective Norm positively influence an individual's attitude toward stock market investment intentions.

Investment Intentions and Personality Traits

Personality is a distinct representation of how individuals feel, think, and behave [42]. Multiple researchers, including Raymond Cattell, Donald Fiske, Norman, Smith, Goldberg, McCrae & Costa, have conducted various empirical studies to contract personality attributes [43]. The Big Five Traits taxonomy can be identified by addressing five personality dimensions: extroversion, openness to experience, conscientiousness, emotional stability and agreeableness [44]. Numerous studies have suggested that personality traits can anticipate the purview of human behaviour, preference and effects [20, 45, 46]. Pak and Mahmood [47] found that these attributes affect individual investors' risk tolerance behaviour, ultimately impacting their investment decisions in the financial market.

While studying the perceptions of individual investors and their decisions regarding various investment opportunities, it has been found that anxious people are sensitive to high risk and tend to save more and avoid investment. In contrast, independent and extroverted individuals lean more toward making investments [48]. Researchers have examined various psychological antecedents related to investment intentions and proposed that extroverted individuals have more intentions to invest in the short-term. In contrast, individuals with higher neuroticism and risk aversion avoid investing in short-term investment opportunities [19]. Conscientious, open to experience, and agreeable individual investors carry long-term investment intentions, whereas risk-averse individuals avoid them [49]. This study will extend the literature on how different personality characteristics influence individual intentions to invest. Subsequently, the following hypothesis is proposed:

H5: Extroversion (H5a), Agreeableness (H5b), Conscientiousness (H5c), Emotional Stability (H5d) and Openness to Experience (H5e) significantly influence individuals' stock market intentions.

Moderating roles of Demographic Factors (Age & Gender)

Several researchers have examined various demographic factors affecting the investment decisions of individuals. It has been found that males are more overconfident than females and often underperform while indulging in excessive trading [50]. While designing a practical application for behavioural finance, women are more risk-averse than men [51]. Various personality traits and emotional intelligence significantly affect the risk tolerance level of males and females [52]. A diverse relationship has been found between different age groups when making an investment decision [53]. It has also been found that risk aversion falls with age, increases until five years before retirement, and then rises again with age [54]. Therefore, the research proposes the following hypothesis to study the moderating role of gender and age:

H6: Gender (H6a) and Age (H6b) moderate the relationships between the personality of an individual investor, intuitive factors, and stock market investment intention.

Figure 1 represents the Conceptual Framework for the study. This framework will help to understand factors influencing Stock Market Investment Intentions.

RESEARCH DATA AND METHODOLOGY

Sample and Data Collection

The target population for the present study is individual investors who are 20 years of age and older and eligible to do stock market trading in India with or without prior trading experience. A solicited questionnaire is better for a dispersed population to understand their personal opinions; thus, a well-structured questionnaire was designed. Individual participants from the National Capital Region (NCR), India were approached randomly, and questionnaires were distributed via phone and e-mail using purposive and convenience sampling techniques. In order to

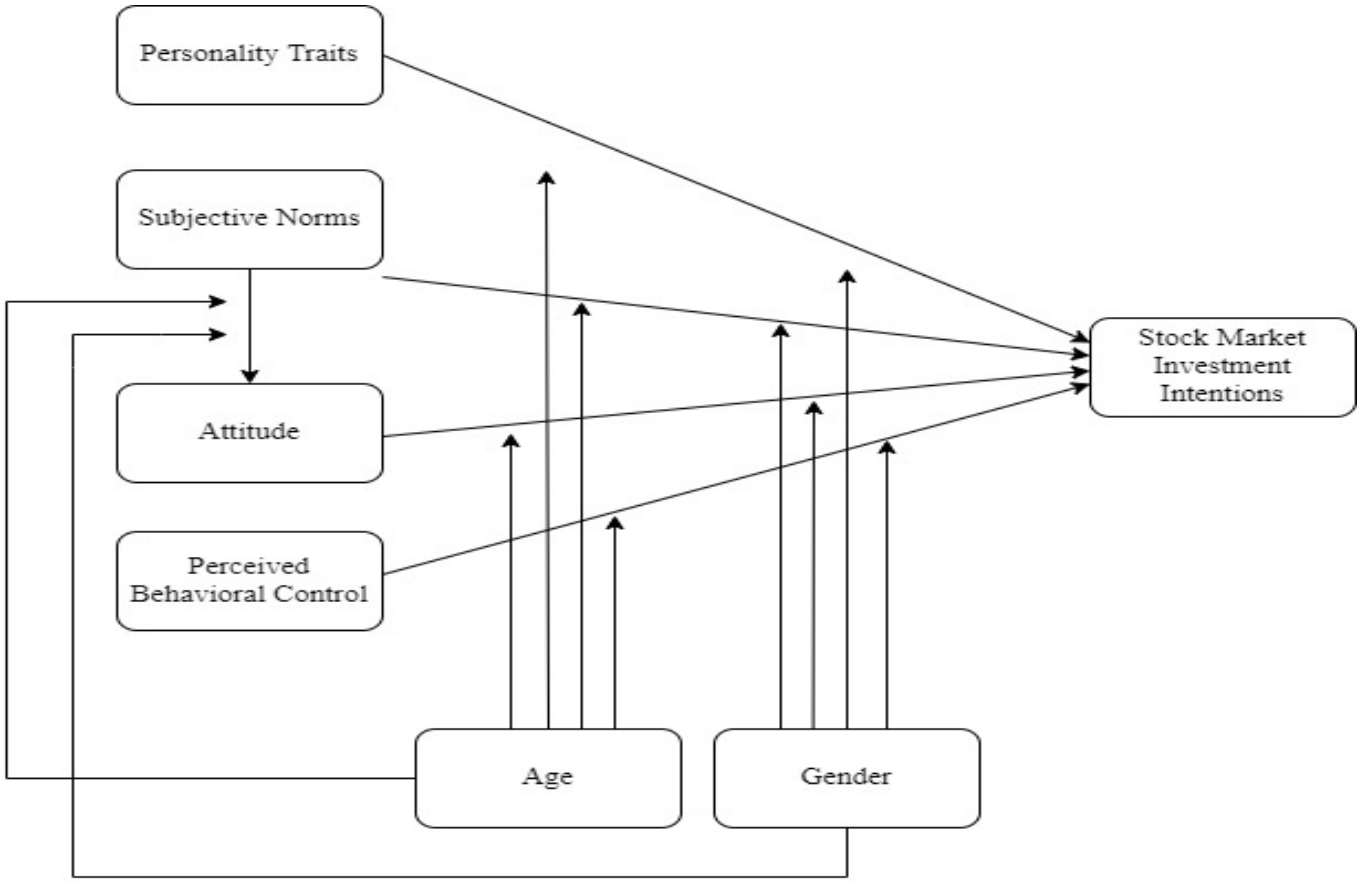


Fig. 1. **Conceptual Framework for Studying Stock Market Investment Intentions**
Source: Compiled by the authors.

prevent sampling errors and ensure the predictability and validity of the research, G* Power Software is a statistical power analysis program used to estimate the sample size and conduct power analyses [55]. With the help of G* Power Software V 3.1.9.7, the minimum sample size was estimated at 160 respondents at 0.80 power at a 0.05 confidence level [56]. For this study, nearly 483 participants were approached with the questionnaire, out of which 422 responses were received, with twelve incomplete responses. At last, 411 responses were found valid [57], with an effective response rate of 85.09%.

Measurement of the variables

The first section of the research survey explained the aim of the study and provided directions for completing the survey. The second section was designed for respondents to submit demographic data. The third section included a research tool with items studied through a seven-point Likert scale, with one being "Strongly Disagree" and seven being "Strongly Agree". Various exogenous and endogenous variables, along with their latent variables, were adapted from previous studies. Some items were modified in the Indian context for better research analysis. The research is analyzed through the Partial Least Squares — Structural Equation Model (PLS-SEM) with the help of SmartPLS software.

The proposed model for this study includes five variables. The big five-factor model is the most commonly used personality model for research [58]. Romeros et al. [59] suggested that a compact version of the big five personality scale might save research costs, boost participation, and simplify survey administration. In this study, personality traits are measured through a Ten-Item Personality Inventory (TIPI) measure, which is adapted from the study of Gosling, Rentfrow, & Swann [60]. This research examined the cognitive constructs of TPB adopted from the previous work of Taylor and Todd [61] & Elliot and Ainsworth [24] and modified the items to align with the study [3, 4]. For the dependent variable, i.e., the investment intention of individual investors,

Table 1

Demographic Information

	Characteristics	Frequency	Percentage
Gender	Male	217	52.8%
	Female	194	47.2%
Age	20–30 years	324	78.8%
	30–40 years	57	13.9%
	40–50 years	14	3.4%
	50–60 years	16	3.9%
Educational Qualification	Diploma	18	4.4%
	Graduate	115	28.0%
	Post-graduate	278	67.6%
Marital Status	Married	127	30.9%
	Unmarried	284	69.1%
Trading Experience	Yes	168	40.9%
	No	243	59.1%

Source: Compiled by the authors.

four items were used for measurement, adapted from the work of Lim, Soutar, & Lee [62].

RESULTS

Demographic Profile

Table 1 summarizes the demographic profile of the survey respondents. Of 411 respondents, 52.8% were male, and 47.2% were female. A total of 78.8% lie in the age group of 20–30 years, 13.9% were in 30–40 years, 3.4% in 40–50 years and 3.9% respondents were from the 50–60 years age group. Most of the respondents were post-graduates (67.6%), followed by graduates (28%) and the rest were diploma qualified (4.4%). Respondents who had trading experience in the stock market stood at 40.9% while 59.1% did not have any trading experience.

DATA ANALYSIS VIA PLS-SEM

Measurement Model

The measurement model is assessed by examining the reliability of the item, internal consistency, and discriminant validity [63]. *Table 2* shows the 28-indicators with their factor loadings in the measurement model. Cronbach's alpha is applied to determine internal consistency for a detailed reliability check. The value of Cronbach's alpha is within the acceptable limit of 0.7 and above [64]. Furthermore, the internal consistency and composite reliability (CR) of the latent variables are analysed to ascertain the convergent reliability of the constructs, which is between 0.79 and 0.95, exceeding the threshold value of 0.7 [65]. Thus, CR is assured. Additionally, to determine convergent validity, the average variance extracted (AVE) is calculated and is higher than 0.5, which is considered adequate [65, 66].

Discriminant validity is determined to evaluate the degree to which the constructs are different from others [67]. According to Fornell and Larcker [65], to determine discriminant validity, the AVE square root of an identified construct should be greater than the inter-construct correlation in a measurement model, as shown in *Table 3*. The value of the square root of AVE *(in italics)* is greater than the inter-construct correlation. *Table 4* illustrates the Heterotrait-Monotrait ratio (HTMT ratio) to ascertain the discriminant validity of the constructs, which are under the required threshold of 0.85 [68]. Therefore, the results of the discriminant validity analysis are accepted.

Table 2

Standard Loadings of the Measurements

Constructs	Items	Outer Loadings	AVE	Composite Reliability	Cronbach's Alpha
Extroversion (EX)	*I find myself extraverted and enthusiastic*	0.977	0.717	0.831	0.786
	I am reserved and quiet®	0.692			
Agreeableness (AG)	*I am critical and quarrelsome®*	0.971	0.784	0.878	0.766
	I am sympathetic and warm to others	0.791			
Conscientiousness (CT)	*I am dependable and self-disciplined*	0.913	0.743	0.852	0.764
	I am disorganized and careless®	0.807			
Emotional Stability (ES)	*I am anxious and quickly get upset®*	0.799	0.742	0.851	0.765
	I am calm and emotionally stable	0.919			
Openness to Experience (OE)	*I am open to new experiences*	0.981	0.674	0.798	0.727
	I am conventional and uncreative®	0.621			
Subjective Norm (SN)	*I will participate in stock markets if:* • *My colleagues do*	0.775	0.608	0.886	0.845
	• *The media promote*	0.842			
	• *The senior management agrees*	0.742			
	• *My family approves*	0.777			
	• *The Government and experts encourage*	0.760			
Attitude (AT)	*Investment in the stock market increases the financial knowledge of an individual*	0.754	0.644	0.900	0.861
	Stock market investment is a smart choice	0.827			
	I perceive stock market investment as substantial	0.882			
	Stock market investment is a fresh concept	0.688			
	I enjoy trading in the stock market	0.848			
Perceived Behavioural Control (PBC)	*I generally have the information required to invest in the stock market*	0.910	0.758	0.924	0.886
	I invest in the stock market for a significant amount of time	0.956			
	I invest in the stock market and put forth more effort	0.948			
	I have enough money to make stock market investments	0.624			
Investment Intentions (IN)	*I aim to invest in the stock market*	0.922	0.831	0.951	0.932
	I endorse investing in the stock market and will advise others to do the same	0.870			
	I will keep on investing in the stock market	0.960			
	I can cope with the disruptions brought on 0.892 the stock market trading	0.892			

Source: Compiled by the authors.

Table 3

Discriminant Validity of the Measurements

	EX	AG	CT	ES	OE	SN	AT	PBC	IN
EX	0.720								
AG	0.593	0.756							
CT	0.524	0.729	0.765						
ES	0.523	0.601	0.517	0.773					
OE	0.650	0.662	0.668	0.588	0.807				
SN	0.193	0.012	−0.006	0.004	0.023	0.78			
AT	0.162	−0.020	0.089	0.045	0.073	0.53	0.803		
PBC	0.180	−0.025	0.080	0.020	0.067	0.363	0.645	0.87	
IN	0.174	−0.019	0.102	0.078	0.098	0.471	0.778	0.659	0.911

Source: Compiled by the authors.

Table 4

HTMT Ratio

	EX	AG	CT	ES	OE	SN	AT	PBC	IN
EX									
AG	0.409								
CT	0.486	0.193							
ES	0.447	0.181	0.635						
OE	0.400	0.442	0.534	0.525					
SN	0.289	0.116	0.143	0.121	0.062				
AT	0.219	0.142	0.117	0.101	0.130	0.570			
PBC	0.251	0.082	0.160	0.069	0.095	0.373	0.704		
IN	0.207	0.074	0.149	0.140	0.129	0.472	0.605	0.714	

Source: Compiled by the authors.

Structural Model Assessment

The structural model assessment is based on four parameters, including examination of multicollinearity, structural model relevance, and determination of coefficient (R^2) [69]. Collinearity is evaluated by assessing the Variation Inflation Factor (VIF) with the help of latent constructs. According to Hair et al. [67], the value of VIF should not exceed 5 for the data to follow collinearity. In the present study, no issue of multicollinearity is found, as the VIF values obtained are EX (1.484), AG (1.302), CT (1.435), ES (1.185), OE (1.700), SN (1.428), AT (2.168) and PBC (1.729).

After a successful collinearity check, the significance of the constructs is determined using bootstrapping techniques [67]. *Table 5* represents the results of path coefficients and t-statistics through bootstrapping

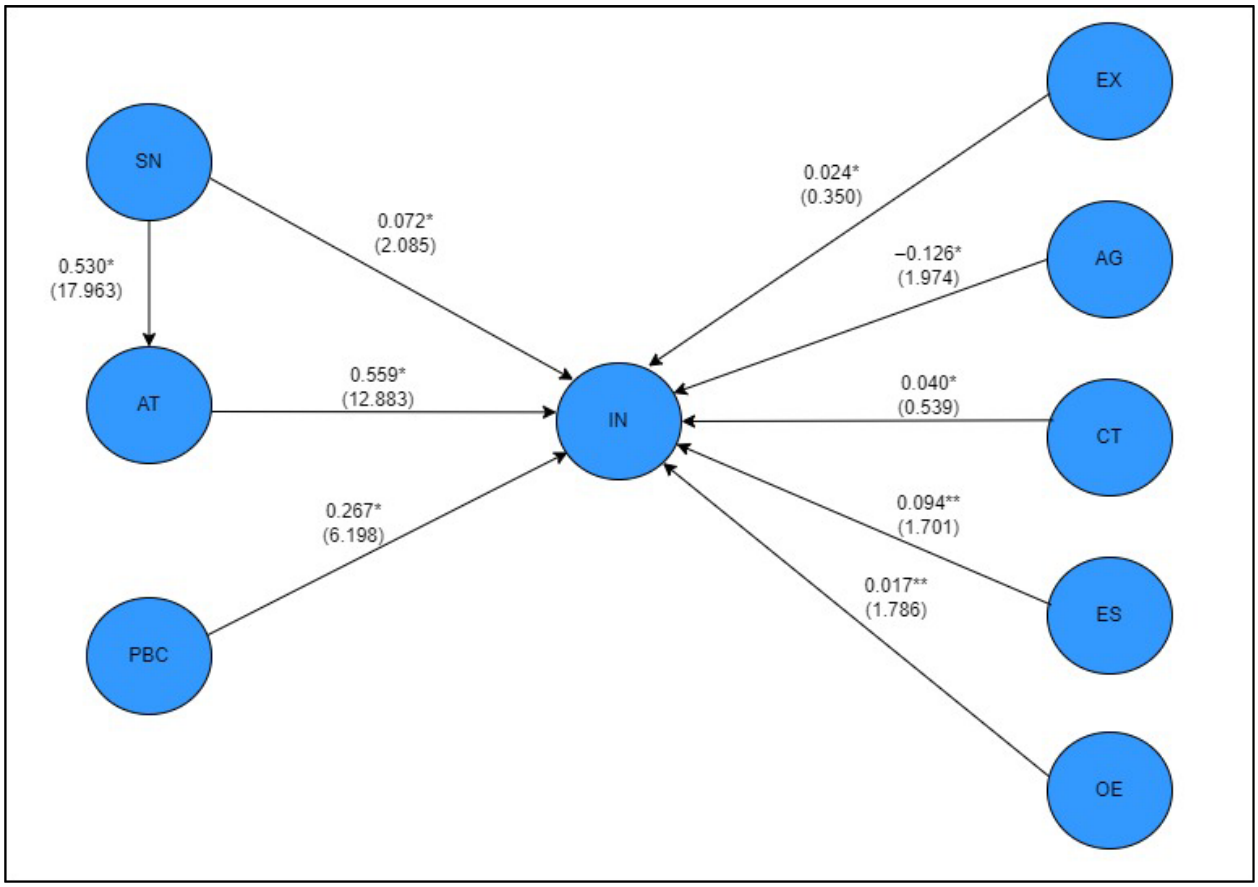


Fig. 2. **PLS-SEM Full Model with Path Coefficient and t-Statistics (p < 0.05*, p < 0.10**)**

Source: Compiled by the authors.

5000 random cases. *Figure 2* shows the structural model results using Partial Least Squares (PLS) analysis with standardized path coefficients and summarizes the PLS analysis of the structural model with t-test statistics. Post-hypothesis testing, the coefficient of determination (R^2) is calculated, and the results are satisfactory [70], as shown in *Table 6*.

DISCUSSIONS AND IMPLICATIONS

Discussions

Hypotheses Testing

Table 5 represents the path coefficient value and results of the hypothesis. The results support the hypotheses H1, H2 and H3, showing a positive and significant impact of SN, AT and PBC on IN (H1: t = 2.085, p < 0.05; H2: t = 12.883, p < 0.05; H3: t = 6.198, p < 0.05). SN has also shown a significant and positive effect on AT (H4: t = 17.963, p < 0.05). Thus, the results support hypotheses H4. While talking about the effect of personality traits on investment intentions, ES and OE have a significant and positive impact on IN (H5d: t = 1.701, p < 0.10; H5e: t = 1.786, p < 0.10), while AG has a significant and negative impact on IN (H5b: t = 1.974, p < 0.05). For testing further hypotheses (H6a and H6b), partial least squares — multi-group analysis (PLS-MGA) is done.

This research confirms the role of personality traits and perceptive factors in determining individual stock market investment intentions. It expands the knowledge of individual investment behaviour rather than sticking to fundamental or traditional theories. This study provides empirical evidence demonstrating individual investors' intentions in the stock market by revalidating TPB. The findings suggest that perceptive factors, including subjective norms, attitudes, and perceived behavioural control, positively and significantly influence the stock market investment intentions and align with the work of Ibrahim and Arshard's [71]. Investment firms can introduce mobile applications and financial analysis software to promote new and innovative portfolio management techniques. Investment organizations or security firms can also

Table 5

Results of Hypothesis Testing. ** and * Represents a Significant Level at 5% and 10% (Two-Tailed Test)

	Hypothesis	Path Coefficients	t-Value
H1	SN–>IN	0.072	2.085*
H2	AT–>IN	0.559	12.883*
H3	PBC–>IN	0.267	6.198*
H4	SN–>AT	0.530	17.963*
H5a	EX–>IN	0.024	0.350
H5b	AG–>IN	–0.126	1.974*
H5c	CT–>IN	0.040	0.539
H5d	ES–>IN	0.094	1.701**
H5e	OE–>IN	0.017	1.786**

Source: Compiled by the authors.

Table 6

Coefficient of Determination (R^2)

Variables	Coefficient of Determination (R^2)
AT	0.288
IN	0.657

Source: Compiled by the authors.

Table 7

Result of PLS-MGA. * and ** Represent a Significant Level at 5% and 10% (Two-Tailed Test)

Variables	Path Coefficients		Gender Differences	Path Coefficients		Age Differences
	Male	Female		Below 40 years	Above 41 years	
SN–>IN	0.124	0.091	0.657	0.071	–0.234	0.057**
AT–>IN	0.76	0.255	0.000*	0.536	0.549	0.939
PBC–>IN	0.076	0.535	0.000*	0.258	0.249	0.963
SN–>AT	0.473	0.667	0.000*	0.498	–0.805	0.000*
EX–>IN	–0.091	0.03	0.328	–0.017	–0.09	0.774
AG–>IN	–0.014	–0.237	0.191	0.045	–0.139	0.552
CT–>IN	–0.076	0.204	0.064**	–0.007	0.213	0.49
ES–>IN	0.009	0.076	0.603	0.067	0.009	0.777
OE–>IN	0.182	0.012	0.32	–0.02	–0.079	0.866

Source: Compiled by the authors.

influence an individual's perception of participating in stock market trading by providing accurate information and efficient infrastructure and technology. More media reporting will help promote the stock market, which will escalate an individual's investment intention. The empirical results of this study also indicate that subjective norms positively affect an individual's attitude towards stock market investment. It implies that individual opinions will also turn positive towards stock markets if their family or peers participate in trading.

The result also suggests a positive and significant association between personality traits like emotional stability and openness to experience and the investment intentions of individual investors in the stock market. However, agreeableness negatively impacts investment intentions. These results extend the work of Aren & Nayman [72]. As every individual carries different characteristics, the social trait of being emotionally stable and open to new experiences positively boosts the intention to invest. Investment organizations may seek happy individuals who are excited about new opportunities and can invest more time and energy participating in stock markets. Besides expecting investors to develop efficient portfolios, a financial adviser might ask for preferences and build a behavioural portfolio based on their personality attributes.

Multi-group Analysis using PLS

PLS-MGA has been suggested as a practical approach to study group comparison research [70]. The current research examines the moderating effect of Gender and age through PLS-MGA using SmartPLS. The Gender is divided into male and female, while the construct age is categorized into below 40 and above 41 to compensate for the unequal age distribution of the sample. The findings of PLS-MGA are summarized in *Table 7*. The group difference of path coefficients of the male and female groups is significant and, thus, moderates the relationship between AT and IN, PBC and IN, and SN and AT at $p < 0.05$. The findings also suggest that Gender moderates the association of CT and IN at $p < 0.10$. Thus, H6a is partly supported. The path coefficient difference of age category significantly moderates two relationships, including SN and IN at $p < 0.10$ and SN and AT at $p < 0.05$. Consequently, H6b is partly supported. This study tries to understand the moderating effect of demographic factors, i.e., Gender and age, on the relationship between perceptive variables and traits with individual investment intentions. The empirical results extend the research work of Mayfield et al. [20] and Barber & Odean [12]. The research findings suggest that males form an attitude toward their investments; in contrast, females have a perceived difficulty while investing and develop attitudes towards their investments based on social pressure.

A substantial influence of Gender is also seen between conscientiousness and investment intentions, suggesting that females are more anxious and conscientious regarding their investments when compared with males. Furthermore, the results suggest a difference in the impact of an investor's age on their intent to invest. It was found that young investors have a positive intent to invest in the Indian stock markets. However, they are swayed away by social pressure and develop an attitude of their own. In contrast, older investors are experienced and are not influenced by social anxiety. The policymakers can deliver a clear-cut fair-trading process with transparent corporate details to enhance individuals' stock market trading experience. As a result, the government and financial intermediaries should work more to rebuild investor confidence, develop better attitudes toward investing, consequently booming the stock market.

CONCLUSION

The traditional finance theories state that investors make their choices rationally and maximize their utility [1]. Whereas behavioural finance research works on the premise that investors behave irrationally and proposes various models to understand investment decision-making. This research examines the association between individual investors' perceptions, their personalities, and the effect on stock market investment intentions. The results show a significant effect of perceptive factors on the investment intentions of individuals. It also suggests that personality traits like agreeableness, emotional stability, and openness to experience influence an individual's investment intentions.

The study found a meaningful moderating role of socio-economic factors like age and Gender on the association of perceptive factors, personality traits and investment intentions. The research will help

the media report about the stock market and escalate new government policies to promote the same in a way that will induce an individual's intention to invest. Accordingly, if investment firms and policymakers consider these implications to promote participation and investment in the stock market, they can change individual investors' perceptions about the Indian stock market. These measures will make it easier for businesses to obtain low-cost financing, resulting in long-term growth.

LIMITATIONS AND FUTURE SCOPE OF STUDY

The findings of this survey may not be universally applicable because it was conducted in limited parts of India, with respondents aged 20 and above who earn a salary or have investment income, including those with and without stock trading expertise. Although the questionnaires are disseminated to be proportional to the demographic background, more empirical variation in other geographic locations and settings, such as Asia and Western countries, will broaden the scope of the current study's applicability. Furthermore, it is observed that the data is not proportionally distributed among different age-groups. Future studies might focus on the effects of the Big Five personalities and intuitive factors on other financial decision-making processes, such as herding, disposition effects, and ability heuristics. Finally, this research thoroughly examines people's intent to participate in stock markets, and the research model may be used as a theoretical framework for future sustainable development research.

REFERENCES

1. Fama E.F. Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*. 1970;25(2):383–417. DOI: 10.1111/j.1540–6261.1970.tb00518.x
2. Jain J., Walia N., Gupta S. Evaluation of behavioral biases affecting investment decision making of individual equity investors by fuzzy analytic hierarchy process. *Review of Behavioral Finance*. 2020;12(3):297–314. DOI: 10.1108/RBF-03–2019–0044
3. Albaity M.S., Rahman M. Gender, ethnicity, and religion and investment decisions: Malaysian evidence. *Journal of Sociological Research*. 2012;3(2):502–519. DOI: 10.5296/jsr.v3i2.2649
4. Akhtar F., Das N. Predictors of investment intention in Indian stock markets: Extending the theory of planned behaviour. *International Journal of Bank Marketing*. 2019;37(1):97–119. DOI: 10.1108/IJBM-08–2017–0167
5. Muhammad N.M., Abdullah M. Investment decision-making style: Are Malaysian investors rational decision makers. *Interdisciplinary Journal of Contemporary Research in Business*. 2009;1(3):96–108.
6. Rubaltelli E., Pasini G., Rumiati R., Olsen R.A., Slovic P. The influence of affective reactions on investment decisions. *Journal of Behavioral Finance*. 2010;11(3):168–176. DOI: 10.1080/15427560.2010.507409
7. Hoffmann A.O.I., Post T. How return and risk experiences shape investor beliefs and preferences. *Accounting & Finance*. 2017;57(3):759–788. DOI: 10.1111/acfi.12169
8. 2016 Global survey of individual investors. Paris: Natixis Global Asset Management; 2016. 28 p. URL: https://www.fa-mag.com/userfiles/stories/whitepapers/2016/June/Individual-Investor-Survey-2016_white_paper-052516c.pdf (accessed on 07.03.2023).
9. Mittal S.K. Behavior biases and investment decision: Theoretical and research framework. *Qualitative Research in Financial Markets*. 2022;14(2):213–228. DOI: 10.1108/QRFM-09–2017–0085
10. Nagy R.A., Obenberger R.W. Factors influencing individual investor behavior. *Financial Analysts Journal*.1994;50(4):63–68. DOI: 10.2469/faj.v50.n4.63
11. Korniotis G.M., Kumar A. Do older investors make better investment decisions? *The Review of Economics and Statistics*. 2011;93(1):244–265. DOI: 10.1162/REST_a_00053
12. Barber B.M., Odean T. The behavior of individual investors. In: Constantinides G.M., Harris M., Stulz R.M., eds. Handbook of the economics of finance. Vol. 2B. Amsterdam: North Holland; 2013:1533–1570. DOI: 10.1016/B 978–0–44–459406–8.00022–6

13. Ainia N.S.N., Lutfi L. The influence of risk perception, risk tolerance, overconfidence, and loss aversion towards investment decision making. *Journal of Economics, Business, & Accountancy Ventura*. 2019;21(3):401–413. DOI: 10.14414/jebav.v21i3.1663
14. Nandan T., Saurabh K. Big-five personality traits, financial risk attitude and investment intentions: Study on Generation Y. *International Journal of Business Forecasting and Marketing Intelligence*. 2016;2(2):128–150. DOI: 10.1504/IJBFMI.2016.078154
15. Sivaramakrishnan S., Srivastava M., Rastogi A. Attitudinal factors, financial literacy, and stock market participation. *International Journal of Bank Marketing*. 2017;35(5):818–841. DOI: 10.1108/IJBM-01–2016–0012
16. Kanojia S., Singh D., Goswami A. Impact of herding on the returns in the Indian stock market: An empirical study. *Review of Behavioral Finance*. 2022;14(1):115–129. DOI: 10.1108/RBF-01–2020–0017
17. Gross savings (%). World Bank national accounts data, and OECD National Accounts data files. World Bank Group. 2021. URL: https://data.worldbank.org/indicator/NY.GNS.ICTR.ZS (accessed on 25.11.2022).
18. SEBI investor survey 2015. Mumbai: Securities and Exchange Board of India; 2015. 151 p. URL: https://www.sebi.gov.in/sebi_data/attachdocs/1491452612271.pdf (accessed on 27.11.2022).
19. East R. Investment decisions and the theory of planned behaviour. *Journal of Economic Psychology*. 1993;14(2):337–375. DOI: 10.1016/0167–4870(93)90006–7
20. Mayfield C., Perdue G., Wooten K. Investment management and personality type. *Financial Services Review*. 2008;17(3):219–236. URL: https://csinvesting.org/wp-content/uploads/2014/06/Investing-and-Personality-Type.pdf
21. Ajzen I., Fishbein M. Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall; 1980. 288 p.
22. Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991;50(2):179–211. DOI: 10.1016/0749–5978(91)90020-T
23. Yadav R., Pathak G.S. Intention to purchase organic food among young consumers: Evidences from a developing nation. *Appetite*. 2016;96:122–128. DOI: 10.1016/j.appet.2015.09.017
24. Elliott M.A., Ainsworth K. Predicting university undergraduates' binge-drinking behavior: A comparative test of the one- and two-component theories of planned behavior. *Addictive Behaviors*. 2012;37(1):92–101. DOI: 10.1016/j.addbeh.2011.09.005
25. Zhang K. Theory of planned behavior: Origins, development and future direction. *International Journal of Humanities and Social Science Invention*. 2018;7(5):76–83. URL: https://pdf4pro.com/view/theory-of-planned-behavior-origins-development-and-670b07.html
26. Cialdini R.B., Trost M.R. Social influence: Social norms, conformity and compliance. In: Gilbert D.T., Fiske S.T., Lindzey G., eds. The handbook of social psychology. 4th ed. New York, NY: McGraw-Hill Book Co.; 1998:151–192.
27. Koropp C., Kellermanns F.W., Grichnik D., Stanley L. Financial decision making in family firms: An adaptation of the theory of planned behavior. *Family Business Review*. 2014;27(4):307–327. DOI: 10.1177/0894486514522483
28. Hong H., Kubik J.D., Stein J.C. Social interaction and stock-market participation. *The Journal of Finance*. 2004;59(1):137–163. DOI: 10.1111/j.1540–6261.2004.00629.x
29. Akhtar F., Thyagaraj K.S., Das N. The impact of social influence on the relationship between personality traits and perceived investment performance of individual investors: Evidence from Indian stock market. *International Journal of Managerial Finance*. 2018;14(1):130–148. DOI: 10.1108/IJMF-05–2016–0102
30. Eagly A.H., Chaiken S. The psychology of attitudes. New York, NY: Harcourt Brace Jovanovich College Publishers; 1993. 794 p.
31. Yen S.-H., Chang Y.-S., Wu M.-C. Behavioral intention of earnings management: The explanation of agency problem, moral development and theory of planned behavior. *Tai Da Guan Li Lun Cong*. 2016;26(2):107–138. (In Chin.). DOI: 10.6226/NTUMR.2016.FEB.R.12028
32. Wood R., Zaichkowsky J.L. Attitudes and trading behavior of stock market investors: A segmentation approach. *Journal of Behavioral Finance*. 2004;5(3):170–179. DOI: 10.1207/s15427579jpfm0503_5

33. Raut R.K. Past behaviour, financial literacy and investment decision-making process of individual investors. *International Journal of Emerging Markets*. 2020;15(6):1243–1263. DOI: 10.1108/IJOEM-07–2018–0379
34. Sheeran P., Trafimow D., Armitage C.J. Predicting behaviour from perceived behavioural control: Tests of the accuracy assumption of the theory of planned behaviour. *British Journal of Social Psychology*. 2003;42(3):393–410. DOI: 10.1348/014466603322438224
35. Lin H.-F. Applicability of the extended theory of planned behavior in predicting job seeker intentions to use job-search websites. *International Journal of Selection and Assessment*. 2010;18(1):64–74. DOI: 10.1111/j.1468–2389.2010.00489.x
36. Palamida E., Xanthopoulou D., Papagiannidis S., Stamati T. Exploring intentions towards human, social and financial capital investments in a turbulent economic environment. *The International Journal of Entrepreneurship and Innovation*. 2017;18(2):79–90. DOI: 10.1177/1465750316669908
37. Mahastanti L.A., Hariady E. Determining the factors which affect the stock investment decisions of potential female investors in Indonesia. *International Journal of Process Management and Benchmarking*. 2014;4(2):186–197. DOI: 10.1504/IJPMB.2014.060407
38. Dzung P.T., Thanh N.T., Anh T.P. Factors affecting market adoption toward futures derivatives in Vietnam. *International Journal of Business and Emerging Markets*. 2021;13(3):253–268. DOI: 10.1504/IJBEM.2021.116564
39. Chang M.K. Predicting unethical behavior: A comparison of the theory of reasoned action and the theory of planned behavior. *Journal of Business Ethics*. 1998;17(16):1825–1834. DOI: 10.1023/A:1005721401993
40. Lai C.-P. Personality traits and stock investment of individuals. *Sustainability*. 2019;11(19):5474. DOI: 10.3390/su11195474
41. Shanmugham R., Ramya K. Impact of social factors on individual investors' trading behaviour. *Procedia Economics and Finance*. 2012;2:237–246. DOI: 10.1016/S 2212–5671(12)00084–6
42. Holzman P.S. Personality. Britannica. 2024. URL: https://www.britannica.com/topic/personality (accessed on 02.12.2022).
43. Cherry K. What are the Big 5 personality traits? Verywell Mind. 2019 URL: https://www.verywellmind.com/the-big-five-personality-dimensions-2795422 (accessed on 02.12.2022).
44. Costa P.T., Jr., McCrae R.R. The revised NEO personality inventory (NEO-PI-R). In: Boyle G.J., Matthews G., Saklofske D.H., eds. The SAGE handbook of personality theory and assessment. Vol. 2: Personality measurement and testing. Thousand Oaks, CA: Sage Publications, Inc.; 2008:179–198. DOI: 10.4135/9781849200479.n9
45. Durand R.B., Newby R., Sanghani J. An intimate portrait of the individual investor. *Journal of Behavioral Finance*. 2008;9(4):193–208. DOI: 10.1080/15427560802341020
46. Ben-Shahar D., Golan R. Real estate and personality. *Journal of Behavioral and Experimental Economics*. 2014;53:111–119. DOI: 10.1016/j.socec.2014.08.008
47. Pak O., Mahmood M. Impact of personality on risk tolerance and investment decisions: A study on potential investors of Kazakhstan. *International Journal of Commerce and Management*. 2015;25(4):370–384. DOI: 10.1108/IJCoMA-01–2013–0002
48. Gambetti E., Giusberti F. Personality, decision-making styles and investments. *Journal of Behavioral and Experimental Economics*. 2019;80:14–24. DOI: 10.1016/j.socec.2019.03.002
49. Thanki H., Goyal A.K., Junare S.O. Personality traits, financial risk attitude, and long term investment intentions: Study examining moderating effect of gender. *Finance India*. 2020;34(2):785–798. URL: https://financeindia.org/data/2020/FI342/FI-342-CP25.pdf
50. Barber B.M., Odean T. Boys will be boys: Gender, overconfidence, and common stock investment. *The Quarterly Journal of Economics*. 2001;116(1):261–292. DOI: 10.1162/003355301556400
51. Pompian M.M., Longo J.M. A new paradigm for practical application of behavioral finance: Creating investment programs based on personality type and gender to produce better investment outcomes. *The Journal of Wealth Management*. 2004;7(2):9–15. DOI: 10.3905/jwm.2004.434561

52. Dhiman B., Raheja S. Do personality traits and emotional intelligence of investors determine their risk tolerance? *Management and Labour Studies*. 2018;43(1–2):88–99. DOI: 10.1177/0258042X17745184
53. Charles M.A., Kasilingam D.R. Does the investor's age influence their investment behaviour? *Paradigm: A Management Research Journal*. 2013;17(1–2):11–24. DOI: 10.1177/0971890720130103
54. Rana M.H., Murtaza S., Noor F., Rehman K. Effects of demographic factors on risky decision-making behaviour. *European Journal of Social Sciences*. 2011;25(3):69–76.
55. Kang H. Sample size determination and power analysis using the G*Power software. *Journal of Educational Evaluation for Health Professions*. 2021;18:17. DOI: 10.3352/jeehp.2021.18.17
56. Faul F., Erdfelder E., Lang A.-G., Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*. 2007;39(2):175–191. DOI: 10.3758/BF03193146
57. Wolf E.J., Harrington K.M., Clark S.L., Miller M.W. Sample size requirements for structural equation models: An evaluation of power, bias, and solution propriety. *Educational and Psychological Measurement*. 2013;73(6):913–934. DOI: 10.1177/0013164413495237
58. Woods S.A., Hampson S.E. Measuring the Big Five with single items using a bipolar response scale. *European Journal of Personality*. 2005;19(5):373–390. DOI: 10.1002/per.542
59. Romero E., Villar P., Gómez-Fraguela J.A., López-Romero L. Measuring personality traits with ultra-short scales: A study of the Ten Item Personality Inventory (TIPI) in a Spanish sample. *Personality and Individual Differences*. 2012;53(3):289–293. DOI: 10.1016/j.paid.2012.03.035
60. Gosling S.D., Rentfrow P.J., Swann W.B., Jr. A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*. 2003;37(6):504–528. DOI: 10.1016/S 0092–6566(03)00046–1
61. Taylor S., Todd P. An integrated model of waste management behavior: A test of household recycling and composting intentions. *Environment and Behavior*. 1995;27(5):603–630. DOI: 10.1177/0013916595275001
62. Lim K.L., Soutar G.N., Lee J.A. Factors affecting investment intentions: A consumer behaviour perspective. In: Harrison T., ed. Financial literacy and the limits of financial decision-making. Cham: Palgrave Macmillan; 2016:201–223. DOI: 10.1007/978–3–319–30886–9_10
63. Barclay D., Higgins C., Thompson R. The partial least squares (PLS) approach to casual modeling: Personal computer adoption and use as an illustration. *Technology Studies*. 1995;2(2):285–309. URL: https://www.researchgate.net/publication/242663837_The_Partial_Least_Squares_PLS_Approach_to_Causal_Modeling_Personal_Computer_Use_as_an_Illustration
64. Urbach N., Ahlemann F. Structural equation modeling in information systems research using partial least squares. *Journal of Information Technology Theory and Application (JITTA)*. 2010;11(2):2. URL: https://www.researchgate.net/publication/228467554_Structural_equation_modeling_in_information_systems_research_using_Partial_Least_Squares
65. Fornell C., Larcker D.F. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*. 1981;18(1):39–50. DOI: 10.1177/002224378101800104
66. Bagozzi R.P., Yi Y. On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*. 1988;16(1):74–94. DOI: 10.1007/BF02723327
67. Hair J.F., Sarstedt M., Pieper T.M., Ringle C.M. The use of partial least squares structural equation modeling in strategic management research: A review of past practices and recommendations for future applications. *Long Range Planning*. 2012;45(5–6):320–340. DOI: 10.1016/j.lrp.2012.09.008
68. Henseler J., Ringle C.M., Sarstedt M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*. 2015;43(1):115–135. DOI: 10.1007/s11747–014–0403–8
69. Cohen J. Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Lawrence Erlbaum Associates Publishers; 1988. 567 p. DOI: 10.4324/9780203771587
70. Sarstedt M., Henseler J., Ringle C.M. Multigroup analysis in partial least squares (PLS) path modeling: Alternative methods and empirical results. In: Sarstedt M., Schwaiger M., Taylor C.R., eds. Measurement

and research methods in international marketing. Leeds: Emerald Group Publishing Limited; 2011:195–218. (Advances in International Marketing. Vol. 22). DOI: 10.1108/S 1474–7979(2011)0000022012

71. Ibrahim Y., Arshad I. Examining the impact of product involvement, subjective norm and perceived behavioral control on investment intentions of individual investors in Pakistan. *Investment Management and Financial Innovations*. 2018;14(4):181–193. DOI:10.21511/imfi.14(4).2017.15
72. Aren S., Hamamci H.N. Relationship between risk aversion, risky investment intention, investment choices: Impact of personality traits and emotion. *Kybernetes*. 2020;49(11):2651–2682. DOI: 10.1108/K-07–2019–0455

ABOUT THE AUTHORS

Chaandni Gautam — MBA, PhD (Management), Assist. Prof., Management Education and Research Institute, New Delhi, India
https://orcid.org/0000-0003-0157-3858
Corresponding author:
chaandnigautam@gmail.com

Ritu Wadhwa — MBA (Finance), PhD, Assoc. Prof., Amity Business School, Amity University, Noida, Uttar Pradesh, India
https://orcid.org/0000-0002-9712-5787
rwadhwa1@amity.edu

Thanikella V. Raman — MBA, PhD in Management, Assoc. Prof., Department of Accounting and Finance, Birla Institute of Management and Technology (BIMTECH), Greater Noida, India
https://orcid.org/0000-0002-4335-3450
Drtvraman@gmail.com

Author's declared contribution:
C. Gautam — research problem development, justification of hypothesis, and assessment of consistency between theoretical and practical frameworks.
R. Wadhwa — review of literature and substantiation of methodology.
T.V. Raman — validation of the methodology, hypotheses, and results.

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 06.02.2023; revised on 06.03.2023 and accepted for publication on 27.03.2023.
The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-33-45
JEL D91, G41

Factors Affecting Financial Decision Making: The Women Lecture's Perspective

Y.K. Arumsari[a], Surachman[b], Sumiati[c], Andarwati[d]
[a, b, c, d] Brawijaya University, Malang, Indonesia;
[a] Gajayana University, Malang, Indonesia

ABSTRACT

Research on women's financial decision-making involves a great deal of behavior and financial research. Due to the complexity of the phenomenon and the fact that it encompasses various aspects of life, making a deep-seated decision necessitates consideration of both financial and cognitive factors. A woman, as a wife, plays a vital role in the household, especially in terms of financial decisions. The **purpose** of the study is to assess a variety of determinant-taking decisions lecturer finance woman, Dpk LLDikti Region VII, Indonesia. It evaluates connection intelligence fluid (FI), which consists of dimensions number intelligence (FI NI), verbal comprehension (FI VU), perception speed (FI PS), inductive reasoning (FI IR), and deductive reasoning (FI DR), as well as literacy finance (FL) with making financial decisions (FDM). It employs a quantitative statistical method to examine the relationship between specified variables. Using smartPLS 4, primary data from a structured questionnaire utilizing a 5-point Likert scale were analyzed using a partial least squares-structural equation modeling approach. FI NI; FI VU; FI PS; FI IR; and FI DR exhibited a positive and statistically significant correlation with FI, as indicated by the results. This also demonstrates that FI and FL have a positive and substantial relationship. The results also demonstrate that FI and FL have a positive and statistically significant relationship with FDM. Successful FDM requires FI (FI VU; FI PS; FI IR; FI DR) and FL to optimally execute a systematic and logical decision-making process.
Keywords: fluid intelligence; financial literacy; financial decision making

For citation: **Arumsari Y.K., Surachman, Sumiati, Andarwati. Factors affecting financial decision making: the women lecturer's perspective. *Finance: Theory and Practice.* 2024;28(4):33-45. DOI: 10.26794/2587-5671-2024-28-4-33-45**

INTRODUCTION

According to a survey conducted by the Danareksa Research Institute in 2022, 39.56% of respondents admitted that the financial decision-makers in their household were the wife or the female head of the household, followed by the husband or male head of the household with a percentage of 30.97%, and the remaining 29.47% of financial decision-making is carried out jointly by the husband and wife. The results of this survey indicate that the wife is primarily responsible for making financial decisions for the family. In determining the functions and responsibilities of a woman within the family as the Chief Household Officer or the primary decision-maker in managing personal and family finances, the ability to make financial decisions is a crucial factor [1]. Women are expected to have confidence in managing their household finances; however, according to the results of a McKinsey survey conducted in 2020, women have less confidence in making financial decisions, despite having worked with financial advisors.

Women need more confidence when making financial decisions, and they tend to avoid taking financial risks. When making investment decisions, women have a lower percentage than men; this is because women's perspectives on financial positions are strongly influenced by their family background [2]. Women's status can be the greatest impediment to household financial decision-making [3]. The relationship between financial decision-making and women is collectively between husband and wife, but there are impediments as to who is entitled between husband and wife to determine good household decision-making [4]. Financial decision-making is significantly related to certain demographic characteristics of career women (age, marital status, education, occupation, and income) [5]. Through the use of structural equation modeling to examine the financial decision-making of female entrepreneurs, it was discovered that financial literacy has a significant impact on financial decision-making [6]. Financial decisions can be made with the participation of women. Nonetheless, the degree of interference from government regulations in the form of regulations also affects the quality of the resulting financial decision-making [7].

Several recent studies [8–11] indicate a close relationship between women, education, psychology, cognitive ability, level of literacy, and family income contribution to financial decision-making. The findings of a 2020 survey conducted by McKiney explain the significance of identifying social and other variables to clarify the phenomenon of women making financial decisions. Personal preference [12, 13], intrinsic and extrinsic motivation [14], financial knowledge [15, 16], confidence in the information obtained [17, 18], financial information [19, 20], and family environment [21] are correlated with other latent variables in individual financial decision-making, according to previous research.

Meanwhile, constructs that are rarely explored are cognitive abilities and habits that can influence decision-making. Cognitive abilities and positive habits can help individuals reduce bias in their financial behavior. Cognitive abilities and positive habits such as fluid intelligence constructs [22, 23], financial literacy [24], and budgeting habits [25] with individual financial decision-making. This study aims to fill a gap in previous research and add to the originality of the relationship between financial behavior bias and individual financial decision-making. By examining the relationship between the research model, specifically fluid intelligence, and financial decision-making. Nonetheless, prior research has shown that investors who do not engage their cognitive side make a large number of irrational financial decisions [26]. In contrast to the findings of other studies, cognitive abilities (fluid intelligence) and a solid educational background are positively associated with individual financial decisions [27].

This study aims to assess fluid intelligence and financial literacy concerning financial decision-making among female lecturers in Region VII of Dpk LLDekti, Indonesia. This article investigates the connection between fluid intelligence, financial literacy, and financial decision-making. This study examines the exogenous variables of fluid intelligence, including numerical intelligence, verbal comprehension, perception speed, inductive reasoning, and deductive reasoning. It employs a quantitative method to forecast the relationship between the identified variables. In the following order, the research will be conducted: The literature review in Section 2 will focus on fluid intelligence, financial literacy, and financial decision-making. Section 3 then discusses the research methodology and data. The fourth section discusses measurement models, structural models, and testing hypotheses. The fifth section presents the research's conclusions, practical implications, limitations, and scope for future study.

LITERATURE REVIEWS

Fluid Intelligence

It has been widely acknowledged that the theory of fluid intelligence is useful for accommodating several conflicting views regarding the nature of intelligence in general, particularly regarding intelligence as a general ability and the relative roles of heredity and environment in the development of intelligence. Sobkow [28] presents the theory of fluid intelligence as a taxonomy that integrates fluid intelligence and crystallized intelligence in financial decision-making. The theory of fluid intelligence derives from an analysis of second-order factors of individual mental ability factors, which indicate the presence of multiple general factors [29]. Capabilities requiring a certain level of individual intelligence can be arranged into multiple dimensions at a more general level [30]. Number intelligence (FI NI), verbal comprehension (FI VU), perception speed (FI PS), inductive reasoning (FI IR), and deductive reasoning (FI DR) are the components of fluid intelligence.

Several prior studies have demonstrated the connection between fluid intelligence and financial literacy. The relationship between financial behavior and financial literacy has several positive associations with an age-based approach [31]. Other studies examining the relationship between financial behavior, fluid intelligence, and financial literacy reveal that as people age, their scores and comprehension of financial literacy decline [32]. Other research indicates that as women age and approach widowhood, their attitudes and perspectives on finances will change, increasing their financial literacy [33]. Consequently, this study proposes the next hypothesis:

H1: Their literacy finances are impacted by their intelligence fluid.

Financial Literacy

Better financial decision-making is associated with financial literacy. Individuals with greater financial acumen perform better in future planning, are less likely to incur debt, and participate in financial markets with more diversified portfolios more

frequently. Additionally, financial literacy is associated with greater yields on deposit accounts and a greater propensity to withdraw bank deposits [34].

Financial literacy is indispensable for assessing financial issues and implementing financial education programs [35]. A high level of financial understanding contributes significantly to a person's financial well-being because those with a strong grasp of finances are more likely to make plans. In contrast, a lack of financial literacy is one of the most influential factors in making sound financial decisions, which has a negative effect. Consequently, this study proposes the next hypothesis:

H2: Their level of financial literacy affects their financial decisions.

Financial Decision Making

The theory of behavioral finance explains the psychological relationship between the behavior of investors or financial analysts and the process of making financial decisions. The theory of behavioral finance explains why investors are not always rational, have limited self-control, and are susceptible to (subjective) bias. There is a growing body of literature that explains how families make financial decisions. Within the framework of domestic production, the two most prominent theories are based on the perspective of bargaining power and the specialization of tasks and responsibilities [36].

Empirical evidence supports the bargaining explanation, which asserts that household members with financial control associated with education, employment, and wage levels wield the greatest influence in the decision-making process [37]. In determining which spouse is responsible for household decisions, differences in income and employment status are always decisive, whereas the evidence regarding the influence of other factors is inconsistent [38]. After years of making financial decisions and observing others, however, older individuals may also benefit from the experience.

Financial decision-making effectiveness is determined empirically by financial decision-making competence [39–41] and financial literacy [35, 38]. Competence in decision-making refers to an individual's ability to make better choices. It is also related to the rational choice model's proposed decision-making principle. The psychological field of decision-making has examined how well people adhere to decision-making principles under experimental conditions that have been scientifically manipulated [42]. The scientific argument that establishes financial literacy as a mediating variable [43–46] is that it has been demonstrated that financial literacy as a mediating variable influences decisions regarding the adoption of various financial strategies.

Without the role of financial literacy as a particular mediation, financially illiterate groups of respondents are more likely to have financial problems and are more likely to reduce expenses, seek work opportunities, increase debt, and reduce/sell housing, among others, whereas the financially literate group of respondents is more likely to seek professional financial advice, purchase a life annuity, and contribute to a retirement plan. Consequently, this study proposes the next hypothesis:

H3: Fluid intelligence and financial literacy influence their financial decisions.

Fig. 1 displays variable exogenous and endogenous research. This is based on prior relevant theory and research. *Fig. 1* is a second-order conceptual model for understanding fluid variable intelligence, which is comprised of number intelligence, verbal comprehension, speed of perception, inductive reasoning, and deductive reasoning, as well as variables related to literacy and financial decision-making.

RESEARCH DATA AND METHODOLOGY

Sample and Data Collection

The research population consists of 540 individuals who are female college lecturers Dpk in the private sector of East Java, Indonesia. With the Slovin formula and a margin of error of 5%, a total sample of 230 people is obtained. This study employed multiple levels of sampling, with the first stage employing a proportional simple random sample. The application of this method is based on the assumption that it does not stratify the population. Universities, institutes, colleges, academies, and polytechnics fall under the category of higher education. This study's participants were categorized by age, institution, number of years of service, and most recent education. Using a structured questionnaire to collect primary data on the opinions of the sample population.

Measurement of the Variables

This study collects primary data via a structured questionnaire and employs a unique scale to assess

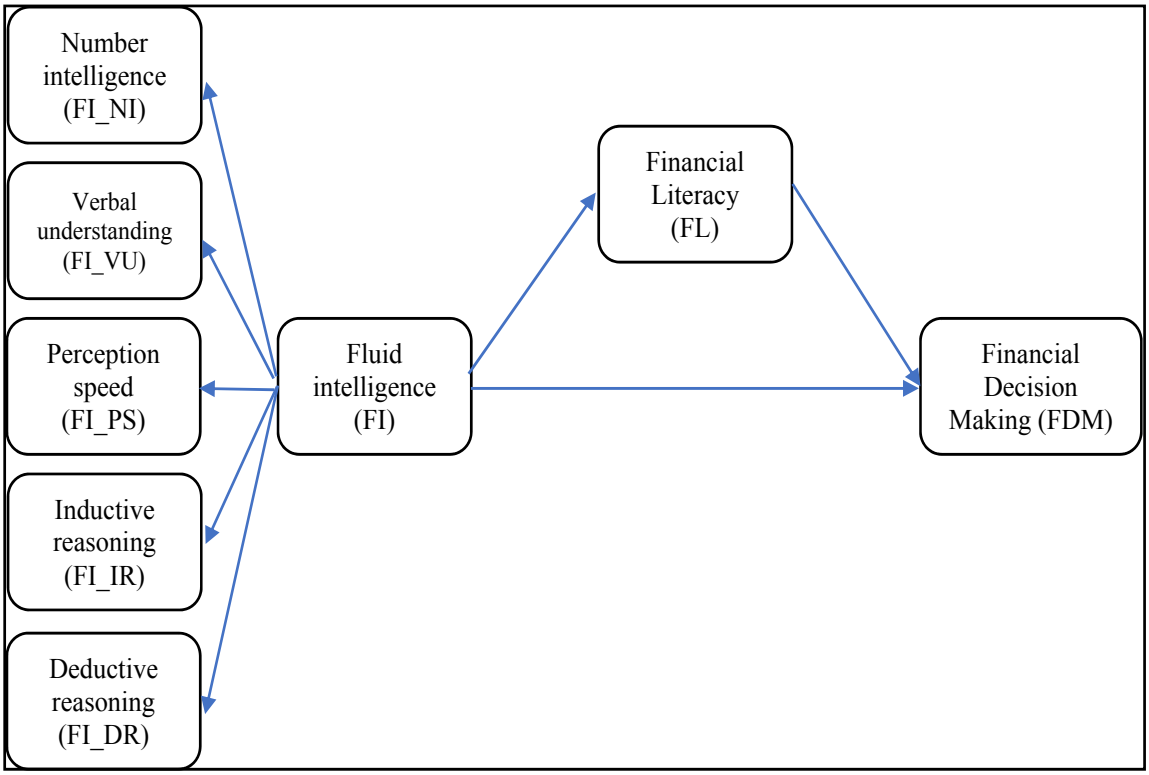


Fig. 1. **Conceptual Framework**

Source: Compiled by the authors.

the identified variables' impact on female lecturers' financial decision-making. The survey consists of two parts, the first of which is designed to collect respondent profile information. The second section is a research instrument with items to be studied on a five-point Likert scale, with "strongly disagree" receiving the least weight and "strongly agree" receiving the most. Exogenous and endogenous variables were adapted from previous research and modified to account for the lecturing profession of women. Using a scale inspired by Li et al. [47] and Sobkow et al. [28], fluid intelligence is an independent variable comprised of numerical intelligence; verbal comprehension; the speed of perception; inductive reasoning; and deductive reasoning. The financial literacy variable statement was adapted from Balasubramanian and Sargent [35] and Liu and colleagues [48]. Adapted from Mertzanis [36] and Fong et al. [38]: financial decision-making, endogenous variable statement.

RESULTS

Respondent Profile

The population and sample for this study were DPK lecturers from Region VII of LLDikti. There were a total of 230 female lecturers who provided information for this study. Percentage of respondents based on age, the majority of respondents observed were aged between 51–60 years, as many as 140 individuals (60.9%); aged 61 years, as many as 52 individuals (22.6%); and as many as 38 individuals (16.5%) aged between 41–50 years. This distribution indicates that the majority of female professors are still in their productive years. The percentage of respondents by institution, with the majority of respondents observed at the university level, was 143 (62.2 percent), followed by 48 (20.9), 32 (13.9), and 7 (3.0 percent) for Institutes, Polytechnics, and High Schools, respectively. The percentage of respondents based on years of service revealed that the majority of respondents (92 individuals) had 21–30 years of service (40.0 percent). 136 individuals comprised the majority of respondents with a master's degree, based on the percentage of respondents with recent master's degrees (59.1 percent). *Table 1* provides a summary of the characteristics of the study's respondents.

Data Analysis Using PLS-SEM

Verification of the analysis in the study is achieved using the statistical test tool with the equation test

Table 1

Respondent Profi

Characteristics	Frequency	Percentages
Age (years)		
41–50	38	16.5
51–60	140	60.9
⩾ 61	52	22.6
agency		
University	143	62.2
Institute	48	20.9
Polytechnic	32	13.9
High School	7	3.0
Working Period (year)		
1–10 Years	19	8.3
11–20 Years	40	17.4
21–30 Years	92	40.0
⩾ 31 Years	79	34.3
Last Education		
Masters	136	59.1
Doctor	94	40.9

Source: Compiled by the authors.

structure based on variance or Partial Least Square (PLS) software SmartPLS 4. PLS is utilized to forecast the relationship between constructed variable pairs. Another benefit of PLS is that it enables researchers to obtain the dominant latent variable values for evaluating their prediction results. The indicators of the latent variables are linear aggregates, and the latent variable score components (weight estimate) are derived by examining the inner model (a structural model that links latent variables) and the outer model (the measurement model, i.e., the relationship between indicators and their constructs).

Measurement Model

In measuring convergent validity, the outer loading value obtained by each measurement indicator is compared to the variable it represents. Indicators with outer loading values less than 0.6 indicate that these indicators are ineffective at describing the variables in the developed model. The AVE values for all variables satisfy the requirements, which are above 0.5, as shown in *Table 2*. The lowest AVE value is found in the FL variable, with a value of 0.627; it can be concluded that the data from this study satisfied the requirements of the convergent validity test.

The next test is the construct reliability test, which is measured by two criteria, Composite Reliability (CR) and Cronbach's Alpha (CA) from the indicator block, which measures the CR construct utilized to demonstrate good reliability. A construct is deemed reliable if the composite reliability or Cronbach's Alpha value is greater than 0.70. The composite reliability test and Cronbach alpha values in *Table 2* are greater than 0.6, indicating that each instrument's value is reliable. Measure formative construction with a collinearity indicator whose VIF score is 10.

Table 3 is a discriminant of measurement validity based on: Which correctly assigns a variable to every indicator whose measurements were input into the model? Currently, every instrument measurement must satisfy a discriminant condition of validity, followed by measurements of cross-loading. Cross-loading measurements are conducted by evaluating every model instrument for every model variable.

Hypothesis Test

The last stage of statistical analysis and inference is hypothesis testing. Testing The hypothesis was formed by comparing the t-statistic and t-table values derived from the connection between variables in the previous model. The confidence level of the processed data is 95%, with a critical r value or alpha of only 5%. Based on such a rate, the t-table values used for comparison with the t-statistic value of each relationship is 1.964; if the connection between variables possesses a t-statistic value greater than 1.964, the hypothesis can be accepted (*Table 4*).

Initially (H1), intelligence fluid affects their literacy finances. This acknowledged. *Table 5* shows that the result is supported by greater t-statistic values than t-table values (6.119 > 1.964). The accepted second (H2) hypothesis is that financial literacy affects their financial decisions. This result is observed for a greater number of t-statistic values than t-table values (5.817 > 1.964).

Table 2

Factor Loadings of the Constructs

Constructs and Items	ID	Outer Loadings	AVE	Composite reliability	Cronbach's Alpha	VIF
FI_(NI)	FI_(NI)1	0.900	0.822	0.786	0.783	2.124
	FI_(NI)2	0913				2.654
FI_(VU)	FI_(VU)1	0.916	0.834	0.801	0.801	1.804
	FI_(VU)2	0911				1.804
FI_(PS)	FI_(PS)1	0910	0.835	0.803	0.802	2.200
	FI_(PS)2	0917				2.347
FI_(IR)	FI_(IR)1	0.906	0.819	0.779	0.779	1688
	FI_(IR)2	0.904				2.363
FI_(DR)	FI_(DR)1	0.894	0.793	0.739	0.739	2.186
	FI_(DR)2	0887				1988
FL	FL1	0.772	0.627	0.804	0.802	1.443
	FL2	0.790				1.742
	FL3	0.799				1.739
	FL4	0.806				1.719
FDM	FDM1	0.901	0.700	0891	0.806	1.734
	FDM2	0.733				1.721
	FDM3	0867				1.774

Source: Compiled by the authors.

Table 3

Discriminant Validity

	FL	FI	FI_(NI)	FI_(VU)	FI_(PS)	FI_(IR)	FI_(DR)
FI	0.124						
FI_(NI)	0.155	1.026					
FI_(VU)	0.160	1.023	0.956				
FI_(PS)	0.113	0967	0.807	0.802			
FI_(IR)	0.061	1.049	0.901	0.940	0.919		
FI_(DR)	0.101	1040	0.940	0914	0814	0.946	
FDM	0.243	0.064	0.069	0.038	0.102	0.042	0.053

Source: Compiled by the authors.

Table 4

T-statistics

	Path Coefficients	T Statistics	P Values	decision
FI → FI_(NI)	0.708	13.359	0.000	Sig.
FI → FI_(VU)	0.667	11.114	0.000	Sig.
FI → FI_(PS)	0.770	22.272	0.000	Sig.
FI → FI_(IR)	0.673	13.046	0.000	Sig.
FI → FI_(DR)	0.630	11.603	0.000	Sig.

Source: Compiled by the authors.

Table 5

T-statistics

	Path Coefficients	T Statistics	P Values	decision
FL → FDM	0.324	5.817	0.000	Supported
FI → FL	0.351	6.119	0.000	Supported
FI → FDM	0.351	11.603	0.000	Supported
FI → FL → FDM	0.114	4.094	0.000	Supported

Source: Compiled by the authors.

The third (H3) hypothesis is that fluid intelligence and financial literacy influence financial decisions. This acknowledged. This conclusion is supported by greater t-statistic values than t-table values (11.603 > 1.964 and 5.817 > 1.964).

The outcomes of employing bootstrapping to overcome the problem of abnormal data. *Fig. 2* depicts the outcome of the PLS-SEM full model, including the path coefficient and p values. *Fig. 3* depicts the outcomes of the PLS-SEM full model with t values.

PLS-SEM 4 bootstrapping in *Fig. 2* and *Fig. 3* tests the hypothesis and examines the relationship between variables. The outcome demonstrates a positive and statistically significant relationship between the FIs from FI NI; FI VU; FI PS; FI IR; FI DR; and FDM-related FL variables. Consequently, H1 (t = 6.119, p = 0.05), H2 (t = 5.817, p = 0.05), and H3 (t = 11.603, p = 0.05) were accepted.

DISCUSSION AND IMPLICATIONS

The research objectives are to examine the relationship between the elements of the decision finance lecturer, Dpk at LLDikti Region VII, Indonesia. Identified as crucial determinants of financial decision-making, fluid intelligence, and literacy are the two most essential components. The results of this study are supported by additional research [31, 32]. As supported by previous research [47], all dimensions of the exogenous variables — number intelligence, verbal comprehension, perception speed, inductive reasoning, and deductive reasoning were determinants of fluid intelligence. This finding suggests that female

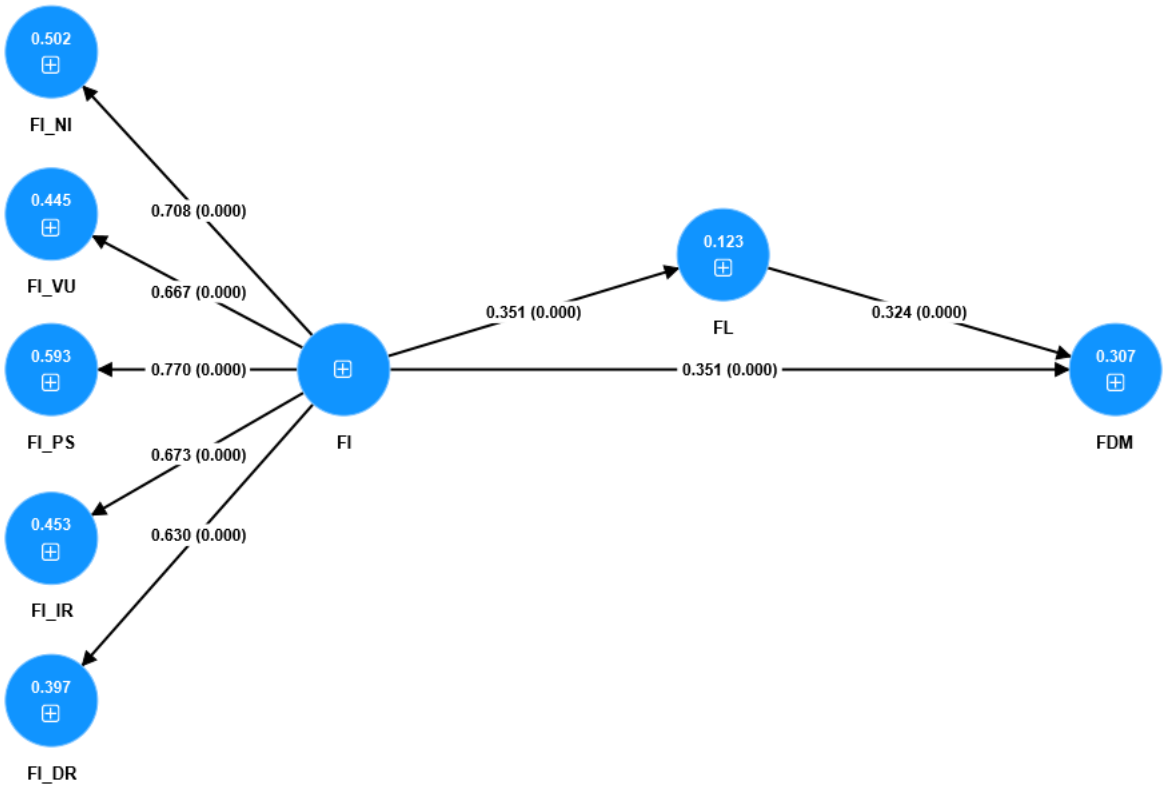


Fig. 2. **PLS-SEM full model with path coefficient**

Source: Compiled by the authors.

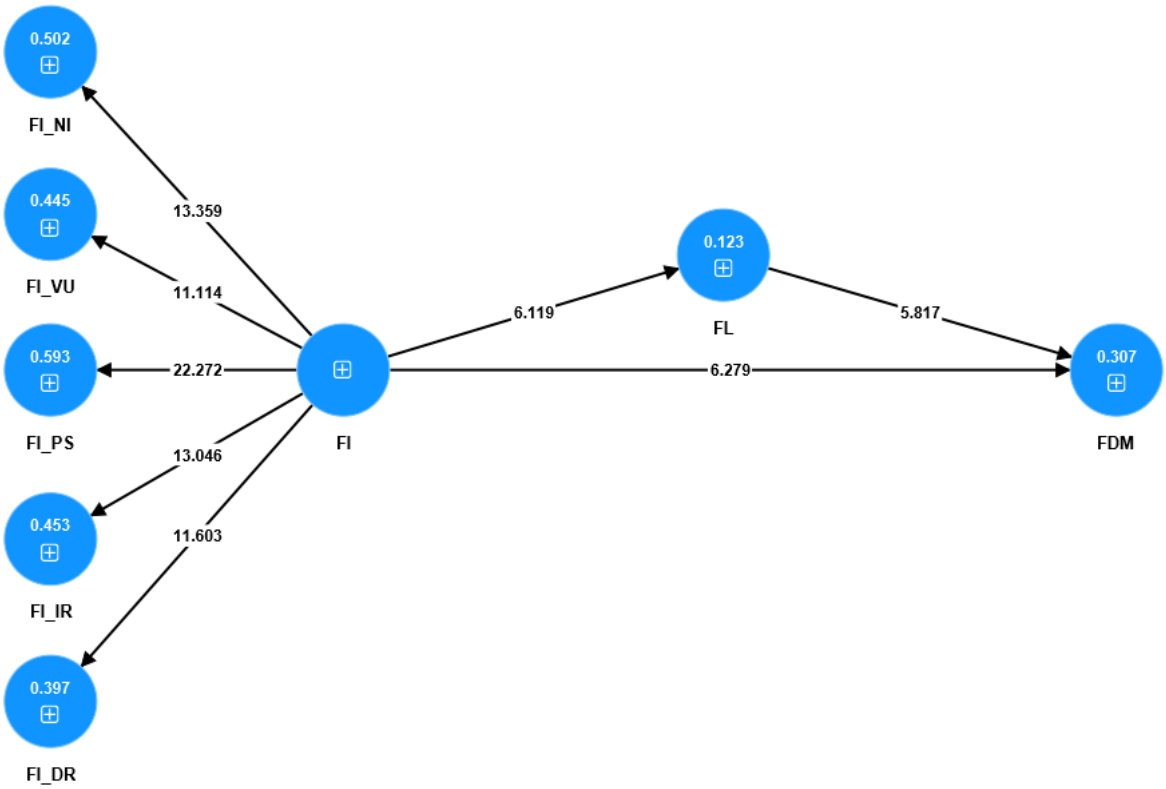


Fig. 3. **PLS-SEM Full Model With T-Value**

Source: Compiled by the authors.

professors have a high level of financial literacy; they have control over and benefit from their financial decisions, so financial planning is essential.

Several previous studies have examined the direct relationship between financial behavioral bias (fluid intelligence) and financial literacy; for instance, [31] explains that financial behavior and age are positively related to financial literacy, and [32] supports these findings by revealing a relationship between age and fluid intelligence on decreasing financial literacy scores. According to [33], older and approaching-elderly women demonstrate increased financial literacy. Numerous relationships with financial behavior and a significant relationship with financial decision-making have been discovered through research on financial literacy as a predictive variable [49–52]. The relationship between financial behavior (overconfidence) and investment decisions is moderated by financial literacy [45].

This study's findings will address the gaps and weaknesses of previous research. The study of financial decision-making has been explained using behavioral finance theory, which emerged and developed in the 1990s as a combination of psychology, decision-making, and classical economics. The behavioral finance theory is an investor preference to support investment decisions [53]. Psychological calculations, certainty effects, value functions, probabilities, and framing are examples of behavioral finance theory's guiding principles [54]. The results of this study can be explained using behavioral finance theory, as supported by previous researchers who have used behavioral finance theory in the context of women's decision-making, such as [55], which examines the role of behavioral and psychological factors in financial decisions. Women are capable of making prudent financial choices [56].

CONCLUSION

This study's findings contribute to the literature on financial decision-making in various ways and have diverse implications. This study identifies the variables of fluid intelligence and financial literacy that significantly influence female lecturers' financial decision-making. The role of women in the household economy is one of the primary concerns of this study. Partnership, as a relationship between husband and wife in the home, is a pattern of partnership that aligns men and women in the family, including decision-making. The role of women in the family economy will lead to an equitable distribution of development outcomes and the growth of human resources.

Currently, women are not only mothers who give birth, care for, and guide their children, nor are they merely companions for their husbands; they are a fundamental component of society's economic system. When a woman is financially independent, she can earn and manage her finances, granting her the ability to make decisions. One of the most critical roles of women in the family is as the primary household decision-maker, including financial management decisions. Decision-making is a response to social or personal situations that considers the situation faced, the resources owned, the capacity to solve problems or achieve specific objectives, and the consequences or risks of the choices made. Women can regulate and make decisions regarding the management of household income. In general, decision-making is a multifaceted phenomenon encompassing all aspects of life, involving multiple dimensions and the selection of numerous alternatives. Gender roles influence financial and decision-making skills among individuals. In this study, it was found that women have an important role in making financial decisions in the family, and when they are financially independent, they can make money and manage their finances, which ultimately gives them strength in making decisions.

This research makes an important contribution in showing that the role of gender in financial decision-making is very significant and should not be ignored. This research also shows that the role of women in the family economy will provide equitable results in the development of human resources.

LIMITATIONS AND FUTURE SCOPE OF STUDY

This study has several limitations. First, the respondent is a woman Dpk lecturer at LLDikti in Region VII, Indonesia. The findings cannot be generalized because they are not widely accepted in other jurisdictions. This study is based solely on the perspectives of female lecturers at private postsecondary institutions. Thus, there may be differences between fluid intelligence and financial literacy. Third, the sample size for this investigation

was relatively small. Additionally, only two constructs have been investigated to determine their impact on financial decision-making. Other constructs, such as financial behavior, risky behavior, and financial planning, are anticipated to be able to be measured in future research.

REFERENCES

1. Constantinidis C., Lebègue T., El Abboubi M., Salman N. How families shape women's entrepreneurial success in Morocco: An intersectional study. *International Journal of Entrepreneurial Behavior & Research*. 2019;25(8):1786–1808. DOI: 10.1108/IJEBR-12–2017–0501
2. Li Z.-C., Liu W.-J., Wang X.-Y. Women-only parking spaces: Determinants of parking space choice, investment decision, and a case study of Wuhan, China. *Transportation Research Part C: Emerging Technologies*. 2022;137:103553. DOI: 10.1016/j.trc.2022.103553
3. Ke D. Who wears the pants? Gender identity norms and intrahousehold financial decision-making. *The Journal of Finance*. 2021;76(3):1389–1425. DOI: 10.1111/jofi.13002
4. Booysen F., Guvuriro S. Gender differences in intra-household financial decision-making: An application of coarsened exact matching. *Journal of Risk and Financial Management*. 2021;14(10):469. DOI: 10.3390/jrfm14100469
5. Asandimitra N., Aji T.S., Kautsar A. Financial behavior of working women in investment decision-making. *Information Management and Business Review*. 2019;11(2):10–20. DOI: 10.22610/imbr.v11i2(I).2878
6. Iram T., Bilal A.R., Latif S. Is awareness that powerful? Women's financial literacy support to prospects behavior in prudent decision-making. *Global Business Reviews*. 2021. DOI: 10.1177/0972150921996185
7. Kochar A., Nagabhushana C., Sarkar R., Shah R., Singh G. Financial access and women's role in household decisions: Empirical evidence from India's National Rural Livelihoods project. *Journal of Development Economics*. 2022;155:102821. DOI: 10.1016/j.jdeveco.2022.102821
8. Ozawa S., Laing S.K., Higgins C.R., et al. Educational and economic returns to cognitive ability in low- and middle-income countries: A systematic review. *World Development*. 2022;149:105668. DOI: 10.1016/j.worlddev.2021.105668
9. Yusefi A.R., Barfar E., Daneshi S., et al. Health literacy and health-promoting behaviors among inpatient women during the COVID-19 pandemic. *BMC Women's Health*. 2022;22(1):77. DOI: 10.1186/s12905–022–01652-x
10. Kadoya Y., Khan M.S.R. Financial literacy in Japan: New evidence using financial knowledge, behavior, and attitude. *Sustainability*. 2020;12(9):3683. DOI: 10.3390/su12093683
11. Volokobinsky M. Yu., Pekarskaya O.A., Razy D.A. Decision-making based on the hierarchy analysis method. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2016;20(2):33–42. (In Russ.). DOI: 10.26794/2587–5671–2016–20–2–33–42
12. Yuan F. Psychological cognition and preference selection in the decision-making process of financial investment. *Revista Argentina de Clínica Psicológica*. 2020;29(1):1222. DOI: 10.24205/03276716.2020.175
13. Kling L., König-Kersting C., Trautmann S.T. Investment preferences and risk perception: Financial agents versus clients. *Journal of Banking & Finance*. 2023;154:106489. DOI: 10.1016/j.jbankfin.2022.106489
14. Farrar J., Hausserman C. An exploratory investigation of extrinsic and intrinsic motivations in tax amnesty decision-making. *Journal of Tax Administration*. 2016;2(2):47–66. URL: https://pdxscholar.library.pdx.edu/cgi/viewcontent.cgi?article=1046&context=busadmin_fac
15. Mette F.M.B., de Matos C.A., Rohden S.F., Ponchio M.C. Explanatory mechanisms of the decision to buy on credit: The role of materialism, impulsivity, and financial knowledge. *Journal of Behavioral and Experimental Finance*. 2019;21:15–21. DOI: 10.1016/j.jbef.2018.10.002
16. Rostamkalaei A., Riding A. Immigrants, financial knowledge, and financial behavior. *The Journal of Consumer Affairs*. 2020;54(3):951–977. DOI: 10.1111/joca.12311
17. Thompson V.A., Pennycook G., Trippas D., Evans J.S.B. Do smart people have better intuitions? *Journal of Experimental Psychology: General*. 2018;147(7):945–961. DOI: 10.1037/xge0000457

18. Galiani S., Gertler P., Navajas -Ahumada C. Trust and saving in financial institutions by the poor. *Journal of Development Economics*. 2022;159:102981. DOI: 10.1016/j.jdeveco.2022.102981
19. Hoffmann A. O.I., Plotkina D. Why and when does financial information affect retirement planning intentions, and which consumers are more likely to act on them? *Journal of Business Research*. 2020;117:411–431. DOI: 10.1016/j.jbusres.2020.06.023
20. Kumar P., Pillai R., Kumar N., Tabash M. I. The interplay of skills, digital financial literacy, capability, and autonomy in financial decision making and well-being. *Borsa Istanbul Review*. 2023;23(1):169–183. DOI: 10.1016/j.bir.2022.09.012
21. Zahera S. A., Bansal R. Do investors exhibit behavioral biases in investment decision-making? A systematic review. *Qualitative Research in Financial Markets*. 2018;10(2):210–251. DOI: 10.1108/QRFM-04–2017–0028
22. Vostroknutov A., Polonio L., Coricelli G. The role of intelligence in social learning. *Scientific Reports*. 2018;8:6896. DOI: 10.1038/s41598–018–25289–9
23. Heath R. L. Immovable objects/irresistible forces: Intelligences of sociopolitical decision making. *Public Relations Reviews*. 2021;47(2):102013. DOI: 10.1016/j.pubrev.2021.102013
24. Gautam C., Wadhwa R., Raman T. V. Examining behavioral aspects of financial decision making: The working women perspective. *Finance: Theory and Practice*. 2022;26(6):288–301. DOI: 10.26794/2587–5671–2022–26–6–288–301
25. Habibah U., Ibne H., Iqbal M. S., Naintara. Household behavior in practicing mental budgeting based on the theory of planned behavior. *Financial Innovation*. 2018;4(1):28. DOI: 10.1186/s40854–018–0108-y
26. Huck N., Mavoori H., Mesly O. The rationality of irrationality in times of financial crises. *Economic Modeling*. 2020;89:337–350. DOI: 10.1016/j.econmod.2019.10.033
27. Muñoz-Murillo M., Álvarez-Franco P.B., Restrepo-Tobón D.A. The role of cognitive abilities on financial literacy: New experimental evidence. *Journal of Behavioral and Experimental Economics*. 2020:84:101482. DOI: 10.1016/j.socec.2019.101482
28. Sobkow A., Garrido D., Garcia-Retamero R. Cognitive abilities and financial decision making. In: Zaleskiewicz T., Traczyk J., eds. Psychological perspectives on financial decision making. Cham: Springer-Verlag; 2020:71–87. DOI: 10.1007/978–3–030–45500–2_4
29. Glover C. M., Yu L., Stewart C. C., et al. The association of late life cognitive activity with healthcare and financial decision making in community-dwelling, non-demented older adults. *The American Journal of Geriatric Psychiatry*. 2021;29(2):117–125. DOI: 10.1016/j.jagp.2020.06.010
30. Ramchandran K., Tranel D., Duster K., Denburg N. L. The role of emotional vs. cognitive intelligence in economic decision-making amongst older adults. *Frontiers in Neuroscience*. 2020;14:497. DOI: 10.3389/fnins.2020.00497
31. Henager R., Cude B. J. Financial literacy and long- and short-term financial behavior in different age groups. *Journal of Financial Counseling and Planning*. 2016;27(1):3–19. DOI: 10.1891/1052–3073.27.1.3
32. Finke M. S., Howe J. S., Huston S. J. Old age and the decline in financial literacy. *Management Science*. 2017;63(1):213–230. DOI: 10.1287/mnsc.2015.2293
33. Hsu J. W. Aging and strategic learning: The impact of spousal incentives on financial literacy. *Journal of Human Resources*. 2016:51(4):1036–1067. DOI: 10.3368/jhr.51.4.1014–6712r
34. Zhang Y., Jia Q., Chen C. Risk attitude, financial literacy, and household consumption: Evidence from stock market crash in China. *Economic Modeling*. 2021;94:995–1006. DOI: 10.1016/j.econmod.2020.02.040
35. Balasubramnian B., Sargent S. C. Impact of inflated perceptions of financial literacy on financial decision making. *Journal of Economic Psychology*. 2020;80:102306. DOI: 10.1016/j.joep.2020.102306
36. Mertzanis C. Financial supervision structure, decentralized decision-making, and financing constraints. *Journal of Economic Behavior & Organization*. 2020;174:13–37. DOI: 10.1016/j.jebo.2020.03.004
37. Yurttadur M., Ozcelik H. Evaluation of the financial investment preferences of individual investors from behavioral finance: The case of Istanbul. *Procedia Computer Science*. 2019;158:761–765. DOI: 10.1016/j.procs.2019.09.112

38. Fong J.H., Koh B.S.K., Mitchell O.S., Rohwedder S. Financial literacy and financial decision-making at older ages. *Pacific-Basin Finance Journal*. 2021;65:101481. DOI: 10.1016/j.pacfin.2020.101481
39. Lichtenberg P.A., Ocepek-Welikson K., Ficker L.J., et al. Conceptual and empirical approaches to financial decision-making by older adults: Results from a financial decision-making rating scale. *Clinical Gerontologist*. 2018;41(1):42–65. DOI: 10.1080/07317115.2017.1367748
40. Lubis A.W. Skills and household financial decision-making in Indonesia. *International Journal of Social Economics*. 2020;47(11):1433–1450. DOI: 10.1108/IJSE-10–2019–0632
41. Bavol'ár J., Orosová O. Decision-making styles and their associations with decision-making competencies and mental health. *Judgment and Decision Making*. 2015;10(1):115–122. DOI: 10.1017/S 1930297500003223
42. Hess T.M., Queen T.L., Ennis G.E. Age and self-relevance effects on information search during decision making. *The Journals of Gerontology. Series B: Psychological Sciences & Social Sciences*. 2013;68(5):703–711. DOI: 10.1093/geronb/gbs108
43. Bongomin G.O.C., Mpeera Ntayi J., Munene J.C. Institutional framing and financial inclusion: Testing the mediating effect of financial literacy using SEM bootstrap approach. *International Journal of Social Economics*. 2017;44(12):1727–1744. DOI: 10.1108/IJSE-02–2015–0032
44. Xue R., Gepp A., O'Neill T.J., et al. Financial literacy and financial strategies: The mediating role of financial concerns. *Australian Journal of Management*. 2021;46(3):437–465. DOI: 10.1177%2F0312896220940762
45. Ahmad M., Shah S.Z.A. Overconfidence heuristic-driven bias in investment decision-making and performance: Mediating effects of risk perception and moderating effects of financial literacy. *Journal of Economic and Administrative Sciences*. 2022;38(1):60–90. DOI: 10.1108/JEAS-07–2020–0116
46. Ahmed Z., Noreen U., Ramakrishnan S.A.L., Abdullah D.F.B. What explains the investment decision-making behavior? The role of financial literacy and financial risk tolerance. *Afro-Asian Journal of Finance and Accounting*. 2021;11(1):1–19. DOI: 10.1504/AAJFA.2021.111814
47. Li Y., Baldassi M., Johnson E.J., Weber E.U. Complementary cognitive capabilities, economic decision-making, and aging. *Psychology and Aging*. 2013;28(3):595–613. DOI: 10.l037/a0034172
48. Liu X., Zhou X., Zhu B., Wang P. Measuring the efficiency of China's carbon market: A comparison between efficient and fractal market hypotheses. *Journal of Cleaner Production*. 2020;217:122885. DOI: 10.1016/j.jclepro.2020.122885
49. de Bruin B.W., Parker A.M., Fischhoff B. Decision-making competence: More than intelligence? *Current Directions in Psychological Science*. 2020;29(2):186–192. DOI: 10.1177/0963721420901592
50. Nyakurukwa K., Seetharam Y. Household stock market participation in South Africa: The role of financial literacy and social interactions. *Review of Behavioral Finance*. 2024;16(1):186–201. DOI: 10.1108/RBF-03–2022–0083
51. Tan J., Cai D., Han K., Zhou K. Understanding peasant household's land transfer decision-making: A perspective of financial literacy. *Land Use Policy*. 2022;119:106189. DOI: 10.1016/j.landusepol.2022.106189
52. Basha S.A., Bennasr H., Goaied M. Financial literacy, financial development, and leverage of small firms. *International Review of Financial Analysis*. 2023;86:102510. DOI: 10.1016/j.irfa.2023.102510
53. Kumar P., Islam M.A., Pillai R., Sharif T. Analyzing the behavioral, psychological, and demographic determinants of financial decision making of household investors. *Heliyon*. 2023;9(2): e13085. DOI: 10.1016/j.heliyon.2023.e13085
54. Kahneman D., Tversky A. Prospect theory: An analysis of decision under risk. *Econometrica*. 1979;47(2):263–292. DOI: 10.2307/1914185
55. Mahapatra M.S., Metha S. Behavioral finance: A study on gender-based dilemma in making investment decisions. *SUMEDHA Journal of Management*. 2015;4(1):4–16. URL: https://www.indianjournals.com/ijor.aspx?target=ijor:sjm&volume=4&issue=1&article=001&type=pdf
56. Gunabalan R., Thakoor M.B., Tilhaun T. Impact of behavioral finance in the investment decision among women in the city of Mumbai during pandemic 2020. *Elementary Education Online*. 2021;20(5):3330–3334. DOI: 10.17051/ilkonline.2021.05.364

ABOUT THE AUTHORS

Yuni Kusuma Arumsari — Doctoral student, Brawijaya University, Malang, Indonesia; Lecturer, Gajayana University, Malang, Indonesia
https://orcid.org/0000-0002-6625-9096
Corresponding author:
yka.finance2606@gmail.com

Surachman — PhD, Prof., Faculty of Economics and Business, Brawijaya University, Malang, Indonesia
https://orcid.org/0000-0002-9592-4630
surachman@ub.ac.id

Sumiati — PhD, Prof., Faculty of Economics and Business, Brawijaya University, Malang, Indonesia
https://orcid.org/0000-0001-8471-1261
sumiati_atiek@yahoo.com

Andarwati — PhD, Assoc. Prof., Faculty of Economics and Business, Brawijaya University, Malang, Indonesia
https://orcid.org/0009-0002-5961-7032
andarwati@ub.ac.id

Authors' declared contribution:
Y. K. Arumsari — formulation of the research problem, justification of hypothesis, and evaluation of theory.
Surachman — practical framework's consistency.
Sumiati — critical analysis of the literature and validation of methodology.
Andarwati — substantiation of the methodology, hypotheses, and results.

