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RESEARCH ARTICLE

Formation and optimization of a Private Investor's Investment Portfolio

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ARTICLE INFO	ABSTRACT
	This paper aims to optimize investment portfolios for individual investors in the ever-changing Russian stock market. There has been substantial expansion in market capitalization, investor base, and financial instruments inside the market. Nevertheless, obstacles such as inadequate financial support and geopolitical conflicts present substantial hazards. We conducted an investigation of the Russian stock market, determined its characteristics, and constructed a regression model to examine index investing. The research proposes to assess the competitiveness of the Russian stock market, rectify deficiencies in the legal framework that impact investor categorization, and suggest regulatory reforms to protect and promote wider market participation. It also aims to create a novel investing strategy that achieves a balance between risk and return, especially during periods of economic downturn. By conducting extensive literature research and regression analysis, this study uncovers significant relationships between the Moscow Exchange index and specific equities. It also investigates the applicability of M. Edleson's cost-averaging approach and G. Markowitz's portfolio theory. Despite the Russian market's development potential, the presence of volatility and regulatory obstacles poses significant risks. The suggested investment design provides a strategic approach for private investors to overcome these difficulties, with the goal of achieving improved long-term profits. The article has devised a novel investment system that allows you to generate money even during a market downturn while mitigating risks.

INTRODUCTION

In the last few years, the Russian stock market has experienced incredible growth simultaneously in several indicators: an increase in the number of private investors, market capitalization, growth of instruments on the stock exchange, etc. These factors were linked to Russia's economic growth, specifically a decrease in interest rates on bank deposits, which further enhanced the attractiveness of the stock market. However, the relatively undeveloped financial market system poses a risk of capital loss for private investors, particularly following the imposition of sanctions and the active withdrawal of non-residents.

Accordingly, the purpose of the study is to analyze the competitiveness of the Russian stock market, identify the negative features of the law that divides investors into qualified and unqualified, which is supposed to protect the unqualified investor from financial losses, and propose changes that will

attract more citizens to the securities market for preservation and increase of capital. We are developing a new investment model that enables you to generate income in a declining market while reducing risks.

LITERATURE REVIEW

The relevance of saving money has recently been gaining momentum, slowly, but the growing financial literacy of the population opens up the opportunity to use different tools to save and increase money. Due to the growing demand of private investors for new instruments, stock market participants contribute to the supply, which leads to the improvement of the stock market in the Russian Federation. The stock market actually appeared in pre-revolutionary Russia, when the commodity exchange arose under Peter I and the first joint-stock companies under Alexander I. Financial instruments subsequently contributed to peasant reform and industrialization, leading to the growth of regions, military power, and economic development.

If we consider the financial market as an integral element of the economic system, then it is essential to consider the relevance of the development and formation of the financial market for the state and the market economy. Recently, in addition to professional participants in the financial market, there has been an influx of individuals—private investors; therefore, at this point in time, mechanisms to prevent the loss of funds by private investors are being actively considered (Rodionov et al., 2023a). Existing economic entities make it possible to create both new and basic elements for the development of the Russian economy and stock market in the international arena and within the country; therefore, understanding specific tools for managing financial resources is necessary for the activities of financial market participants (RusEtfs, n.d.).

Many studies in foreign literature focus on the stock market, private investors' behavior, and portfolio strategy analysis. Thus, according to Clark-Murphy and Soutar (2004), individual investing is saving money for retirement. Reilly and Brown (2002) defined investment as investing money in an organization for a certain period of time with the goal of making a profit.

Cole and Shastry (2009) noted that participation in the stock market is of utmost importance because it promotes asset accumulation, wealth enhancement, and consumption smoothing. The consumption life cycle model confirms that a decrease in the economy's welfare results from a lack of stock market participation. According to J Cocco et al. (2005), a pattern of labor income was identified, and the share invested in stocks decreased over the course of life. The team of authors discovered that neglecting the investment share leads to significant future fixed costs. The introduction of new money products and services led to an increase in people's active participation in stock markets. However, some of these products are difficult to understand, especially for financially unsophisticated investors. Standard portfolio selection models assume that knowledgeable investors make rational decisions to maximize lifetime utility. There are various motivations to suggest that an individual's choice of whether to invest resources in stocks may depend on his monetary attitude, which is created through social interaction, education, and experience (Krokida et al., 2020).

The psychology of investing in the stock market is the subject of some foreign literature. Georgarakos and Pasini (2011) and Dimmock and Kouwenberg (2010) looked at how important investor confidence and openness of information are for people to be able to participate in the stock market. They estimated that these two factors had significant effects and found that company loyalty can partially balance out the effect of disappointment on investor equity.

