

# ASSESSMENT OF INTERNAL FACTORS OF THE EFFECTIVENESS OF THE RUSSIAN NON-STATE PENSION FUNDS' PORTFOLIO MANAGEMENT

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## Abstract

The article is devoted to problems of the evaluation the effectiveness of the non-state pension funds' investment. Internal factors affecting the effectiveness of managing pension funds' portfolios of non-state pension funds in Russia are studied. The article presents an analysis of statistical data of 33 non-state pension funds for the period of 2013-2018. As a result of the analysis, the following factors were classified as internal factors of the effectiveness of the pension fund portfolio management: amount of pension savings per one insured person; growth rate of pension savings; non-state pension fund market share; presence of risk strategies involving equity instruments usage; remuneration share of management companies from investing of pension savings. Mentioned factors' influence on the effectiveness of managing the portfolio of pension savings was assessed based on multi-factor econometric models. The Sharpe ratio was used as criteria of the effectiveness of pension funds investment. The dependence of the effectiveness level of managing pension savings of funds on the chosen investment strategy and growth rate of pension savings was revealed. Article justifies the need of reducing the amount of non-state pension funds' assets placement by management companies with increasing share of assets self-placement.

**Key words:** non-state pension funds, pension savings, pension fund portfolio management, portfolio management effectiveness

**JEL Code:** G 11, G 23

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## Introduction

In the early 2000s, the Russian Federation adopted a pension reform program, according to which non-state pension funds (NPF) were assigned the role of an institution of voluntary supplementary pension provision (insurance). NPFs were assigned two functions - the function of pension provision (market) and the function of pension insurance (social). In

recent years, increasing attention to problems of reliability and sustainability of the NPF was introduced a multilevel system of guarantees of safety of pension savings, have tightened the requirements to the size of the Fund own funds of the insurance reserve and provision for mandatory pension insurance Fund. These and other conditions contributed to an increase in the number of insured persons under mandatory pension insurance (OPS) and the volume of pension savings (PN). Thus, according to Rosstat data, from 2013 to 2018, the number of persons under the OPS increased from 22.2 to 36.97 million. people, and the amount of pension savings of the PF increased from 1088 billion rubles to 2582 billion rubles.

In this aspect, the issues of increasing the efficiency of pension savings portfolios of non-state pension funds and determining internal factors that affect their effectiveness in managing NPF portfolios at the current stage of pension reform development become relevant.

## **1 Theoretical bases of the research**

A study of the scientific literature on the problems of evaluating the effectiveness of managing portfolios pension saving made it possible to identify the following areas of research. These areas are based on various conceptual and methodological approaches.

Direction 1 - study of the profitability of individual financial instruments in which pension funds invest pension savings and identifying factors affecting portfolio profitability. Fedotov's study established factors that determine the profitability of a portfolio of pension savings, such as a portfolio management strategy, its distribution structure, and the dynamics of the financial market (Fedotov, 2016). Tumanyants K.A. calls external factors such as high inflation and negative interest rates in real terms as the reason for low efficiency. The quality of investment management and regulatory restrictions on the structure of investments, according to the author, are not the reasons for the inefficient activities of non-state pension funds. The quality of investing pension savings in the Russian Federation using the benchmark method was carried out by K.A. Tumanyants and M.V. Utuchenkova (Tumanyants & Utuchenkova, 2014). The authors compared the profitability of investing in compulsory pension insurance funds with inflation, interest rate dynamics, and the profitability of the main Russian indices. The discrepancies between the results of managing pension savings and the dynamics of market indicators were identified, and a quantitative assessment of each factor was carried out. External factors for evaluating the effectiveness of pension funds are investigated by Chybalski, Alserda, (Alserda,2018; Chybalski, 2016).