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 12.03.2023; revised on 12.04.2023 and accepted for publication on 27.04.2023.
The author read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-46-58
UDC 334.72(045)
JEL G23, G32

Rationing as a Normative Principle of Ecosystem Interaction's Financing

N.M. Abdikeev[a], I.M. Stepnov[b], J.A. Kovalchuk[c]
[a, b] Financial University, Moscow, Russia;
[c] Moscow Aviation Institute, Moscow, Russia

ABSTRACT

The relevance of the study is confirmed by the fact that it is financial relations in ecosystems that have become the **subject of research** that are influenced by certain rules (including state regulation) that limit the degrees of freedom of ecosystem participants and its organizers and ultimately determine the viability of the ecosystem approach, which determined **the purpose of the study** as establishing the potential of the financial instruments of the state in ensuring the necessary level of rationing for regulation in business ecosystems. It is shown that the distinctive feature between the corporate and ecosystem approach is the use of rationing as additional restrictions to financial decisions based on public and private sources of financial resources available in business ecosystems. **Research methods,** on the one hand, are based on a key methodology — the emerging ecosystem's theory in the part where it replaces the firm's theory, taking into account the provisions of the credit rationing theory as an application to corporate finance, on the other hand, the conceptual provisions of the theory of constraints in relation to finance are taken into account. **The results of the study** show that the allocation of public and private ecosystem rationing makes it possible to form the basis for strategic financial decisions. It is established that when creating an industrial business ecosystem, small and medium-sized businesses will become its main participants, which is justified by the need for external financing that the business ecosystem can provide. **It is concluded** that when implementing the idea of rationing, the search for the optimal strategy for participants can be simplified to considering only pair interaction (instead of optimizing the entire set of relationships). The presented paired partitions make it possible to clarify the constraints and individualize them. Comparative analysis has shown that, from the point of view of effective implementation of restrictions, the consortium with state participation has the greatest potential, and clusters have the least potential, from the point of view of capital rationing. As a result, the conclusion is made about the prospects for the development of business ecosystems with state financing (control), which would imply a purposeful solution to the tasks of the state in the modern economy.

Keywords: finance; digital finance; digital economy; united digital space; financial constraints; credit rationing; credit rationing; business ecosystem; ecosystem with state participation

For citation: **Abdikeev N.M., Stepnov I.M., Kovalchuk J.A. Rationing as a normative principle of ecosystem interaction's financing.** ***Finance: Theory and Practice.*** **2024;28(4):46-58. DOI: 10.26794/2587-5671-2024-28-4-46-58**

INTRODUCTION

Ecosystem interaction in any of its forms (supply chains, cluster consortium and others [1]) requires a new approach, different from corporate finance, to financial support for the functioning of these forms, because it is finance that will ultimately determine the viability of the ecosystem approach in the future.

In terms of financing, we note that the ideal scenario for business ecosystems falls somewhere between market radicalism and rationing (normalization), wherein financial decisions — and thus all interaction designs — are subject to regulations that typically restrict the degree of freedom available to ecosystem participants and organizers. This conclusion is based on the fact that ecosystem participants (according to the business ecosystem theory) interact with the market (with varying degrees of limitation of the range of decisions taken) by engaging in business-organized interaction (when the level of restrictions imposed depends on the type of eco-system).

The basic research question in this case: are such constraints a disruptive factor in the efficiency of ecosystems, or a benefit that ensures the stability of the functioning, primarily, of the participants?

Undoubtedly, this research issue is further reinforced by the widespread use of digital financing (in particular, digital credit, which is both theoretically and practically possible as a decentralized solution), which also has a large impact on ecosystem financing.

The initial challenge that needs to be addressed is the need for a clear separation between corporate and ecosystem governance. As a rule, the budgeting system of any company is a strict set of rules that ensure the achievement of the objectives set while minimizing resources [2]. The objectives of corporate capital rationing are to ensure in the end the financial viability of projects [3].

Rationing as a system of constraints (and an integral part of management) within the business ecosystem depends on its organizer or sponsor: so, with a private sponsor, the purpose of rationing only partially remains the same — to prevent the involvement of financially unstable participants in the ecosystems, but at the same time to provide additional profit (or surplus profit) [4]. The task of the public organizer of the business ecosystem is different — to ensure the implementation of projects (often socially significant) and the necessary control of activities from the point of view of the state, including fiscal policy.

As a rule, most large corporations do not allow freedom of access to financial markets to separate units, thus forming restrictions (rationalizing) and, accordingly, providing the necessary degree of control.

At the same time, more advanced rationing associated with public budgeting ensures the success of public resources, preventing the deficit of financial resources in the target areas and limiting the irrational requests of participants in the budget process. Government rationing benefits where principles or rules are long-term and not subject to rapid change. However, it is no secret that bureaucratic mechanisms do not always fully determine the effective selection of financing directions, which initially leads to a reduction in the efficiency of the targeted use of public funds.

Additional difficulties are posed by the digital economy when a significant number of new instruments appear (such as digital financial assets) that do not always curb ineffective solutions, or whose inefficiency cannot be determined at the time of rationing rules (for the purposes of discarding the use of new tools). The emergence of a digital transformation in terms of the organization of payments (including the same FinTech solutions [5]) or the use of digital financial assets, including the organization of decentralized finance is complicated. In this case, the danger of opportunistic behavior of corporate participants further reinforces the need for the formation of state business ecosystems.

All of the above forms the need to clarify the task of government regulation — establishing the capacity of the financial instrument of the state in ensuring unavoidable rationing for regulatory purposes in business ecosystems.

RESEARCH METHODOLOGY

The key methodology of this study is the formation of the ecosystem theory in that part where it replaces the theories of firm [6] and public administration (including the concept of modern management [7]). The second component is the theory of credit rationing in part of the appendix to corporate finance (according to J. Tirole's approach [8], rather than J. Tobin's [9], and based on J. Stiglitz's famous article [10]). In other words, the basis is the methodology of organizing the design of interaction on a financial basis within the framework of business ecosystems with public participation, but without the formation of public ownership (which reduces long-term costs of the state while in control of the efficiency of the use of transferred financial resources). Some conceptual provisions of E. Goldratt's limitation theory [11] were used for finance.

In this study, we noted two fundamentally different types of entrepreneurial ecosystems:

1) private-initiated ecosystem as the business eco-system of the organizer or sponsor (a natural or legal entity that compensates for the cost of organizing the interaction of the ecosystem), the source of which becomes private capital;

2) public-participating ecosystem without the formation of public ownership, but with control of access to public resources, creating a "unique-specific resource" [12].

The second type of ecosystems can also be called control-service or financial-service in the sense that the ecosystem provides financing for interaction, but not on market terms, but on terms of limitation (rationalization) of financing in order to the required results.

From our point of view, for example, the emerging concept of a single digital space in industry, can be implemented as the first type (with private initiative), and as the second, but closer to the second approach, which implies a more targeted use of resources as a result of the synergy of private solutions and a set of state constraints, which has largely determined the development of this study.

THE RESEARCH RESULTS

Financing rationing needs to be established initially. In most cases, the researchers talk about rationing the loan (in the initial formulation of the question of trust to the borrower in the light of information asymmetry, according to the basic work of J. Stiglitz) and much less often — about rationing the credit portfolio [13]. Even fewer publications relate to the rationing organization process, although according to T.A. Liseichikova and R.T. Balakina "rationing includes not only limiting, but also its organization" [13] as the process of setting limits. The above-mentioned features of the business ecosystem indicate that in order to solve the task, it is necessary to study all aspects, but, above all, from the side of demand and supply of money [14]. At the same time, rationing of the loan significantly improves its quality by eliminating the problem of bad choices and bad behavior of the borrower [15].

The issue of the digital balance of credit rationing is addressed in the study of O.V. Lunyakov, which argues that the "credit market has the potential to increase the aggregate amount of payments per monetary unit of borrowed funds" [16], which confirms our conclusion about the potential of over-profit of the lender in the business ecosystem. However, the article of A.A. Lobov makes a reasonable conclusion that with the increase of claims to borrowers, "the elasticity of the number of borrower (capital) at the interest rate decreases" [17]. It should also be noted that we believe that in terms of rationing of credit it is more effective to use the Bayes-Nash separation balance [18], which cannot be attributed to a "self-organizing procedure" [19].

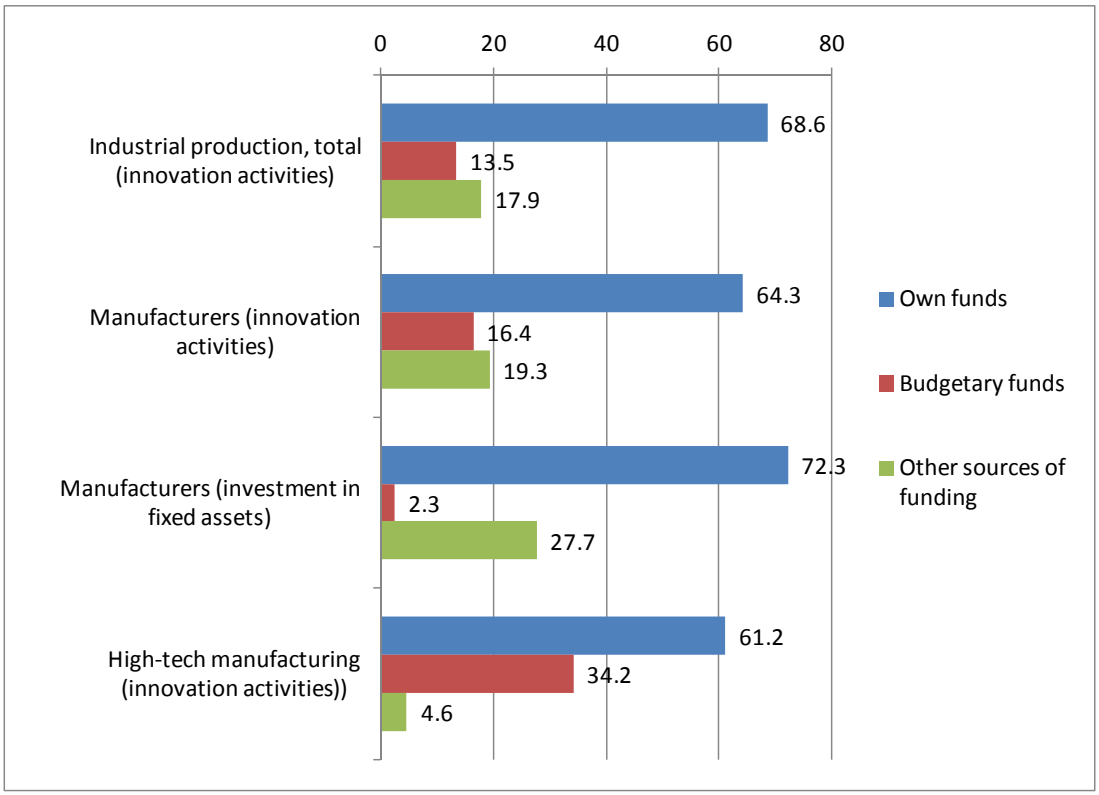


Fig. 1. **The Structure of Sources of Financing in Industrial Production in 2022, %**

Source: Compiled by the authors based on the data: Factors of growth in the effectiveness of innovations. Science. Technologies. Innovations, 02.20.2024. Institute of Statistical Research and Economics of Knowledge af the HSE. URL: https://issek.hse.ru/mirror/pubs/share/898321071.pdf; Industrial production in Russia. 2023. Statistical collection. Moscow: Rosstat; 2023. 259 p. (accessed on 29.06.2024).

Digitization also has a significant impact on rationing processes. We consider that with a certain level of digitization of financial resources (especially with the introduction of central bank digital currencies) the situation in this area can change substantially by moving to the stage of interaction and control. In this case, it is possible to discuss the hierarchy of single spaces (digital money and industrial digital), which will require further separate studies in the future.

The experience of the development of Russian industry historically shows that the most successful implementation of projects, fully or partially funded by the state, was achieved precisely in those situations when the state did not initiate projects on a competitive basis with further freedom of decision-making, and when it exercised control over the use of funds through the introduction of financial restrictions. Thus, the statistics show the predominance of own funds in the structure of sources of financing for different directions and sector sectors in industrial production (*Fig. 1*), while the financing of innovative activities is a noticeable share of budget sources.

At the same time, noting the growth of the volumes of state support within the activities of the Industrial Development Fund in the Russian Federation (from 60.9 bln rubles in 2020 to 140.1 bln rubles in 2022[1]), which provides preferential loans for the development of import substitute industries and updating the logistical base, it should be noted that the control of key indicators, which is carried out by this fund. Thus, in addition

[1] Industrial Development Fund. Results of IDF 2022. 10 p. URL: https://bod.frprf.ru/public/documents/rezultaty-raboty-frp-za-2022-god (accessed on 29.06.2024).

to the amount of private investments in the projects it supports the revenue indicators, the number of high-performance jobs created and the tax deductions of the recipient industrial companies are monitored.

At the same time, in individual studies devoted to the problems of rationing credit in the Russian economy, it is argued that "direct financing or preferential lending from the state budget are the worst forms of support... interest rate subsidy is in the second place among worst support measures" [20], which is not confirmed by real economic decisions.

It should be noted that in the creation of an industrial business ecosystem, at least of a sectoral scale, the main players will not be large, but small and medium-sized, except in the situation of contracting (if the business eco-system with the participation of the state will take over the functions of concluding large contracts, actually becoming an operator). The reason for the priority of small and medium-sized enterprises is the fact that large corporations are provided with funding and potential sources of such funding, while for small and mid-size enterprises this problem will be substantial. Thus, with a 45.8% increase in the volume of loans granted to small and medium-sized enterprises from 2019 to 2022, and with an 88.7% increase in their number[2,3] the statistics characterizing financial stability indicate an objective but slight decrease in the own capital assurance of small enterprises due to the growth of the credit burden, but for medium business entities this trend is not confirmed — the ratio of financial autonomy increases every year (*Fig. 2*).

[2] Ministry of Economic Development of the Russian Federation. Report on the State of Small and Medium Entrepreneurship in the Russian Federation and Measures for its Development for 2019–2022. URL: https://www.economy.gov.ru/material/dokumenty/doklad_o_sostoyanii_msp_v_rossiyskoy_federacii_i_merah_po_ego_razvitiyu_za_20192022_gg.html (accessed on 29.06.2024).

[3] OPORA of the Russia. Crediting to SMEs: new records. URL: https://opora.ru/news/opinion/kreditovanie-msp-novye-rekordy/ (accessed on 29.06.2024).

At the same time, individual corporations strive to create their own ecosystems (shaping a mini digital space compared to a single one and striving to attract the largest number of market participants). These actions are aimed at convincing the State that these mini spaces retain the old principles of corporate governance and related design of interaction, as before, and do not constitute a competition to state decisions.

From our point of view, this does not allow to clarify the research question, using the following formulation: how within the framework of ecosystems created will be organized regulation by the state: through the organizer of the ecosystem (as we have already noted in early publications, until ecosystems fall under the regulation of the state due to the absence of the organizational-legal form of eco-systems and not always manifested direct connection with organizer), or the state should form a different industrial policy and enter into the single digital space as a full player, taking away the role of organizers of rationing financing, excluding the mediation of sponsors of ecosystems, and leaving the freedom of entrepreneurial initiative to the participants of such ecosystem? Such decisions will also be further justified by national characteristics, when, for example, the requirements to the regulation of credit and finance in general are reinforced by additional conditions in Islamic finance in the establishment of special conditions imposed on "business within the framework of religious Sharia control, as well as additional control over the activity of the entrepreneur by the bank or investor" [21].

On the basis of the above, we distinguish for further consideration two types of rationing: public and private.

State rationing within the business ecosystem involves not only the elimination of information asymmetry (when accessing the digital profile of participants), but also the use of the state-available solutions that provide additional effect:

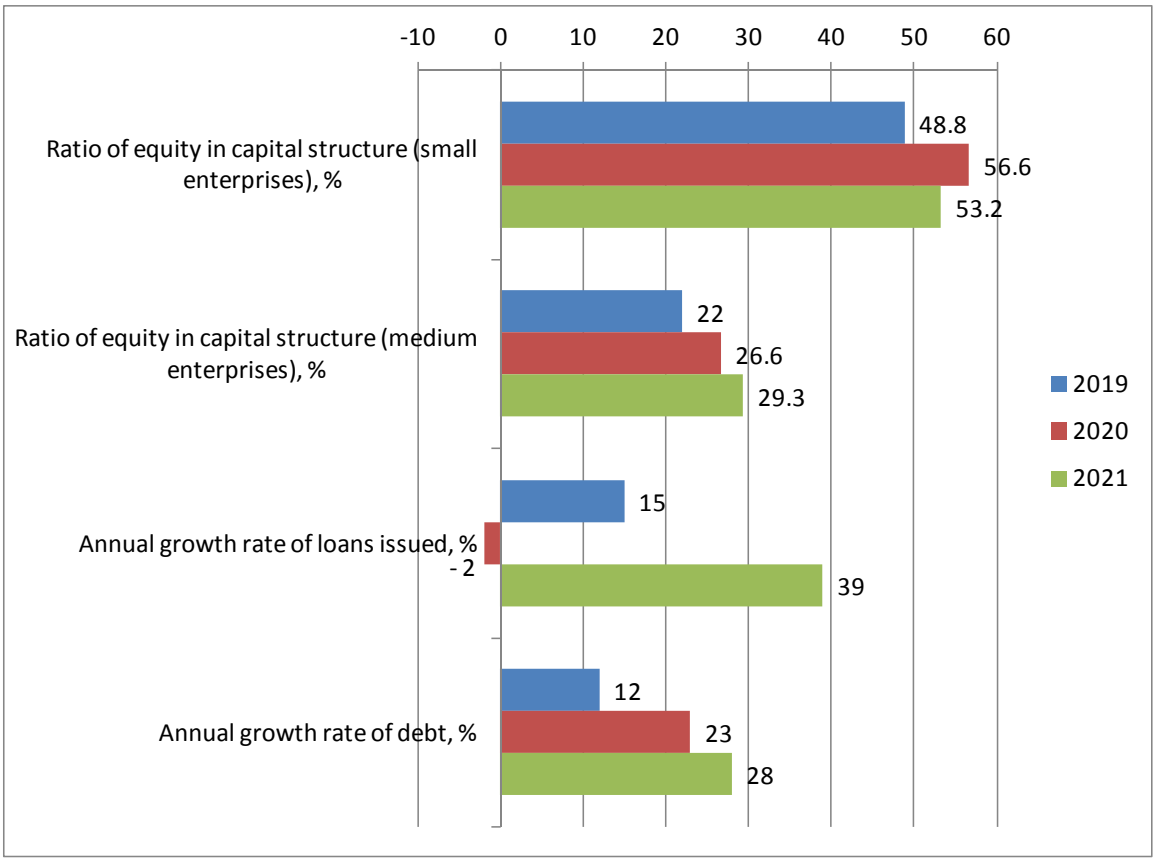


Fig. 2. **Indicators of the Dynamics of Capital Provision for Small and Medium-Sized Businesses**

Source: Compiled by the authors based on the data: Small and medium-sized enterprises in Russia. 2022: Statistical collection. Moscow, Rosstat, 2022. 101 p.; Expert RA, March 2023. SME lending in 2022–2023: at maximum speed. URL: https://raexpert.ru/docbank/92d/0aa/d42/6b6d6a98664cf02dbc874a8.PDF (accessed on 29.06.2024).

- direct financing;
- interest rate subsidy;
- guarantee.

At the same time, the state can use, in addition to direct participation, and a hybrid model, involving in the rationing process of either its own operator or the bank-agent. In the latter case, the opportunistic behavior of the agent bank is possible, which can, for example, impose an additional commission (including a covered commission) and significantly reduce the effect of rationing. Therefore, from our point of view, it is more efficient to use the operating bank, which should be integrated into the services of the business ecosystem.

The system of restrictions is also affected by a significant number of regions of presence, which is characteristic of the Russian Federation. This raises the question of whether regional services can be empowered to rationalize or fund, or whether this option can be retained only at the federal level. In our view, the solution depends on the quality of a single digital space, in which the "invisibility" of regional specifics and the smooth transition from the regional level to the federal level should be created.

Private financing, depending on supply or demand surplus, controls the following rationing parameters in the business ecosystem:

- collateral requirements;
- information awareness;
- establishment of an ecosystem premium, including disguised payments for financing risk.

The choice of these solutions would be more justified with a set of empirical data,

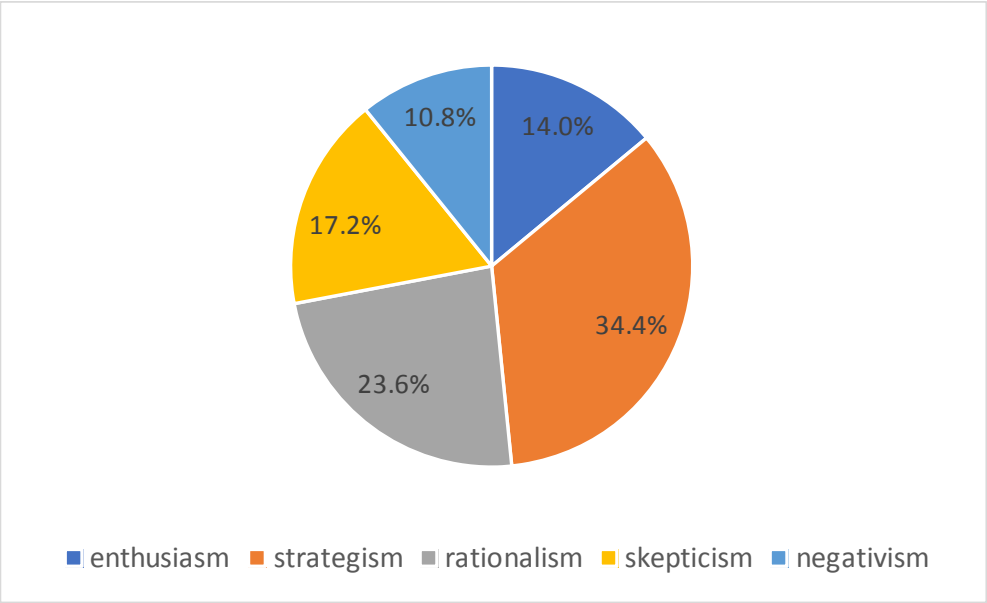


Fig. 3. **Clustering of Opinions of Survey Participants by Groups**

Source: Compiled by the authors.

but, according to the study of V.V. Akberdina and E.V. Vasilenko, "an analysis of ecosystems cannot be carried out in a short period of time, it requires long-term observation of the dynamic evolution of the structure of the ecosystem, the relationships of the participants, their goals" [22, p. 551]. Although there is another statement in the scientific literature that already "the ecosystem has become the unit of economic analysis at this stage" [23, p. 91]. Factual information on the ecosystem, especially on internal services (including funding), is unfortunately not available due to the lack of an organizational, legal or other form capable of statistical accounting, including within the framework of internal reporting. Such data is not always available to the participants of the business ecosystem, for whom information about the environment and services becomes available only after the creation of a digital profile and integration into the supply chain with the general declaration that there will be an exchange of profile data for information about contracts and other benefits, while such exchange is possible, but not guaranteed.

Therefore, it is more reasonable to study empirical experience on ecosystem sites (which is not always objective) or conduct various surveys (what is used for this study) to establish trends. As a sample, we focused on medium-sized business organizations, in whose interests production activity in a particular area is indicated.

Note that, despite the absence of a de facto full-fledged single digital space, most participants assume that in one way or another they will participate in the ecosystems, but as a result of the processing of the results were established 5 groups (*Fig. 3*), which are further used as integral opinions, instead of taking into account the opinions of individual participants — conditionally named opinions "enthusiasm", "strategism", "rationalism", "skepticism" and "negativism". The financial failure to establish resilient groups (re-group participants) may have been due to insufficient specific and definite provision on the financial capabilities of ecosystems.

DISCUSSION OF THE RESULTS

Initially, we should note two assumptions used in the discussion of the results:

- business ecosystem level was not considered as a virtual structure or object for reasons of lack of objectivity due to lack

of ownership and tax evasion, as well as the performance of the intermediary function on behalf of the sponsor/ecosystem operator without commitment;

• at the same time, we exclude some of the ecosystem operating processes that are not related to real business processes, considering the costs incurred compensated by either the organizer's or the participants' contribution.

These assumptions allow us to focus on the contractual component of the business ecosystem functioning — i.e. the contracts that can be concluded within the framework of the services of the Business ecosystems are identified:

• as one-off non-repetition transactions, short in time of execution;

• medium- and long-term transactions that form supply chains;

• long-term repetitive transactions that require the formation of a consortium;

• cluster solutions that support an anchor organization within an ecosystem;

• cluster solutions for an external anchor organization, but whose interests are within the interests of the ecosystem (services);

• internal business processes focused on the integration of ecosystem participants at the request of the ecosystem customer on a contractual basis.

The following sources of funding are available for these contracts:

• ecosystem resources, including digital credit and accumulated participant contributions/contributions;

• resources of the ecosystem organizer/sponsor;

• resources of domestic bank (financial service);

• resources of an external agent bank (accredited or with a cooperation agreement);

• budgetary sources (if they are not included in the resources of the customer's ecosystem).

Additional features for funding sources:

• private domestic sources of ecosystem financing;

• budgetary sources of ecosystem financing;

• external financing (both private and public).

Accordingly, business ecosystem participants can be divided into three:

• participants with sufficient own funding for both current projects and new contracts that may be available in the ecosystem;

• participants who need funding but are ecosystem-oriented as a source of funding;

• participants in need of funding but oriented towards external funding.

Identifying the economic agents of the ecosystem allows the following strategies to be identified:

– on the demand side:

• search for financial resources with sincere intentions but with poor financial condition;

• search for resources with sincere intentions and good financial condition, but about which the creditor does not know;

• search for financial resources with planned moral hazard;

– on the supply side:

• transfer of financial resources without limitation;

• credit rationing to limit access to credit by vulnerable borrowers;

• reducing information asymmetry by accessing the digital profile of the borrower (internal financial service only) and setting limits according to typed profiles;

• introduction of additional rationing conditions to limit moral hazard.

The vast majority of contemporary publications affirm the desire of all potential participants to engage in interaction with the ecosystem. Future statistics will show this, but the survey we have already conducted has identified two groups (the groups "skepticism" and "negativism") that initially do not consider participation in ecosystems (total private and public) desirable, and their share is about 28% (*Fig. 3*), which calls into question the hypothesis of supply deficit and substantial demand for financial resources.

From our point of view, the implementation of the strategy of the entire ecosystem should take into account the divisive balance of Bayes-Nash, i.e. both sides may know about the probability of a certain strategy, but not know the specific preference (choice). This balance means that individual constraints can be applied to each participant, but that will not lead to exit from the business ecosystem. It is obvious that finding the optimal strategy for all participants can be simplified to consider only pairing interaction (rather than optimizing the whole set).

When interacting in pairs, we can identify the participant's choice implementation process (forming the matrix of strategies) iteratively and consistently:

- first option: own or external financing;
- second option: external or ecosystem financing;
- third option: private or public funding (if available).

Sourcing allows another option to be considered — co-financing through collaboration: i.e. supply chain participants or consortium (much less often cluster or simple contract) may expect co-financing within the supply chain.

The presented pairs allow to clarify the directions of restrictions (like the mechanism of rationing on the part of the supply of financial resources) for specific solutions and to individualize them.

Financial Constraints in the Design of Ecosystem Interaction on the Supply Chain Model

It is presented that requires no proof that the participation of the borrower in the supply chain created by the business ecosystem service significantly increases the volume of information about it and reduces information asymmetry. Moreover, participation in many chains often no longer requires additional funding, as reverse mechanisms arise when financing of the buyer's credit scheme is formed. Therefore, from the point of view of rationalization, it should in this case be more applicable to the offer, i.e. under other equal conditions, the financing of the participant in the sustainable supply chain brings additional benefits and guarantees to the financial service provider, which requires a higher priority in the loan portfolio of the offer to the participants in such a process.

A similar situation can be considered when investing in projects related to future supply chain security, which does not eliminate all risks, but in many ways guarantees payment capacity in the offer for a long period, making this choice rational. In this case, the pioneering should be focused on ensuring that the financing of such a supply chain remains in the business ecosystem and does not allow choices to be made in favor of non-institutions. In addition, the involvement of the State in the supply chain as a financier allows it to exercise considerable control. Therefore, supply chains are the simplest and most efficient tool of the business ecosystem and actually form its competitive advantage.

Financial Constraints in the Design of Ecosystem Interaction According to the Consortium Model

A consortium can consist of both effective and less effective participants, who need to be subject to the most stringent rationing measures, including funding restrictions up to a certain physical level of participation in the production or provision of products or services. The most common form for a consortium on the part of the State is the issuance of guarantees, but they do not provide full necessary control. In terms of private lending, the situation is the opposite. Consortium — a larger association existing as a form (as opposed to a supply chain that exists only in contracts) allows to attract larger amounts and become an attractive investment object. At the same time, a large information asymmetry is inherent in the investor, as a consortium can often doubt the

possibility of attracting the necessary amount of funds by one investor.

Financial Constraints in Designing Ecosystem Interaction on the Model "Cluster"

From the point of view of funding as a whole, the cluster has no special advantages. The participation of an organization in a cluster does not compensate for information asymmetry and does not supplement the information in the digital profile of the organization, while the cluster provides no increase in the pledge, as there is no need to distribute ownership between all the organizations that are members of the cluster. Often, only the so-called anchor enterprise or nucleus of the cluster enjoys all the benefits of a cluster, while other participants can either receive additional benefits or not receive them.

From the point of view of the State, a cluster becomes a consumer of infrastructure resources, and the State must introduce the most stringent measures to rationalize the financing of the cluster, avoiding preferential financing or other ways of allocating financial resources (considering that the Cluster cannot guarantee the intended use). Therefore, the level of rationing in the business ecosystem cluster should exceed the market level, increasing responsibility for the decisions.

Ensuring Balance between Capital Rationing and other Approaches in the State's Industrial Policy

In the paper of I. V. Filimonov [24], a comparison of "European" and "Asian" approaches to the regulation of ecosystems at the state level was presented, which allowed establishing that the European approach tends to advancing innovative development, and the Asian approach to integration into a single national system. This separation is largely because, according to our approach, in the first case, there is a surplus and in the second a shortage of supply for financial resources, which leads to the need for concentration of resources and appropriate management.

This comparison shows that industrial policy should eliminate unrestricted preferential financing and replace it with rationing (including preferential and targeted financing), allowing for a more accurate resource fee setting on the basis of the creation of a single digital space, only within which a full-fledged digital industrial policy will be implemented (at least at the level of industry segments). In this case, funding constraints should be tightened even more, as self-organization in achieving balance does not occur with this approach.

CONCLUSION

The proposed approach may not be the only one suitable for such a new category as ecosystem finance with its uncertain legal status.

Nevertheless, this article proposes a model of limitation (rationalization) of financing in the organization of interaction within the ecosystem for four potentially different solutions: supply chains, consortia, clusters, and stimulating digital industrial policies. At the same time, the possibility of public participation without the creation of state property with the preservation of the state control was demonstrated through the category "finances", and not only through taxation and dividend payments. It has been concluded that the possible perspective of business ecosystems for the digital economy is precisely the formation of a single digital space as a new institutional environment that has the potential to solve the challenge of confronting private initiative in terms of localization of both tax payments and the activity itself. Indeed, this conclusion shows that the ecosystem model can and should be implemented within the framework of traditional public administration or new public administration, counteracting collective or private management in every way.

The comparative analysis showed that in terms of effective implementation of constraints, the most potential has a public participation consortium as a form of

achievement of achieved results and control of objectives. The most weak in terms of capital rationing is a cluster, except for a model that would have chosen financing as its cluster advantage (a financial cluster), but such models are unknown in practice, or they operate solely within free economic zones.

Therefore, attention should be paid to the development of "industrial business ecosystems" or ecosystem with state funding or state control as a means of implementation of modern effective industrial policy with the replacement of large companies as organizers of business-ecosystems, which implies a targeted solution of the tasks of the state in the modern economy.

In many ways this solution can be achieved through transformation of industrial policy, for which the direction of transformation must adopt not the general ideology of digitization (proclamation), but concrete solutions related to new forms and possibilities of digitization and support (including financial) of industrial companies.

ACKNOWLEDGMENTS

The article was prepared based on the results of research carried out at the expense of budgetary funds under the state task of the Financial University, Financial University, Moscow, Russia.

REFERENCES

1. Stepnov I.M., Kovalchuk J.A. Business ecosystem finance: Modern agenda and challenges. *Finance: Theory and Practice*. 2023;27(6):89–100. DOI: 10.26794/2587–5671–2023–27–6–89–100
2. Zinovieva Yu.S., Gomeleva E.V. Improving the efficiency of the budgeting system in large corporations using the technology of a competence approach (on the example of Russian Railways holding corporations). *Vestnik evraziiskoi nauki = The Eurasian Scientific Journal*. 2018;10(3):22. (In Russ.).
3. Zotov V.M., Abdikeev N.M. New technologies for managing industrial innovation funding. *Finance: Theory and Practice*. 2021;25(6):112–127. DOI: 10.26794/2587–5671–2021–25–6–112–127
4. Stepnov I.M., Kovalchuk J.A. Platform capitalism as a source of digital rentier's superprofit. *Vestnik MGIMO-Universiteta = MGIMO Review of International Relations*. 2018;(4):107–124. (In Russ.). DOI: 10.24833/2071–8160–2018–4–61–107–124
5. Razletovskaya V.V. Managing development processes and the national model of financial technology. *Ekonomika, predprinimatel'stvo i pravo = Journal of Economics, Entrepreneurship and Law*. 2023;13(9):3795–3814. (In Russ.). DOI: 10.18334/epp.13.9.119219
6. Tambovtsev V.L. Strategic theory of the firm: Status and possible development. *Rossiiskii zhurnal menedzhmenta = Russian Management Journal*. 2010;8(1):5–40. (In Russ.).
7. Ohotskii E.V. Public administration: Modernizing the current model of state management. *Vestnik MGIMO-Universiteta = MGIMO Review of International Relations*. 2014;(3):115–127. (In Russ.).
8. Tirole J. The theory of corporate finance. Princeton, NJ: Princeton University Press; 2010. 656 p.
9. Bolton P., Chen H., Wang N. A unified theory of Tobin's *q*, corporate investment, financing, and risk management. *The Journal of Finance*. 2011;66(5):1545–1578. DOI: 10.1111/j.1540–6261.2011.01681.x
10. Stiglitz J.E., Weiss A. Credit rationing in markets with imperfect information. *The American Economic Review*. 1981;71(3):393–410. URL: https://pages.ucsd.edu/~aronatas/project/academic/Stiglitz%20credit.pdf
11. Şimşit Z.T., Günay N.S., Vayvay Ö. Theory of constraints: A literature review. *Procedia — Social and Behavioral Sciences*. 2014;150:930–936. DOI: 10.1016/j.sbspro.2014.09.104
12. Obydenov A. Yu. Strategic competitive advantage: A resource-institutional view. *Rossiiskii zhurnal menedzhmenta = Russian Management Journal*. 2016;14(1):87–110. (In Russ.).
13. Liseychikova T.A., Balakina R.T. Credit risk-management through credit portfolio rationing. *Vestnik Omskogo universiteta. Seriya: Ekonomika = Herald of Omsk University. Series: Economics*. 2009;(3):173–179. (In Russ.).

14. Podrugina A., Tabakh A. next credit cycle: Danger of new "euthanasia for the rentiers". *Ekonomicheskii zhurnal Vysshei shkoly ekonomiki = The HSE Economic Journal*. 2020;24(4):598–621. (In Russ.). DOI: 10.17323/1813–8691–2020–24–4–598–621
15. Revtova E.G. Genetic typology of credit as an economic phenomenon. *Vestnik Tomskogo gosudarstvennogo universiteta. Ekonomika = Tomsk State University. Journal of Economics*. 2022;(59):93–108. (In Russ.). DOI: 10.17223/19988648/59/6.
16. Lunyakov O.V. Credit rationing equilibrium achievement in the conditions of digitalization. *Finance: Theory and Practice*. 2023;27(1):91–102. (In Russ.). DOI: 10.26794/2587–5671–2023–27–1–91–102
17. Lobov A.A. Development of a credit policy for markets subject to credit rationing. *Mir ekonomiki i upravleniya = World of Economics and Management*. 2015;15(3):21–31. (In Russ.).
18. Guzikova L.A. Conditions for the existence of a dividing equilibrium in the credit market. *π-Economy*. 2008;(6):245–251. (In Russ.).
19. Shastitko A.E., Pavlova N.S. Socially efficient entry barriers? *Baltic Region*. 2016;8(4):26–38. (In Russ.: *Baltiiskii region*. 2016;8(4):34–52. DOI: 10.5922/2074–9848–2016–4–3).
20. Moiseev S.R. Prospects of credit rationing in the Russian economy. *Finansovaya analitika: problemy i resheniya = Financial Analytics: Science and Experience*. 2009;(5):21–26. (In Russ.).
21. Islamutdinov V.F. Measures for limiting opportunism in the Islamic banking. *Journal of Institutional Studies*. 2022;14(4):110–121. (In Russ.). DOI: 10.17835/2076–6297.2022.14.4.110–121
22. Akberdina V.V., Vasilenko E.V. Basic strategies for the behaviour of industry as a participant in regional innovation ecosystems. *AlterEconomics*. 2023;20(3):548–569. (In Russ.). DOI: 10.31063/AlterEconomics/2023.20–3.4
23. Karpinskaya V.A., Rybachuk M.A. The genesis of the ecosystem form of production organization in a modern economy: Factors and results. *Journal of Economic Regulation*. 2021;12(2):85–99. (In Russ.). DOI: 10.17835/2078–5429.2021.12.2.085–099
24. Filimonov I.V. The role of the state in the development of the digital economy ecosystem. *Nauchnye issledovaniya ekonomicheskogo fakul'teta. Elektronnyi zhurnal = Scientific Researches of Faculty of Economics. Electronic Journal*. 2023;15(3):29–49. (In Russ.). DOI: 10.38050/2078–3809–2023–15–3–29–49

ABOUT THE AUTHORS

Niyaz M. Abdikeev — Dr. Sci. (Engin.), Prof., Director of the Institute of Financial and Industrial Policy of the Faculty of Economics and Business, Financial University, Moscow, Russia
http://orcid.org/0000-0002-5999-0542
nabdikeev@fa.ru

Igor M. Stepnov — Dr. Sci. (Econ.), Prof., Department of Corporate Finance and Corporate Governance, Financial University, Moscow, Russia
http://orcid.org/0000-0003-4107-6397
Correspondent author:
stepnoff@inbox.ru

Julia A. Kovalchuk — Dr. Sci. (Econ.), Prof., Department of Management and Marketing of High-Tech Industries, Moscow Aviation Institute, Moscow, Russia
http://orcid.org/0000-0002-9959-3090
fm-science@inbox.ru

Authors' declared contributions:
N.M. Abdikeev — problem statement, research's conceptualization.
I.M. Stepnov — preparation of the initial draft of the study, article concept development, description of the results and formation of conclusions of the research.
J.A. Kovalchuk — review and editing, verification of the validity of research results, sources selection, analysis of theoretical provisions of the subject.

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 21.03.2024; revised on 13.04.2024 and accepted for publication on 27.04.2024.
The authors read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-59-70
JEL H74, E49, E44, L32

Effect of State Bonds on the Private Sector: Evidence from a Growing Economy

C.O. Omodero
Covenant University Ota, Ogun State, Nigeria

ABSTRACT

The frequent issuance of state bonds or securities by the government in the stock market crowds out the private sector in developing economies. The main concern is whether the economy can continue to function normally in the face of this occurrence if it is not checked. We use an Autoregressive Distributed Lag (ARDL) co-integration approach to confirm this scenario using data from the World Development Indicator and the Central Bank of Nigeria, spanning 1989 to 2021. The analysis' findings indicate that lowering borrowing costs will not put a strain on the private sector. However, the current government borrowing domestically has no significant positive influence, confirming that if the government does not reduce the amount of securities in the stock market, investors will continue to invest in government bonds while ignoring corporate bonds. This finding implies that the economy will not be in parity because private sector investment will be stifled. In accordance with the study, the government should promote private sector operations by lowering interest rates and regulating borrowing limits to ensure that they do not exceed the threshold that is beneficial to both the economy and private sector operations.

Keywords: state bonds; private sector; investment; borrowing cost; stock market

For citation: **Omodero C.O. Effect of state bonds on the private sector: evidence from a growing economy. *Finance: Theory and Practice.* 2024;28(4):59-70. DOI: 10.26794/2587-5671-2024-28-4-59-70**

INTRODUCTION

The private sector is said to be the driving force of trade and industry evolution for a nation, particularly for emerging countries [1]. Too much borrowing by the government at the cost of the private sector, the control tower of the economic system, raises doubts about the reliability of the government's industrial policy. The National Government issues bonds in the Nigerian Exchange Group Plc ('NGX Group') through the Debt Management Office (DMO), at month-to-month sale prices, and these securities are then advertised on the stock market for investing. These semi-annual, coupon-paying bonds are supported by the Federal Government of Nigeria's entire trust and confidence. FGN debt securities earnings are tax-free. The National Government issues treasury bonds, Sukuk bonds, savings bonds, green bonds, and Eurobonds among others, helping to make Federal Government bonds the most liquid, attractive and capitalized securities on the Nigerian Exchange Group Plc. This is why it has become very critical and alarming because the attraction to government bonds by investors is now putting the private sector at risk due to the thronging out consequence of administration borrowing using bonds. As a result, experts and equity market participants have excoriated the government's exorbitant borrowing from both domestic and foreign markets without regard for cash flow to payback the debt, even as it has attained the disturbing juncture of pushing out the resourceful private sector. The trickle-down effect on the private sector is a significant threat to the real sector's capability to produce wealth and employment [2].

To induce the private sector to start raising debt financing, interest rates must be kept as low as possible. As a result of counterproductive funding, the economy suffers, and total savings fall as a result of capital crowding out [3]. According to [2], if the authority reduces its debt levels in order to control the rising cost of loan maintenance, funds will flow to the common stock market as investors seek higher yields, especially as these companies' earnings improve, supporting stock value and dividend payments.

Public debt is typically the result of fiscal policy expansion in order to satisfy public needs for more social amenities and infrastructure [4]. In general, when the government decreases the amount of money invested in the economic system, there will be a decline in the

country's long-run economic growth [3]. According to [3], this upshot can be negated to some extent if new fiscal stimulus is in the context of resourceful investment in human capital, public assets, social utilities, and research and development projects.

When a country reaches a borrowing limit or has a sovereign debt ceiling, its productivity recovery can suffer immensely. This could be accomplished through increases in interest rates, rising inflation, and a reduction in private sector investment [5]. The purpose of this research is to determine the impact of government bonds on private sector investment and operations. Several empirical studies have been conducted on the impact of government bonds on the national economy. The most recent works are those done by [6–10]. Considering the works of [4, 11–13] on the effect of state bonds on private sectors, no conclusion was reached on how private sectors are affected generally in several economies. The current study fills that void by shedding light on the impact of state bonds on private sector operations in a developing country. We use stock-market-issued state bonds as well as the general interest rate to confirm the response of the private sector to receiving adequate funding for its operations.

LITERATURE REVIEW

Conceptual Review

State bonds are widely marketed on the fixed-income securities exchange, serving as extremely important standard bond yields for most forms of privately issued company's shares at both theoretical and practical stages [14]. Government debt raises the possibility of companies' imminent tax intensifications or economic exploitation of business investments [15]. Simultaneously, some research indicates that public debt can enhance organizational direct exposure to the international lending market [16]. According to [17], supreme pledges provide substantial advantages to the development of commercial bond markets in unindustrialized parsimonies. As a result, output drops because new investment is more resourceful than old capital, and a lower interest rate on accumulating capital results in less growth in the economy [16].

Government residential debt is used for a variety of purposes, including financing the budget shortfall when the government is unable to satisfy its expenditure commitments using domestically raised revenue and externally sourced grants and borrowing. Green bonds are like traditional debt instruments, but they are primarily intended to boost funds to finance sustainability initiatives [18]. The delivery of interest-bearing public bonds makes commerce and assessment of all investment products that can provide cash flows to financial assets easier [16].

Theoretical Framework

The major idea supporting this work is the theory of capital and investment propounded by Fisher in 1930. Capital is gathered to enable private sector investment, which are inputs into the productive economy. Consequently, Fisher described capital as an investment vehicle that generates a consistent income stream over time. As a result, best possible capital formation would act as a driver for economic expansion [19]. Fisher [20] presumed that all finance was purely to make funds available for investment and that wealth was being used up in the process of production, so a portfolio of reserved equity was not included in his hypothesis of investments and capital, rather it is expressed that all capital is an investment. Since the state has a greater credit worthiness than the private industry, it crowds out the private sector in mobilizing funding for investment, thereby reducing their growth potential [21].

Empirical Review

Impact of State Bond on Economic Growth

The sovereign obligation is the cash the regime obtains from either international creditors or residents within the nation, and it grows as the government engages in more fiscal stimulus [22, 23]. Government borrowing permits the federal government to spend on activities that contribute to the economic system where tax income is insufficient to fund such initiatives [24]. It ought to be stated that using municipal liability to fund management outlays can be hurtful to frugality [25, 26]. Government borrowing can have a beneficial or detrimental effect on the budget, contingent on the level of borrowing and its objective [27]. For example, in 2020 and 2021, the supply of state debt instruments in developed economies significantly increased as authorities issued bonds to pay for their government's financial response to the bubonic plague [28]. Nevertheless, if such spending increases are required, they must be funded via taxes rather than issuing debt [26].

Koka [19] examined the link between the issuing of Government debt instruments and wealth creation in Kenya utilizing data collected from 2003 to 2011. The findings revealed that the issuing of government securities had a beneficial impact on Kenya's productivity expansion. Oke et al. [7] looked into the influence of bond market development on Nigerian economic growth from 1986 to 2018. Government securities had an unimportant favorable connection; corporate bonds and the value of bonds traded had a beneficial and statistically significant relationship; and bond yield had a negative correlation with Nigerian economic growth. Mhlaba and Phiri [29] assessed the long-term and short-term consequences of public debt on economic expansion in South Africa from 2002 to 2016. The researchers reported that all projected regressions found a strong negative debt-growth association, with the negative correlation reinforcing post-crisis. Saungweme and Odhiambo [30] investigated the causal links between public debt and economic growth, as well as public debt service and economic growth in Zambia from 1970 to 2017. The results of this analysis found no link between sovereign debt service and economic expansion in Zambia.

Yusuf and Mohd [10] examined the impact of sovereign debt on Nigerian economic growth from 1980–2018. Findings revealed that foreign debt was a long-term growth hindrance, while its short-term actual impact was economic expansion-driven. Household debt had a major positive effect on long-term advancement while having an adverse effect on short-term economic expansion. Both the long- and short-term cost of borrowing decreased development substantially, affirming the debt overhang consequence. According to Teixeira et al. [9], sovereign bonds had no influence on bank credit risk but had an influence on financial performance, with government borrowing financial products having a beneficial impact on asset profit growth in the long term. Omodero and Alege [8] studied the sway of various public-sector bonds on Nigerian economic growth between 2003 and 2019. The results revealed that treasury bills and FGN bond funds had a positive and significant impact on the country's economic growth. Treasury bonds and higher inflation, on the other hand, had a considerable negative impact on economic growth. However, some debt securities and commitments had a relatively insignificant adverse effect on economic growth. Nneka et al. [6] investigated the impact of sovereign debt expansion on economic growth in a sample of evolving nations from 1990 to 2020. The study discovered that government debt capitalization, trade openness, and rising prices all had a beneficial effect on economic growth, whereas corporate debt capitalization and household credit available to the private sector had a detrimental effect on economic expansion and stability.

Effects of State Bond on Private Sector Investment

High levels of public debt may also have an impact on private investment through a variety of channels [31, 32]. When accessing stock markets, both the public and private sectors will start competing for limited resources if the portfolio of bank loans is narrow. As the government borrows more, fewer funds are available for the private sector. This raises interest rates for the private sector, resulting in less private sector investment.

Ambaye et al. [33] used historical data from 1992 to 2010 to investigate the drivers of national private sector investment in Ethiopia. The study used an Autoregressive Distributed Lag (ARDL) model and the bounds test method to simulate the long-term key drivers of home capital funding. The research identified exchange rates, internal saving, and financial deepening as major elements having a significant and negative influence on private sector investment. Mbate [34] anticipated an interactive cross-country framework and examined the effects of internal debt on the economy and private sector financing in a panel of 21 Sub-Saharan African (SSA) nations from 1985 to 2010. The System-GMM analysis indicated a non-linear correlation between national debt and GDP growth, with an optimum major shift of 11.4 percentage points of GDP. Furthermore, household debt was discovered to crowd out private enterprise finance by an elastic modulus of –0.3% of GDP, discouraging capital formation and private industry expansion.

Lidiema [35] investigated the impact of government domestic borrowing on private investment in Kenya. The analysis indicated that household debt had a significant and negative association with gross fixed capital creation. The findings also demonstrated that the administration's exorbitant internal borrowing had an adverse influence on private sector investment, which ultimately impaired economic growth. Bouis [11] examined the connection between banks' holdings of national jurisdictional bonds and private-sector credit expansion in emerging

and developing nations. According to the assessment, the poor association between banks' assertions on the government and private sector credit growth was primarily due to banks' portfolio realignment toward relatively safe, more liquid government resources during times of heightened stress, with only scant data of a crowding-out influence attributed to financial suppression. Ahmad et al. [21] investigated the link between public debt and private sector growth in Nigeria. It employed the Structural Vector Auto-regressions model to analyze the complexities of federal debt actions on the advancement of Nigeria's corporate companies. The results of impulse responses and regression analysis seemed to indicate that government debt management had a detrimental effect on the efficiency of private sector growth in Nigeria. W. Obeng-Ampousah et al. [1] showed there was no long-run relationship between the variables, but a considerable short-run relationship between government debt and the private sector, broad money, and gross capital accumulation.

Akanbi [4] examined the effects of household government debt on private sector financing in Nigeria. The findings revealed that, while not statistically relevant, prime loan rates have a beneficial influence on the government's bond issuance. The results also showed an inverse correlation between federal government internal debt issuance and bank lending to the private sector. Mwakalila [36] factually scrutinized the effects of government spending and national borrowing on private sector financing in Tanzania by raising loan rates. In the long-term, government spending and internal borrowing crowded out credit for the private sector by increasing borrowing costs.

Kayongo [12] demonstrated that the effect of government investment on private sector investment was not as considerable as the influence of public household debt, implying that government investment was not supplementary to private sector investment. Interest rate fluctuations had a hurtful impact on private investment, whereas GDP growth stimulated more private sector investment. Vanlaer et al. [13] examined whether higher government debt led to less private sector investment, a phenomenon known as the debt overhang effect. Using an instrumental variable framework, the study addressed the likely endogeneity between private sector ventures and other macroeconomic indicators. The findings reinforced the commitment-outcropping proposition and demonstrated that this connection could only be explained through the government debt stream.

METHODOLOGY

The Autoregressive Dispersed Interval co-integration style or bound co-integration technique was used in the study. The Amplified Dickey-Fuller Trial unit root test and Phillip Perron were used to investigate the degree of connectivity. This check was used as a foundation for determining the most appropriate prediction models for the analysis. Data for the research emanates from the World Expansion Pointer and the Central Bank of Nigeria databases. The study lasted from 1989 to 2021.

The model provided for this investigation is highlighted in Equation 1:

$$Y = \beta_0 + \beta X + \beta X + \mu_{it}, \quad (1)$$

where Y = Credit available to the private sector; X_1 = = State bond; X_2 = Inflation; β = Coefficient; μ_{it} = Error term.

The econometric transformation of the above model is shown as follows:

$$LNCPS = \beta_0 + \beta_1 LNTBN + \beta_2 LNINT + \mu_{it}, \quad (2)$$

where LN = Natural Logarithm form of variables; CPS = Credit available to the private sector; TBN = Government total bond; INT = Borrowing cost; β_0 = Measurement of the factor guesstimate; $\beta_1 - \beta_2$ = Coefficients; μ_{it} = Miscalculation stint.

Table 1 provides information on the variables used for this study. The sample is taken from 1989–2021 from the sources indicated in *Table 1* below.

The universal ARDL (p, q) model is identified as follows:

$$Yt = Yoi + \sum_i^p = 1\ \delta i Yt - i + \sum_i^q = 0 \beta i\ Xt - I + \mu_{it}, \quad (3)$$

where Yt is a vector and the variables in (Xt) are allowed to be purely 1(0) or 1(1) or co-integrated; β and δ are coefficients; Y is the constant; $I = 1, \ldots, k$; p, q are optimal lag orders; μ_{it} is the vector of the error terms in unobservable zero mean white noise vector process (serially uncorrelated or self-determining). p lags represent the dependent variable while the q lags are used to denote the exogenous/independent variables.

Table 1

Variables Information

Name of Variable	Abbreviat-ion	Metric Measurement	Transformation Type	Source
Private Sector Credit	CPS	National currency (Naira)	Natural logarithm	Central Bank of Nigeria Statistical bulletin from 1989–2021
Government Total Bond	TBN	Local currency (Naira)	Natural logarithm	Central Bank of Nigeria Statistical bulletin from 1989–2021
Interest rate/ borrowing cost	INT	Percentage	Natural logarithm	World Development Indicators from 1989–2021

Source: Research output, 2023.

To perform the bound test for co-integration, the conditional ARDL (p, $q1$, $q2$) model with 3 variables is specified as shown below:

First of all, the following hypotheses apply:

$$H_0 : \alpha_1 = \alpha_2 = \alpha_3 = 0 \text{ (No co-integrating equation)}$$

$$H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq 0 \text{ (H_0 is not true);}$$

where, α_1, α_2 and α_3 are coefficients to be estimated. The ARDL methodology used AIC to choose the best model and the appropriate length for the lag level.

Therefore, the specification for bound test include:

$$\Delta \ln CPS_t = \alpha_1 \ln CPS_{t-i} + \alpha_2 \ln TBN_{t-i} + \\ + \alpha_3 \ln INT_{t-i} + \ln CPS_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta \ln CPS_{t-i} + \\ + \sum_{i=0}^{q_1} \alpha_2 \Delta \ln TBN_{t-i} + \sum_{i=0}^{q_2} \alpha_3 \Delta \ln INT_{t-i} + \mu_t. \quad (4)$$

For the purpose of this study ARDL is specified as follows:

$$\ln CPS_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta \ln CPS_{t-i} + \\ + \sum_{i=0}^{q_1} \alpha_2 \Delta \ln TBN_{t-i} + \sum_{i=0}^{q_2} \alpha_3 \Delta \ln INT_{t-i} + \mu_t. \quad (5)$$

DATA ANALYSIS AND INTERPRETATION

The data collected on the factors under study have been analyzed and explained in this section. Section 4 includes detailed analyses of the datasets and the results of the tests, which include descriptive statistics in *Table 1*, unit root results in *Table 2*, ARDL free estimation results in *Table 3*, ARDL bounds test results in *Table 4*, VAR Lag order selection criteria in *Table 5*, ARDL short-run estimation results in *Table 6*, test of multi-collinearity results in *Table 7*, serial correlation results in *Table 8*, and finally *Fig. 1–3* expressing the model's appropriateness.

Table 1 displays the descriptive statistics results, which show that the mean values of CPS, TBN, and INT are 7.47, 7.42, and 1.82, respectively. The standard deviations for the variables mentioned are 2.27, 1.64, and 0.88, respectively. This result indicates that the dispersion of the data is low when compared to the mean value, which is higher. However, the Jarque-Bera result, which indicates that the p-values are greater than 0.05, is used to confirm that the dataset has a normal distribution.

To avoid false regression analysis, statistical methods espoused that interconnected time series be differenced progressively before using models [37, 38].

Table 3 shows the free ARDL result that has not yet been subjected to a bound test for lag selection. At this point, we can confirm that private sector investment credit has a significant impact on private sector capital at lag 1. Similarly, interest rates at lag 2 have a significant impact

Table 2

Descriptive Statistics

Variables	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	No. of Observation
CPS	7.47	7.52	10.40	3.41	2.27	–0.65	1.75	2.63(0.27)	33
TBN	7.42	7.33	9.86	3.85	1.64	–0.31	2.20	1.39(0.49)	33
INT	1.82	1.89	3.45	0.00	0.88	–0.30	2.79	2.39(0.30)	33

Source: Author's calculation.

Table 3

Unit Root Test Result

Variables	ADF T–Statistic	Critical Value @ 5%	P–Value	PP T–Statistic	Critical Value @ 5%	P–Value	Order of integrat–ion	Remarks
lnCPS	–4.77	–3.56	0.00	–4.85	–3.56	0.00	1(1)	Stationary
lnTBN	–4.36	–3.56	0.00	–4.58	–3.56	0.00	1(0)	"
lnINT	–6.06	–3.56	0.00	–6.06	–3.56	0.00	1(0)	"

Source: Author's calculation.

Table 4

ARDL Unrestricted Estimation Result

Variable	Coefficient	Std. Error	t–Statistic	Prob.*
LNCPS(–1)	1.028969	0.093697	10.98184	0.0000***
LNTBN	–0.099930	0.139180	–0.717991	0.4794
LNINT	0.031128	0.032868	0.947053	0.3527
LNINT(–1)	–0.000234	0.034047	–0.006877	0.9946
LNINT(–2)	–0.103033	0.034140	–3.017955	0.0058***
C	0.905965	0.406380	2.229355	0.0350
Adj. R^2	0.994407			
S.E. of regressn	0.155873			
F-statistic	1067.674	Durbin-Watson stat.		1.976090
Prob(F-statistic)	0.000000			

Source: Author's calculation.

on private sector growth. The implication is that a steady flow of credit to the private sector and low interest rates will improve the country's private sector operations. It should be noted that government bonds and interest rates without lag and at lag 1 cause significant harm to private sector operations. As a result, crowding out of the private sector is inevitable and harmful to the economy when the government issues more bonds and raises borrowing costs through its monetary authorities.

The Autoregressive Distributive Lag (ARDL) model was utilized to study the relationship between state bonds and private sector investment. The Ardl bound testing, which was recommended by [39], was used to determine whether there is co-integration in the series. The appearance of co-

Table 5

ARDL Bounds Test Result

F-Statistic	Significance	I0 Bound	I1 Bound
2.92	10%	3.17	4.14
	5%	3.79	4.85
	2.5%	4.41	5.52
	1%	5.15	6.36

Source: Author's calculation, 2022.

Table 6

VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	–10.99395	NA	0.153810	0.965100	1.106544	1.009398
1	10.89604	37.74135*	0.036454*	–0.475589*	–0.286996*	–0.416524*
2	10.95884	0.103947	0.038955	–0.410954	–0.175214	–0.337123

Source: Author's calculation.

Note: * Specifies interval direction carefully chosen by the gage.

integration presupposes that there is a long-run balance connection between the variables under consideration [40]. When the unit root test indicates different arrangements of interconnection and the sample size is relatively small, the bounds test is favorable [41].

The lesser and greater bound precarious standards are determined by the bounds test. The figured F-statistic ought to be greater than the high destined check to indicate that co-integration exists [42]. In the analysis in Table 4, the F-statistic of 2.92 is lower than both the lower bound 1(0) result of 3.79 and the upper bound 1(1) result of 4.85. Therefore, there is no long-run co-integration in the series, and H_0 of no long-run co-integration is true.

The outcomes of the ARDL bound test for selecting the most appropriate lags are shown in *Table 5*. The bound test is critical for validating optimum lag performance and achieving a more reliable and unbiased output while aiming to prevent multi — collinearity issues. *Table 5* demonstrates that the optimal lag to apply is one (1), which is backed by all metrics (LR, FPE, AIC, SC and HQ).

Having conducted the bound test as shown in *Table 4*, we were able to select the lag length, which all applicable criteria decided at l (see *Table 5*). Therefore, ARDL short-term estimation was conducted as displayed in *Table 6*. From the result in *Table 6*, the interest rate at lag 1 impacted the private sector at a 10% level of significance. It is important to note that government bonds have no significant impact on private sector operations. This result confirms that government bonds oppress the private sector and prevent it from getting sufficient credit facilities for operation.

The test of the interrelationship of predictor variables is conducted, and the result in *Table 7* indicates that there is no appearance of multi-colinearity of variables in this study. The VIF is less than both 4 [43] and 10 [44]. In *Table 8*, the serial correlation test result confirms the absence of autocorrelation, as indicated by the Durbin-Watson result in *Table 6*.

CUSUM and CUSUMSQ tests were conducted to ensure the model's reliability. This operation is employed to verify the long-run consistency of the regression coefficient. The thematic maps of CUSUMSQ (*Fig. 1*) and CUSUM (*Fig. 2*) can be seen below, and because the plots of these facts and figures continue to stay within the essential frontiers of the 5% level of significance, the Null hypothesis cannot be dismissed. Thus, it implies that the regression equation is unwavering and suitably stated. As a result, these figures show the long-run solidity of the parameters applied in this research. The consistency of each parameter was also checked, and the recursive estimate graph in *Fig. 3* clearly

Table 7

ARDL Short-term estimation result Dependent Variable: D(LNCPS)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCPS(−1))	0.258987	0.174057	1.487940	0.1484
D(LNTBN(−1))	0.047088	0.223226	0.210943	0.8345
D(LNINT(−1))	0.047476	0.025033	1.896558	0.0686**
C	0.156309	0.063335	2.467972	0.0202
S.E. of regression	0.176394			
F-statistic	2.008065	Durbin-Watson stat		1.844155
Prob(F-statistic)	0.006537			

Source: Author's calculation.

Table 8

Test of Multicolinearity

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
C	0.004011	3.996483	NA
D(LNCPS(−1))	0.030296	2.484793	1.006039
D(LNTBN(−1))	0.049830	2.788174	1.031915
D(LNINT(−1))	0.000627	1.027303	1.027275

Source: Author's calculation.

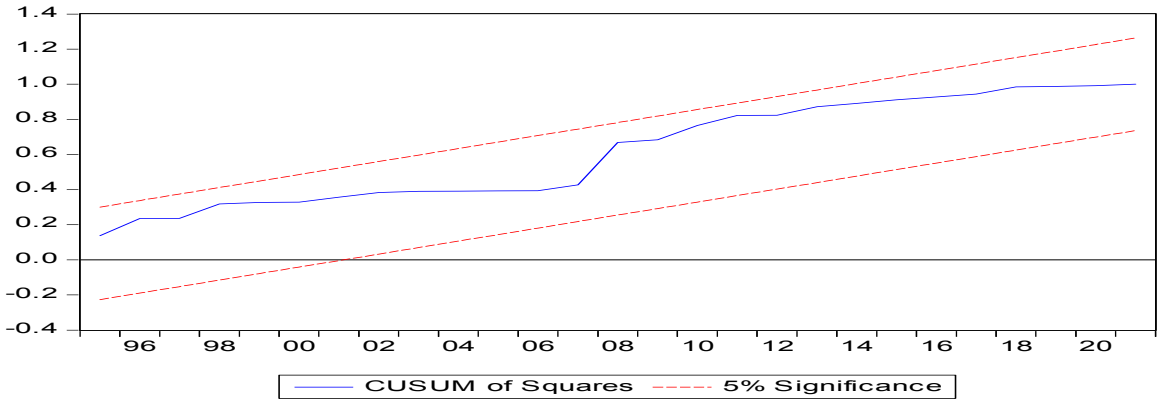


Fig. 1. **Cumulative Sum of Squares**

Source: Research output from e-view 10.

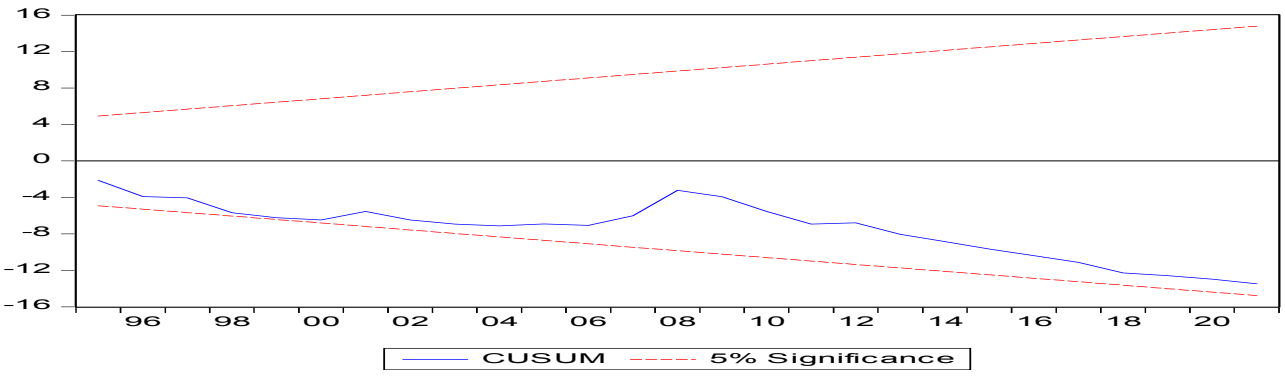


Fig. 2. **Cumulative Sum**

Source: Research output from e-view 10.

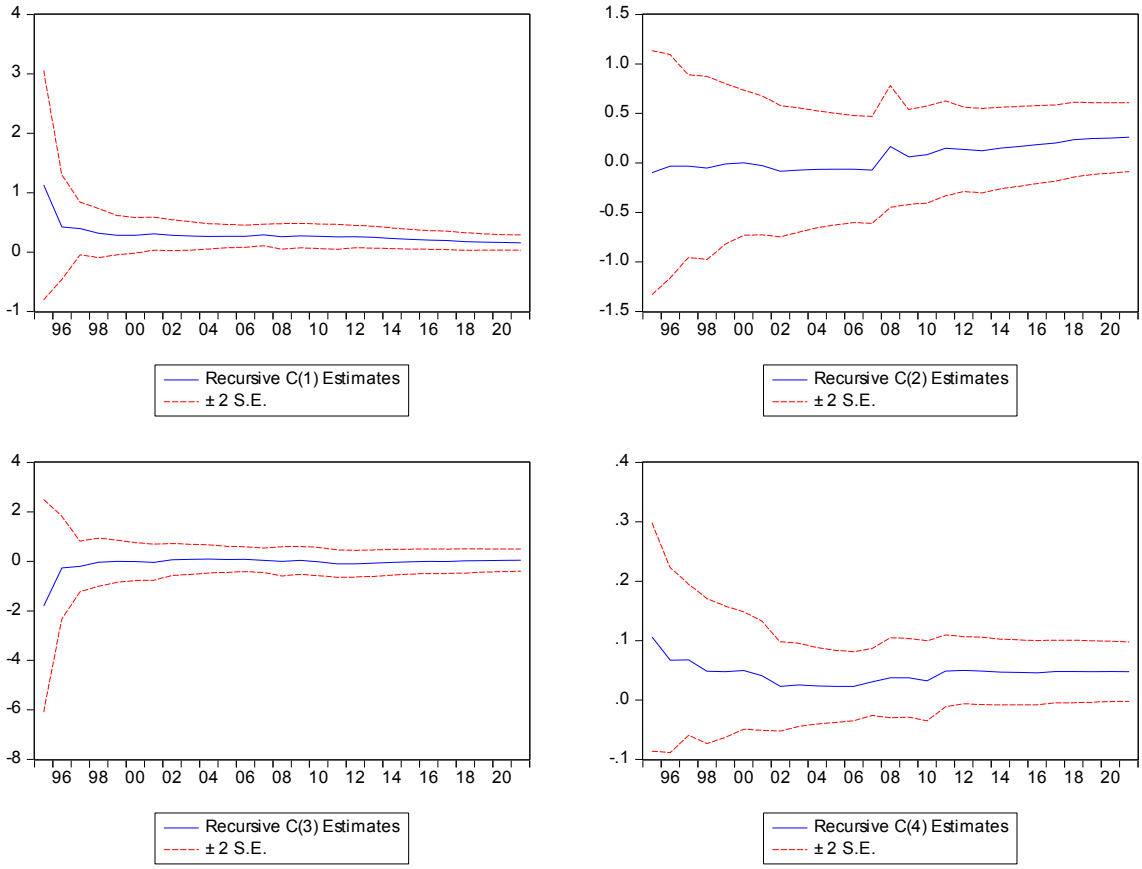


Fig. 3. **Recursive Estimates**

Source: Research output from e-view 10.

shows that the statistics are within the threshold point at the 5% level of significance, inferring that all coefficients in the model are constant. As a result, the chosen output model can be used to inform policy decisions.

CONCLUSION AND RECOMMENDATION

The investigation focused on the impact of government bonds on private sector operations, which is very much dependent on the amount of credit available to the private sector for investment. We evaluated a lot of previous works on the effect of government domestic borrowing both on the economy at large and on the private sector; however, the results were inconclusive, implying that government borrowing domestically has both harmful and beneficial effects on the economy. Thus, the emergence of this current study has proved

that if care is not taken, government borrowing may likely force the private sector out of business in Nigeria. The fiscal implication of this scenario is that there will be massive unemployment and economic chaos because the economy will be harmed and the government sector will not be able to absorb the shock. The private sector has been a significant contributor to Nigeria's economic growth and productivity, and it requires adequate funding to continue operating at full capacity. Furthermore, the private sector has made significant contributions to the production of goods and services, as well as human capital development and job creation. The private sector in the country is responsible for the majority of exports and international trade. For the government, the private sector contributes to the generation of tax revenue for social development. Firms' capital structures include debt issuance, which is necessary for firms to take advantage of investment opportunities, maximize growth, and boost after-tax earnings [[45]. Therefore, the study suggests that the federal government formulate strategies to regulate government domestic borrowing and rates of interest, as well as measures to facilitate financial growth by boosting SME access to low interest credit facilities, in order to promote private sector investments in the country. There is a need for further studies in other Sub-Saharan African countries, as this study is limited by a lack of data to cover other countries in Africa.

REFERENCES

1. Obeng-Ampousah W., Sun Z., Havidz H.B.H., Dey E.A. Determinants of domestic credit to the private sector in Ghana: Application of Vector Auto-Regressive Method. In: Proc. 1st Int. symp. on management and social sciences (ISMSS 2019). (Wuhan, April 13–14, 2019). Dordrecht: Atlantis Press; 2019:132–139. (Advances in Social Science, Education and Humanities Research. Vol. 309). DOI: 10.2991/ismss-19.2019.28
2. Egwuatu P. Alarm, as FG chokes private sector out of bonds market. Vanguard. Oct. 04, 2021. URL: https://www.vanguardngr.com/2021/10/alarm-as-fg-chokes-private-sector-out-of-bonds-market/ (accessed on 10.12.2022).
3. Smetters K., Dinerstein M. Explainer: Capital crowd out effects of government debt. Budget Model. Jun. 28, 2021. URL: https://budgetmodel.wharton.upenn.edu/issues/2021/6/28/explainer-capital-crowd-out-effects-of-government-debt (accessed on 20.12.2022).
4. Akanbi A. Government domestic borrowing and private sector credit crowding out: Empirical evidence from Nigeria. *Journal of Investment and Management.* 2020;9(4):100–106. DOI: 10.11648/j.jim.20200904.12
5. Boccia R. How the United States' high debt will weaken the economy and hurt Americans. The Heritage Foundation. Feb. 12, 2013. URL: https://www.heritage.org/budget-and-spending/report/how-the-united-states-high-debt-will-weaken-the-economy-and-hurt
6. Nneka U.J., Ngong C.A., Ugoada O.A., Onwumere J.U.J. Effect of bond market development on economic growth of selected developing countries. *Journal of Economic and Administrative Sciences.* 2022. DOI: 10.1108/JEAS-01–2022–0015
7. Oke M.O., Dada O., Aremo N.O. Impact of bond market development on the growth of the Nigerian economy. *Folia Oeconomica Stetinensia.* 2021;21(1):60–75. DOI: 10.2478/foli-2021–0005
8. Omodero C.O., Alege P.O. Public-sector bonds and economic growth in Nigeria. *Montenegrin Journal of Economics.* 2022;18(2):95–103. DOI: 10.14254/1800–5845/2022.18–2.9
9. Teixeira J.C., Vieira C., Ferreira P. The effects of government bonds on liquidity risk and bank profitability in Cape Verde. *International Journal of Financial Studies.* 2021;9(1):2. DOI:10.3390/ijfs9010002
10. Yusuf A., Mohd S. The impact of government debt on economic growth in Nigeria. *Cogent Economics & Finance.* 2021;9(1):1946249. DOI: 10.1080/23322039.2021.1946249
11. Bouis R. Banks' holdings of government securities and credit to the private sector in emerging market and developing economies. IMF Working Paper. 2019;(224). URL: https://www.imf.org/en/Publications/WP/Issues/2019/10/11/Banks-Holdings-of-Government-Securities-and-Credit-to-the-Private-Sector-in-Emerging-Market-48651 (accessed on 19.01.2023).
12. Kayongo A.J. Government domestic borrowing and private sector credit in Uganda: A time series analysis. Unpublished master's theses. Kampala: Makerere University. 2021. URL: http://www.dspace.mak.ac.ug/handle/10570/10422 (accessed on 22.01.2023).

13. Vanlaer W., Picarelli M., Marneffe W. Debt and private investment: Does the EU suffer from a debt overhang? *Open Economies Review*. 2021;32(1):789–820. DOI: 10.1007/s11079–021–09621-x
14. Scott R., Moosa S., PonArul R. Government debt in the macro economy and finance. *Review of Business Research*. 2008;8(5):198–202.
15. Aguiar M., Amador M., Farhi E., Gopinath G. Sovereign debt booms in monetary unions. *American Economic Review*. 2014;104(5):101–106. DOI: 10.1257/aer.104.5.101.
16. Mokhova N., Zinecker M. Sovereign debt and corporate capital structure: The evidence from selected European countries during the global financial and economic crisis. *Business: Theory and Practice*. 2017;18:14–24. DOI: 10.3846/btp.2017.002
17. Dittmar R.F., Yuan K. Do sovereign bonds benefit corporate bonds in emerging markets? *The Review of Financial Studies*. 2008;21(5):1983–2014. DOI: 10.1093/rfs/hhn015
18. Grishunin S., Bukreeva A., Suloeva S., Burova E. Analysis of yields and their determinants in the European corporate green bond market. *Risks*. 2023;11(1):14. DOI: 10.3390/ risks11010014
19. Koka D.N. The relationship between the government bond issues and economic growth in Kenya. Master degree theses. Nairobi: University of Nairobi; 2012. 50 p. URL: http://erepository.uonbi.ac.ke/bitstream/handle/11295/14570/Koka%20_The%20Relationship%20Between%20The%20Government%20Bond%20Issues%20And%20Economic%20Growth%20In%20Kenya.pdf?sequence=6&isAllowed=y (accessed on 20.01.2023).
20. Fisher I. The theory of interest: As determined by impatience to spend income and opportunity to invest it. New York, NY: The Macmillan Company; 1930. 601 p.
21. Ahmad A.A., Adeleke A.I., Ujunwa A. Government borrowing behavior: Implications for private sector growth in Nigeria. *International Journal of Sustainable Development & World Policy*. 2019;8(2):68–82. DOI: 10.18488/journal.26.2019.82.68.82
22. Bonga W.G., Chirowa F., Nyamapfeni N. Growth-debt nexus: An examination of public debt levels and debt crisis in Zimbabwe. *Journal of Economics and Finance*. 2015;6(2):9–14. DOI: 10.9790/5933–06230914
23. Woo J., Kumar M.S. Public debt and growth. *Economica*. 2015;82(328): 705–739. DOI: 10.1111/ecca.12138
24. Ali Abbas S.M., Christensen J.E. The role of domestic debt markets in economic growth: An empirical investigation for low-income countries and emerging markets. IMF Working Paper. 2007;(127). URL: https://www.imf.org/external/pubs/ft/wp/2007/wp07127.pdf (accessed on 15.01.2023).
25. Mabugu R., Robichaud V., Maisonnave H., Chitiga M. Impact of fiscal policy in an intertemporal CGE model for South Africa. *Economic Modelling*. 2013;31:775–782. DOI: 10.1016/j. econmod.2013.01.019
26. Tsoulfidis L. Classical economists and public debt. *International Review of Economics*. 2007;54(1):1–12. DOI: 10.1007/s12232–007–0003–8
27. Rahman N.H.A., Ismail S., Ridzuan A.R. How does public debt affect economic growth? A systematic review. *Cogent Business & Management*. 2019;6(1):1701339. DOI: 10.1080/23311975.2019.1701339
28. Baker N., Miller M., Rankin E. Government bond markets in advanced economies during the pandemic. Reserve Bank of Australia Bulletin. 2021;(Sept.):52–60. URL: https://www.rba.gov.au/publications/bulletin/2021/sep/pdf/government-bond-markets-in-advanced-economies-during-the-pandemic.pdf (accessed on 25.01.2023).
29. Mhlaba N., Phiri A. Is public debt harmful towards economic growth? New evidence from South Africa. *Cogent Economics & Finance*. 2019;7(1):1603653. DOI: 10.1080/23322039.2019.1603653
30. Saungweme T., Odhiambo N.M. Government debt, government debt service and economic growth nexus in Zambia: A multivariate analysis. *Cogent Economics & Finance*. 2019;7(1):1622998. DOI: 10.1080/23322039.2019.1622998
31. Traum N., Yang S.-C.S. When does government debt crowd out investment? *Journal of Applied Econometrics*. 2005;30(1):24–45. DOI: 10.1002/jae.2356
32. Fatás A., Ghosh A., Panizza U., Presbitero A.F. The motives to borrow. IMF Working Paper. 2019;(101). URL: https://www.imf.org/en/Publications/WP/Issues/2019/05/10/The-Motives-to-Borrow-46743

33. Ambaye G.G., Berhanu T., Abera G. Modeling the determinants of domestic private investment in Ethiopia. *Agris On-Line Papers in Economics and Informatics*. 2013;5(4):13–23. URL: https://www.researchgate.net/publication/287611537_Modeling_the_Determinats_of_Domestic_Private_Investments_in_Ethiopia
34. Mbate M. Domestic debt, private sector credit and economic growth in sub-Saharan Africa. *African Development Review*. 2013;25(4):434–446. DOI: 10.1111/1467–8268.12040
35. Lidiema C. Effects of government borrowing on private investments in Kenya. KBA Centre for Research on Financial Markets and Policy. Working Paper Series. 2017;(22). URL: https://www.econstor.eu/bitstream/10419/249523/1/WPS-22.pdf
36. Mwakalila E. Crowding out of private sector in Tanzania: Government expenditure, domestic borrowing and lending rates. *Emerging Economy Studies*. 2020;6(1):123–135. DOI: 10.1177/2394901520913653
37. Kim B.S. Impact of the global financial crisis on Asia-Pacific real estate markets: Evidence from Korea, Japan, Australia and U.S. REITs. *Pacific Rim Property Research Journal*. 2009;15(4):398–416. DOI: 10.1080/14445921.2009.11104288
38. Dolado J.J., Gonzalo J., Marmol F. Cointegration. In: Baltagi B.H., ed. A companion to theoretical econometrics. Oxford: Blackwell Publishing Ltd; 2001:634–654. DOI: 10.1002/9780470996249.ch31
39. Pesaran M.H., Shin Y., Smith R.J. Bonds testing approaches to the analysis of level relationships. *Journal of Applied Economics*. 2001;16(3):289–326. DOI: 10.1002/jae.616
40. Pesaran M.H. Market timing and return prediction under model instability. *Journal of Empirical Finance*. 2002;9(5):495–510. DOI: 10.1016/S 0927–5398(02) 00007–5
41. Pesaran M.H., Shin Y. An autoregressive distributed-lag modelling approach to co-integration analysis. In: Strøm S., ed. Econometrics and economic theory in the 20th century: The Ragnar Frisch centennial symposium. Cambridge: Cambridge University Press; 1998:371–413. (Econometric Society Monographs Series. No. 31).
42. Ncanywa T., Masoga M.M. Can public debt stimulate public investment and economic growth in South Africa? *Cogent Economics & Finance*. 2018;6(1):1516483. DOI: 10.1080/23322039.2018.1516483
43. Garson G. Testing statistical assumptions. Asheboro, NC: Statistical Associates Publishing; 2012. 52 p.
44. Gujarati D.N., Porter D.C. Basic econometrics. 5th ed. Boston, MA: McGraw-Hill/Irwin; 2009. 946 p.
45. Homapour E., Su L., Caraffini F., Chiclana F. Regression analysis of macroeconomic conditions and capital structure of publicly listed British firms. *Mathematics*. 2022;10(7):1119. DOI: 10.3390/math10071119

ABOUT THE AUTHOR

Cordelia O. Omodero — PhD, Senior Lecturer, Department of Accounting College of Management and Social Sciences, Covenant University Ota, Ogun State, Nigeria
https://orcid.org/0000-0002-8758-9756
onyinyechi.omodero@covenantuniversity.edu.ng

Conflicts of Interest Statement: The author has no conflicts of interest to declare.