J Cocco et al. (2005) found that behavioral preferences and beliefs significantly influence stock market participation, with higher loss aversion associated with a lower likelihood of participation. They also found that higher levels of loss aversion reduced the likelihood of directly owning stocks significantly more than the likelihood of owning mutual funds.

Calvet et al. (2016) examine that participation in financial markets has recently increased sharply due to the structuring of investment products on exchanges, the operation of the exchanges themselves, and the spread of the Internet. Studying the reasons why people avoid participating in the stock market is of decisive importance. Various psychological factors such as beliefs, preferences, and psychological biases influence stock market participation, according to the literature. A comprehensive set of attributes elucidates the level of investment using stock market participation, although financial literacy plays a predominant role in the stock market. The researchers strengthened their argument by demonstrating that financially educated individuals face lower costs of collecting and processing information, and therefore face a more moderate financial threshold for participating in the stock market.

Conlin et al. (2015) found out that differences in the level of funding and risk aversion do not satisfactorily explain an investor's choice of whether to invest or not. The study found that excitability, extravagance, harm avoidance, sentimentality, and assertiveness in investor personality were consistently associated with active participation in stock market trading. Despite its weak association, the study found a negative correlation between fear of uncertainty and stock market participation. The correlation between personality traits and stock market participation is strong, even when factoring in risk aversion, income, education, and occupation. It turns out that only persistent and extravagant investors are ready for long-term trading in the stock market, and they are less emotional.

Today, many citizens of the Russian Federation still distrust the stock market, although the significant role of the stock market in the country's economy is due to the fact that the stock market performs important functions of concentration and centralization of financial resources, which allows financing in various sectors of the economy. Supply and demand constantly collide, capital accumulates, and new opportunities emerge on the stock market. This phenomenon arises from the establishment of a system to facilitate the issuance of securities by public companies, which typically drive the national economy, and from the implementation of personnel training initiatives, among other factors (Eremina & Rodionov, 2023). The stock market also regulates economic investment flows and facilitates the redistribution of financial resources to the most profitable sectors of the economy (Rodionov et al., 2023b; Rashid et al., 2023). In addition, the stock market performs an information function, reporting on the state of the economy based on special indicators.

According to Levine (2001), the geopolitical situation greatly influences the stock market price. The stock market not only regulates and directs financial flows, but also serves as a mechanism for attracting investment, primarily through the purchase of corporate securities (Bibi, U., & Safia Shaukat, 2023; Dharmadasa, 2023). It also serves as a mechanism for attracting money to the state budget, primarily through the purchase of government securities and taxes. Finally, it serves as a mechanism of natural selection in the economy, dividing rights to a controlling stake.

In summary, we can interpret the definition of a stock market as a regulated and organized state system of trading, currency and goods exchange, and the exchange of securities and precious metals. The security is defined as a financial document that confirms the owner's property rights to the document. The transfer and implementation of special property rights is possible only upon presentation of a security. The Russian stock market witnessed a surge in the volume of securities transactions until 2023, coinciding with an increase in the number of issuers.

Steil (2001) characterized the stock exchange as an organized platform for trading derivatives and securities. This platform is responsible for organizing the stock market and holds the necessary license. A legal entity with a stock exchange license can exclusively combine its activities with the following types of stock market activities: commodities exchange activities, currency exchange activities, information dissemination activities, clearing activities (clearing for transactions with securities and investment units), property rental activities, and publishing activities. A legal entity

with stock exchange status does not have the right to combine its activities with depository activities. This implies that another legal entity, the depository, must perform the depository services of the stock exchange, subject to an agreement between them. Historically, the stock exchange emerged as the most advanced form of organization of the stock market (primarily stocks and bonds). In our country there is a division of market organizers into stock exchanges and other market organizers, which is of a formal legal nature.

MATERIALS AND METHODS

We concluded that the stock market is one of the best financing instruments after examining foreign authors' literature, learning about the profitability of non-state pension funds, examining private investors' investment dynamics, and considering the geopolitical risks that compel the population to save and increase funds (Rodionov et al., 2023b). The state also needs to attract capital to the stock market because it is the majority shareholder of most liquid securities on the Moscow Exchange, receives dividends, and actively spends on government needs. Individuals subject coupons and dividends to personal income tax, and investors pay personal income tax to the state Treasury when they fix profits. When buying or selling securities, the investor pays a commission to the broker, which is subsequently subject to income tax. Additionally, private investors purchase a portion of an european bank for reconstruction and development EBRD (federal loan bond) during placement.