Direction 2 - development of methods for assessing the effectiveness of the management of the investment portfolio of NPFs. In the studies of Nogin Yu.B. a methodology has been developed for evaluating the effectiveness of managing pension savings based on the calculation of Sharpe and Jensen's alpha coefficients. The author suggested dividing the NPF into groups of leaders and outsiders by the effectiveness of managing pension reserves and accumulations (Nogin, 2017). To determine the historical effective boundaries for conservative and growing pension funds, the Black-Litterman optimization methodology was used (Mlynarovic, 2016). G.F. Fathslislamova analyzed the effectiveness of investing pension savings of NPFs and private management companies from the point of view of loss-making (). Based on an empirical study, as the main factor in the profitability of investment Abramov A.E. and Chernova M.I. indicated the distribution of assets (Abramov & Chernova, 2014).

Direction 3 - Efficiency investment models of pension savings. The modeling of the performance of management companies that manage pension savings based on the DEA methodology was carried out by E.A. Fedorova, A.S. Didenko and D.A. Sedykh. Using panel regression, the authors identified external factors (exchange rate, MICEX index, interbank lending rates) and internal factors (a balanced investment portfolio management strategy, the lifetime of this portfolio and seasonality) that affect the performance of management companies (Fedorova, Didenko, & Sedykh, 2016). The construction of a multiple regression model for assessing the influence of various factors on the market share of NPFs was carried out in the work of K. Tumanyants et al. Profitability and the Sharp coefficient were the dependent variables. The calculation results showed the absence of a significant relationship between the investment results and the decision of the insured persons to choose an NPF for managing the funded part of the pension. E.A. Fedorova developed models that can be used with various strategies for managing a portfolio of pension savings. With passive management, it is recommended to use the quasi-Sharp model, which allows you to find an effective portfolio with minimal risk and is more suited to the situation of an unstable market. For active management, the Huang and Litzenberger method is recommended, which allows the investor to find among the set of effective portfolios the most acceptable in terms of profitability. For active management, the Huang and Litzenberger method is recommended, which allows the investor to find among the set of effective portfolios the most acceptable in terms of profitability (Kompa, 2015).

## 2 Research methods

Only non-market factors affecting portfolio management efficiency were selected. The aim of the study was to identify the influence of internal factors. The exclusion of external factors had a significant impact on the quality of the model.

The Sharpe coefficient has traditionally been used as the resulting (endogenous) variable that characterizes the result or efficiency of the process.

The Sharpe ratio is calculated using the following formula:

$$S_i = (R_i - R_m) / \sigma_i \quad (1)$$

where

$S_i$  - the Sharpe ratio of the  $i$ -th NPF;

$R_i$  - cumulative return on investment of the pension savings portfolio of the  $i$ -th NPF for the last five calendar years, calculated according to the Irwin-Fisher formula;

$R_m$  - accumulated profitability of the pension savings market for the last five calendar years, calculated according to the Irwin-Fisher formula;

$\sigma_i$  - historical volatility of the return on investment of the pension savings portfolio of the  $i$ -th NPF for the last five calendar years/

The analyzed period of time in the work is 6 years, therefore, in these calculations, the Sharpe ratio for a six-year period was estimated. The empirical base of the study was formed on the basis of statistics on 33 non-state pension funds operating at the end of 2018 on compulsory pension insurance. Only those NPFs that provided similar services throughout the analyzed period were selected. The share of pension savings of NPFs in the sample in the total amount of pension savings amounted to an average of 75.5% over the analyzed period. At the end of 2018, the share of pension savings analyzed by NPFs in the sample in the total amount of pension savings placed in NPFs amounted to 96.1%; share in the total number of insured persons - 96.9%. This allows us to characterize the sample as representative.

The ratio of the total investment income received by all NPFs for the year to the value of the obligations of all NPFs under compulsory pension insurance agreements at the end of the year was used as the yield on the pension savings market ( $R_m$ ). The calculation of the profitability of the pension savings market is presented in table 1.