The article was submitted on 13.03.2023; revised on 28.03.2023 and accepted for publication on 26.04.2023.
The author read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-71-83
UDC 336.02(045)
JEL H74, H77, Q58, R51

Budget Policy of the Largest Russian Cities as a Tool to Respond to Global Challenges

V.V. Klimanov, A.A. Mikhaylova
The Russian Presidential Academy of National Economy and Public Administration (The Presidential Academy, RANEPA), Moscow, Russia;
NGO Institute for Public Finance Reform, Moscow, Russia

ABSTRACT

The largest cities in Russia, just like other megacities in the world, are facing the challenges of a new reality. Fiscal policy actively helps to counter these challenges, among other things. The **purpose** of the study is to identify fiscal tools for large cities to respond to global challenges. The **methodology** consisted in the fact that, based on a unique database compiled by the authors on the budgets of the ten largest cities in Russia from 2011 to 2021, a comparative study of their parameters was carried out (tax and non-tax revenues by types, intergovernmental fiscal transfers by types, expenses by industry classification), their structures and dynamics. The **results** obtained indicate that the cities are very different and a lot of budget parameters, in principle, do not depend on the budget policy of the city, as they are determined by regional legislation, for example, transferred tax deduction standards or transferred spending powers. At the same time, it is **concluded** that cities retain the ability to pursue an independent budget policy, for example, by managing the structure of expenditures, which was transformed in a certain way during periods of crisis. That is an element of scientific novelty. To a greater extent, this statement is true for such a megacity as Moscow, which really showed a high degree of independence in times of crisis. Other large cities generally do not have sufficient independence in terms of opportunities to replenish their budgets and spend funds, and they have to rely on transfers from budgets at a higher level. The **practical significance** for higher-level government bodies lies in confirming the thesis about the need to implement a differentiated budget policy for cities that fall into different groups according to the level of budgetary provision.

Keywords: fiscal policy; megacity; fiscal sustainability; budgetary independence; intergovernmental fiscal transfers; budget openness; state programs and projects

For citation: **Klimanov V.V., Mikhaylova A.A. Budget policy of the largest Russian cities as a tool to respond to global challenges.** ***Finance: Theory and Practice.*** **2024;28(4):71-83. DOI: 10.26794/2587-5671-2024-28-4-71-83**

INTRODUCTION

It is recognized that that the world of today, and more that of the future, is a world of cities, the positive and negative impact of global challenges is manifested more in the big cities involved in international relations. Megacity challenges include overpopulation, large-scale migration, multiculturalism, social fragmentation, economic crises, environmental problems, and opportunities for new technologies, digitalization of economic sectors and spheres of life, overall growth in wealth and consequent growth in consumption, deficit and costly resources.

At the same time, for the various countries of the world, the current challenges concern both the industrial phase of development of countries and cities in the world and the stage of post-industrial society. This fact must be taken into account in the formulation of tools for responding to these challenges by governments at the country level and especially at the city-specific level.

Analysis of scientific literature on global challenges reveals the multiplicity of interpretations, from narrow to broad, of a theoretical or applied nature, including in the "link" to the UN Sustainable Development Goals, other international-level documents.

The manifestation of global challenges for cities at different stages of evolutionary development (industrial and post-industrial stages; various phases of technological development) is different. As N.V. Zubarevich shows, the largest cities are centers of modernization of the economy and human capital [1]. At the same time, the largest metropolises of the post-industrial world with a diversified urban economy, a highly skilled population, an advanced level of digitalization and a quality urban environment are becoming more resilient (shock-resistant) to external influences and shocks. This distinguishes them in a positive way compared to cities with a narrower set of economic functions, dependency of the city budget on a limited number of taxpayers, acute environmental problems [2]. In this regard, the vulnerability of small cities to adverse impacts may be greater, including due to the limited implementation of budgetary maneuvers [3].

At the same time, the growth of the role of the city authorities in state and municipal administration is also necessary to realize the full economic potential of the largest cities [4]. S.V. Bogachov noted that the substantial role of state subsidies and grants in the income structure of city budgets can lead to a reduction in incentives for the work of municipal authorities to mobilize their own tax and non-tax sources [5].

The budgets of the major cities of Russia are a subject of scientific interest, mainly in terms of determining the budgetary possibilities of their socio-economic development [6, 7]. Thus, O.V. Kuznetsova shows that the autonomy of the authorities of urban districts is very low and has a tendency to decline. They lost their impact on health development, but started spending relatively more money on the economy. The amounts of funds that are disposed of by the authorities of the city districts are several times smaller in comparison with the volumes of Moscow and St. Petersburg funds [6].

According to our paper [3], global challenges were systematized, allowing them to be "adapted" to the conditions of Moscow as a megacity, acting as the main object of analysis. Thus, the following groups of challenges are important for Moscow:

- changes in the structure and composition of the population, including the problems of its ageing, active migration to the Moscow agglomeration of visitors from other regions of Russia and countries of "near abroad", social stratification, labor deficit in a number of sectors;
- need to develop the transport complex, engineering and social infrastructure;
- housing construction on new principles;
- change and diversification of the economic structure, including — which is quite specific to Moscow and its budget in

the last decade — the decrease in the share of income associated with the concentration in the city headquarters of companies using the resources of other regions and cities;

- over-compressed urban space, shortage of free plots for new construction, and the need to re-profile the current use of land;
- technological innovations and their spread throughout the territory;
- environmental issues and demands for the quality of the urban environment;
- costs associated with the availability in the city of administrative bodies and representatives of the suburban level (country, other states, international organizations).

Similar challenges are in many ways characteristic of other megacities of countries of the world, characterized in the scientific literature as global cities.

A review of megacities' budget response practices to the challenges faced by the coronavirus-induced 2020 crisis shows that progressive cities have been able to use the difficult crisis period caused by the pandemic as an opportunity to improve their economic and budgetary policies [3]. In any case, the coronavirus pandemic has had a negative impact on the public finances of all the countries of the world [8]. Important to this crisis are the problems associated with economic inequality and different budgetary capabilities of regions and municipal institutions for the confrontation of the pandemic [9, 10]. Some studies have shown that countries and regions that had a well-established system of inter-budgetary relationships that could be used to provide rapid inter- budgetary transfers for prompt decision-making were more effective in this situation [11].

At the same time, during the period of lockdown and other constraints caused by the pandemic, many budget practices have improved, various fiscal innovations have been promptly developed, approved and implemented, including those relating to help to and certain categories of citizens. Budgets of many megacities have become more focused on supporting the vulnerable segments of the population, helping small business, and the rate of adoption and implementation of budget innovations has increased.

In recent years, a number of studies have emerged on the impact of the pandemic on the budget parameters of cities and regions [12, 13], with continued emphasis on federal policy measures. S.P. Solyannikova shows that against the background of the growth of inter-budgetary transfers from the federal budget in many regions the income of the population from entrepreneurial activity is decreasing, but the share of social benefits and salaries of state and municipal employees is increasing [14].

Moreover, not only in times of crisis, the "green agenda" now plays a major role in the budgetary agenda of the world's megacities [15]. Climate change policy studies state that effective state climate action requires cooperation and coordination between all levels of state and municipal administration [16].

Next, a detailed study on the budgets of the largest cities of Russia will be presented, in which the authors attempt to answer the question: how has the structure of budgets in the largest Russian cities changed in connection with the need to respond to the challenges of the new reality?

This review does not address issues related to the 2022–2023 challenges due to large-scale changes in the geopolitical and geo-economic situation, including the imposition of economic sanctions against Russia by hostile countries. Analysis of the response of city budgets to these changes will require a separate study based on more up-to-date information.

MATERIALS AND METHODS

For extensive analysis, the budgets of the ten most populous Russian cities for 11 years, from 2011 to 2021, were selected. These cities

Table 1

Population, Revenues and Expenditures of the Budgets of the Largest Russian Cities

City	Resident population as of January 1, 2022, thousand people	Budget revenues in 2021, million rubles	Budget expenditures in 2021, million rubles
Moscow	12 635	3 335 600.0	3 445 684.8
St. Petersburg	5 378	843 344.7	796 487.6
Novosibirsk	1 621	57 697.9	57 347.4
Yekaterinburg	1 494	57 678.3	56 862.2
Kazan	1 259	37 924.1	36 414.9
Nizhny Novgorod	1 234	45 166.6	45 502.2
Chelyabinsk	1 179	49 642.4	48 193.7
Samara	1 137	33 718.0	33 264.1
Ufa	1 135	35 906.0	35 862.8
Rostov	1 135	45 229.8	44 444.2

Source: Compiled by the authors based on data from Rosstat and ConsultantPlus: Regional Legislation. URL: https://rosstat.gov.ru/compendium/document/13282 (accessed on 03.18.2023).

are: Moscow, St. Petersburg, Novosibirsk, Yekaterinburg, Kazan, Nizhny Novgorod, Chelyabinsk, Samara, Ufa, and Rostov (*Table 1*).

In the course of the study, a unique database has been compiled, which includes information on the revenues and expenditure of the city budgets. Data collected from approved reports on the performance of the relevant budgets from the "ConsultantPlus: regional legislation system". We have used the grouping of budget revenues by type and subtype and the grouping of expenditure according to sections of the budget classification. Unfortunately, the approved reports in a number of cases in different years did not have the data for the necessary classification, and only departmental groups were present. At the same time, the majority of the data was collected. The budget indicators of the city of St. Petersburg are also not considered, because the annexes to the laws on budget implementation containing the classifications that interest us are not present in the "ConsultantPlus: Regional legislation system".

Furthermore, using methods of comparative statistics, we analysed how the dynamics and structure of the largest urban budgets of Russia changed over the years.

It must be noted at once that such comparisons have a number of limitations. Thus, Moscow and St. Petersburg, being at the same time cities and regions of the Russian Federation, have a completely different structure of budgetary revenues and expenditure than the other millionaire cities. Their budgets are filled, inter alia, by substantial amounts of corporate income tax, property tax, transport tax and personal income tax. And in the expenditure part there are inter-budgetary transfers to municipalities, national defense expenditures. As can be seen in *Table 1*, the consolidated budget of Moscow is 100 times greater than the budget, for

Table 2

Growth of Budget Revenues of the Largest Cities, % to the Previous Year

City	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Moscow	0.6	–0.5	4.3	7.7	11.3	13.2	13.3	10.7	9.1	16.3
Novosibirsk	6.9	8.9	–3.8	–9.4	1.0	5.7	12.7	17.2	5.4	12.8
Yekaterinburg	5.9	9.9	–10.9	0.2	7.6	17.0	6.2	14.3	8.5	8.5
Kazan	12.4	–10.7	–0.8	2.1	1.3	0.1	20.6	1.6	5.6	30.5
Nizhny Novgorod	–11.6	4.8	4.5	0.3	18.1	13.2	–1.1	2.0	16.2	19.7
Chelyabinsk	0.0	7.3	–0.2	–4.7	9.2	9.1	14.5	17.4	14.7	–4.9
Samara	18.4	7.0	7.4	–8.3	10.4	10.8	–1.9	10.2	6.4	11.3
Ufa	10.3	21.6	–3.0	–1.0	4.2	4.3	14.0	19.6	0.6	8.0
Rostov	2.4	–0.6	12.6	12.8	–2.7	4.5	–2.6	0.7	18.1	16.9

Source: Compiled by the authors based on data from ConsultantPlus: Regional Legislation (accessed on 03.18.2023).

example, of Samara. Even with the population adjustment, the surplus will be more than 10 times. At the same time, the budgetary levels of cities, which are not regions, are comparable in theory, even corrected by the fact that budgetary legislation, transferable expenditure commitments and revenue authority vary from region to region.

RESULTS AND DISCUSSION

From 2012 to 2021, all the cities in our sample experienced a reduction in budget revenues in one way or another compared to the previous year (*Table 2*).

At the same time, Moscow is the only city that in the period considered in principle never showed a negative dynamic of the growth of tax and non-tax revenues of the budget (*Table 3*).

The 2014–2015 crisis almost everywhere affected both budget revenue and budget expenditure (*Table 4*), while the corona crisis, having a completely different nature, did not result in budget expenditures cuts in 2020. The exception is Chelyabinsk, which is mainly due to the high rates of growth of its income in 2019.

The average rate of growth of budget expenditure of the largest cities for the period 2012–2021 (*Fig. 1*) shows that only Moscow showed significantly high result.

When calculated on the basis of regional consumer price indices, it can be concluded that in only a few cities the real levels of revenue and expenditure of the budget increased compared to 2012 (*Fig. 2*). These are Ufa, Chelyabinsk, Moscow and Samara. In the other cities surveyed, real budget revenues in 2021 were even lower than they were in 2011. As is expected, the cities encountered the maximum drop in the crisis year of 2015 (the lowest indicators in Nizhny Novgorod, Chelyabinsk, Yekaterinburg, Novosibirsk), in 2020 such a strong decline did not follow, and by 2021 almost all cities reached the level of 2011 on the indicator of real budget income, taking into account the index of consumer prices. This can be explained by the fact that inter-budgetary transfers have increased significantly. In terms of the average rate of growth of urban budgets expenditure by major sectors, it is possible to identify almost everywhere (with the exception of Kazan) the growth of national expenditures, which

Table 3

Growth of Tax and Non-Tax Budget Revenues of the Largest Cities, % to the Previous Year

City	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Moscow	6.3	2.4	5.2	5.2	11.7	15.5	12.2	11.2	0.9	23.9
Novosibirsk	6.7	6.8	4.1	– 16.5	1.0	4.1	5.8	11.1	– 0.5	17.6
Yekaterinburg	5.8	6.5	– 10.8	– 4.0	– 1.9	9.0	7.8	23.9	– 1.7	5.4
Kazan	10.2	8.7	– 4.6	2.2	…	…	14.3	0.9	1.3	17.8
Nizhny Novgorod	– 11.1	16.8	4.6	…	…	…	…	…	…	…
Chelyabinsk	3.8	3.1	– 8.8	– 16.8	4.8	15.0	10.9	3.9	– 0.3	13.2
Samara	1.5	7.6	– 4.5	– 11.9	6.4	6.9	6.2	3.3	0.4	13.8
Ufa	– 11.3	17.0	3.9	– 0.3	– 14.9	6.5	17.7	10.3	6.7	9.5
Rostov	8.5	3.8	2.2	…	…	…	…	…	…	…

Source: Compiled by the authors based on data from ConsultantPlus: Regional Legislation (accessed on 03.18.2023).

Table 4

Growth of Budget Expenditures of the Largest Cities, % to the Previous Year

City	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Moscow	9.7	–0.4	4.7	–5.0	14.1	20.6	10.5	16.0	12.0	14.6
Novosibirsk	0.8	13.4	–6.6	–7.4	–2.5	10.5	8.5	18.2	2.5	11.1
Yekaterinburg	5.5	14.3	–8.9	–2.3	4.0	14.4	8.2	16.8	7.1	8.0
Kazan	–23.1	–1.0	–6.4	–0.2	–0.8	3.8	16.1	4.2	2.7	29.3
Nizhny Novgorod	–10.5	6.1	3.9	0.6	11.2	22.3	–7.7	6.3	12.1	19.3
Chelyabinsk	–2.4	7.1	–0.8	–2.8	6.7	6.7	16.4	18.6	13.7	–8.1
Samara	14.3	6.5	3.6	–4.8	4.3	16.5	–7.2	10.9	5.8	10.6
Ufa	9.5	14.1	9.0	–7.6	9.1	–4.6	9.0	20.7	–1.3	12.2
Rostov	4.1	4.3	12.5	8.4	–4.5	8.5	–0.1	–0.3	14.8	15.2

Source: Compiled by the authors based on data from ConsultantPlus: Regional Legislation (accessed on 03.18.2023).

exceeded the overall rate of expenditure growth by all items.

In the period since 2015 Moscow shows extremely dynamic growth in both income and expenditure (*Fig. 3*). In 2021, with the ability to implement an extremely independent budgetary policy, Moscow became the first region in Russia to issue an unprecedented amount of "green" bonds worth 70 billion rubles, the funds from the placement of which went to the purchase of electric buses and the construction of the Ring Line of Moscow metro. Separately, it is possible to note the extremely high share of funds allocated in the budget of Moscow within the framework of state programs, approaching 100% of budgetary expenditures, which Moscow transferred as early as 2012.

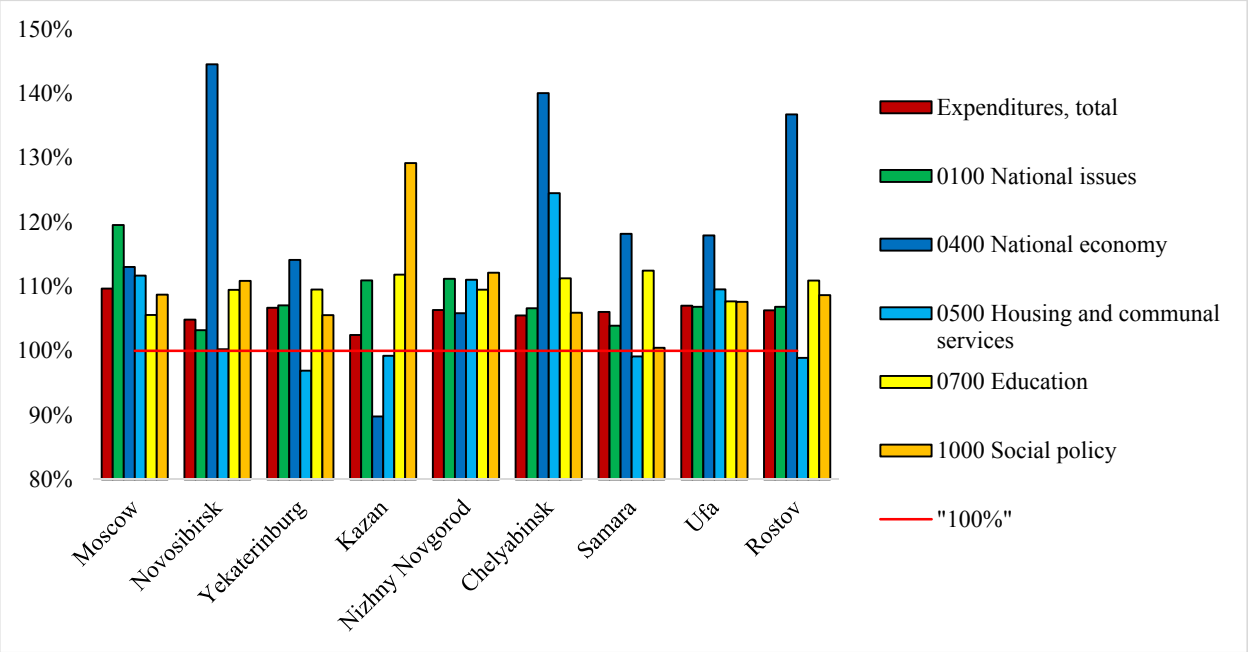


Fig. 1. **The Average Growth Rate of City Budget Expenditures by Main Items, for 2012–2021**

Source: Compiled by the authors based on data from ConsultantPlus: Regional Legislation (accessed on 03.18.2023).

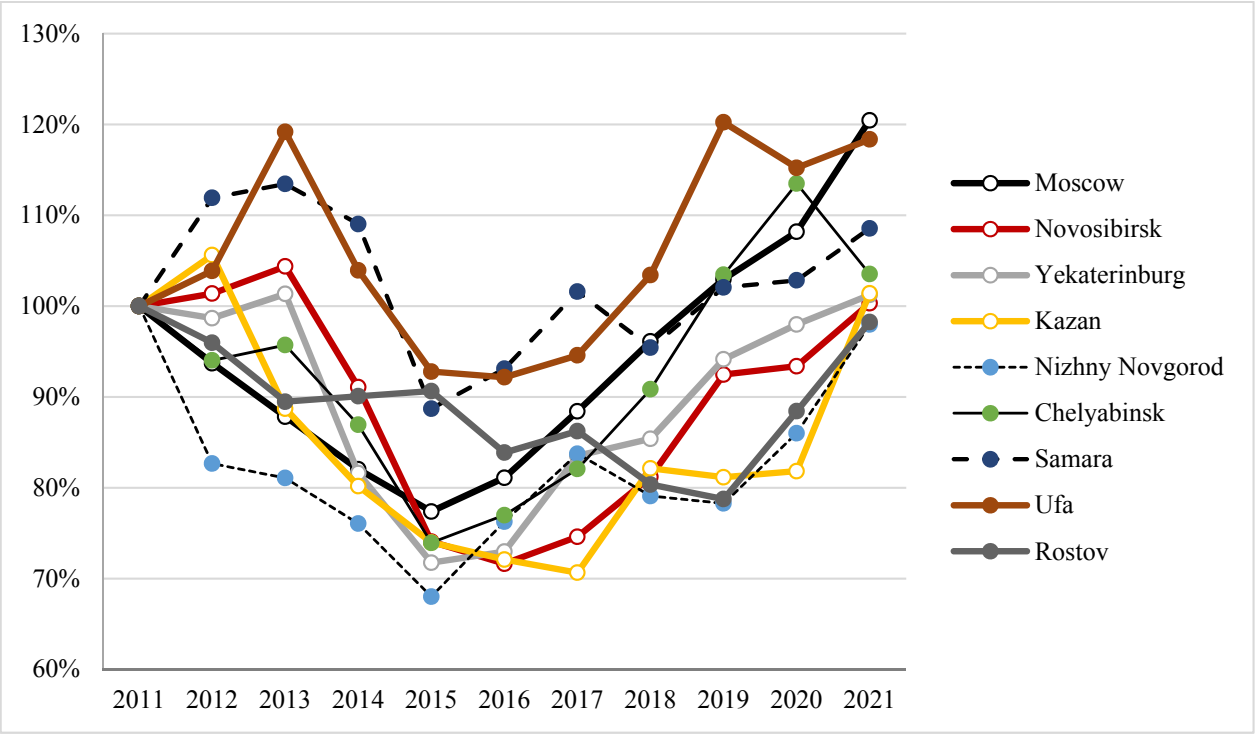


Fig. 2. **Dynamics of City Budgets' Expenditure Compared to the 2011 Level at 2021 Prices, %**

Source: Compiled by the authors based on data from ConsultantPlus: Regional Legislation (accessed on 03.18.2023).

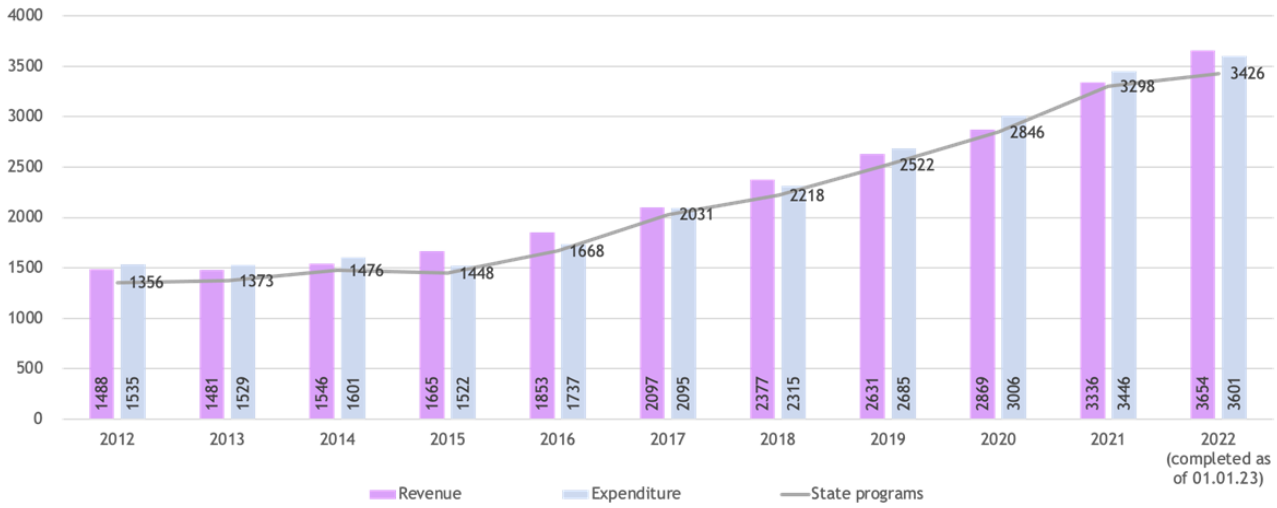


Fig. 3. **Revenue and Expenditure of the Moscow Budget in 2012–2022, Billion Rubles**

Source: Compiled by the authors based on data from ConsultantPlus: Regional Legislation (accessed on 03.18.2023).

It should be noted that at the end of May 2023, the "green" agenda in Moscow's debt policy was continued. Special "green" bonds for the population were issued.[1]

Analysis of the structure of the budgets of the largest Russian cities confirms the hypothesis that the sources of tax and non-tax revenue, as well as structure of expenditure in them differ, first of all, due to distinction in regional legislation. In different years, decisions were made in some regions to transfer certain norms on tax deductions, as well as expenditure obligations to the municipality level, which gives such a heterogeneous picture.

For example, since 2012, regions have been able to determine which health responsibilities are to municipalities and which are transferred to higher levels. And with rare exceptions, most of the authority since that period has been redistributed from cities to regions. For example, in Kazan and Nizhny Novgorod, expenditures under the article "health" in 2012 decreased by tens of times compared to 2011. In the budget of Novosibirsk since 2014 health expenditure is absent in principle. In Yekaterinburg, healthcare expenditure decreased by only 1.5 times and, although it was in 2015–2016, retained its high level. Moreover, in 2020, healthcare expenditure in the capital of the Urals increased sharply — 2.5 times as compared to previous years, in response to the coronavirus pandemic. The situation in Rostov was almost identical to that of Yekaterinburg in terms of the financing of health care.

If you look at the income structure of the budgets of the largest Russian cities from 2012 to 2021, then from the group of cities in question, except for Moscow and St. Petersburg, they are all extremely dependent on inter-budgetary transfers from the higher level (*Fig. 4*). In addition, it can be seen that in all cities, except Moscow, the share of tax and non-tax income in the total amount of budget revenues decreased in 2021 compared to 2012 (*Fig. 5*). The main source of tax revenues is traditionally the income tax of individuals, followed by property taxes.

From the point of view of the structure of the expenditure budgets of the largest cities, the main share of them is traditionally the cost of education, which reaches 50% of all city budgets (*Fig. 6*). Otherwise predictable is the situation in Moscow, which, because of its regional status, also realizes the expenditure powers of the subject of the federation, and

[1] URL: https://www.mos.ru/news/item/124385073 (accessed on 19.06.2023).

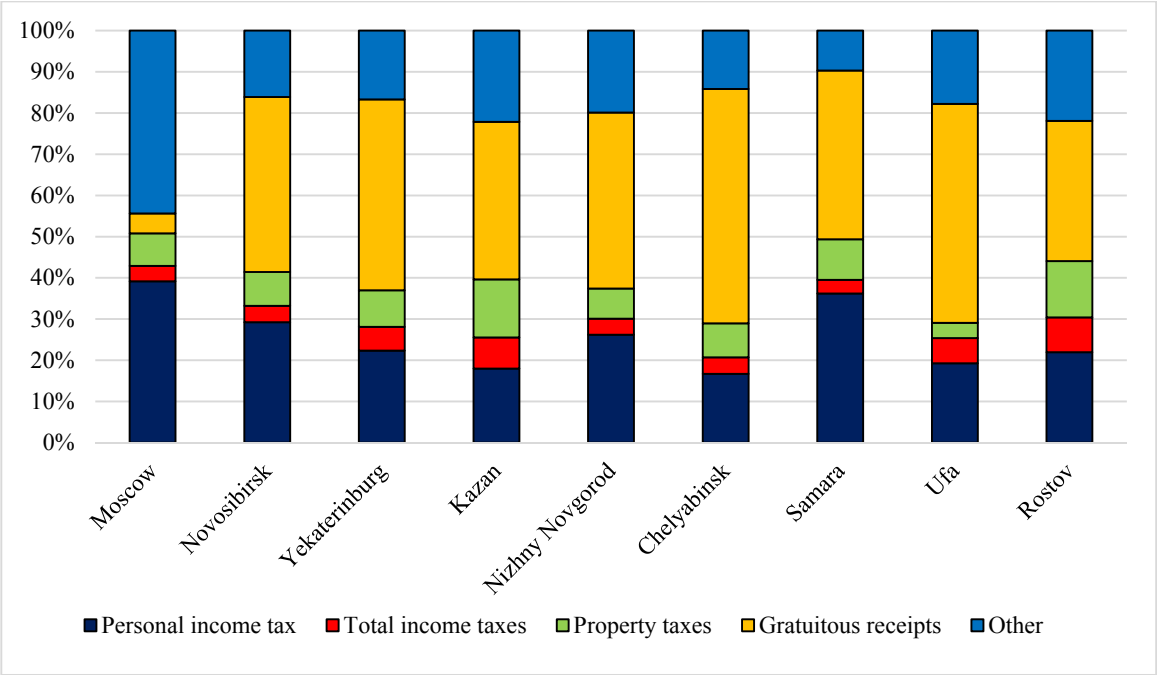


Fig. 4. **Structure of Incomes of City Budgets, on Average for 2012–2021, %**

Source: Compiled by the authors based on data from ConsultantPlus: Regional Legislation (accessed on 03.18.2023).

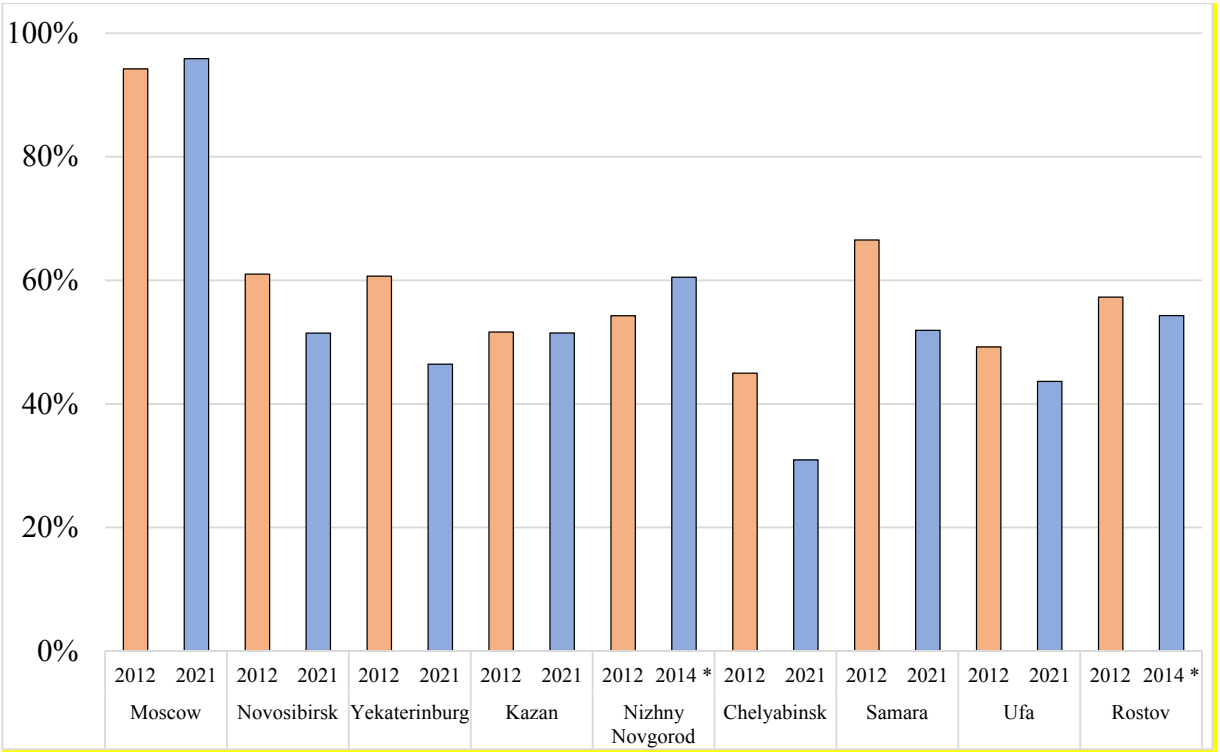


Fig. 5. **Share of Tax and Non-Tax Revenues in the Total Revenues of City Budgets in 2012 and 2021, %**

Source: Compiled by the authors based on data from ConsultantPlus: Regional Legislation (accessed on 03.18.2023).

Note: * The most recent data.

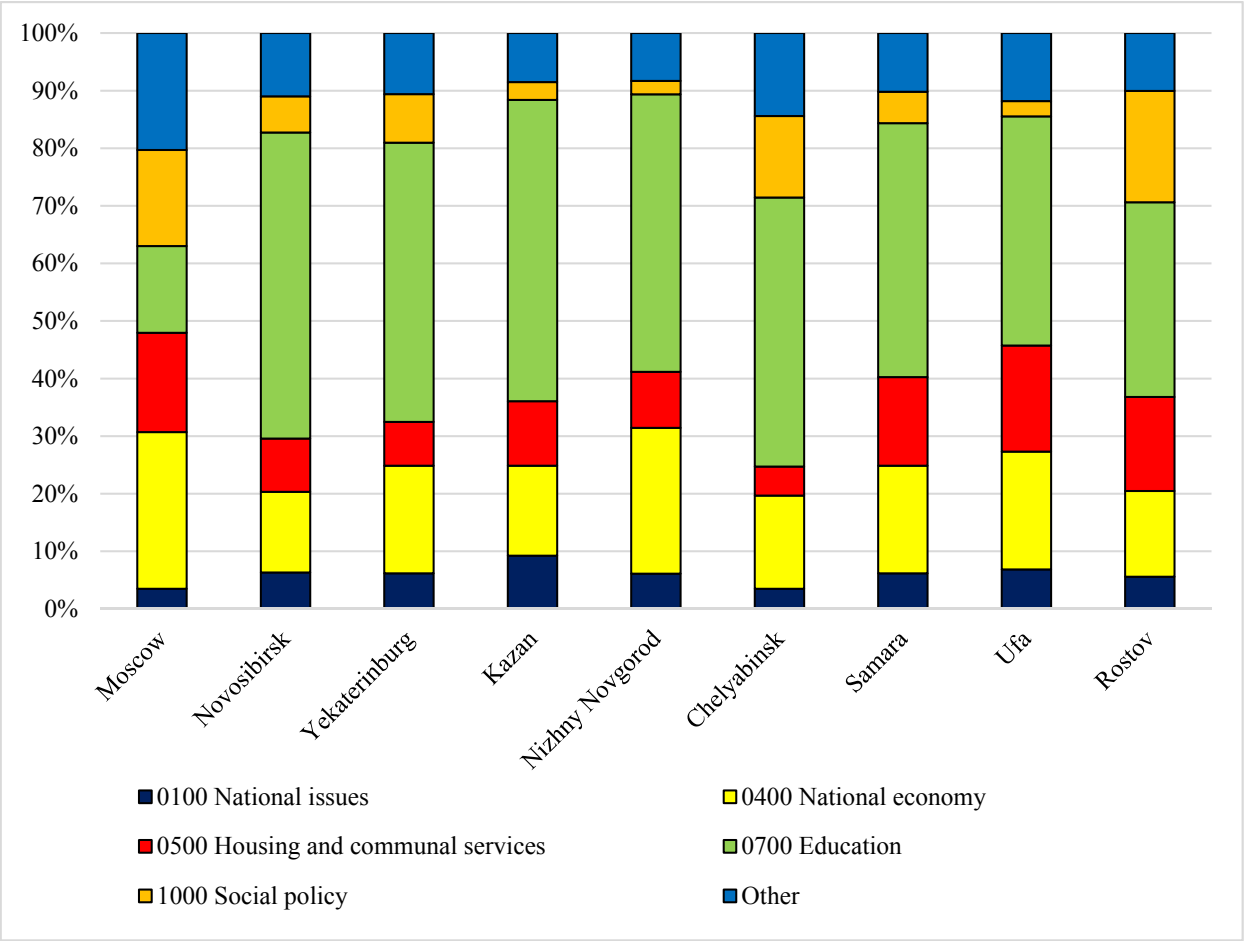


Fig. 6. **Structure of Expenditures of City Budgets, on Average for 2012–2021, %**

Source: Compiled by the authors based on data from ConsultantPlus: Regional Legislation (accessed on 03.18.2023).

therefore has a high share of healthcare costs and not as high as other cities, education costs.

Rostov is interestingly distinguished, where, like Moscow, healthcare is a significant expenditure sector, because health care authority was not transferred to the regional level. Moreover, the amounts of such expenditure in connection with the need to combat the coronavirus in Rostov in 2020–2021 have increased several times, and in 2020 even surpassed the expenditures on the national economy, which is traditionally the second (after education) most important item of the budgets of the largest cities. Otherwise, apart from the cities that have the status of regions, the situation is only in Chelyabinsk and Rostov, where expenditure on social policy for the time period considered on average did not inferior or even vice versa exceeded costs on the national economy.

The differences in budgetary legislation determined the absence of media expenditure in Kazan throughout the period under review. In Chelyabinsk, this type of expenditure was absent from 2011 to 2017. There were no environmental costs in Rostov during the survey period.

It is of special interest that in the budgets of Kazan, Samara, Rostov and Chelyabinsk there are expenditures under Section 14 "Inter-budgetary transfers of a general nature". It is not entirely clear how these costs appear, as not all documents provide their decoding. However, in the expenditure part of the approved execution of the Rostov budget, it is reflected that these are subsidies to the

budget of the region in connection with the excess of the level of estimated tax revenues, that is, this subsidy is a rare interesting case of negative transfer, when the funds, on the contrary, are transferred from the lower level to the higher level.

Another unusual point is the costs (although small) for the "National defense" section in Samara and Rostov. Local budgets do not, in principle, involve significant expenditure under this item. As in Rostov, for example, such expenditure is carried out in the framework of the organization and implementation of civil defense activities, protection of the population and the city territories from natural and technological emergencies.

CONCLUSION

As the study showed, the possibilities of using the budgetary policy of the city to respond to the challenges of the new reality are significantly different for the largest cities of Russia, if you compare them with Moscow, which is at the same time a subject of the Russian Federation and has a different structure of income sources and spending authority. The reasons for this situation consist in the differences in regional legislation, which the largest millionaire cities have no influence on. The budget of Moscow even with the population adjustment many times exceeds the budgets of other major Russian cities, and the volume of inter-budgetary transfers in the structure of its incomes is extremely low, unlike the rest of the cities.

The dynamics of the budget parameters of largest cities from 2011 to 2021 show that only a smaller part of them (Ufa, Chelyabinsk, Moscow and Samara) in 2021 managed in real prices to exceed the volume of 2011 parameters in income and expenditure. Moscow can be confidently called the most dynamically developing megacity of Russia, having the opportunity to give effective budgetary responses to the challenges of the new reality and to implement independent budgetary policy.

The nature of the economic crises of the last decade has affected the way the largest cities have survived them. Thus, in 2014–2015, almost all of them faced a reduction in budgetary revenue and expenditure, and in 2020–2021, such a negative dynamic was not observed, as the need for growth of budgetary expenditures was offset by inter-budgetary transfers.

In this regard, proposals to the governing bodies of the largest cities as responses to global challenges should include both general and individualized provisions, both in relation to a particular period (situation) and in respect of each city. The overall solutions include revenue mobilization (involving greater inter-budgetary transfers), expenditure restructuring, balanced and long-term-oriented debt policy. Individual budget policy improvements envisage tighter spending measures for cities with negative budget parameters.

A general recommendation for higher-level authorities could be a proposal to develop a differentiated budgetary policy for cities falling into different groups in terms of budgetary stability, quality of public finance management and future development opportunities.

ACKNOWLEDGEMENTS

The research was carried out with the support of the Russian Science Foundation. Project No. 22-28-20117 "Fiscal policy of the megacity as a tool for responding to the challenges of New Normal". The Presidential Academy, RANEPA.

REFERENCES

1. Zubarevich N. Cities as centers of modernization of economy and human capital. *Obshchestvennye nauki i sovremennost' = Social Sciences and Contemporary World*. 2010;(5):5–19. (In Russ.).
2. Klimanov V.V., Kazakova S.M., Mikhaylova A.A. Economic and fiscal resilience of Russia's regions. *Regional Science Policy & Practice*. 2020;12(4):627–640. DOI: 10.1111/rsp3.12282
3. Klimanov V.V., Mikhailova A.A. Responses of the budgetary policy of the world's megacities to the challenges of the new reality. *Obshchestvennye finansy = Public Finance*. 2022;(43):4–21. (In Russ.).
4. Herrschel T. Cities, state and globalisation: City-regional governance in Europe and North America. Abingdon: Routledge; 2014. 216 p.
5. Bogachov S.V. Tax-budget policy of large European cities. *Finansy: teoriya i praktika = Finance: Theory and Practice*. 2016;20(6):140–146. (In Russ.). DOI: 10.26794/2587–5671–2016–20–6–140–146
6. Kuznetsova O.V. Budget capacities of million-plus cities as a factor of their social-economic development. *Vestnik Moskovskogo universiteta. Seriya 5: Geografiya = Moscow University Bulletin. Series 5: Geography*. 2018;(4):75–82. (In Russ.).
7. Kuznetsova O.V. Budgets of Moscow and St. Petersburg: A comparative analysis. In: Old and New Moscow: Tendencies and problems of development: Coll. sci. pap. Moscow: I.I. Matushkina Publ.; 2018:9–24. (In Russ.).
8. Grossi G., Ho A.T., Joyce P.G. Budgetary responses to a global pandemic: International experiences and lessons for a sustainable future. *Journal of Public Budgeting, Accounting & Financial Management*. 2020;32(5):737–744. DOI: 10.1108/JPBAFM-12–2020–189
9. Andrew J., Baker M., Guthrie, J. Accounting, inequality and COVID-19 in Australia. *Accounting, Auditing & Accountability Journal*. 2021;34 (6):1471–1483. DOI: 10.1108/AAAJ-07–2020–4688.
10. Reveiu A., Constantin D.L. The impact of the COVID-19 pandemic on regional inequalities in Romania. Spotlight on unemployment and health conditions. *Regional Science Policy & Practice*. 2023;15(3):644–658. DOI: 10.1111/rsp3.12637
11. Ahrens T., Ferry L. Financial resilience of English local government in the aftermath of COVID-19. *Journal of Public Budgeting, Accounting & Financial Management*. 2020;32(5):813–823. DOI: 10.1108/JPBAFM-07–2020–0098
12. Zubarevich N.V. Possibility of decentralisation during the year of pandemic: What does the analysis of public budgets reveal? *Regional'nye issledovaniya*. 2021;(1):46–57. (In Russ.). DOI: 10.5922/1994–5280–2021–1–4
13. Yushkov A.O., Alexeev M.V. The fiscal impact of the COVID-19 pandemic on the Russian regions: An overview of federal support measures. *Zhurnal Novoi ekonomicheskoi assotsiatsii = Journal of the New Economic Association*. 2021;(3):232–242. (In Russ.). DOI: 10.31737/2221–2264–2021–51–3–12
14. Solyannikova S.P. Appropriate budgetary policy for a changing economy. *Mir novoi ekonomiki = The World of New Economy*. 2021;15(2):6–15. (In Russ.). DOI: 10.26794/2220–6469–2021–15–2–6–15
15. Jones S. Climate change policies of city governments in federal systems: An analysis of Vancouver, Melbourne and New York City. *Regional Studies*. 2013;47(6):974–992. DOI: 10.1080/00343404.2011.585150
16. Klimanov V., Kazakova S. Debt policy for the sustainable development of Russian regions and megacities. *R-Economy*. 2022;8(4):327–339. DOI: 10.15826/recon.2022.8.4.025

ABOUT THE AUTHORS

Vladimir V. Klimanov — Dr. Sci. (Econ.), Assoc. Prof., Director of the Center for Regional Policy of the Institute of Applied Economic Research, The Russian Presidential Academy of National Economy and Public Administration (The Presidential Academy, RANEPA), Moscow, Russia; Director, NGO Institute for Public Finance Reform, Moscow, Russia
http://orcid.org/0000-0001-9282-0812
vvk@irof.ru

Anna A. Mikhaylova — Cand. Sci. (Econ.), Assoc. Prof., Leading Researcher at the Institute of Applied Economic Research, Russian Academy of National Economy and Public Administration under the President of the Russian Federation, Moscow, Russia; Head of Department at NGO Institute for Public Finance Reform, Moscow, Russia
http://orcid.org/0000-0003-0831-2554
Corresponding author:
aam@irof.ru

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 25.05.2023; revised on 25.06.2023 and accepted for publication on 27.06.2023.
The authors read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-84-96
UDC 338.2:330.322(045)
JEL F21, F51, G11

Development of the Investment Climate in the Russian Federation against the Background of Political and Economic Sanctions

D.A. Zyukin[a], E.A. Bolycheva[b], S.V. Kashirin[c], A.A. Barannikov[d], O.N. Goncharenko[e]
[a] Kursk State Agrarian University Named After I.I. Ivanov, Kursk, Russia;
[b] South-West State University, Kursk, Russia; [c] Financial University, Moscow, Russia;
[d] Shakhty automobile and road construction institute (branch) of Platov SRSPU (NPI), Shakhty, Russia;
[e] Institute of Service and Entrepreneurship (branch) of Don State Technical University, Shakhty, Russia

ABSTRACT

The stability of the national economy is dependent on the investment climate. The **purpose** of the study is to identify prospects for improving the investment climate in Russia by taking into account the level of influence of investments in individual sectors of the national economy on the change of their share in the structure of the GDP of the country. In order to achieve the purpose of the study, the authors set the following **tasks**: to analyze the dynamics of investment in equity between forms of ownership, sources of financing and key industries; to examine the changes in the volume and share of shipped goods of their own production, performed works and services in GDP between key sectors of the country. In the paper used different **methods** such as intellectual data analysis, statistical analysis methods, data dynamics analysis and general scientific analysis tools. In the paper shown that fixed capital investment had a sustainable trend of growth, which was based mainly on Russian sources, while foreign and joint investment remained virtually unchanged. It was not possible to trace a direct correlation between the volume of investment and the change in the share of shipped goods of own production, completed works and services in the key sectors of the economy. One of the reasons for this could be the lack of certainty about the timing for which the effect of the investment should appear, as large-scale investments do not produce immediate effects. It was **concluded** that the situation in the Russian economy is unstable, which does not allow to ensure a stable influx of foreign direct investment, and this, in turn, negatively affects the formation of capacity for the transition of the national economic system to a new technological system.
Keywords: investments; sanctions pressure; sectoral structure of the economy; economic growth; investment structure; investment climate

For citation: **Zyukin D.A., Bolycheva E.A., Kashirin S.V., Barannikov A.A., Goncharenko O.N. Development of the investment climate in the Russian Federation against the background of political and economic sanctions. *Finance: Theory and Practice*. 2024;28(4):84-96. DOI: 10.26794/2587-5671-2024-28-4-84-96**

INTRODUCTION

Investment is a driver of the development of any sector of the economy. The problem of investment in the Russian Federation is rather controversial, as the country for many years is under the influence of political and economic sanctions, which generates instability in the national economy and has an adverse effect on the formation of the investment climate of the state.

Undoubtedly, the crisis is having an impact on the global economic system as a whole in addition to the Russian economy. It has also resulted in a decline in income reinvested in a number of industries, and it may eventually cause multinational corporations to disperse their investments geographically once the global economy recovers [1]. Russia is not the most attractive for foreign investors and it is necessary to take care in advance of increasing the attractiveness of the domestic economy for investment from abroad, in order to ensure the sustainability of the development of the national economy.

The development of sustainable post-crisis GDP growth, including the slowdown of the global economic system in the context of the pandemic caused by the spread of the coronavirus infection, should be influenced by a change in the economic growth pattern in developed and developing economies [2].

For many years in Russia there has been a steady outflow of investment, which does not allow to stabilize the development of the social sphere and to carry out accelerated modernization of production, and in the conditions of rapid transformation of the world economic system this clearly deprives enterprises of the country of the possibility to increase their own competitiveness and retain the markets conquered [3].

The economic crisis, which has lasted in the Russian Federation and has a negative impact on GDP development, is accompanied by the development of the crisis of foreign economic activity. At the same time, in order to increase GDP in the current situation, the state preferred the strategy of implementation of mega-projects, such as technical rearmament of the army, construction of large-scale sports facilities and bridge across the Kerch Strait, which revived for some time domestic metallurgy, construction industry, construction materials production, logistics. The burden on the external economic sector has been minimized. However, from the experience of foreign countries, it is known that the investments involved in the implementation of mega-projects are often ineffective [4].

In Russia, there are schemes of redistribution of revenues of a business with high profitability in favor of unprofitable, which is most often connected with the state, forming the so-called surrogate investment system [5].

In the context of the need to increase GDP, public investment is less efficient than private investment, so particular attention should be paid to developing private investment and stimulating the influx of foreign direct investment [6].

There is an opinion that foreign direct investment has a greater influence on the formation of the tendency of Russian companies belonging to small and medium-sized enterprises to exports characteristic of the manufacturing industries of the Russian economy. At the same time, for large companies, this effect has a much smaller impact [7]. Large companies that sell raw materials abroad and thus have a stable position in the export system of the country.

Some authors consider that in the Russian economy there is a distribution of domestic investment by foreign investment, and the degree of influence of this effect is more significant in industries where foreign direct investment accounts for more than 25%, as well as among private and more effective national companies. At the same time, the adaptation of national companies to coexistence with foreign companies within the industries is rather weak, which requires

creating conditions for the interaction of national and foreign companies on inter-branch chains and the stimulation by the state of projects involving foreign companies that do not create direct competition for national companies [8].

As noted above, the Russian economy is not as attractive to foreign investors as, for example, the economies of various countries of the Asia-Pacific region with cheap or highly skilled labor. Therefore, the leadership of the party is taking various measures to form integration associations with States experiencing problems similar to those of Russia in the foreign policy arena. The process of regional economic integration has a positive effect on attracting foreign direct investment. An example is the Eurasian Economic Union, which smoothest up the problem of the limited markets of the Member States. Developing economic integration can increase investment in services and manufacturing [9].

One way of addressing the problem of the massive influx of foreign direct investment into national economic systems is the creation of bilateral and multilateral sovereign funds for direct investment among States of regional associations, such as the CIS and the Eurasian Economic Union [10].

Nonetheless, the anticipated improvement in relations with the main participants in the Asian market has not happened against the context of Russia's deteriorating relationship with Western nations. As a result, expectations regarding the planned effect of the "turn to the East" — namely, the inflow of capital from China and other Asian nations, as well as the provision of equipment and the exchange of knowledge and technology in the most promising sectors of the contemporary economy, such as the digital sphere — have not materialized [11].

The loss of viability of the export and raw materials model of the Russian economy, in the opinion of some authors, is one of the key causes of stagnation of Russian economy. This model keeps the ruble in undervalued-intervention and monopoly pricing strategy, stimulating capital exports from the country through foreign exchange revenues from the oil and gas sector and ensuring payment of net income of non-residents. Resignation from the systematic undervaluation of the ruble and monopoly pricing can lead to the redistribution of investment in favor of the processing and infrastructure industries, increasing the efficiency of capital use [12]. On the other hand, devaluation has a positive effect on export-oriented industries. In recent years, military industrial and agro-industrial complexes have received additional impetus in export potential. The grain industry achieved significant successes in the world market — in the export of wheat Russia emerged into the world leaders [13].

Economic growth in Russia is restricted, because the rate of accumulation in the Russian economy for many years does not exceed 20% of GDP, which is not enough to activate the investment factor and renew the fixed capital. This rate of accumulation is not enough for growth and, more importantly, for a leap, so in Russia in the near future the issue of raising the rate at least to 23–25% of GDP is quite acute, otherwise it will not be possible to maintain economic growth at the level of the world indicator and much less to realize high rates of growth such as China, where the rate of accumulation reached 40% of the GDP [14].

Enormous attention is being paid worldwide to the development of high technologies, the access to the technical component of which for Russia has been restricted through the introduction of sanctions, which against the background of falling influx of foreign direct investment makes it difficult for the national economy to transition from the fuel and raw materials to the innovative and technological model. Investment in scientific and technological capacity development and the development of digital technologies at the current stage are no less important than investments in the

modernization of the industrial sphere of the economy [15].

The digital transformation of the Russian economy, characterized by a high level of inequality in wealth, can have economic growth benefits than in countries where wealth disparities are much lower, so investing in the digital development of the economy is of particular importance for the country [16].

In Russia there are a large number of factors that negatively affect economic growth, related to demographic problems, the country's involvement in the arms race against the background of political tension, low productivity of labor, low investment attractiveness of non-performing industries for investors of any kind, wishing to safely get a profit from investments in the short-term [17].

After 2015, when sanctions were imposed against Russia, the economic situation in the country deteriorated, aggravated by fluctuations in oil market prices, weakening the Russian economy. At the end of 2019, a new coronavirus infection from China began to spread, slowing down the development of the entire global economy in 2020. Russia, emerging from a structural crisis, has entered a new wave of crisis, which has undoubtedly affected the domestic investment climate and influenced the movement of investment flows [18].

The purpose of the study is to identify prospects for improving the investment climate in Russia by taking into account the level of impact of investments in individual sectors of the national economy, manifested in the change of their share in the structure of the GDP of the country.

The tasks of the study are the analysis of the dynamics of investments in fixed capital in the forms of ownership, sources of financing and key industries, as well as the change in the volume and share of shipped goods of their own production, performed works and services in GDP in the key sectors of the country in order to identify the main trends and problems of investment development in Russia.

The period from 2016 to 2020 is studied. In 2016, the Russian economy was at the height of the crisis, associated with the introduction of anti-Russian sanctions, which had a significant impact, in particular, on the country's energy exports. In 2020, the Russian, as well as the world economy as a whole, faced a new wave of crisis, resulting from COVID-19, which also negatively affected investment processes within the country.

Intellectual data analysis, statistical analysis methods, data dynamics analysis and general scientific analysis tools are used as basic research methods.

RESULTS OF THE STUDY

The volume of equity investments had a steady trend towards growth, as evidenced by the trend line with a high approximation reliability factor of 0.9863. The year-on-year rate of growth was also quite high — 1 410 billion rubles per year, or at the level of almost 10% of the indicator of 2016. At the same time, the average approximation error is less than 2%, indicating sustained growth and change in the indicator (*Fig. 1*).

In 2020, the growth rate was 36.4%. The lowest rate of growth in equity investment was recorded in 2016 after the introduction of anti-Russian sanctions in 2015 and in 2020, when the world economy was affected by the crisis that developed against the background of the spread of the coronavirus infection. The biggest growth in investment was in 2018, when the Russian economy began to stabilize after the peak of the crisis caused by economic sanctions.

The volume of investments in the main capital of Russian ownership in the dynamic increased by 44.5%. At the same time, investment in the principal capital of foreign and joint foreign and Russian ownership remained virtually unchanged, and investment in capital development of these types of ownership had not such a steady trend as with

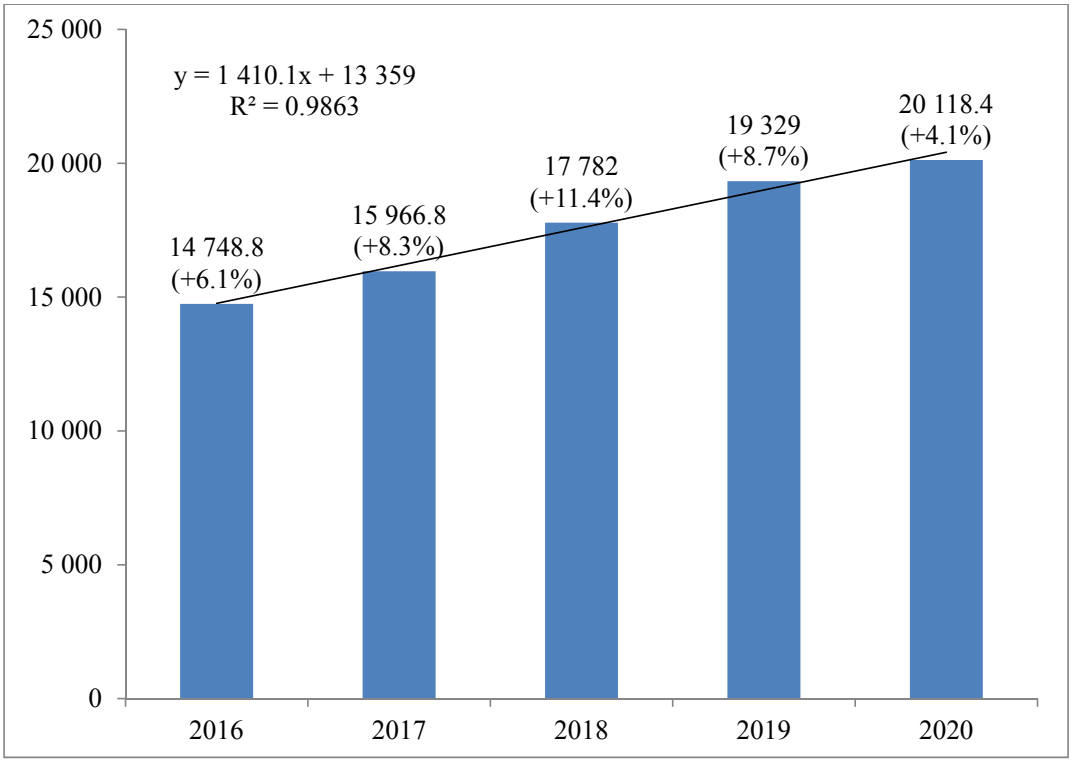


Fig. 1. **Investments in Fixed Assets in 2016–2020, Billion Rubles**

Source: Compiled by the authors on the basis of data from the Federal State Statistics Service. URL: https://rosstat.gov.ru/folder/210/document/12993# (accessed on 01.01.2022).

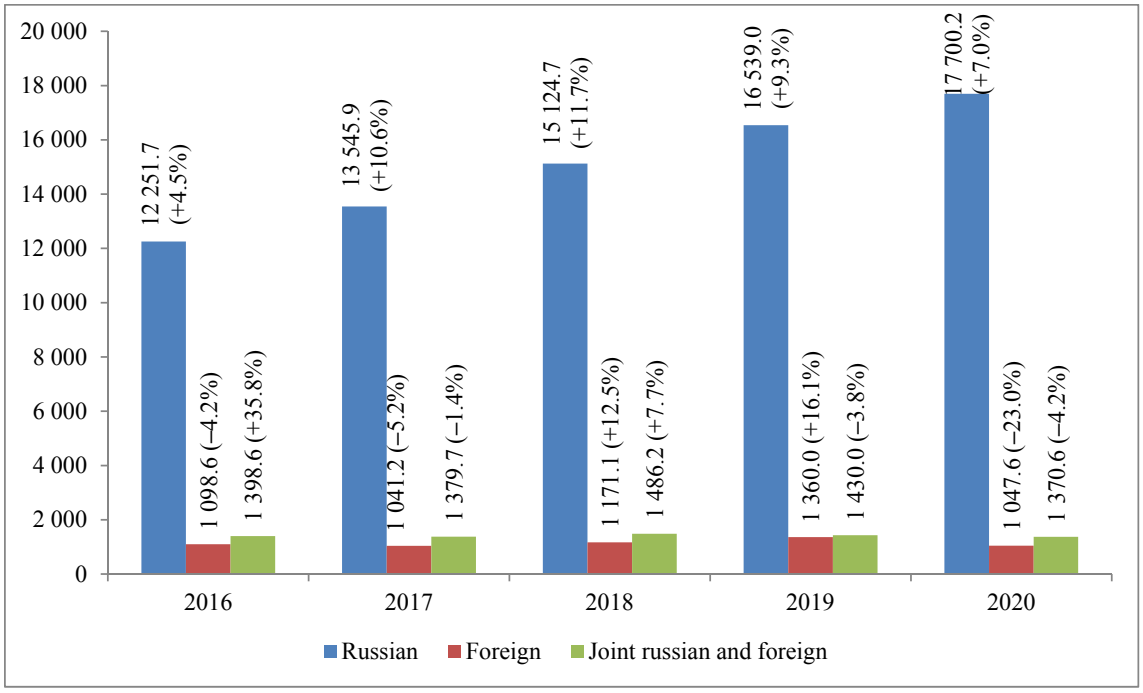


Fig. 2. **Investments in Fixed Assets in 2016–2020 by Forms of Ownership, Billion Rubles**

Source: Compiled by the authors on the basis of data from the Federal State Statistics Service. URL: https://rosstat.gov.ru/folder/210/document/12993# (accessed on 01.01.2022).

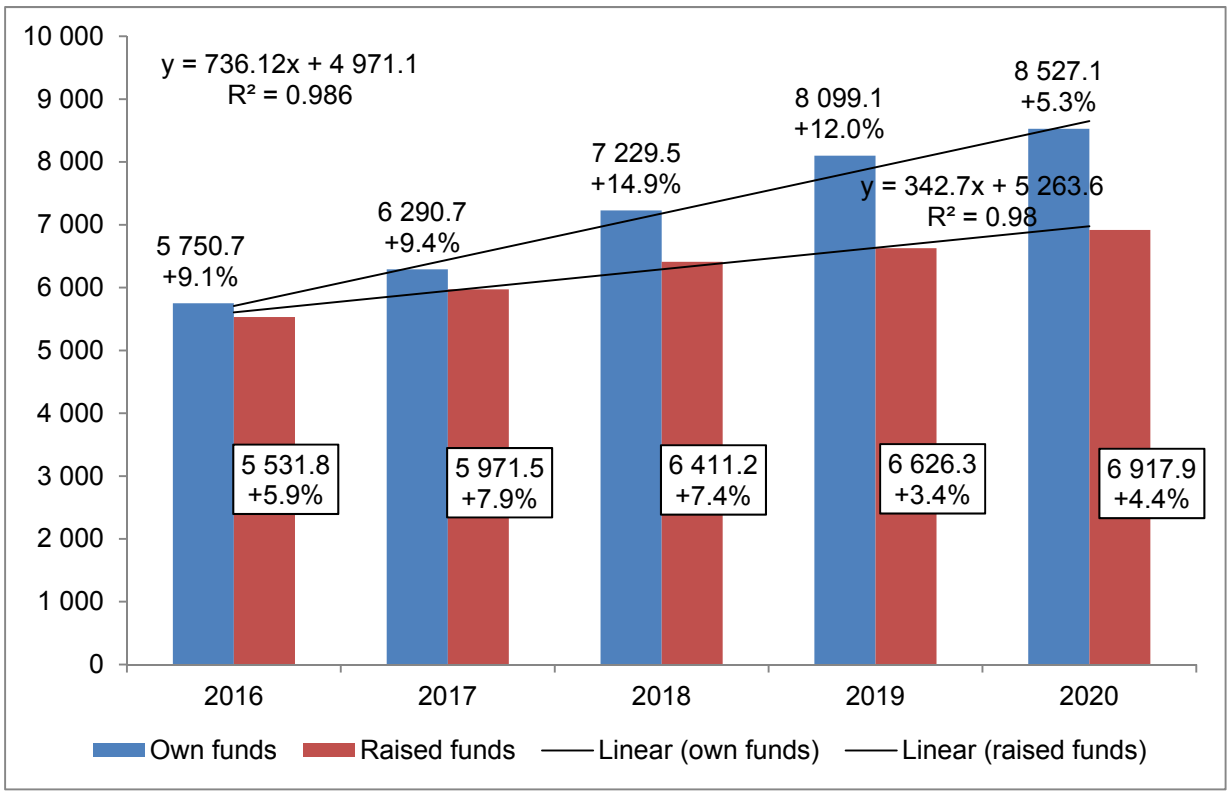


Fig. 3. **Investments in Fixed Assets in 2016–2020 by Sources of Financing, Billion Rubles**

Source: Compiled by the authors on the basis of data from the Federal State Statistics Service. URL: https://rosstat.gov.ru/folder/210/document/12993# (accessed on 01.01.2022).

regard to the capital of the Russian form of property (*Fig. 2*).

This situation is related to Russia's weakening connection with Western nations in the area of foreign policy and the reluctance of foreign residents to establish businesses there, as they view the destabilization of the domestic market and the possibility of state pressure as a serious risk factor that encourages the elimination of assets from the Russian economy.

Fixed capital investment in the vast majority of the world's economies is made from various sources of financing. The nature of the sources of financing has changed somewhat in the Federation in recent years, as the exacerbation of relations with international financial institutions and foreign partners, as well as sanctions restrictions have negatively affected the nature of attracted sources of funding for investments in fixed capital (*Fig. 3*).

The change in equity investments between sources of financing has a sustainable trend. Annual average investment growth from own funds was 736.12 billion rubles, and from raised funds — 342.7 billion rubles. Approximation accuracy for both indicators exceeded 98%, the average approximation error also set at a level not exceeding 2%, indicating sustained growth and sustained change in the indicator.

In the dynamic, investment in fixed capital from own funds of financing increased by 48.3%, and at the expense of raised funds — by only 25.1%. At the same time, the largest increase in financing from own sources was observed in 2018–2019. This is a positive point, on the one hand, because investors are more willing to invest in enterprise development through profits rather than through raised funds. But, on the other hand, it can also mean the willingness of investors to reduce their own risks to credit institutions

Table 1

Investments in Fixed Assets in the Russian Federation by Sources of Financing, Billion Rubles

Source of financing	2016	2017	2018	2019	2020	Growth, %
Own funds	5750.7	6290.7	7229.5	8099.1	8527.1	48.3
Raised funds	5531.8	5971.5	6411.2	6626.3	917.9	25.1
Of which: bank loans	1174.5	1370.1	1531.1	1435.8	1534.9	30.7
including foreign bank loans	329.4	665.1	604.6	292.8	270.8	–17.8
credit from other Institutions	674.4	662.9	582.9	709.2	750.2	11.2
investments from abroad	86.7	95.8	86.5	65.0	50.5	–41.8
budget funds	1856.7	2003.4	2085.8	2385.0	2950.7	58.9
including:						
federal budget funds	1048.6	1046.3	1033.4	1124.7	1338.5	27.6
funds of the Russian Federation's regional budgets	681.3	824.5	902.1	1091.7	1430.1	109.9
local budget funds	126.8	132.6	150.3	168.6	182.1	43.6
public extrabudgetary funds	27.8	24.5	27.4	30.0	34.0	22.3
funds of organizations and population for the partial construction	340.7	400.0	478.6	629.0	505.2	48.3
including population funds	264.6	303.7	339.0	457.8	396.0	49.7
Other	1371.0	1414.8	1618.9	1372.3	1092.4	–20.3

Source: Compiled by the authors on the basis of data from the Federal State Statistics Service. URL: https://rosstat.gov.ru/folder/210/document/12993# (accessed on 01.01.2022).

in the context of a crisis, as businessmen in unstable economic conditions can lose their solvency at any time, and even a temporary loss of it can lead to penalties against borrowers by banks or even to loss of own property, which can be recovered from the debt to credit organizations.

At the same time, the structure of financing of investments through raised funds has changed (*Table 1*).

Overall, it is worth noting the tendency to decrease investment by foreign bank loans and investments from abroad, although investment by credit by banks increased by 30.7%, despite the rise in interest rates on loans. As regards the structure of the raised funds, the majority of funds are budget funds and loans from banks. It is also worth noting that more than 100% increased financing of investments at the expense of budgets of the regions of the Russian Federation.

Thus, the impact of anti-Russian sanctions is clearly traced to the nature of sources of financing of investments in fixed capital in the form of a decrease in investments at the expense of foreign sources of various nature.

Some of the most important sectors of Russia's economy have an influence on

Table 2

Dynamics of Investments in Fixed Assets by Key Industries, Billion Rubles

Industry	2016	2017	2018	2019	2020	Growth, %
Mining	2830.4	3025.5	3225.8	3280.5	3300.7	16.6
Transportation and storage	2726.7	2177.8	3083.0	3315.9	3204.7	17.5
Manufacturing industries	2123.7	1921.2	2513.2	2707.6	2944.5	38.6
Production and distribution of electricity, gas and water	940.2	940.0	1173.8	1217.5	1345	43.1
Agriculture, hunting and forestry, fisheries and fish farming	627.6	412.5	781.5	844.2	855.9	36.4
Construction	445.0	281.7	638.4	682.3	782.2	75.8
Wholesale and retail trade	632.7	358.5	784.1	723.9	692.2	9.4
Other	4313.5	2468.2	2241.2	2933.4	2470.1	–42.7

Source: Compiled by the authors on the basis of data from the Federal State Statistics Service. URL: https://rosstat.gov.ru/folder/210/document/12993# (accessed on 01.01.2022).

the formation of GDP: mining, agriculture, manufacturing, transportation and storage, production and distribution of gas and water, trade, and construction. Therefore, it is necessary to analyze how the change in the volume of investment in these sectors is interrelated with their development and change in their share of the country's GDP (*Table 2*).

In terms of the period, it is worth noting the fall in investment volumes for all industries, except for mineral mining, in 2017. The growth of investment volumes is observed in all key sectors of the Russian economy, which, of course, should predetermine the positive message of development of these directions. Investment in mining has always been the most attractive direction. Transportation and storage as one of the most promising industries of the modern economy from the perspective of development of world trade in Russia has the second largest niche in investment. Serious progress is being made in investing in manufacturing, which in the circumstances of the need to move away from the export and raw materials model of the economy creates an alternative source of GDP formation. Investments in the production and distribution of electricity, gas and water increased by 43.1%, which is the second most progressive result in terms of dynamics after construction. Agriculture, as one of the most important sectors of the national economy, has been receiving a third more investment than the level of 2016, due to the intensification of import substitution measures and capacity building to ensure the food security of the country [19]. The least progress in investment was in wholesale and retail trade.

Priority of investment from the point of view of foreign direct investment is slightly different (*Table 3*).

The total volume of foreign direct investment in the dynamic decreased by 70.9% and they developed abruptly and unsustainably. The decline was mainly influenced by a fall in investment in mining

Table 3

Dynamics of Foreign Direct Investment in Fixed Assets by Key Industries, USD Million

Industry	2016	2017	2018	2019	2020	Growth, +/–
Total	32 538.9	28 557.4	8784.9	31 974.7	9478.8	–23 060.1
Mining	22 303.7	8329.0	5043.1	8446.1	8142.4	–14161.2
Wholesale and retail trade; motor vehicle and motorcycle repair	1700.6	1826.3	–7074.6	7245.6	4536.3	2835.6
Electricity, gas and steam supply, air conditioning; water supply	–107.1	1136.9	693.5	423.0	468.9	576.0
Agriculture, forestry, hunting and fishing	–140.5	–273.6	57.8	–22.6	134.4	274.9
Construction	–342.3	2072.4	–214.2	162.7	130.6	472.8
Transportation and storage	–72.0	369.1	–1518.1	70.3	17.7	89.6
Manufacturing industries	4884.5	2867.1	4289.5	6607.9	–1894.0	–6778.4
Other	4312.0	12 230.2	7507.9	9041.8	–2057.4	–6369.3

Source: Compiled by the authors on the basis of data from the Federal State Statistics Service. URL: https://rosstat.gov.ru/folder/210/document/12993# (accessed on 01.01.2022).

Table 4

Changes in the Volume and Share of Shipped Goods of Own Production, Completed Works and Services in GDP by Key Sectors of the Country

Indicator	2016		2020		Growth, %
	billion rubles	Share in GDP, %	billion rubles	Share in GDP, %	
GDP	64 997	100.0	94 831	100.0	45.9
Mining	11 712	18.0	14 294	15.1	22.0
Manufacturing industries	33 898	52.2	45 071	47.5	33.0
Electricity, gas and steam supply, air conditioning; water supply	5164	7.9	6989	7.4	8.6
Agricultural products	5626	8.7	6111	6.4	35.3
Construction	6184	9.5	9498	10.0	53.6
Other	2413	3.7	12 868	13.6	433.3

Source: Compiled by the authors on the basis of data from the Federal State Statistics Service. URL: https://rosstat.gov.ru/folder/210/document/12993# (accessed on 01.01.2022).

and processing, although mining is the most attractive direction for investment and the key to foreign direct investment. Volumes of foreign direct investment in key industries vary over different periods and do not correspond to trends in the development of equity investment, indicating instability in the national economy, which negatively affects the investment climate of the State.

Investments have a long-term impact. It is extremely difficult to assess the impact of their impact and to predict the period in which an investment step will be reflected in such a volatile economic environment. Nevertheless, over five years, the cumulative effect of investment in individual sectors had to be reflected in the GDP of the country (*Table 4*).

GDP in 2020 increased relative to the 2016 level by 45.9%, at the same time the volume of shipments of goods of own production, completed works and services by themselves increased. However, there is no direct correlation between the growth of capital investment and the increase in the share of production of a particular industry in the country's GDP, as in the structure of GDP almost every key industry loses its share. This may indicate that, firstly, investments have different impact times in different sectors, and secondly, it is not to be ruled out that investments do not always have a positive impact, especially in an environment of volatility and exposure to a large number of adverse factors.

CONCLUSION

The lack of a complex investment policy at various levels of the state system, complicated year-by-year political and financial-economic relations with the countries of the Western world do not allow forming an organized system of investment activity within the country, which adversely affects the sustainability of the development of the national economy. The formation of a favorable investment climate is an essential condition for stabilizing economic development and ensuring the prospects of accelerated transition to an innovative type of development of the national economic system.

The lack of stability in attracting foreign direct investment also distorts domestic investors who prefer to withdraw assets to offshore zones, which in combination with other factors does not allow forming a rate of accumulation of more than 20% of GDP.

High risks, including instability national economies, complicated Russian foreign policy maneuvers in international scene, a poorly developed legal framework protecting foreign investors in the Russian market, increased state pressure on business, particularly during the pandemic, ineffective regional and local investment promotion initiatives, and a high degree of corruption, make it impossible to establish a steady pool of investors for each of the important national economic sectors. The main investor most often in Russia remains the state, especially if it concerns strategically important industries, characterized by long returns or low profitability.

Due to the lack of the possibility of changing the vector of national policy in the international arena, it should be assumed that radical changes in the investment climate in Russia will not occur in the near future. There is almost no chance to stabilize the national economy and make the transition to an innovative type of development and the widespread adoption of digital technologies if no steps are taken to mitigate business, if effective measures to support it are not developed in the context of the pandemic and the periodic restrictions associated with its spread, and if no ways are found to protect investors from the risks of destabilizing the national economic system under the influence of fairly frequent fluctuations of the national currency and the introduction of new sanctions.

REFERENCES

1. Smirnov E. N., Lukyanov S. A. Global foreign direct investment: Structural changes in the current crisis. *Ekonomika regiona = Economy of Regions*. 2021;17(3):1014–1026. (In Russ.). DOI: 10.17059/ekon.reg.2021–3–21
2. Afontsev S. A. New trends in global economy. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2019;63(5):36–46. (In Russ.). DOI: 10.20542/0131–2227–2019–63–5–36–46
3. Kvashnina I. A., Obolenskii V. P. Import and export of capital: Effects for Russia. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2015;(1):63–76. (In Russ.).
4. Faltsman V. K. Russia: Growth factors in the framework of the global economy. *Sovremennaya Evropa = Contemporary Europe*. 2020;(1):5–14. (In Russ.). DOI: 10.15211/soveurope120200513
5. Zubov V. M., Inozemtsev V. L. Surrogate investment system. *Voprosy ekonomiki*. 2015;(3):76–86. (In Russ.). DOI: 10.32609/0042–8736–2015–3–76–86
6. Vlasov S. A., Sinyakov A. A. Public investment efficiency and monetary policy consequences: The case of investment ratio enhancing policy in Russia. *Voprosy ekonomiki*. 2020;(9):22–39. (In Russ.). DOI: 10.32609/0042–8736–2020–9–22–39
7. Kadochnikov S. M., Fedyunina A. A. The impact of foreign direct investment on export activity of Russian firms: The size matters. *Voprosy ekonomiki*. 2017;(12):96–119. (In Russ.). DOI: 10.32609/0042–8736–2017–12–96–119
8. Drapkin I. M., Lukyanov S. A., Bokova A. A. Influence of foreign direct investment on domestic investment in the Russian economy. *Voprosy ekonomiki*. 2020;(5):69–85. (In Russ.). DOI: 10.32609/0042–8736–2020–5–69–85
9. Spitsyn A. T., Kulubekova G. A. The Eurasian Economic Union and prospects for the development of transnational corporations in the context of globalization. *Ekonomika regiona = Economy of Regions*. 2016;12(3):695–702. DOI: 10.17059/2016–3–7
10. Mamedov T. A role of foreign direct investment in the CIS cooperation. *Sovremennaya Evropa = Contemporary Europe*. 2020;(3):188–195. (In Russ.). DOI: 10.15211/soveurope32020188195
11. Zagashvili V. S. Diversification of Russian economy under sanctions. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2016;60(6):52–60. (In Russ.). DOI: 10.20542/0131–2227–2016–60–6–52–60
12. Manevich V. E. Alternative strategies of overcoming stagnation and a “new growth model” of the Russian economy. *Voprosy ekonomiki*. 2017;(8):121–137. (In Russ.). DOI: 10.32609/0042–8736–2017–8–121–137
13. Zyukin D. A., Pronskaya O. N., Svyatova O. V., et al. Directions and prospects for expanding the export of Russian wheat. *Revista de la Universidad del Zulia*. 2021;12(32):87–101. DOI: 10.46925//rdluz.32.07
14. Faltsman V. K. Crisis in Russia’s foreign economic activities: Ways to overcome. *Mirovaya ekonomika i mezhdunarodnye otnosheniya = World Economy and International Relations*. 2017;61(5):57–66. (In Russ.). DOI: 10.20542/0131–2227–2017–61–5–57–66
15. Maslennikov M. I. The technological innovations and their impact on the economy. *Ekonomika regiona = Economy of Regions*. 2017;13(4):1221–1235. (In Russ.). DOI: 10.17059/2017–4–20
16. Belozyorov S. A., Sokolovska O. Economic sanctions against Russia: Assessing the policies to overcome their impact. *Ekonomika regiona = Economy of Regions*. 2020;16(4):1115–1131. DOI: 10.17059/ekon.reg.2020–4–8
17. Zyukin D. A., Golovin A. A., Pshenichnikova O. V., Nadzhafova M. N. Assessing the functionality of models for predicting bankruptcy of pharmaceutical companies. *Amazonia Investiga*. 2020;9(28):272–280. DOI: 10.34069/AI/2020.28.04.30

18. Zyukin D.A., Bystritskaya A. Yu., Golovin A.A., Vlasova O.V. The share of health care spending in the structure of GDP as a criterion for the healthcare system effectiveness. *Revista de la Universidad del Zulia*. 2020;11(30):352–363. DOI: 10.46925//rdluz.30.22
19. Golovin A., Derkach N., Zyukin D. Development of food exports to ensure economic security. *Economic Annals-XXI*. 2020;186(11–12):75–85. DOI: 10.21003/ea.V186–09

ABOUT THE AUTHORS

Danil A. Zyukin — Cand. Sci. (Econ.), Assoc. Prof. of the Department of Accounting and Finance, Kursk State Agrarian University Named After I.I. Ivanov, Kursk, Russia
http://orcid.org/0000-0001-8118-2907
Correspondent author:
nightingale46@rambler.ru

Elena A. Bolycheva — Assoc. Prof. of the Department of Customs and World Economy, South-West State University, Kursk, Russia
http://orcid.org/0000-0002-3365-8621
boly4eva12@yandex.ru

Sergey V. Kashirin — Cand. Sci. (Hist.), Assoc. Prof. of the Department of Management and Innovation, Financial University, Moscow, Russia
http://orcid.org/0000-0002-9401-2867
ser-kashiri1@yandex.ru

Alexey A. Barannikov — Cand. Sci. (Phys. and Math.), Assoc. Prof. of the Department of Fundamental Engineering Disciplines, Shakhty automobile and road construction institute (branch) of Platov SRSPU (NPI), Shakhty, Russia
http://orcid.org/0000-0001-7724-8686
Albardon@mail.ru

Olga N. Goncharenko — Cand. Sci. (Econ.), Assoc. Prof., Department of Economics and Management, Institute of Service and Entrepreneurship (branch) of Don State Technical University, Shakhty, Russia
http://orcid.org/0000-0003-3459-5623
Gon77lm@mail.ru

Authors' declared contributions:
D. A. Zyukin — problem statement, development of the concept of the article, formation of the final conclusions of the research.
E. A. Bolycheva — tabular and graphical presentation and description of the results of investment analysis depending on the source of financing; critical analysis of the literature.
S. V. Kashirin — statistical data collection and literature review.
A. A. Barannikov — performance of correlation-regression analysis and graphic representation of its results.
O. N. Goncharenko — tabular and graphical presentation and description of the results of investment analysis by industry.

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 18.10.2022; revised on 17.11.2022 and accepted for publication on 27.11.2022.
The authors read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-97-107
JEL E22, F21, F35

Effect of Inward Capital Flows on Financial Stability in Nigeria

K. Ebire[a], M.N. Nwala[b], A.A. Musa[c]
[a] Nile University of Nigeria, Abuja, Nigeria;
[b, c] Nasarawa State University, Keffi, Nigeria

ABSTRACT

Capital inflows could thwart monetary policies by stimulating reckless lending and asset bubbles, resulting in financial instability. This study examines the effect of inward capital flows on financial stability in Nigeria, spanning over 2003 to 2019. The hypotheses were tested using Error Correction Mechanism (ECM). The findings indicate that the short runs deviations will adjust to their long-run equilibrium by 10.9% quarterly. The findings show that inward FDI and inward portfolio investment have a positive effect on Nigeria's financial stability, while other capital flows do not have a significant effect on Nigeria's financial stability. Also, the analysis shows that controlling for macroeconomic factors such as GDP and inflation rate significantly affects Nigeria's financial stability. Based on the findings, the study recommends that monetary authorities need to adopt and promote economic policies to increase FDI and entice portfolio investment with rewards such as better economic freedom and lower taxation to boost the country's economy.

Keywords: inward capital flows; financial stability; inward foreign direct investment; inward portfolio investment

For citation: **Ebire K., Nwala M.N., Musa A.A. Effect of inward capital flows on financial stability in Nigeria. *Finance: Theory and Practice*. 2024;28(4):97-107. DOI: 10.26794/2587-5671-2024-28-4-97-107**

INTRODUCTION

Financial stability has become a policy objective for many central banks as well as a topic of discussion for policymakers and academics. The increased focus on financial stability comes from the consequences of various financial crises worldwide. Financial stability has become one of the most fascinating issues in contemporary economies due to the growing integration of international financial markets, the globalisation of financial institutions, and the interconnection of entire financial systems.

Financial stability is the absence of system-wide crises in the financial system. In other words, financial stability refers to the ability of financial systems to withstand stress. In periods of financial instability, financial institutions such as commercial banks are reluctant to finance viable projects, leading to a fall in the intrinsic value of assets, thereby affecting confidence in the financial system. This can result in bank runs, rising inflation rates, or stock market crashes (World Bank Group, 2020).[1]

Globalisation has fostered nations' financial integration, as demonstrated by capital flows from one nation to another [1]. These capital flows have a significant role in an economy's financial stability. The 2008 Global Financial Crisis (GFC) showed that unexpected changes in capital flows could disrupt financial stability. The financial system's inability to absorb these shocks and prevent disruptive tendencies could lead to crises. This has raised intense debate among policymakers, researchers, and other stakeholders as regards restraints on free capital flows around countries.

This study's motivation is that the effect of inward capital flows on Nigeria's financial stability

[1] World Bank Group (2020). Global Financial Development Report. World Bank, Washington. URL: https://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/financial-stability (accessed on 29.06.2024).

has gained interest for its potential benefits and consequences. Inward capital flows such as inward portfolio investment, inward Foreign Direct Investment (FDI) and other capital flows, if not correctly managed, could be a double-edged sword accompanied by fluctuations, thereby distorting the financial system.

This study examines the effect of various forms of inward capital flows on financial stability in Nigeria. Prior studies on capital flows focused on the nexus between capital flows and economic growth. For example, I. Alley focused on the impact of capital flows and economic growth in Sub-Sahara Africa [2]. O.O. Adeola [3] concentrated on capital flows on South Africa, Nigeria, Kenya and Mauritius economic growth. In Nigeria, studies such as [4] studied the effect of capital flows on Nigeria's economic growth. Also, other studies on financial stability focused on the factors affecting financial stability [5–7].