Figure 1 shows the dynamics of dividend receipts from company ownership. The fact that most companies paid dividends in 2021 for the 2020 pandemic year, which was clearly unprofitable, made 2021 less profitable.

We present the forecast values for 2022, but the national education association NEA and geopolitical issues prevented many companies from paying dividends, including Gazprom, which set a record. In general, there is a high probability that companies with state participation will continue to pay dividends.
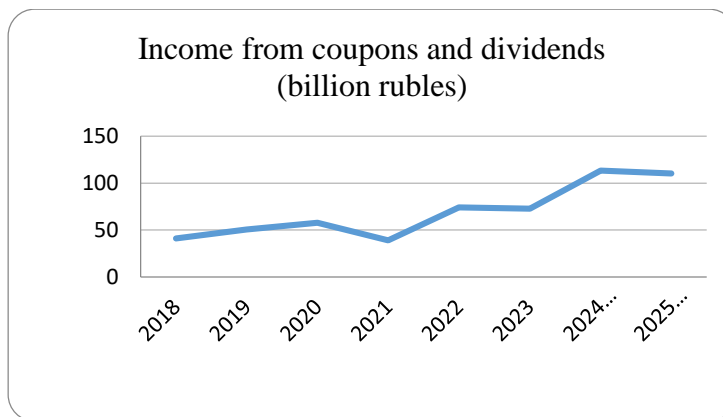

Figure 1: Dynamics of dividend receipts from companies with state participation by the Ministry of Finance and the Federal Property Management Agency

Figure 2 shows a graph with an upward trend in dividend income from companies with state participation, which means that government agencies still expect dividend growth, but take a sensible look at the situation, predicting a fall in dividend income in 2024. The frequent additional tax on mineral extraction (MET), which Gazprom "tested" in June 2022 despite the board of directors' positive decision to pay dividends, also contributes to this explanation.

In addition to direct income from owning companies, the state collects personal income tax from coupons and dividends; Figure 2 shows the dynamics of tax revenues, which are projected to increase.
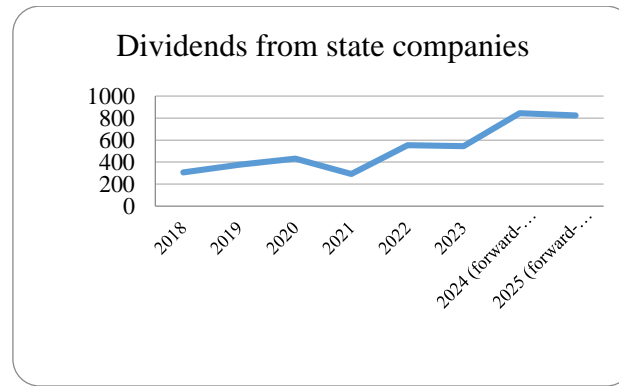
Figure 2: Income from coupons and dividends as taxes from individuals

In 2022, non-residents withdrew over \$1.2 billion, which naturally dropped the stock market; the National Welfare Fund was unable to support the stock market in the long term. Individuals may be able to invest money from now-taxed deposits, but the Russian stock market's low attractiveness to private investors may serve as a deterrent. However, as previously discussed, a long-term strategy favors investing in securities over most other investment methods available to the population.

Due to sanctions, foreign funds have become inaccessible to private investors, but the index strategy, in foreign literature, is considered one of the most optimal in terms of risk-to-income ratio (Rodionov et al., 2023c). Therefore, we built a regression model based on the Moscow Exchange index, which comprises the 50 most liquid shares with the largest capitalization, to analyze the strategy of the Russian stock market. We then used the Moscow Exchange's published "private investor's portfolio" to determine the relationship between the variables. Table 1 shows the result of the regression analysis.

Table 1: Regression analysis result

Variable name	Regression coefficients	p-value
Constant	515,44	0,007051
GAZP	1,43	0,037202
SBER	-4,97	0,001756
LKON	0,06	0,009342
GMKN	0,01	0,008959
SBERP	7,31	0,008648
YNDX	0,09	0,048432
SNGSP	-3,76	0,038847
ROSN	-0,34	0,002359
MTSS	0,89	0,009748
NVTK	0,10	0,003322
VTBR	11882,14	0,021971
NLMK	2,18	0,003463