Also, prior empirical studies on capital flows and financial stability did not disaggregate capital flows. For example, [8] focused on inward FDI. This study also extends the existing literature on capital flows and financial stability by exploring other forms of capital flows. Therefore, this study fills the existing gaps by exploring the effect of inward capital flows on Nigeria's financial stability. This study is structured into five sections. Following this introduction, the paper reviews components of capital flows, financial stability, and the theoretical framework in Section 2. Methodological issues, including estimation techniques and model specifications, were presented in Section 3. Section 4 presents the econometric estimates, while Section 5 concludes and presents policy recommendations.

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Conceptual Review

Financial stability has no single consensus definition that is widely accepted. Scholars and apex banks worldwide have defined financial stability in different forms. Financial stability is described by the European Central Bank[2] as the ability of the financial system, which includes financial intermediaries, and market infrastructure, to resist shocks and the unraveling of financial imbalances. This concept emphasizes the financial system's ability to minimize the risk of structural disturbances in the financial intermediation process, serious enough to trigger a material contraction in real economic activity. The Central Bank of Nigeria[3] the country's apex bank, defines financial stability as the financial system's resilience to unanticipated adverse shocks while allowing the financial system's intermediation mechanism to continue smoothly. This definition stresses the ability of the financial system to cushion all forms of instability while maintaining the intermediation process. However, the definition does not explain how these shocks or instability can affect the financial system and the real economy. More so, the definition failed to state what constitutes the financial system.

Financial stability includes the risk of widespread disruption in providing financial services, the quality of those services continuously, and allowing policymakers to recognise areas where policy interventions could improve efficiency and reduce systemic risk [9]. This definition sees financial stability beyond systemic risk and emphasizes the efficiency of the operations of the financial system.

This study uses the ratio of non-performing loans to total loans as a proxy for financial stability. Non-Performing Loans (NPL) are loans in which the contractual payments are delinquent, that is, overdue for more than a specified period. Non-performing loans to total loans capture the liquidity risk exposure by considering the discrepancy between liabilities and assets [10]. When left unsolved, NPL can compound into a financial crisis when these loans exceed bank capital in a relatively large number of banks. Prior empirical studies have linked non-performing loans to financial instability [1, 11–15]. These studies concluded that NPL indicates the beginning of financial crises, which adversely affect the economy's growth by reducing credit growth. Thus, this study will be aligned with the philosophies of [1, 12–14]. Therefore, financial stability will be proxied by non-performing loans.

[2] European Central Bank (2019). Financial stability review November 2019 URL: https://www.ecb.europa.eu/pub/financial-stability/fsr/html/index.en.html (accessed on 29.06.2024).

[3] Central Bank of Nigeria (2013). Financial stability report, Central Bank of Nigeria.

This study defines inward FDI in line with the definition the OECD[4] put forward, which described it as a resident entity's cross-border investment in another economy to acquire a long-term interest in a company in that economy. The word "lasting interest" refers to a long-term link between the direct investor and the company, and the direct investor's considerable control over the company's management. The basic condition is that the investor must own at least 10 percent of the voting power, representing their control. Inward FDI is essential to globalisation, as it promotes technology transition, jobs, competitiveness, and economic development.

This study views inward portfolio investment as a component of international capital flows involving the transfer of financial assets, which includes cash, promissory notes, equity shares, debentures, bonds, and money market instruments like treasury bills, negotiable deposits, commercial papers, and bankers' acceptances issued in a domestic market to foreigners in search of profit. It involves holding transferable securities that are either issued or guaranteed by the importing country's government. Other capital flows are short-term debt flows between residents and non-residents, including loans, deposits, trade credits, counterpart-to-value adjustments, exceptional financing, net errors and omissions.

In modeling capital flows and financial stability, controlling for macroeconomic factors significantly affects financial stability. Financial systems are prone to boom and burst, destabilising the real economy. In the paper [15] they found that the effect of the effect of capital flows on financial stability varies substantially across countries and, interestingly, across various flows after controlling for macroeconomic factors. They revealed that the variation is both in magnitude and in the in the signs of the coefficients. Gross Domestic Product (GDP) and inflation rate were used as control variables in this analysis.

GDP growth positively affects capital flows because it directly affects the investment's expected revenue. GDP is a proxy for economic growth, which is also referred to as a market size. The inflation rate, on the other hand, impedes the financial system's ability to function effectively. Inflation targeting adoption on banking system resilience and capital inflows is significant and positive [16]. On the contrary, [17] investigated the impact of inflation targeting and financial instability on 104 advanced and developing countries from 1980 to 2017. The GMM estimate shows a positive effect of inflation on financial stability.

Empirical Review

Inward Foreign Direct Investment and Financial Stability

There is a growing body of empirical research on the link between inward FDI and financial stability. However, their findings are diverse. In the paper [18], a study on 63 countries from 1990 to 2014 concludes that rising FDI increases financial instability by advancing incentives to foreign investors in the country.

M. Ali and A. Iness [19] used disaggregated inflows for 85 developing countries from 2000 to 2014. The panel data were estimated using a two-step GMM. Findings show that prior to the 2000–2007 crisis, financial stability improved capital inflow in the form of investments in developing countries. Post-crisis (2010–2014), financial stability decreased when more investments moved into the countries. This study emphasised the harmful effect of instabilities in preventing developing countries from benefiting from cross-border flows.

R. Mercado and S. Noviantie [20] used a dataset on bilateral capital flows on 64 advanced and emerging economies from 2000 to 2016. Findings show differences across different types of investments, with direct investment flows more concentrated than others.

On the contrary, [21] found that financial instability negatively impacts inward FDI. In his study of how inward FDI has changed during several financial instabilities in India spanning 1971 to 2015, secondary data were adopted. The variables used include GDP, inflation rate, inward FDI, and financial stability. Using causality, cointegration, and VECM, he showed that inward FDI in India has been catapulting at 21.56% per year. Also, the study concluded that inward FDI did not cause financial

[4] Organisation for Economic Co-operation and Development, (2008). OECD benchmark definition of foreign direct investment. 4th Edn, OECD Publishing.

instability, but financial stability did cause FDI. The study did not indicate the construct used to proxy financial instability.

Contrary to the above findings, [22] found that financial instability positively affects inward FDI. They examined the potential effect of financial instability, including macroeconomic factors as control variables, on FDI using a panel dataset of 23 developing countries from 1993 to 2013.

Inward Portfolio Investment and Financial Stability

A study on 63 countries from 1990 to 2014 concludes that financial asset flows are a good proxy for international transmission of financial innovation that affects stability, leading to crises [18].

M. Ali and A. Iness [19] used disaggregated inflows for 85 developing countries from 2000 to 2014. Findings show that prior to the 2000–2007 crisis, financial stability improved capital inflow in the form of investments in developing countries. Post-crisis (2010–2014), financial stability decreased when more portfolio investments moved into the countries. A study on bilateral capital flows in 64 advanced and emerging economies from 2000 to 2016 shows that portfolio investment is less concentrated relative to other flows in these countries [20].

In the paper [15] found that inward portfolio investment harms financial stability. Their study investigated the relationship between gross capital flows and various financial stability indicators for 16 newly industrialized economies and emerging economies between 1989 and 2011. On the contrary, [22] found no cointegrating association between inward portfolio investment and financial stability. They examined the cointegrating and causal relationship between the financial sector, inward FDI, and inward portfolio investment in Central and Eastern European countries from 1996 to 2015 using the cointegration test of Westerlund-Durbin-Hausaman and the causality test. Similarly, this study aligns with [23], who found that net inward portfolio investments are never affected by major international financial shock incidence. They examined the extent and nature of the impact of foreign portfolio investment on instability, particularly in the Southeast Asian emerging market, namely India, Thailand, Indonesia, and the Philippines, in the context of global financial instability from 2000 to 2014. The daily net inward portfolio investment and stock market composite index were analysed using Autoregressive Conditional Heteroscedasticity (ARCH) model.

Contrary to the above findings, [8] confirmed a significant effect between inward portfolio investment and financial stability. This study explored the impact of a capital flow shock on financial stability in Jamaica from the second quarter of 2006 to the first quarter of 2018. Secondary data from inward portfolio investment and financial stability, which were proxied as non-performing loans, were used for the study. The finding from the Structural Vector Autoregressive (SVAR) model emphasises the need to develop macro-prudential measures to curb possible threats to financial stability. In the paper [24] had a divergent view, revealing that an increase in global instability generates lower portfolio investment, particularly in private sector securities. They examined the different capital flows to Mexico between 1995 and 2015. This study's secondary data include inward portfolio investment, FDI, and other investments as a proxy for capital flows, while financial instability was proxied using a dummy. The variables were analyzed using impulse responses.

Other Capital Flows and Financial Stability

This form of capital flow has grown popular over the years and is understood to be more volatile than FDI. Different studies have been conducted to understand the interaction between investment in other capital flows and financial stability. In study [15] found that outward FDI positively affects financial stability. Between 1989 and 2011, they looked at]the effect of gross capital flows and various financial stability indicators in 16 emerging and newly industrialised economies. This finding was corroborated by K. Ebire and co-authors examined the effect of disaggregate capital flows on financial stability in middle-income countries from 2005 to 2017 [1]. Analysis from PSCC revealed that other capital flows significantly affect financial stability.

In their study [20] used a dataset on bilateral capital flows on 64 advanced and emerging economies from 2000 to 2016. Findings show differences across

different types of investments, with other capital flows being less concentrated relative to others.

METHODOLOGY

Theoretical Framework

The theories that underpin this study are Financial Instability Hypothesis (FIH) and the theory of capital control. The FIH was developed by Minsky, who claimed that financial crises became inherent in capitalism because cycles of economic growth enabled lenders and borrowers to become increasingly reckless. Financial bubbles and subsequent busts are caused by excessive optimism. Based on this hypothesis, he claimed that capitalism is prone to changing from periods of financial stability to periods of instability. In addition, Minsky points out that financial instability can be summed up as excess successes leading to crises or economic stability itself, creating instability.

Keynes works are the source of the theory of capital control. In his general theory, Keynes considered controls an important measure for ensuring stability and directing investment towards productive growth, generating employment, and successfully promoting capital transaction regulations at Bretton Woods. The theory of capital control is relevant to explain the direction of capital flows. Capital controls theory explains the direction of capital flows, i.e., whether controls are placed on inflows or outflows of capital. In the study [24], policymakers in several emerging markets responded to financial instability by actively managing capital flows, for example, by imposing counter-cyclical capital controls that are tightened during stability and relaxed during instability.

Method of Analysis

This study employs an ex-post facto research design. Quarterly secondary sources of data were used for this study, sourced from the Economist Intelligence Unit.[5] The secondary data, which are time series, were collected on the following variables: inward foreign direct investment, inward portfolio investment, other capital flows, inflation rate, GDP, and non-performing loans spanning from Q1 of 2003 — Q4 of 2019.

Model Specification

The multiple regression that captures the effect of capital flows on financial stability in Nigeria is stated below:

$$\Delta NPL_t = \beta_0 + \beta_1 \Delta IFDI_t + \beta_2 \Delta IPI_t + \beta_3 \Delta OCF_t + \\ + \beta_4 \Delta LOGGDP_t + \beta_5 \Delta INFLR_t + \propto_i \Delta Y_{t-i} + \varepsilon_t,$$

where *NPL* — Ratio of non performing loans to total loans; *IFDI* — Inward Foreign Direct Investment; *IPI* — Inward Portfolio Investment; *OCF* — Other Capital Flows; *INFLR* — Inflation rate; *LGDP* — Log of Gross Domestic Product; β_0 is the constant term; β_1, β_2, β_3, and β_4, β_5 — beta coefficients; ε is error term, *t* = time.

Table 1 shows the variables, their measurements, and their *apriori* expectations, as well as their sources. Theoretically, it is expected that inward *FDI*, inward portfolio investment, and *GDP* positively affect financial stability (measured as *NPL*). On the other hand, capital flows could positively or negatively affect financial stability. The inflation rate is expected to negatively affect financial stability.

Technique of Estimation

The technique employed for this study is Error Correction Mechanism (ECM). The ECM method is an econometric technique developed by Engel and Granger to reconcile an economic variable's short-run behaviour with its long-run behaviour. The data were subjected to a stationarity test to avoid spurious regression and analysed using Eviews 10.

RESULTS AND DISCUSSION

The analysis of the data and discussion of the results are presented in this section. Below are the findings.

Presentation of Data

Descriptive Statistics

Table 2 shows that the average of each variable is not exactly situated at the middle (median) of the distribution. The table also illustrates the skewness of the distribution, which measures the length of the

[5] The Economist Intelligence Unit (2020). Capital account, Retrieved from. URL: http://graphics.eiu.com/data_services/contentguide/capitala.htm#othercapflows (accessed on 29.06.2024).

Table 1

Variables, Measurement and Apriori Expectations

S/N	Variable	Nature	Measurement	Apriori expectation	Source
1	Ratio of non-performing Loans (NPL)	Dependent variable	the proportion of defaulted loans to total loans		[1]
2	Inward Foreign Direct Investment (IFDI)	Independent variable	non-residents' direct investment capital into the country	+	[1, 14]
3	Inward Portfolio Investment (IPI)	Independent variable	Acquisition of assets in a domestic stock or money market by a foreign national or firms	+	[1, 14]
4	Other capital flows (OCF)	Independent variable	Defined as net flows of short-term capital, counterpart to valuation changes, exceptional financing, net errors and omissions	–/+	[14]
5	Inflation rate (INFLR)	Control variable	measured as the increase in general prices of goods and services	–	[4]
6	Gross Domestic Product (GDP)	Control variable	Measured as annual real GDP growth	+	[1, 4]

Source: Authors compilation.

Table 2

Descriptive Statistics

Indicators	NPL	IFDI	IPI	OCF	INFLR	LOGGDP
Mean	12.39412	5.017647	3.347059	–19.34706	10.67647	4.717647
Median	9.837500	4.895312	1.925000	–24.31250	10.13750	4.787500
Maximum	39.58437	9.106250	19.81250	5.468750	25.65000	4.959375
Minimum	2.790625	1.437500	–7.337500	–38.87812	–0.537500	4.484375
Std. Dev.	9.110467	2.246194	5.487935	12.08738	6.616776	0.116699
Skewness	1.180080	0.236421	1.260069	0.253234	0.610886	–0.542663
Kurtosis	4.097929	2.058640	4.766194	1.766868	2.630945	2.309797
Observations	68	68	68	68	68	68

Source: Authors compilation.

Table 3

Augmented Dickey-Fuller Tests

Variable	ADF t-statistics	P-value	Order
NPL	–3.104935	0.0313	1
IFDI	–1.934564	0.0513	1
IPI	–2.669254	0.0083	1
OCF	–2.411001	0.0166	1
INFLR	–3.665328	0.0000	1
LOGGDP	–6956733	0.0070	1

Source: Authors compilation.

tail of the distribution. *NPL, IFDI, IPI, OCF,* and *INFLR* are positively skewed. Thus, they have a long right tail. Implying that the distribution extends more to the positive side. While *LOGGDP* is negatively skewed, it has a long left tail. The table also measures the distribution's kurtosis (peakedness or flatness). All variables are platykurtic, that is, the distributions are flat relative to the normal.

Unit Root Test Results

Table 3 displays the stationarity test results used to check for the existence of the unit root, which was done at a 5 percent Mackinnon critical value. The ADF method was used in this analysis since it involves supplementing the previous three equations with the dependent variable's lagged values. The aim is to use enough terms to make the error term serially uncorrelated. All variables (*NPL, IFDI, IPI, OCF, INFLR* and *LOGGDP*) were stationary at the first difference, that is, I(1).

The ADF model is specified as:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \propto_i \Delta Y_{t-i} + \varepsilon_t .$$

Cointegration Test

To determine the existence of a long-run relationship between the variables, the Johansen cointegration test was used. We determine the optimal lag length requirements for the variables before performing the cointegration test. From the analysis, 2 lag was found to be more appropriate. At the 5% level of significance, cointegration with the trace test reveals three cointegration equations. This implies a long-run relationship between the variables and the need for an Error Correction Mechanism (ECM) to explain the relationship.

Error Correction Mechanism

The ECM was used to describe any short-run deviations that may have arisen in estimating the long-run cointegration equation and test the hypotheses that had been proposed is presented below:

$$\Delta NPL_t = \beta_0 + \beta_1 \Delta IFDI_t + \beta_2 \Delta IPI_t + \beta_3 \Delta OCF_t + \\ + \beta_4 \Delta LOGGDP_t + \beta_5 \Delta INFLR_t + \propto_i \Delta Y_{t-i} + \varepsilon_t .$$

The ECM estimation using data from the sample period suggested that the $R^{2,}$ also known as the coefficient of determination, is 79.6 percent, implying that the explanatory variables — *IFDI, IPI, OCF, GDP* and *INFLR* account for 79.6 percent of the total variations in financial stability. In contrast, the remaining 20.4% represents the changes in the dependent variables, which were not included in the equation. After the R^2 is adjusted, the total variation is 74.9 percent. Additionally, the model's fitness was evaluated using F-statistics, indicating that the model is statistically fit at the 1% significance level. Also, the Durbin Watson test shows that serial correlation is absent, as indicated by the test statistics of 2.50, which is within the threshold.

From the analysis in *Table 4*, the ECM term corresponds to our expectations. The ECM's negative

Table 4

ECM Result

Variables	Coefficient	t-statistics	P-value
D(IFDI)	3.601045	3.945128	0.0002
D(IFDI(–1))	–3.342136	–3.521256	0.0009
D(IPI)	0.375401	2.680896	0.0098
D(IPI(–1))	–0.336092	–2.194446	0.0326
D(OCF)	–0.088482	–0.971599	0.3357
D(OCF(–1))	–0.000140	–0.001538	0.9988
D(LOGGDP)	–194.3156	–6.107634	0.0000
D(LOGGDP(–1))	165.5028	4.650030	0.0000
D(INFLR)	–0.563472	–4.828617	0.0000
D(INFLR(–1))	0.464533	3.818634	0.0004
ECM (–1)	–0.108751	–2.911461	0.0053
R 2	0.795614		
Adj R 2	0.749338		
F–statistics	17.19278		
DW	2.50		

Source: Authors compilation.

sign and statistical significance of 1% indicate that 10.9% of the adjustment will be made quarterly. As a result, the ECM will behave appropriately to correct any short-run dynamics deviations from their long-run equilibrium by 10.9 percent quarterly.

The study' residuals were subjected to a variety of diagnostic tests. The residuals were tested for serial correlation using Breush-Godfrey serial correlation LM test. The findings indicated that there was no serial correlation. Lastly, the study tested for Heteroskedasticity using Autoregressive Conditional Heteroskedasticity (ARCH) and findings indicated that the residuals were not heteroskedastic (i.e., they were homoskedastic). This is important because ignoring the impact of heteroskedasticity on time series residuals can negatively affect the estimators.

Discussions

The empirical result shows that inward *FDI* positively and significantly affects Nigeria's financial stability, which is evident at the 1% level of significance. On the basis of this result, the null hypothesis is rejected. This finding implies that a unit increase in inward *FDI* increases financial stability by 360%. In addition, the lag inward FDI was negative but statistically significant at 1%. These findings align with the studies of [18, 19].

The result shows a significant effect of inward portfolio investment on financial stability in Nigeria at the 1% significance level. As a result, the null hypothesis is rejected. Implying that a unit increase in inward portfolio investment results in a 37.5% increase in financial stability in Nigeria. On the other hand, an increase in the one year lag of inward portfolio investment negatively affects Nigeria's financial stability, implying that a one year lag in inward portfolio investment could cause financial instability in Nigeria. This study corroborates the findings of [8], who found that inward portfolio investment significantly affects financial stability.

The analysis shows that other capital flows have no significant effect on financial stability in Nigeria.

Based on this result, as shown by the p-value, which is not statistically significant, we accept the null hypothesis. The implication of this finding is that other capital flows did not impact financial stability in Nigeria for the period under review. However, prior studies, such as [1, 15], showed that other capital flows significantly affect financial stability.

This study also analysed the control variables introduced in the model. Based on the findings, *GDP* negatively affected financial stability in Nigeria. This finding supports the financial instability hypothesis, which holds that financial stability breeds financial instability. In other words, economic prosperity encouraged lenders and borrowers to be progressively reckless. The high optimism creates financial bubbles and later busts.

On the other hand, a one-year GDP lag positively affects Nigeria's financial stability. These findings align with those of [16], who concluded that the spillover effect of inflation targeting adoption on banking system resilience and capital inflows is significant and positive. According to [15], financial inflows tend to amplify countries' financial instability with a higher inflation rate.

CONCLUSION AND RECOMMENDATION

This study examines the effect of inward capital flows on Nigeria's financial stability, spanning from the first quarter of 2003 to the last quarter of 2019. An econometric model was specified using the ECM method to ascertain the independent variables' effect on the dependent variables. The variables were first tested for stationarity using ADF, and the analysis revealed that all variables were integrated in the order of 1, that is, I(1). This influenced the decision to conduct a cointegration analysis to ascertain the long-run relationship between the variables, which revealed a long-run relationship. The ECM test confirmed that long-term equilibrium speed was achieved with an adjustment of 10.9% quarterly. The hypothesis testing results revealed that inward FDI and inward portfolio investment positively affect Nigeria's financial stability, while other capital flows do not have a significant effect on Nigeria's financial stability. Also, the analysis shows that controlling for macroeconomic factors such as GDP has a significant but negative effect on Nigeria's financial stability, while the inflation rate positively affects Nigeria's financial stability. The following recommendations are made based on the findings:

i. Capital is needed in Nigeria, so monetary authorities need to adopt and promote economic policies to increase FDI and entice portfolio investment with rewards such as better economic freedom and lower taxation to boost the country's economy.

ii. An increase in inward capital flows could lead to the expansion of credit, but if not properly managed, it can lead to risky activities by financial institutions. Therefore, Nigeria's central bank should intensify its effort to provide adequate prudential supervision and regulations to control flows and curb risky activities by financial institutions in the country.

iii. Unstable macroeconomic variables can cause volatile capital flows, which may result in financial instability. Therefore, the monetary authorities in Nigeria should implement policies that will ensure a stable macroeconomic environment capable of absorbing internal and external shocks, which is fundamental to managing financial instabilities.

REFERENCES

1. Ebire K., Ullah S., Adeleye B.N., Shah M.I. Effect of capital flows on financial stability in middle-income countries. *Journal of Financial Regulation and Compliance*. 2021;29(5):491–513. DOI: 10.1108/JFRC-08–2020–0081
2. Alley I. Capital flow surges and economic growth in sub-Saharan Africa: Any role for capital controls? African Development Bank Group. Working Paper Series. 2017;(252). URL: https://www.mfw4a.org/sites/default/files/resources/Capital_flow_surges_and_economic_growth_in_sub_Saharan_Africa_Any_role_for_capital_controls.pdf
3. Adeola O.O. Foreign capital flows and economic growth in selected sub-Saharan. A PhD thesis. Stellenbosch: Stellenbosch University; 2017. 218 p. URL: https://scholar.sun.ac.za/server/api/core/bitstreams/7bec4275-cc45–4861–885e-e1f9ca41db03/content

4. Adekunle W., Sulaimon M. A re-examination of the relationship between foreign capital flows and economic growth in Nigeria. Munich Personal RePEc Archive. MPRA Paper. 2018;(87754). URL: https://mpra.ub.uni-muenchen.de/87754/1/MPRA_paper_87754.pdf
5. Alshubiri F. N. Determinants of financial stability: An empirical study of commercial banks listed in Muscat Security Market. *Journal of Business and Retail Management Research*. 2017;11(4):192–200. DOI: 10.24052/JBRMR/V11IS 04/DOFSAESOCBLIMSM
6. Ngaira A. P., Miroga J. Determinants of financial stability of listed commercial banks in Kenya. *The Strategic Journal of Business & Change Management*. 2018;5(4):1074–1097. DOI: 10.61426/sjbcm.v5i4.931
7. Ozili P. K. Banking stability determinants in Africa. *International Journal of Managerial Finance*. 2018;14(4):462–483. DOI: 10.1108/IJMF-01–2018–0007
8. Cork J. The effect of capital flows on key financial stability measures in Jamaica. Kingston: Bank of Jamaica; 2018. 27 p. URL: https://boj.org.jm/wp-content/uploads/2019/10/papers_pamphlets_The_Effect_of_Capital_Flows_on_Key_Financial_Stability_Measures_in_Jamaica.pdf
9. Heath R., Goksu E. B. Financial stability analysis: What are the data needs? IMF Working Paper. 2017;(153). DOI: 10.5089/9781484306215.001
10. Ahmad D. Financial inclusion and financial stability: Survey of the Nigeria's financial system. *International Journal of Research in Finance and Management*. 2018;1(2):47–54. URL: https://www.allfinancejournal.com/article/view/15/1–2–11
11. Fofack H. Non-performing loans in sub-Saharan Africa: Causal analysis and macroeconomic implications. World Bank Policy Research Working Paper. 2005;(3769). DOI: 10.1596/1813–9450–3769
12. Atoi N. V. Non-performance loan and its effects on banking stability: Evidence from national and international licensed banks in Nigeria. *CBN Journal of Applied Statistics*. 2018;9(2):43–74. DOI: 10.33429/Cjas.09218.3/6
13. Nyarko-Baasi M. Effects of non-performing loans on the profitability of commercial banks — A study of some selected banks on the Ghana Stock Exchange. *Global Journal of Management and Business Research: C Finance*. 2018;18(2):39–47. URL: https://globaljournals.org/GJMBR_Volume18/4-Effects-of-Non-Performing-Loans.pdf
14. Dhiman R. Identifying the key indicators of financial stability and financial development: A review of financial service sector. *Asian Journal of Management Science and Applications*. 2018;3(4):302–320. DOI: 10.1504/AJMSA.2018.098902
15. Baum C. F., Pundit M., Ramayandi A. Capital flows and financial stability in emerging economies. Asian Development Bank. ADB Economics Working Paper Series. 2017;(522). URL: https://www.adb.org/sites/default/files/publication/372256/ewp-522.pdf
16. Mishra A., Dubey A. Inflation targeting and its spillover effects on financial stability in emerging market economies. *Journal of Policy Modeling*. 2022;44(6):1198–1218. DOI: 10.1016/j.jpolmod.2022.10.003
17. Musa U., Jun W. Does inflation targeting cause financial instability? An empirical test of paradox of credibility hypothesis. *North American Journal of Economics and Finance*. 2020;52:101164. DOI: 10.1016/j.najef.2020.101164
18. Owoundi J.-P.F., Mbassi C. M., Owoundi F. Does inflation targeting weaken financial stability? Assessing the role of institutional quality. *The Quarterly Review of Economics and Finance*. 2021;80:374–398. DOI: 10.1016/j.qref.2021.03.003
19. Ali M., Iness A. Capital inflows and bank stability around the financial crisis: the mitigating role of macro-prudential policies. *Journal of International Financial Markets, Institutions & Money*. 2020;69:101254. DOI: 10.1016/j.intfin.2020.101254
20. Mercado R., Noviantie S. Financial flows centrality: Empirical evidence using bilateral capital flows. *Journal of International Financial Markets, Institutions & Money*. 2020;69:101255. DOI: 10.1016/j.intfin.200.101255

21. Bhowmik D. Financial crises and nexus between economic growth and foreign direct investment. *Financial Markets, Institutions and Risks*. 2018;2(1):58–74. DOI: 10.21272/fmir.2(1).58–74.2018
22. Hasli A., Ibrahim N.A., Ho C.S.F. The effect of financial crisis and macroeconomic factors on foreign direct investment in developing countries. *International Journal of Economics and Financial Issues*. 2017;7(1):31–36. URL: https://dergipark.org.tr/en/download/article-file/364139
23. Bayar Y., Gavriletea M.D. Foreign direct investment inflows and financial development in Central and Eastern European Union countries: A panel cointegration and causality. *International Journal of Financial Studies*. 2018;6(2):55. DOI: 10.3390/ijfs6020055
24. Ibarra R., Tellez-Leon I.-E. Are all types of capital flows driven by the same factors? Evidence from Mexico. *Empirical Economics*. 2019;59(1):461–502. DOI: 10.1007/s00181–019–01624–5

ABOUT THE AUTHORS

Kolawole Ebire — PhD in Finance, Department of Banking and Finance, Nile University of Nigeria, Abuja, Nigeria
https://orcid.org/0000-0001-7000-2552
Corresponding author:
Kolawole.ebire@gmail.com

Maurie Nneka Nwala — PhD in Accounting and Finance, Assoc. Prof., Department of Banking and Finance, Nasarawa State University, Keffi, Nigeria
https://orcid.org/0000-0002-1183-1059
maurienwala@gmail.com

Abdullahi Abdullahi Musa — PhD in Accounting, Department of Taxation, Nasarawa State University, Keffi, Nigeria
https://orcid.org/0000-0002-5864-0540
abdullahimusa@gmail.com

Authors' declared contribution:
K. Ebire — identify the topic, identified gaps, literature review, data collection, analysis and conclusion of the result.
M.N. Nwala — Reviewed the paper, identification of gaps, techniques and conclusion and recommendation.
A.A. Musa — discussed the variables, literature review and contribution to findings.

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 22.02.2023; revised on 22.03.2023 and accepted for publication on 15.04.2024.
The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-108-121
UDC 336.221(045)
JEL H30

Tax Preferences in the Spatial Development of the Country: Terminological Aspect of the Study

L.I. Goncharenko
Financial University, Moscow, Russia

ABSTRACT

For harmonious socio-economic development of the Russian Federation, national goals in the most important spheres of the state were defined. The first Decree of the President of the Russian Federation, signed by V.V. Putin 07.05.2024, defined the national goals until 2030 and for the period until 2036. The strategy of spatial development of Russia until 2030 is aimed at reducing the high level of uneven development of individual territorial parts of the state, which will increase the sustainability of the economy. Tax incentive instruments have a significant role to play in achieving the objectives set. In order to realize the task of increasing the effectiveness of tax instruments of impact on economic processes, it is important to have a correct view of the terminology used in the development of economic, including tax, policy, which has become the central subject of the study. The **purpose** of the study is to offer the author's identification of such definitions as: spatial, territorial, regional, cluster development; tax preferences and tax benefits; special tax regimes; regional tax policy and others. It is proved that the allocation of spatial development as an object of influence of tax policy is the result of institutionalization of multilevel tax regulation. The classification of tax preferences with the allocation of those important for spatial development and the proof that special tax regimes are a form of preferences is proposed. The classification of tax instruments as a manifestation of multilevel system of tax regulation in the context of stimulating spatial development of the country is shown. The diversity of special tax regimes, the content of which is realized both within the framework of regional tax policy and based on the competence of tax policy of the regions, is stated. **Conclusion**: the use of theoretically verified tax terminology in the justification of tax innovations will improve the quality of decision-making for the spatial development of the country.

Keywords: tax policy; level of tax regulations; regional tax policy; special tax regime; tax preferences; tax benefits; spatial development; regional development; clustering; tax policy of region; special economic zone

For citation: **Goncharenko L.I. Tax preferences in the spatial development of the country: terminological aspect of the study.** ***Finance: Theory and Practice.*** **2024;28(4):108-121. DOI: 10.26794/2587-5671-2024-28-4-108-121**

INTRODUCTION

Long-term planning of the development of the national economy in Soviet periods systematically included such a direction as the placement of productive forces. The centralized nature of public administration was realized, inter alia, through mandatory industrial development indicators brought to each economic entity and provided by allocated budgetary funding. The management of enterprises and organizations is accountable for party responsibility through defined administrative processes.

The development of market relations has changed a lot. Indirect economic, first of all, financial instruments for regulating socio-economic processes in the state were activated. These include tax measures taken by both the federal and regional levels of government and administration. Instruments for implementing tax policy in relation to the territorial development of the country have different forms and purposes. At the same time, the problem of optimization of both the list of applicable tax incentives and the irrational taxation in setting and solving complex tasks of different levels of spatial development is beginning to appear. In the elaboration of practical issues, especially at the legislative level, there are often terminological inaccuracies that can have a negative impact on the subsequent implementation of the established positive ideas in improving measures of state influence on the socio-economic development of the country.

EVOLUTIONARY AND SUBSTANTIAL CONTENT OF DEFINITIONS: SPATIAL, TERRITORIAL, REGIONAL DEVELOPMENT OF THE COUNTRY, CLUSTERING

Russia — is a country with a complex territorial organization of the federal system with enormous diversity of natural and climate conditions and unequal placement of minerals. All this predetermines the goals, objectives and risks of tax policy when implementing a territorial approach to preferential taxation. It is important to determine the terminology, because the development of new forms of organization of tax relations has become in demand in the conditions when the state in the developing of the territorial aspect of economic policy has evolved into a strategy of *spatial development*. In the Order of the Government of the Russian Federation from 13.02.2019 No. 207, spatial development is presented as an activity aimed at solving the state tasks of management of the development of the territories (optimal resettlement of the population, placement of productive forces, etc.) as a holistic object of regulation and including the tools of such management.[1] At the same time, spatial development is viewed as a strategic direction from the point of view of territorial purpose.

D.E. Simakova in the form of components that demonstrate its evolutionary changes proposes the hierarchical implementation of spatial development with the disclosure of content cluster development, regional development, territorial development, space development [1]. It seems possible to agree with the author, who argues that the evolutionally first, relating to economic growth and the reduction of differentiation between regions in Russia, are two definitions: territorial and regional development. Territorial development is broader than "regional development" because it is more dependent on resource capacity in a particular part of the country. At the same time, territorial development is the process of improving the territories in order to improve their structural and functional characteristics, affecting both socio-demographic and economic aspects. Spatial development is different from territorial, according to D.E. Simakova, in that it changes the configuration, the structure

[1] Order of the Government of the Russian Federation from 13.02.2019 No. 207 "On approval of the strategy of spatial development of the Russian Federation for the period up to 2025". ConsultantPlus.

of the territory, its individual systems, and complexes. Based on the objectives set out in the Strategy of spatial development of the Russian Federation, it is also possible to assume the formalized and organizational structure of spatial development as a 3D-format of the territory with an archipelagic system of multi-vector target coordinates of interconnections of individual parts of the country, as well as with the implementation of ESG-principles of development, including even the preservation of cultural heritage. This required an integrated approach to identifying a set of tax tools for achieving targets at different levels of governance. Other modern forms of preferential zones, including special administrative districts (SADs), are also organically integrated into the pro-transitional structure, with additional competences compared to solving territorial and regional development tasks, in particular, on the legalization of foreign investment.

It should be noted that the use of the definition of "cluster", first introduced in 1990 by M. Porter, which means, in terms of the territorial aspect, a group of geographically adjacent interconnected companies (group, merger) is increasing. Thus, the concept of "cluster", which includes in the content of different goals and objectives in contrast to spatial, territorial and regional development, is nevertheless their integral part in the framework of the creation of a favorable investment climate in the vast areas of Russia [1–3].

The process of clusterization, as well as the already existing evidence of its effectiveness, in particular, in the field of innovation achievements, prove the thesis expressed on the basis of cross-country comparison by E. V. Balatsky, that large states have all the possibilities through the development of their individual regions, taking into account their specificities, to no less high results than the successful technological models of Singapore, Israel, South Korea, Norway, Iceland [4, 5]. At the same time, the organization of a group of clusters in the region is also likely with the formation of economic zones with a specific purpose and vice versa — groups of special economic zones (hereinafter — SEZ) in a cluster, which can positively affect the development of each other.

In Russia, a certain practice of creating and developing clusters using zones with preferential tax regime was formed, which was reflected in the formation of such an institution as the Association of Clusters, Technology Parks and SEZ (AKIT of the Russian Federation).

The substantive understanding of spatial development as a complexly structured process makes it possible to recognize the correctness of the researchers' identification of three approaches to the inclusion of clusters in the mechanism of tax incentives for spatial development [6]:

1) cluster is formed on the basis of already functioning SEZs or territories of advanced socio-economic development (hereinafter — TASED) (the advantages of such an approach is the availability of established infrastructure and a number of already attracted residents — as a rule, with large investment projects, because their presence is one of the conditions for the creation of SEZs). As at the beginning of 2020, there were 6 such clusters in Russia;

2) reverse movement — the criterion for the creation of SEZ and other forms of preferential tax regimes is the presence of formed clusters, including a sectoral approach (e.g. Kamsk Innovative Territorial Production Cluster and TASED "Nizhnekamsk");

3) consolidation of a number of SEZs into a single cluster. The decision is not taken at the regional level, but at the level of the Government of the Russian Federation (for example, the North Caucasian tourist cluster, which unites the zones of Karachay-Cherkess, Kabardino-Balkarian Republics, the Republics of Dagestan and Ingushetia; the fifth interregional cluster of composite producers).

Thus, the distinction between the concepts of cluster development, regional development,

territorial development and spatial development will contribute to structuring the content of normative documents, including government legal acts, to a clearer definition of the competences of the various management structures in solving the respective tasks in the context of the national development goals of the country. All this will have a positive impact on the organization of tax relations, eliminating contradictions in the application of various preferential forms.

TAX BENEFITS AND TAX PREFERENCES: IS THERE A DIFFERENCE IN CONTENT, DESTINATION, AND FORM?

The tax component in ensuring sustainable spatial development is primarily associated with the active impact on economic entities. Tax incentive instruments designed to influence the interests of economic entities with a view to their development in directions defined by the State as relevant, including the territorial aspect, are generally recognized tax benefits defined in the Tax Code of the Russian Federation as advantages for certain categories of taxpayers (art. 56 Tax Code of the Russian Federation). However, in the scientific and educational literature, a different definition of the granting of advantages to certain participants in tax relations has become increasingly used, namely, "preference". In the scientific literature, there has even been a terminological discussion about the distinction between these two definitions. The combination of territorial and preferential emphasis in taxation gives impetus to a new look at the theory of taxes and taxation.

In scientific circles, the concept of "tax preferences" is seen as a synonym for the definition of "tax benefits". However, it is also very persistent that these are different definitions, having different content and having different consequences for their application by taxpayers [7–9]. However, there are no clear criteria for distinguishing these two concepts, including tax legislation. It is possible to distinguish three groups of scientists with different opinions [10, pp. 48, 49]:

Group I — identifies the concepts of "tax benefits" and "tax preferences", and, when describing tax preferences, calls them tax benefits or a system (subsystem) of tax benefits;

Group II — distinguishes the two concepts, but does not represent the criteria for distinguishing;

Group III — considers tax benefits as a means of realizing tax preferences, defining the concept of "tax preferences" in a narrow and broad sense.

The generalization and critical consideration of the positions of the various authors allows to propose to use the most general criteria for separating the content of the terms "tax preferences" and "tax benefits" as follows: by the nature of the application (mandatory/non-mandatory); by the forms of application (tax / non-tax); by subject belonging (author criterion). Allow us to present some significant results from the application of these criteria.

The mandatory nature of application is primarily attributed to the concept of "preference" (e.g. simplification of reporting). With regard to tax benefits, there is both a compulsory nature of the application of some of them (for example, in the part of the exemption from VAT of metal fractures and black metals), and non-compulsory, voluntary, which is included even as a position in the development of tax policy of the taxpayer.

Tax benefits mainly have forms relating to the elements of taxation on individual taxes and charges (reduction of tax rates, granting of tax deductions, exemption from the tax base, etc.); non-tax forms are the sphere of preferences (exemption from tax checks, simplification of reporting, criteria of subjectivity of preferential zones, etc.).

Subjectively, individual taxpayers in accordance with the established conditions ultimately apply both tax benefits and tax

preferences. However, it is correct to assume that preferences generally relate to differently institutionalized groups of taxpayers (subjects of individual preferential tax regimes, preferential zones, certain types of clusters, regions, etc.).

In this way, the following definition of the term "tax preference" seems correct — these are advantages in the sphere of ***tax relations***, which are granted to taxpayers on their subjective belonging to groups institutionalized by different characteristics (on certain territories, on certain types of activity), as well as to legal and natural persons for achieving certain objectives of the economic policy of the State through stimulation of economic activity, social protection and development of society, legalization of shadow cash flows. It should be noted that in this version the definition of "tax preference" also includes tax control reliefs. This takes place both in special tax regimes (not only for small business entities, but also in the territorial aspect), and outside their framework, including in the context of unprecedented Western sanctions against Russian legal entities (for example, tax manoeuvres towards accredited entities of the IT industry, including by facilitating their spread throughout the territory of the state, although not targeted, to solve the spatial development). This approach further broadened the distinction between the notions of "tax preferences" and "tariff benefits".

The classification of their types contributes to the discovery of the content of concepts. The following classification features and, accordingly, types of preferences are distinguished [10, p. 52–54]:

- by scope of application (within priority development zones aimed at sectoral incentives, providing state support to a certain (target) category of payers);
- by methods of introduction (applications) (administrative, economic);
- by duration of action (unique, periodic (interval), prolonged);
- by motivational reasons (economic, social);
- by functional purposes (stabilizing (supporting), stimulating);
- by implementation (facilitated, not preferential, combined (mixed)).

Let us specify some types of tax preferences in relation to the territorial approach. Thus, let us pay attention to tax preferences introduced by practical *administrative methods*. Preferences granted this tax by executive bodies, for example, within free economic zones, technology parks, in the form of tax debt restructuring, social tax benefits, etc.

One-time preferences, such as tax amnesty, tax vacancies, exemptions from tax checks, etc., are granted by the State under certain circumstances (including external sanctioning pressure).

Long-term preferences, such as exemption or reduction of the object of taxation, tax credit, investment tax credits, investment protection and promotion agreements, sectoral tax maneuvers, etc., are defined by the State as components of the tax system or its elements and remain unchanged/modified slightly over a long period.

Economic tax preferences are intended to obtain positive dynamics of economic activity development and improvement of the general and regional economic situation in the State.

Non-preferential preferences — include deferred and delayed tax payments, reduced checks, stabilization reservation, etc.

Interest is presented in the interpretation of *stabilizing (supporting) tax preferences*. It is considered that they are intended, primarily, to reduce the tax burden of small and medium-sized enterprises, the legalization of income of business representatives. Taxpayers have the opportunity to decide on their own whether to use the preference if they are subject to statutory conditions. Supporting preferences include alternative (special) tax systems.

The establishment of *combined (mixed) preferences* is often used by the state for the development of depressed territories, special economic zones (SEZ), territories of advanced socio-economic development (TASED), technology parks, tax havens. In this sense, preferences are not preferential, but they are implemented with various benefits, including tax benefits.

In this way, it is correct to believe that the concept of "tax preferences" is wider than the definition of "tax benefits", in particular because the former also extend to the organization of tax relationships, and the second — primarily relate to the mechanism of calculation and payment of taxes and fees. However, the author's position on the separation of tax preferences and benefits as sufficiently conditional and serving rather educational purposes to understand the diversity of not only the forms of the tax benefits granted as such, but also of the conditions and areas of their application, is reflected in the proposed interpretation of the criteria and the substantive filling of the ratio of these two terms.

SPECIAL TAX REGIMES — ONLY FOR SMALL ENTITMENTS?

Tax preferences include various forms of tax reliefs and exemptions from the general rules of taxation. For example, special tax regimes for small business entities in the form of taxation of their income, which differ from general income taxes in all elements and result in a comparative reduction in tax obligations, can be attributed to tax preferences. However, the opinion is expressed that special tax regimes are non-tax benefit, but a mechanism of tax regulation of a systemic nature, i.e. an alternative, preferential mechanism/regime of taxation embedded in the tax system [10, p. 34]. One of the arguments here may be the fact that in the special tax regime there is no link to the elements of one of the taxes, and in fact several taxes are replaced by one (for example, for agricultural producers — a single agricultural tax). If we focus on the tools for implementing tax preferences, *special tax regimes are a combined form of tax preference*.

In the Encyclopedia of theoretical foundations of taxation was presented an expanded understanding of the definition of "special tax regime"— a special taxation system that is established with the purpose of creating favorable economic and financial conditions of activity for certain categories of tax subjects (organizations, individual entrepreneurs), including through the simplification of tax rules and reduction of tax burden.[2] At the same time, the following tax privileges and preferences have been identified as the main instruments for implementing special tax regimes:

1) replacement of individual taxes and charges existing under the general taxation regime by a single tax specific to certain activities or categories of taxable persons;

2) establishment of a special procedure for determining the elements of taxation on individual taxes, including by categories of taxpayers;

3) exemption from individual taxes and fees (federal, regional and local);

4) simplification of tax reporting and tax control.

In national tax legislation, both all instruments and individual types of instruments can be used simultaneously (for example, Russia, Kazakhstan use all four types of tools, while Switzerland uses only the third type). The special tax regime may be limited for a certain period.

Based on the subject of this article, let us first draw attention to the second type of instruments for the implementation of special tax regimes, as the most common in modern practice. It relates to the establishment of peculiarities in the elements of taxation on individual taxes (entity income tax, corporate income tax) in respect of taxable persons

[2] Encyclopedia of theoretical foundations of taxation. Edited by I.A. Mayburov, Y.B. Ivanov. Moscow: UNITI-DANA; 2016. 503 p.

(including non-residents) operating in certain territories (SEZ, TASED, etc.), as well as in certain industries (activities, for example, IT-companies; structures of social purpose). The focus of such special tax regimes is to attract national investments, including in the territorial vector, and taking into account their targeting.

An example of the third type of instrument of implementation of special tax regimes is exemption for a period of up to 10 years from the performance of the obligations of the taxpayer on the income tax of organizations — persons who have received the status of participants in the project to implement research, development and commercialization of their results "Skolkovo". Examples include exemptions for participants in regional investment projects (RIPs), as well as special investment contracts (SICs), investment protection and promotion agreements (IPPAs). In general, RIP and SIC are focused locally on a specific territory and allow to stimulate the development, mainly, of their participants, i.e. individual economic entities. However, this result is achieved mainly not through tax instruments, but through the creation of stable development conditions in the medium-term.

For the fourth type, the special tax regimes for small and medium-sized enterprises in terms of the various levels of simplification of accounting and tax reporting are the most striking example. It is also important that from 01.10.2024 it is envisaged to simplify the procedure for connecting residents of the SEZ to the tax monitoring system, which means the transfer of tax checks to online. Accordingly, the procedure for the refund of VAT paid, which is important for large, will be accelerated.

SEZ AS AN ORGANIZATIONAL FORM OF SYNERGY BETWEEN PREFERENTIAL TAXATION AND TERRITORIAL DEVELOPMENT OF THE COUNTRY

External experience shows that special economic regimes are one of the options for achieving integrated application of incentives [11–13].[3] Based on the classification of special economic zones proposed in the annual study of UNCTAD,[4] we can identify the peculiarities of the practice in Russia. Analysis of the organizational forms of special economic regimes makes it possible to conclude that the objectives of the establishment of SEZs in low-income countries, as in the Russian practice in part of the separately allocated territories, are: attracting investment in infrastructure in limited territory, stimulating the development of industrial production and compensation for the "small spots" in the investment climate. However, for economic with above-average incomes, faced with the challenge of creating high-tech industries, high value-added production, the creation of preferential tax zones is not so typical and can only serve as a platform for preventing distortions in the economy, as well as for building complex cross-border supply chains. Thus, it is correct to conclude that there is a contradiction: by using Russia's SEZs, it must simultaneously the goals characteristic of economies at different levels of development. Accordingly, preferential taxation zones should also be diverse in form and purpose [4, p. 302, 303; 14].

From the statistics of development and effectiveness of SEZs in Russia, it follows that they are one of the most large-scale projects to attract direct investment in priority types of economic activities and among the most sought-after tools of regional development. However, after failures in the actual results of monitoring activities, a moratorium on their creation was introduced in the first phase. Following changes in the regulatory and legal framework, as well as the criterion for decision-making on the feasibility of forming new and effective existing SEZs,

[3] OECD Digital Economy Outlook 2017. Paris: OECD Publishing. 2017. URL: http://dx.doi.org/10.1787/9789264276284-en (accessed on 20.03.2024).

[4] World investment report 2019. URL: https://unctad.org/system/files/official-document/wir2019_en.pdf. (accessed on 20.03.2024).

Table

Preferences for SEZ Residents Cumulatively (From the Beginning of the SEZ Operation)

Indicator	Until 01.01.2020		Until 01.01.2021 s		Until 01.01.2022		Until 01.01.2023		
	as a % of the total amount for the section	volume in millions of rubles	as a % of the total amount for the section	volume in millions of rubles	as a % of the total amount for the section	volume in millions of rubles	as a % of the total amount for the section	volume in millions of rubles	dynamics of 01.01.2023 in relation to 01.01.2020
Benefits of paying customs duties	53	33 238.3	51	40 222	48	48 232	47	57 257	172.3%
Tax benefits	37	23 455.9	40	31 147	44	43 841	46	56 219	239.7%
Benefits of paying insurance premiums	10	6565	9	6999	8	7711	7	7711	117.5%
Total provided benefits	100	63 259.2	100		100		100	121 187	191.6%
Customs fees have been paid	20	28 377.7	38	71 244	34	93 888	32	116 151	409.3%
Taxes paid	39	53 428.2	42	77 605	46	127 394	48	176 247	329.9%
Insurance premiums are paid	41	56 076.4	20	37 074	20	53 972	20	72 404	129.1%
Total amount paid	100	137 882.3	100		100		100	364 802	264.6%

Source: Compiled by the author based on statistical data from the business navigator for the SEZ for the relevant years; Report on the results of the functioning of special economic zones for 2022 and for the period from the beginning of the functioning of special economic zones. URL: https://www.economy.gov.ru/material/file/699ec37679f67c137b011926f7a15119/business_navigator_2020–2022.pdf; https://www.economy.gov.ru/material/file/cbb3dd2a3836539769b9a50284bd2888/otchet_oez_2022.pdf (accessed on 20/03/2024).

the Government of the Russian Federation approved the formation of 50 SEZ in 43 regions of the country as of 01.01.2024, of which 31 are of industrial and industrial type, seven are of technical and developmental type, ten are of tourist and recreational type and two are of port type. They are mainly concentrated on the European part of Russia. At the end of 2023, 1 128 residents were registered in SEZs, including more than 123 companies with foreign participation from 36 countries. They created more than 66 000 jobs (184 000 were declared). The volume of investments amounted to more than 989 billion rubles (of the declared 6 trillion rubles).

The dynamics of change for benefits granted on customs duties, taxes and insurance premiums, as well as accordingly on amounts paid shows a clearly positive trend. Moreover, there is budgetary capacity for all types of preferences: granted benefits increased by 191.6%, and paid amounts increased with 264.6%. By the end of 2022, the state has reimbursed all the costs incurred on SEZs, the cumulative budgetary effect amounted to more than 55 billion rubles.[5] In 2023 compulsory payments of residents (taxes, customs payments and insurance contributions) to budgets of all levels amounted to more than 368 billion rubles.[6]

According to the results of 2022, the Ministry of Economy recognized 7 OECDs: 4 OEZs of production type, 2 of tourist-recreational type and 1 of port special economic zone, effective — 23 zones and 14 — sufficiently effective. The combined efficiency indicator, excluding the tourist cluster, was 93.9% (in 2021–96.5%), since the start of the operation of the zones — 90.7%. The differentiation is due to the influence of the time factor and the large number of new zones deployed for economic development that have not yet realized their potential.[7]

At the same time, it should be acknowledged that one of the reasons inhibiting the implementation of the declared achievements of the organizational forms created with special taxation regimes is the presence of all-Russian territorial disparities, which cannot be "treated" only by tax instruments. Thus, the analysis of the territorial location of SEZs clearly testifies to their attraction to regions with developed infrastructure and logistical availability. As a rule, it is Central and Volga federal districts, where more than 50% of the manufacturing industry and more than 70% of the production of innovative products is concentrated [15]. In this regard, the first reimbursement of infrastructure costs to the regions in 2023 based on federal taxes and customs duties actually paid by residents is appreciated. 1.4 billion rubles were reimbursed for St. Petersburg and Dubna SEZs.[8]

REGIONAL POLICY AND TAX POLICY OF REGIONS: WHAT ARE THESE TERMS?

In general, special tax regimes with different implementation tools fit into the institutionalization of tax preferences as a complex of combined forms, methods, instruments, including tax benefits and preferences, to the goals of socio-economic development of the country and its individual territorial units.

The heterogeneity of the development of the regions initiates the transfer of a certain amount of powers (functions) to the regional

[5] Ministry of Economic Development of the Russian Federation: SEZ continue to show steady positive dynamics. URL: https://www.economy.gov.ru/material/news/mer_rf_oez_prodolzhayut_demonstrirovat_ustoychivuyu_polozhitelnuyu_dinamiku.html (accessed on 20.03.2024).

[6] Special Economic Zones. URL: https://www.economy.gov.ru/material/directions/regionalnoe_razvitie/instrumenty_razvitiya_territoriy/osobye_ekonomicheskie_zony (accessed on 17.03.2024).

[7] SEZ tested for stability. Monitoring of SEZ effectiveness. URL: https://www.kommersant.ru/doc/6095851 (accessed on 07.02.2024).

[8] St. Petersburg and the Moscow region have been reimbursed for the construction of SEZ infrastructure through state support / URL: https://www.economy.gov.ru/material/news/sankt_peterburgu_i_moskovskoy_oblasti_vozmestili_ zatraty_na_sozdanie_infrastruktury_oez_za_schet_gospodderzhki.html (accessed on 07.02.2024).

level. This is also one of the theoretical aspects of the territorial approach in preferential taxation. Significantly achieving the optimal combination of a centralized, federal element of public administration with a regional one. Despite a certain degree of autonomy, the regions must be an effective part of the overall management system. In this regard, it is important to search for fiscal tools of *macroeconomic* regulation at both the federal and sub-federal levels. The concept of a multi-level system of tax regulation will be developed. This is most clearly seen in the example of the construction of tax regimes for components of the oil and gas complex, including the territorial aspect [16].

In this regard, we will rely on the definitions of "tax policy of the region" and "regional tax policy". In scientific literature, the most common publications are those where both terms meet without any difference in their content [17–19].[9]

Indeed, in the federal state, legislative rules for the establishment and introduction of taxes are in force throughout the territory, as reflected in both the first part and the second part of Tax Code of the Russian Federation. For example, paragraph 5 of article 12 of the Tax Code of the Russian Federation "Types of taxes and charges in the Russian federation. Powers of the legislative (representative) bodies of the state authority of the constituent entities of the Russia Federation and representative organs of municipalities on the establishment of tax and fees" states: "Federal, regional and local taxes and charges are abolished by this Code". In paragraph 6 of the same article: "No federal, regional or local taxes and charges may be imposed other than those laid down in this Code". At the same time, the subjects of the federation have constitutionally defined autonomy, based on the principle of equality, including in economic policy, and therefore in the conduct of tax policy. In the Tax Code of the Russian Federation, this approach is recorded in the aforementioned article of article 12 of the tax code already in its very title. Hence, the initial conclusion can correctly be presented as that the terms "regional tax policy" and "regional taxation policy" have a substantial difference.

Regional tax policy is an integral part of the tax policy of the federal center, which defines the parameters and rules of taking independent measures in the field of taxation and tax administration of the regions of the country. In turn, the tax policy of the region, incorporating federal-wide approaches to regions in the field of taxation, includes self-determinable taxation parameters, primarily in relation to regional and local taxes, as well as tax administration. Per that is what the authors of the Greater Tax Dictionary of Terms and Norms meant, arguing that tax policy "is shaped and implemented at the federal, regional and local levels".[10]

This understanding of the tax policy of the region appears to be more embedded in the context of the national program of spatial development of Russia, in which each region is characterized by its socio-economic, geographical, cultural and other features, but together they constitute, including, and the economic space of the country. The purpose of the tax policy of the region is to an optimal symbiosis of the development tasks of the area, the financial, economic, social and other functions performed by it with the tax potential of the region. For understanding, we have an example with the experience of transforming the industrial monastery of Vyksa into a single urban space on the basis of a metallurgical combination with the inclusion of art-plots, the cultural and historical center "Shukhov-park" etc. "OMK" companies in the framework of ESG activities as well as the national objective "comfortable

[9] Greater interpretative dictionary of tax terms and norms. A.B. Paskachev, B.A. Kashin. Moscow: Helios ARV, 2002. 469 p. Ozhegov S.I., Swedenova N.Y. Interpretative dictionary of the Russian language. 2nd ed. Moscow: Azi, 1994; 907 p.

[10] Greater interpretative dictionary of tax terms and norms. A.B. Paskachev, B.A. Kashin. Moscow: HELIOS ARV, 2002. 469 p.

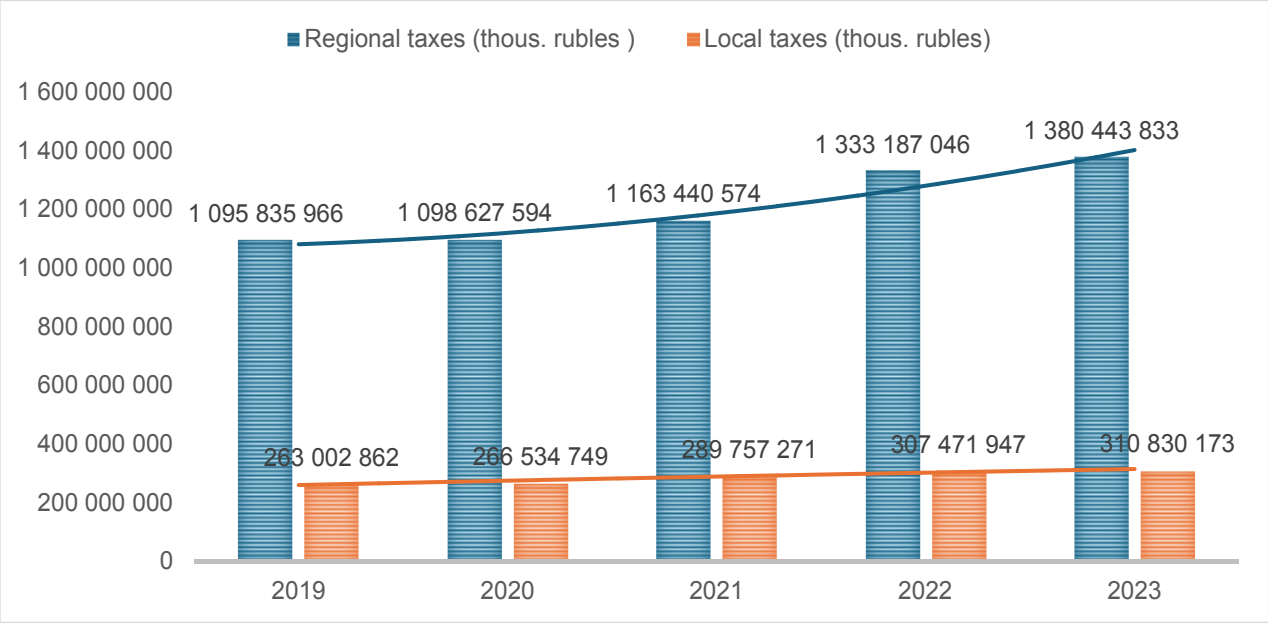


Fig. **Income of Regional and Local Taxes to the Consolidated Budget of the Russian Federation (Thousand Rubles) According to the Report of the Federal Tax Service of Russia on Form 1-nm**

Source: Compiled by the author according to the report of the Federal Tax Service of Russia on form 1-nm.

safe environment for living" received relevant regional tax concessions in terms of corporate income tax and corporate property tax [20].

PREVENTIONS OF THE MULTILIVERAL CONCEPT OF TAX REGULATION

Multi-level approach in the practice of tax regulation, based on the specific economic situation and orientation to the achievement of the local goal, is becoming one of the current trends.[11] The institutional component of the multilevel system of tax regulation can be defined in the context of the tools used: systemic (level of taxation, system of taxes and fees); integrated (special taxation regimes); local (changes in the regulatory tools used). Given the specific nature of capital-intensive and labor-intensive industries located on the territory of the country, two respective approaches to stimulating the territorial development of a country are possible [21].

Tax instruments to regulate *labor-intensive* production as requiring less capital investment can be seen as a central link in the complex of state incentive instruments for the introduction of high-technology processes.

Capital-intensive industries, as a rule, are characterized by territorial consolidation. Effective stimulation of production activities using modern technologies cannot be achieved only by tax methods: modernization and expansion of production are accompanied by significant investments, the priority of which is the consolidation of stable conditions of activity of the economic entity, if there is a stable financial legislation. In addition, capital-intensive production is geographically dependent on locations with well-developed infrastructure and the availability of highly qualified personnel. Thus, tax incentives for the creation (improvement) of capital-intensive infrastructure should include not only a reduction in tax rates, but also mechanisms for accelerated depreciation, full accounting of R&D costs with an increasing coefficient, a change in the date of payment of corporate income tax, etc.

Regional and local taxation is mainly based on property taxation. Objects are real estate of individuals and legal entities, vehicles,

[11] Levey S. Mobilization Theory: Some Lessons from the Literature for Today. Global Institute for Sustainable Prosperity. Working Paper No. 126, 2020.

land. As statistics show, regional and local tax revenues to regional budgets and local budgets have a trend of growth (2023/2019 for regional taxes — 125.97%, for local taxes — 118.18%), which is largely due to the expansion of the tax base (*Fig.*).

There are several reasons for the benefits of property tax preferences, both for individuals and for legal entities, among which the main one is that a more objective approach to the tax base can be achieved at the sub-federal level, taking into account regional and local characteristics. It is not a coincidence that the regional bodies, including the level of inventory assessment itself, the application of the relevant coefficients, determine the timing and procedure for the transition to the cadastral assessment of real estate of individuals. For example, with a lower average wage in the Altai region (32.8 thous. rubles) compared to, for example, the Voronezh and Omsk regions (40.9 thous. and 40.7 thous. rubles, respectively), the tax on the property of individuals in Altai province for one object was higher than in the aforementioned subjects (respectively — 1.2; 0.9; 0.6 thous. rubles) [22]. Such a comparison provides some information for regional authorities to respond appropriately within the framework of the region's tax policy in terms of the feasibility of the use of benefits and preferences. There are also some problems with the establishment and application of property tax benefits for individuals, in particular, based on activities characteristic of a particular territory [23, 24]. This testifies to the emergence of the need for transformation in approaches to expanding the circles of autonomy of tax policy of the regions in solving issues of development of a particular territory, taking into account the synergistic effect of interaction with neighboring regions through various organizational forms of preferential taxation.

CONCLUSION

From the set of theoretical aspects studied, it can be concluded that at the conceptual level an important condition for implementing the territorial approach in preferential taxation is the understanding of the multi-level and multi-purpose nature of tax incentives for the socio-economic development of the country. The range of measures to be taken should be diversified, including direct subsidies, infrastructure development, access to credit (long-term, stable and low-interest rate) etc., with emphasis on forms of spatial development such as clusters and cluster groups, as well as in the framework of SEZs, TASEDs, RIPs, SICs, IPPAs, since a comprehensive combination of tax and non-tax instruments should be a prerequisite for such an approach to stimulating territorial development.

REFERENCES

1. Simakova D.E. Evolutionary changes in spatial development as an object of tax incentives. *Ekonomika i upravlenie: problemy, resheniya = Economics and Management: Problems, Solutions*. 2023;4(10):124–130. (In Russ.). DOI: 10.36871/ek.up.p.r.2023.10.04.017
2. Borisenko O.K. Cluster development of Russian regions. *Vestnik MGTU. Trudy Murmanskogo gosudarstvennogo tekhnicheskogo universiteta = Vestnik of MSTU. Scientific Journal of Murmansk State Technical University*. 2012;15(1):143–148. (In Russ.).
3. Goncharenko L.I., Advocatova A.S., Kosenkova Yu. Yu. Special tax regimes as instruments of spatial economic development in new conditions. *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law*. 2021;14(6):127–136. (In Russ.). DOI: 10.26794/1999–849X-2021–14–6–127–136
4. Goncharenko L.I., Vishnevskii V.P., Gurnak A.V. et al. Study of alternative concepts of tax regulation as a factor in ensuring the new industrial revolution in Russia. Moscow: KnoRus; 2023. 486 p. (In Russ.).
5. Balatsky E.V. Global challenges of the Fourth Industrial Revolution. *Terra Economicus*. 2019;17(2):6–22. (In Russ.). DOI: 10.23683/2073–6606–2019–17–2–6–22

6. Bakhshian E.A. Tax incentives of development of innovation and industrial clusters in Russia using the mechanisms of special economic zones and priority social and economic development areas. *Nalogi i nalogooblozhenie = Taxes and Taxation*. 2019;(9):1–13. (In Russ.). DOI: 10.7256/2454–065x.2019.9.30793
7. Panskov V.G. Problems and prospects of tax policy for the sustainable development of regions. *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law.* 2024;17(1):34–43. (In Russ.). DOI: 10.26794/1999–849X-2024–17–1–34–43
8. Balandina A.S. Analysis of the theoretical aspects of tax exemptions and tax preferences. *Vestnik Tomskogo gosudarstvennogo universiteta. Ekonomika = Tomsk State University. Journal of Economics*. 2011;(4):105–110. (In Russ.).
9. Tyutyuryukov N.N., Ternopolskaya G.B., Tyutyuryukov V.N. Tax benefits and preferences: The goal is the same, but the mechanism is different. *Nalogovaya politika i praktika*. 2009;(10):18–23. (In Russ.).
10. Maiburov I.A., Ivanov Yu.B., eds. Tax benefits: Theory and practice of application. Moscow: UNITY-DANA; 2014. 487 p. (In Russ.).
11. Hagemann R.P., Jones B.R., Montador B.R. Tax reform in OECD countries: Economic rationale and consequences. OECD Economics Department Working Papers. 1987;(40). DOI: 10.1787/082177701741
12. Cheesman A. Special economic zone & development: Geography and linkages in the Indian EOU scheme. The Bartlett Development Planning Unit. DPU Working Paper. 2012;(145). URL: https://www.ucl.ac.uk/bartlett/development/sites/bartlett/files/migrated-files/WP145_0.pdf
13. Maiburov I.A., Ivanov Yu.B., eds. Special economic zones: Foreign and domestic experience. Bk. 2. Moscow: UNITY-DANA; 2017. 287 c. (In Russ.).
14. Maiburov I.A., Ivanov Yu.B., eds. Special economic zones. Theoretical and methodological aspects of development. Bk. 1. Moscow: UNITY-DANA; 2017. 351 p.
15. Danilova S.N., Petrov A.M., Teyslina O.G. Special economic zones in the Russian Federation: Development tendencies, organizational and legislative basis. *Vestnik Saratovskogo gosudarstvennogo sotsial'no-ekonomicheskogo universiteta = Vestnik of Saratov State Socio-Economic University*. 2019;(2):57–63. (In Russ.).
16. Dyachkov G.S. Features of tax regulation of the oil and gas sector of the economy in conditions of high volatility of the energy market. *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law*. 2023;16(5):137–149. (In Russ.). DOI: 10.26794/1999–849X-2023–16–5–137–149
17. Troyanskaya M.A. Regional tax policy: Performance and methods of assessment. *Sibirskaya finansovaya shkola = Siberian Financial School*. 2013;(6):128–132. (In Russ.).
18. Chuzhmarova S.I. Methodology of interrelations between tax policy and the regional component of tax policy and their impact on the development of the Northern regions. *Regional'naya ekonomika: teoriya i praktika = Regional Economics: Theory and Practice*. 2013;(19):27–37. (In Russ.).
19. Evstafieva A. Implementation of the tax policy of the Russian Federation at the regional level. *Izvestiya Kazanskogo gosudarstvennogo arkhitekturno-stroitel'nogo universiteta = News of the Kazan State University of Architecture and Engineering*. 2014;(1):208–214. (In Russ.).
20. Kolodnyaya G.V. Social responsibility of business as a key factor in sustainable development. *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law*. 2023;16(5):78–85 (In Russ.).
21. Kosenkova Yu. Yu. The use of special economic zones as a tax instrument for spatial development in the context of Industry 4.0. *Voprosy regional'noi ekonomiki = Problems of Regional Economy*. 2021;(4):211–220. (In Russ.).
22. Mayburov I.A., Mezhov S.I., Goncharenko L.I. XIV International symposium "Theory and practice of tax reforms". *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law*. 2022;15(5):155–166. (In Russ.). DOI: 10.26794/1999–849X-2022–15–5–155–166
23. Maiburov I.A., ed. Theory and pragmatics of property taxation of individuals. Moscow: UNITY; 2022. 263 p. (In Russ.).
24. Maiburov I.A., ed. Theoretical and methodological aspects of property taxation of legal entities. Moscow: UNITY; 2022. 311 p. (In Russ.).

ABOUT THE AUTHOR

Lubov I. Goncharenko — Dr. Sci. (Econ.), Prof., Scientific Director of the Department of Taxes and Tax Administration Faculty of Tax, Audit and Business Analysis, Financial University, Moscow, Russia
https://orcid.org/0000-0002-9872-3279
LGoncharenko@fa.ru

Conflicts of interest statement: the author has no conflicts of interest to declare.

The article was submitted on 03.04.2024; revised on 13.05.2024 and accepted for publication on 27.05.2024.
The author read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-122-135
UDC 336.71(045)
JEL G31

Modern Artificial Intelligence Technologies as a Tool of Transformation of Value Chains of Russian Commercial Banks

I.E. Pokamestov[a], N.A. Nikitin[b]
[a, b] Financial University, Moscowa, Russia;
[a] Factoring PRO LLC, Moscow, Russia

ABSTRACT

The **object** of the study is the value chain of the bank. The **purpose** of the study is to identify the possibility of applying artificial intelligence (AI) technologies in the value chain stages of commercial banks and transform value chains under the influence of these technologies. It uses both general scientific **methods** — analysis, synthesis, abstraction, induction and deduction, and graphical and statistical analysis, the methodology of value chain creation. The main approaches to the formation of the value chain in the banking industry, as well as the key characteristics of the business processes included in it, were studied. Particular attention is paid to the technological component as the basis for the development of modern digital banking. During the research, the main directions for the implementation of modern artificial intelligence technologies, both applied and generative. Analysis of the value chain showed that the creation and use of AI models is an independent supporting process, the work of which not only affects the core activities of the bank, but also requires a certain level of technology development and risk-management in the bank. Data from the AI Russia case library demonstrates the actual impact of AI models on the value chain phases of marketing and sales, customer support and communications, operational processing and risk management. Based on the **results** of the study, it was concluded that the introduction of innovations in the field of artificial intelligence increases the value of the company by increasing the efficiency of business processes. The introduction of artificial intelligence into processes requires the technological maturity of the enterprise, and its use is an independent technological process that requires the participation of auxiliary processes, for example, risk management. The results of the study are of practical importance for companies in the banking industry, since methods for analyzing the impact of AI technologies on the value chain can be used when making decisions about their implementation.

Keywords: value chain; banking industry; artificial intelligence; generative models

For citation: **Pokamestov I.E., Nikitin N.A. Modern artificial intelligence technologies as a tool of transformation of the value chains of Russian commercial banks. *Finance: Theory and Practice.* 2024;28(4):122-135. DOI: 10.26794/2587-5671-2024-28-4-122-135**

INTRODUCTION

The use of artificial intelligence is one of the stages in the development of the digital economy, the peculiarity of which is the use of promising technologies such as the Internet, big data, virtual and augmented reality technologies, robotics, quantum technologies and blockchain. AI is the ability of computer systems to simulate human cognitive functions, such as learning or problem solving. In our study, we will focus on modern AI technologies — generative models, including large language models (solving common problems on multimodal data), application models (solving specific problems).

The use of artificial intelligence models allows you to transform the business, significantly increase its operational and economic efficiency. Business interest in using these technologies is confirmed by a significant increase in global private investment in artificial intelligence technologies: between 2013 and 2022, investment in such technologies increased from $ 14.6 billion to $ 189 billion. The key leaders in this industry are U.S. and Chinese companies, which account for more than 80% of private investment [1]. According to the estimates of the NTI Artificial Intelligence Centre, Russia also shows positive dynamics in the development of AI: the AI market in 2022 was estimated at 647 billion rubles against less than 150 billion rubles in 2013.[1] To increase investment in AI technologies and their penetration into business processes, it is necessary to understand the benefits and benefits they bring. According to a study by Rostelecom and TAdvisors, 13% of companies in 2019 did not use AI in their activities at all. The key problem for them was the lack of understanding of possible effects and fear of unprofitability of such solutions [2].

The purpose of our study is to formulate the advantages of using modern AI technologies in the financial industry.

To achieve the goal, the following tasks must be solved:

1) identify the key stages of the value chain in the banking industry, taking into account the use of financial technologies;
2) analyze existing artificial intelligence technologies, their key features and applications in business processes;
3) identify key effects on the value chain in the banking industry with modern artificial intelligence technologies;
4) on specific examples from the banking industry to show the impact of AI models on the value chain.

The scientific novelty of the study is that a new approach to the analysis of the most cost-effective business areas in the development and implementation of artificial intelligence technologies has been proposed. The procedure for analyzing the effectiveness of AI implementation can be used by banking companies that decide on the introduction of artificial intelligence into business processes, which determines the practical significance of the research.

THE CONCEPT OF A VALUE CHAIN IN THE BANKING INDUSTRY

The value chain methodology was developed by M. Porter to determine competitive advantages of the enterprise [3]. In the scientific literature, this concept was clarified for companies in the banking sector by E. Lamarck, T. Pushmann, A. Reiner, V. Smirnov and others. The key problem of defining a value chain is to assign processes to the main or supporting function. Articles of the early 2000s, for example, E. Lamarck determines that Porter's value creation analysis scheme is applicable to banks, and marketing and sales of banking products are a key element of value creation. All other elements, such as risk management, technology and infrastructure in its work, are classified as supporting [4]. Later studies on the evolution of the banking industry determine the growing role of technology and

[1] Almanah "Artificial Intelligence: Index 2022". MIPT, NTI Competence Centre "Artificial Intelligence". 2023. URL: https://aireport.ru/ai_index_russia-2022 (accessed on 11.10.2023).

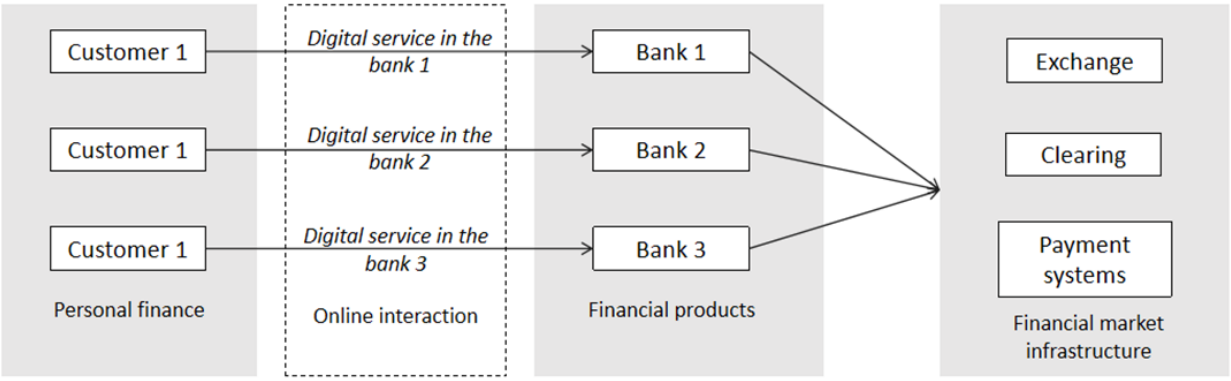


Fig. 1. **The Value Chain of Commercial Banks in the Context of Digital Transformation**

Source: Complied by the authors based on [4].

digitalization of the banking infrastructure. For Example, T. Pushmann and A. Reiner notes the change in the behavior of bank customers, defining them as "digital natives", that is, using digital technologies on a daily basis [5]. The result of this transformation was the first place of the technological component of the bank's services. It allowed banks to become a more customer-oriented business by personalizing the interface of banking services applications, expanding channels of communication with customers, customizing banking products.

Fig. 1 shows the value chain in the banking industry: a key feature here is existence of the bank's digital space, which provides online interaction. The bank itself provides financial products through this channel.

Research in the 2020s focuses on the innovative activity of banks, which allows to improve the efficiency of banking processes and introduce innovations in the bank's products and its business model. Digital transformation of the banking business is considered as a launching pad for the introduction of breakthrough technologies (disruptive technologies), such as social media, fintech, blockchain, artificial intelligence [6]. V. Smirnov highlights the technological content of banking activities in a supporting direction, noting the ambidextrality of the banking industry at the present stage of development, which means the organization of a business model that implies the coexistence of both gradual development and innovative changes [7].

Fig. 2 presents a model of value creation in a modern bank. It includes the main activities of the bank — marketing and sales of banking products, efficiency of raising funds — funding, implementation of transactions, risk and liquidity management of the bank. All these activities are interrelated, as sales of banking products without risk management can, on the contrary, lead to a decrease in the company's value. The lack of the necessary technological base reduces the bank's ability to effectively implement the sales and risk management process, reduces sales margins. Sometimes the process and operational processes are combined in one function, as in modern banking the operational processes are implemented through working with customer data and processing them by technological systems [8].

The need for innovation in the banking industry is based on three main motives:

1) improvement of operational efficiency, which can be accompanied by a complete change in the business process or even the business model;

2) continued market growth and/or increase in profitability, especially in cases where there is high competition in the market and requires increased attention to the client and his needs;

3) effective risk management, including optimization of decision-making processes.

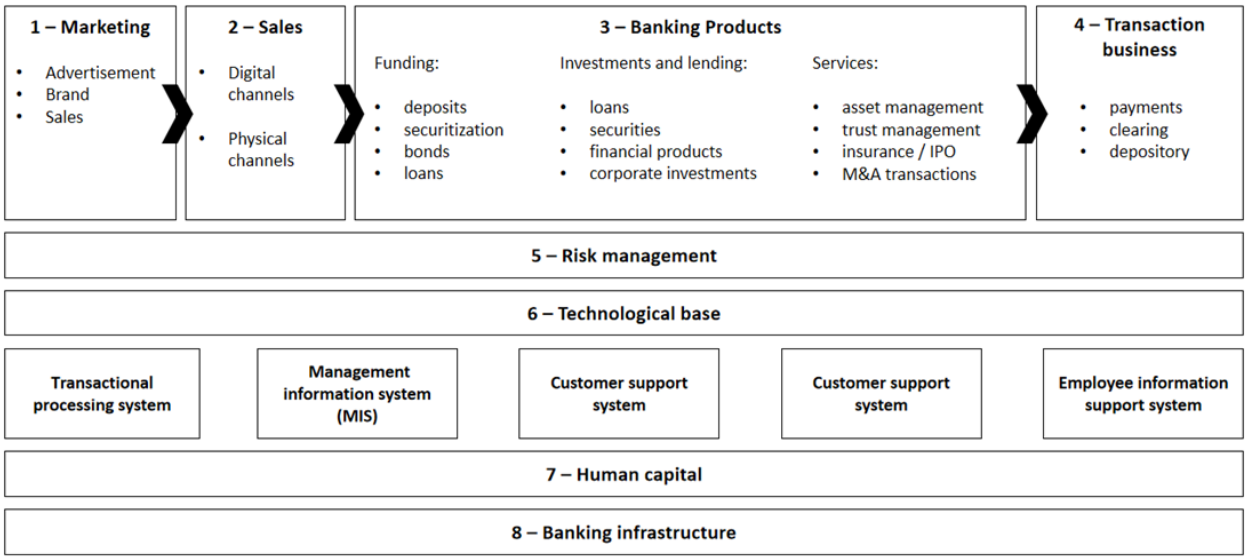


Fig. 2. **Bank Value Chain Implementing Supporting Activities**

Source: Complied by the authors based on [6].

Analysis of the value chain for the degree and nature of the impact of artificial intelligence technologies on it is carried out on the basis of changes in the above parameters. Understanding which element of the chain is affected by AI will allow you to prioritize investments and introduce them into banking processes.

ANALYSIS OF ADVANCED ARTIFICIAL INTELLIGENCE TECHNOLOGIES

Applied Models of Artificial Intelligence

This type of technology is now models that are used to solve cognitive problems based on the following technologies:

- *Machine learning*. This direction is based on the technique of learning the model on data in order to form a mathematical relationship between the predicate and the predictor, expressed in the equation and maximizing the statistical metric. The key difference is the absence of algorithms with predefined rules.
- *Computer vision*. Models of this type of technology work with the recognition or generation of data in the form of images. At the moment, the accuracy of image recognition exceeds human capabilities: the accuracy rate[2] is 99% for the latest Microsoft Cloud models against 94.9% of the correctness of human recognition [1].
- *Natural language processing*. Models of this type work with the recognition and generation of text data. Traditionally, they solve the following tasks: recognition of text and determination of logical relationships between units of text, determination of the emotional coloring of the text, machine translation of text, recognition of oral speech and digitization of it in text form.
- *Deep learning with reinforcement*. A special kind of models that works on the principle of an agent that maximizes the reward for correct actions and minimizes fines based on his own experience of interaction with the environment. Widely used in the work of industrial robots and autonomous transport.

The work of these models is already actively used by banks at almost all stages. Machine learning models are created to assess credit risks, forecast market conditions, calculate the elasticity of customer demand for banking products. Computer vision allows you to monitor the work of client managers in real

[2] Author's note: accuracy shows the proportion of correct answers from all outcomes.

time, reducing operational risks. Natural language processing models automate document recognition processes, allow you to analyze the quality of communication with the bank's customers through speech transcription. Deep learning can be used by banks in analyzing the bank's business processes and ways to improve them. The next step in the development of deep learning models is generative artificial intelligence.

Generative Artificial Intelligence

This type of technology opens up great opportunities for application compared to application models, as it is able to work with unstructured and multimodal data — text, audio, video, images, program code, mathematical, chemical and physical formulas. Generative models can be adapted to work on all the above tasks, which makes them closer to general-purpose technologies, that is, to strong artificial intelligence [9].

The generative models are based on the following technologies:

1) *Foundation models*. Deep learning models trained on a large number of unstructured, unlabeled data, which can then be adapted to solve specific problems. For example, the modern generative model Palm2 2023 was trained for more than 3 trillion tokens (conditional data units), and 300 billion tokens were used to train the most famous GPT-3 2020 model [10]. This amount of data requires significant computing power.

2) *Modern hardware*. GPUs (graphic processing units) are used to speed up calculations. A feature of the characteristics of the models since 2016 has been the use of a huge amount of data, which significantly increases the need for computing power [11]. On the other hand, the development of generative models was made possible by increased availability and hardware performance: GPU performance increased by $ 1 between 2006 and 2021(*Fig. 3*).

3) *Integration technologies*. These are separate add-ins on top of the base model, which are aimed at narrowly adjusting the results of the model to a specific set of data, tasks and queries. The most common example is ethical filters, specific databases, such as medical reports, which allow models to obtain specific information for additional training.

Generative artificial intelligence technology has four key areas of application — smart search, copilots, smart assistants and content generation. *Table 1* presents directions and examples of implementation.

The above examples indicate the universality of the use of generative AI in business processes in various sectors of the economy. This means that the training of the basic model should not always be the subject of investment of the company that implements it in its business processes. She can purchase a subscription to use the basic model from the developer company [13]. For example, according to this model, the business of the Open AI company, which developed the ChatGPT, GPT-3.5, GPT-4 models, was organized. In this case, the buyer company pays per unit of data — tokens and trains on internal data. This process is called "fine-tuning" [14].

The directions of using generative AI in various sectors of the economy illustrate that the function that is transformed in the value chain of a commercial bank is primarily communication with the client. Models of generative artificial intelligence, especially language models in commercial banking, can be used to hyper-personalize the process of marketing and sales of banking products. On the example of the smart assistant of Bank of America and Gigachat by Sberbank can be seen that the introduction of AI in the process of communication with the client both in the form of automation (complete replacement of human AI) and in the form of augmentation (AI as an addition to human solutions) allows the bank to automate the communication process and make it more effective. On the one hand, the skills of existing banking chatbots can be significantly improved, for

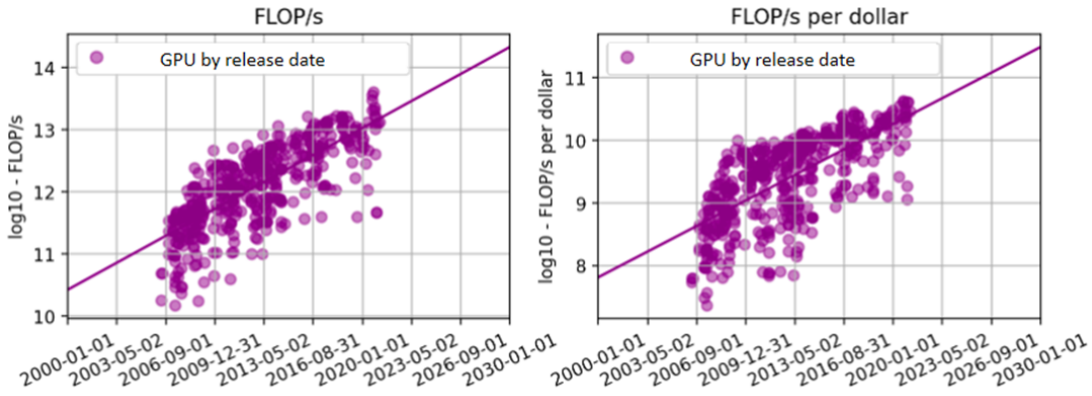


Fig. 3. **GPU Performance Between 2006 and 2021 in Terms of Out-of-System Units (FLOPs)**

Source: Complied by the authors based on [12].

Table 1

Directions for Implementing Generative Models with Examples of Application in Various Sectors of the Economy

Direction	Description	Examples of application
Smart search	Transformation of search queries: instead of a set of links — a response to a query aggregated from different sources	Bing, Google, Yandex
Copilot	A digital counterpart of an employee prompting or making a decision together with a specialist	Software development tools — GitHub Copilot, VsCode, JARVIS Copilot in medicine — NablaCopilot, CAPTIS, Sber Med AI Copilot in Fintech — Onnix, Gigachat (Sberbank), Cash Copilot
Smart assistant	Digital assistant of the company's client, allowing you to replace direct communication between the client and the employee	Smart assistant in banks — Erica в Bank of America Personalization of assistant recommendations in e-commerce — Magento 2 Amazon Personalize
Content generation and analysis	Automation of content creation and its analysis using multimodal data	Creation of advertising and product elements — Nestle, Heinz, Stitch Fix, Mattel

Source: Complied by the authors.

example, "Oleg" of Tinkoff Bank and "Salute" and "Athena" of Sberbank, and on the other hand, generative AI as a tool for summarizing customer information allows sales managers to hold meetings with customers more effectively, offering only relevant products.

ARTIFICIAL INTELLIGENCE IN THE BANK VALUE CHAIN

In terms of the stages of value creation, the AI of technologies is a separate space not only in the technological basis of the bank, but also in the process of risk management.

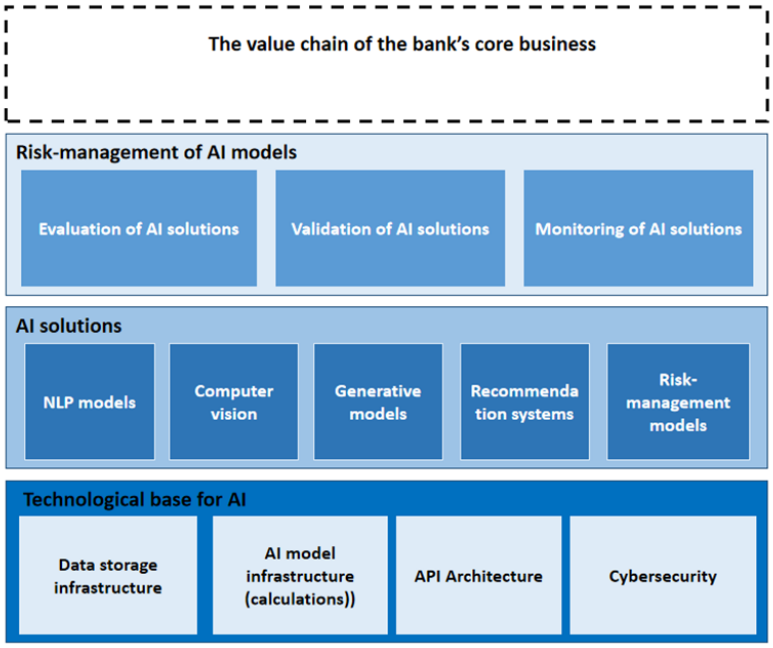


Fig. 4. **Artificial Intelligence Models in the Banking Value Chain**

Source: Complied by the authors.

To achieve the results of AI transformation, the bank needs to invest in three integrated sub-processes — the technological base for AI, the development of AI solutions and risk management of AI solutions, the result of which work together is a business process with AI in the value chain (*Fig. 4*). Each of these processes is mandatory, as the absence or weak development of one of them leads to risks for the main banking processes.

Deploying artificial intelligence capabilities in an organization requires a scalable, fault-tolerant and adaptable set of core technological components. Digitalization of the main processes and the availability of a data storage and processing system is a prerequisite for the implementation of AI solutions. Without a storage infrastructure, the calculation system for AI models does not make sense. In addition, it must be in one way or another interconnected with other analytical systems of the bank in order to access up-to-date data or, on the contrary, send the results of calculations to them [15]. This interaction is implemented using the API architecture. A separate element in this system is cybersecurity and data encryption.

The next layer is AI models and their development. They can be divided into groups by the task to be solved, or by the business processes in which they participate. Simply, they can be divided into application models and generative artificial intelligence.

Finally, all AI solutions should go through a process of assessing their effectiveness, validating them for errors, inefficiencies, discrimination and other ethical violations. After the introduction of the AI model into the business process, regular monitoring is implemented in order to neutralize the consequences of model risk [16].

Banks should have a single technology strategy, which is closely related to the business strategy and determines the strategic choice of which elements, skill sets and talents the bank will hold within the company and which — through partnerships or relationships with suppliers. In addition, the technology strategy should clearly define how each component of the AI target architecture will support the concept of the bank as an artificial intelligence-oriented company and interact with each element of

the value chain. A practical way to develop such a strategy is to assess how the bank's strategic goals (e.g. growth, profitability, customer interaction, costs) can be materially implemented using a number of artificial intelligence technologies, as well as to reconcile the goals of artificial intelligence with the strategic goals of the bank. Once such agreement is reached, bank management should conduct a comprehensive analysis of the bank's position at all levels of the AI creation process in order to identify areas that need key changes, additional investments and specialists.

ANALYSIS OF THE APPLICATION OF AI MODELS IN THE VALUE CHAIN OF A COMMERCIAL BANK

The analysis of the concept of the value chain in the banking industry showed that the technological base allows to improve processes, so it is necessary to prioritize those developments in the field of AI that will have the greatest effect. According to the analytical report of the foreign company McKinsey & Company, AI technologies can increase profits through greater personalization of offers, reduce costs due to increased automation, reduce errors. The overall effect of the introduction of AI on the value of the company in the banking industry is estimated at 15% of revenue, most of which — 60% of the effect — falls on marketing and sales. The rest of the effect falls on risk management, human capital and technological base [17]. At the same time, the effect of modern generative models is estimated at 3–5% of revenue and is more manifested in the development and maintenance of the bank's technological solutions and customer support [18].

Based on the data of the library of successful initiatives to implement AI Russia, we analyzed the examples presented there for economic effects and classified their impact on one of the four elements of the value chain — marketing and sales, customer support, operational processing and risk management.[3] In total, 35 successful implementation cases were presented in the "Finance, Credit, Insurance" industry section, of which 7 initiatives were aimed at transforming processes in marketing and sales, 10 — at developing customer support, 11 — at operational processes, 7 — at risk management processes. The data were presented by twelve companies in the financial sector of Russia — Sberbank, VTB, Gazprombank, Alfabank, Otkritie, Pochta Bank and others. The conclusions and evaluation of economic results were based on the effects stated on the web page of each initiative. Let's consider examples of the use of AI at each stage of the value chain and assess the potential contribution to the efficiency of the bank.

1. **Marketing and sales.** The main models are aimed at personalizing communications in order to increase customer involvement and increase the likelihood of the transaction. The analysis of initiatives showed that the introduction of AI in the personalization of sales of a particular product or segment allows to increase revenue for specific products by 10–25%, and more global models aimed at several client segments and a group of products by 4%. At the same time, a number of models allow you to optimize marketing processes and affect the bank's costs.

Let's study at a few private examples.

At the end of 2021, Sberbank developed an individual communication policy (ICP) based on machine learning models. The essence of the model is that with the help of machine learning technologies, the ICP determines what product the client needs, in which communication channel it is more convenient for the client to get an offer, at what time to send communication, so that the client does not miss it, what frequency and

[3] AI Russia — a library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

Table 2

Economic Effects and Influence on the Type of Competition from Marketing and Sales Models

Case study AI	Economic effect	Competitive impact
Individual Communication Policy (ICP)	Revenue growth by 4% Increasing the clients lifespan due to an increase in satisfaction by 7%	Product competition
Search for an interested audience for targeting	Increase in sales conversion from 0.3% to 8% Reduction of attraction costs by 36 times	Product competition Cost competition
K7M	Sales growth	Product competition Cost competition

Source: Complied by the authors based on AI Russia — the library of effective AI solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

frequency of communication is most effective in interacting with the client. As a result of the implementation, the bank recorded an increase in revenue by 4%, as well as an increase in customer satisfaction on the CSI indicator[4] to 7%.[5]

Another example is the model of finding an interested audience for targeting Alfa Bank. In this model, the main task is to determine the audience for promoting a new credit card using the tools of the Second Party Data Exchange (SPDE) platform. As a result of the implementation of the model, there was an increase in conversion to a transaction from 0.3% to 8% and the cost of attraction decreased by 36 times.[6]

Combining a group of models allows you to transform the sales process altogether, making it fully automated. This sales experience was demonstrated by Sberbank: after the introduction of the K7M intellectual system "Credit in 7 minutes" it was possible to reduce the loan issuance time to 7 minutes. The essence of the model is to automate the legal processes of document verification and assessment of the borrower's creditworthiness.

The impact on the value of the bank is presented in *Table 2*.

In addition to the financial effect of the company, AI models have an image and social effect, reducing the volume of irrelevant offers that affect the customer experience and perception of the company by the client. Thus, AI allows commercial banks to hyperpersonalize the offers of banking products.

2. **Customer support and communications.** At this stage, the model's value chain is focused on increasing customer satisfaction while maintaining or reducing support costs. Analysis of 10 cases of AI implementation showed that the average savings on customer contact processes are 30% of the total cost of the process and range from 200 to 1 billion per year. However, the financial effect does not fully reflect the essence of the economic effect of AI. In addition to reducing costs, banks increase customer satisfaction, which affects their willingness to purchase bank services. The lack of a unified methodology for assessing customer satisfaction and the calculation of the financial effect of its growth does not allow to unambiguously assess the contribution to the revenue of banks. Point estimates show that an increase in customer

[4] Author's note: CSI (customer satisfaction index) shows the level of customer satisfaction with the bank's service or product.

[5] AI Russia — a Library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

[6] AI Russia — a Library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

Table 3

Economic Effects and Influence on the Type of Competition from Customer Support and Communications Models

Case study AI	Economic effect	Competitive impact
Advisor for small and medium-sized businesses	Increasing the client's lifespan by increasing loyalty by 8–10% Revenue growth per 1 client by 10–12%	Product competition
Intellectual customer support service VTB Business	Increasing the client's lifespan Reducing costs by reducing the volume of appeals by 33%	Product competition Cost competition
Anticipating the wishes of Sber's customers	Cost reduction by 1 billion rubles per year	Product competition Cost competition
Voice robot Oleg for communication with customers	Cost reduction by 33 million rubles per month	Cost competition

Source: Complied by the authors based on AI Russia — the library of effective AI solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

loyalty (NPS)[7] by 8% leads to an increase in revenue by 10%.

Let's study at a few private examples.

In 2023, PJSC Bank "Financial Corporation Otkritie" created the service "Advisor for Small and Medium-Sized Businesses" with smart recommendations, alerts and tips for the bank's customers. For example, the client will be prompted by a more favorable tariff, a quick solution to the issue, pay attention to important events at counterparties, the risk of blocking, cash gap and much more. The declared effect of the implementation is as follows: an increase in revenue per 1 client by 10–12%, a reduction in outflow by 38–43%, an increase in customer loyalty according to the NPS metric by 8–10%.[8]

The 2021 initiative in Sberbank called "Anticipating the wishes of Sberbank customers" is a predictive analytics tool to identify the bank's client's problems before contacting the support line. The model analyzes the data of the client's digital traces in real time and sends a hint through one of the communication channels on how to solve the problem facing him. The effect of the initiative is to save the costs of the contact center up to 1 billion rubles per year.

A similar service was developed by VTB Bank in 2021, it focused on the needs of medium and small businesses. Its essence was to create a self-learning search string based on NLP technologies in order to provide a relevant answer. The business effect of the initiative was to reduce the number of contact center calls by 32%.[9]

A separate area is the work of voice robots in customer support. Tinkoff Bank automated the call center using deep learning models. The robot was named Oleg. It allows the bank to save 33 million rubles per month.[10]

The impact on the value of the bank is presented in *Table 3*:

[7] Author's note: NPS (Net Promoter Score) is an index of customer commitment to a product or company. NPS shows how ready the client is to recommend the company's services and products to his environment.

[8] AI Russia — a Library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

[9] AI Russia — a Library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

[10] AI Russia — a Library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

Table 4

Economic Effects and Influence Transaction of Processing Models on the Type of Competition

Case study AI	Economic effect	Competitive impact
Patriot	Cost reduction by 675 million rubles per year	Cost competition
Online settlement of failed operations at Sberbank ATMs	Cost reduction by 36 million rubles per year. Increasing the client's lifespan	Cost competition
Accelerating the processing of mortgage applications	Cost reduction by 24 million rubles per year	Cost competition

Source: Complied by the authors based on AI Russia — the library of effective AI solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

Table 5

Economic Effects and Influence on the Type of Competition from Risk Management Models

Case study AI	Economic effect	Competitive impact
Fraud monitoring: countering fraud	Reduction of expected losses by reducing the volume of fraudulent transactions by 7 billion rubles per year	Product competition
Anti-fraud facial recognition system	Reduction of expected losses by reducing the volume of fraudulent transactions by 2 billion rubles per year	Product competition
Model risk management	Reduction of process costs by 50%	Cost competition

Source: Complied by the authors based on AI Russia — the library of effective AI solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

3. **Operational processing.** Improvements in this type of banking involve the automation of processes related to the implementation or support of banking products. All analyzed initiatives using AI are aimed at reducing costs. The most common process is the automation of decision-making on loan applications, recognition of client documents. The effect of such initiatives ranges from 20 million rubles per year to 300 million rubles per year and in general can be estimated at 10–20% of the total costs of the process. A number of initiatives are also aimed at improving the operation of ATMs. Sberbank annually saves from 700 million rubles per year as a result of the introduction of AI in this process. When assessing the ATM network of Sberbank at 45 thousand devices for 2022, the savings for 1 device are about 15 million rubles per year, which can be used as a predictable effect for banks that plan to introduce AI into this process.

Let's study at a few private examples.

In 2020, Sberbank developed a decision-making system for the collection of Patriot.

The essence of his work is to predict the necessary amounts of cash in ATMs and bank offices. Initially, decisions on amounts were made on the basis of offline data manually, the model made it possible to predict the financial load of each point and more accurately form the volume of collection. The declared effect of the implementation is the savings of 649 million rubles on the remuneration fund of specialists engaged in forecasting and collection, as well as 35 million rubles of savings on the use of third-party software.[11]

Similarly, in 2021, Sberbank implemented a model of online settlement of failed operations at ATMs. In this case, the AI model conducts multiphase checks on the client's financial profile to assess the likelihood of a failed operation. As a result of the introduction, the bank saved 3 million rubles per month on the wage fund.

Another example of automation of operational processes was implemented in the online service "Domclick" of Sberbank. The image data recognition model made it possible to automate the process of transferring client data to the system for credit analysis. The effect of using this initiative is 2 million rubles per month.[12]

The impact on the value of the bank is presented in *Table 4*.

Risk management. This type of activity has quite a lot of applications, but the key are compliance with regulatory requirements, combating fraud, as well as controlling the risks of the borrower's default on loans. The analysis showed that the main financial effect of such initiatives is to reduce the operating costs and losses of the bank as a result of fraud. In the direction of combating fraud, the impact assessment is 2–7 billion rubles per year. Reducing operating costs is 25% of the cost of the risk control process.

Let's study at a few private examples.

To improve the security of real-time customer transactions, Sberbank in 2019 introduced the AI model "Fraud Monitoring: Countering Fraud", which analyzes card transactions and determine the probability that the transaction is fraudulent. The system itself is a cascade of online and offline models that produce cluster analysis, graph analysis, clustering and classification. The effect of the implementation of the initiative is to reduce the volume of fraudulent transactions by 7 billion rubles per year.[13]

In Pochta Bank JSC, the fight against fraudsters is carried out with the help of a face recognition system based on the VisionLabs biometric system. In the process of use, the model recognizes whether the client issuing the loan is a fraudster under someone else's name. As a result, the bank potentially prevented 2 billion fraudulent credit transactions.[14]

The artificial intelligence models themselves also need to be monitored, a decrease in the predictive capabilities of the model leads to a decrease in customer service. In 2019, Sberbank introduced a model risk management system, which made it possible to refine models in a timely manner, whose predictive capabilities became lower than required. The direct effect of this initiative is to reduce the cost of the model validation process by 50%.[15]

The impact on the value of the bank is presented in *Table 5*.

CONCLUSION

The methodology of value chain analysis in banking is a universal tool for assessing business competitiveness. Due to the development of technology and the change in

[11] AI Russia — a Library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

[12] AI Russia — a library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

[13] AI Russia — a Library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

[14] AI Russia — a Library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

[15] AI Russia — a Library of effective AI-based solutions. URL: https://ai-russia.ru/ (accessed on 15.09.2023).

the transformation of the business model, its main components are changing, despite the preservation of the key element of the chain — the banking product. The study demonstrated several approaches to determining the value chain in the bank, as well as the important role of the technological base and innovation. We have determined that innovation allows the bank to gain a competitive advantage at a certain stage of the value chain.

Modern technological trends in the banking industry are determined by the possibility of introducing artificial intelligence models. They can be divided into two types: applied models of artificial intelligence and generative models. The latter differ in that they can not only work with these of several modalities, but also solve several tasks without additional training. The potential of such models is still being tested by business, but already now it is possible to identify areas of use — smart search, copilots, smart assistants, content generation.

Special attention is paid to the place of the process of development, implementation and operation of AI in the value chain. We have determined that the AI model permeates several auxiliary components of the chain — the technological base, risk management and human capital.

To test the theoretical conclusions, we considered examples of practical use of modern models of artificial intelligence by Russian banks. Analysis of experience has shown that AI models really affect the efficiency of processes in each type of the bank's core business: they help to improve sales, customer support and interaction with the banking institution, reduce the costs of operational processing, and neutralize the potential risks borne by the bank as a credit institution.

REFERENCES

1. Maslej N., Fattorini L., Brynjolfsson E., et al. Artificial intelligence index report 2023. Stanford, CA: Institute for Human-Centered AI, Stanford University; 2023. 386 p. URL: https://aiindex.stanford.edu/wp-content/uploads/2023/04/HAI_AI–Index-Report_2023.pdf (accessed on 11.09.2023).
2. Glazkov B., Krasovskii P., Lysenko A., Levashov A. Effects of implementing solutions based on artificial intelligence in Russian companies. Moscow: Rostelekom; 2020. 16 p. URL: https://www.company.rt.ru/press/news/files/ROSTELECOM_AI_0112.pdf (accessed on 12.09.2023). (In Russ.).
3. Porter M.E. The competitive advantage: Creating and sustaining superior performance. New York, NY: The Free Press; 1985. 559 p.
4. Lamarque E., Key activities in the banking industry: An analysis by the value chain. 2000. URL: https://www.researchgate.net/publication/228224964_Key_Activities_In_The_Banking_Industry_An_Analysis_By_The_Value_Chain (accessed on 12.09.2023).
5. Alt R., Puschmann T. The rise of customer-oriented banking — electronic markets are paving the way for change in the financial industry. *Electronic Markets.* 2012;22(4):203–215. DOI: 10.1007/s12525–012–0106–2
6. Naimi-Sadigh A., Asgari T., Rabiei M. Digital transformation in the value chain disruption of banking services. *Journal of the Knowledge Economy.* 2022;13(1):1212–1242. DOI: 10.1007/s13132–021–00759–0
7. Smirnov V.D. About the value chain in banking. *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law*. 2023;16(1):77–86. (In Russ.). DOI: 10.26794/1999–849x-2023–16–1–77–86
8. Boobier T. AI and the future of banking. Chichester: John Wiley & Sons Ltd; 2020. 304 p.
9. Eloundou T., Manning S., Mishkin P., Rock D. GPTs are GPTs: An early look at the labor market impact potential of large language models. arXiv:2303.10130. 2023. DOI: 10.48550/arXiv.2303.10130
10. Naveed H., Ullah Khan A., Qiu S., et al. A comprehensive overview of large language models. arXiv:2307.06435. 2023. DOI: 10.48550/arXiv.2307.06435
11. Sevilla J., Heim L., Ho A., et al. Compute trends across three eras of machine learning. arXiv:2202.05924. 2022. DOI: 10.48550/arXiv.2202.05924

12. Hobbhahn M., Besiroglu T. Trends in GPU price-performance. Epoch AI. 2022. URL: https://epochai.org/blog/trends-in-gpu-price-performance#dataset (accessed on 15.09.2023).
13. Ran C. Exploring the opportunities and challenges of developing large AI models and their commercialization. *Advances in Engineering Technology Research*. 2023;6(1):611–620. DOI: 10.56028/aetr.6.1.611.2023
14. Chung H.W., Hou L., Longpre S., et al. Scaling instruction-finetuned language models. *Journal of Machine Learning Research*. 2024;25:1–53. URL: https://www.jmlr.org/papers/volume25/23–0870/23–0870.pdf
15. Manser Payne E.H., Dahl A.J., Peltier J. Digital servitization value co-creation framework for AI services: A research agenda for digital transformation in financial service ecosystems. *Journal of Research in Interactive Marketing*. 2021;15(2):200–222. DOI: 10.1108/JRIM-12–2020–0252
16. Nikitin N.A. Probabilistic methods for accounting model risks in assessing investments in artificial intelligence technologies. *Innovatsionnoe razvitie ekonomiki = Innovative Development of Economy*. 2023;(2):123–134. (In Russ.). DOI: 10.51832/2223798420232123
17. Thomas R., Agarwal A., Bhattacharjee A., et al. Building the AI bank of the future. Washington, DC: McKinsey & Company; 2021. 66 p. URL: https://www.mckinsey.com/~/media/mckinsey/industries/financial%20services/our%20insights/building%20the%20ai%20bank%20of%20the%20future/building-the-ai-bank-of-the-future.pdf (accessed on 15.09.2023).
18. Chui M., Hazan E., Roberts R., et al. The economic potential of generative AI: The next productivity frontier. Washington, DC: McKinsey & Company; 2023. 68 p. URL: https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/the%20economic%20potential%20of%20generative%20ai%20the%20next%20productivity%20frontier/the-economic-potential-of-generative-ai-the-next-productivity-frontier.pdf (accessed on 15.09.2023).

ABOUT THE AUTHORS

Ilya E. Pokamestov — Cand. Sci. (Econ.), Assist. Prof., Department of Financial and Investment Management, Financial University, Moscow, Russia;
Chief Executive Officer, Factoring PRO LLC, Moscow, Russia
https://orcid.org/0000-0002-8457-4866
Correspondent author:
pokamestov@mail.ru

Nikita A. Nikitin — postgraduate student of the Graduate School of Management Faculty, Financial University, Moscow, Russia
https://orcid.org/0000-0003-1217-713X
nikitanrus@mail.ru

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 09.11.2023; revised on 04.12.2023 and accepted for publication on 27.12.2023.
The authors read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-136-143
UDC 336.767,519.853(045)
JEL G11, C61

Method for Determining the Risk Profile of Investors Based on the Relationship of Two Stock Investing Problems

V.A. Gorelik[a], **T.V. Zolotova**[b]
[a] Federal Research Center "Informatics and Control" RAS, Moscow, Russia;
Pedagogical State University, Moscow, Russia;
[b] Financial University, Moscow, Russia

ABSTRACT

The subject of research in this paper is the investor's risk profile as a characteristic of his behavior in the stock market. **The purpose** of the study is to assess the investor's risk profile in the form of a risk ratio in a model with a linear convolution of expected return and variance. A financial consultant can use this information to create a portfolio of financial instruments that corresponds with an investor's acceptance of risk. This makes the study **relevant** because it addresses the problem of minimizing potential risks in the management of an investment portfolio, which is related to the investor's attitude toward risk. **The scientific novelty** lies in the development of a mathematical approach to solving the problem of determining the risk profile based on the relationship between the solutions of two problems of choosing an investment portfolio, expressed as conditions on the parameters under which the solutions of these problems exist and coincide. Wherein, mathematical programming **methods** were used, as well as the Python programming language. **As a result**, the risk coefficient is expressed in terms of the model parameter with a constraint on profitability; a classification of the risk profile according to the acceptable value of the risk coefficient is proposed; the method is implemented as a set of programs and demonstrated on the example of the Russian stock market. **The conclusion** is made about the possibilities of trust managers using this approach when making decisions on choosing the best portfolio.
Keywords: risk coefficient; risk profile; expected return; criteria convolution; investment portfolio

For citation: **Gorelik V.A., Zolotova T.V. Method for determining the risk profile of investors based on the relationship of two stock investing problems. *Finance: Theory and Practice*. 2024;28(4):136-143. DOI: 10.26794/2587-5671-2024-28-4-136-143**

INTRODUCTION

The development of the Russian economy largely depends on the stock market, which plays an important role in the redistribution of financial resources. The economic situation in the Russian Federation contributes to an increase in investment volumes in the securities of Russian enterprises. Economic progress is closely related to the results of investment activity. Attracting investors is one of the key issues related to the Russian stock market. Investing in shares of Russian companies carries a high risk of losing investment.

The main function of the financial market is associated with the transformation of risks. The market mechanism analyzes many types of risks and forms the so-called risk premium. It is important to note that even under conditions of market equilibrium, when all risks are fairly assessed, securities will not be equally attractive to all investors. Factors influencing investor preferences include their financial condition, individual attitude to risk, composition of assets and liabilities, current market conditions and much more. It is important to note that attempts to completely avoid risk result in a portfolio return approaching the risk-free rate, which may not be in the interest of the investor. Identifying the specific types of risk, that need to be addressed allows for a controlled increase in portfolio performance.

To achieve positive results in investment activities, investors form portfolios of securities that reduce the risk of losses and maximize profits [1–3]. To reduce the risks associated with managing investment portfolios, various equity portfolio management strategies are used. One

approach to making such investment decisions is to determine the investor's risk profile. The risk profile of an investor determines the level of a person's willingness to take the risk associated with the loss of an investment. Each investor has a different attitude to market volatility or risk, and this attitude depends, for example, on factors such as available funds, age, etc. Risk profiling allows both the investor and the financial advisor to create a portfolio of financial instruments that corresponds to the risk investor profile [4]. The investor's trustee can take proactive or reactive measures to minimize and, in certain cases, even prevent potential losses after the risk profile is determined.

The investor's risk profile is divided into three types: conservative (low risk propensity), moderate (moderate risk propensity), and aggressive (the greatest willingness to withstand market volatility) [5, 6]. In normal practice, testing is carried out to determine the risk profile [7, 8]. A selection of different data collection instruments was used in [9]: several structured online questionnaires, designed to provide an understanding of risk profiles and personalities, and a software package for simulating investments, used to track investors decisions when managing a portfolio. The article [10] proposes the experimental method, with the application of structured questionnaires, and computer simulation of investments with Expecon software utilizing data on real financial instruments that are available on the market. The articles [11–13] are devoted to the development of platforms for robotic consultants for risk analysis and investor profiling. An empirical method for studying investor risk tolerance is discussed in [14].

This paper proposes to determine the investor's risk profile using quantitative methods, i.e., the problem of finding the optimal portfolio is solved, taking into account the individual attitude of the investor to risk, expressed as a risk coefficient. Thus, the main role of the manager is to determine the goals, restrictions, the choice of appropriate types of securities, the selection of acceptable returns and risks, as well as the formulation of the optimization problem.

A portfolio manager must deal with multicriteria tasks and the problem of lack of information when choosing methods for assessing future results. The choice of an approach to multicriteria, uncertainty and risk leads to a formulated mathematical programming problem that can be solved using available optimization methods [15–19], and using machine-learning methods [20]. When choosing a portfolio, an investor is primarily interested in the expected return and the risk of loss. Really, the investor is interested in profitability, but one cannot determine it. Therefore, when optimizing a portfolio, this uncertainty is formalized by averaging real return values for the previous period and introducing a risk assessment as a deviation from the average. Accordingly, in this paper, the accounting for these two indicators is formalized in the form of two optimization problems. In the first problem, the linear convolution of the mathematical expectation and the return variance is maximized. In the second problem, the variance is minimized, and the mathematical expectation of the return must be equal to the given value. Conditions on the parameters under which the solutions of these problems exist and coincide are given.

To implement this analytical approach, a software package was developed using the Python programming language version 3.8.5 and the Google Colaboratory environment. It was tested on a practical example with real data from the Russian stock market.

THEORETICAL BASIS OF THE METHOD

The models under consideration are based on the assumption that there is a set of assets, which is described by the vector $\bar{r} = (\bar{r}_1, \ldots, \bar{r}_i, \ldots, \bar{r}_n)$, where $\bar{r}_i$ — the expected return of the i-th financial instrument, and the covariance matrix $V = (\sigma_{ij})_{n \times n}$.

The investor's strategy consists in the distribution of funds between assets and is

described by the vector $x=(x_1,\ldots,x_i,\ldots,x_n)$, where x_i — share of funds invested in the i-th financial instrument.

The formulation of the first problem of determining the optimal portfolio:

$$\max_x\left[\bar{r}x-\alpha(xVx)\right],\ xe=1, \qquad (1)$$

where $\alpha>0$ — weighting factor that determines the investor's attitude to risk (risk coefficient), $e=(1,\ldots,1)$.

The optimal composition of the portfolio x^* and the corresponding value of the Lagrange multiplier λ^* are found from the system of linear algebraic equations:

$$\bar{r}-2\alpha Vx^*=\lambda^* e, x^* e=1. \qquad (2)$$

Assume that the covariance matrix V is nondegenerate and introduce the notation for scalar quantities $a=eV^{-1}e$, $b=\bar{r}V^{-1}e$, $c=\bar{r}V^{-1}\bar{r}$ and vectors $h=V^{-1}e$ and $g=V^{-1}\bar{r}$. Solving system (2), we obtain the composition of the optimal portfolio

$$x^*(\alpha)=\frac{h}{a}+\left(g-\frac{b}{a}h\right)\frac{1}{2\alpha}. \qquad (3)$$

The formulation of the second problem of determining the optimal portfolio:

$$\min_x xVx,\ \bar{r}x=r_p,\ xe=1, \qquad (4)$$

where r_p — the expected return of the portfolio, given by the investor.

Optimal portfolio composition x^* and the corresponding values of the Lagrange multipliers λ_1^* and λ_2^* are found from the system of linear algebraic equations:

$$2Vx^*=\lambda_1^*\bar{r}+\lambda_2^* e,\ \bar{r}x^*=r_p, x^* e=1. \qquad (5)$$

Find x^* from the first vector equation of the system (5):

$$x^*=\frac{1}{2}\left(\lambda_1^* g+\lambda_2^* h\right). \qquad (6)$$

Substituting (6) into the second and third equations of system (5), we obtain a system for finding λ_1^* and λ_2^*. It is shown that if all $\bar{r}_i$ are distinct, then $ca-b^2>0$. Then we have the values of the Lagrange multipliers

$$\lambda_1^*=\frac{2(ar_p-b)}{ca-b^2}, \lambda_2^*=\frac{2(c-br_p)}{ca-b^2}.$$

It is proved that problem (4) has a solution if the following conditions are satisfied

$$\max\left\{\frac{b}{ar_p},\frac{b^2}{ac}\right\}1,<\min\left\{\frac{b}{ar_p},\frac{b^2}{ac}\right\}>1. \qquad (7)$$

If the risk coefficient $\alpha=\frac{ca-b^2}{2(ar_p-b)}>0$, then the solutions of problems (1) and (4) coincide.

To classify the investor's risk profile according to the type of conservative, moderate, aggressive it is convenient to map range values [0, ∝) of the coefficient α into the segment [0, 1] using the function

$$\beta(\alpha)=1-\frac{1}{1+\alpha}. \qquad (8)$$

Let's connect the investor's risk profile with the value of the coefficient β, namely,

- aggressive, if β∈[0,0.25],
- moderate, if β∈(0.25,0.75],
- conservative, if β∈(0.75,1].

Note that this classification of the risk profile does not exclude the possibility of its adjustment by financial consultants.

TOOLS FOR IMPLEMENTING THE PROPOSED METHOD

The developed software package selects the period and the initial list of shares, data processing, entering the defining parameters and checking the conditions, calculating the risk profile of the investor and the composition of the optimal portfolio (the programs were written with the participation of a student at the Financial University A.V. Karasev).

0	2008-01-09	0.018400	0.011200	0.028600	0.005800	0.051200	0.060600	0.023100	-0.017100	-0.001500	-0.033400
1	2008-01-10	0.019013	0.007866	-0.000822	-0.008177	0.003824	0.005102	0.046834	0.012558	0.016495	0.000822
2	2008-01-11	0.091167	0.017187	0.009960	-0.012609	0.000000	0.045685	0.000829	-0.031310	0.011301	0.000000
3	2008-01-14	-0.031385	0.023276	0.021888	-0.015717	-0.009524	0.029029	0.038079	0.002776	0.002865	-0.006568
4	2008-01-15	-0.003352	0.019377	-0.009513	-0.006487	0.000000	-0.009388	0.018979	-0.009018	0.006762	-0.015702
...	...	...	...	...	...	...	...	...	...	...	...
3742	2022-12-26	-0.002492	0.004952	0.007645	-0.000125	0.005933	0.004198	-0.001853	0.026507	0.021821	0.010337
3743	2022-12-27	-0.001665	0.016125	0.012028	0.004613	0.005551	-0.000380	0.006787	0.008655	-0.007449	-0.006139
3744	2022-12-28	-0.007506	-0.020498	-0.013714	-0.003227	-0.003278	-0.000760	-0.011702	-0.000985	-0.002788	-0.030882
3745	2022-12-29	0.000000	-0.000675	0.006736	0.001619	-0.002769	0.012367	-0.004633	0.012672	0.010394	0.008194
3746	2022-12-30	0.003361	0.017789	-0.002148	0.011810	0.021867	0.013343	-0.005431	0.016129	0.001348	-0.013245

3747 rows x 11 columns

Fig. 1. **Content of Dataframe Profit_DF**

Source: Compiled by the author.

For the specific implementation of the practical part, stock quotes of ten companies of the Russian stock market were selected:

- AFK Sistema (AFKS)
- Gazprom (GAZP)
- Lukoil (LKOH)
- NLMK (NLMK)
- NOVATEK (NVTK)
- Pole (PLZL)
- Rosneft (ROSN)
- Sberbank (SBER)
- VTB (VTBR)
- Severstal (CHMF)

As the data under consideration, we will take the daily closing prices of the corresponding shares for the period from 2008 to 2022, inclusive. The choice of this period is determined by the completeness of data on closing prices for the selected shares.

Export of quotes of company shares was made from the site "Investing.com".[1] On the main page of "Investing.com" in the "Quotes" tab, select "Shares", "Russia", then select the type of shares, for example, shares of VTB (VTBR). Then you need to open the tabs "Overview", "Past data" and select "Time period" — "Day". Set the upload boundaries from "01/01/2008" to "12/31/2022" and sort the data in ascending order for the convenience of further manipulations, click on "Download data".

A unified data frame profit_df containing the date and returns for the specified date for the corresponding tickers is shown in *Fig. 1*.

Further, the possibility of limiting the considered period is implemented by entering the start and end dates from the keyboard, as well as selecting certain securities from the specified list.

Then, in the "Select stocks" block, we will enter the tickers of the stocks we are interested in, from which we want to make an investment portfolio.

A program has been developed that calculates the vector of mathematical expectations of returns mean_vec and the covariance matrix of returns cov_matrix for selected stocks for a limited period (*Fig. 2*).

For the selected set of stocks, we find the vector of mathematical expectations of returns and the covariance matrix (*Fig. 3*).

We use the inverse covariance matrix for calculations (*Fig. 4*).

Fig. 5 shows the fragment program for calculating mathematical expressions from conditions (7).

Fig. 6 shows a program that allows, at a given level of profitability, to check the

[1] Investing.com. URL: https://ru.investing.com/equities/russia (accessed on 05.02.2023).

```
[25] mean_vec = profit_df.iloc[:, 1:].mean()
     mean_vec
```

```
[27] cov_matrix = profit_df.iloc[:, 1:].cov()
     cov_matrix
```

Fig. 2. **Formation of Mathematical Expectations of Stock Returns and Covariance Matrix**

Source: Compiled by the author.

```
vtbr   -0.000526
gazp    0.000516
nlmk    0.000038
plzl    0.000698
sber   -0.000042
dtype: float64
```

	vtbr	gazp	nlmk	plzl	sber
vtbr	0.000590	0.000342	0.000252	0.000178	0.000445
gazp	0.000342	0.000655	0.000215	0.000182	0.000368
nlmk	0.000252	0.000215	0.000427	0.000158	0.000264
plzl	0.000178	0.000182	0.000158	0.000560	0.000184
sber	0.000445	0.000368	0.000264	0.000184	0.000621

Fig. 3. **Calculation of Mathematical Expectations of Stock Returns and Covariance Matrix**

Source: Author calculations.

```
vtbr     1.0
gazp     1.0
nlmk     1.0
plzl     1.0
sber     1.0
dtype: float64
```

	vtbr	gazp	nlmk	plzl	sber
vtbr	4037.797394	-609.049459	-647.816870	-181.060099	-2202.751357
gazp	-609.049459	2475.869965	-275.337073	-255.346884	-838.026319
nlmk	-647.816870	-275.337073	3474.592059	-450.628332	-714.762674
plzl	-181.060099	-255.346884	-450.628332	2105.606688	-152.918728
sber	-2202.751357	-838.026319	-714.762674	-152.918728	4034.890055

Fig. 4. **Calculation Inverse Covariance Matrix**

Source: Author calculations.

```
ratio1 = (mean_vec @ inv_cov_matrix @ e.T) / (r_p * (e @ inv_cov_matrix @ e.T))

ratio2 = ((e @ inv_cov_matrix @ mean_vec.T) ** 2) / ((mean_vec @ inv_cov_matrix @ mean_vec.T) * (e @ inv_cov_matrix @ e.T))
```

Fig. 5. **Matrix operations**

Source: Author calculations.

conditions that ensure the equivalence of problems (1) and (4). We introduce the required value of the mathematical expectation of the daily return of the portfolio r_p and check the conditions (7).

For a given level of return $r_p = 0.0005$ got the value of the risk coefficient $\alpha = 5.4799$.

The program for calculating optimal portfolios uses formulas (3) and (6), as well as numerical optimization methods of the CVXPY

```
condition = (max(ratio1, ratio2) < 1) or (min(ratio1, ratio2) > 1)
print(condition)
```

```
True
```

```
  term1 = mean_vec @ inv_cov_matrix @ mean_vec.T
  term2 = e @ inv_cov_matrix @ e.T
  term3 = (e @ inv_cov_matrix @ mean_vec.T) ** 2
```

```
alpha = (term1 * term2 - term3) / (2 * (r_p * term2 - (mean_vec @ inv_cov_matrix @ e.T)))
```

```
True    alpha = 5.47985274407859
```

Fig. 6. **Checking conditions and calculating the risk profile for a given level of return**

Source: Author calculations.

```
alpha: 5.47985274407859
 vtbr   -0.122357
 gazp    0.264364
 nlmk    0.372643
 plzl    0.413066
 sber    0.072284
dtype: float64
```

```
r_p =  0.0005
 vtbr   -0.122357
 gazp    0.264364
 nlmk    0.372643
 plzl    0.413066
 sber    0.072284
dtype: float64
```

Fig. 7. **Finding optimal portfolios**

Source: Author calculations.

library. *Fig. 7* shows the result of calculating the optimal portfolios for the selected set of financial instruments.

As can be seen from *Fig. 5*, in this example, there is a negative value of one of the components of the portfolio composition vector. A negative value of the share, as you know, means a short sale. If it is required to build a portfolio without short sales, then the process of finding a solution in problems (1), (4) is reduced to enumeration of square submatrices of the original covariance matrix. When using tools, one can build a portfolio without short sales, for example, by adding a non-negativity condition on the variables and using a numerical method for convex programming problems (1), (4).

For the found value $\alpha = 5.4799$, we get the value $\beta = 0.8457$ by formula (8). This means that, in accordance with the above classification, the constructed portfolio is suitable for a conservative investor.

CONCLUSION

Thus, the investor's risk profile, which is a certain characteristic of the investor's behavior in the stock market, helps the trustee to choose the right investment strategy. At the same time, for each type of investor, the return on his portfolio is related to, for example, the inflation rate or the rate on deposits.

The purpose of a conservative investor is to protect against inflation and preserve his capital. It is reasonable for him to get paid for investing 70% of the money at the rate of return on deposits or the rate at which inflation is indicated.

The moderate investor is focused on stable accumulation. He only invests 50% in bonds and the rest in stocks. The return on investment should be well above the rate of inflation.

An aggressive investor is prepared to accept chances in order to generate high profits. He tries to maximize return on investment by investing

about 80% of the assets in highly volatile financial instruments.

If, when making decisions on choosing the best portfolio, convolution of sum-type criteria with a risk coefficient for dispersion is used, then the problem of setting the risk coefficient (investor's risk profile) arises. In this paper, a mathematical approach to solving such a problem is developed.

The procedure for determining the relationship between the coefficient α and the expected level of return can help financial advisers in making informed decisions on compiling investment portfolios for clients with different risk profiles.

The technical implementation of the proposed method makes it possible to automate the process of determining the investor's risk profile. The use of the Python 3.8.5 programming language and the user-friendly Google Colaboratory environment, which does not require the installation of additional software, allow multiple users to work together.

REFERENCES

1. Bacon C.R. Practical portfolio performance measurement and attribution. New York, NY: John Wiley & Sons; 2023. 529 p.
2. Gorelik V.A., Zolotova T.V. Criteria for evaluation and optimality of risk in complex organizational systems. Moscow: Dorodnicyn Computing Centre of RAS; 2009. 162 p. (In Russ.).
3. Kalayci C.B., Ertenlice O., Akbay M.A. A comprehensive review of deterministic models and applications for mean-variance portfolio optimization. *Expert Systems with Applications*. 2019;125:345-368. DOI: 10.1016/j.eswa.2019.02.011
4. Dekanova K.V. Evaluation of opportunities to increase the potential for attracting funds from private investors through their rational interaction with an independent financial (investment) adviser. *Sibirskaya finansovaya shkola = Siberian Financial School*. 2022;(2):77-87. (In Russ.). DOI: 10.34020/1993-4386-2022-2-77-87
5. Kislitsyna L.V., Shnitova G.A., Makhonina O.V., Safonova V.A. Methodology for categorizing investors for the purposes of forming their investment portfolio. *Zhurnal prikladnykh issledovanii = Journal of Applied Research*. 2021;(6-7):667-672. (In Russ.). DOI: 10.47576/2712-7516_2021_6_7_667
6. Zhiluk D.A., Skorokhod A.Yu. Categorization of private investors: New risks and opportunities. *Izvestiya Sankt-Peterburgskogo gosudarstvennogo ekonomicheskogo universiteta*. 2020;(4):42-47. (In Russ.).
7. Kachalov A.A. Determining level of risk tolerance of individual investor. *Finansovyi biznes = Financial Business*. 2021;(11):56-58. (In Russ.).
8. Nguyen L., Gallery G., Newton C. The joint influence of financial risk perception and risk tolerance on individual investment decision-making. *Accounting & Finance*. 2019;59(S1):747-771. DOI: 10.1111/acfi.12295
9. De Bortoli D., da Costa N., Jr., Goulart M., Campara J. Personality traits and investor profile analysis: A behavioral finance study. *PloS One*. 2019;14(3):e0214062. DOI: 10.1371/journal.pone.0214062
10. Goulart M., da Costa N.C.A., Jr., Andrade E.B., Santos A.A.P. Hedging against embarrassment. *Journal of Economic Behavior & Organization*. 2015;116:310-318. DOI: 10.1016/j.jebo.2015.04.014
11. Abraham F., Schmukler S.L., Tessada J. Robo-advisors: Investing through machines. Research and Policy Briefs. 2019;(21). URL: https://documents1.worldbank.org/curated/en/275041551196836758/pdf/Robo-Advisors-Investing-through-Machines.pdf
12. Capponi A., Ólafsson S., Zariphopoulou T. Personalized robo-advising: Enhancing investment through client interaction. *Management Science*. 2022;68(4):2485-2512. DOI: 10.1287/mnsc.2021.4014
13. Fisch C., Masiak C., Vismara S., Block J. Motives and profiles of ICO investors. *Journal of Business Research*. 2021:125:564-576. DOI: 10.1016/j.jbusres.2019.07.036
14. Mubaraq M.R., Anshori M., Trihatmoko H. The influence of financial knowledge and risk tolerance on investment decision making. *Jurnal Ekonomi Bisnis dan Kewirausahaan*. 2021;10(2):140-153. DOI: 10.26418/jebik.v10i2.47089

15. Ao M., Yingying L., Zheng X. Approaching mean-variance efficiency for large portfolios. *The Review of Financial Studies*. 2019;32(7):2890-2919. DOI: 10.1093/rfs/hhy105
16. García F., González-Bueno J.A, Oliver J. Mean-variance investment strategy applied in emerging financial markets: Evidence from the Colombian stock market. *Intellectual Economics*. 2015;9(1):22-29. DOI: 10.1016/j.intele.2015.09.003
17. Guo X., Chan R.H., Wong W.-K., Zhu L. Mean-variance, mean-VaR, and mean-CVaR models for portfolio selection with background risk. *Risk Management*. 2019;21(2):73-98. DOI: 10.1057/s41283-018-0043-2
18. Harman R., Prus M. Computing optimal experimental designs with respect to a compound Bayes risk criterion. *Statistics & Probability Letters*. 2018;137:135-141. DOI: 10.1016/j.spl.2018.01.017
19. Radner R. Decision and choice: Bounded rationality. In: Wright J.D., ed. International encyclopedia of the social & behavioral sciences. 2nd ed. Oxford: Elsevier Science; 2015:879-885.
20. Chen W., Zhang H., Mehlawat M.K., Jia L. Mean-variance portfolio optimization using machine learning-based stock price prediction. *Applied Soft Computing*. 2021;100:106943. DOI: 10.1016/j.asoc.2020.106943

ABOUT THE AUTHORS

Victor A. Gorelik — Dr. Sci. (Phys. and Math.), Leading Researcher of the Department of Simulation Systems and Operations Research, Federal Research Center "Informatics and Control" RAS, Moscow, Russia; Prof., Chair of the Theoretical Informatics and Discrete Mathematics, Moscow Pedagogical State University, Moscow, Russia
http://orcid.org/0000-0003-2435-0796
gorelik@ccas.ru

Tatyana V. Zolotova — Dr. Sci. (Phys. and Math.), Assoc. Prof., Prof. of the Chair of Modeling and System Analysis, Financial University, Moscow, Russia
http://orcid.org/0000-0001-5185-0687
Correspondent author:
tzolotova@fa.ru

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 21.08.2023; revised on 05.12.2023 and accepted for publication on 27.12.2023.
The authors read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-144-156
UDC 336.74(045)
JEL E42, E58, G2

Impact of Non-Bank Financial Intermediation on Banking Crises

V.V. Kuznetsova[a], O.I. Larina[b]
[a] Lomonosov Moscow State University, Moscow, Russia;
[b] State University of Management, Moscow, Russia

ABSTRACT

The article is devoted to the study of trends in the development of non-bank financial intermediation. The scale of the non-banking segment of the financial market has increased significantly, and it is believed that at the beginning of 2022 it accounted for about half of global financial assets, which may affect the financial stability not only of individual states, but also of the entire global economy. In this regard, the analysis of risks emanating from non-bank financial intermediation institutions is an urgent task of national financial regulatory authorities. The present study is aimed at solving this problem. The **purpose** of the study is to identify the impact of non-bank financial intermediation on the banking sector in order to determine the prospects for its anti-crisis regulation and develop approaches to the formation of strategies for managing systemic risks that may be caused by the activities of such institutions. The study is based on data from the Financial Stability Board, the International Monetary Fund, and the Bank of Russia. **Methods** of analyzing regulatory documents and comparative economic analysis are used. The paper systematizes possible channels for the implementation of risk factors and develops new approaches for the diagnosis of systemic risks due to the influence of non-bank financial institutions. There are suggestions made regarding the formulation of systemic strategies for risk management: strengthen regulation and supervision of NBFP institutions; provide conditions for providing liquidity in case of stress in the NBFP sector; ensure coordination between the Central Bank and sectoral regulators in order to manage crisis situations. Possible tools for setting up macroprudential policy to control risk factors of certain groups of non-banking financial institutions in order to ensure the stability of financial markets are presented: limitations of interrelationships with the banking system; indicators of sensitivity to customer panics; improving the quality of risk assessment; prohibition of secondary and tertiary securitizations of assets. It is concluded that there is a need for national authorities to apply 4 main approaches to regulation, primarily aimed at reducing liquidity risks, financial leverage, currency gaps and interconnectedness.

Keywords: financial system; non-bank financial companies; financial stability; digital technologies; systemic risk; regulation and supervision; banking crises; macroprudential policy

For citation: **Kuznetsova V.V., Larina O.I. Impact of non-bank financial intermediation on banking crises.** ***Finance: Theory and Practice.*** **2024;28(4):144-156. DOI: 10.26794/2587-5671-2024-28-4-144-156**

INTRODUCTION

"Black clouds are gathering over the global financial system. Many analysts fear that regulators will soon discover that they not only have no control, but also no understanding of the non-banking financial sector."[1]

Even before the global crisis (2007–2009), experts noted that part of financial intermediation "migrates" from traditional banks to other financial organizations. But a systematic study of the scale and activities of "shadow banking"[2] [1, p. 2], as well as existing relationships with national banking systems began later — after the establishment of the Financial Stability Board in 2009 (further — FSB). FSB was given broad powers: to develop the general concept of "shadow banking", to collect information and analyze statistical data characterizing the evolution of market dynamics of the sector, to develop general recommendations for the regulation and supervision of organizations and institutions belonging to this segment of the financial sector. In its activities, the FSB pays special attention to monitoring the risks arising from the activities of shadow banking institutions and organizations for national financial systems, including threats to the development of a systemic crisis.

The functioning of non-bank financial intermediation institutions can involve a variety of risks that can become systemic. The complexity of the sector, its close ties with the traditional banking system, which are not always possible to clearly trace, have made it difficult and make it difficult to accurately assess the market volume and the possible risks generated by non-bank financial intermediation. At the same time, most national regulators currently do not have accurate estimates of the extent of non-bank financial intermediation and its links with the traditional banking system and the real sector of the economy.

As shown by the incomplete data published by the FSB in the relevant reviews (data on non-bank financial intermediation, the FSB receives only from 29 jurisdictions), since the global financial crisis, the scale of the non-banking financial sector has increased many times: at the beginning of 2022, it accounted for about half of global financial assets (see below for more details). At the same time, there was a process of entering the market of new types of financial intermediaries and the complexity of their network relationships both within the sector and with traditional banks. In Russia, these trends can also be traced.

NON-BANK FINANCIAL INTERMEDIATION: CONCEPT AND OVERVIEW OF SOURCES

In the Russian scientific literature, a limited number of publications are devoted to the problems of shadow banking. In particular, in the article by V.M. Usoskin (2016) considers the development of this segment of the financial market in the U.S. and the EU, as well as the peculiarities of its legal regulation [2]. Similar issues are devoted to the publication of N.N. Rubtsova [3]. In the article V.M. Usoskin (2019) considered the influence of the Basel Standards on the activities of traditional banks and non-banking intermediaries, and the author concludes that: "the financial instability of shadow structures, the lack of channels for their support from official bodies and the potential danger of "contamination" of traditional banking institutions in the event of financial cataclysms still pose a real threat to economic stability" [4, p. 78]. Similar problems are addressed in paper by A.V. Ramazanov [5].

At the same time, the development of the non-banking sector, according to a number of researchers, contributes to the availability of credit and financial services for economic

[1] The dangerous growth of shadow banking. World Finance. 17.01.2023. URL: https://www.worldfinance.com/special-reports/the-dangerous-spread-of-shadow-banking (accessed on 11.05.2023).

[2] We considered that the term "shadow banking" was proposed by Paul McCulley at an economic symposium in Jackson Hall, organized by the Federal Reserve of Kansas in 2007, he defined "shadow banking" as "full alphabetic" of financial institutions.

entities, and thus supports economic growth. Thus, a study by specialists of the Bank of England shows on the basis of data on the U.S. that with the tightening of monetary policy, non-bank financial intermediaries increased the supply of syndicated loans to non-American corporations compared to banks [6, p. 2]. Non-bank financing organizations also play an important role in the government and corporate bond markets, which can contribute to greater stability in the budgetary sphere.

At the initial stage, FSB experts used the concept of "shadow banking" when organizing work on monitoring and analyzing the evolution of the dynamics of financial services outside the scope of traditional banks. But, as reviews of scientific publications showed, different meanings were put into this concept in different studies. B. Bernanke, as head of the Federal Reserve System, noted that "shadow banking consists of a set of different institutions and markets that together perform the functions of traditional banking, but they are outside or only indirectly related to the traditional system of regulated depositary institutions".[3] Other specialists put a narrower meaning in this concept, for example, the institutional approach to the definition of shadow banking was presented in the publication 2013: "shadow banking activity consists in the transformation of credit, urgency and liquidity without direct and indirect access to public sources of liquidity or credit support" [7, p. 1].

Despite significant differences in the understanding of what shadow banking is, until 2019 the FSB used this concept, collecting and analyzing data on market development, based on the legal status of financial institutions and organizations. Since 2019, FSB experts have instead introduced the concept of "non-bank financial intermediation" (further — NBFI), which unites all legal organizations outside the regulated banking system that provide various financial services. FSB experts noted [8] that financial intermediation of such institutions is distinguished by four key features:

- transformation of urgency (for example, attracting short-term funds to invest in long-term assets);
- liquidity transformation (for example, the use of such cash liabilities to buy non-tradable assets such as loans);
- leverage (for example, the use of debt financing mechanisms for the purchase/investment of fixed assets);
- transfer of credit risk (for example, acceptance of the borrower's default risk and its transfer from the loan organizer to a third party).

At the same time, the FSB began to classify NBFI organizations according to the functional criterion (economic function performed by the organization) into 6 segments (see *Table 1*), and began to use three indicators to measure the scale of the FSB sector:

- *broad indicator* includes all financial institutions, including such as insurance corporations, pension funds, securities market professionals and financial support organizations (all financial institutions, except for political and commercial banks). According to this indicator, the scale of non-bank financial intermediation for 2021 amounted to $ 239.3 trillion, or about half of global financial assets;
- *intermediate indicator* includes a part of the NBFI sector, which includes money market funds, hedge funds, other investment funds, central counterparties, brokers/dealers. Their assets amounted in 2021to $ 152 trillion;
- *narrow indicator* includes non-bank financial organizations, which regulatory authorities assess as intermediary institutions capable of posing risks to financial stability, such as banking ones (for example, trusts, special legal entities and others), which accounted for $ 67.8 trillion (see *Table 1*).

[3] Speech by B. Bernanke at the Conference of European Central Banks, Frankfurt, Germany, 19 November 2010. URL: https://www.federalreserve.gov/newsevents/speech/bernanke20131108a.htm (accessed on 13.05.2023).

Currently, the largest share of the narrow NBFI indicator (20.5 trillion dollars, or 30.3%) is in the U.S., in second place — 8 jurisdictions of the euro area (15.7 trillion dollars, or 23.2%), and in third place — China (11.4 trillion dollars, or 16.8%). The U.S. share in the narrow indicator of the NBFI decreased in 2008–2016, and subsequently remained at a relatively stable level. A similar figure of China decreased in 2016–2020, but began to grow again from 2021. In general, in 16 of the 29 jurisdictions for which the FSB collects data, the annual growth rate of the NBFI in 2021 outperformed their 5-year average.[4]

According to experts, Russian banks are not slightly exposed to risks from institutions classified as the NBFI,[5] since the financial sector of Russia is dominated by traditional banks in terms of assets. But in recent years, the number of various non-credit financial institutions has begun to grow in the Russian financial market. In 2022 alone, the number of such NBFIs as operators of investment platforms increased by 14 units; operators of information systems issuing digital financial assets by 3 units; collective investment market organizations by 10 units; mutual investment funds by 198 units; management companies of specialized companies by 16 units (see *Table 2*).

The growing number and diversity of NBFI organizations represented in the Russian financial market shows that the problem of improving prudential regulation [see, for example, 9] and careful monitoring of the dynamics of development of the NBFI sector is also relevant for our country. The Bank of Russia, as well as individual specialists, conducts regular monitoring and analytical analysis of the situation in the NBFI sector.

[4] Global Monitoring Report on Non-Bank Financial Intermediation, 2022. FSB, 2022, Dec. p. 37 (89 p.). URL: https://www.fsb.org/2022/12/global-monitoring-report-on-non-bank-financial-intermediation-2022/ (accessed on 11.05.2023).

[5] Global Monitoring Report on Non-Bank Financial Intermediation, 2021. FSB, 2021, Dec. p. 19 (75 p.). URL: https://www.fsb.org/2021/12/global-monitoring-report-on-non-bank-financial-intermediation-2021/ (accessed on 11.05.2023).

SYSTEMIC RISKS ARISING FROM THE NBFI

As noted above, after the global financial crisis, the scale of the NBFI has almost doubled (see *Fig.*). Moreover, the tightening of prudential requirements for traditional banks or individual organizations of the NBFI (for example, insurance) has stimulated and stimulates the entry of new intermediaries into the market and the accelerated growth of the sector as a whole.

Many NBFI institutions provide services similar to traditional banks: they convert savings into loans, participate in the transformation of urgency and liquidity, and they also play a significant role in the short- and long-term funding markets. But if all such operations can be concentrated in one traditional bank, in the non-bank financing sector they are usually carried out by different institutions. Nevertheless, they all have risks that are the same or similar to those of traditional banks. But the NBFI institutions are not always subject to the same level of regulatory requirements or close supervision as traditional banks [10].

The complexity of the NBFI sector, the network effects and the relationship of non-bank intermediaries with traditional banks make it extremely difficult to analyze the sources of systemic risk formation. At the same time, the network relationships formed between traditional banks and NBFI organizations differ from country to country: their configuration in the U.S. is different, for example, from the Chinese one [11]. The relative "closeness" of the sector, the lack of unambiguous reporting criteria and methods for calculating indicators allows NBFI participants to manipulate financial and statistical reporting data, combining off-balance sheet assets and liabilities [12].

Key features of the NBFI (primarily the transformation of urgency and liquidity, as well as a high level of leverage, the policy of using risky investment strategies by sector institutions) can now become sources of a

Table 1

Structure of the Narrow NBFP Indicator for 2021

Economic Functions (EF)	Typical entity types**	Size, trillion dollars	Sector's share, %	Growth rate in 2021, %
EF1. Collective investment institutions	Money market funds, fixed income funds, hedge funds, real estate funds*	51.6	76.2	10.6
EF2. Organizations whose loans are dependent on short-term funding	Microfinance companies, leasing and factoring companies, consumer lending companies	4.6	6.8	7.7
EF3. Organizations whose mediation depends on short-term funding	Brokerage and dealer companies, custodians, securities financing companies	4.6	6.8	5.6
EF4. Organizations that promote lending	Credit insurance companies; credit guarantee companies	0.2	0.2	4.0
EF5. Organizations whose credit intermediation is based on securitization	Securitization trusts; structured financing trusts; legal entities — ABS and MBS issuers	5.1	7.5	9.0
EF6. Other	Other financial intermediaries	1.7	2.4	10.8
Total		67.8	100	9.9

Source: Compiled by the authors on the basis of Global Monitoring Report on Non-Bank Financial Intermediation, 2022. FSB, 2022, Dec. p. 3 (89 p.). URL: https://www.fsb.org/2022/12/global-monitoring-report-on-non-bank-financial-intermediation-2022/ (accessed on 12.05.2023).

Notes: * money market funds, fixed income funds, real estate funds are varieties of investment funds; special legal entities are project companies (SPV) that issue asset — backed securities (ABS) and mortgage-backed securities (MBS); ** in Russia there are also non-bank financial organizations capable of generating the risks under study. The so-called non-credit financial organizations are recognized as: professional participants in the securities market; management companies of an investment fund, a mutual investment fund and a non-governmental pension fund; specialized depositories of an investment fund, a mutual investment fund and a non-governmental pension fund; joint-stock investment funds. Non-bank financial organizations carry out: clearing activities, actuarial activities; They perform the functions of: central counterparty, trade organizer, central depository, insurance business entities, non-governmental pension funds, microfinance organizations, consumer credit cooperatives, housing savings cooperatives, credit bureaus, rating agencies, agricultural consumer credit cooperatives, pawnshops (Article 76.1 of the Federal Law "On the Central Bank of the Russian Federation").

Table 2

Change in the Number of NBFI Organizations in Russia in 2022

Financial market institutions' names	Number at 01.01.2022	Number at 01.01.2023
Subjects of the insurance business, total	222	215
Including: • insurance organizations	147	140
• mutual insurance company	16	18
• insurance brokers	59	57
• associations of insurance entities	20	20
Professional participants of the securities market, total	472	515
Including: — brokers	251	253
– forex dealers	4	4
– dealers	279	277
– trustees	182	179
– depositories	250	252
– registrars	31	31
– investment advisers	126	179
Infrastructure organizations, total	72	90
Including: • clearing organizations	6	6
• stock exchanges	6	6
• trading systems	1	1
• commodity supply operators	4	4
• repositories	2	2
• central depository	1	1
• central counterparties	3	3
• news agencies	5	5
• operators of investment platforms	50	64
• financial platform operators	5	6
• information system operators serving platforms that issue digital financial assets	0	3
• payment system operators and foreign payment system operators	28	25
Subjects of the collective investment market, total	328	338
Including: • non-state pension funds	41	39
• joint-stock investment funds	2	2
• management companies of collective investment organizations	259	268

Table 2 (continued)

Financial market institutions' names	Number at 01.01.2022	Number at 01.01.2023
• specialized depositories of collective investment organizations	26	29
Mutual funds, total	1965	2163
Including: — open	262	277
– interval	44	50
– closed	1534	1705
– stock exchanges	125	13
Microfinance entities and cooperatives, total	6015	5341
• microfinance organizations	1267	1162
• housing savings cooperatives	48	44
• credit consumer cooperatives	1775	1517
• agricultural credit consumer cooperatives	694	638
• pawn shops	2231	1980
Management companies of specialized companies	55	71

Source: Compiled by the authors based on materials from the Bank of Russia. Annual Report 2022. P. 350–351.

systemic financial crisis, when the central banks of many countries tighten financial conditions to slow down inflation, increase prudential requirements for supervised organizations, and asset price volatility increases. The change in the general financial conditions makes the NBFI institutions more vulnerable to various risks (see *Table 3*), the materialization of which can provoke investor panic (such as raids on banks) and emergency asset sales.

The tightening of the global macro-financial environment increases the instability of the NBFI sector due to the relatively high level of leverage. The actual vulnerabilities of NBFI institutions due to financial leverage may not be known to both regulators and market participants, as they are difficult to measure or it is embedded in various transactions and operations [13]. Under the current conditions, the financial leverage of NBFI institutions can take various forms: the use of buyback agreements or margin borrowing on major brokerage accounts; a variety of financial derivatives or structured financing mechanisms. Moreover, individual transactions may include several forms of financial leverage, for example, secured credit transactions may contain three levels of leverage.

NBFI banks and organizations are directly interconnected through funding channels operating in both directions. Banks continue to be net recipients of funding from NBFI institutions. Although the total share of non-bank financing of banks has gradually decreased since 2013, it is significant in a number of jurisdictions: in South Africa — more than 30% of total bank assets; in Luxembourg — more than 20%; in Australia,

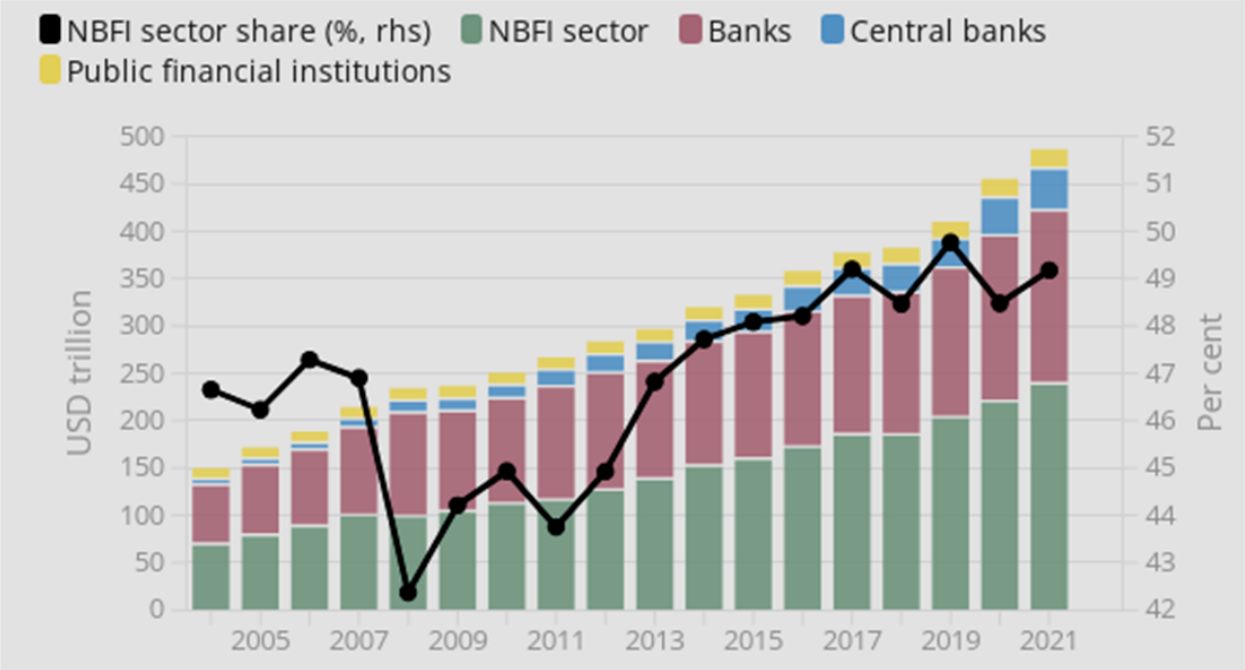


Fig. **Global Financial Assets Dynamics**

Source: Compiled by the authors based on materials from the Global Monitoring Report on Non-Bank Financial Intermediation, 2022. FSB, 2022, Dec. p. 37 (89 p.) URL: https://www.fsb.org/2022/12/global-monitoring-report-on-non-bank-financial-intermediation-2022 (accessed on 11.05.2023).

Argentina, Brazil, Chile, Switzerland, South Korea — more than 10%.[6]

Credit database information[7] shows that after the global financial crisis, the share of NBFI institutions in the syndicated loan market has increased significantly. At the same time, NBFI organizations specialize in lending to borrowers with higher leverage and a lower level of interest coverage than banks. The rapid growth of non-bank lending can exacerbate the negative consequences of financial shocks, as in crisis situations, NBFI institutions reduce their loan supply more than banks for firms most dependent on lending [14]. Unlike traditional banks, NBFI institutions do not have direct access to the Central Bank's liquidity support programs, so in the case of a limited supply of market liquidity, they become catalysts for its further compression, which can increase financial stress in the money markets.

To replenish liquidity, NBFI institutions begin to sell assets under stress, which provokes waves of price decline, further asset sales, an increase in risk premiums and requirements for additional collateral, which further worsens the situation. A decrease in the cost of collateral, an increase in discounts implies a tightening of secured credit conditions, which is rapidly spreading in the unsecured lending market, including money markets. This may mean that the liquidity stress of NBFI institutions can be transformed into stress in all systemically important segments of financial markets, including the traditional banking system. The latter is possible for at least two reasons. First, a significant part of the NBFI's institutions are either owned or funded by traditional banks. Secondly, commercial banks are directly involved in the NBFI through broker-dealer activities. In the event of market stress and

[6] Global Monitoring Report on Non-Bank Financial Intermediation, 2022. FSB, 2022, Dec. p. 25. (89 p.). URL: https://www.fsb.org/2022/12/global-monitoring-report-on-non-bank-financial-intermediation-2022/ (accessed on 11.05.2023).

[7] URL: https://www.library.hbs.edu/find/databases/dealscan (accessed on 11.05.2023).

Table 3

Theoretical Assessment of Potential Vulnerabilities Main NBFP Institutions

NBFI Institutes (2021 sector assessment)	Financial leverage	Liquidity risk	Interconnectedness	Currency gaps
Investment funds, excluding money market funds and hedge funds ($ 58 trillion, 12% GFA*)	Low, but average for bond funds subject to derivatives risks	High for fixed-income funds holding illiquid assets of the EM** or with high yields	High, including cross-border (ME and DE***), possible links with banks on derivatives	Low, but possible significant externalities for foreign exchange markets
Insurance companies ($ 40 trillion, 8% GFA)	Low	Low, but medium with tougher policies	Average; banks — large holders of bank debts; there may be requirements for additional collateral	Low, but medium with tougher policies
Pension funds ($ 43 trillion, 9% GFA)	Low, but medium in countries with a large share of schemes with established payments	Low, but can be high in countries with a large share of schemes with established payments and negative cash flows	Data does not allow for a reasonable assessment	Low
Money market funds ($ 8.5 trillion, 2% GFA)	No data	Low, but average for fixed assets	High among key participants in the main funding markets	No data
Structured financing companies ($ 6 trillion, 1% GFA)	Average/ high	Average	Average; insurance companies and pension funds can be large investors in these structures	Low
Hedge funds ($ 6 trillion, 1% GFA)	Average/high	Average	Average/High	Average
Central counterparties ($ 0.7 trillion, 0.1% GFA)	No data	High, but they also have strong risk management and financial control	High, given the systemic role in the markets	No data

Source: Compiled by the authors based on materials from the Global Financial Stability Report, April 2023. IMF, 2023. p. 61 (126 p.). URL: https://www.imf.org/en/Publications/GFSR/Issues/2023/04/11/global-financial-stability-report-april-2023 (accessed on 11.05.2023).

Notes: * GFA — global financial assets; ** EM — Countries with emerging markets; *** DE — developing economies.

a fall in the cost of collateral, dealer banks face the risks of prolongation of positions, which, in fact, do not differ from the classic withdrawal of deposits. Thus, the NBFI can be a source of systemic risk, especially if the development of the sector is mainly motivated by regulatory arbitration.

POSSIBLE NBFP MANAGEMENT STRATEGIES TO PREVENT SYSTEMIC CRISES

In 2013, the FSB recommended that national regulators strengthen regulation in 5 areas of the NBFI to reduce systemic risks[8]:

1) reduction the effects of the spread of the crisis between the NBFI and the traditional banking system (risk of infection);

2) reduction the sensitivity of money market funds to "raids" (panic);

3) increase the accuracy of assessment of systemic risks generated by NBFI organizations;

4) reduction of incentives for secondary and tertiary asset securitization;

5) elimination of pro-cyclical risks associated with secured financing contracts such as REPO transactions, securities lending, which can exacerbate the lack of financing during periods of serious financial stress.

The 2022 FSB report[9] proposes a variant of a functional approach to regulating the activities of NBFI institutions (*Table 4*).

In the report of the International Monetary Fund[10] is emphasized that in the current conditions of increasing interest rates to contain inflation, increase asset price volatility and increase risks and uncertainties, the NBFI sector can become a source of systemic risk.

Thus, fears that the NBFI will become a source of a deep systemic crisis, which will provoke a serious decline in the real sector and lead to a significant decrease in household well-being, naturally raise the issue of improving the prudential regulation of NBFI institutions and strengthening supervision. To this end, in our opinion, four main regulatory strategies can be applied:

- *for institutions with high liquidity risks:* regulation of NBFI liabilities. It is possible to restrict the use of liquidity tools and spread the rule of "automatic suspension" of operations in the event of stressful situations. This strategy is appropriate, as it will allow the regulator to influence the volatility of asset prices in a timely manner and provide liquidity reserves for repayment of obligations;
- *for institutions with high financial leverage:* restrictions on the use of deposit-like instruments to finance long-term investments. Possible measures: capital requirements, liquidity standards and restrictions on the use of client assets to transform urgency. This strategy should help to limit the creation of "bubbles" and also be aimed at controlling the risk of loss of liquidity;
- *for institutions sensitive to currency gaps:* reducing the asymmetry of information regarding the quality of assets providing liabilities. The strategy is aimed at limiting currency risks, similar to banking methods of regulation can be used (limits of open positions, liquidity reserves, risk assessment and control, etc.);
- *for institutions with interconnectedness:* development of system crisis management plans. It is a well-known fact that even excellent regulation cannot prevent systemic crises, but it is important that regulators are ready to manage a complex situation, so it is important to have a comprehensive plan with possible alternative management tools.

It should be noted that in addition to the NBFI sector, high-tech companies

[8] An Overview of Policy Recommendations for Shadow Banking. SB, 2013, Aug. 15 p. URL: https://www.fsb.org/2013/08/an-overview-of-policy-recommendations-for-shadow-banking (accessed on 15.05.2023).

[9] Global Monitoring Report on Non-Bank Financial Intermediation, 2022. FSB, 2022, Dec. p.32, 33. (89 p.). URL: https://www.fsb.org/2022/12/global-monitoring-report-on-non-bank-financial-intermediation-2022/ (accessed on 15.05.2023).

[10] Global Financial Stability Report, April 2023. IMF, 2023. p. 59 URL: https://www.imf.org/en/Publications/GFSR/Issues/2023/04/11/global-financial-stability-report-april-2023 (accessed on 11.05.2023).

Table 4

Possible List of Regulatory and Supervisory Measures Introduced for NBFP Institutions and their Economic Functions

Economic functions	Tools
EF1 Collective investment institutions	Instruments should be aimed at reducing the risks associated with the transformation of liquidity and the use of leverage, including: - limits: on investments in illiquid assets; concentration of assets; leverage level; mandatory liquidity reserves; - price-based instruments: fees for asset dilution and restriction of pricing based on fluctuations in securities rates; - instruments based on quantities (volumes): redemption amounts; redemption suspensions The last two types of instruments can be activated discretely or on a permanent basis by decision of both the supervisory authority and fund managers
	Instruments aimed at reducing the risks (credit and liquidity) associated with financing long-term investments with short-term borrowing: - capital requirements (either similar to banking or separate regimes); - standards of maximum permissible risks and leverage; - the standard of the mandatory liquidity reserve; - restrictions on the types of liabilities that the institution can issue For organizations belonging to EF3, requirements may be introduced regarding the use of customer funds
EF2 Organizations whose loans depend on short-term funding and **EF3** Organizations whose mediation depends on short-term funding	The instruments are aimed at reducing the risks of credit, liquidity, counterparty. In addition to capital requirements and liquidity standards, restrictions on the scale and volume of business are possible; requirements for risk management and mandatory risk sharing with the policyholder. Tools are introduced on an ongoing basis
EF4 Organizations that promote lending	The instruments are aimed at reducing the risks of securitization, including: restrictions on the transformation of urgency/liquidity; accepted collateral; risks associated with financing allocated to banks or accepted from banks (other financial organizations). To ensure proper incentives, it is possible to introduce rules limiting hidden risks (for example, retention requirements for the issuance of securitizations). Tools should be introduced on an ongoing basis
EF5 Organizations whose credit intermediation is based on securitization	Policy instruments are aimed at reducing the risks of securitizations, including: restrictions on the transformation of urgency/liquidity; accepted collateral; risks associated with financing allocated to banks or accepted from banks (other financial organizations). To ensure proper incentives, it is possible to introduce rules limiting hidden risks (for example, retention requirements for the issuance of securitizations). Tools should be introduced on an ongoing basis

Source: Compiled by the authors based on materials from Global Monitoring Report on Non-Bank Financial Intermediation, 2022. FSB, 2022, Dec. p. 32, 33. (89 p.). URL: https://www.fsb.org/2022/12/global-monitoring-report-on-non-bank-financial-intermediation-2022/ (accessed on 15.05.2023).

simultaneously operating in several jurisdictions (bigtech companies) have also entered the financial intermediation market, which poses a new problem of organizing effective supervision and monitoring of the influence of bigtech companies. Such dynamics suggest that the perimeter of financial regulation and supervision should be expanded.

CONCLUSION

Currently, the NBFI sector is represented by a wide range of organizations, and the practical application of innovative financial technologies stimulates the entry into the market of new types of financial intermediaries, whose activities give rise to new risks, including systemic ones. But so far, financial regulators and supervisory authorities cannot clearly identify them and assess their importance for maintaining financial stability.

The article presents an analysis of the state of the NBFI sector and possible channels for implementing risk factors that may affect financial stability: relationships with the banking system; sensitivity of some institutions to customer panic; existing fragmentation in risk assessment; secondary and tertiary asset securitizations.

The following directions and actions can be implemented as recommended measures to maintain financial stability and to prevent the development of the crisis in the NBFI sector:

- strengthening the regulation and supervision of NBFI institutions. First of all, it is necessary to close the main data gaps, stimulate proper risk management in the relevant organizations, introduce the necessary prudential requirements;
- in case of stress in the NBFI sector, direct access of NBFI institutions to the Central Bank's liquidity programs is possible (specific conditions for providing liquidity should be provided);
- it is necessary to ensure coordination between the Central Bank and sectoral regulators (if any) in order not only to identify risks, but also to manage crisis situations.

REFERENCES

1. Nath R.D., Chowdhury M.A.F. Shadow banking: A bibliometric and content analysis. *Financial Innovation*. 2021;7(1):68. DOI: 10.1186/s40854–021–00286–6
2. Usoskin V. Shadow banking: Place and role in financial intermediation. *Den'gi i kredit = Russian Journal of Money and Finance.* 2016;(4):20–27. (In Russ.).
3. Rubtsov N.N. Shadow banking and its role in the modern global financial system. *Kreativnaya ekonomika = Journal of Creative Economy.* 2016;10(6):577–600. (In Russ.). DOI: 10.18334/ce.10.6.35301
4. Usoskin V.M. Shadow banking: regulatory reform and its effectiveness. *Finance: Theory and Practice*. 2019;23(4):69–79. DOI: 10.26794/2587–5671–2019–23–4–69–79
5. Ramazanov A.V. On the essence and regulation of shadow banking. *Finansy i kredit = Finance and Credit*. 2022;28(6):1379–1398. (In Russ.). DOI: 10.24891/fc.28.6.1379
6. Elliott D., Meisenzahl R.R., Peydró J.-L. Nonbank lenders as global shock absorbers: Evidence from US monetary policy spillovers. *Journal of International Economics*. 2024;149:103908. DOI: 10.1016/j.jinteco.2024.103908
7. Pozsar Z., Adrian T., Ashcraft A., Boesky H. Shadow banking. *FRBNY Economic Policy Review.* 2013;(Dec.):1–16. URL: https://www.newyorkfed.org/medialibrary/media/research/epr/2013/0713adri.pdf (accessed on 11.05.2023).
8. Kodres L.E. What is shadow banking? *Finance & Development*. 2013;50(2):42–43. URL: https://www.imf.org/external/pubs/ft/fandd/2013/06/pdf/basics.pdf (accessed on 11.05.2023).
9. Gospodarchuk G.G., Zeleneva E.S. Effectiveness of macroprudential policy: Problems of measurement and evaluation. *Finance: Theory and Practice*. 2023;27(1):32–41. DOI: 10.26794/2587–5671–2023–27–1–32–41

10. Kelleher D., Basil P. The increasing dangers of the unregulated "shadow banking" financial sector. Washington, DC: Better Markets, Inc., 2022. 18 p. URL: https://bettermarkets.org/wp-content/uploads/2022/03/BetterMarkets_Report_Dangers_of_the_Shadow_Banking_System_March2022.pdf
11. Liu A., Liu J., Shim I. Shadow loans and regulatory arbitrage: Evidence from China. BIS Working Papers. 2022;(999). URL: https://www.bis.org/publ/work999.pdf (accessed on 11.05.2023).
12. Adrian T., Jones B. Shadow banking and market-based finance. IMF Departmental Paper. 2018;(14). URL: https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2018/08/01/Shadow-Banking-and-Market-Based-Finance-45663 (accessed on 11.05.2023).
13. Aldasoro I., Doerr S., Zhou H. Non-bank lending during financial crises. FDIC Working Paper. 2022. 42 p. URL: https://www.fdic.gov/analysis/cfr/bank-research-conference/annual-21st/papers/zhou-paper.pdf (accessed on 12.05.2023).

ABOUT THE AUTHORS

Valentina V. Kuznetsova — Cand. Sci. (Hist.), Assoc. Prof., M.V. Lomonosov Moscow State University, Moscow, Russia
https://orcid.org/0000-0002-8698-4295
vkuz_55@mail.ru

Olga I. Larina — Cand. Sci. (Econ.), Assoc. Prof., State University of Management, Moscow, Russia
https://orcid.org/0000-0002-9841-8194
Corresponding author:
oilarina@mail.ru

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 09.06.2023; revised on 10.07.2023 and accepted for publication on 27.07.2023.
The authors read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-157-180
UDC 378.31(045)
JEL H52

University Financial Support and Academic Ranking: Aspects of Interconnection

L.V. Prikhodko, A.N. Amerslanova, E.A. Kameneva
Financial University, Moscow, Russia

ABSTRACT

Increasing the competitiveness of Russian education is an important national strategic priority, enshrined within the framework of the national project "Education" and the concept of Russia's humanitarian policy abroad. National and international academic rankings, despite the barriers that have arisen are a highly proven information resource in the world for all categories of participants in the higher education system. The **purpose** of the study is to identify whether there is an interconnection between a university's financial support and its position in academic rankings. The authors use the classical correlation analysis, ranking and comparison of universities' funding amounts and their position change in academic rankings. The examined development strategies, competitiveness improvement programs, sustainable development reports of the Russian and world's universities that are constantly improving their positions in the world rankings. Based on the results obtained **conclude** that there is no direct interconnection between universities' funding amounts and their positions in the rankings and a determining factor in the promotion of the universities in the academic rankings. For universities, direct competitive funding algorithms appear to be more effective in achieving the specific objective than regulatory funding. Russian universities seeking to advance in rankings focus on the combined application of mechanisms and sources of funding.

Keywords: university; academic ranking; financial support; promotion in the ranking; state programs for financing universities; financial policy of education

For citation: **Prikhodko L.V., Amerslanova A.N., Kameneva E.A. University financial support and academic ranking: aspects of interdependence. *Finance: Theory and Practice*. 2024;28(4):157-180. (In Russ.). DOI: 10.26794/2587-5671-2024-28-4-157-180**

INTRODUCTION

Increasing the competitiveness of national education and using its potential to expand Russian humanitarian influence in the world is an important state task, enshrined in the Concept of the Humanitarian Policy of the Russian Federation abroad, approved by the Presidential Decree in 2022.[1] National and inter-level academic rankings, despite the geopolitical barriers that have arisen in relation to the latter, remain an effective tool for assessing the competitiveness of higher education institutions in a global and regional context, thanks to a relatively simple and transparent system for determining the position of a particular university in the global/regional educational market in a specific subject area or by a specific criterion. For example, the ranking of universities on the demand of graduates by employers (from the largest recruitment agencies Head Hunter, SuperJob), the rating of ESG and on the realization of the goals of sustainable development (THE Impact Rankings, ESG-ranking RAEX), on media activity (Ministry of Science and Education of Russia, "Medialogia", "Integrum") and others. Thus, the position of universities in international and national rankings is a significant benchmark in strategic development for both educational institutions and national education systems [1].

The relevance of university rankings is confirmed by scientific, theoretical, scientific and practical publications, publicist articles of various scientific and information platforms, in social and professional networks and on websites, in speeches at conferences of representatives of universities, scientific organizations, ministries of education, commercial organizations and accreditation agencies. The number of publications devoted to the rankings of educational organizations in the last 10 years in the international scientific databases Web of Science and Scopus is approaching 10 000 units. They have a wide range of readers, which is confirmed by their high citation.

In February 2024, the President of the Russian Federation V. V. Putin approved the creation in Russia of the ranking of universities of the BRICS countries, the results of which are planned to be presented in October 2024 at the BRICS summit.[2]

MATERIALS AND METHODS

Basic general scientific methods of research — analysis and synthesis, induction and deduction, analogy, abstraction and concretization.