The calculations show that all selected companies influence the Moscow Exchange index, and since the p-value in all cases is less than 0.05, we do not exclude any terms. The coefficient of determination, equal to 0.97, characterizes the quality of the regression equation, explaining 97% of the index value through changes in 12 securities. The moscow exchange MOEX index includes all 12 securities in varying proportions, providing an explanation. This means that a private investor does not have to assemble an index of 50 securities on his own, but he can assemble a portfolio of 10-12

securities, as private investors did in 2023. This allows you not to spread yourself across many companies but to monitor only a small number without losing quality. The multiple regression equation is:

$$Y = 515.44 + 1.43GAZP - 4.97SBER + 0.06LKON +$$
$$+0.01GMKN + 7.31SBERP + 0.09YNDX - 3.76SNGSP -$$
$$-0.34ROSN + 0.8MTSS + 0.1NVTK + 11882.14VTBR +$$
$$+2.18NLMK$$

As you can see, three factors influence the index negatively: SBER, SNGSP and ROSN, and VTBR has the greatest weight, all due to the fact that it has historically traded as 1 lot equals 10,000 shares. This means that for further testing of the hypothesis, it makes no sense to consider these three companies, but for personal interest, a correlation matrix was built with all the securities from the "private investor's portfolio", which is presented in color in Table 2.

Table 2: Correlation Matrix

	GAZP	SBER	LKON	GMKN	SBERP	YNDX	SNGSP	ROSN	MTSS	NVTK	VTBR	NLMK
GAZP	1,00	0,63	0,60	0,53	0,62	0,27	0,47	0,63	0,42	0,47	0,62	0,50
SBER	0,63	1,00	0,63	0,69	0,98	0,44	0,63	0,79	0,58	0,70	0,90	0,69
LKON	0,60	0,70	1,00	0,67	0,70	0,31	0,59	0,74	0,52	0,68	0,65	0,61
GMKN	0,53	0,69	0,67	1,00	0,69	0,20	0,64	0,70	0,49	0,67	0,63	0,70
SBERP	0,62	0,98	0,68	0,69	1,00	0,44	0,63	0,79	0,57	0,69	0,91	0,69
YNDX	0,27	0,44	0,31	0,20	0,44	1,00	0,29	0,41	0,19	0,37	0,43	0,25
SNGSP	0,47	0,63	0,59	0,64	0,63	0,29	1,00	0,75	0,42	0,68	0,53	0,63
ROSN	0,63	0,79	0,74	0,70	0,79	0,41	0,75	1,00	0,52	0,76	0,75	0,68
MTSS	0,42	0,58	0,52	0,49	0,57	0,19	0,42	0,52	1,00	0,39	0,57	0,55
NVTK	0,47	0,70	0,68	0,67	0,69	0,37	0,68	0,76	0,39	1,00	0,58	0,62
VTBR	0,62	0,90	0,65	0,63	0,91	0,43	0,53	0,75	0,57	0,58	1,00	0,68
NLMK	0,50	0,69	0,61	0,70	0,69	0,25	0,63	0,68	0,55	0,62	0,68	1,00

It turned out that almost all shares of companies are dependent on each other. It is understandable that SBER and SBERP exhibit almost complete dependence, given that they are shares of the same company, or that SBER and VTBR are securities from the same sector, both of which are listed on the sanctions list. The dependence of NLMK and GMKN is not obvious at first glance, but despite different industries, there is still a large state participation, which results in new sanctions and restrictions. Both companies primarily engage in export operations, and the reorganization of logistics processes for sales results in additional expenses and a reduction in profits, which in turn impacts the cost of securities. Therefore, we decided to further analyze YNDX, which exhibits the least dependence among all companies, and MTSS, whose interfactor correlation indicators are less than 0.6.

Using the portfolio of G. Markowitz, it was not possible to analyze the "people's portfolio" because, most likely, the method works in a growing market. However, for the entire 2022 after the February fall, the Russian stock market is in a flat position. Consequently, we will analyze YNDX and MTSS, as well as randomly select two bonds from the public sector and corporate sector: EBRD26233 and RZD001R Although 100% of the shares of JSC Russian Railways belong to the Russian Federation

under Federal Law 29 of February 27, 2003, it is difficult to classify the bond as corporate due to its trading on the market as a corporate bond under the Securities Act of 1933 (Securities Act of 1933).

RESULTS

When making analysis using M. Edleson's method, which consists of forming a portfolio by cost averaging under initial conditions, a private investor creates a portfolio worth 10,000 rubles and invests on payday (every 10th day) in selected securities using the M. Edleson method every month, adding 1,000 rubles to the portfolio. The portfolio consists of 50% stocks and 50% bonds, which is important during an economic downturn. The method's essence is cost-averaging of securities. Table 3 presents calculations for portfolio formation; moments of securities purchases are highlighted in italics.

Table 3: Portfolio formation using the M. Edleson method

Date	MTSS	YNDX	EBRD	RZD	Stock portfolio	Sum investments
10.jun	*2958,51*	*4196,41*	821,00	1085,40	9061,30	10 000
10.feb	2934,53	3805,03	767,18	1047,50	8554,18	11 000
10.apr	*2117,52*	*1945,24*	687,53	910,80	7259,37	12 000
10.may	2094,49	*1638,22*	719,00	1023,90	10951,20	13 000
10.june	2740,00	1456,23	786,70	1034,60	13491,20	14 000
10.july	2398,50	1613,61	786,00	*1032,60*	13275,00	15 000
10.aug	2500,50	1904,02	797,00	1057,80	15480,40	16 000
10.sept	2406,00	2177,62	*793,32*	1056,80	16101,81	17 000
10.oct	*2001,00*	2032,03	*714,96*	1008,90	15269,60	18 000
10.nov	2283,50	2071,61	726,88	1075,10	19198,07	19 000
10.dec	2311,00	1849,64	733,70	*1017,30*	18468,45	20 000

Notably, within two months, the portfolio's value exceeded the investment amount, preventing the purchase of securities. However, on July 10, during the study, the decision was made to opt for the bonds of JSC Russian Railways to avoid disrupting diversification by purchasing the cheaper EBRD26233. Figure 3 shows the "risk-return" map when forming a stock portfolio according to M. Edleson's theory, whose cost averaging of every 10th day of the month transferred to G. Markowitz's model showed the optimal investment strategy. The theory posits that M. Edleson's theory will identify the securities at the bottom of the sideways trend within the selected set, and a thorough analysis can utilize this information for portfolio formation. Table 4 shows the profitability of the assembled portfolio, both for each security and for the entire portfolio.

Table 4: Profitability of the collected portfolio (%)

Ticker	MTSS	YNDX	EBRD26233	RZD 001P
Yield on the stock	1,78	1,02	7,9	8,7
Portfolio return			4,85	

With a daily yield of -0.05%, the multi-tiered system of supports (MTSS) successfully collected securities during the buying process, resulting in a yield of 1.78%. This yield, coupled with a negative annual yield of 0.92%, is quite favorable. Stock key data (YNDX) performed slightly worse with a return of 1.02%, although its average annual return was -0.36% and the annual negative return was 7.1%, which is much greater than the fall in multi-tiered system of supports (MTSS), but when buying a security it was possible to achieve low profitability. Notably, the bonds showed a slight drop in yield of 0.1% each; this could be negative in the long term, but no one knows the future, so it is likely that

bonds will outperform the average current yield in the long term. It's important to note that this theory operates on small scales, making it suitable for the Russian stock market, given its challenging geopolitical environment and the limited financial resources of the population. Still, this yield could not catch up and overtake inflation, which for 2023 amounted to 7.4% (U.S. Securities and Exchange Commission, 2019).

Figure 3 shows G. Markowitz's model with the range of acceptable values. It would be a stretch to call the securities effective, but they still provide at least some return, unlike the analysis of the "private investor's portfolio." Further research is necessary for a more comprehensive analysis.
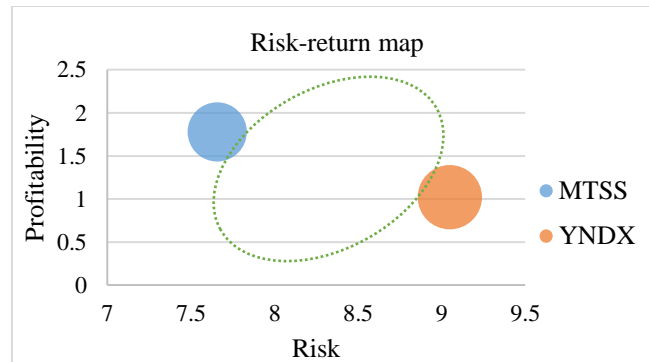

Figure 3: Risk-return map when forming a stock portfolio

CONCLUSION

As a result, we can draw the conclusion that this model will partially save the funds of private investors in conditions of sharply growing inflation, even if the bank's instructions on recognizing persons as qualified are functioning in the form that they are now. The combination of model and theory showed that even in a falling market, the portfolio remained profitable while minimizing risks. In addition to the population's interest in the stock market, the Russian Federation's financial market has significant potential for development. By making the stock market more appealing to citizens, we can liberate their savings from inflation's "mattresses". When making the changes proposed in this study, the state's efficiency will be about 1.2%, which, in the long term and with a growing market, will bring even more money to the state treasury.

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