Russian and foreign sources of statistical data and analytics in the field of higher education, the normative and legal framework of regulation of educational activities in Russia and abroad, materials of scientific publications and interviews of leading experts served as the information base of the study.[3]

Scientific and practical search for ways of increasing the international competitiveness of universities, including the identification of factors that most effectively influence the growth of positions in the world and national rankings, are dedicated to the candidate and doctoral dissertations defended in different countries over the last 5 years (in Spain, Great Britain, Lithuania, France, Sweden, Croatia, Scotland, the United States of America, Russia, etc.).[4]

[1] Decree of the President of the Russian Federation from 05.09.2022 No. 611 "On approval of the Concept of the Humanitarian Policy of the Russian Federation abroad". ConsultantPlus.

[2] Session of the Council on Science and Education under the President of the Russian Federation from 08.02.2024. URL: http://kremlin.ru/events/president/news/73407 (accessed on 02.03.2024).

[3] Online conference of Yandex on education 2023. URL: https://yace.yandex.ru/ (accessed on 09.02.2024).

[4] DART-Europe portal. URL: https://www.dart-europe.org (accessed on 10.01.2024).

Assessment of factors affecting the international competitiveness of Russian universities and, as a consequence, on the positions in the rankings of educational organizations, is presented in numerous papers of foreign and Russian authors [2–23].

The geographical location of the university, status (national research, federal, reference, with special status), institutional freedoms in the management of the University, the level of annual income were noted in the papers by D. A. Endovitsky, V. V. Korotkikh, M. V. Voronova as factors that have a significant influence on the international competitiveness of universities [24].

T. N. Gavrilyeva, A. Sugimoto, M. Fujii and others have noted the networking of universities in the sphere of sustainable development as a factor for increasing competitiveness and increasing positions in specialized rankings [25].

R. P. Bulyga, I. F. Vetrova, O. G. Korolev, M. V. Mel'nik have proposed a system of analytical indicators for evaluating the performance of educational organizations, including indicators of financial support and indicators evaluated by ranking agencies [26].

The use of statistical, economic and mathematical and instrumental methods of analysis to assess the degree of influence of individual indicators of the activity of the university on the positions in the rankings is discussed in the papers by E. M. Anokhina, I. P. Boiko, N. B. Boldyreva etc. [27], A. A. Mikryukov, M. S. Gasparian, D. S. Karpov [28], L. V. Konstantinova, E. V. Shubenkova, M. E. Mazurov, A. A. Mikryukov [29], V. M. Moskovkin, H. Zhang [30], T. A. Salimova, I. A. Ivanova, E. A. Sysoeva [31]. The methodology of assessing the "return" of investments in the financing of universities to advance by one point in the international rankings is proposed in the papers by G. A. Agarkov and A. E. Sudakova [32].

With the aim of training professionals in the field of management of economic actors in education, specialized educational programs [5] are opened at universities (Harvard University, University of Sussex, Hebrew University of Jerusalem, the University of Bath, Higher School of Economics, Skolkovo and others). There are training simulators, for example, "University's competitiveness: management simulator" in Skolkovo, allowing to evaluate what results the university will come to with a certain distribution of funding between different directions of the University's activities over several years.

Due to high levels of competition both at the level of educational institutions and national education systems in general, governments in many countries are exploring effective ways to improve the position of their universities in international educational rankings. One of the most successful solutions has been the state programs, which provide additional funding for the country's leading universities in order to improve their effectiveness, resulting in increased international recognition. These programs are often referred to as "excellence initiatives" [33].

Research by J. Salmi, I. D. Frumin [34], who oversaw higher education at the World Bank, shows that at the turn of the 20th and 21st centuries, 13 public funding programs — 13 excellence initiatives — were initiated. Of these, 8 — are in the Asia-Pacific region (Australia, China, Japan, New Zealand, Hong Kong, South Korea), 4 — in Europe (Finland, Denmark, Norway, Ireland) and 1 — in North America (Canada). Between 2005 and 2023 the number of such programs increased to 45. The main increase was in the European region — up to 23 programs (Denmark, France, Germany, Luxembourg, Norway,

[5] Portal for the search of educational programs. URL: https://www.findamasters.com (accessed on 15.01.2024).

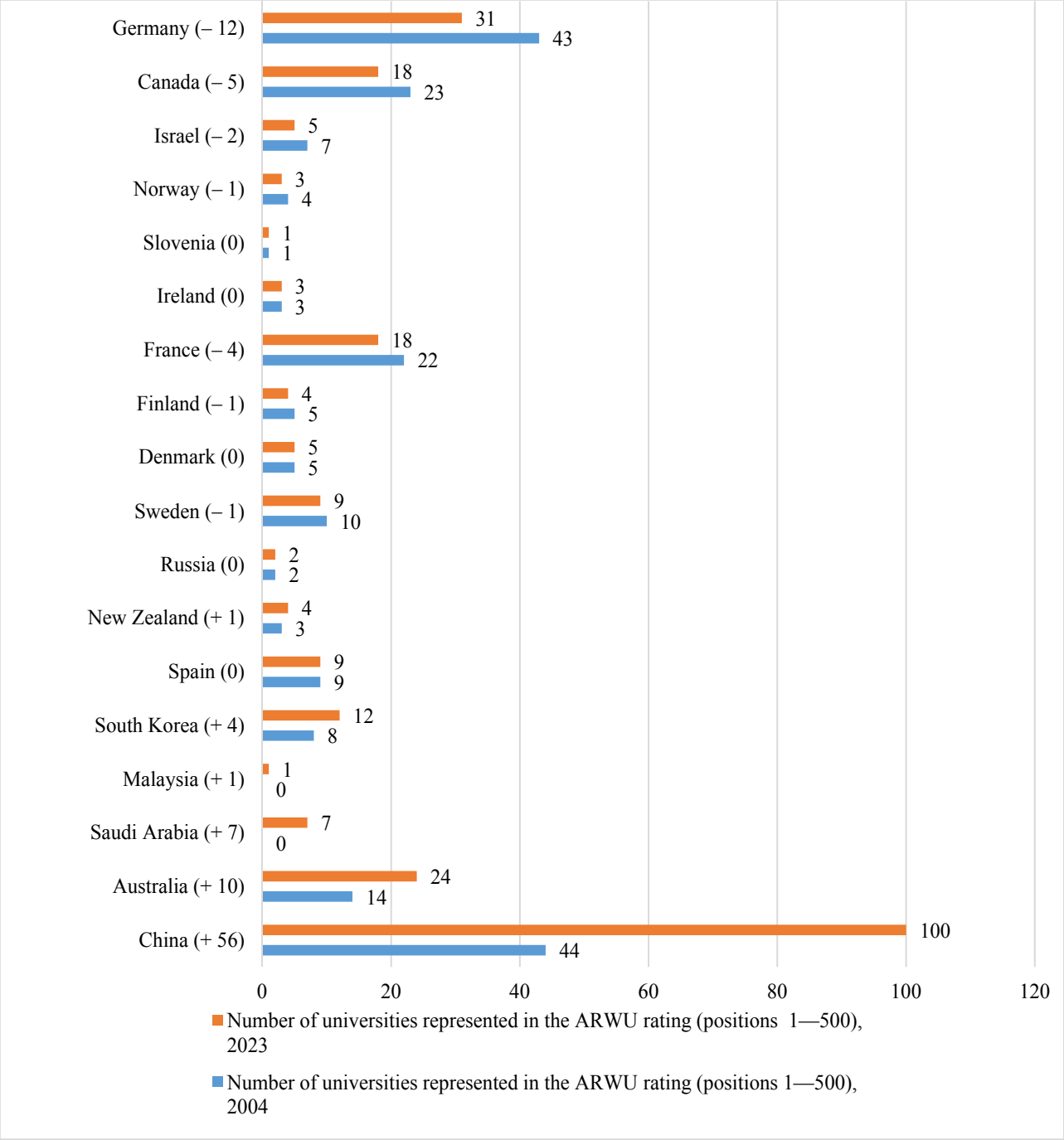


Fig. 1. **Representation in the ARWU Ranking of Universities from Countries that Implemented Excellence Initiatives**

Source: Compiled by the authors based on the results of the Academic Ranking of World Universities. URL: https://www.shanghairanking.com/rankings (accessed on 17.09.2023).

Poland, Russian Federation, Slovenia, Spain, and Sweden). In the Asia-Pacific region, up to 15 programs (China, India, Japan, Malaysia, Singapore, South Korea, Taiwan, and Thailand). New excellence initiatives have emerged in the African region (Nigeria) and the Middle East (Israel, Saudi Arabia), and the Canadian program has continued to develop in North America.[6]

[6] Materials of the Peter the Great St. Petersburg Polytechnic University. Higher education in Europe; 2017. URL: https://www.spbstu.ru/upload/inter/higher-education-europe-2017.

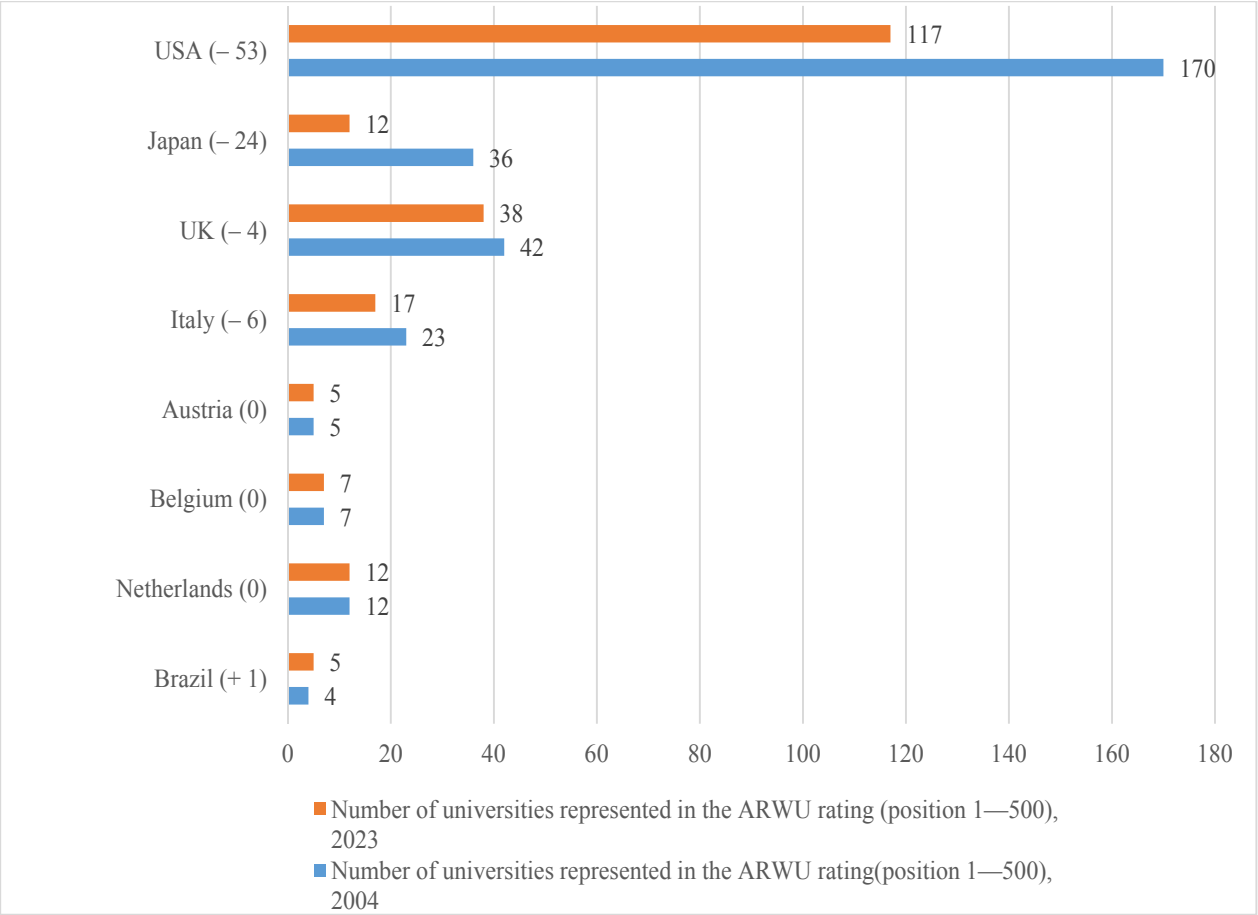


Fig. 2. **Representation in the ARWU Ranking of Universities from Countries that not Implemented Excellence Initiatives**

Source: Compiled by the authors based on the results of the Academic Ranking of World Universities. URL: https://www.shanghairanking.com/rankings (accessed on 17.09.2023).

The above data show that, while at the beginning of the 21st century, a relatively small number of countries realized the need to enhance the competitiveness of their national systems, at the present stage, the majority of both developed and developing countries have begun to fully support the innovative development of higher education institutions and have formed their own excellence initiatives [35]. Study of methodology and analysis of implementation of Russian excellence initiatives, such as the "5–100" project and the Priority 2030 strategic academic leadership program [36–39].

It should be noted that the main purpose of the "5–100" project — entering the top 100 world rankings of ARWU (Shanghai Rating), THE and QS — has not been fully achieved. One of the main reasons experts and the participants of the Russian initiative of excellence called "insufficient budget of the project — 80 billion rubles were allocated to 21 universities for a short period — for only 7 years" [40, 41].

State funding for excellence initiatives varies significantly from country to country. The minimum budget for excellence initiatives was less than 20 million dollars (e.g. in Denmark and Germany). The average level of funding was between 20 million dollars and 100 million dollars (e.g. in the Russian Federation, Spain), and a maximum

pdf; Internet portal for searching educational programs. URL: https://www.findamasters.com (accessed on 10.01.2024).

budget of more than 100 million dollars was allocated to initiatives of superiority by countries such as China, France, and Singapore.[7]

Analysis of the effectiveness of state programs of support of higher education is a complex and complex process, because, firstly, the effect of the modernization of the national education system can be observed after a sufficiently long period of time, and secondly, evaluation of the performance of universities should be based on a large number of different criteria. This is due to the fact that many excellence initiatives have indeed had a significant qualitative effect on the development of national education systems, but attempts to evaluate their effectiveness have been negligible [33].

Within the framework of the present study, the task is to analyze the relationship between the financial support of universities and the dynamics of their positions in the international ranking. A statistical analysis of the data shown in *Fig. 1* and *2* shows that many government funding programs for leading universities in order to improve their effectiveness and rank international recognition in different countries have indeed achieved significant results in terms of university representation in world educational rankings. *Fig.1* and *2* show countries grouped by excellence initiatives implemented between 2004 and 2023, and the increase in the number of universities in these countries in the top-500 of the Shanghai International Education Rankings (ARWU) for the period indicated.

Universities from Africa, Asia, Europe, America, Oceania and Russia were selected to analyze the keys of universities successfully advancing in the world rankings (*Fig. 1* and *2*). Russian universities are represented by individual participants of the programs "5–100" and "Priority 2030", as universities that received additional funding, including for increasing competitiveness and promotion in the ranking. The dynamics of advancement of Russian universities in the most famous, large-scale and long-standing international and Russian rankings QS, THE, RAEX were analyzed.

RESULTS AND DISCUSSION

Despite the active scientific controversy about the non-objectivity of the indicators used, approaches to assessment, subjectiveness of weighting factors, etc. "international educational rankings are today a very important indicator of the competitiveness of the universities of a particular country and an indication of the level of development of the educational system and even the national innovation system of the States of the world as a whole" [42]; "global university rankings encourage national governments to strengthen policies with regard to so-called world-class universities, the position of universities in the world ratings largely reflect the ability of the countries they represent to influence world processes" [33]. The transformation of universities into world-class universities is a global trend of the last decade, which has become one of the main vectors of national strategies. This gave impetus to the emergence and development of academic excellence initiatives worldwide (currently available in approximately 30 countries). In fact, it is programs of state financial support selected on a competitive basis of universities, giving the universities the opportunity to develop at a faster pace. Let us note some of them:

- Russian Federation: project "5–100", "Priority 2030", among indicators of which — mandatory presence in world ratings or indicators taken into account by world rating agencies;
- China: World Class project 2.0;
- Germany: Exzellenzinitiative;

[7] Materials of the Peter the Great St. Petersburg Polytechnic University. Higher education in Europe; 2017. URL: https://www.spbstu.ru/upload/inter/higher-education-europe-2017.pdf ; Internet portal for searching educational programs. URL: https://www.findamasters.com (accessed on 10.01.2024).

Table 1

Russian Universities Participation Dynamics in Rankings by Year

Ranking	Number of Russian universities, ranked in world rankings				
	2019	2020	2021	2022	2023
QS WUR	27	25	32	48	48
THE WUR	35	39	48	100	103
ARWU	11	11	9	10	9

Source: Compiled by the authors based on the results of the QS World University Rankings, The Times Higher Education World University Rankings, Academic Ranking of World Universities. URL: https://www.topuniversities.com/qs-world-university-rankings; https://www.topuniversities.com/qs-world-university-rankings; https://www.shanghairanking.com/rankings (accessed on 31.01.2024) [43].

- France: Excellence Initiatives (IDEX);
- Poland: Leading National Research Centers (KNOWs);
- UK: Research Excellence Framework etc. [35].[8]

The main objectives of excellence initiatives in all countries of the world as a whole are the following:

- restructuring (modernization) of the education and research system;
- increasing the competitiveness and recognition of academic reputation and research in an environment of international competition;
- improving the quality of education and research;
- expanding internationalization;
- growth of university positions in national and world rankings.

It is worth to mention that the last objective is an indicator of the successful implementation of the four previous. The popularity of rankings and their number is growing every year: at the moment already 60 rankings from 35 countries of the world (all rankings of universities and schools issued by the Russian agency RAEX, including the international rating "Three university missions", "Ranking of the best universities of Russia", ESG-ranking and many others) approved IREG. Positions in the leading world rankings of universities, first of all in such as the Times Higher Education World University Ranking (THE), Academic Ranking of World Universities (ARWU), QS World University ranking (QS), are one of the main indicators of the influence of Russian universities participation in the world academic agenda. These rankings will be reviewed in the study together with the national RAEX ranking.

THE, QS, ARWU rating indicators provide a basis for evaluating the growth indicators that universities are directing their funding, including the additional funding received within the framework of state financial support programs. The world rankings in question have a relatively similar set of indicators and evaluation methodologies developed over more than fifteen years of analysis and ranking of universities. In general, they evaluate the same main directions of the activities of universities, differing only by the number of indicators and sometimes differences in

[8] Materials of the Peter the Great St. Petersburg Polytechnic University. Higher education in Europe; 2017. URL: https://www.spbstu.ru/upload/inter/higher-education-europe-2017.pdf Internet portal for searching educational programs. URL: https://www.findamasters.com (accessed on 10.01.2024).

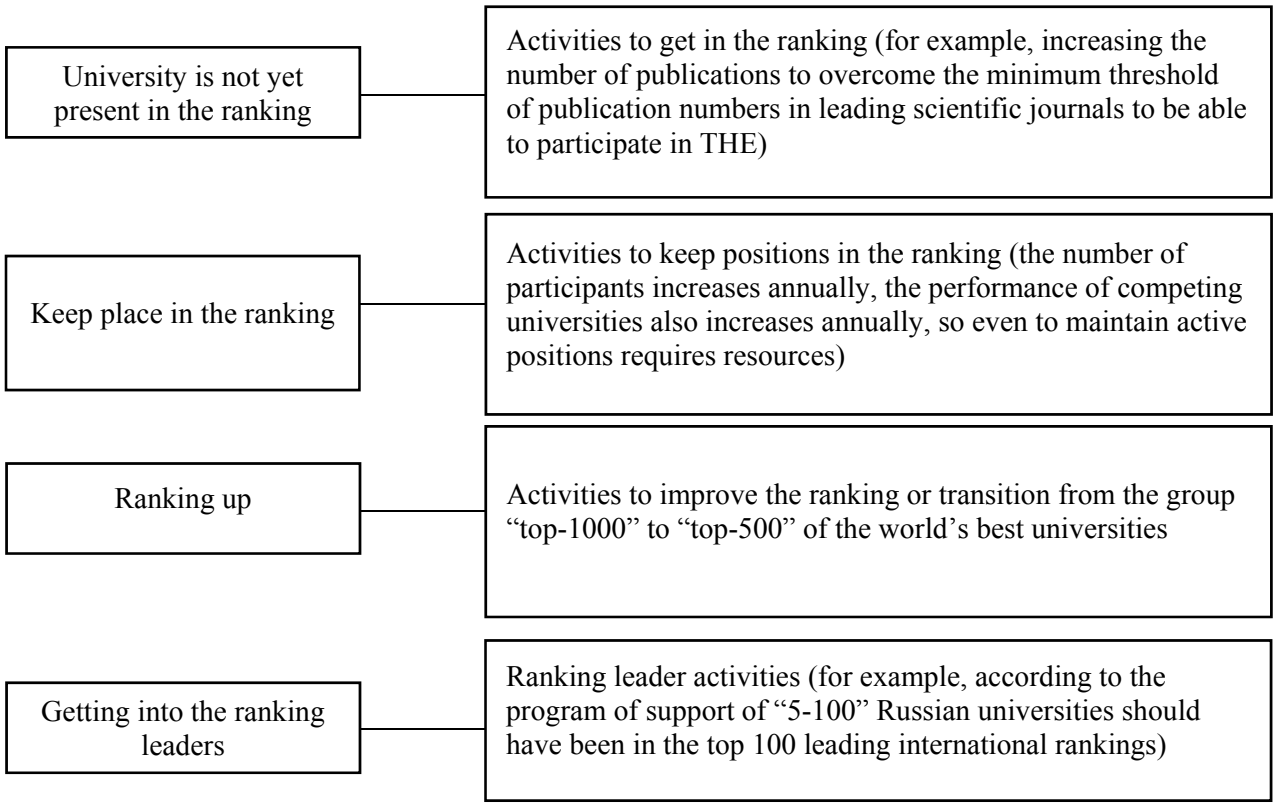


Fig. 3. **University Goals for Positioning in Rankings**

Source: Compiled by the authors.

the methodology of calculation of some of them. The level of international interaction of the university is assessed by the rating agencies by assessing the number of foreign students and staff who have chosen the place of work and study of the evaluated university, the share of publications with foreign authors. Indicators of scientific activity traditionally include the level of productivity and citation of publications of university authors, income from scientific research, and the results of the survey of representatives of the academic world. The level of educational activity is assessed by analyzing the number of students per teacher, the proportion of teachers with academic degrees and the income of the university per employee, the results of academic surveys. The link with employer organizations is also used by assessing their funding of university projects, the results of employer surveys. There are specific indicators characteristic of only one ranking. For example, the ARWU rating, in addition to the number and citation of publications, evaluates the presence of Nobel Prize or Fields Medal to university staff and graduates.[9]

It was revealed that the main directions of expenditure of funds by universities to improve positions in the main world rankings are: increased publishing activity (number of scientific publications and quotations of the university authors), active international integration, including the growth of the number of foreign scientific and pedagogical staff and students, growth of university's reputation in the academic community and in the community of

[9] World University Rankings Times Higher Education Methodology. URL: https://www.timeshighereducation.com/world-university-rankings/world-university-rankings-2023-methodology (accessed on 15.01.2024). QS World University Rankings Methodology. URL: https://www.topuniversities.com/qs-world-university-rankings/methodology (accessed on 08.07.2023). Academic Ranking of World Universities Methodology. URL: https://www.shanghairanking.com/methodology/arwu/2023 (accessed on 15.01.2024).

Table 2

Trend of the Achievement of 5–100 and Priority 2030 Positions by Individual Universities Participating in the Project in the QS, THE, RAEX Rankings

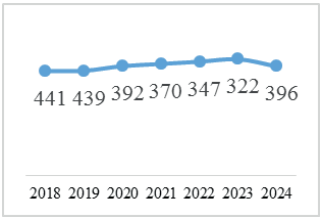
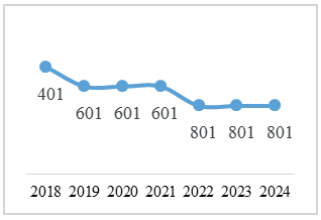
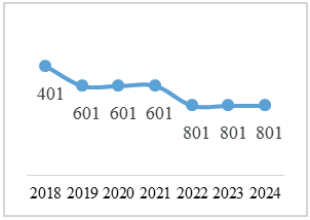
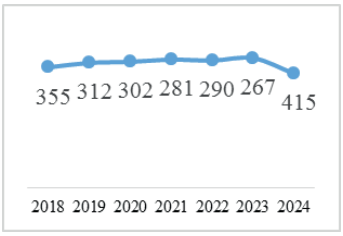
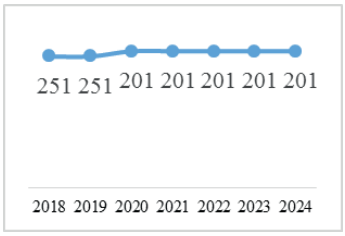
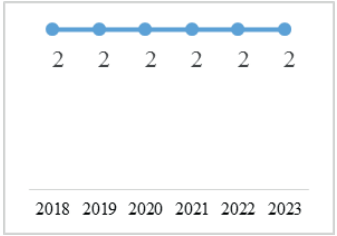
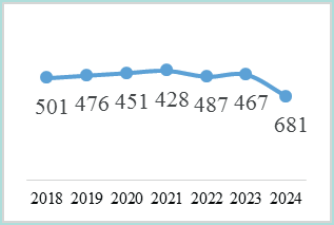
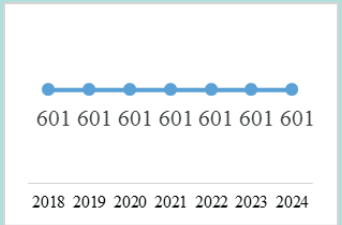
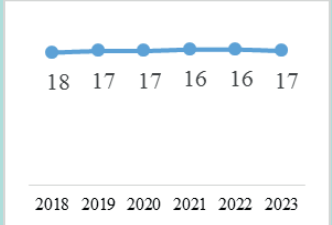
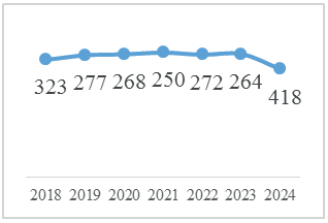
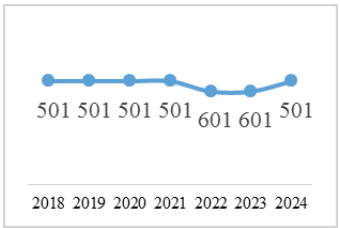
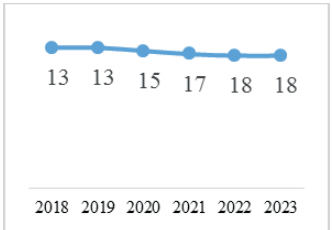
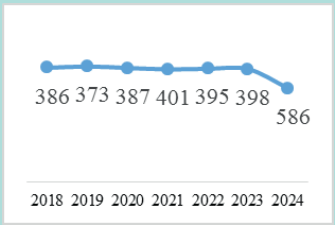
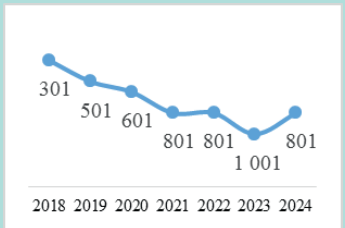
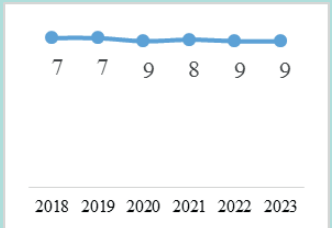
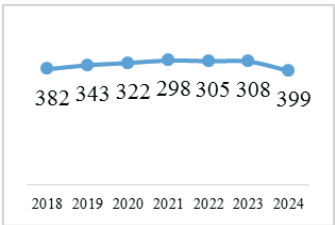
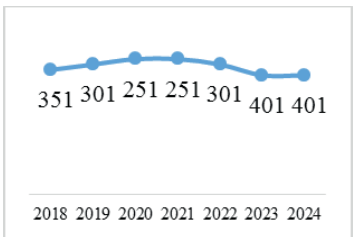
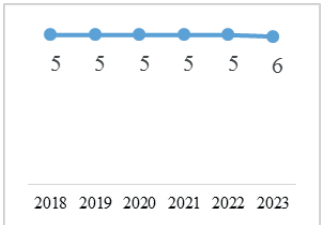
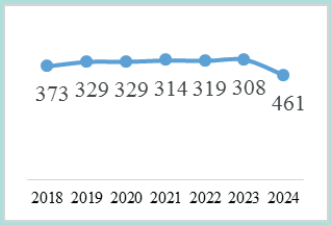
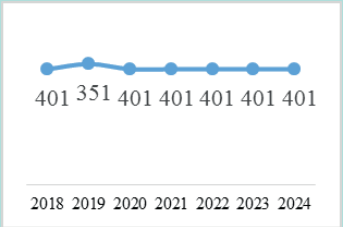
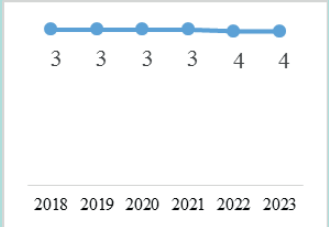
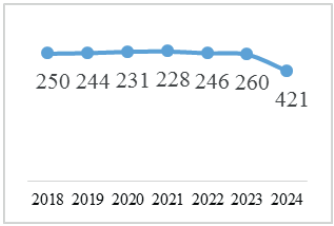
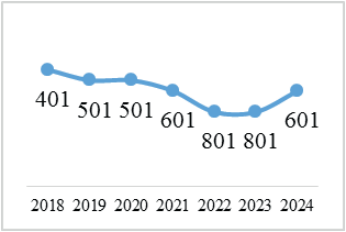
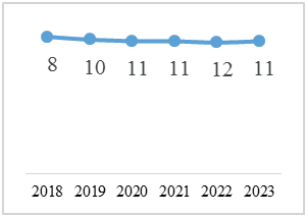
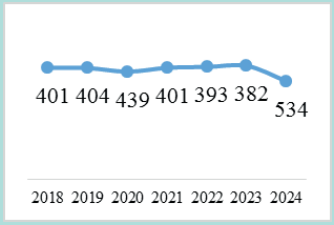
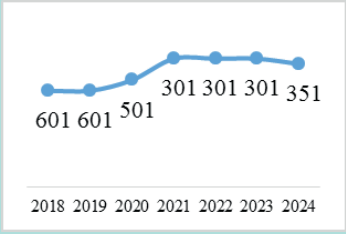
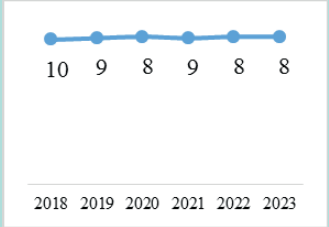
University	Trend of position dynamics in the QS ranking	Trend of position dynamics in THE ranking	Trend of position dynamics in the RAEX rating
Kazan Federal University			
MIPT			
MISIS			
Tomsk State University			
Tomsk Polytechnic University			
HSE			

Table 2 (continued)

University	Trend of position dynamics in the QS ranking	Trend of position dynamics in THE ranking	Trend of position dynamics in the RAEX rating
MEPhI			
Novosibirsk State University			
St. Petersburg Polytechnic University			

Source: Compiled by the authors based on the results of the QS World University Rankings, The Times Higher Education World University Rankings, The best universities in Russia RAEX-100. URL: https://www.topuniversities.com/qs-world-university-rankings; https://www.topuniversities.com/qs-world-university-rankings; https://raex-a.ru/rankings/#r_11550 (accessed on 31.01.2024).

employers (representatives of state bodies and business), information openness.

Despite the significant dynamics of advancement of Russian universities in the world rankings, the share of universities represented in the top-300 remains extremely small and is less than 1% (*Table 1*).

Analysis of documents on planning of current activities and long-term development (programs, strategies, plans, road maps) of Russian and foreign universities confirmed the understanding of universities of the importance of planning indicators evaluated by rating agencies in their strategic documents.

Russia's orientation towards getting universities in the top of the world's rankings implies their transformation. This model entails a more adaptive organizational structure of university management capable of responding effectively to changes in the external environment.

Main forms of impact of rankings on public management of universities:

- the approach by which funding is allocated in accordance with the status in the ranking or in relation to specific indicators assessed by the ranking agencies;
- the merger of universities in order to combine existing financial, human resources, scientific, reputational and other resources, allowing the synergistic effect to expand the window of opportunities for raising positions in the rankings (experience of the UK and Russia on the establishment of reference universities; this form of impact

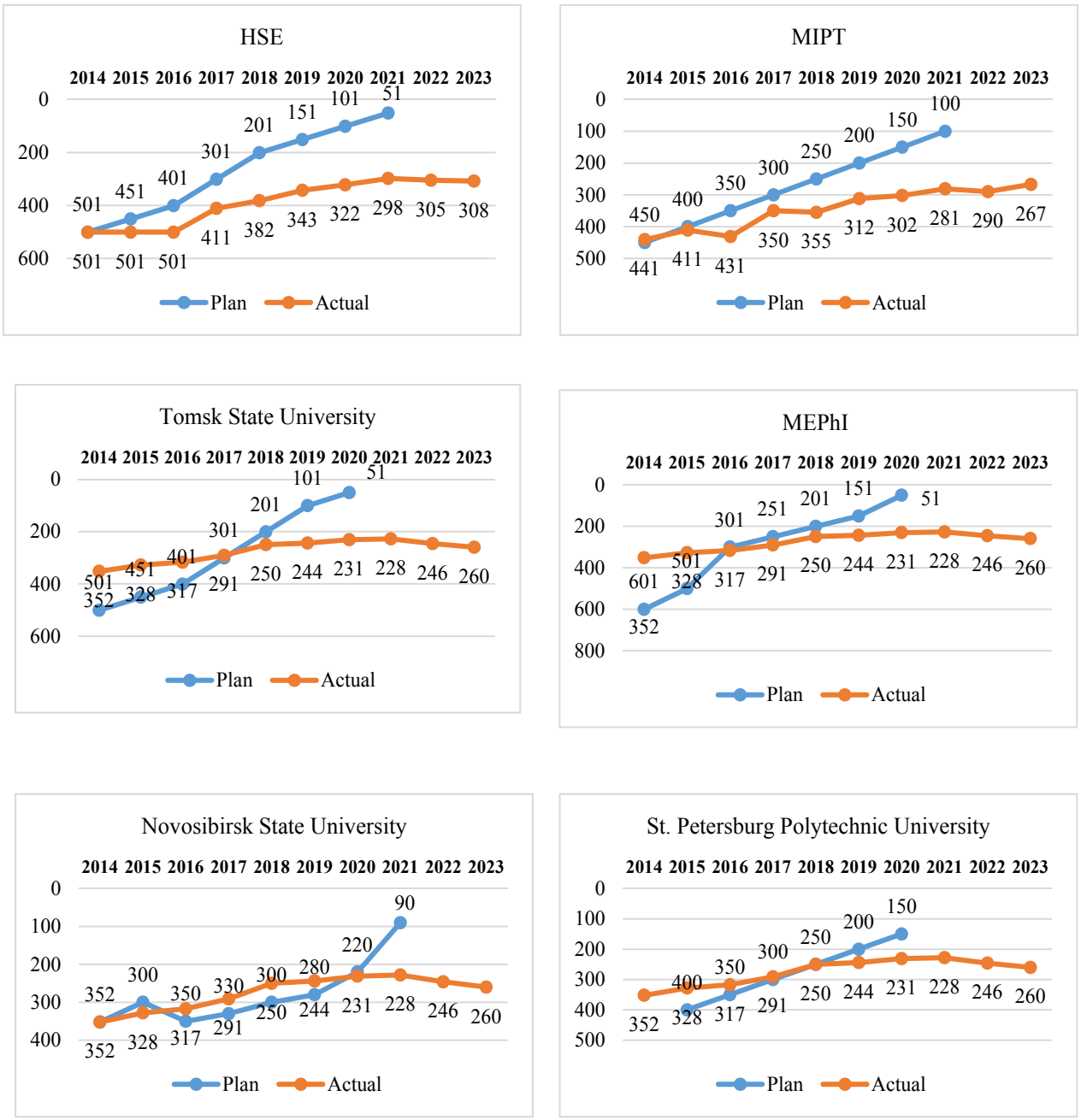


Fig. 4. **Achievement of 5–100 and Priority 2030 Planed Positions by Individual Universities Participating in the Project in the QS**

Source: Compiled by the authors based on the results of the QS World University Rankings. URL: https://www.topuniversities.com/qs-world-university-rankings (accessed on 15.06.2023) [32]. Data on the planned values in Fig. 4 are presented until 2021, as starting with the 2022 rating the format of the representation of Russian universities on the official QS website has changed, universities have largely shifted from planning specific targets in their development programs to planning activities to advance in the ranking, including by shifting the focus from promotion in the QS world ranking of universities to the subject. This period is also due to the fact that the "5–100" university support program was in place from 2012 to 2020. The QS rating is more relevant to the purpose of the study than THE or ARWU rating also for several reasons: due to the set of indicators faster to in the QS ranking; THE rating has an entry threshold in terms of the number of articles in the international quotation databases, and Russian universities were only at the beginning of the path of activation of publications in the journal Web of Science and Scopus. However, the information shown in Fig. 3 illustrates that the majority of universities that participated in the "5–100" university financial support program between 2012 and 2020 failed to meet their targets.

Table 3

Calculation of Return on Investment in Promotion Per 1 Position on the Example of the QS Rating

Indicator	2024	2023	2022	2021	2020	2019	2018
Kazan Federal University							
University income, thous. rubles	13 504 122	11 828 205.9	10 920 432.1	10 580 390.4	9 359 186.6	8 690 898.8	8 694 769.5
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001
University position in the ranking, place	396	322	347	370	392	439	441
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	13 436.94	10 962.19	12 787.39	16 767.66	15 368.12	15 464.23	15 526.37
Dynamics of positions, places	–74	25	23	22	47	2	–
Investment dynamics, thous. rubles	2474.74	–1825.20	–3980.26	1399.53	–96.11	–62.14	–
MIPT							
University income, thous. rubles	8 356 846	6 972 764.7	7 631 538.5	6 589 617.4	6 857 114.2	5 706 607.1	6 392 736.2
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001
University position in the ranking, place	681	467	487	428	451	476	501
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	11 606.73	7 465.49	10 688.43	11 500.20	12 467.48	10 869.73	12 785.47
Dynamics of positions, places	–148	23	–9	21	10	43	–
Investment dynamics, thous. rubles	4741.38	–1244.87	–2529.49	1192.56	2442.84	–704.55	–
MISIS							
University income, thous. rubles	8 356 846	6 972 764.7	7 631 538.5	6 589 617.4	6 857 114.2	5 706 607.1	6 392 736.2
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001
University position in the ranking, place	681	467	487	428	451	476	501

Table 3 (continued)

Indicator	2024	2023	2022	2021	2020	2019	2018
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	11606.73	7465.49	10688.43	11500.20	12467.48	10869.73	12785.47
Dynamics of positions, places	–214	20	–59	23	25	25	–
Investment dynamics, thous. rubles	4141.24	–3222.94	–811.78	–967.28	1597.75	–1915.74	–
Tomsk State University							
University income, thous. rubles	10864840.7	9737234.6	6235755.7	6013337.5	5953784.2	4279534.9	4403649.9
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001
University position in the ranking, place	418	264	272	250	268	277	323
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	11052.74	8563.97	6712.33	8007.11	8122.49	5910.96	6495.06
Dynamics of positions, places	–154	8	–22	18	9	46	–
Investment dynamics, thous. rubles	2488.77	1851.64	–1294.78	–115.38	2211.53	–584.10	–
Tomsk Polytechnic University							
University income, thous. rubles	6904135.8	5480919.5	5494621.7	5730805.2	5295025.6	5336328	6019164.2
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001
University position in the ranking, place	586	398	395	401	387	373	386
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	8471.33	5464.53	6817.15	9551.34	8623.82	8497.34	9787.26
Dynamics of positions, places	–188	–3	6	–14	–14	13	–
Investment dynamics, thous. rubles	3006.81	–1352.62	–2734.19	927.52	126.48	–1289.92	–

Table 3 (continued)

Indicator	2024	2023	2022	2021	2020	2019	2018
HSE							
University income, thous. rubles	30 288 521.1	27 720 873.7	24 336 388.6	21 547 521.1	21 547 521.1	16 222 774.8	13 957 791.4
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001
University position in the ranking, place	399	308	305	298	322	343	382
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	30 228.06	25 362.19	27 161.15	30 650.81	31 734.20	24 654.67	22 548.94
Dynamics of positions, places	–91	–3	–7	24	21	39	–
Investment dynamics, thous. rubles	4865.87	–1798.96	–3489.66	–1083.39	7079.53	2105.74	–
MEPhI							
University income, thous. rubles	7 859 391.1	6 539 240.1	6 956 088	6 805 526.5	6 289 948.8	5 032 908.8	5 216 843.8
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001
University position in the ranking, place	461	308	319	314	329	329	373
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	8 361.05	5 982.84	7 886.72	9 906.15	9 360.04	7 489.45	8 307.08
Dynamics of positions, places	–153	11	–5	15	0	44	–
Investment dynamics, thous. rubles	2378.22	–1903.88	–2019.43	546.11	1870.60	–817.63	–
Novosibirsk State University							
University income, thous. rubles	4 723 772.3	4 038 090.3	4 359 099.1	4 306 827.9	3 750 158.5	3 187 684.1	3 216 993.6
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001

Table 3 (continued)

Indicator	2024	2023	2022	2021	2020	2019	2018
University position in the ranking, place	421	260	246	228	231	244	250
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	4820.18	3539.08	4564.50	5571.58	4870.34	4210.94	4283.61
Dynamics of positions, places	–161	–14	–18	3	13	6	–
Investment dynamics, thous. rubles	1281.10	–1025.42	–1007.07	701.24	659.39	–72.67	–
St. Petersburg Polytechnic University							
University income, thous. rubles	12937710.1	11562405.2	10812832.3	11181730.4	10455351.7	8219020.7	7929772
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001
University position in the ranking, place	534	382	393	401	439	404	401
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	14922.39	11346.82	13382.22	18636.22	18603.83	13767.20	13216.29
Dynamics of positions, places	–152	11	8	38	–35	–3	–
Investment dynamics, thous. rubles	3575.57	–2035.40	–5254.00	32.39	4836.62	550.92	–

Source: Author's calculations based on the Main Information and Computing Center of the Ministry of Science and Higher Education of the Russian Federation data. URL: http://indicators.miccedu.ru (accessed on 31.01.2024).

is also among other criteria used by the Ministry of Science and Education of Russia to combat inefficient universities).

The general aspects of the planning of the rating positions of the university are:

1) the planned ranking indicators should be consistent with the university's development forecast;

2) the planning of non-financial rating indicators must be carried out through financial indicators.

Today's universities need a flexible approach to their funding strategy depending on where each ranking starts (*Fig. 3*). Higher competing universities and priority for analysis by rating agencies indicators may vary depending on the rating: international, subject, sustainable development, etc.

It is also necessary to implement a systematic monitoring of the conformity of the planned values with the results achieved,

Table 4

Calculation of Return on Investment in Promotion Per 1 Position on the Example of THE Ranking

Indicator	2024	2023	2022	2021	2020	2019	2018
Kazan Federal University							
University income, thous. rubles	13 504 122	11 828 205.9	10 920 432.1	10 580 390.4	9 359 186.6	8 690 898.8	8 694 769.5
Number of positions in the ranking, place	1501	1501	1201	1001	1001	1001	1001
University position in the ranking, place	801	801	801	601	601	601	401
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	19 291.60	16 897.44	27 301.08	26 450.98	23 397.97	21 727.25	14 491.28
MIPT							
University income, thous. rubles	13 760 323.2	10 449 045.6	9 528 324.6	9 351 851.8	8 245 492.9	6 444 418.3	6 497 365.3
Number of positions in the ranking, place	1501	1501	1201	1001	1001	1001	1001
University position in the ranking, place	201	201	201	201	201	251	251
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	10 584.86	8 037.73	9 528.32	11 689.81	10 306.87	8 592.56	8 663.15
MISIS							
University income, thous. rubles	8 356 846	6 972 764.7	7 631 538.5	6 589 617.4	6 857 114.2	5 706 607.1	6 392 736.2
Number of positions in the ranking, place	1501	1501	1201	1001	1001	1001	1001
University position in the ranking, place	601	601	601	601	601	601	601
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	9 285.38	7 747.52	12 719.23	16 474.04	17 142.79	14 266.52	15 981.84
Tomsk State University							
University income, thous. rubles	10 864 840.7	9 737 234.6	6 235 755.7	6 013 337.5	5 953 784.2	4 279 534.9	4 403 649.9
Number of positions in the ranking, place	1501	1501	1201	1001	1001	1001	1001
University position in the ranking, place	501	601	601	501	501	501	501

Table 4 (continued)

Indicator	2024	2023	2022	2021	2020	2019	2018
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	10 864.84	10 819.15	10 392.93	12 026.68	11 907.57	8 559.07	8 807.30
Tomsk Polytechnic University							
University income, thous. rubles	6 904 135.8	5 480 919.5	5 494 621.7	5 730 805.2	5 295 025.6	5 336 328	6 019 164.2
Number of positions in the ranking, place	1401	1401	1201	1001	1001	1001	1001
University position in the ranking, place	586	398	395	401	387	373	386
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	8 471.33	5 464.53	6 817.15	9 551.34	8 623.82	8 497.34	9787.26
HSE							
University income, thous. rubles	30 288 521.1	27 720 873.7	24 336 388.6	21 547 521.1	21 547 521.1	16 222 774.8	13 957 791.4
Number of positions in the ranking, place	1501	1501	1201	1001	1001	1001	1001
University position in the ranking, place	401	401	301	251	251	301	351
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	27 535.02	25 200.79	27 040.43	28 730.03	28 730.03	23 175.39	21 473.53
MEPhI							
University income, thous. rubles	7 859 391.1	6 539 240.1	6 956 088	6 805 526.5	6 289 948.8	5 032 908.8	5 216 843.8
Number of positions in the ranking, place	1501	1501	1201	1001	1001	1001	1001
University position in the ranking, place	401	401	401	401	401	351	401

Table 4 (continued)

Indicator	2024	2023	2022	2021	2020	2019	2018
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	7144.90	5944.76	8695.11	11342.54	10483.25	7742.94	8694.74
Novosibirsk State University							
University income, thous. rubles	4723772.3	4038090.3	4359099.1	4306827.9	3750158.5	3187684.1	3216993.6
Number of positions in the ranking, place	1501	1501	1201	1001	1001	1001	1001
University position in the ranking, place	601	801	801	601	501	501	401
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	4723772.3	4038090.3	4359099.1	4306827.9	3750158.5	3187684.1	3216993.6
St. Petersburg Polytechnic University							
University income, thous. rubles	12937710.1	11562405.2	10812832.3	11181730.4	10455351.7	8219020.7	7929772
Number of positions in the ranking, place	1501	1501	1201	1001	1001	1001	1001
University position in the ranking, place	351	301	301	301	501	601	601
Return of investments of the university in promotion to one position, thous. rubles to one place in the ranking	11250.18	9635.34	12014.26	15973.90	20910.70	20547.55	19824.43

Source: Author's calculations based on the Main Information and Computing Center of the Ministry of Science and Higher Education of the Russian Federation data. URL: http://indicators.miccedu.ru (accessed on 31.01.2024).

with mandatory analysis of the causes of the deviations and the adoption of corrective measures, if necessary.

The choice of Russian universities, the dynamics of which are discussed below (*Table 2*), corresponds to the objectives of this article and is determined by the participation of these universities in the state support programs "5–100" (from 2012 to 2020), "Priority 2030" (from 2021); the reflection in their development programs of activities to promote in the ratings; the annual submission by universities of data on their activities to rating agencies for participation in the ranking, etc.

It is important to note that the analysis of the methods of the QS, THE and RAEX ratings in order to ensure comparability of the data were brought to the unity periods (years), which included the performance indicators of the universities, on the basis of which the results of the rankings were summarized and monitoring of the Ministry of Science and Education of Russia was carried out. Each ranking agency, in accordance with its rating methodology, uses different periods of time for the analysis that underlie the published ranking results. In *Tables 3* and *4* calculation "Returns from investments in promotion for 1 position" in the scope of this article also brought into line the periods analyzed by rating agencies with the data monitoring university corresponding to these periods. For example, the ranking agency Times Higher Education uses actual performance to prepare and publish the Times Higher Education World University Rankings 2024 universities 2022. Therefore, to calculate the effectiveness of investments for promotion on one position, the data of the Ministry of Science of Russia of monitoring of the activities of universities "Monitoring 2023" are accepted, because it contains data on the income of the universities in 2022 (from the statistical form No.1 — Monitoring).

Scientists of the Ural Federal University propose the following approach: they compare information about the university budget for the year and the position of the universities in the ranking in the year being analyzed. The methodology proposed by them to estimate the "return on investment on promotion by one ranking position" for growth by one point in international ratings is calculated as the ratio of the amount of funding of the university to the difference between the lowest possible position in the rating to be analyzed and the position actually occupied by the University. Therefore, the "return" for each ruble invested in different ratings will be different due to different indicators used in the rating. For example, the growth of the university ratings used by THE requires greater financial investments than the growth in QS or national ratings (e.g. RAEX). This is confirmed by the number, places, and years of entry and dynamics of the movement of universities in the rankings (trends are presented in *Table 3*). Primary entry in the ranking also requires less financial costs than growing and strengthening the University's ranking position. This illustrates the analysis of the results of the calculation of the return of investment on promotion on one position on the example of nine universities that successfully realize their promotion in the world rankings QS and THE (*Table 3, 4*).

According to the results of the analysis of development strategies, competitiveness improvement programs, reports on sustainable development of universities in Russia and the world, successfully implementing promotion in the world rankings, identified four areas of activity for financing development and intensification of promotion to the world community:

- educational;
- scientific;
- personnel;
- reputational.

However, the existing principles of university funding generally focus on the university's current level of functioning. Therefore, when planning to promote the rating positions of the university, it is necessary to take into account the following:

- the transformation of non-financial indicators into financial indicators in the medium term;
- the possibility of determining the planned budget affecting the achievement of the sub-target in the medium term;
- the application of thresholds for planned indicators;
- the establishment of minimum profitability of paid educational and other services.

CONCLUSION

The study of development strategies, programs to increase competitiveness, reports on sustainable development of universities of Russia and the world, successfully implementing promotion in the world rankings, did not reveal a stable relationship between the volumes of funding of the university and its promotion in rankings. It is not the amount of funding, but the effective financial management and financial policy of the university, with the existing mechanism of public funding of universities, that currently determine the possibility of promoting the University in academic rankings. In these circumstances, direct competitive funding algorithms appear to be more effective in achieving the specific objective than regulatory funding. Russian universities seeking to advance in the ratings are focused on the combined application of mechanisms and sources of financing (normative financing, targeted subsidization, attracting new formats and types of financial support), which corresponds to modern international practice.

ACKNOWLEDGEMENTS

The article is based on the research financed under the given to the Financial University state assignment and financing by state budget funding. Financial University, Moscow, Russia.

REFERENCES

1. Satsyk V. I. Determinants of universities' global competitiveness: Higher education development strategies in Ukraine. *Voprosy obrazovaniya = Educational Studies Moscow.* 2014;(4):134–161. (In Russ.). DOI: 10.17323/1814–9545–2014–1–134–161
2. Li X., Horta H., Jung J. University ranking games in East Asia: Triggers and consequences. In: Lee W. O., Brown P., Goodwin A. L., Green A., eds. International handbook on education development in Asia-Pacific. Singapore: Springer-Verlag; 2023:1–18. DOI: 10.1007/978–981–16–2327–1_91–2
3. Carvalho T. The transformation of universities in response to the imperatives of a knowledge society. In: Aarrevaara T., Finkelstein M., Jones G. A., Jung J., eds. Universities in the knowledge society. Cham: Springer-Verlag; 2021:15–31. (The Changing Academy — The Changing Academic Profession in International Comparative Perspective. Vol. 22). DOI: 10.1007/978–3–030–76579–8_2
4. Fowles J., Frederickson H. G., Koppell J. G.S. University rankings: Evidence and a conceptual framework. *Public Administration Review.* 2016;76(5):790–803. DOI: 10.1111/puar.12610
5. Millot B. International rankings: Universities vs. higher education systems. *International Journal of Educational Development.* 2015;40:156–165. DOI: 10.1016/j.ijedudev.2014.10.004
6. Estermann T., Nokkala T., Steinel M. University autonomy in Europe II: The scorecard. Brussels: European University Association; 2011. 84 p. URL: https://eua.eu/downloads/publications/university%20autonomy%20in%20europe%20ii%20-%20the%20scorecard.pdf (accessed on 05.01.2024).

7. Downing K., Ganotice F.A., Jr. World university rankings and the future of higher education. Hershey, PA: IGI Global; 2017. 534 p.
8. Liu Z., Moshi G.J., Awuor C.M. Sustainability and indicators of newly formed world-class universities (NFWCUs) between 2010 and 2018: Empirical analysis from the rankings of ARWU, QSWUR and THEWUR. *Sustainability.* 2019;11(10):2745. DOI: 10.3390/su11102745
9. Fatkhutdinov R.A. Method of development and implementation of the strategy of improvement of the organization competitiveness. *Sovremennaya konkurentsiya = Journal of Modern Competition*. 2011;(3):113–143. (In Russ.).
10. Batalova O.S. Competitiveness of the university in the educational services market. *Molodoi uchenyi = Young Scientist.* 2010;(10):53–58. (In Russ.).
11. Tatochenko A.L., Tatochenko I.M., Surai N.M., Neverov P.A. Econometrics of education: Analysis of factors for the promotion of Russian universities in world rankings using the correlation matrix method. In: Modernization of economic systems: A look into the future (MESLF-2021): Coll. sci. pap. (Prague, December 22, 2021). Prague: Vědecko vydavatelské centrum "Sociosféra-CZ"; 2022:74–83. (In Russ.).
12. Polikhina N.A., Trostyanskaya I.B. University rankings: Continuing the development. Moscow: Synergy University; 2022. 324 p. (In Russ.).
13. Vorobeva E.S., Krakovetskaya I.V., German M.V., et al. Integration of universities into the global educational space: World competitiveness rankings. *Kreativnaya ekonomika = Journal of Creative Economy.* 2023;17(9):3395–3418. (In Russ.). DOI: 10.18334/ce.17.9.119172
14. Tarakanov A.V., Tatochenko A.L., Lebedeva M.A. Statistical analysis of rankings of universities occupying top positions in leading world rankings. *Modern Science*. 2022;(1–2):71–78. (In Russ.).
15. Borovskaya M.A., Nikitaeva A. Yu., Bechvaya M.R., Chernichenko O.A. Financial instruments of economic mechanisms for strategic development of science and education: Ecosystem approach. *Finance: Theory and Practice.* 2022;26(2):6–24. DOI: 10.26794/2587–5671–2022–26–2–6–24
16. Vidal J., Ferreira C. Universities under pressure: The impact of international university rankings. *Journal of New Approaches in Education.* 2020;9(2):181–193. DOI: 10.7821/naer.2020.7.475
17. Valyukhova M.A., Mamedova N.R., Brovchak S.V. Ranking as a key factor in the development of the university within the framework of the national project. *Kreativnaya ekonomika = Journal of Creative Economy.* 2021;15(6):2529–2550. (In Russ.). DOI: 10.18334/ce.15.6.112110
18. Abakumova N.N., Xu S. Entry and promotion of universities in the world rankings: The Russian and Chinese experience. *Vestnik Tomskogo gosudarstvennogo universiteta = Tomsk State University Journal.* 2020;(452):181–185. (In Russ.). DOI: 10.17223/15617793/452/22
19. Balatsky E.V., Ekimova N.A. Global competition of universities in the mirror of international rankings. *Herald of the Russian Academy of Sciences.* 2020;90(4):417–427. DOI: 10.1134/S 1019331620040073 (In Russ.: *Vestnik Rossiiskoi akademii nauk.* 2020;90(8):726–738. DOI: 10.31857/S 0869587320080022).
20. Song Yu. Rating of university as a component of PR-strategy of advancement at the market of educational services. *Mir nauki, kul'tury, obrazovaniya = The World of Science, Culture and Education*. 2021;(1):346–349. (In Russ.). DOI: 10.24412/1991–5497–2021–186–346–349
21. Tarakanov A.V., Tatochenko I.M., Baigullov R.N. RAEX-100 rating as a tool for assessing the competitiveness of domestic universities in the global education market. *Sovremennoe pedagogicheskoe obrazovanie = Modern Pedagogical Education.* 2022;(5):62–69. (In Russ.).
22. Ebzeeva Yu.N. International ranking of modern universities as a mechanism for managing the development of the educational system. Doct. sociol. sci. diss. Moscow: RUDN University; 2023. 287 p. URL: http://disser.herzen.spb.ru/Preview/Vlojenia/000000954_Disser.pdf (accessed on 02.01.2024). (In Russ.).
23. Polezhaeva T. Yu. World university rankings: Peculiarities and differences in methodology. *Teoriya i praktika obshchestvennogo razvitiya = Theory and Practice of Social Development*. 2024;(2):60–65. (In Russ.). DOI: 10.24158/tipor.2024.2.7

24. Endovitsky D.A., Korotkikh V.V., Voronova M.V. Competitiveness of Russian universities in the global system of higher education: Quantitative analysis. *Vysshee obrazovanie v Rossii = Higher Education in Russia.* 2020;29(2):9–26. (In Russ.). DOI: 10.31992/0869–3617–2020–29–2–9–26
25. Gavrilyeva T.N., Sugimoto A., Fujii M., et al. Sustainable development of universities: International and Russian practices. *Vysshee obrazovanie v Rossii = Higher Education in Russia.* 2018;27(7):52–65. (In Russ.). DOI: 10.31992/0869–3617–2018–27–7–52–65
26. Bulyga R.P., Vetrova I.F., Korolev O.G., Mel'nik M.V. Improving the assessment of the effectiveness of educational and scientific institutions subordinate to the Government of the Russian Federation. Moscow: Nauchnaya biblioteka; 2014. 192 p. (In Russ.).
27. Anokhina E.M., Boiko I.P., Boldyreva N.B., et al. The global competitiveness of leading universities: Models and methods for estimating and forecasting. Moscow: Prospekt; 2018. 544 p. (In Russ.).
28. Mikryukov A.A., Gasparian M.S., Karpov D.S. Proposals for university promoting in QS rating based on the methods of statistical analysis. *Statistika i Ekonomika = Statistics and Economics.* 2020;17(1):35–43. (In Russ.). DOI: 10.21686/2500–3925–2020–1–35–43
29. Konstantinova L.V., Shubenkova E.V., Mazurov M.E., Mikryukov A.A. Development of scientifically based recommendations to improve the university's position in international rankings based on cognitive modeling methods. *Plekhanovskii nauchnyi byulleten' = Plekhanov Scientific Bulletin.* 2021;(2):43–54. (In Russ.).
30. Moskovkin V.M., Zhang H. Mathematical models for managing the process of promoting universities in the TOP-*N* world university rankings. *Original'nye issledovaniya = Original Research.* 2020;10(9):129–134. (In Russ.).
31. Salimova T.A., Ivanova I.A., Sysoeva E.A. Global and national university rankings: A multivariate analysis. *Obrazovanie i nauka = Education and Science Journal.*2021;23(10):11–43. (In Russ.). DOI: 10.17853/1994–5639–2021–10–11–43
32. Agarkov G.A., Sudakova A.E. Assessing the effectiveness of university funding based on an analysis of the dynamics of their academic rankings. In: Modern university between global challenges and local tasks. Proc. 7th Int. conf. of Russian Association of Higher Education Researchers. Moscow: HSE Publ.; 2016:237. (In Russ.).
33. Podberezkin A.I., Bol'shova N.N., Podberezkina O.A. Modern universities are a forge of ideas, technologies and creative class. *Vestnik MGIMO-Universiteta = MGIMO Review of International Relations*. 2012;(2):231–244. (In Russ.).
34. Salmi J., Frumin I. Russian colleges in the competition of leading world universities. *Voprosy obrazovaniya = Educational Studies Moscow.* 2007;(3):5–45. (In Russ.).
35. Volkov A.E. University: Competition for talent. 2019. URL: http://ngup.ru/f/volkov_aye_x_shkola_gradostroitelei.pdf. (accessed on 15.01.2024). (In Russ.).
36. Guseva A.I., Kalashnik V.M., Kaminsky V.I., Kireev S.V. The first year of the Priority 2030 program implementation: Positive results and problem areas of research track universities. *Vysshee Obrazovanie v Rossii = Higher Education in Russia*. 2023;32(3):9–25. (In Russ.). DOI: 10.31992/0869–3617–2023–32–3–9–25
37. Kabelkova V.N. State programs as a tool to maintain the competitiveness of Russian universities. *Vestnik VIEPP.* 2021;(1):29–32. (In Russ.).
38. Nirov A.A. Comparative analysis of the strategic academic leadership program "Priority-2030" and the Project "5–100" aimed at state support in order to increase the competitiveness of universities among the world leading scientific and educational centers. *Universum: ekonomika i yurisprudentsiya = Universum: Economics and Law*. 2024;(3):13–16. (In Russ.). DOI: 10.32743/UniLaw.2024.113.3.16905

39. Rodenkova T.N., Grishina O.A., Anokhova E.V. Assessing financial and economic performance of public investments in academic excellence programs of universities. *Finansy i kredit = Finance and Credit*. 2022;28(10):2201–2224. (In Russ.). DOI: 10.24891/fc.28.10.2201
40. Gertsik Yu.G., Moskovkin V.M. Improving the competitiveness of Russian universities and the role of state programs in the development of higher education. *Ekonomika nauki = The Economics of Science*. 2021;7(1):39–50. (In Russ.). DOI: 10.22394/2410–132X-2021–7–1–39–50
41. Podorvanyuk N. Yu., Rekshinskaya A. Ya., D'yachenko I.S. University rankings: Who is to blame, who benefits and what to do? *Sotsiodigger*. 2021;2(7):62–69. (In Russ.).
42. Epifantseva A.S. Position of Russian universities in international rankings. *Fundamental'nye issledovaniya = Fundamental Research*. 2014;(12–7):1488–1491. (In Russ.).
43. Sheregui F.E., Arefiev A.L., eds. University rankings: International and Russian experience. Moscow: Center for Sociological Research; 2014. 504 p. (In Russ.).

ABOUT THE AUTHORS

Liliya V. Prikhodko — Cand. Sci. (Tech.), Assoc. Prof., Assoc. Prof. of the Department of Strategic and Innovative Development, Financial University, Moscow, Russia
https://orcid.org/0000-0002-4548-1421
Corresponding author:
lvprikhodko@fa.ru

Aynara N. Amerslanova — Cand. Sci. (Econ.), Assoc. Prof., Department of Audit and Corporate Reporting, Financial University, Moscow, Russia
https://orcid.org/0000-0003-1923-5224
aamerslanova@fa.ru

Ekaterina A. Kameneva — Dr. Sci. (Econ.), Vice-Rector for Academic affairs, Financial University, Moscow, Russia
https://orcid.org/0000-0001-9909-6986
eakameneva@fa.ru

Declared contribution of the authors:
L. V. Prikhodko — critical literature review, organization of statistical data.
A. N. Amerslanova — graphic and table data representation, formulation of research results.
E. A. Kameneva — problem statement, development of the concept of the article.

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 30.01.2024; revised on 25.03.2024 and accepted for publication on 15.04.2024.
The authors read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-181-192
UDC 332.14,330.43(045)
JEL G33

Assessment of the Prospects for Bankruptcy of Industrial Sectors of the Sverdlovsk Region

I.V. Naumov, A.A. Bychkova, N.L. Nikulina, V.M. Sedelnikov
Institute of Economics of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia

ABSTRACT

The subject of the study is the assessment of the financial viability of industrial enterprises. The purpose of the paper is to develop a methodological approach to assessing the prospects for bankruptcy of enterprises in various industries in territorial systems and testing it on the example of an industrially developed region. The relevance of the study is due to the fact that in the conditions of significant sanctions pressure on the Russian economy, narrowing of the markets of sale of produced products and disturbance of logistics chains, restrictions on the import of high-tech equipment, Russian enterprises face problems of shortage of operating funds, non-liquidity of assets, high levels of debt. The significant deterioration in the financial situation of enterprises, that is currently observed, creates the prospects for bankruptcy of entire industries, which creates threats to the socio-economic development of territorial systems. The novelty of the study is the author's methodological approach to assessing the prospects for bankruptcy of industrial sectors, based on the use of multidimensional discriminant analysis of the financial viability of not individual enterprises, but of industrial sectors as a whole to determine sectoral priorities for state support for their development. General scientific and empirical methods, multivariate discriminant analysis were used. During testing of the developed methodological approach using the example of the Sverdlovsk region, the following results were obtained: currently, the risks of bankruptcy of enterprises in the entire industrial complex of the Sverdlovsk region are significantly increasing; The Altman curve has approached a critical threshold value, indicating a high level of probability of enterprise bankruptcy. It was concluded that in the Sverdlovsk region, enterprises in the food production, electrical equipment, chemical production and mineral mining industries are in the most critical condition. Increased risks of loss of financial viability are observed in the industries of metallurgical production, production of finished metal products, as well as other non-metallic mineral products, production and distribution of electricity, gas and water, which dominate the industry structure of the region. These industries require government support in the implementation of industrial policy at the federal and regional levels.

Keywords: probability of bankruptcy; industries; region; multivariate discriminant analysis; financial solvency; threshold levels

For citation: **Naumov I.V., Bychkova A.A., Nikulina N.L., Sedelnikov V.M. Assessment of the prospects for bankruptcy of industrial sectors of the Sverdlovsk region**. ***Finance: Theory and Practice***. **2024;28(4):181-192. (In Russ.). DOI: 10.26794/2587-5671-2024-28-4-181-192**

INTRODUCTION

The industrial complex plays a key role in the development of the economy of Russian regions. It provides a significant part of their gross regional product, creates jobs, makes a significant contribution to the formation of budgetary provision of territorial systems. It has a significant impact on the social development of the regions where industrial enterprises are located, by creating favorable conditions for the development of infrastructure and the social sphere. Sverdlovsk region is one of the industrialized regions of Russia with a high level of concentration of industrial enterprises and their significant contribution to GRP. The socio-economic development of this region depends on the state and prospects of development of the industrial complex. It is based on enterprises of metallurgy and mechanical engineering, chemical, mining, food industry and transport.

In the current geopolitical situation, in the conditions of significant sanctions pressure on the Russian economy and restrictions on the import of foreign technologies and equipment, on which many Russian enterprises operate, the impossibility of their timely and high-quality service, risks are formed in the economic and financial development of industries in the region. Transaction costs for enterprises increase, the cost of production of goods increases, equipment wear increases, and its breakdowns lead to the shutdown of production processes. All this affects the decrease in the quality of products, its competitiveness in the domestic and foreign markets. Restrictions imposed by foreign countries on the export of Russian producers within the framework of the sanctions policy lead to an increase in the limitation of working capital of enterprises, a decrease in their liquidity, an increase in their level of debt, and, as a result, a decrease in their financial stability. The limited financial resources and the difficulty of adapting enterprises to new conditions significantly increase the prospects for industrial failure. The cessation of production activities of a significant part of enterprises may negatively affect the development of certain industries, and this poses serious threats to the economic security of industrially developing regions, such as the Sverdlovsk region. In such conditions, the assessment of the prospects for bankruptcy not of individual enterprises, but of industries as a whole, becomes an important and urgent task. Analysis of the probability of bankruptcy of enterprises — an essential tool for forecasting and counteracting the negative effects of global economic trends. Currently, there is no universal methodological approach to assessing the prospects for bankruptcy of industries and the industrial complex in the territorial system as a whole. This study is dedicated to its development.

THEORETICAL REVIEW

Multidimensional discriminant analysis is the main method of assessing the probability of financial insolvency of enterprises in the works of both Russian and foreign researchers. This method was used by V.M. Fedorov and A.S. Grisko in the development of a predictive model for crisis prevention at industrial enterprises of the machine-building complex of the Omsk region [1]. Their methodological approach was based on Model E. Altman [2] is the most common tool for financial diagnostics and forecasting the risks of bankruptcy of enterprises. This model was used by N.A. L'vov [3] when conducting financial diagnostics of Russian enterprises operating in developed and emerging markets, V.B. Popov and E. Sh. Kadyrov [4] when predicting the probability of bankruptcy of Russian enterprises. They analyzed the advantages and disadvantages of models of foreign authors, such as E. Altman [2], W. Beaver [5], R. Taffler and G. Tishow [6], as well as models from Russian authors. Multidimensional discriminant analysis was used in the works of M.A. Fedotova [7], O.P. Zaitseva [8]. They highlighted

the need to take into account specific indicators, taking into account the industry affiliation and scale of the enterprise's activities, to increase the reliability of the methodology. Using multidimensional discriminant analysis of R. K. Sharma and N. Bhalla developed a model for predicting the financial instability of companies in the information technology sector in India [9], P. Kopchinsky assessed the bankruptcy risk of Polish joint-stock companies [10], and D. Verma and S. S. Raju predicted the default of large corporations [11].

The theoretical review of the studies showed that the methods used by both Russian and foreign researchers to predict the probability of bankruptcy of enterprises are not universal, as they do not take into account the industry specifics of the activities of enterprises, the territorial features of their location, researchers set standard thresholds to assess the probability of bankruptcy of enterprises of various types of economic activities, and this distorts the real picture of their financial condition. When using multidimensional analysis, the size of enterprises, spatial aspects of their location, their importance for the development of a particular territorial system are not taken into account. The thresholds used by researchers to assess the probability of bankruptcy of enterprises are determined expertly and this contributes to the increase in the subjectivity of the results obtained. The integral indicators of the probability of bankruptcy of enterprises used by researchers are calculated on the basis of data for the last reporting period, the dynamics of changes in this probability in the past are not taken into account, and this reduces the reliability of the forecasts generated.

METHODOLOGICAL APPROACH TO ASSESSING THE PROSPECTS OF BANKRUPTCY OF INDUSTRIES

The methodological approach presented in the work is aimed at eliminating the restrictions of multidimensional discriminatory analysis noted above when assessing the probability of bankruptcy of enterprises of various industries in the territorial system. The basis of this methodological approach is formed by the five-factor model E. Altman (1), characterized by high accuracy of forecasting the financial insolvency of enterprises (up to 94%) and the breadth of coverage of factors:

$$Z = 1{,}2 * X1 + 1{,}4 * X2 + 3{,}3 * X3 + 0{,}6 * X4 + X5, \quad (1)$$

where $X1$ — ratio of working capital to the sum of all assets of the enterprise; $X2$ — ratio of retained earnings to the amount of assets of the enterprise; $X3$ — ratio of operating profit to the amount of enterprise assets; $X4$ — ratio of the market value of shares to the amount of all liabilities; $X5$ — ratio of revenue to the sum of all assets of the enterprise.

Its main advantage is that it takes into account factors that reflect various aspects of the company's activities and this makes the methodology more universal. At the same time, the model has an important limitation — it can be used to assess the probability of bankruptcy of only large enterprises whose shares are traded on the stock market and is practically not applicable to most small and medium-sized enterprises. And this significantly distorts the actual dynamics of the financial stability of industries. When assessing the prospects for bankruptcy of industries, it is important to take into account the entire set of functioning enterprises. Therefore, the Altman model was modified by us by eliminating the *X4* factor, reflecting the ratio of the market value of shares to the obligations of the enterprise.

At the initial stage of the study, the modified Altman model is proposed to be used to calculate the probability of bankruptcy of enterprises in various industries. To assess the prospects for bankruptcy of each industry, it is proposed to calculate the average values of Z statistics for the entire set of enterprises (2):

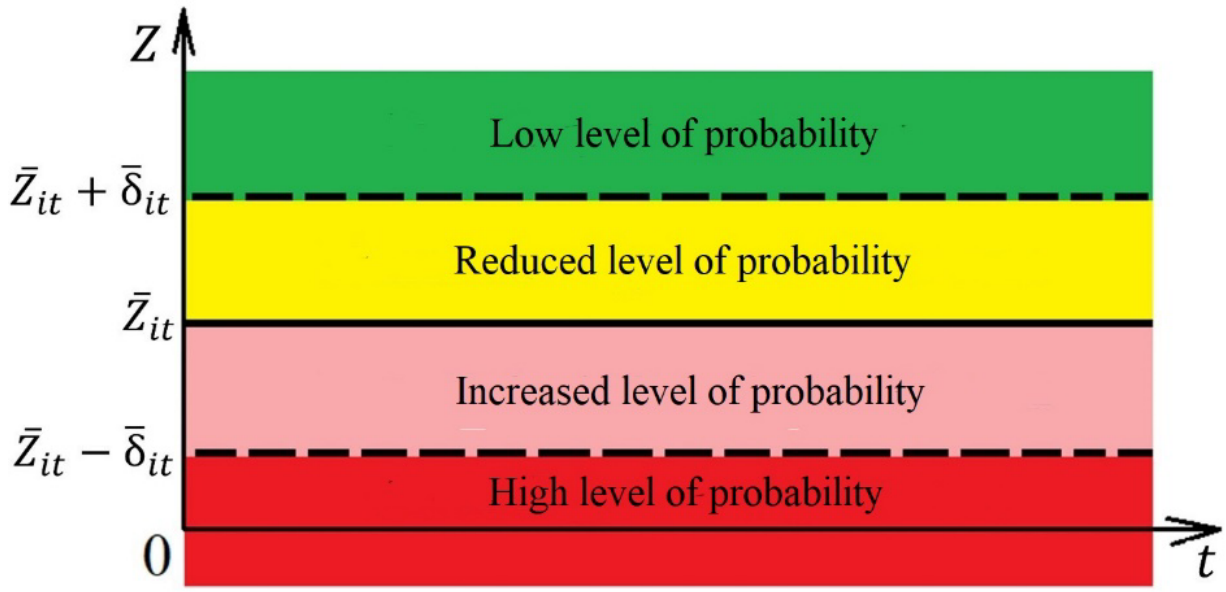


Fig. 1. **Zones of Probability of Bankruptcy of Industries**

Source: Compiled by the authors.

$$\overline{Z_i} = \sqrt[n]{Z_i \cdot Z_{i+1} \cdot Z_{i+2} \cdot \ldots \cdot Z_n}, \quad (2)$$

where $\overline{Z_i}$ — average geometric value Z of statistics for the entire set of enterprises of a certain industry at a time; Z_i — Z value of statistics for a single industry enterprise; n — total number of enterprises in the industry.

This approach will allow to analyze the dynamics of the financial solvency not of individual enterprises, but of each industry as a whole, establish the prospects for their bankruptcy in the future and determine sectoral priorities for state support for their development, which are so necessary for the development of industrial policy concepts and strategic programs at the regional level. To take into account industry and spatial specifics, it is proposed to use non-standard thresholds proposed by E. Altman, and the values calculated using standard deviations from the average value for all enterprises of the industry for the period under review from 1999 to 2022 (*Fig. 1*).

This will avoid subjectivity in assessing the likelihood of bankruptcy of enterprises and use threshold values specific to a particular industry in a particular territorial system. According to the methodology of E. Altman, a high level of probability of bankruptcy is observed in enterprises with Z values of statistics less than 1.8, which corresponds to the "red" zone in *Fig. 1*. To take into account the industry specifics of enterprises and calculate the individual threshold value of the high-risk bankruptcy zone of enterprises for each industry, it is proposed to use the formula (3):

$$Z_i < \left(\overline{Z_{it}} - \overline{\delta_{it}}\right) = \sqrt[n]{\overline{Z_t} * \overline{Z_{t+1}} * \ldots * \overline{Z_{tn}}} - \sqrt{\frac{\sum_{i=1}^{n}\left(\overline{Z_t} - \overline{Z_{it}}\right)^2}{n-1}}, \quad (3)$$

where Z_i — Z value of statistics for a single industry enterprise; $\bar{Z}_t$ — average geometric value of Z, calculated for enterprises of a certain industry in the subject of the Russian Federation at a time; $\bar{Z}_{it}$ — average geometric value Z of statistics calculated for all enterprises of the industry in the subject of the Russian Federation for the analyzed period of time; $\overline{\delta_{it}}$ — average value of the standard deviation of Z statistics for all enterprises of

the industry in the subject of the Russian Federation for the entire period of time; n — duration of the time series.

As a result of this approach, enterprises with Z statistics values below the average by one standard deviation will be in the zone with a high probability of bankruptcy (δ_{it}). A low level of probability of bankruptcy, respectively, will be observed in the "green" zone (*Fig. 1*) in enterprises with Z statistics values exceeding the industry average by one standard deviation. The uncertainty zone in assessing the probability of bankruptcy of enterprises according to the Altman method corresponds to the intermediate values between the "red" and "green" zones. Studies using this model show that a significant part of the evaluated enterprises fall into this zone and the use of standard thresholds introduced by Altman creates difficulties in the study of their financial viability. For a more accurate assessment of the prospects for bankruptcy of enterprises, this methodological approach proposes the allocation of a zone with a moderate (average) level of probability of bankruptcy of enterprises ($\overline{Z_{it}}$), as well as two additional risk zones (with increased and reduced probability). An increased level of probability of bankruptcy according to this approach will be observed in enterprises whose statistics Z value is below the average level calculated for all enterprises in the industry for the entire period under review from 1999 to 2022, but does not reach the standard deviation from the average (4):

$$(\overline{Z_{it}} - \overline{\delta_{it}}) < Z_i < \overline{Z_{it}} . \qquad (4)$$

The reduced level of probability of bankruptcy of enterprises, respectively, will be determined in the range of values from the middle level to the upper limit of the spread of values determined using the standard deviation. The allocation of a reduced and increased level of bankruptcy probability increases the sensitivity of assessing the prospects for bankruptcy of industries. The methodological approach proposed in the work allows a more correct approach to the assessment of the financial viability of enterprises — to take into account their size, sectoral and spatial specifics, differentiation of the levels of probability of their bankruptcy. Its novelty is the use of individual thresholds calculated for each industry, based on the dynamics that has been observed for all enterprises over a long period of time. This approach eliminates the subjectivity of assessments, which is characteristic of most studies using multidimensional discriminant analysis. Its novelty also lies in the use of tools for dynamic analysis of bankruptcy prospects. Calculation of Z statistics in dynamics makes it possible to establish patterns of changes in the probability of bankruptcy of enterprises during periods of increasing crisis phenomena in the economy and its recovery.

Spatial features of the placement of enterprises are also important in assessing the prospects for bankruptcy of industries. And in part, the approach proposed in the work takes them into account when calculating individual thresholds for each industry of the probability of bankruptcy of enterprises. It is obvious that in each territorial system, the Z values of statistics for enterprises of the same industry will differ, which means that the thresholds of the probability of bankruptcy of enterprises in different territorial systems will also differ. The spatial features of the location of enterprises are most fully disclosed when assessing the prospects for bankruptcy of the entire industrial complex of the territorial system. Each territory is unique and distinguished by its unique industry structure. And the adjustment of the calculated Z values of the probability of bankruptcy of industries for their share in the industry structure of the territory would allow to take into account the spatial features of the development of the industrial complex (5):

$$\overline{\overline{Z}} = \overline{X_i} \cdot \overline{Z_i} + \ldots + \overline{X_{in}} \cdot \overline{Z_n} , \qquad (5)$$

where $\overline{\overline{Z}}$ — value Z of a statistic calculated for all enterprises of an industrial complex in the

subject of the Russian Federation at a certain time; $\overline{Z_i}$ — average geometric value of Z, calculated for enterprises of a certain industry in the subject of the Russian Federation at a time; $\overline{X_i}$ — weighted average for a certain period of time specific weight of industry i in the structure of the industry of the subject of the Russian Federation.

To level the random changes observed in the dynamics of the sectoral structure of territorial systems and use its really established proportions, it is advisable to use the weighted averages for a certain period of time, for example, the last 5–7 years, coefficients reflecting the occupied share of industries in its structure. Since individual thresholds are used to interpret the results of the assessment of the financial viability of industries, summing up the results of this analysis throughout the industrial complex requires the calculation of thresholds generalized for all industries. To generalize them, it is proposed to use a standard approach — the calculation of average values.

Assessment of the prospects of bankruptcy of the industrial complex of the territorial system in general and its industries in particular, a comparison of their dynamics will help to establish those areas of production activities of enterprises, Currently in a difficult financial situation and requiring increased attention and support from public authorities.

RESULTS

The developed methodological approach to assessing the prospects for bankruptcy of industries was tested on the example of an industrially developed region — the Sverdlovsk region. The main branch of its specialization is metallurgical production, the weighted average share of which in the industry structure over the past seven years (from 2016 to 2022) was 46.6%. A significant share in the industry structure of the region is occupied by the production, distribution of electricity, gas, water (10.2%), production of vehicles (7.2%), finished metal products (7.1%) and food products (6.1%). The calculation of Z statistics and thresholds showed that these industries are in a difficult financial situation and have an increased level of probability of bankruptcy. In many branches, the Altman curve has approached the red zone (*Fig. 2*).

In the metallurgical production industry in 2022, Z statistics reached 1.16 at a critical level of 1.01 for this industry, indicating a significant probability of bankruptcy of enterprises. During the periods of financial and economic crisis, which was observed in 2009, significant sanctions pressure in 2014, the coronavirus pandemic in 2020–2021, this curve crossed the specified threshold and was in the red zone of high risk of loss of financial solvency by enterprises. Currently, such large metallurgical enterprises of the Sverdlovsk region are in the field of increased financial risks as JSC "Svyatogor" (in 2022 the Z value of Altman's statistics reached the level of 0.97), PJSC "Revdinsky Non-Ferrous Metals Processing Plant" (1.4), JSC "Seversky Pipe Plant" (1.23), JSC Ural Mining and Metallurgical Company (1.06), JSC "UMK-Steel" (1.17) and JSC "Kamensk-Ural Metall Metallurgical Plant" (0.6). Small metallurgical enterprises in the region are in the most difficult financial situation — 69 enterprises out of 240 are located in the red zone with the highest level of bankruptcy and 29 — in the zone of increased probability. Metallurgical production forms the basis of the industrial complex of the Sverdlovsk region, makes a significant contribution to the formation of its GRP and the deterioration of the financial stability of metallurgical enterprises, which is currently observed, has a negative impact on the pace of economic development of the region.

The Z values of statistics in the enterprises of the electricity, gas and water production and distribution industry throughout the period under review from 1999 to 2022 were close to zero. The use of standard Altman thresholds to interpret the results of the assessment of the probability of bankruptcy of

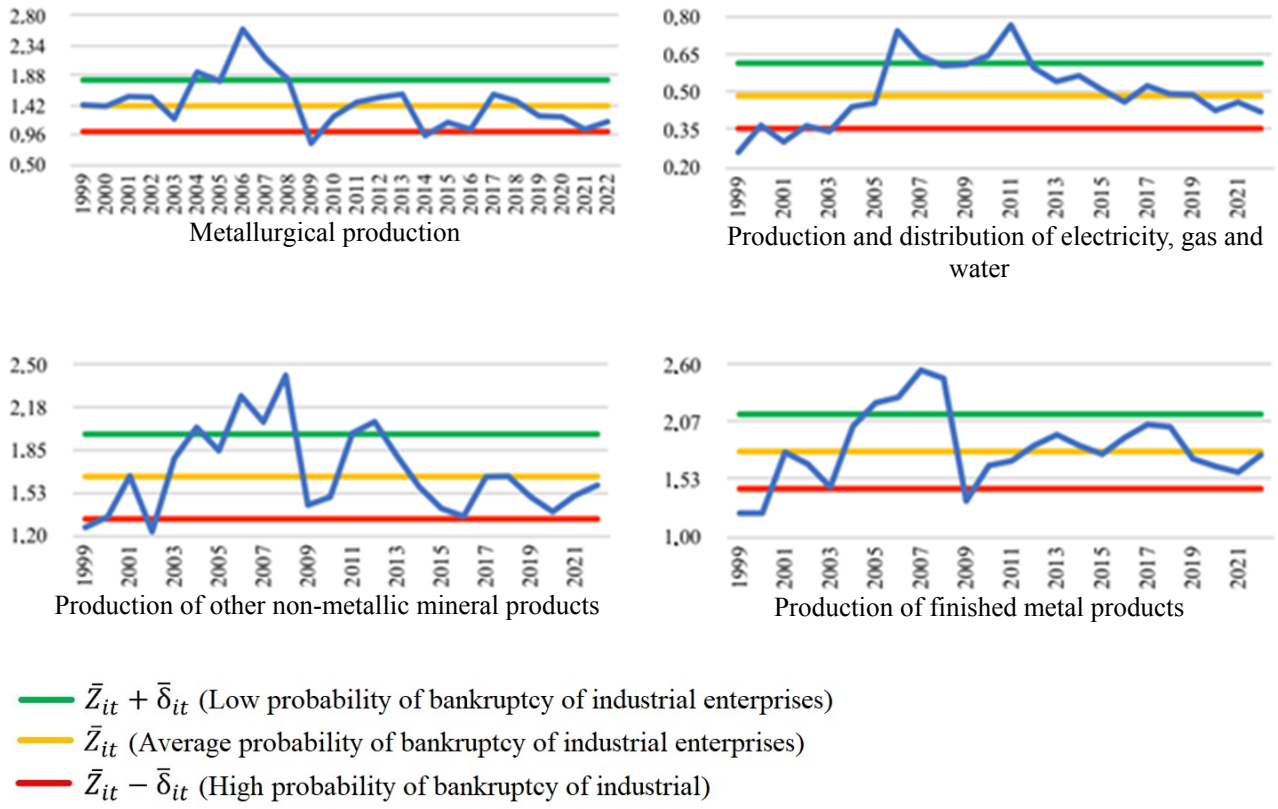


Fig. 2. **Dynamics of *Z* Statistics for Industries in the Sverdlovsk Region with an Increased Level of Probability of Bankruptcy of Enterprises**

Source: Compiled by the authors.

this industry in the region would lead to false conclusions, to the conclusion that enterprises are in a deep financial crisis. However, it should be noted that most large and medium-sized enterprises in this industry are financially stable and have an extremely low level of probability of bankruptcy. The *Z* values of statistics calculated in the industry as a whole were influenced by small enterprises with an extremely unstable financial situation. Their predominance in the industry (497 enterprises) contributed to obtaining near-zero *Z* values of statistics. The use of individually calculated thresholds for this industry, presented in *Fig. 2*, made it possible to draw more correct conclusions about the probability of bankruptcy of enterprises in the industry: there are increased risks of loss of financial solvency by enterprises and they have been increasing significantly since 2012. The high level of dependence of enterprises on foreign technologies, equipment and the growth of foreign currency quotations had a negative impact on their financial stability.

An increased level of probability of bankruptcy is also observed in enterprises engaged in the production of non-metallic products (*Fig. 2*). However, the situation in this industry is not as critical as in metallurgical production. In 2022, *Z* statistics calculated for industry enterprises approached the average level of probability of bankruptcy of enterprises. Moreover, for a significant part of the period under review, the values of this indicator were in a reduced risk zone. A significant decline in the dynamics of *Z* statistics, indicating an increase in the risks of bankruptcy of industry enterprises, was observed during periods of economic turmoil 2008–2009, 2014–2015, 2018–2021. Currently, the financial situation of enterprises engaged in the production of finished metal products

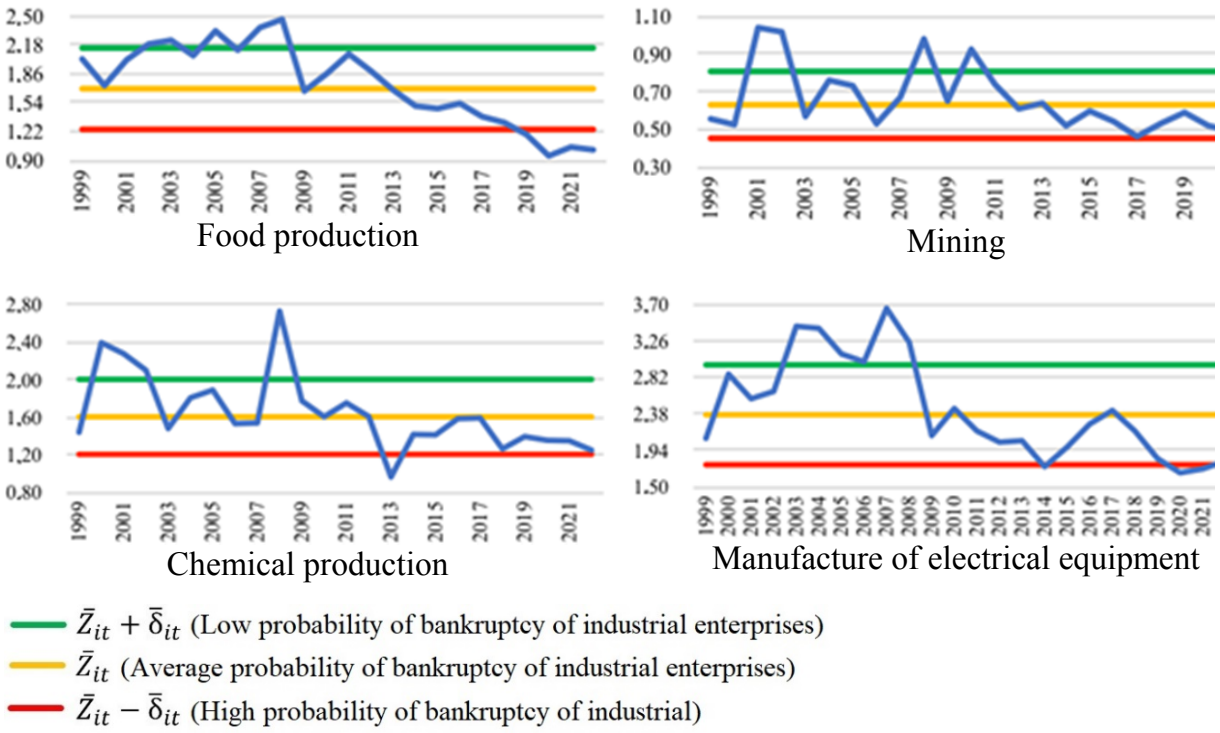


Fig. 3. **Dynamics of *Z* Statistics for Industries in the Sverdlovsk Region with a High Level of Probability of Bankruptcy of Enterprises**

Source: Compiled by the authors.

is improving and it is quite possible that next year this industry will move to the category with a reduced risk of bankruptcy of enterprises.

A similar dynamics of *Z* statistics was observed in the production of other non-metallic mineral products and currently enterprises in this industry are characterized by an increased level of probability of bankruptcy. However, unlike manufacturers of metal products, the difficult financial situation of these enterprises has been observed over the past 10 years, the values of Altman statistics fluctuate in the zone of increased probability of bankruptcy. Not only small, but also a significant part of the average revenue of enterprises are in the most vulnerable position. These include: plant LLC "Atomstroycomplex Cement" (with a value of *Z* statistics 0.1 in 2022), LLC "BETONSTROY" (–31.1), LLC "ZAPSIBNEFTESTROY" (1.2), LLC "Severouralsky ZhBK Plant" (1.1), LLC "Isetsky Granite" (1.6), LLC "Monolit" (–0.6). At the same time, the financial situation of enterprises producing other non-metallic mineral products improved significantly by 2022, and the value of *Z* statistics for the industry as a whole reached the average level. Enterprises in this industry have good prospects for development in the future, since the National Project "Safe and Quality Roads" is currently being implemented in the urban agglomerations of the region, which involves the construction of new roads, infrastructure facilities, and this will significantly increase the demand for products of industry enterprises.

The Z-dynamics study of Altman statistics showed that the most difficult financial situation is found in enterprises engaged in food production, electrical equipment, chemical production and mining (*Fig. 3*). The values of this indicator in these industries are in the red zone with a high level of probability of bankruptcy of enterprises. And if in chemical production and mining this level

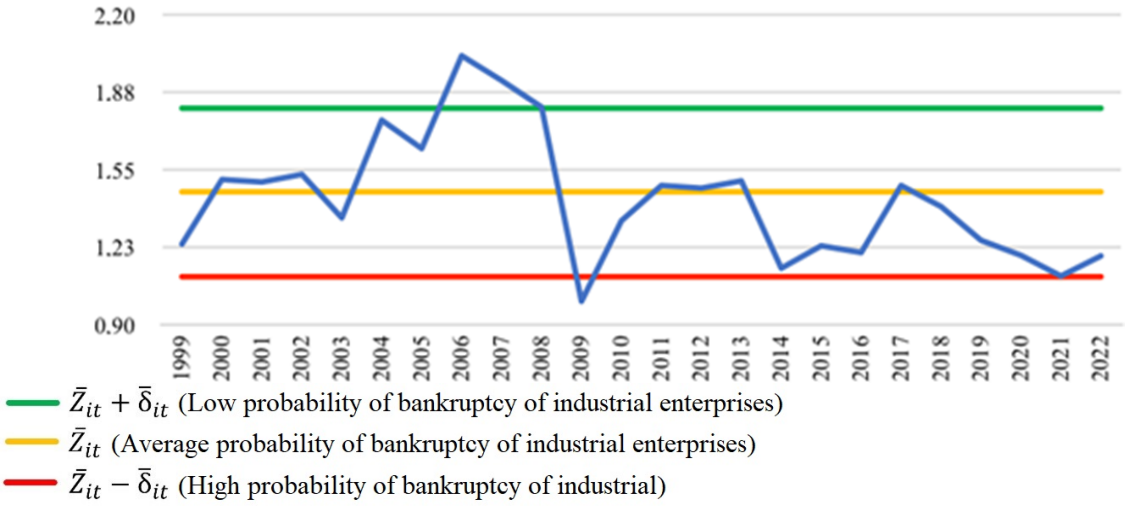


Fig. 4. **Dynamics of *Z* Statistics for All Enterprises Industrial Complex of the Sverdlovsk Region for the Period from 1999 to 2022**

Source: Compiled by the authors.

was reached by enterprises only in 2022, then in food production it has been observed for 5 years. In the critical zone with a very high level of probability of bankruptcy (*Z* statistics below 1.24 for this industry) there are such large enterprises as: JSC "Zhirovoy Combine" (0.33), LLC "KDV Nizhny Tagil" (1.19). An increased level of probability of bankruptcy is observed in JSC Food Combine "Khoroshii Vkus" (1.69), JSC "SMAK" (1.49). The food industry occupies a significant share in the sectoral structure of the Sverdlovsk region (6.1%) and ensures food security of the region, therefore, the bankruptcy of enterprises in this industry is simply unacceptable.

Mining is not the leading branch of specialization in the region, its share in the industry structure on average for the period from 2016 to 2022 did not exceed 4%. However, its importance for the region is very great — it is closely interconnected with the metallurgical complex and the production of non-metallic mineral products. Among large enterprises, a high level of probability of bankruptcy is observed in LLC "Mechanoremontnyi Complex" (the value of *Z* statistics in 2022 was 0.39), LLC "Saratov-Cement" (0.01), JSC "EVRAZ Kachkanar Mining and Processing Plant" (–4.98). In the zone of high risk of bankruptcy, as the calculations of *Z* statistics showed, there are 141 out of 463 small enterprises with revenues of up to 198 million rubles. And this forms significant risks for the future development of the mining industry in the region.

Chemical production enterprises are also in a difficult financial situation, as evidenced by the dynamics of the Altman curve, which reached a critical value of 1.2 in 2022 (*Fig. 3*). The highest level of probability of bankruptcy is observed in small enterprises, whose share in the industry according to 2022 is 96%. Since 2008, the probability of bankruptcy of enterprises in the field of electrical equipment production has increased significantly (*Fig. 3*). The development of this industry is under considerable pressure: the increasing cost of imported equipment used by enterprises due to the growth of foreign currency quotes, as well as the restriction of imports of high-tech equipment. Industry enterprises in the region are very dependent on foreign components that are used in the production of electrical equipment, and the difficulties arising in the process of their purchase and transportation due to sanctions restrictions and broken logistics chains significantly increase the cost of their products, which ultimately affects

the decrease in the financial stability of industry enterprises. Small enterprises were in the most difficult financial situation: a high level of probability of bankruptcy (below the threshold of 1.76) is observed in 204 out of 624 enterprises, and an increased level of probability of bankruptcy (with $Z < 2.37$) — 39 enterprises.

In the most stable financial position, with Z values of statistics in the zone with a reduced level of probability of bankruptcy of enterprises are such industries as: mechanical engineering, production of vehicles, rubber and plastic products, textile and clothing production, as well as wood processing and production of wood products. In the vehicle industry, only a small part of small businesses are experiencing financial difficulties (26 out of 126). An increased level of probability of bankruptcy (with $Z < 2.13$) is observed only in some enterprises producing rubber and plastic products, in particular: LLC "Polymer Technologies" (–0.93), LLC "Ural Tire Plant" (1.52), PJSC "Ural Plant RTI" (1.66), LLC "Ural Plant of Lining RTI" (2.1). In the field of woodworking and production of wood products, increased risks of bankruptcy (at a value of $Z < 1.93$) are observed in PKF Prominvest LLC (0.94) and in JSC Turin Pulp and Paper Mill (1.52). The textile and clothing industry is the only one in the region that was not significantly affected by the financial and economic crisis of 2009 and the sanctions pressure that began in 2014. The Z values of Altman's statistics for enterprises in this industry for a long period, from 2007 to 2022, were located in a zone with a reduced level of probability of bankruptcy (above 1.64). The development prospects of enterprises in this industry, taking into account the reduced competition in the textile market due to the withdrawal of foreign manufacturers from the country, are good, the probability of bankruptcy of enterprises in this industry in the future is very low.

To assess the risks of bankruptcy of enterprises of the entire industrial complex of the Sverdlovsk region as a whole, the average geometric levels of Z statistics for all industries were summed up with the use of weighing coefficients, based on the averages for the period from 2016 to 2022, characterizing the share of a particular industry in the production structure. Calculations of Z statistics showed that currently the risks of bankruptcy of enterprises as a whole of the entire industrial complex of the Sverdlovsk region are significantly increasing. The Altman curve has approached a critical threshold indicating a high level of probability of bankruptcy of enterprises (*Fig. 4*).

The industrial complex of the region did not recover after the financial and economic crisis of 2009, and this is evidenced by the dynamics of Z statistics, which until 2022 fluctuated in the zone of increased risks of bankruptcy of enterprises. The dynamics of this indicator, shown in *Fig. 4*, indicates the current phase of recovery of the industrial complex after the coronavirus pandemic. The same phase of recovery was observed in 2015 after the introduction of severe sanctions restrictions and in 2010 after the financial and economic crisis. Therefore, it is quite possible to expect the restoration of the financial stability of industrial enterprises in the region in the next 4–5 years, the achievement of the Altman curve of the moderate risk zone (values Z = 1.46).

CONCLUSION

The paper presents the author's methodological approach to assessing the prospects of bankruptcy of enterprises in various industries, involving the use of multidimensional discriminant analysis of the dynamics of development not of individual enterprises, but of their totality, the calculation of individual threshold values for the correct interpretation of the results and taking into account the industry specifics of the territorial system.

The industrial complex of the Sverdlovsk region is currently located in a zone with

an increased probability of bankruptcy of enterprises. Enterprises in the food production, electrical equipment, chemical production and mining industries are in the most critical condition. Increased risks of loss of financial solvency are observed in the industries of metallurgical production, production of finished metal products, as well as other non-metallic mineral products, production and distribution of electricity, gas and water, which prevail in the industry structure of the region. These industries require state support in the implementation of industrial policy at the federal and regional levels.

The results obtained in the future will be used for regression analysis of internal and external factors in the formation of industry bankruptcy risks and the development of multivariate scenarios for changing its dynamics in the future.

ACKNOWLEDGMENTS

The research was supported by the grant of the Russian Science Foundation No. 24–28–00704 "Scenario modeling and forecasting of bankruptcy risks of industries in the Sverdlovsk region" (https://rscf.ru/project/24–28–00704/). Institute of Economics of the Ural Branch of RAS, Yekaterinburg, Russia.

REFERENCES

1. Fyodorov V. M., Grisko A. S. Predicative model of pre-empting crises at industrial enterprises of machine-building complex in the Omsk region on the basis of multiple discriminant analysis. *Rossiiskoe predprinimatel'stvo = Russian Journal of Entrepreneurship*. 2010;(1–1):66–70. (In Russ.)
2. Altman E. I. Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*. 1968;23(4):589–609. DOI: 10.1111/j.1540–6261.1968.tb00843.x
3. L'vova N. A. Financial diagnostics of Russian enterprises with the Altman's model application for developed and emerging markets. *Finansovaya analitika: problemy i resheniya = Financial Analytics: Science and Experience*. 2015;(7):37–45. (In Russ.).
4. Popov V. B., Kadyrov E. Sh. Analysis of models for predicting the probability of bankruptcy of enterprises. *Uchenye zapiski Tavricheskogo natsional'nogo universiteta im. V. I. Vernadskogo. Seriya: Ekonomika i upravlenie = Scientific Notes of the Tauride National University named after V. I. Vernadsky. Series: Economics and Management*. 2014;27(1):118–128. (In Russ.).
5. Beaver W. H. Financial ratios as predictors of failure. *Journal of Accounting Research*. 1966;4:71–111. DOI: 10.2307/2490171
6. Taffler R. J., Tisshaw H. Going, going, gone — four factors which predict. *Accountancy*. 1977;88(3):50–54.
7. Fedotova M. A. How to assess the financial stability of an enterprise. *Finansy = Finance*. 1995;(6):13–16. (In Russ.).
8. Zaitseva O. P. Anti-crisis management in a Russian company. *Sibirskaya finansovaya shkola = Siberian Financial School*. 1998;(11–12):66–73. (In Russ.).
9. Sharma R. K., Bhalla N. Insolvency prediction model of the Indian information technology companies using multiple discriminant analysis: The case of the Republic of India. In: India Finance Conference (Kolkata, December 19–21, 2019). Kolkata: Indian Finance Association; 2019.
10. Kopczyński P. Bankruptcy risk assessment of Polish listed companies using Asian multiple discriminant analysis models. *Zeszyty Teoretyczne Rachunkowości*. 2022;46(2):69–96. DOI: 10.5604/01.3001.0015.8810
11. Verma D., Raju S. Predicting corporate defaults using multiple discriminant analysis. *CASS Studies*. 2019;3(2):1–19. URL: https://onlinejournals-heb.pen-nic.in/cass/admin/freePDF/qwe23cmok7mgp2zf68tn.pdf

ABOUT THE AUTHORS

Ilya V. Naumov — Cand. Sci. (Econ.), Assoc. Prof., Head of the Laboratory for Modelling of Spatial Development of Territories, Institute of Economics of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia
https://orcid.org/0000-0002-2464-6266
naumov.iv@uiec.ru

Anna A. Bychkova — Junior Researcher of the Laboratory for Modelling of Spatial Development of Territories, Institute of Economics of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia
https://orcid.org/0000-0001-8676-5298
bychkova.aa@uiec.ru

Natalia L. Nikulina — Cand. Sci. (Econ.), Senior Researcher of the Laboratory for Modelling of Spatial Development of Territories, Institute of Economics of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia
https://orcid.org/0000-0002-6882-3172
Corresponding author:
nikulina.nl@uiec.ru

Vladislav M. Sedelnikov — Junior Researcher of the Laboratory for Modelling of Spatial Development of Territories, Institute of Economics of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia
https://orcid.org/0000-0003-0494-2647
sedelnikov.vm@uiec.ru

Author's declared contribution:
I.V. Naumov — problem statement, article concept development, development of methodological and methodological approaches, calculations, description of results, formation of research conclusions.
A.A. Bychkova — development of methodological approach, collection of statistical data, calculations, tabular and graphical presentation of results, description of results, formation of research conclusions.
N.L. Nikulina — theoretical literature review, collection of statistical data, formation of research conclusions.
V.M. Sedelnikov — collection of statistical data.

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 02.05.2024; revised on 02.06.2024 and accepted for publication on 27.06.2024.
The authors read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-193-202
UDC 336.051(045)
JEL G12, E43, E51, H63, K15

Economically Reasonable Interest Rate on Debt Obligation sin the Course of Economic Activity

A.V. Shchepot'ev
Tula State University, Russia, Tula

ABSTRACT

This paper is devoted to the issues of determining the upper and lower limits of an economically reasonable interest rate on debt obligations. The **purpose** of the study is to determine the boundaries of an economically reasonable interest rate on debt obligations, taking into account the main conditions of the loan relations: security, urgency, frequency of payments, availability (absence) measures of state support, etc. In the course of the study, such **methods** as content analysis of sources, regulatory regulation, and market analysis were used. The study is based on the analysis of the norms of the relationship between economic entities, taking into account the conditions for implementation of state support in socially significant areas of economic relations. In order to study the pay ability of debt obligations, the author analyzed the rules of tax legislation. It examined legal acts which revealed the facts of the use of terms of relationships other than those applied in the open market. Identified reasons for the existence of conditions of credit and borrowing relations, other than economically reasonable: interaction of affiliates, bonded terms of the transaction. The author discloses the concept of an "economically reasonable interest rate on debt obligations", which arose as a result of the inadmissibility (taking into account the rules of regulatory legal acts and established judicial practice) of the use of the term "market value" in relation to loan relations. The **results** demonstrated that the values of interest rates on debt obligations have an economically reasonable linkage (through the specified multiples of the key rate values). From the point of view of the interest rate on loan obligations, debt obligations are divided into corresponding magnified groups (debt obligations between affiliates; preferential debt liabilities; debts taking into account the degree of risk of the borrower and the security of borrowing resources). The author makes a **conclusion** about the revealed fundamental patterns in relation to economically reasonable interest rates on debt obligations, taking into account contractual terms between economic entities.

***Keywords*:** debt obligations; credit and loan relations; key rate; refinancing rate; interest rate; market relations; appraisal activity; forensic examination; bankruptcy; tax control; affiliated entities

For citation: **Shchepot'ev A.V. Economically Reasonable Interest Rate on Debt Obligation sin the Course of Economic Activity.** ***Finance: Theory and Practice.*** **2024;28(4):193-202. DOI: 10.26794/2587-5671-2024-28-4-193-202**

INTRODUCTION

Many business entities use credit sources of financing for their activities: loans from credit institutions (banks and NCOs); loans from microfinance organizations; loans from non-specialized entities (legal entities or individual entrepreneurs who do not specialize in lending; loans from participants (shareholders) or other affiliates). There is a huge variety of credit and borrowing relations: in form, subjects of the transaction, security, payment, etc. [1].

Credit and borrowing relations between business entities can be of a market nature, but there are situations when the terms of borrowed relations are more favorable than those in the open market (such conditions may be between affiliates) [2]. There are also situations in which the conditions for the provision of credit resources are liable for the borrower ("a transaction on extremely unfavorable terms, which the person was forced to make due to difficult circumstances than the other party took advantage of (bondage transaction)"), determined by such paragraph 3 of Art. 179 Civil Code of the Russian Federation [3].

The rate on credit and borrowing relations has a significant impact on the development of the economy in the world as a whole and in individual countries; lending conditions affect the investment activity of enterprises, investment mechanisms in capital investments and investments in securities [4, 5]. It should be noted that the formation of interest rates is influenced by various factors, for example, the global financial and economic crisis [6, 7], the COVID-19 pandemic [8]. In Russia, the size of interest rates was also influenced by sanctions against Russia by many economically developed countries of the world [9]. Inflation also plays an important role in the formation of interest rates, which in Russia can have different meanings from year to year. The high interest rate on credit and borrowing relations is one of the factors of stagnation of the country's economy [10–12]. It should be noted that in economically developed countries, where inflation is significantly lower than in Russia, base rates on credit relations are more stable [13]. Over the past one and a half to two years (since the beginning of 2022, which correlates with the SMO in Russia) and in economically developed countries, the LIBOR rate has increased, and with it the interest rates on credit and borrowing relations. But even taking into account increased inflation in economically developed countries over the past one and a half to two years, the interest rate on reliable loans, as a rule, does not exceed 5–6% per year. Of course, the interest rate on credit and debt relations due to its importance for macroeconomic processes in the country is subject to control and regulation at the state level [5, 14, 15].

Through the regulation of credit and borrowing relations, the state influences economic processes, seeking to improve the financial situation of economic entities and the population of the country [16]. That is why there is a need for an in-depth study of the conditions of interaction within the framework of credit and borrowing relations.

The study was carried out on the basis of an analysis of the norms of relations between economic entities, taking into account the conditions for the implementation of state support in socially significant spheres of the economy. In order to study the payment of debt obligations, the author also analysed the rules of tax legislation. Judicial acts are considered, which reveal the facts of the use of relationship conditions other than their use in the open market. The article analyses the reasons for the existence of terms of credit and borrowing relations other than economically justified ones: interaction of affiliated persons, bonded terms of the transaction.

The rates on credit and borrowing relations, which are offered to potential borrowers for economic activities by specialized credit and borrowing organizations (banks, entrepreneurship support funds, etc.) have also been analyzed. The author revealed that the trends in interest rates on credit and borrowed

funds are correlated with the limits of the rates defined in this study. At the same time, when the key rate changes in the appropriate proportion, the rates on credit and borrowing relations also change.

The purpose of the study is to determine the upper and lower limits of the economically justified interest rate on debt obligations, taking into account the main conditions of credit and borrowing relations: security, urgency, frequency of payments, availability (absence) of state support measures, etc.

To achieve this goal, the authors solve the following **tasks** in the study**:**

- to determine the main criteria and conditions of credit and borrowing relations affecting the formation of the interest rate on credit and borrowing relations;
- to analyze the reasons for the existence of conditions of credit and borrowing relations, different from economically justified ones: interactions of affiliated persons, edged terms of the transaction;
- to identify the main boundaries of interest rates, taking into account the contractual terms of debt obligations between economic entities.

RESEARCH PART

Analysis of the compliance of the conditions for obtaining debt obligations with the conditions of open market relations may be relevant in the following cases.

1. When carrying out tax control or procedures to prepare an economic entity for a tax audit (by an auditor, an internal or independent auditor, etc.). The procedure for calculating interest on debt obligations (when calculating the income tax base) is defined in Art. 269 Tax Code of the Russian Federation. Similar principles of tax control are also implemented in respect of debt obligations for entities applying the Simplified Taxation System (Chapter 26.2 of the Tax Code of the Russian Federation). At the same time, tax legislation pays attention to tax control in the interaction of interdependent (affiliated) persons (section V.1 of the Tax Code of the Russian Federation). At the same time, the norms of the Russian current legislation provide for the possibility of providing interest-free borrowed funds. However, the tax authorities may consider an interest-free loan as a potential (in terms of taxation) income for the lender. The lender's income under the interest-free loan agreement can be determined in the amount of interest that would have been received on comparable terms at an economically reasonable rate (see the letter of the Ministry of Finance of Russia from 27.05.2016 No. 03–01–18/30778).

2. When analyzing transactions during the bankruptcy procedure. The debt obligations of the bankrupt debtor (in case of non-compliance with their market conditions) may be reclassified by the court into other (not credit and borrowed) relations. The issuance of a participant's loan to an established (dependent) company does not indicate corporate relations, but taking into account the real circumstances of the case, the court has the right to reclassify the loan relations into relations regarding the increase in the authorized capital [recapitalization of the subsidiary (dependent) company]. This possibility is due to the current legislation of paragraph 2 of Art. 170 of the Civil Code of the Russian Federation or according to the rules on circumvention of the law [paragraph 1 of Art. 10 of the Civil Code of the Russian Federation, para. 8 of Art. 2 of the Federal Law of 26.10.2002 No.127 "On Insolvency (Bankruptcy)"]. The relevant legal position is specified in the ruling of the Supreme Court of the Russian Federation from 06.07.2017 No. 308-ES 17–1556.

3. If signs of deliberate bankruptcy are revealed. The use of borrowed funds with an increased interest rate can be used to withdraw assets through affiliates or "one-day" firms.

4. When bondered transactions are invalidated in court. According to Art. 179 of the Civil Code of the Russian Federation provides for challenging transactions if the borrower has received debt obligations on extremely unfavorable terms.

5. When implementing financial and analytical procedures necessary to make various management decisions related to business reorganization, obtaining additional credit funds or property in leasing, when selling a business, etc.

6. When exercising control functions by the state, including for compliance with antitrust legislation, determining the relevance and necessity of implementing state support measures for socially important sectors of the economy.

7. In the course of the activities of internal auditors, audit commissions, independent auditors carrying out appropriate audits of economic activities of organizations.

The importance of analyzing the compliance of the terms of credit and borrowing relations with the market is very high. Based on the scientific turnover, the established practice of business turnover and the norms of the current legislation, the terminology "market interest rate on credit and loan relations" is not provided. It should be noted that the scientific literature [9], the established judicial practice (see, for example: Resolution of the Praesidium of the Supreme Arbitration Court of the Russian Federation from 03.08.2004 No. 3009/04, Resolutions of the Federal Antimonopoly Service of the North-Western District from 14.12.2006 No. A66–6512/2006 and the Far Eastern District from 24.01.2007, 17.01.2007 No. F03-A73/06–2/5259) and explanations of the authorities (see, for example: letters of the Ministry of Finance of Russia from 09.08.2005 No. 03–03–04/2/44, from 14.03.2007 No. 03–02–07/2–44, from 12.04.2007 No. 03–02–07/1–171) the concept of "market conditions" regarding the interest rate on credit and borrowed relations does not apply. This is due to a number of reasons.

The bet itself is one of the elements (important, but not the only one) in such a relationship. Interest on debt obligations is the borrower's payment to the lender for the use of funds or other things for a certain period of time.

The interest rate on debt obligations is set taking into account the following conditions:

- the availability of protective measures for the repayment of credit and borrowed funds, including through collateral;
- the level of financial stability of the borrower, including the high or low probability of the borrower's bankruptcy;
- the amount (size) of the loan (credit, loan), taking into account the scale effect;
- the term of provision of credit and borrowed funds;
- the frequency of interest accrual and cancellation (monthly, quarterly, once a year, at the end of the term, etc.);
- the frequency of repayment of the body of the provided credit and borrowed funds;
- the ability to control the intended use of borrowed funds, monitor the financial condition of the borrower before repayment of the debt, etc.;
- the availability of targeted state (regional, local) targeted programs to support socially important areas of activity through the provision of borrowed resources on preferential terms (for example: targeted programs to support agriculture, small businesses, export-oriented industries, IT entities, etc.)
- the amount of sanctions for improper fulfillment of obligations under the contract;
- other conditions.

The analysis of various conditions and factors in the formation of credit and borrowing relations has led to the creation of various tools for determining interest rates on credit and borrowing relations [17–19]. When developing and implementing tools for setting the interest rate on credit and borrowing relations, specialists take into account the basic criteria and conditions for the provision of debt obligations, trying to take into account all possible risks when determining the rate. For the unification and uniformity of interest rate formation, specialized credit and borrowing organizations develop internal documents regulating the procedure for setting interest rates [20].

The inadmissibility of the use of the term "market conditions" in relation to the interest rate on credit and borrowing relations has led to the expediency of introducing the concept of "economically justified interest rate on credit and borrowing relations", which can be perceived as a kind of economic analogue of the market value of the interest rate on credit and borrowed relations.

Economically reasonable interest rate on credit and borrowing relations is the most likely interest rate at which cash (or other property that can be provided on borrowed principles) can be provided taking into account the main essential conditions [(Availability (absence) of interim measures for the return of credit and borrowed funds, the level of financial stability of the borrower, the amount of the loan (credit, loan), the term of provision of credit and borrowed funds, the frequency of accrual and repayment of interest, the frequency of the repayment of the body of the provided credit and borrowed funds itself, the amount of sanctions for improper performance of contractual relations, the possibility (impossibility) of controlling the targeted use of credit and borrowed funds, the possibility (impossibility) of monitoring the financial condition of the borrower before repayment of the debt and other conditions] on the principles of urgency, payment, return on the open market in a competitive environment, when the parties to the transaction act reasonably, with all the necessary information, and the terms of the transaction do not reflect any extraordinary circumstances, i.e. when:

- one of the parties to the transaction is not obliged to provide credit and borrowed funds, and the other party is not obliged to accept credit and borrowed funds;
- the parties to the transaction are well aware of the subject of the transaction and act in their own interests;
- information on the terms of the transaction is presented on the open market;
- the interest rate on credit and loan relations is a reasonable reward for the use of funds (or other property);
- there was no coercion to make a transaction against the parties to the transaction from any party;
- payment at the interest rate on credit and borrowing relations is expressed in cash [2].

It should be noted that in some cases, the parties on debt obligations may be able to carry out a transaction on terms that are impossible for other entities, for example: borrowed relations in a credit cooperative (deals with shareholders of the cooperative), borrowed relations of certain categories of economic entities under certain state target programs to support various categories of economic entities [deals on preferential terms or with compensation (subsidy) from budget funds of interest (in whole or in part) on borrowed funds].

But let's go back to the terms of credit and loan relations for entities operating in the open market.

The borrower is looking for borrowing conditions (receiving a loan) with a minimum (if possible, other things being equal) rate, and the lender is looking for borrowing conditions (loan) with the maximum (if possible, other things being equal) rate.

In fact, there is another economic restriction for the lender: it is impractical and ineffective to provide own funds in a loan at a rate below the inflation rate (consumer price index), as there is (in case of inflation) impairment of money (asset): after the return of the loan with interest, the amount of which is lower than the inflation rate, the lender will not only not receive additional income, but will also have an asset less (in terms of its purchasing power) than before the loan.

Accordingly, the loan rate below the inflation rate in the country cannot be economically feasible. An exception may be in the following cases:

- the entity providing credit and borrowed funds has a source of external financing (borrowed funds), the payment (expenditure) of which is lower than the rate of funds issued to the borrower;

- the entity providing credit and borrowed funds participates in state target programs aimed at supporting certain categories of economic entities (agriculture, small or medium-sized businesses, etc.) and receives targeted public funds for the issuance of credit and borrowed funds on preferential terms (or receives state subsidies for compensation for preferential lending);
- the entity providing credit and borrowed funds is a non-profit organization and has the right to provide borrowed funds (for example: credit cooperatives, entrepreneurship support funds, etc.).

Let's study the definition of reasonable boundaries (corridor) of the economically justified interest rate on debt relations.

The refinancing rate (lending rate) of the Central Bank of the Russian Federation can be considered as a basis in credit and borrowing relations. This conclusion can be reached by analyzing Art. 317.1 and 809 of the Civil Code of the Russian Federation.

According to paragraph 1 of Art. 317.1 of the Civil Code of the Russian Federation "Interest on the monetary obligation" "in cases where the law or contract provides that interest is accrued on the amount of the monetary obligation for the period of use of funds, the amount of interest is determined by the key rate of the Bank of Russia (legal interest) in force in the relevant periods, unless another amount of interest is established by law or contract".

A similar norm in its essence is specified in paragraph 1 of Art. 809 of the Civil Code of the Russian Federation "unless otherwise provided by law or loan agreement, the lender has the right to receive interest from the borrower for the use of the loan in the amount and in the manner specified in the contract. If there is no condition in the contract on the amount of interest for the use of the loan, their amount is determined by the key rate of the Bank of Russia in force during the relevant periods".

Let's consider the legal and economic essence of the Bank of Russia interest rate.

Refinancing interest rate (counting rate) — the interest rate when the Central Bank provides loans to commercial banks. It is also used for taxation and calculation of penalties and fines. It was introduced on 1 January 1992.

The key rate is the interest rate on the main operations of the Bank of Russia to regulate the liquidity of the banking sector. It is the main indicator of monetary policy. It was introduced by the Bank of Russia on 13 September 2013.

"The key rate of the Bank of Russia affects market interest rates, on which the tendency of economic entities to consume or save depends" [see "The main directions of the unified state monetary policy for 2022 and the period 2023 and 2024" (approved by Bank of Russia)].

From 1 January 2016, the Bank of Russia does not set an independent value of the refinancing rate of the Bank of Russia.

In practice, the "refinancing rate (counting rate)" and "key rate" are synonymous terms. This study does not make a fundamental distinction between these concepts.

Next, we will consider the principle of forming a rate on credit and borrowing relations. The Central Bank (Bank of Russia) credits commercial banks at a key rate. Commercial banks, having received the appropriate funds, increase the rate on a certain margin, which should cover the bank's expenses (including bank management, ensuring current operations, etc.) and bring profit.

The entity providing credit and borrowed funds may have cheaper sources of borrowed funds than the key rate, but from the point of view of the theory, the interest rate on borrowed funds is formed taking into account "basically".

Naturally, the rate on the provided credit and borrowed funds should cover the risk of non-repayment of the provided credit and borrowed resources.

Taking into account the above for more risky entities, in the absence (or low level) of collateral for the return of credit and borrowed resources, a higher rate is established.

It should be noted that from a legal point of view, the loan [issued by a credit institution (bank or non-bank credit organization)] and the loan (issued by an economic entity in the course of economic activity) will have different legal forms, but from an economic point of view, debt obligations (for the recipient of credit and borrowed funds) will have a similar (from an economic point of view) basis: the principles of payment, urgency and repayment.

To analyze the rates on debt obligations, we will analyze the regulatory framework, as well as statistics on interest rates in the credit market.

It should be noted that in certain regulatory and legal documents regulating the relevant spheres of economic activity, which are of high socio-economic importance for society, there are certain restrictions on the size of interest rates, for which it is permissible to attract credit and borrowed resources.

Let's look at the examples.

According to p.p.e.p. 3 Resolutions of the Government of the Russian Federation from 29.12.2011 No. 1178 "On pricing in the field of regulated prices (tariffs) in the electric power industry" regarding the maximum interest rate on debt obligations, it is stated that "the amount of interest included in uncontrolled expenses is accepted equal to the rate under the loan agreement or loan agreement, but not higher than the key rate of the Central Bank of the Russian Federation, increased by 4% points", i.e. "the amount of interest included in the uncontrolled expenses is accepted" in the amount of not more than 1.5 key rate.

Here and further, the author recalculated the absolute percentage points specified in the regulatory document into multiple sizes (shares, rounded to one decimal place after the decimal point) of the key rates (refinancing rates).

The Resolution of the Government of the Russian Federation from 22.10.2012 No. 1075 "On Pricing in the Field of Heat Supply" borrowed funds "at an interest rate not exceeding 5% per year" as a preferential rate on debt obligations (note: 0.6 key rate). At the same time, according to the resolution of the Government of the Russian Federation from 25.08.2017 No. 997 "On the implementation of financial support measures at the expense of the state corporation — the Fund for Assistance to the Reform of Housing and Communal Services and Amendments to Certain Acts of the Government of the Russian Federation", the maximum value of interest on borrowed funds is indicated the amount of "actually incurred expenses not exceeding the amount equal to the refinancing rate of the Central Bank of the Russian Federation, increased by 4 percentage points", i.e. not more than 1.5 key rate.

The Decree of the Government of the Russian Federation from 13.05.2013 No. 406 "On state regulation of tariffs in the field of water supply and sanitation" as a preferential rate on debt obligations, borrowed funds are specified "at an interest rate not exceeding 5% per year" (note: 0.5 key rate), and the limit value of the interest rate "in the amount calculated on the basis of the interest rate, equal to the refinancing rate of the Central Bank of the Russian Federation, effective on the date of attraction of such funds (conclusion of the loan agreement, loan agreement), increased by 1.5 times, but not less than 4 percentage points" (note of the car: 1.5 key rate).

The Decree of the Government of the Russian Federation from 30.05.2016 No. 484 "On pricing in the field of solid municipal waste management" states that "expenses related to the maintenance of borrowed funds are taken into account in the amount calculated on the basis of the interest rate equal to the key rate of the Central Bank of the Russian Federation in force on the date of attraction of such funds (conclusion of the loan agreement, loan agreement), increased by 4 percentage points", i.e. not more than 1.4 key rate.

According to the order of the Ministry of Economic Development of Russia from 26.03.2021 No. 142 "On approval of requirements for the implementation of measures carried out by the subjects of the

Russian Federation, whose budgets are provided with subsidies for state support of small and medium-sized businesses, as well as individuals applying the special tax regime "Professional Income Tax" in the constituent entities of the Russian Federation aimed at achieving the goals, indicators and results of regional projects that ensure the achievement of the goals, indicators and results of federal projects included in the national project "Small and medium-sized enterprises and support of individual entrepreneurial initiative", and requirements for organizations that form the infrastructure of support for small and medium-sized businesses" (registered with the Ministry of Justice of Russia from 20.05.2021 No. 63543)" depending on the category of borrowers to whom microloan is granted, a differentiated approach is applied to determining the interest rate for the use of microloan":

- not more than 0.5 key rate in respect of borrowed funds provided to small and medium-sized businesses "registered and operating on the territory of a mono-profile municipality, when they implement priority projects";
- not more than the key rate in respect of borrowed funds provided to small and medium-sized businesses in the implementation of their priority projects;
- not more than 2–2.5 key rate in respect of borrowed funds provided to small and medium-sized businesses, including unsecured borrowed funds [in the absence of collateral and/or surety (guarantee) of the credit assistance fund (guarantee fund, surety fund)].

It should be noted that in some regulatory documents regulating the limit (maximum) interest rate on credit and borrowed resources, there is a reference to the norms of tax legislation. And the restrictions provided for under the tax legislation regarding the interest rate on credit and borrowing relations will also reasonably illustrate the economically reasonable rate on credit and borrowing relations. Let's consider the limit norms for including interest on borrowed funds under tax legislation.

This issue is devoted to Art. 269 of the Tax Cod of the Russian Federation. It refers to the inclusion of the average interest value in the expenditure, and in the absence of an average value, interest rate limits are used. It should be noted that the norms of tax legislation (on this issue) are periodically changed and had (in different periods of time) restrictions on the maximum amount of inclusion of interest on debt obligations in the amount of not more than 1.25 and 1.8 of the key rate.

Analysis of deposit rates on savings of individuals (from the point of view of debt obligations of banks) allows us to conclude that for term debt obligations, the economically justified interest rate can be considered a range from 0.5 to 1.5 of the size of the key rate (taking into account the norms of the Federal Tax Service of Russia from 15.08.2012 No. ED-4–3/13520@ "On personal income tax"). At the same time, in respect of deposits of individuals (lenders in respect of the analyzed debt obligations) for a certain amount, the state acts as a guarantor of the return of these funds through the deposit insurance system.

The validity of the findings is clearly illustrated by the change in interest rates (within the described limits) with a significant change in the size of the key rate in 2022. The jump in the size of the key rate in March 2022 from 9.5% per year to 20% [with a further reduction (from the end of 2022 to the first half of 2023, the key rate was 7.5% per year, which is proportional to the key rate before the beginning of the SMO)] led to a commensurate increase in rates on credit-borrow (and deposit) relations.

CONCLUSION

Summing up the results of the study, the author made the following conclusions about the limits of the economically justified interest rate on debt obligations:

- interest-free debt obligations are possible among affiliates;
- preferential interest rates on debt obligations in the amount of about 0.5 of the

key rate (or even lower) can be considered preferential;

- 0.5–1 key rate can be considered an economically reasonable interest rate on debt obligations in some cases;
- 1–1.5 of the key rate should be considered an economically reasonable interest rate on debt obligations;
- up to 2.5 of the key rate can be considered an economically reasonable interest rate on debt obligations in respect of medium-risk unsecured borrowed relations;
- more than 2.5 of the key rate may be an economically reasonable interest rate on debt obligations on high-risk debt relations against financially unstable entities.

The results obtained in the course of the studies regarding the values of interest rates on debt obligations have an economically justified link (through the specified multiples of the values of the key rate) to the key interest rate, which will allow to analyze borrowed relations not only for the current date, but also for relations in the past and in the future, using the key rate effective on the corresponding date for analysis.

The use of the values of the economically justified interest rate on debt obligations given in the study will allow to adequately and economically competently assess the terms of debt obligations in the course of state control functions in the field of taxation, compliance with the norms of antimonopoly legislation and the selection of subjects for the provision of state support measures, in judicial proceedings during the consideration of bankruptcy cases or corporate disputes, as well as in the course of management decisions.

REFERENCES

1. Belotserkovsky V.I., Kandaurov D.V., Korneev M.V., Shchepot'ev A.V. Commercial and non-commercial credit and loan relations. Tula: Tula State University Publ.; 2003. 76 p. (In Russ.).
2. Shchepot'ev A.V. Peculiarities of the analysis and evaluation of loan relationships with related persons. *Bankovskoe pravo = Banking Law*. 2021;(3):32–38. (In Russ.). DOI: 10.18572/1812–3945–2021–3–32–38
3. Shestakova E.V. Principle of freedom of contract and onerous transactions. *Yurist = Jurist*. 2015;(4):17–22. (In Russ.).
4. Makarenko Yu.G. Analysis of the regulatory impact of financial and credit policy on investments in Russia. *Ekonomika. Pravo. Pechat'. Vestnik KSEI*. 2015;(1):250–258. (In Russ.).
5. Semenkova E.V., Ibrahim M.A., Kalinkina K.E., Al Saady W. Influence of new factors on the Russian stock market. In: Science and innovation 2021: Development directions and priorities (Melbourne, March 14–31, 2021). Pt. 1. Melbourne: AUS Publishers; 2021:8–18. DOI: 10.34660/INF.2021.33.18.001
6. Galiyeva G.F., Imamova L.M., Saitov R.M. The impact of the financial and economic crisis on lending. *Global'nyi nauchnyi potentsial = Global Scientific Potential*. 2017;(3):51–54. (In Russ.).
7. Flood R.P., Marion N.P. A model of the joint distribution of banking and currency crises. *Journal of International Money and Finance*. 2004;23(6):841–865. DOI: 10.1016/j.jimonfin.2004.05.005
8. Karahan Ö., Bayır M. The effects of monetary policies on foreign direct investment inflows in emerging economies: Some policy implications for post-COVID-19. *Future Business Journal*. 2022;8(1):39. DOI: 10.1186/s43093–022–00152–6
9. Sedova V.D., Voronina O.P. Monetary policy of the Central Bank in the context of the current sanctions situation. In: Kuz'mina V.M., ed. Problems of development of modern society. Proc. 8th All-Russ. nat. sci.-pract. conf. (Kursk, January 19–20, 2023). In 4 vols. Vol. 1. Kursk: Southwestern State University; 2023:354–356. (In Russ.). DOI: 10.47581/2022/ML-72/Sedova.01
10. Aukutsionek S. Investment behavior of enterprises in 2021–2022. *Rossiiskii ekonomicheskii barometr = Russian Economic Barometer*. 2022;(3):3–12. (In Russ.). DOI: 10.20542/reb.rus-2022–3–3–12
11. Borodovaya Ya.A., Khramchenko A.A. Modern trends in the monetary sphere in Russia. In: Lipchiu N.V., Khramchenko A.A., comp. Transformation of the Russian economy: Management levers and development of

regional economic systems. Proc. Int. sci.-pract. conf. of students, postgraduates and teachers of the faculty "Finance and Credit" of the Kuban State Agrarian University (Krasnodar, September 23–24, 2022). Krasnodar: Kuban State Agrarian University; 2023:69–74. (In Russ.).
12. Vîntu D. The relationship between inflation, interest rate, unemployment and economic growth. Munich Personal RePEc Archive. MPRA Paper. 2022;(112931). URL: https://mpra.ub.uni-muenchen.de/112931/2/MPRA_paper_112931.pdf
13. Patron P.A. Credit pricing: LIBOR reform. *Vestnik Moskovskogo universiteta. Seriya 6: Ekonomika = Moscow University Economics Bulletin*. 2014;(1):74–84. (In Russ.).
14. Fedorova E.A., Oleynik M.A. The role of the state in the development process of commercial bank lending of innovative projects. *Izvestiya Tul'skogo gosudarstvennogo universiteta. Ekonomicheskie i yuridicheskie nauki = News of the Tula State University. Economic and Legal Sciences*. 2016;(1–1):263–270. (In Russ.).
15. Iefymenko T.I., Dunaev B.B., Lyubich A.A. Model for regulating the reproduction process in the economy. *Cybernetics and Systems Analysis*. 2022;58(5):727–739. DOI: 10.1007/s10559–022–00506–6
16. Dunaev B.B. Banking regulation of macroeconomic processes. *Cybernetics and Systems Analysis*. 2021;57(4):108–123. DOI: 10.1007/s10559–021–00334–0
17. Gorelaya N. Evaluation of the impact of factors on loan pricing. *Korporativnye finansy = Journal of Corporate Finance Research*. 2016;10(1):59–76. (In Russ.). DOI: 10.17323/j.jcfr.2073–0438.10.1.2016.59–76
18. Romanenko R.V. The formula of the full cost of the loan. In: Innovative economics and management: Methods and technologies. Proc. 6th Int. sci.-pract. conf. (Moscow, October 26–27, 2021). Moscow: Lomonosov Moscow State University; 2021:238–244. (In Russ.).
19. Fedorova T.A., Zaitsev O.A. Calculation of compensation for lost profits in venture lending. *Finansy i kredit = Finance and Credit*. 2008;(9):17–21. (In Russ.).
20. Belotserkovsky V.I., Shchepot'ev A.V. Loan and savings policy of mutual financial assistance credit societies. Tula: Tula State University Publ.; 2003. 60 p. (In Russ.).

ABOUT THE AUTHOR

Alexander V. Shchepot'ev — Cand. Sci. (Econ.), Assoc. Prof., Department of Finance and Management, Tula State University, Russia, Tula
https://orcid.org/0000-0003-3451-2947
shepotevsv@mail.ru

Conflicts of interest statement: the author has no conflicts of interest to declare.

The article was submitted on 02.05.2023; revised on 02.06.2023 and accepted for publication on 27.06.2023.
The author read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-203-217
UDC 330.43.338.1.338.2(045)
JEL E20, E31, O11, O41

Macrostructural Analysis of the Dynamics of the Two-Sector Economy

O.S. Sukharev[a], E.N. Voronchikhina[b]
[a] Institute of Economics, Russian Academy of Sciences, Moscow, Russia;
[b] Perm State National Research University, Perm, Russia

ABSTRACT

The article is devoted to an empirical demonstration of the application of macrostructural analysis of the dynamics of the Russian economy, represented by the capital goods and consumer goods sectors, including the intangible sphere. The **purpose** of the study is the formation of an algorithm for macrostructural analysis of the two-sector Russian economy with the identification of the main patterns and relationships of their joint dynamics — contribution to the overall growth rate, price dynamics, and the definition of a model for further development. The **methodology** consists of the theory of economic growth, structural analysis, empirical and regression methods for studying the relationships of relevant parameters. The main **result** of the study is the formation of an algorithm for macrostructural analysis and its application to the Russian economy at the specified time interval with the highlighting of the main characteristics of the structural dynamics represented by the capital goods and consumer goods sectors. The relationship between these sectors, mutual determination determines not only the current model of development in Russia, but provide opportunities for future economic growth, since the creation of investment and consumer products form the foundation of a growing economy. The study found that the predominance of the consumer goods sector in the Russian GDP structure not only determined the current dynamics, but also the potential for the growth rate of the capital goods sector, as well as the level of its efficiency, which affects the dynamics of prices in the sector. The growth rates of the sectors influenced each other, but the resulting structural change, in the form of a decrease in the share of the capital goods sector, was accompanied by both a reduction and an increase in overall inflation. And any impulse of acceleration of capital goods led to greater rise in sectoral prices than equivalent accelerations in the consumer goods sector. Thus, the proposed algorithm of macrostructural analysis allowed us to reveal the specifics of the structural dynamics of the Russian economy, revealing the determinants of non-monetary inflation. The perspective of the study is to assess the contribution of sectoral dynamics to a higher price level and the selection of policy instruments that affect the structure, ensuring both its growth and qualitative transformation in accordance with development goals.

Keywords: macrostructural analysis; capital goods; consumer goods; two-sector economy; the condition of economic growth; industrialization policy; inflation; the contribution of sectors to the GDP growth rate

For citation: **Sukharev O.S., Voronchikhina E.N. Macrostructural analysis of the dynamics of the two-sector economy. *Finance: Theory and Practice*. 2024;28(4):203-217. (In Russ.). DOI: 10.26794/2587-5671-2024-28-4-203-217**

INTRODUCTION

The study of structural dynamics in modern economic literature has been given a lot of space, ranging from the structure of labour markets [1, 2], structural relations and industrial policy [3], structural changes and growth [4–10], changes in finances, investments, inflation and their impact on growth [11–16], with an assessment of the integration and diversification of economic activities [17, 18] and general aspects of macroeconomic influences or demographic changes, wealth structure, inequality, income, etc.[19–21].

At the same time, some studies rightly, in our opinion, note a very low level of incorporation of structural changes in the theory of economic growth [22] and more broadly in economic theory, despite the development of methods of structural analysis, including the macroeconomic aspect of its application [23–25].

Particularly noteworthy is the low degree of validity of the goals of economic growth and its structural modernization, which can accelerate or slow down growth, up to the provocation of the crisis. The best scenario when GDP growth occurs due to qualitative improvements in the economy, transformation of its structure, which creates new sources of growth. For the Russian economy, this formulation of the problem is relevant, since high losses in past years due to deindustrialisation, accompanied by GDP growth, need to be eliminated and increased opportunities for the development of industrial sectors — high-tech industries [26].

The solution of such a problem requires the use of macrostructural analysis of sectoral dynamics with the formulation of the conditions for economic growth and its industrialization. Only should industrialization be limited exclusively to the spread of "Industry 4.0" [27], which includes the introduction of digital and related information technologies? Or is there a need for a wider technological re-equipment of the manufacturing sectors, including the creation of new activities in the field of means of production? The speed of the industrial process in relation to the rate of GDP growth of the country [28] and changes in the economic structure is of fundamental importance.

If in the Soviet period the approach from the position of two sectors — means of production and consumer goods — was popular, and there were official statistics on them, then currently such accounting is not maintained in Russia. This structural breakdown is not made, a study the dynamics and coherence of the development of these sectors, and their contribution to overall economic growth.

This allows us to formulate the purpose of this study: filling the gap in the field of application of macrostructural analysis, its algorithm ideation with the study of structural dynamics within the framework of the model of the two-sector economy of Russia (means of production and consumer goods). The methodology is made up of structural analysis — empirical and model (regression analysis) methods, as well as the theory of structural changes. To achieve this goal, two tasks must be solved. First, to expand the methodology for macrostructural analysis of the two-sector economy, showing the algorithm for studying its dynamics. Secondly, to determine the conditions for the growth of industrial development within the framework of the two-sector model of the Russian economy, giving a description of the dynamics by basic indicators and structural parameters.

Let's consider the consistent solution of these tasks.

RESEARCH METHODOLOGY. MACROSTRUCTURAL ANALYSIS OF THE TWO-SECTOR ECONOMY

Macrostructural analysis is a method of studying structural changes at the macro level of the economy, causal relationships of direct and inverse action between elements,

sectors, industries with the identification of mutual dynamics. It is the direction of structural analysis, which is a powerful way to study economic changes in order to correct economic policy measures, determine the impact of individual elements of the economic system on its overall dynamics [23, 24, 26].

The content of macrostructural analysis is expressed in the "cost-output" method of V.V. Leontiev [23], theories of multi-level economy Yu.V. Yaryomenko [24], theories of technological ways S. Yu. Glazyeva [26], theories of economic restructuring and industrial development [29], structural models of economic growth, as well as in empirical [16] and index representation [25].

The central point in the implementation of structural analysis for the study of the economy at the macro level is the allocation of large aggregates — sectors, industries, interconnected and determining each other's development. In this study, the Russian economy is represented as an object of study by two large sectors — means of production (investment goods) and consumer goods (consumer goods) plus the intangible sphere, which together give the country's gross domestic product. This structure of the economy in the form of a dichotomy allows to analyze not only the contribution of these sectors to the rate of economic growth of Russia, to see the relationship between sectors, but also to highlight the conditions for the implementation of the industrialization strategy, supporting a positive rate of economic growth. In addition, the connection between price dynamics in sectors and the possibility of increasing gross value added in them is of interest. By analyzing the dynamics of the means of production sector, it is possible to get an idea of how industrialization and investment in the development of this sector affect the economic growth of the country and the consumer goods sector. The allocation of sectors will be carried out according to Rosstat ICTEA, which is reflected in *Tables 1, 2*. The time interval from 2011 to 2022 inclusive is taken for the study. Calculations were made in 2016 prices (unless otherwise specified).

After the sectors are allocated, the further algorithm of empirical and model macrostructural analysis includes the following steps.

Step 1. Calculation of the value of two sectors and share in Russia's GDP, assessment of investments in fixed assets, parameters of profitability and risk of economic activity, contribution of sectors to the economic growth rate of the country.

Step 2. Empirical assessment of economic growth conditions within the framework of two-sector dynamics according to the obtained theoretical ratios.

Step 3. Empirical assessment of the current model of economic development in the coordinates of "growth mode — industrialization model".

Step 4. Determining the mutual dynamics of sectors, as well as the dynamics of prices and gross value added in the sector of means of production and consumer goods.

Step 5. Obtaining relevant research conclusions with recommendations for the ongoing economic policy of growth and technological modernization in Russia, which requires the creation of new means of production.

To implement the given algorithm, the implementation of which is necessary to achieve the set goal and objectives of the study, we will introduce some formal relations describing the two-sector dynamics.

Let the value of gross domestic product Y consist of two product values created in sectors: means of production(Y_s) and consumer goods (Y_p), so $Y = Y_s + Y_p$. The full labour force in the economy $L = L_s + L_p$ equal to the sum of those employed in the sector of means of production and consumer goods, respectively. Let's mark the shares of each sector in the country's GDP: $n_s = Y_s / Y$, $n_p = Y_p / Y$, $z = n_s / n_p$, and the z parameter actually sets the structure of the economy that changes

Table 1

Types of Activities Included in the Capital Goods Sector

ICTEA	Designation ICTEA
Section B	Mining
C 19	Production of coke and petroleum products
C 24	Metallurgical production
C 26	Production of computers, electronic and optical products
C 27	Production of electrical equipment
C 28	Production of machinery and equipment not included in other groups
C 29	Production of motor vehicles, trailers and semi-trailers
C 30	Production of other vehicles and equipment
C 33	Repair and installation of machinery and equipment
Section D	Electricity, gas and steam supply; air conditioning
Section E	Water supply; water disposal, organisation of waste collection and disposal, pollution elimination activities
Section F	Construction

Source: Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 12.04.2024).

over time. The growth rate of the sectors and the economy of Russia can be imagined as follows: $g_Y = (1 / Y)\, dY / dt$, $g_s = (1 / Y_s)\, dY_s / dt$, $g_p = (1 / Y_p)\, dY_p / dt$ [29].

Then it is not difficult to write down the condition of economic growth, taking into account the connection of sectors, by differentiating in time the value of the product represented by the sum of sectors $Y = Y_s + Y_p$. Taking into account the introduced designations, we will record the growth of gross product:

$$g_Y > 0 \text{ or } g_Y = g_s n_s + g_p n_p > 0 \qquad (1)$$

Hence, we get the structural condition for the economic growth of the economic system, consisting of two sectors:

$$g_s > -\frac{g_p}{z}. \qquad (2)$$

Expression (1) shows the contributions of each sector to the overall growth rate of the economy: $g_s\, n_s$ — sector of means of production, $g_p\, n_p$ — sectors of consumer goods. Thus, the contribution to the overall dynamics of economic development of each sector should be evaluated.

Since the structural dynamics is variable, both the structural parameter z and the values of growth rates are changing over time, reflecting the different contributions of sectors to the country's economic growth rate and significant structural transformations, determined, including by policy.

The dynamics of prices in each sector depends on the internal processes of development of the sector and is determined by the prices of another sector. This allows you to model such a connection and see the structural cut of inflation within the two-sector economic model. It is also not difficult to show that a situation where the wage growth rate exceeds the productivity growth rate is acceptable for economic growth. If we assume that wages in two sectors go to

Table 2

Types of Activities Included in the Consumer Goods and Intangible Sector

ICTEA	Designation ICTEA
Section A	Agriculture, forestry, hunting, fishing and fish farming
C (10–12)	Production of food, beverages, tobacco products
C (13–15)	Production of textiles, clothing, leather and leather products
C 16	Wood processing and production of wood and cork products, except furniture, production of straw products and weaving materials
C 17	Production of paper and paper products
C 18	Printing activities and copying of media
C 20	Production of chemicals and chemical products
C 21	Production of medicines and materials used for medical purposes
C 22	Production of rubber and plastic products
C 23	Production of other non-metallic mineral products
C 25	Production of finished metal products, except machinery and equipment
C (31, 32)	Production of furniture, other finished products
Section G	Wholesale and retail trade; repair of motor vehicles and motorcycles
Section H	Transportation and storage
Section I	Activities of hotels and catering establishments
Section J	Information and communication activities
Section K	Financial and insurance activities
Section L	Real estate operations activities
Section M	Professional, scientific and technical activities
Section N	Administrative activities and related additional services
O 84	State administration and military security, social security
P 85	Education
Section Q	Activities in the field of health and social services
Section R	Activities in the field of culture, sports, leisure and entertainment
Section S	Provision of other services
Section T	Activities of households as employers; undifferentiated activities of private households in the production of goods and services for their own consumption

Source: Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 12.04.2024).

the purchase of the produced product in the consumer goods sector, then $Y_p = w_s L_s + w_p L_p$, where w_s, w_p — the average salary in the sector (per employee), so that the product per number of employees gives the total wage in the sector. By entering productivity in the sector in the form of $A_s = Y_s / L_s$, $A_p = Y_p / L_p$, we get:

$$Y = Y_s \left(1 + \frac{w_s}{A_s} + \frac{1}{z} \frac{w_p}{A_p} \right). \quad (3)$$

Adopting the growth condition for the two-sector economic system $g_Y > 0$ and differentiating the expression (3) in time, it is not difficult to obtain a condition for the rate of wage growth in the means of production sector depending on the growth rate of labour productivity (g_{As}) in the sector of means of production and, accordingly, in the sector of consumer goods (g_{Ap}) [29].

Thus, the view of economic dynamics changes due to the applied macrostructural

analysis, because to varying degrees, taking into account the initial state of the sectors, they affect each other, their growth rates differ, the dynamics of prices in sectors are also differently related and affect the overall price dynamics and growth. In this regard, in the above theoretical formulation, it is even possible that the growth rate of productivity in the means of production sector is positive, but the rate of wage growth may be negative, while in the consumer sector wages will grow faster than productivity. In practice, as you know, wages are not sensitive to decrease, as there are institutional restrictions. Nevertheless, joint sectoral dynamics require macrostructural analysis, and the recommendations developed in the field of economic policy require an assessment of the conditions of structural dynamics and existing development regimes in order to be adequate to the goals set not only for quantitative growth, but also for its quality.

This allows us to move on to the consideration of the conditions of industrialization of the growing economy, that is, to assess what possible government measures and influences to change the structure in the required direction as the economy grows. The criterion for distinguishing development models is the dynamics and structure of sectors.

CONDITION OF INDUSTRIAL DEVELOPMENT IN A TWO-SECTOR ECONOMY

Fig. 1 shows the relationship between the growth rate of the sector of means of production and consumer goods. The structure of the economy is given by the parameter *z*, the growth condition by formulas (1) and (2). Depending on the existing structure, the ratio between growth rates and their impact on the overall economic dynamics will be different. The AB line of *Fig. 1* reflects the superiority in the share in the structure of GDP of the consumer goods sector, the EF line — the sector of means of production. In fact,

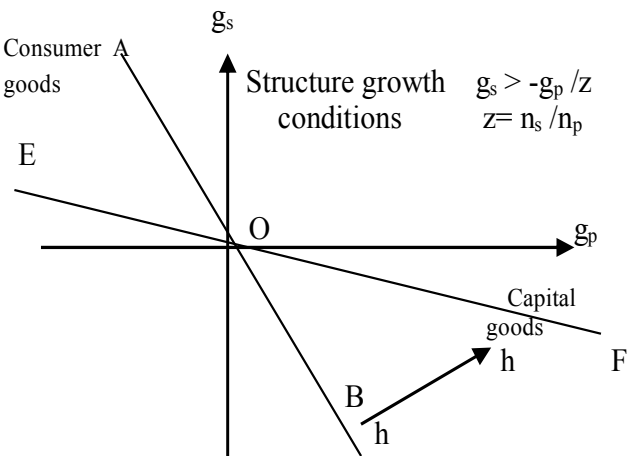


Fig. 1. **Growth Rates of the Capital Goods (g_s) and Consumer Goods (g_p) Sectors and the Economic Growth Condition**

Source: Author's calculations.

these lines embody the existing investment (EF) or consumer (AB) model of economic development. The transition from one model to another will mean a structural change and a general movement on the arrow hh (*Fig. 1*).

From the presented *Fig. 1*, linking the pace of development of economic sectors to ensure its growth within the framework of the existing and possibly changeable parameter of the *z* structure, it follows that with the growth of the consumer sector, if the industries of the means of production dominate (investment model of development) in the structure, a smaller amount of decline in this sector is allowed for the economy as a whole to grow. If the development model is consumer (the consumer goods sector is large), the decline in means of production can be large to ensure positive dynamics of the entire economy.

This theoretical result well explains the economic growth in Russia in the 2000s, when the growth rate was high with the deindustrialisation of the economy and the degradation of the sectors of the means of production. At the same time, the consumer goods sector has strengthened its position.

In the case when there is a decline in the consumer goods sector $g_p < 0$ (*Fig. 1*), then the

Table 3

Development Models and Growth Modes of Economic Sectors

Development model by structural parameter z	Growth mode by growth rate of consumer goods sector gp	
	$g_p > 0$	$g_p < 0$
Investment	Deindustrialisation is acceptable	Passive industrialization (the growth rate of the means of production is low)
Consumer	Deindustrialisation can be deep	Active industrialization (the growth rate of the means of production is high)

Source: Compiled by the authors according to *Fig. 1*.

growth rate of means of production should be higher for the consumer model than for the investment model, so that the economy as a whole grows.

Thus, it can be argued that a smaller amount of deindustrialisation is allowed in the investment model of development than in the consumer one. Therefore, the dismantling of knowledge-intensive industries and processing in the consumer development model is faster with the growth of the economy, which seems to cover this dismantling.

The best development option is the overall positive dynamics, covering both sectors of the country's economy. However, the structural task to determine which ratio of sectors is most favorable for development and prospects of the economy remains relevant and involves the assessment of the qualitative state, level of technology and connectivity of their functioning (dependence on imports, etc.).

If consumption is decreasing (the rate is negative), then to support growth in the case of the consumer model, accelerated industrialization will be needed, that is, a more intensive increase in the means of production than in the state of dominance of the means of production sector, the increase of which for the investment model with a decline in consumption may be less intensive. Models of economic development in accordance with the growth regime of the consumer goods sector are reflected in *Table 3*.

Table 1 shows that depending on the dynamics of the consumer goods sector, some de-industrialization or passive industrialization is possible so that the economy shows growth — with an investment model of development (the sector of means of production dominates the structure of GDP). If the consumer development model (the consumer goods sector dominates the structure of the gross product), then with its growth, deindustrialisation is allowed very significant, and in case of decline, active industrialization will be required. This explains, among other things, if there are other reasons, why the topic of industrialization returns to the agenda of the analytical debate during the crisis of the consumer Russian growth model.

In fact, *Fig. 1* and *Table 3* set the conditions for the industrial development of the two-sector economy — according to the allocated basic sectors (structure) and the associated dynamics. Of course, the dynamics itself cannot be the only criterion for the implementation of the industrialization process. Therefore, *Table 3* sets out a general approach useful in the field of macroeconomic policy planning, involving macrostructural analysis based on the growth rate criterion and the currently formed structure of economies.

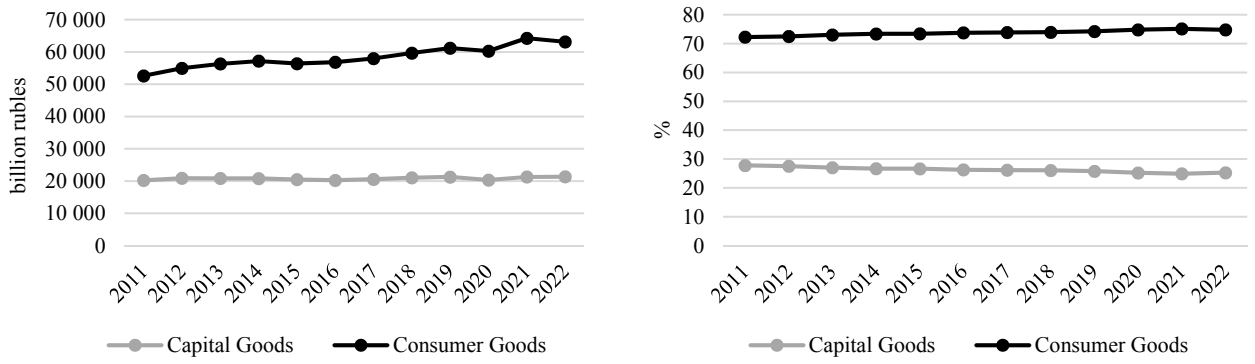


Fig 2. **Structure of Gross Value Added of the Capital Goods and Consumer Goods Sectors in Russia**

Source: Author's calculation according to Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 10.04.2024).

Note: On the Left — in 2016 prices, billion rubles, on the Right — shares in GDP, 2011–2022.

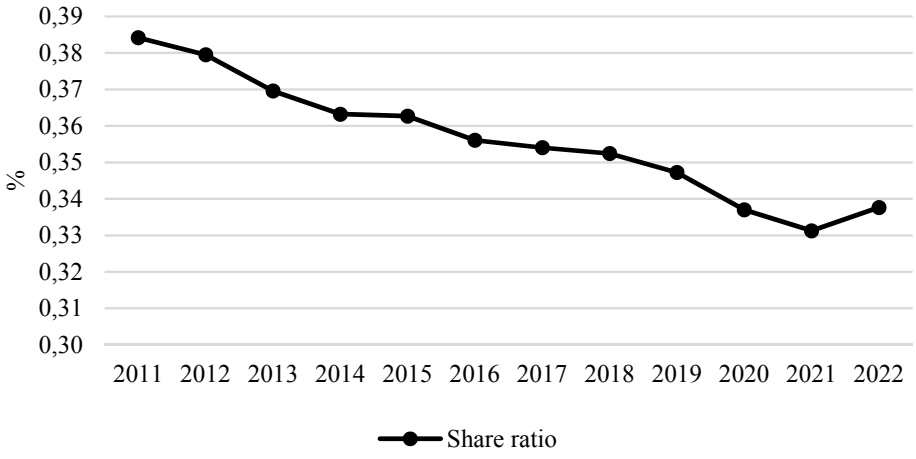


Fig. 3. **Dynamics of the Structural Parameter *z*(*t*) in the Russian Economy, 2011–2022**

Source: Rosstat. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 10.04.2024).

Further, focussing on the above algorithm and the introduced condition of industrial growth, we will analyze the dynamics of the sectors of means of production and consumer goods (including the intangible sphere) of the Russian economy during the 2011–2022.

DYNAMICS OF THE SECTORS OF MEANS OF PRODUCTION AND CONSUMER GOODS IN RUSSIA

The current structure of the sectors of means of production and consumer goods in Russia in the period 2011–2022 is reflected in *Fig. 2*.

Fig. 2 gives a clear idea that the gross added value of the sector "consumption items and intangible sphere" is increasing in real 2016 prices, and the share of this sector in the structure of the Russian economy is increasing with a decrease in the share of the sector of means of production.

Investments in fixed assets of the sectors gave such a structural one, changing in 2011–2022: from about 32 to 38% for the sector of means of production, and 62–68% for the sector of consumer goods of the total investment in fixed assets. Moreover, for

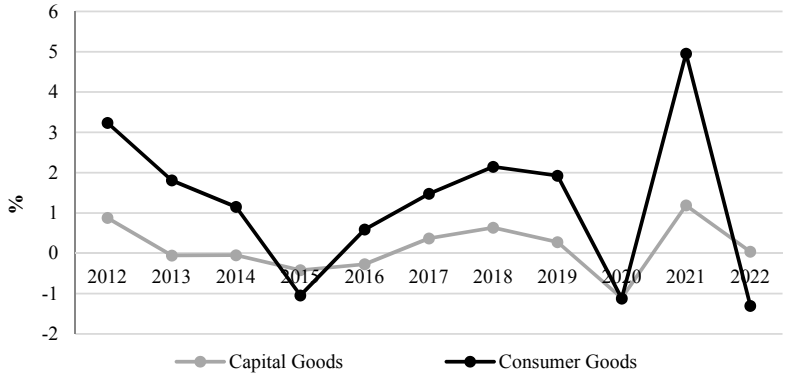


Fig. 4. **Contribution of the Capital Goods and Consumer Goods Sectors to the Growth Rate of Russia's GDP, 2012–2022**

Source: Author's calculation according to Rosstat data. URL: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/#, в ценах 2016 г. (accessed on 10.04.2024).

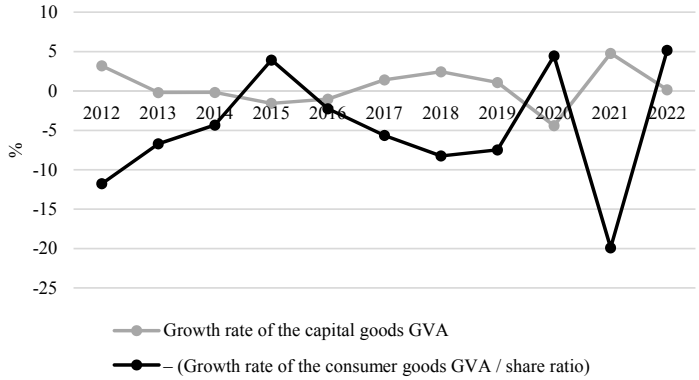


Fig. 5. **Condition of Economic Growth, % 2012–2022**

Source: Author's calculation according to Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 10.04.2024).

the consumer goods sector, this share first decreased, then increased to the previous value. For the sector of means of production — on the contrary: first increased, then decreased to the previous value by 2022. It should be noted that in terms of investment in fixed assets in 2016 prices, their volume in the consumer goods sector exceeded the same indicator in the sector of means of production from 1.5 to 2 times.

The change in the structural parameter *z* reflects *Fig. 3*, which confirms the transformation of the structure of the Russian economy towards the sector of consumer goods and the intangible sphere when the sector of means of production is compressed. Only in 2022, the share of the sector of means of production obviously increased due to significant injections of resources and active import substitution policy in Russia.

At the 2011–2022 time interval under consideration, the profit gap in 2016 prices in favor of the consumer sector is growing, so that by 2021 it becomes twofold. Wages in 2016 prices are consistently higher in the sector of means of production, the excess is on average 15–20%. The level of profitability of sold goods, services of the means of production sector exceeds on average this indicator of the consumer goods sector by 1.5–2 times until 2017, where profitability is compared in the region of 10–12%, and further until 2022 the profitability of the consumer goods sector is higher than in the sector of means of production. In 2022, the gap is becoming the largest: the consumer goods

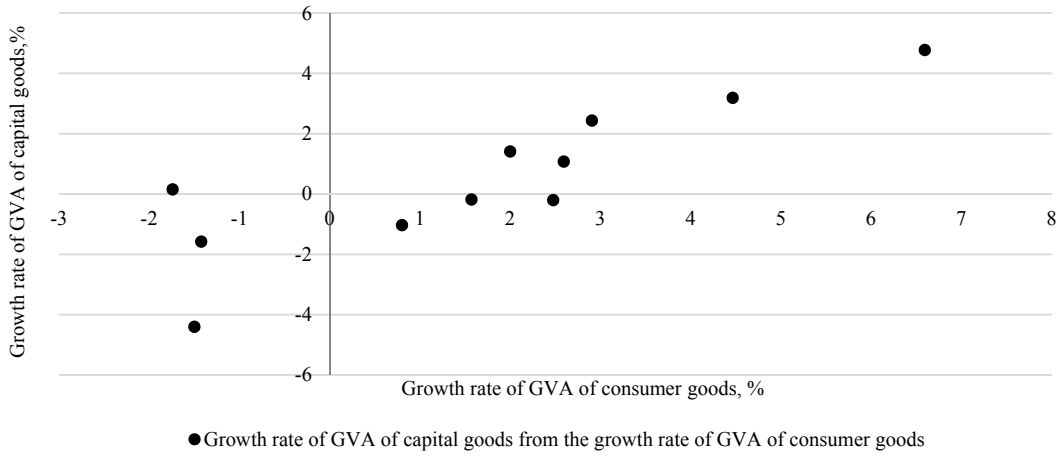


Fig. 6. **Empirical Assessment of the Growth Rates of the Sectors of the Russian Economy, 2012–2022**

Source: Author's calculation according to Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 10.04.2024).

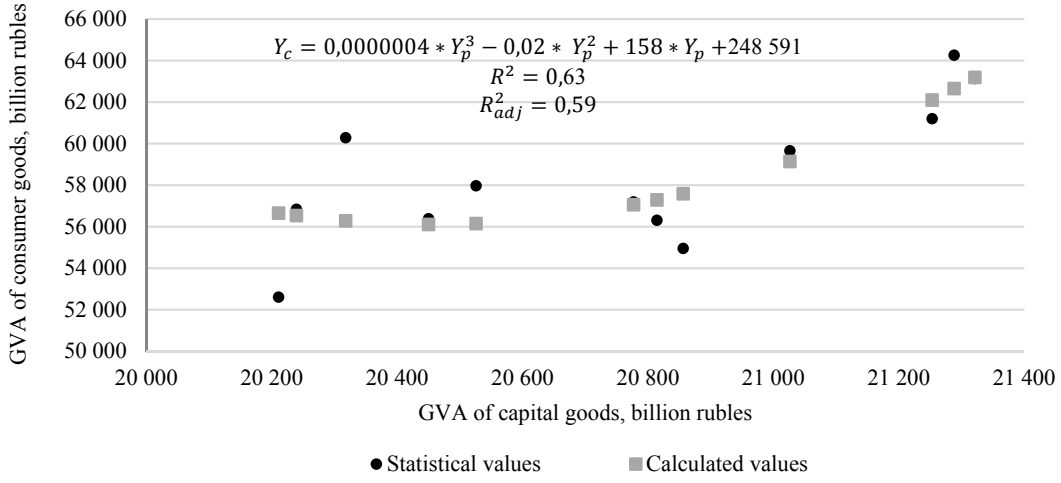


Fig. 7. **Gross Value Added Dynamics of the Capital Goods and Consumer Goods Sectors, in 2016 Prices, 2011–2022**

Source: Author's calculation according to Rosstat data. URL: https://www.gks.ru/investment_nonfinancial, https://www.gks.ru/folder/14476, https://www.gks.ru/storage/mediabank/tab1(2).htm (accessed on 10.04.2024).

Note: Regression model statistics: F-criterion = 16.9; D-Wcalc. = 1.43 ∈ [1.33; 2.67]; White's test: χ^2 calc. = 2.85; χ^2 crit. = 3.84

sector with a profitability of 18%, and 12% of the means of production. The calculation of the risk of operating in sectors shows that from approximately equal risk in 2013 in 2016 prices in two sectors of 500 billion rubles, the risk increased, reaching in the sector of means of production in 2022 to almost 5 000 billion rubles, in the consumer goods sector — up to 1600 billion rubles. The following ratio is characteristic for sectors in the 2011–2022 interval: in the sector of means of production, risk increased, profitability decreased, in the consumer goods sector — with increasing risk, profitability increased.

Thus, the risk of activity increased in the economy as a whole and in its allocated sectors, but at different rates, which was greater for the sector of means of production and less for the consumer goods sector. Thus, the risk of doing business in the sector of means of production was first 1.5–2 times in 2014–2015, and then 3 times higher than the risk in the consumer goods sector. Given the low margin of profitability, and even higher

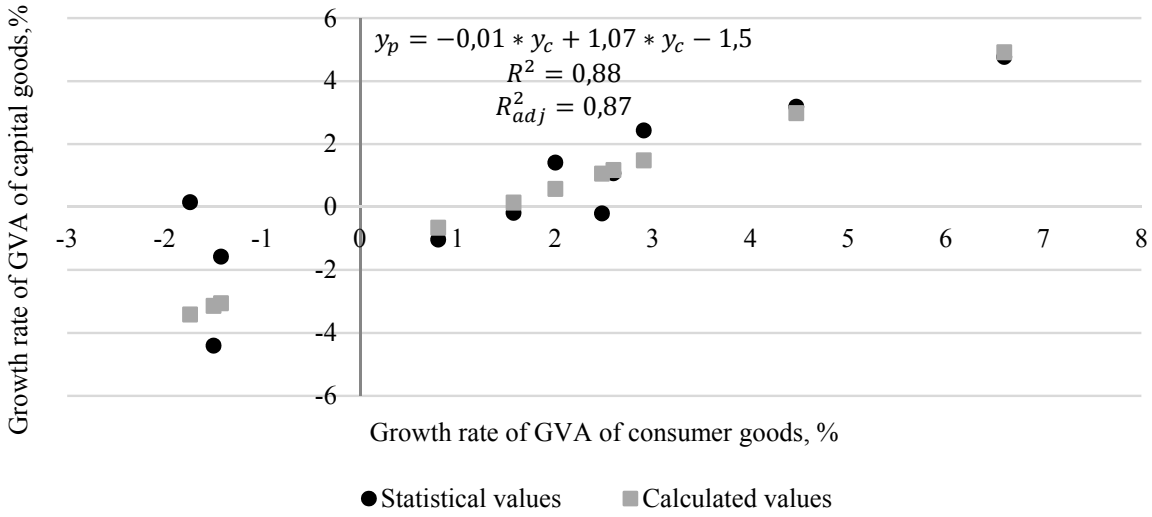


Fig. 8. **Growth Rate of the Capital Goods and Consumer Goods Sectors in Russia, 2012–2022**

Source: Author's calculation according to Rosstat data. URL: https://www.gks.ru/investment_nonfinancial, https://www.gks.ru/folder/14476, https://www.gks.ru/storage/mediabank/tab1(2).htm (accessed on 10.04.2024).

Note: Regression model statistics: F-criterion = 86.5; D-Wcalc. = 1.37 ∈ [1.32; 2.68]; White's test: χ^2 calc. = 1.43; χ^2 crit. = 3.84

profitability of the means of production sector until 2017, it is quite obvious why investment in the means of production sector was significantly less than in the consumer goods sector — due to the high instability of economic activity (risk of conducting it) in the means of production sector.

The described structural dynamics of the selected sectors of the Russian economy also predetermined their contribution to the country's economic growth rate (in accordance with the components of the formula (1)), which reflects *Fig. 4*.

Fig. 4 shows that the contribution of the sector of means of production to growth in the current assessment of dynamics was very modest and came to the first place, exceeding the contribution of the consumer goods sector, only in 2022.

Thus, we can say that a consumer model of economic growth has developed in Russia at the considered time interval. The growth condition according to formula (2) reflects *Fig. 5*, which shows crisis situations in 2015, 2020 and 2022.

Fig. 6 reflects the empirical ratio of the growth rate of the sectors of means of production and consumer goods. Within the coordinates of the "development model—growth regimes", corresponding to *Table 3* and *Fig. 1*, we can talk about the consumer growth model in Russia, for which with the growth of the consumer goods sector *($g_p > 0$)* is characterized by high deindustrialisation, which was observed in the 2000s, or active industrialization (if $g_p < 0$) in the years of crises, in particular in 2022, in connection with the tasks of ensuring the country's Defense capability.

The connection of the sectors seems to be an important condition for their joint development. *Fig. 7* shows how the change in gross value added (GVA) in one sector determines its increase in another sector.

As can be seen from *Fig. 7*, with a small increase in value added in the means of production sector, it is possible to achieve a large increase in value added in the consumer goods sector. Although there is a site where there is a very slight decrease or no significant increase in value added in the consumer goods sector. This may be due to the state of the means of production and the nature of their replacement, the creation and introduction of new means of production that do not make it possible to increase value added in the

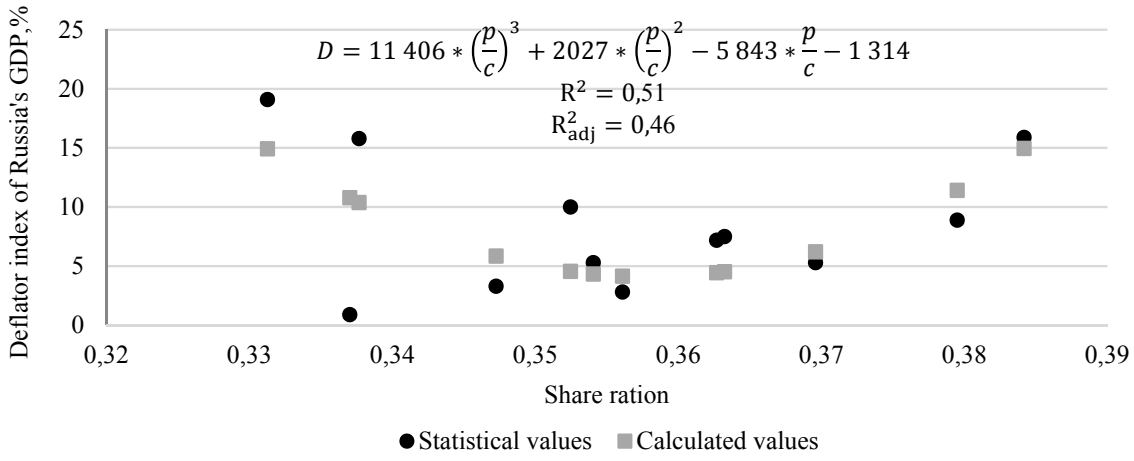


Fig. 9. **Deflator Index of Russia's GDP (*D*) and the Ratio of the Capital Goods (*s*) and Consumer Goods (*p*) Sectors, 2011–2022**

Source: Author's calculation according to Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts, https://rosstat.gov.ru/statistics/price (accessed on 10.04.2024).

Note: Regression model statistics: F-criterion = 11.05; D-Wcalc. = 1.87 ∈ [1.33; 2.67]; White test: χ^2 calc. = 2.41; χ^2 crit. = 3.84.

consumer goods sector. This circumstance should be taken into account when planning economic development policies and stimulating the development of specific types of industries.

Analysis of the growth rate of the Russian economy in the studied period of time, depending on the structure of investments in fixed assets in the allocated sectors, shows that with the growth of investment in means of production relative to investments in consumer goods, the growth rate has decreased.[1]

Consequently, active industrialization was clearly not enough, both in years of decline in GDP and its growth, and the process of unstable economic activity in the means of production sector revealed insufficient regulation, as the risk increased steadily and quite high in relation to the consumer goods sector.

The mutual dynamics of the two sectors in 2012–2022 is reflected in *Fig. 8*.

In the positive area of growth rates, it can be seen that 2% of the growth rate of means of production corresponds to 3% of the growth rate of consumer goods. In the negative area of the growth rate of sectors, the decline in the sector of means of production to –4% corresponds to a decline in consumer goods of less than –2%. (*Fig. 8*). This is fully consistent with the consumer development model described above.

As for the relationship between the growth rate of sectors and the dynamics of prices in them, it is described as follows. The increase in the growth rate of the consumer goods sector from negative values to +2.5% was accompanied by a decrease in the consumer price index (CPI). A further increase in the growth rate of the sector led to an increase in the CPI to 8%. With negative and positive values of the growth rate of means of production, the producer price index fluctuated from 4 to 12%, the same fluctuations corresponded to the positive growth rate of the sector to 2.5%. With a higher growth rate, the producer price index became even higher. There were two points for a positive growth rate of means of production of 0.5 and 1%, corresponding to the negative producer price index. Therefore, the growth rate of means of production is accompanied by a very tangible increase in prices, which indicates

[1] To save space, the regression model is not given. The calculation was made by the authors according to the data: Rosstat. URL: https://rosstat.gov.ru/statistics/accounts; ЕМИСС. URL: https://www.fedstat.ru/indicator/57848 (accessed on 10.04.2024).

a high cost (and a specific structure — a high share of material costs) of the functioning of the subjects of this sector, low efficiency and manufacturability. There may be an impact and organizational weakness of functioning, gaps and regional differentiation of development, which also contribute to cost increases and price increases. Thus, the analysis shows that an increase in the growth rate per unit in the means of production leads to a greater increase in prices in this sector than in the consumer goods sector. It also creates advantages in development and fixes the existing economic structure.

Fig. 9 reflects the relationship between the deflator of Russia's GDP and the ratio of the sectors of means of production and consumer goods (economic structure).

The deflator index reflects the overall price dynamics in the country, as opposed to the producer price indices, which indicate the price dynamics of subjects in a specific set of sectors. *Fig. 9* shows that the change in the structure of the economy not in favor of the sector of means of production was accompanied by a decrease in inflation, but then this process was accompanied by an increase in inflation, which is due to the fact that the increase in the growth rate of means of production (whose share in GDP decreased) leads to greater price dynamics in this sector than the equivalent situation in the consumer goods sector (increased the share in GDP).

Thus, it can be concluded that the sector of items is more competitive and regulated in order to curb consumer inflation. The sector of means of production operates with chronic inflationary processes in it caused by the inefficient structure and low technology of this sector.

In the paper [16] it was shown that targeting contributes to the fixation of the economic structure, prolonging its inefficiency (modifying this indicator) and forcing government policy to focus not on solving basic structural problems, but on the method of incremental and local improvements and financing priorities to develop the economy along the trajectory within the framework of, in fact, an unchanging economic structure. The analysis carried out here also confirms this conclusion, demonstrating the relationship of the structure with relevant macroeconomic indicators of development — GDP growth and inflation.

CONCLUSION

Summarizing the analysis, we will formulate the main conclusions.

First, the presented results confirm the need for active industrialization and structural policies to stimulate sectors of means of production with increasing their competitiveness, technology, contribution to the growth rate and reducing the contribution to the dynamics of sectoral prices.

Secondly, the policy pursued in 2011–2022 did not contribute in any way, but only preserved the mutual dynamics of the sectors of means of production and consumer goods with the growth of the second and a decrease in the first in the country's GDP. The decrease in the structural parameter z was accompanied by a decrease in total inflation, but then its increase.

Thirdly, the profitability of the sector of means of production has become lower than the profitability of the sector of consumer goods, and the risk increased in advance, which was reflected in low investments in fixed assets of this sector compared to the consumer goods sector, which also works to fix the existing economic structure within the framework of the current economic policy.

Thus, the macrostructural analysis of economic dynamics allows to distinguish the nuances of joint development of the basic elements of the economy in the context of the policy in order to adjust not only the instruments used, but also the goals and priorities of development, to clarify the methods of influence. In the existing complexity of systemic links between economic objects, this is the foundation for effective macroeconomic management.

REFERENCES

1. Alonso-Carrera J., Raurich X. Labor mobility, structural change and economic growth. *Journal of Macroeconomics*. 2018;56:292–310. DOI: 10.1016/j.jmacro.2018.03.002
2. Brancaccio E., Garbellini N., Giammetti R. Structural labour market reforms, GDP growth and the functional distribution of income. *Structural Change and Economic Dynamics*. 2018;44:34–45. DOI: 10.1016/j.strueco.2017.09.001
3. Andreoni A., Chang H.-J. The political economy of industrial policy: Structural interdependencies, policy alignment and conflict management. *Structural Change and Economic Dynamics*. 2019;48:136–150. DOI: 10.1016/j.strueco.2018.10.007
4. Cardinale I., Galbraith J., Scazzieri R. Structural dynamics and the wealth of nations. Luigi Pasinetti's system of economic theory. *Structural Change and Economic Dynamics*. 2024;69:692–698. DOI: 10.1016/j.strueco.2023.11.019
5. Miles D. Macroeconomic impacts of changes in life expectancy and fertility. *The Journal of the Economics of Ageing*. 2023;24:100425. DOI: 10.1016/j.jeoa.2022.100425
6. Cozzi T. Pasinetti's structural economic dynamics. *Structural Change and Economic Dynamics*. 2023;61:444–449. DOI: 10.1016/j.strueco.2021.12.006
7. Erumban A.A., Das D.K., Aggarwal S., Das P.C. Structural change and economic growth in India. *Structural Change and Economic Dynamics*. 2019;51:186202. DOI: 10.1016/j.strueco.2019.07.006
8. Zhao J., Tang J. Industrial structure change and economic growth: A China-Russia comparison. *China Economic Review*. 2018;47:219–233. DOI: 10.1016/j.chieco.2017.08.008
9. Vu K.M. Structural change and economic growth: Empirical evidence and policy insights from Asian economies. *Structural Change and Economic Dynamics*. 2017;41:64–77. DOI: 10.1016/j.strueco.2017.04.002
10. Samaniego R.M., Sun J.Y. Productivity growth and structural transformation. *Review of Economic Dynamics*. 2016;21:266–285. DOI: 10.1016/j.red.2015.06.003
11. Dräger L., Lamla M.J., Pfajfar D. How to limit the spillover from an inflation surge to inflation expectations? *Journal of Monetary Economics*. 2024;144:103546. DOI: 10.1016/j.jmoneco.2023.12.004
12. Kurozumi T., Van Zandweghe W. Macroeconomic changes with declining trend inflation: Complementarity with the superstar firm hypothesis. *European Economic Review*. 2022;141:03998. DOI: 10.1016/j.euroecorev.2021.103998
13. Higgins C.R. Financial frictions and changing macroeconomic volatility. *Journal of Macroeconomics*. 2020;64:103204. DOI: 10.1016/j.jmacro.2020.103204
14. Iamsiraroj S. The foreign direct investment — economic growth nexus. *International Review of Economics & Finance*. 2016;42:116–133. DOI: 10.1016/j.iref.2015.10.044
15. Pan Zh., Bai Zh., Xing X., Wang Zh. US inflation and global commodity prices: Asymmetric interdependence. *Research in International Business and Finance*. 2024;69:102245. DOI: 10.1016/j.ribaf.2024.102245
16. Sukharev O.S., Voronchikhina E.N. Inflation targeting: Eliminating economic growth and structural deformation in Russia. *Finance: Theory and Practice*. 2024;28(1):6–19. DOI: 10.26794/2587–5671–2024–28–1–6–19
17. Cutrini E. Economic integration, structural change, and uneven development in the European Union. *Structural Change and Economic Dynamics*. 2019;50:102–113. DOI: 10.1016/j.strueco.2019.06.007
18. Freire C. Economic diversification: A model of structural economic dynamics and endogenous technological change. *Structural Change and Economic Dynamics*. 2019;49:13–28. DOI: 10.1016/j.strueco.2019.03.005
19. Taghiyeh S., Lengacher D.C., Handfield R.B. Loss rate forecasting framework based on macroeconomic changes: Application to US credit card industry. *Expert Systems with Applications*. 2021;165:113954. DOI: 10.1016/j.eswa.2020.113954
20. Pi J., Zhang P. Structural change and wage inequality. *International Review of Economics & Finance*. 2018;58:699–707. DOI: 10.1016/j.iref.2018.07.010

21. Yamada T. Income risk, macroeconomic and demographic change, and economic inequality in Japan. *Journal of Economic Dynamics and Control*. 2012;36(1):63–84. DOI: 10.1016/j.jedc.2011.07.001
22. Gabardo F.A., Pereima J.B., Einloft P. The incorporation of structural change into growth theory: A historical appraisal. *EconomiA*. 2017;18(3):392–410. DOI: 10.1016/j.econ.2017.05.003
23. Leont'ev V.V. Intersectoral economics. Moscow: Ekonomika; 1997. 477 p. (In Russ.).
24. Yaremenko Yu.V. Theory and methodology of multilevel economics research. Selected works in three books. Bk. 1. Moscow: Nauka; 2000. 398 p. (In Russ.).
25. Dedov L.A., Botkin O.I. Index macrostructural analysis of economic dynamics. Basic concepts and techniques of macrostructural analysis. Ekaterinburg: Ural Branch of RAS; 2013. 107 p. (In Russ.).
26. Glaz'ev S. Yu. Theory of long-term technical and economic development. Moscow: Vladar; 1993. 310 p. (In Russ.).
27. Lu Y. Industry 4.0: A survey on technologies, applications and open research issues. *Journal of Industrial Information Integration*. 2017:6:1–10. DOI: 10.1016/j.jii.2017.04.005
28. Romano L., Traù F. The nature of industrial development and the speed of structural change. *Structural Change and Economic Dynamics*. 2017:42:26–37. DOI: 10.1016/j.strueco.2017.05.003
29. Sukharev O.S. Elements of the theory of self-development of economic systems. Moscow: Lenand; 2018. 351 p. (In Russ.).

ABOUT THE AUTHORS

Oleg S. Sukharev — Dr. Sci. (Econ.), Prof., Chief Researcher, Institute of Economics, Russian Academy of Sciences, Moscow, Russia
https://orcid.org/0000-0002-3436-7703
Corresponding author:
o_sukharev@list.ru

Ekaterina N. Voronchikhina — Cand. Sci. (Econ.), Assoc. Prof., Department of World and Regional Economics, Economic Theory, Perm State University, Perm, Russia
https://orcid.org/0000-0001-7033-5832
envoronchikhina@gmail.com

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 26.06.2024; revised on 27.07.2024 and accepted for publication on 02.08.2024.
The authors read and approved the final version of the manuscript.

Translated by V. Timonina

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-218-227
JEL F65, G18, G28

The Effect of Financialization on Economic Growth in Developing Countries with Large Financial Sectors

M.R. Mabeba
Corvinus University of Budapest, Budapest, Hungary

ABSTRACT

In recent decades, financialization has emerged as a significant phenomenon shaping global economies. It refers to the increasing role of financial markets, institutions, and practices in the overall functioning of economies, often at the expense of the real economy. The **purpose** of the study is to identify the impact of financing on economic growth in developing countries with a large financial sector. While developing countries are typically characterized by lower levels of economic development and industrialization, some of them may have relatively large financial sectors. In this study, we profile seven developing countries with significant financial sectors. The countries include Brazil, India, Indonesia, Malaysia, Mexico, Singapore, and South Africa. The paper begins by examining the theoretical perspectives on financialization, which argue that financialization should promote economic growth through the Gross Value Added. We study the effect of financialization on economic growth using panel data econometric models, which include the Feasible Generalized Least Squares, Pooled Ordinary Least Squares, Fixed Effects, and Random Effects. The study deploys annual data from 1996 to 2022. This study finds that financialization has a positive and highly significant effect on the economic growth of developing countries with large financial sectors.

Keywords: financialization; economic growth; panel data econometrics; developing countries

For citation: **Mabeba M.R. The effect of financialization on economic growth in developing countries with large financial sectors. *Finance: Theory and Practice.* 2024;28(4):218-227. DOI: 10.26794/2587-5671-2024-28-4-218-227**

INTRODUCTION

Studying the effect of financialization on economic growth in developing countries with large financial sectors is important. Financialization is a relatively recent phenomenon in many developing countries, and its impact on economic growth is not well understood. Therefore, studying this relationship can provide valuable insights into the potential benefits and risks of financialization for economic development. Understanding the effect of financialization on economic growth in developing countries can inform policy decisions aimed at promoting sustainable economic development and reducing the risk of financial instability. While developing countries are typically characterized by lower levels of economic development and industrialization, some of them may have relatively large financial sectors. In this study we profile 7 developing countries with significant financial sectors. The countries include Brazil, India, Indonesia, Malaysia, Mexico, Singapore, and South Africa.

Background

The effect of financialization on economic growth has been the subject of numerous studies in recent years. However, most of these studies have focused on developed economies, and there is a relative paucity of research on the relationship between financialization and economic growth in developing countries with large financial sectors. Developing countries have experienced a significant expansion of their financial sectors over the past few decades, with many countries undergoing financial liberalization and deregulation. According to Gimet et al. [1] this has led to concerns about the impact of financialization on economic growth, particularly given the greater vulnerability of developing countries to financial instability. Several studies have found a positive relationship between financial development and economic growth in developing countries, suggesting that a well-functioning financial sector can contribute to economic development. However, studies by Beck et al. [2] have highlighted the potential negative effects of financialization, including increased income inequality, financial instability, and the misallocation of resources towards unproductive activities. Further research is needed to better understand the impact of financialization on economic growth in developing countries with large financial sectors, and to identify

policies that can promote sustainable economic development while minimizing the potential risks associated with financialization.

Motivation

Studying the effect of financialization on economic growth in developing countries with large financial sectors is particularly important due to the following motivations:

- Developing countries are increasingly becoming more integrated into the global financial system, and large financial sectors have emerged as a result [3]. Understanding the relationship between financialization and economic growth in these countries is crucial for policy decisions aimed at promoting sustainable economic development.
- In many developing countries, the financial sector has grown at a faster rate than other sectors of the economy, leading to concerns about the potential negative impact of financialization on economic growth [4].
- Developing countries are often more vulnerable to financial crises, and large financial sectors can increase the risk of financial instability, which can have negative impacts on economic growth [5].
- Large financial sectors can also exacerbate income inequality and may not contribute to broad-based economic growth, particularly if the financial sector is focused on short-term profit-maximization rather than long-term investments in productive activities [6].
- The impact of financialization on economic growth in developing countries with large financial sectors is critical for sustainable economic development and social welfare.

Aims and Objectives

The aims and objectives of this study on the effect of financialization on economic growth are:

- to examine the relationship between financialization and economic growth, and to identify the main factors that drive this relationship;
- to determine the extent to which financialization contributes to or detracts from economic growth over the long run;
- to provide empirical insight for promoting sustainable economic growth in the context of financialization, considering the potential risks and benefits associated with financialization.

Research Questions and Hypothesis

The study has four questions in which the hypotheses are formulated, research methods are constructed, and answers are provisioned in the subsequent sections.

i. How does financialization affect economic growth in developing economies with large financial sectors?

ii. What is the effect of financialization on economic growth in developing economies with large financial sectors?

iii. What is the key channel through which financialization affects economic growth in developing economies with large financial sectors?

The hypotheses of this study are formulated following the research questions above and are described as:

H_1: Financialization has a statistically significant effect on economic growth.

H_2: The effect of financialization on economic growth is positive.

H_3: There is a causal relationship between financialization and growth in the long-term.

LITERATURE REVIEW

Hartwell [7] defines financialization as the increase in the market share of the financial sector relative to other sectors in the overall economy. Foster [8] defines financialization as "the long-run shift in the centre of gravity of the capitalist economy from production to finance." Lapavitsas [9] postulates that financialization is "the real capital's profit from financial channels rather than commodity production and trade." Palley [10] defines financialization as "the process whereby financial markets, financial institutions, and the financially elites gain greater influence over economic policy and economic outcomes." These processes are wildly acceptable features of financialization by various scholars. According to Sawyer [11] the term "Financialization" as coined in the 1980s, is in alignment with the rise of neoliberalism and globalization. This timing is viewed as the start of an era of the continuity of financialization processes that has already began in earlier decades.

The empirical results of the effect of financialization on economic growth can be varied. The variegated results are obtained from different financial development indicators, empirical methods, sample size, and econometrics specifications. According to Akyüz [12] economic growth stagnation should be expected from an exceptionally large financial sector. Different countries have different economic growth, policies, financial systems, institutions, cultures, and legal systems. Developed countries have better institutions and public policies for an enabling environment. It is, however, expected that developed countries will tend to have developed financial markets. What is important to economists is how these financial markets affect the national economy.

Fufa and Kim [13] find that bank credit is significant in explaining financialization on economic growth. Using panel data models, they found that an increase in bank credit has a positive effect on GDP growth in 64 countries. Rioja and Valev [514] found that private credit as representing financialization increases economic growth in 74 countries. They also postulate that finance may have an uncertain effect in countries with low levels of financial system development. Afsar et al. [14] estimated the effects of financialization on economic growth in the G8 countries and found a positive relationship. Their financialization proxies included bank profitability stated as income before tax, stock market capitalization rate, and securities, which are bank assets. Through our analysis, bank credit to the private sector has empirical evidence of being an important driver of financialization and has a strong link with economic growth. The study by Ehigiamusoe and Samsurijan [6] shows that, from 1980 to 2017, there has been a positive correlation between credit to private sector and real GDP per capita, growth rate of real GDP per capita, and GDP growth rate. This has recently offered a qualitative view that an increase in the financial sector might have increased the growth of the world economy.

According to Pagano [15], developed financial systems can accelerate economic growth, while underdeveloped financial systems can retard economic growth. Some studies from the high-income countries on the African continent tend to hold related results using financial sector indicators. Akpan et al. [16] assessed the effects of financial sector development on economic growth in Nigeria and found that total bank deposits and market capitalization has a positive effect on GDP growth in the long-term. They found that these variables and GDP growth tend to aggravate each other. Sunde [17] applied a similar model of cointegration for South Africa and found that total credit to the private sector had a positive effect on growth in the long-term and that granger causality exists. Rousseau and D'Onofrio [18] applied the vector autoregressive model and found that domestic credit by banks and private sector increased economic growth in 22 Sub-Saharan African countries. Financialization increases the dominance of financial markets and financial institutions in Africa's leading economies. This trend has been driven by several factors, including the growth of foreign investment in African countries, the expansion of financial services, and the liberalization of financial markets. One of the main impacts of financialization in Africa has been the growth of the financial sector. This has led to an increase in the number and size of financial institutions, including banks, insurance companies, and investment firms. However, the benefits of this growth have not been evenly distributed, with many African countries continuing to face significant levels of poverty and inequality. Another impact of financialization in Africa has been the rise of debt.

According to Agyeman [19], many African countries have become increasingly dependent on debt financing from foreign investors and international financial institutions. This has led to concerns about debt sustainability and the potential for debt crises in the future. Furthermore, financialization has also led to a shift in the focus of economic development in Africa. Rather than focusing on the development of productive sectors of the economy, such as agriculture and manufacturing, many African countries have prioritized the growth of the financial sector. This has raised questions about the long-term sustainability of this approach, as well as its potential to exacerbate inequality. The impact of financialization in Africa is complex and multifaceted, with both potential benefits and risks. It is important for African policymakers to carefully consider the potential consequences of financialization, and to ensure that financial sector growth is balanced with the needs of the broader economy and society.

It is not all scholars that found a positive link between finance and growth. Gimet et al. [1] tested the link between financialization and the macroeconomy for 26 high-income countries. They tested the effects of financialization on gross capital formation, wage share, and GDP growth. It has been found that excessive leverage decreases wages, real-sector investment, and economic-growth, and increases financial fragility. The study found that financializations had a significantly negative effect on the real sector of the economy.

THE DATA

From a sample of 26 years, we collect data from Fitch Solutions, which is a data vendor that has access to macroeconomic data from official statistics of many countries.* *Table 1* depicts a list of variables, which includes the dependent, GDP growth rate (GDP), and independent variables, Finance nominal Gross Value Added (FGVA). The control variables included are the fixed capital formation, savings rate, and private final consumption.

The Measure of Financialization and Economic Growth

Finance Gross Value Added (FGVA) is a useful aggregate measure of the size and contribution of the financial sector to the economy and can be used to track changes in the size of the sector over time [20]. FGVA is a measure of the value added by the financial sector to the economy in terms of goods and services produced and includes activities in banking, insurance, and asset management. FGVA is calculated as the sum of the operating profits earned by financial institutions, compensation of employees of the financial sector, taxes paid by the financial sector to the government on their production and import activities, and less subsidies received by the financial sector from the government. FGVA is a leading indicator because it directly reflects the shift of capital from other sectors of the economy to the finance sector. Therefore, we assume that the variable, FGVA, will increase when there is growth in aggregate finance. The shift of capital to the financial sector is the hallmark of financialization [8].

We make use of the nominal FGVA percentage change year-on-year as the key indicator of financialization. The year-on-year percentage change in nominal GVA is calculated by taking the difference between the nominal GVA in the current year and the previous year and dividing it by the nominal GVA of the previous year. 100 to express the change as a percentage then multiply the resulting figure. The year-on-year percentage change in nominal GVA can provide insights into the growth and performance of the financial sector over time and can be used to compare the performance of the financial sector across different periods and countries.

The year-on-year percentage change nominal GDP is the total value of all final goods and services produced in an economy at current market prices. The percentage change in nominal GDP is calculated by taking the difference between the nominal GDP in the current year and the previous year and dividing it by the nominal GDP of the previous year. The resulting figure is then multiplied by 100 to express the change as a percentage. The year-on-year percentage change in nominal GDP can provide insights into the growth and performance of an economy over time and can be used to compare the performance of different economies across different periods. It is an important indicator of economic activity and can influence various policy decisions, such as monetary policy, fiscal policy, and investment decisions [21].

Correlations

FGVA measures the value added by the financial sector to the economy, while GDP measures the total value of goods and services produced in an economy. The financial sector plays an important role in the overall economy and its performance can have an impact on GDP growth. Panel A of *Fig. 1* depicts the scatterplot of the connection between FGVA and GDP. It shows that changes in FGVA are correlated with changes in GDP over time. This tells us that when aggregate financial activity increases, both nominal FGVA and nominal GDP are likely to increase. Conversely, during economic downturns, both nominal FGVA and nominal GDP may decrease as the financial sector contracts and the overall economy slows down.

Panels B and D show that finance and capital formation are positively correlated. Finance can also

* Fitch Solutions. Data Tools. FitchConnect. 2023. URL: https://app.fitchconnect.com/crir/data-tools (accessed on 01.08.2024).

Table 1

Description of Variables

Code	Variable	Definition
gdp	Nominal GDP, USD, % chg y-o-y	Gross domestic product (GDP) is the value of final goods and services produced annually minus intermediate consumption
fgva	Finance nominal GVA, USD, % chg y-o-y	Gross value added (GVA) refers to the value of production less the value of any intermediate inputs. GVA given for the finance sector includes insurance activities
fcap	Fixed capital formation, USD, % chg y-o-y	Represents the value of capital assets accumulated by producers. Capital assets refer only to tangible assets. The cost of depreciation and the value of non-producing assets are also taken into consideration
savx	Savings, USD, % chg y-o-y	Gross national savings represents the domestic level of savings by individuals, businesses and government combined
pcon	Private final consumption, % of GDP	Sum of all household spending on goods and services within the economy. Also include spending by non-profit institutions serving households

Source: Compiled by the author.

boost the formation of capital and the demand for capital can increase provision of finance. Panel C shows that the increase in capital is associated with an increase in economic growth. These trends are consistent with the theory of financialization (Mader et al., 2020).

There is typically a positive correlation between FGVA and GDP, as the finance sector is an important component of the overall economy, and its performance is intricately linked to economic growth. This is further supported by the correlation matrix in *Fig. 2*, which depicts that the correlation between finance and economic growth is an estimated 72.2%. This explains that there is a strong correlation between financialization and economic growth. When the economy is growing, businesses and individuals tend to increase their demand for financial services, such as loans, investment advice, and insurance, which can boost the revenue and profitability of financial institutions.

However, the strength of the correlation between FGVA and GDP can vary depending on several factors, such as the overall health of the financial sector, the structure of the economy, and the level of government regulation. In some cases, the finance sector may experience growth that outpaces the broader economy, while in other cases it may lag. It is worth noting that correlation does not necessarily imply causation. While FGVA and GDP may be correlated, other factors such as capital formation, interest rates, inflation, and government policy can also have an impact on both variables independently.

METHODOLOGY

We utilize the panel data econometrics to study the relationship between financialization and economic growth. All the variables in the model have data availability, making our panel balanced. To conduct a panel data analysis of the effect of financialization on economic growth, we applied the necessary panel data steps [22]. Firstly, we identified 7 developing countries with large financial sectors. Secondly, we collect data on financialization, economic growth, and control variables. Thirdly, we deploy the appropriate econometric models, which includes Feasible Generalized Least Squares (FGLS), Pooled Ordinary Least Squares (POLS), Fixed Effects (FE), and Random Effects (RE). According to the theoretical and empirical literature, we estimate **Equation 1**, which reflects the general linear representation of our panel data econometric models.

$$GDP_{i,t} = \beta_1 FGVA_{i,t} + \beta_2 FCAP_{i,t} + \\ + \beta_3 SAVX_{i,t} + \beta_4 PCON_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where $GDP_{i,t}$ is the nominal *GDP* growth, is the Finance nominal Gross Value Added, $FCAP_{i,t}$ is the

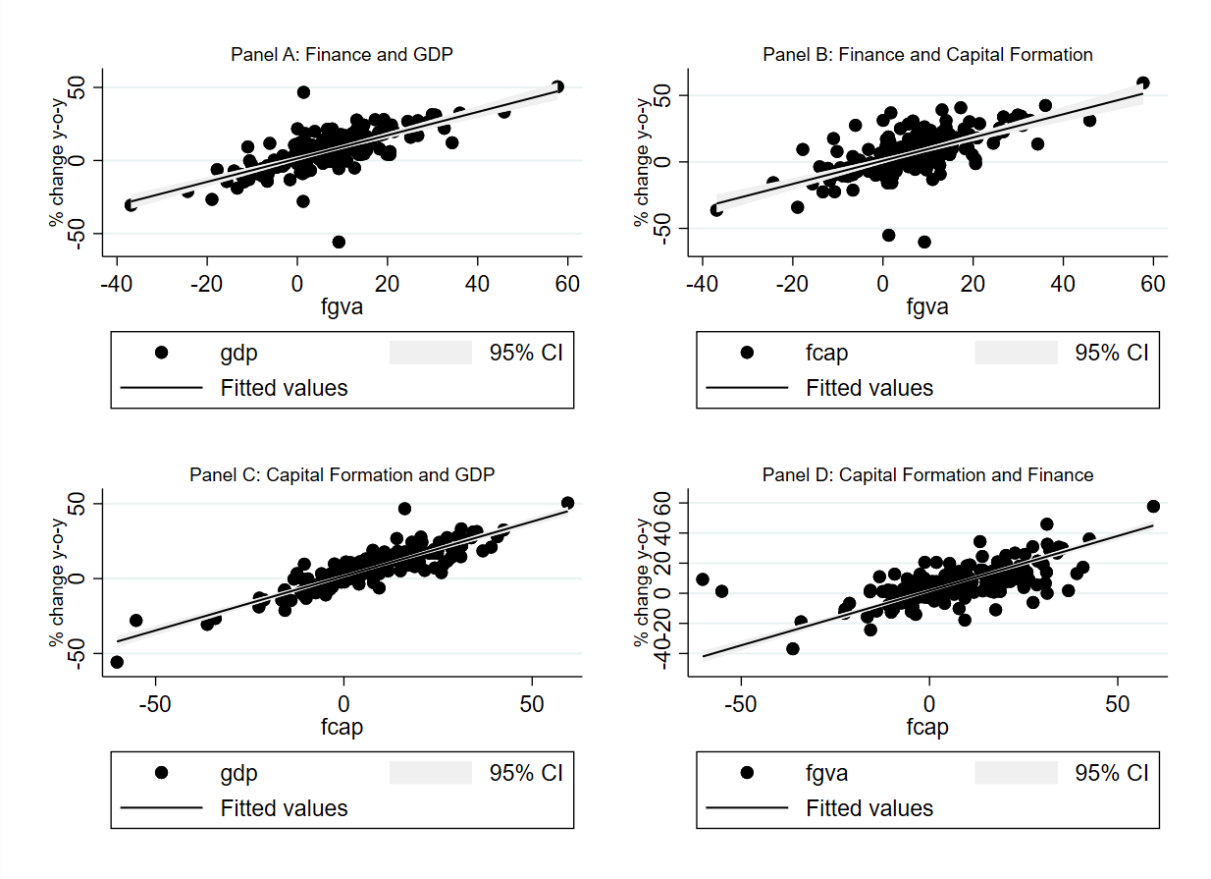


Fig. 1. **Scatterplot**

Source: Compiled by the author.

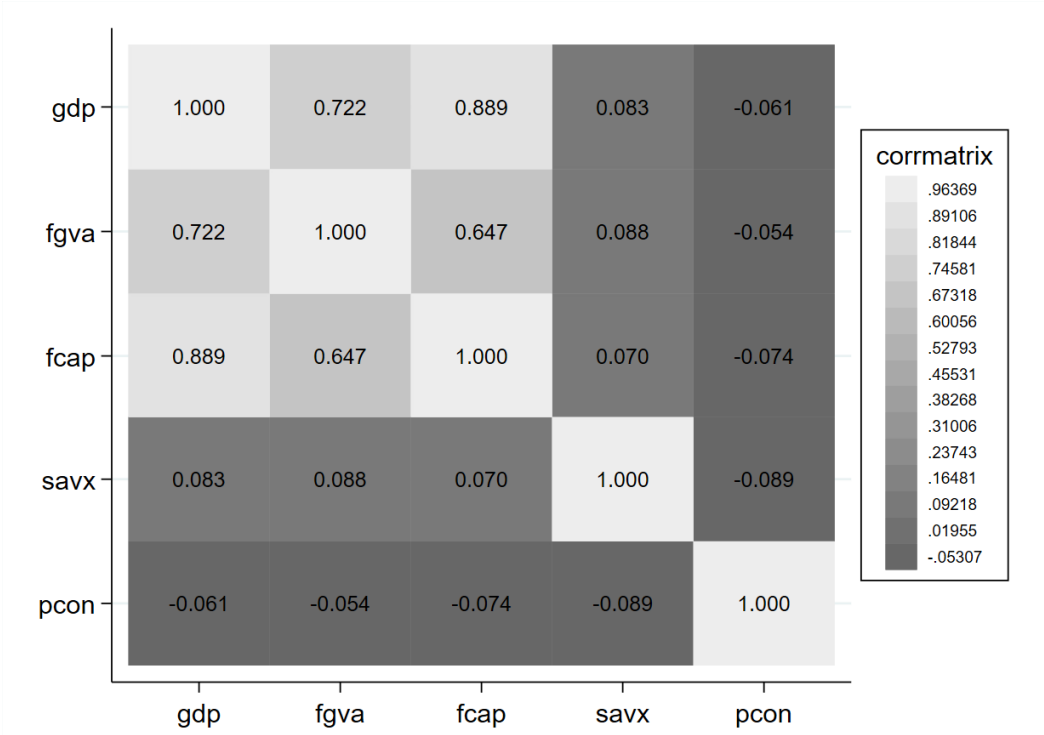


Fig. 2. **Correlation matrix**

Source: Compiled by the author.

Fixed Capital Formation, $SAVX_{i,t}$ is the Savings growth, and $PCON_{i,t}$ is the Private Final Consumption.

Nominal GDP growth is often used in empirical research because it provides a measure of the actual growth rate of an economy's output, including inflation [23]. In contrast, real GDP growth is adjusted for inflation, which may not reflect the actual growth in the economy's output. When conducting empirical research, nominal GDP growth can be a useful indicator of the overall health and performance of an economy. It can provide insights into the current level of economic activity, the pace of expansion, and the overall trend in economic growth over time. Our main independent variable of interest is the *Finance nominal Gross Value Added* and we use it as a single measure of financialization because it reflects the growth in the overall size of the financial sector [20].

We follow a parsimonious strategy in the inclusion of control variables to account for the effects of other factors in the finance-growth estimation. We include *Fixed Capital Formation* because it is a key determinant of long-term economic growth and is strongly associated with nominal GDP growth [24]. Fixed capital includes the physical assets used in production, such as machinery, buildings, and infrastructure. When an economy invests in fixed capital, it is essentially increasing its capacity to produce goods and services, which can lead to higher output and economic growth in the future. We include *Savings growth* because it is one of the key determinants of economic growth and is strongly associated with nominal GDP growth [25]. When individuals and firms save, they are essentially setting aside a portion of their income that can be used to finance investment in fixed capital, which can drive economic growth. Savings growth can help to fund investment in fixed capital, which can increase an economy's productive capacity and lead to higher output and economic growth in the long run. This is because investment in fixed capital can lead to the creation of new products and processes that increase productivity and output. We include the *Private Final Consumption* because it is an important determinant of economic growth, as it represents a significant portion of aggregate demand [26]. When households and non-profit institutions increase their consumption expenditure, this can stimulate demand for goods and services, which can in turn increase output and economic growth.

FINDINGS

There is considerable debate among economists regarding the relationship between financialization and economic growth. Some researchers argue that financialization can have a positive effect on economic growth, while others suggest that it can have negative consequences. Our empirical study partially examines the impact of financialization on economic growth in developing countries with large financial sectors.

Table 2 provides a summary of the empirical results from our panel data econometrics study. We find that financialization has a positive and highly significant effect on economic growth in developing countries with large financial sectors. Specifically, our study finds that a percentage increase in the Finance Gross Value Added, FGVA, is associated with a 28%-point increase in GDP growth, GDPGR.

The FGVA and GDP coefficients from all the panel data models deployed are not statistically different and therefore are consistent. These coefficients are consistent with the correlation matrix we found in *Fig. 2* above, which exhibits a strong and positive correlation of the finance-growth nexus. We are confident in the choice of our covariates, as we found a coefficient of determination, R-squared, of 83%. This shows that even a parsimonious model can produce desired empirical results. This means our choice of covariates helps explain economic growth adequately. The result of this study agrees with all three hypotheses in this study. Therefore, we can postulate that the financialization and economic growth nexus is positive and significant. In addition to the positive correlation between these variables, we also find and agree that financialization has a causal effect on economic growth.

Based on our findings, we postulate that partial studies should be conducted to separate developing countries with a large financial sector from those with a small financial sector. There is no doubt that financial activities are complex and difficult to measure. We believe that the best measure of aggregate financialization is the FGVA because it captures the value

Table 2

The Effect of Financialization on Economic Growth, 1996–2022

gdp	*FGLS*	*POLS*	*FE*	*RE*
fgva	0.276*** (6.21)	0.278*** (3.10)	0.281*** (6.24)	0.279*** (6.28)
fcap	0.596*** (18.13)	0.594*** (8.57)	0.604*** (18.14)	0.595*** (18.15)
savx	0.0102 (0.34)	0.0104 (0.33)	−0.0556 (−1.21)	0.00204 (0.06)
pcon	0.00482 (0.24)	0.00470 (0.28)	−0.00384 (−0.07)	0.00395 (0.18)
_cons	0.334 (0.25)	0.344 (0.31)	2.213 (0.76)	0.560 (0.38)
N	189	189	189	189
R–sq	0.827	0.828	0.831	0.827

Source: Compiled by the author.

Note: t statistics in parentheses *** p < 0.001.

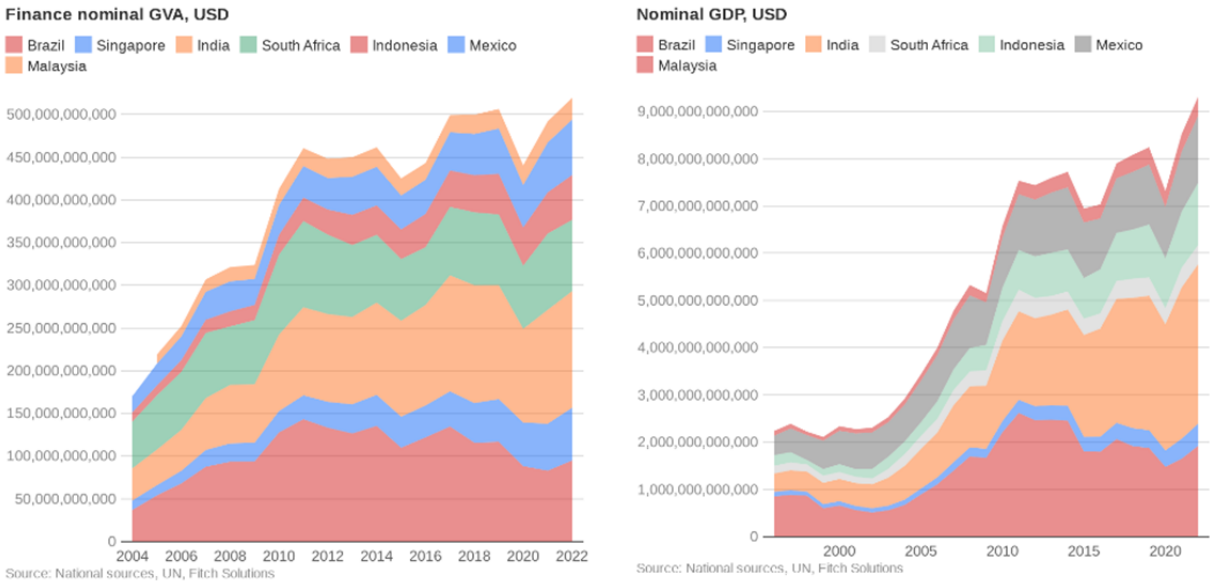


Fig. 3. **Financialization and Economic Growth in Monetary Terms**

Source: Fitch Solutions [21].

added by the financial sector, measures its contribution to GDP, reflects the size of the financial sector, and provides a reliable estimate of financial activity.

Making use of the FGVA as a measure of financialization and partially estimating developing countries with large financial sectors is the novelty of this study. The FGVA provides a reliable estimate of financial activity because it is based on official statistics. It is calculated using a standard methodology that allows for consistent comparisons over time and across countries.

Fig. 3 depicts that, on average, the FGVA has been rising in recent years. This reflects that the size of the financial sector in these countries have been increasing. In the same periods, on average, the GDP of these countries has also been increasing in monetary terms.

CONCLUSION

In conclusion, the effect of financialization on economic growth in developing countries with large financial sectors can be a complex issue. While some studies have shown that financialization can have a positive effect on economic growth by increasing the availability of credit and stimulating investment, others have suggested that it can have negative consequences such as increased financial instability and inequality. Our study concludes that, on aggregate levels, financialization had a positive effect on economic growth in developing countries with large financial sectors in the sample period 1996 to 2022.

We postulate that in addition to a positive correlation there is also a causal effect of financialization on economic growth. In these countries, the impact of financialization on economic growth may be even more nuanced due to the unique economic and political context of these countries. On the one hand, a large financial sector can provide critical infrastructure and access to finance for businesses and households, which can lead to increased investment and economic growth. On the other hand, a large financial sector can also be associated with financial instability and a concentration of economic power in the hands of a few large financial institutions.

REFERENCES

1. Gimet C., Lagoarde-Segot T., Reyes-Ortiz L. Financialization and the macroeconomy. Theory and empirical evidence. *Economic Modelling*. 2019;81:89–110. DOI: 10.1016/j.econmod.2018.12.008
2. Beck T., Degryse H., Kneer C. Is more finance better? Disentangling intermediation and size effects of financial systems. *Journal of Financial Stability*. 2014;10:50–64. DOI: 10.1016/j.jfs.2013.03.005
3. Allen D. S., Ndikumana L. Financial intermediation and economic growth in Southern Africa. *Journal of African Economics*. 2000;9(2):132–160. DOI: 10.1093/jae/9.2.132
4. Guru B. K., Yadav I. S. Financial development and economic growth: Panel evidence from BRICS. *Journal of Economics, Finance and Administrative Science*. 2019;24(47):113–126. DOI: 10.1108/jefas-12–2017–0125
5. Rioja F., Valev N. Does one size fit all? A reexamination of the finance and growth relationship. *Journal of Development Economics*. 2004;74(2):429–447. DOI: 10.1016/j.jdeveco.2003.06.006
6. Ehigiamusoe K. U., Samsurijan M. S. What matters for finance-growth nexus? A critical survey of macroeconomic stability, institutions, financial and economic development. *International Journal of Finance & Economics*. 2021;26(4):5302–5320. DOI: 10.1002/ijfe.2066
7. Hartwell C. A. Special issue on financialization and the future of central banking: Institutions, processes and consequences. *Competition & Change*. 2017;21(2):159–161. DOI: 10.1177/1024529417705247
8. Foster J. The financialization of capitalism. *Monthly Review*. 2007;58(11):1–12. DOI: 10.14452/MR-058–11–2007–04_1
9. Lapavitsas C. The financialization of capitalism: "Profiting without producing". *City*. 2013;17(6):792–805. DOI: 10.1080/13604813.2013.853865
10. Palley T. I. Financialization: What it is and why it matters. In: Financialization: The economics of finance capital domination. London: Palgrave Macmillan; 2013;17–40. DOI: 10.1057/9781137265821_2
11. Sawyer M. What is financialization? *International Journal of Political Economy*. 2013;42(4):5–18. DOI: 10.2753/ijp0891–1916420401
12. Akyüz Y. Inequality, financialisaton, and stagnation. *The Economic and Labour Relations Review*. 2018;29(4):428–445. DOI: 10.1177/1035304618812572
13. Fufa T., Kim J. Stock markets, banks, and economic growth: Evidence from more homogeneous panels. *Research in International Business and Finance*. 2018;44:504–517. DOI: 10.1016/j.ribaf.2017.07.120
14. Afsar M., Afsar A., Meçik O. Financialization process and the outcomes in developed countries. *International Journal of Economics and Finance*. 2014;6(12):192–200. DOI: 10.5539/ijef.v6n12p192
15. Pagano M. Financial markets and growth: An overview. *European Economic Review*. 1993;37(2–3):613–622. DOI: 10.1016/0014–2921(93)90051-b

16. Akpan E.S., Nwosu E.C. Eweke G.O. Causality between non-oil export, financial sector development and economic growth: Evidence from Nigeria. *Journal of Mathematical Finance*. 2017;7(1):39–53. DOI: 10.4236/jmf.2017.71002
17. Sunde T. Financial sector development and economic growth nexus in South Africa. *International Journal of Monetary Economics and Finance*. 2012;5(1):64–75. DOI: 10.1504/ijmef.2012.044467
18. Rousseau P.L., D'Onofrio A. Monetization, financial development, and growth: Time series evidence from 22 countries in sub-Saharan Africa. *World Development*. 2013;51:132–153. DOI: 10.1016/j.worlddev.2013.05.016
19. Agyeman G., Sakyi D., Oteng-Abayie E.F. External debt and economic growth in selected sub-Saharan African countries: The role of capital flight. *Research in Globalization*. 2022;5:100091. DOI: 10.1016/j.resglo.2022.100091
20. Salaga J., Bartosova V., Kicova E. Economic value added as a measurement tool of financial performance. *Procedia Economics and Finance*. 2015;26:484–489. DOI: 10.1016/s2212–5671(15)00877–1
21. Davis G.F. A new finance capitalism? Mutual funds and ownership re-concentration in the United States. *European Management Review*. 2008;5(1):11–21. DOI: 10.1057/emr.2008.4
22. Angrist J.D., Pischke J.-S. Mostly harmless econometrics: An empiricist's companion. Princeton, NJ: Princeton University Press; 2009. 392 p. DOI: 10.2307/j.ctvcm4j72
23. Acemoglu D. Introduction to economic growth. *Journal of Economic Theory*. 2012;147(2):545–550. DOI: 10.1016/j.jet.2012.01.023
24. Ranson B. The institutionalist theory of capital formation. *Journal of Economic Issues*. 1987;21(3):1265–1278. DOI: 10.1080/00213624.1987.11504703
25. Loayza N., Schmidt-Hebbel K., Servén L. Saving in developing countries: An overview. *The World Bank Economic Review*. 2000;14(3):393–414. DOI: 10.1093/wber/14.3.393
26. Setterfield M., Kim Y.K. Debt servicing, aggregate consumption, and growth. *Structural Change and Economic Dynamics*. 2016;36:22–33. DOI: 10.1016/j.strueco.2015.10.002

ABOUT THE AUTHOR

Mahlatse Ruphus Mabeba — PhD in Quantitative Economics, Doctoral School of Economics, Corvinus University of Budapest, Budapest, Hungary
https://orcid.org/0000-0003-4646-679X
mahlatsemabeba@gmail.com

Conflicts of interest statement: the author has no conflicts of interest to declare.

The article was submitted on 30.04.2023; revised on 30.05.2023 and accepted for publication on 05.06.2023.
The author read and approved the final version of the manuscript.

ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-228-238
JEL M41

The Real Earnings Management Mediation: Relation between CEO Overconfidence and Subsequent Performance

M.A. Fahd
Zagazig University, Egypt

ABSTRACT

The **purpose** of this study is to identify the relationship between the CEO overconfidence and the subsequent performance. Furthermore, the study examines the intermediary role of Real Earnings Management (REM). The SPSS version of PROCESS is used to assess the direct, indirect and total effects of CEO overconfidence on subsequent performance. The number of bootstraps for percentile bootstrap confidence intervals is 50 thousand. The **results** of the study showed that the CEO overconfidence has a significant positive impact on the company's subsequent performance. Furthermore, REM acts as a mediator between the overconfidence of the manager and future indicators. The results of this paper may be of interest to accounting regulators, as excessive confidence may affect future performance through REM. This information may be useful in assessing the need for overconfidence managers. This study complements the existing lack of empirical data on the indirect impact of managers' overconfidence on the company's subsequent performance.

Keywords: CEO overconfidence; subsequent performance; real earnings management

For citation: **Fahd M.A. The Real Earnings Management Mediation: Relation between CEO overconfidence and subsequent performance.** ***Finance: Theory and Practice.*** **2024;28(4):228-238. DOI: 10.26794/2587-5671-2024-28-4-228-238**

INTRODUCTION

According to Jensen [1], managers place their own interests above those of the shareholders. Although managers can use the flexibility allowed by the principles of accounting to manipulate the accounting numbers that is not the single tool at their disposal to attain earnings targets. The direct effect of REM on cash flow will have an impact on earnings. REM is described by Roychowdhury [2] as "*departures from normal operational practices, motivated by managers' desire to mislead at least some stakeholders into believing certain financial reporting goals have been met in the normal course of operations.*"

Due to the CEO's significant influence over operational choices, they have an advantage over the CFO when conducting REM. The CEO is frequently regarded as having the most authority within an organization. CEOs are responsible for the company's performance and have authority over corporate decisions like forming the board and disclosing financial information. Given the CEO's responsibility for the company's performance, managerial discretion might be more likely [3]. According to agency theory, managers are driven to prioritize their own interests over those of the shareholders [1]. Therefore, further research is required to determine how the CEO's attitudes and the firm's manipulations are related.

Prior studies have clearly demonstrated the impact of CEO's traits and earnings manipulations, including tenure, experience, compensation, and CEO power [4]. Additionally, after the passage of SOX, executives in the American context used REM more frequently than accrual earnings management, despite REM's higher cost [5].

The irrationality of investors and managers is examined in behavioral financial and accounting studies. This paper will concentrate on the irrationality of managers. This irrational executive strategy implies that the manager is maximizing the performance and value of the company, even though he might not be. The primary bias in this case is overconfidence, and research in psychology shows that managers are more likely to display this bias [6]. CEOs who are overconfident frequently overestimate their skills and undervalue risks. Therefore, it is interesting to examine how overconfidence affects their choices of business policies and assess how it ultimately affects firm performance.

Recent literature in the field of behavioral accounting focused on the effects of CEO overconfidence on accounting and reporting decisions. Bhandari and Deaves [7] state that overconfidence bias is "*the tendency of individuals to overestimate their knowledge, abilities, and the precision of their information.*" Because of previous successes or experiences, people overestimate their

estimates, perceptions of their abilities, and assessments of their skills [8].

According to "upper echelons theory" published by Hambrick and Mason [9] managerial background traits of the upper levels of management can help predict organizational results. It is based on the notion that top executives, who serve as key decision makers, can have an impact on the company's impact on the creating value, decisions, and disclosure choices of the company through their unique individual traits and professional expertise. Due to the widespread attention given to this assumption, researchers are now concentrating on the role that behavioral biases play in decision-making [10]. According to the theory of the upper echelons, executives are vulnerable to cognitive distortions that can result in significant departures from objectivity because manager behavior and attitude can predict business decisions. Finally, these predictions are supported by empirical evidence from the behavioral literature.

According to Hambrick and Finkelstein [9], a CEO with discretionary authority has the power to influence organizational results and decision-making processes through his unique viewpoints and personal traits. Such an impact would be detrimental to firm performance levels. The CEO has an advantage over the chief financial officer when implementing REM because they are the ones who make the final operational decision [11].

The bias of executive overconfidence and its relation to firm performance are of particular interest to behavioral finance researchers. Various studies demonstrate the impact of this bias on subsequent performance [12]. However, the indirect relation between CEO overconfidence and subsequent performance has not been examined in the Egyptian literature. As a result, there has been a gap in the previous literature. This paper fills that gap by addressing interesting research questions. A CEO's overconfidence actually has a complex effect on a firm's performance that can extend beyond a straightforward, uncomplicated effect. To fully comprehend the relationships between managerial overconfidence and performance of the firm, it is essential to investigate the mechanisms underlying this relationship.

The previous literature examined how REM affects firm performance. However, the focus on current-year performance is frequently what drives earnings management. According to Gunny [13], it seems beneficial in the current period and aids in reporting a positive image, but it might be detrimental to future performance. Therefore, a channel is suggested by which CEO overconfidence may affect subsequent performance. The firm's relation with managerial discretion, or REM, is where the intermediary factor comes from.

This research adds to the literature because it informs readers of financial information, analysts, and legal institutions about the intrinsic and acquisitive traits of CEO's that are vital to the quality and readability of financial information. If the value of managerial overconfidence can have a substantial impact on how firms behave, it is logical to make managers responsible for the quality of the information in financial reports. This paper is among the earliest to empirically examine inferences from experimental accounting studies in the Egyptian context.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

CEO Overconfidence and Subsequent Performance

Malmendier and Tate [14] provided evidence of the behavioral deviations related to overinvestment by overconfident CEOs. Additionally, they make unnecessary investments, act in a way that has an adverse influence on the outcomes and value of the firm.

Gervais et al. [15] stated that CEO overconfidence not only motivates managers to make decisions that benefit shareholders, but also motivates managers to work better, which enhances firm performance. Goel and Thakor [16] proposed beneficial roles for overconfident CEOs. It enhances decision implementation, encourages agents to take calculated risks, and increases stock returns for the benefit of principals. This leads to better firm performance.

Ruissen [17] explored how managerial overconfidence affected firm performance from 2005 to 2010. He discovered that executive overconfidence positively influences performance as measured by ROA and Tobin's Q using an options-based measure for overconfidence.

Hirshleifer et al. [18] examined how overconfidence affects subsequent performance measured by ROA. They revealed a link between CEO overconfidence and subsequent performance between 1993 and 2003.

Han et al. [19] investigated the impact of overconfidence on the performance of US firms providing property liability insurance from 1996 to 2013. They discovered that CEO overconfidence positively affects the firm's performance.

CEO overconfidence positively affects firm performance, as shown by Mundi and Kaur [12]. In comparison to the full sample of firms, Indian companies with overconfident executives have greater Tobin's Q and returns on assets, according to data gathered over a 15-year period. The results are important for practitioners who make decisions about corporate policy, create appropriate compensation plans, and choose CEOs for their companies.

According to Hyun et al. [20], the future profitability of a company is significantly influenced by the CEO's overconfidence. They found that companies of overconfidence bias have higher net operating asset returns using US data from 1992 to 2010. According to the findings, companies with overconfident executives have earnings components that are better at predicting potential earnings change. Further analyses are conducted to further explore the relationship between executive overconfidence and stock performance, which is positively associated with abnormal stock market returns as a proxy for stock performance. The findings of previous studies raise the question of whether overconfident CEOs will achieve better performance or not. In considering the aforementioned framework, the following research hypothesis is proposed:

H_1: managerial overconfidence significantly affects subsequent performance.

Managerial Overconfidence and REM Activities

Watts and Zimmerman [21] argue that management of profits may be a trait of opportunistic practices because of its exante gain with redistribution of wealth consequences in between the contractual parties. Earnings management is possible because accounting standards and laws are flexible. The handling or management of outcomes with the intent of attempting to portray a different (worse or better) image in accordance with the relevant interests.

Additionally, psychological components must be taken into account when examining how managers behave when making decisions about the financial information reported. According to behavioral researchers, managers' overconfidence when providing information to the stock market is a significant aspect of their human behavior (Hribar and Yang, 2016).

Previous literature has analyzed overconfidence as a key factor in the stock exchange because it could influence how people behave and how organizations make decisions. Due to accounting decisions that are unrelated to economic reality, the results that companies present through their financial reports may result from their CEOs' opportunism cognitive biases. These biases, which push executives toward earnings management practices, may be caused by external influences on the firm and by individual behaviors [22].

The CEO's overconfidence reveals CEO optimism, which can be biased when making decisions. Additionally, they regularly engage in earnings management to hide firm performance that does not meet their expectations [23]. Hsieh et al. [24] claim that overconfident managers might prefer to use REM to meet specific financial targets rather than the management of accrual earnings. This includes manipulating sales and reducing discretionary expenditure.

Habib et al. [25] found evidence that CEOs who are overconfident engage more in REM. There is also evidence that overconfident executives experience less regulatory restraint. Therefore, they are more probably to employ REM to achieve their earnings benchmarks.

Kouaib and Jarboui [26] place emphasis on the connection between CEO characteristics and real earnings management, and they discovered that personal characteristics of CEOs are significantly linked to limiting R&D spending to manage earnings and meet earnings targets. Kouaib and Jarboui [27] examine the influence of executive overconfidence on REM for non-financial European companies. They discovered that CEOs who are not overconfident use more REM than overconfident CEOs.

According to Chang et al. [28], overconfident executives have a propensity to act aggressively or even irrationally when making investment and financial decisions for their firms. They overestimate potential investment projects as part of their irrational managerial behaviors. Quite specifically, management of earnings plays a major role in firm decisions.

According to Li et al. [29], managers' opportunistic behavior increases with overconfidence. According to the empirical study, overconfidence increases expectations for subsequent performance, and managers who exhibit

these traits are more likely to use earnings management to meet analyst expectations.

H_2: CEO overconfidence significantly affects REM activities.

The Mediating Relationship of REM

Overconfident CEO's might be more probably to employ REM. They believe that they might be able to avoid possibility of legal action or reputational damage from this misstatement, and they are attempting to signal an increased subsequent performance to adjust market expectations. Hung and Li [30] investigate how family concentrated ownership affects the relationship between CEO overconfidence and the EM of Taiwan-listed firms. They demonstrate that, after assessing income increasing discretionary accruals, executive overconfidence bias raises the incentive to manipulate earnings.

In a survey paper by Graham et al. [31], it was found that managers are willing to engage in REM activities in order to maintain accounting performance. According to the survey, 80% will cut discretionary spending and 55.3% will delay or postpone new projects in order to achieve an intended goal, even if it means sacrificing value.

According to research by Bens et al. [32], companies use stock repurchases as a means of manipulating shareholder earnings by diverting capital from real investments. They also investigate evidence that, following such REM activity, organizational performance decreased for a period. In the current period, REM will directly increase earnings, ROA, and operating cash flow [33]. However, Gunny [13] revealed that REM negatively affects subsequent firm performance using the proxy future cash flows, compared to accrual earnings management.

Berry-Stolzle et al. [34] use the insurer›s reserve for errors as a proxy for managerial discretion to investigate the link between EM and CEO overconfidence. They revealed an inverse correlation between executive overconfidence and errors in insurer reserves following the control of firm characteristics. According to this finding, managers who are overconfident have a tendency to underestimate reserves for losses in the future and, hence, will result in higher reported earnings. Hsieh et al. [24] argued that overconfident executives are more likely to participate in REM due to low discretionary expenses and abnormally high cash flows, which work against regulators› efforts to restrain EM.

Cohen et al. [5] argued that REM has an influence on firm's subsequent performance that is higher than if the firm practice accrual earnings management. The study by Kumar and Goswami [35] studies the impact of REM on the subsequent performance of Indian firms. According to regression results, REM practices have a negative impact on both market and accounting performance. Gunny [36] found that while REM may be beneficial in the current period and reports a positive image, it could be harmful to the company's future performance.

Roychowdhury [2] states that engaging in REM is expensive and directly reduces firm value. Gunny [36] agreed with this idea. She explored how REM will influence future operating performance as measured by earnings and cash flows. Results show a substantial decrease in the future performance of companies that were found to be using REM to manipulate discretionary expenditures, special sales discounts, and inventory overproduction to avoid a loss or maintain prior-year earnings.

Managerial overconfidence supports managing earnings in the current period by using REM. As a result, executives who practice REM have low subsequent performance. This chain suggests an indirect relationship between subsequent performance and overconfidence. Managerial overconfidence might influence future performance in part because it affects REM practice, which then affects subsequent performance.

According to Chatterjee et al. [37], a CEO with overconfidence is more probably to be optimistic about subsequent performance and is more probably to manage earnings to meet expectations. Overconfident managers will be driven to indulge in REM activities, which will lower the firm's subsequent performance. Consequently, overconfident CEOs affect future performance indirectly through engaging in REM practices.

Sutrisno et al. [38] investigated how an overconfident executive has an impact on real earnings manipulation and indirectly influences future outcomes. Three metrics are employed for measuring overconfident CEOs in order to get reliable results. Data obtained from manufacturing firms that are traded on the Indonesia stock exchange between 2015 and 2017 were included in the sample. The findings of

this paper demonstrate that overconfidence has no impact on managing real earnings manipulations. The other findings of this paper also suggest that real earnings manipulations and managerial overconfidence negatively affect firm's subsequent performance. The findings of this study's testing, however, reveal that real earnings manipulations did not mediate the relation between overconfidence and a company's future operational performance. According to the aforementioned guidelines, the following research hypotheses are presented:

H_3: REM mediates the relation between overconfidence and subsequent performance.

METHODOLOGY

Data and Sample

Firms that are listed on the Egyptian stock market exchange comprise the data and samples used in this paper from 2011 to 2019. The study is confined to the time frame after 2012 because we need data from one year ago to determine the difference in net sales. The study is confined prior to 2018 to be able to examine years of subsequent earnings. Due to the unique nature of their financial reports, firms in the banking and financial services industries are excluded. Number of bootstrap samples for percentile bootstrap confidence intervals is 50000. The financial information needed to measure the study variables in the linear regression model gathered from the published financial reports.

Research Models

Model (1): CEO overconfidence and REM activities:

$$REMI_t = \lambda_1 + aOVC_t + \mu_1 LEV_t + e$$

***a*:** The a coefficient in model (1) measures the estimated difference in REM between two cases with a one-unit difference in CEO overconfidence.

Model (2): The relation between overconfidence and future performance mediated by REM:

$$\text{Adj}ROA_{t+1} = \lambda_2 + c'OVC_{it} + b\ EMI_{it} + \mu_2 LEV_t + e$$

***c'*:** The regression coefficient c′ in model (2) estimates the overconfidence direct effect on subsequent performance controlling for REM.

***b*:** *b* coefficient represents the REM effect on future performance controlling for overconfidence.

Model (3): CEO overconfidence and subsequent performance:

$$\text{Adj}ROA_{t+1} = \lambda_3 + cOVC_t + \mu_3 LEV_t + e$$

c: The *c* coefficient in model (3) measures the estimated difference in performance between two cases with one unit of overconfidence difference.

Measurement of Variables

Following Schrand and Zechman [23], Ahmed and Duellman [39] and Zaher [40], using an investment-based metric, overconfidence is measured. If capital expenditures in period *t*, divided by total assets (TA) in period *t*+1, exceed the median of industry for the year, the measurement is one; otherwise, it is zero.

Roychowdhury [2] divided the common measurements of REM into three individual metrics: sales manipulation, overproduction, and a decrease in discretionary expenditures. The 3 REM practices that boost bottom-line earning are taken into account when calculating REM.

Sales manipulation is the acceleration of when sales are made by using price discounts or relaxed credit requirements. These credit terms and discounts will boost volume of sales, but decrease margins, resulting in a decrease in abnormal cash flows. Sales and changes in sales are a linear function of the level of operating cash flow, as shown below:

$$CFO_t / TA_{t-1} = \beta_1(1 / TA_{t-1}) + \beta_2(S_t / TA_{t-1}) + \\ + \beta_3(\Delta S_t / TA_{t-1}) + \varepsilon_t \text{ Model (A).}$$

Production should be increased to reduce costs, but increased yearly inventory costs and reduced cash flows will arise from other production and holding costs, resulting in higher abnormal production costs. The following is the estimated normal cost of production:

$$PROD_t / TA_{t-1} = \beta_1(1 / TA_{t-1}) + \beta_2(S_t / TA_{t-1}) + \\ + \beta_3(\Delta S_t / TA_{t-1}) + \beta_4(\Delta S_{t-1} / TA_{t-1}) + \varepsilon_{i,t} \text{ Model (B).}$$

Managers can reduce discretionary expenses to increase current earnings, resulting in lower abnormal expenses. The model following is used to yield the normal level of discretionary expenses:

Table 1

Summary of Research Variables

Variable Symbol	Name	Operational Definition
AdjROA	Industry adjusted *ROA*	The difference between firm specific ROA and the median ROA for the same year and industry
REMI	Real earnings management index	As computed by Cohen et al. (2008)
OVC	CEO overconfidence	If the firm's capital expenditures deflated by lagged total assets are higher than the sector median for that year, then the value is 1, otherwise it is 0
LEV	Leverage	The total debt to total assets

Source: Compiled by the author.

$$DISX_t / TA_{t-1} = \beta_1 (1 / TA_{t-1}) + \\ + \beta_2 (S_{t-1} / TA_{t-1}) + \varepsilon_t \text{ Model (C).}$$

In order to fully represent the overall impact of REM, 3 proxies of real activities management are combined within one proxy, REMI, as follows:

$$REMI = Abn\ PR - Abn\ CFO - Abn\ DE.$$

REM and overconfidence are not the only variables that affect subsequent performance. Leverage measured in previous studies as a covariate variable influencing subsequent performance (Gunny, 2010; Kouaib and Jarbou, 2017). Thus, control variable in this study is LEV to control for leverage ratio. A list of the study's variables is provided in *Table 1*.

Descriptive Statistics

Table 2 below provides descriptive statistics for the complete sample of 490 firm-year observations. The mean of sector-adjusted return on assets ($AdjROA_{t+1}$) is .008 with a standard deviation of 8.2% and falls between –17.2% and 26%. The mean of CEO overconfidence (OC) is .50 with a standard deviation of 50.1% and exists between zero and one. The real earnings management index (REMI) mean is –.001 having a standard deviation of 18.2% and falls between –.559 and .392. As to the control variable, the leverage (Lev) mean is .403 having a standard deviation of 23.9% and falls between 1.4% and 93.8%.

Correlation Analysis

Table 3 presents Pearson correlation between all variables. This table reveals that the highest correlation between independent variables is 46.3 percent. This implies that there is no indicator of multicollinearity between all independent variables as correlation coefficients are less than 70 percent. *Table 3* shows that there is a significant and positive correlation between adjusted return on assets as a dependent variable and CEO overconfidence, which suggests that companies with CEO overconfidence tend to have better subsequent performance. There is a significant negative relation between adjusted return on assets as a dependent variable and REM and leverage.

RESULTS AND DISCUSSION

Statistical Analysis

Adjusted R-squared for regression model (1) is 2.6%, which means that the independent variables account for 2.6% of the variations in the dependent variable REM. The p-value of overall significance equals .002, which means that the model is significant at α = 1%.

For CEO overconfidence and leverage, the coefficients on REM are (–.033)* and (.098)** respectively. This implies that overconfidence and REM have a strong negative relationship at α = 5%, and leverage positively correlates at α = 1%.

With an adjusted R-squared of 28.9% for regression model (2), it can be concluded that the independent variables account for 28.9% of the variation in subsequent performance. The p-value < .001, which means that the model is significant at α = 1%.

For CEO overconfidence, REM and leverage, the coefficients on subsequent performance are (.016)*, (–.188)** and (–.086)** respectively. This indicates that overconfidence and subsequent performance have a significant positive association at α = 5%, REM and leverage has negative relation at α = 1%.

With an adjusted R-squared of 11.7%, the regression model (3) demonstrates that the independent

Table 2

Descriptive Statistics

Variable	Mean	Std. Deviation	Minimum	Maximum
Ad_ROA_{t+1}	.008	.082	–.172	.260
OVC	.50	.501	0	1
REMI	–.001	.182	–.559	.392
Lev	.403	.239	.014	.938

Source: Compiled by the author.

Table 3

Correlation matrix

Variable		Adj.ROAt+1	OC	REMI	Lev
$Adj.\ ROA_{t+1}$	Pearson Correlation	1	.152**	–.463**	$Adj.ROA_{t+1}$
	Sig. (2-tailed)		.001	.000	.000
OVC	Pearson Correlation	.152**	1	–.098*	*OVC*
	Sig. (2-tailed)	.001		.030	.312
REMI	Pearson Correlation	–.463**	–.098*	1	*REMI*
	Sig. (2-tailed)	.000	.030		.003
Lev	Pearson Correlation	–.313**	–.046	.132**	*Lev*
	Sig. (2-tailed)	.000	.312	.003	

Source: Compiled by the author.

Notes: * the relationship is significant at the level of 0.05 (2-tailed); ** the relationship is significant at the level of 0.01 (2-tailed).

variables explain 11.7% of the variation in subsequent performance. The p-value < .001, which means that the model is significant at α = 1%.

For CEO overconfidence and leverage, the coefficients on subsequent performance are (.022)** and (–.105)*1* respectively. This indicates that overconfidence and subsequent performance have a significant positive association at α = 1%, and leverage has a significant negative relation at α = 1%. A summary of the regression analysis is shown in *Table 4*, and *Fig.* statistical model diagram has the regression coefficients superimposed on it.

As shown, $a = –.033$, $b = –.188$, $c' = .016$. Using equations 1 and 2, without the error term, and expressing in terms of the estimated values for *X, M, C,* and *Y.*

$$M_e = –.023 – .033X + .098C$$
$$(.041)^* \ (.004)^*$$
$$Y = .034 + .016X – .188M – .086C$$
$$(.010)^* \ (< .001)^* \ (< .001)^{**} = P\text{-}value$$

Which means that: the indirect effect = $(a * b)$ = $= (–.033) * (–.188) = .006$. The direct effect = $c' = .016$. The total effect = $c' + (a * b) = .016 + .006 = .022$.

Statistical Inference and Hypotheses Test

Inference of X's Total Effect on Y

$$Y = .039 + .022\,X – .105\,c.$$

The total effect is $c = .022$, it meets significance using an α = 0.05, $t = 3.225$; $p = .001$. With 95% confidence, ${}_Tc$ exists between .009 and .036, which means we reject H_0: ${}_Tc = 0$ because the interval estimate does not include zero.

Inference of X's Direct Eeffect on Y

To do this, one of two things must be done: either construct a confidence interval for Tc' or test the null hypothesis of Tc' against the alternative one. If it is different from zero, this confirms the claim

Table 4

Regression Coefficients

	Me (REM)			Y (Subsequent performance)		
	Coeff.	**S.E.**	**p-value**	**Coeff.**	**S.E.**	**p-value**
X (OVC)	a = –.033	.016	.041	c'= .016	.006	.010
Me (REMI)	–	–	–	b = –.188	.017	< .001
C (Lev)	.098	.034	.004	–.086	.013	< .001
Const.	λ^1 = –.023	.018	.212	λ^2 = .034	.007	< .001
R^2 = .026 F = 6.482 P = .002				R^2 = .289 F = 65.673 P < .001		

Source: Compiled by the author.

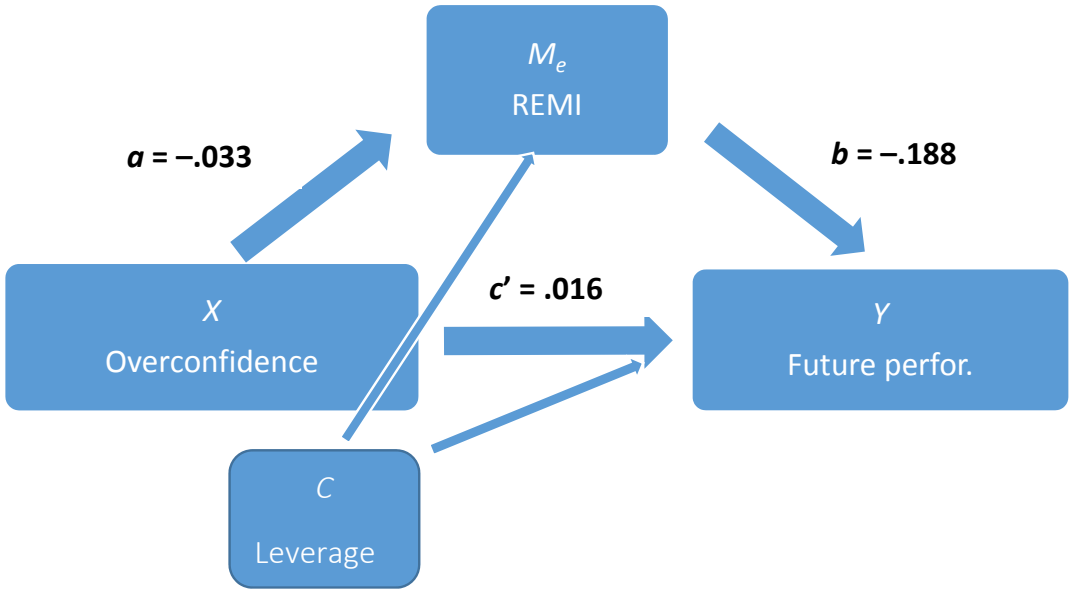


Fig. **Research Mediation Model Statistical Diagram**

Source: Compiled by the author.

that overconfidence affects future performance independent of the REM mechanism. If not, it can be claimed that there is no proof of a correlation between overconfidence and performance when the mechanism through REM is taken into account. In other words, regardless of how *M* affects *Y*, *X* has no impact on *Y*.

The direct effect is found in the PROCESS output of model (2). The direct effect is *c'* = .016, it is statistically significant using an α = 0.05, *t* = 2.571; *p* = .010. With 95% confidence, $_Tc$ exists between .004 and .028, which means we reject H_0: $_Tc$ = zero and alternative hypothesis H_a: $_Tc \neq 0$ cannot be rejected because zero is not included in the interval estimate for $_Tc$.

Inference of Indirect Effect of X on Y Via M

The indirect effect is *ab* = –.033 * –.188 = .006, it is statistically significant using an α = 0.05, *p* = .006. With 95% confidence, $_Tc$ exists between .001 and .014, which means we reject H_0: $_Tc$ = zero and alternative hypothesis H_a: $_Tc \neq 0$ cannot be rejected because zero is not included in the interval estimate for $_Tc$.

CONCLUSION

This paper examines the role of REM mediation in the relationship between CEO overconfidence and subsequent performance. The conditional process analysis is used in testing the indirect and direct

relationships between executive overconfidence and performance. The first hypothesis, argues that managerial overconfidence affects subsequent performance. The findings indicate that H_0 is rejected and there is a strong positive effect of executive overconfidence on subsequent performance. The second hypothesis argues that overconfidence significantly affects REM. The results revealed that H_0 is rejected and there is a strong positive effect of executive overconfidence on REM activities. The last hypothesis claims that managerial overconfidence influences subsequent performance indirectly via REM. The results indicate that H_0 cannot be rejected and the association between overconfidence and subsequent performance is mediated by the REM activities. The difference in results compared to previous literature is due to this paper's focus on the Egyptian context.

The estimated direct effect of managerial overconfidence on future performance is 1.6% means that independent of the impact of REM on company's subsequent performance. According to estimates, overconfident CEOs are estimated to have a 1.6% higher subsequent performance than other CEOs.

The indirect effect is calculated as the sum of the CEO overconfidence effect on REM, and the REM effect on subsequent performance when CEO overconfidence is held fixed. So relative to firms that do not have CEO overconfidence, firms with CEO overconfidence are, on average, .6% higher in their subsequent performance because of the effects of overconfidence on REM, which affect performance of the firm afterward.

The overconfidence total effect on subsequent performance equals 2.2%, which means, relative to firms that do not have CEO overconfidence; firms with CEO overconfidence are 2.2% higher in their subsequent performance. This implies that firms planning to hire CEOs with excessive confidence who can make decisions for the benefit of the firm could increase their performance. Therefore, the hiring process should be biased to hire overconfident CEO's.

Since managerial overconfidence could influence subsequent performance via REM, the findings could be beneficial to regulators of accounting. Understanding how CEO overconfidence affects firm performance can be helpful because it can help businesses decide whether to hire overconfident CEOs. It is recommended that companies keep psychological characteristics in mind when choosing managers, as high managerial overconfidence positively affects firm performance. Furthermore, training programs should be implemented to exploit cognitive biases and compensation committees should be used to maximize shareholder value with overconfident CEO's.

ACKNOWLEDGEMENTS

I appreciate the comments of my PhD supervisors: Ahmed H. Behairy and Mohamed E. Abulezz, professors of Accounting, faculty of commerce, Zagazig University. All errors are my own.

REFERENCES

1. Jensen M.C. Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*. 1986;76(2):323–329.
2. Roychowdhury S. Earnings management through real activities manipulation. *Journal of Accounting and Economics*. 2006;42(3):335–370. DOI: 10.1016/j.jacceco.2006.01.002
3. Yu M. CEO duality and firm performance: A systematic review and research agenda. *European Management Review*. 2023;20(2):346–358. DOI: 10.1111/emre.12522
4. Gong R. CEO overconfidence and the tone of press release. *Accounting & Finance*. 2023;63(2):2081–2108. DOI: 10.1111/acfi.12950
5. Cohen D.A., Dey A., Lys T.Z. Real and accrual-based earnings management in the pre-and post-Sarbanes-Oxley periods. *The Accounting Review*. 2008;83(3):757–787.
6. Moore D.A., Healy P.J. The trouble with overconfidence. *Psychological Review*. 2008;115(2):502–517. DOI: 10.1037/0033–295X.115.2.502
7. Bhandari G., Deaves R. The demographics of overconfidence. *The Journal of Behavioral Finance*. 2006;7(1):5–11. DOI: 10.1207/s15427579jpfm0701_2

8. Benoît J.-P., Dubra J. Apparent overconfidence. *Econometrica*. 2011;79(5):1591–1625. DOI: 10.3982/ECTA8583
9. Hambrick D.C., Mason P.A. The organization as a reflection of its top managers. *Academy of Management Proceedings*. 1982;1982(1):12–16. DOI: 10.5465/ambpp.1982.4976402
10. Kouaib A. CEO overconfidence and subsequent firm performance: An indirect effect via earnings manipulations. *The Journal of High Technology Management Research*. 2023;34(1):100452. DOI: 10.1016/j.hitech.2023.100452
11. Plöckinger M., Aschauer E., Hiebl M.R.W., Rohatschek R. The influence of individual executives on corporate financial reporting: A review and outlook from the perspective of upper echelons theory. *Journal of Accounting Literature*. 2016;37:55–75. DOI: 10.1016/j.acclit.2016.09.002
12. Mundi H.S., Kaur P. Impact of CEO overconfidence on firm performance: An evidence from S&P BSE 200. *Vision: The Journal of Business Perspective*. 2019;23(3):234–243. DOI: 10.1177/0972262919850935
13. Gunny K.A. The relation between earnings management using real activities manipulation and future performance: Evidence from meeting earnings benchmarks. *Contemporary Accounting Research*. 2010;27(3):855–888. DOI: 10.1111/j.1911–3846.2010.01029.x
14. Malmendier U., Tate G. CEO overconfidence and corporate investment. *The Journal of Finance*. 2005;60(6):2661–2700. DOI: 10.1111/j.1540–6261.2005.00813.x
15. Gervais S., Heaton J.B., Odean T. Overconfidence, investment policy, and executive stock options. *SSRN Electronic Journal*. 2003. DOI: 10.2139/ssrn.361200
16. Goel A.M., Thakor A.V. Overconfidence, CEO selection, and corporate governance. *The Journal of Finance*. 2008;63(6):2737–2784. DOI: 10.1111/j.1540–6261.2008.01412.x
17. Ruissen T.H. CEO overconfidence and firm performance. Bachelor thesis. Tilburg: Tilburg University; 2012. 25 p. URL: https://arno.uvt.nl/show.cgi?fid=129757
18. Hirshleifer D., Low A., Teoh S.H. Are overconfident CEOs better innovators? *The Journal of Finance*. 2012;67(4):1457–1498. DOI: 10.1111/j.1540–6261.2012.01753.x
19. Han S., Lai G.C., Ho C.L. CEO confidence or overconfidence. The impact of CEO overconfidence on risk taking and firm performance in the US property-liability insurance companies. SSRN Working Series Paper. 2015.
20. Kim H.A., Choi S.U., Choi W. Managerial overconfidence and firm profitability. *Asia-Pacific Journal of Accounting & Economics*. 2022;29(1):129–153. DOI: 10.1080/16081625.2019.1673190
21. Watts R.L,. Zimmerman J.L. Positive accounting theory: A ten year perspective. *The Accounting Review*. 1990;65(1):131–156.
22. Dal Magro C.B., Gorla M.C., Klann R.C. Excesso de confiança do Chief Executive Officer e a prática de gerenciamento de resultados. *Revista Catarinense Da Ciência Contábil.* 2018;17(50):52–67. DOI: 10.16930/2237–7662/rccc.v17n50.2372
23. Schrand C.M., Zechman S.L.C. Executive overconfidence and the slippery slope to financial misreporting. *Journal of Accounting and Economics*. 2012;53(1–2):311–329. DOI: 10.1016/j.jacceco.2011.09.001
24. Hsieh T.-S., Bedard J.C., Johnstone K.M. CEO overconfidence and earnings management during shifting regulatory regimes. *Journal of Business Finance & Accounting*. 2014;41(9–10):1243–1268. DOI: 10.1111/jbfa.12089
25. Habib A., Hossain M., Cahan S. Managerial overconfidence, earnings management and the global financial crisis. In: Cahan S., ed. Accounting and Finance Association of Australia and New Zealand conf. proc. (AFAANZ). (Melbourne, July 1–3, 2012). Melbourne: Wiley-Blackwell Publishing Asia; 2012:89.
26. Kouaib A., Jarboui A. Real earnings management in innovative firms: Does CEO profile make a difference? *Journal of Behavioral and Experimental Finance*. 2016;12:40–54. DOI: 10.1016/j.jbef.2016.09.002
27. Kouaib A., Jarboui A. The mediating effect of REM on the relationship between CEO overconfidence and subsequent firm performance moderated by IFRS adoption: A moderated-mediation analysis. *Research in International Business and Finance*. 2017;42:338–352. DOI: 10.1016/j.ribaf.2017.07.034
28. Chang S.-L., Hwang L.-J., Li C.-A., Jhou C.-T. Managerial overconfidence and earnings management. *International Journal of Organizational Innovation.* 2018;10(3):189–205.

29. Li C.A., Lin T.M., Huang Y.W. Managerial overconfidence, compensation induced risk taking, and earnings management. *The International Journal of Business and Finance Research*. 2018;12(2):1–26.
30. Li I.-C., Hung J.-H. The moderating effects of family control on the relation between managerial overconfidence and earnings management. *Review of Pacific Basin Financial Markets and Policies*. 2013;16(2):1350010. DOI: 10.1142/S 0219091513500100
31. Graham J.R. Harvey C.R., Rajgopal S. The economic implications of corporate financial reporting. *Journal of Accounting and Economics*. 2005;40(1–3):3–73. DOI: 10.1016/j.jacceco.2005.01.002
32. Bens D.A., Nagar V., Skinner D.J., Wong M.H.F. Employee stock options, EPS dilution, and stock repurchases. *Journal of Accounting and Economics*. 2003;36(1–3):51–90. DOI: 10.1016/j.jacceco.2003.10.006
33. Diyanty V., Sutrisno P., Diyanti V., Shauki E.R. CEO overconfidence, real earnings management, and future performance: Evidence from Indonesia. In: Proc. Asia Pacific business and economics conf. (APBEC 2018). Dordrecht: Atlantis Press; 2019:124–132. DOI: 10.2991/apbec-18.2019.17
34. Berry-Stölzle T.R., Eastman E.M., Xu J. CEO overconfidence and earnings management: Evidence from property-liability insurers' loss reserves. *North American Actuarial Journal*. 2018;22(3):380–404. DOI: 10.1080/10920277.2017.1421977
35. Kumar M., Vij M., Goswami R. Effect of real earnings management on firm performance: Evidence from India. *Vision: The Journal of Business Perspective*. 2021;27(3):386–396. DOI: 10.1177/0972262921100757
36. Gunny K.A. What are the consequences of real earnings management? Berkeley, CA: Haas School of Business, University of California, Berkeley; 2005. 47 p. URL: https://dl.icdst.org/pdfs/files/bfae03727e73211fdf287537a40 8e8bc.pdf
37. Chatterjee A., Hambrick D.C. Executive personality, capability cues, and risk taking: How narcissistic CEOs react to their successes and stumbles. *Administrative Science Quarterly*. 2011;56(2):202–237. DOI: 10.1177/0001839211427534
38. Sutrisno P. Earnings management: An advantage or disadvantage? *Accounting and Finance Review*. 2017;2(2):64–72. DOI: 10.35609/afr.2017.2.2(9)
39. Ahmed A.S., Duellman S. Managerial overconfidence and accounting conservatism. *Journal of Accounting Research*. 2013;51(1):1–30. DOI: 10.1111/j.1475–679X.2012.00467.x
40. Zaher A.M. The effect of managerial overconfidence on accruals-based and real-activities earnings management: Evidence from Egypt. *Academy of Accounting and Financial Studies Journal*. 2019;23(4):1–14. URL: https://www.abacademies.org/articles/The-Effect-of-Managerial-Overconfidence-On-Accruals-Based-1528–2635–23–4–443.pdf

ABOUT THE AUTHOR

Mohamed Anwar Fahd — PhD, Lecturer, Department of Accounting, Faculty of Commerce, Zagazig University, Zagazig, Egypt
https://orcid.org/0000-0003-3255-8167
MAFahd@zu.edu.eg

Conflicts of Interest Statement: The author has no conflicts of interest to declare.

The article was submitted on 04.03.2023; revised on 28.04.2023 and accepted for publication on 26.05.2023.
The author read and approved the final version of the manuscript.