**Tab. 1: Profitability of the pension savings market for 2013-2018 (Rm)**

	2013	2014	2015	2016	2017	2018
Obligations under compulsory pension insurance contracts, mln. rub.	1 008,4	1 132,4	1 719,5	2 129,9	2 374,2	2 582,3
Income received from investing pension savings funds, thousand rubles	69 770	60 214	172 568	23 1376	105 689	20 659
Market profitability, %	6,92	5,32	10,04	10,86	4,45	0,1
Accumulated profitability of the pension savings market over 5 years – 43,63%						

Source: cbr.ru

Definition of regressors (exogenous variables). The following factors were selected as exogenous variables for the analysis of pension savings portfolios:

PS - the amount of pension savings per 1 insured person (rubles).

SPS - the share of pension savings of the i-th APF in the total amount of pension savings (in fractions of a unit). The indicator reflects the share occupied in the pension savings market by these NPFs. These two factors reflect the economies of scale, and allow us to assess the impact of the size of pension savings attracted by NPFs on the efficiency of their investment. Foreign studies show a higher return on large pension plans compared to small ones (Kompa, Witkowska, 2016).

GRPS - the growth rate of pension savings per 1 insured person for this NPF (%).

SoS - the share of stocks and investment shares in the portfolio (%). The indicator reflects how much this NPF uses risk strategies.

SRMC - the share of remuneration of management companies as a percentage of the income from investing pension savings received in the reporting year (%). The introduction of this factor into the model will test the hypothesis that there is no relationship between the size of the remuneration of the authorized capital and the effectiveness of investment of NPF.

The correlation matrix between the factors is presented in table 2; it shows the lack of multicollinearity in the constructed models.

**Tab. 2: Correlation matrix between the Sharpe ratio and the regressors**

	Sr	PS	SPS	GRPS	SoS	SRMC
Sr	1					

PS	0,249967	1				
SPS	-0,09176	-0,11495	1			
GRPS	-0,03361	0,120509	-0,31888	1		
SoS	-0,2896	-0,24098	0,389596	-0,235	1	
SRMC	0,049226	-0,0346	0,289747	-0,29338	0,119234	1

Source: authors' calculations

The results of the formation of univariate linear regression models with selected factors are presented in table 3.

**Tab. 3: Assessment of the impact of the selected factors on the efficiency of pension savings management of NPFs (paired linear regression)**

	PS	SPS	GRPS	SoS	SRMC
Constant	-0,09519 (0,237688)	0,674732*** (0,114639)	0,990645 (0,880159)	0,865495*** (0,11825)	0,602679*** (0,105207)
Coefficient	0,008338*** (0,00253)	-0,02706 (0,023)	-0,00348 (0,008102)	-0,04891*** (0,012662)	0,001051 (0,00167)
R <sup>2</sup>	0,062484	0,008419	0,00113	0,083866	0,002423
Adjusted R <sup>2</sup>	0,056732	0,002336	-0,005	0,078246	-0,0037
Std. Error of estimate	1,285754	1,322307	1,327159	1,271007	1,326299
F	10,86361	1,384002	0,184323	14,92159	0,395944
Importance F	0,001204	0,241136	0,668251	0,000161	0,530072
Number of observations	165	165	165	165	165

For reference: Standard error in parentheses. Levels of significance of indicators \* -  $p < 0,1$ ; \*\* -  $p < 0,05$ ; \*\*\* -  $p < 0,01$

Unfortunately, both univariate models and multivariate models (table 4) show a weak effect (R<sup>2</sup> does not exceed 0.135) between the regressors and the effectiveness of pension savings management.

**Tab. 4: The influence of the selected factors on the efficiency of pension savings management in NPFs (multi-factor linear regression for 5 factors)**

Regressor	Coefficients	Standard error	t- statistics	P- Value
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Constant	1,481409	0,945982	1,566001	0,119336
PS	0,006625	0,002541	2,607645	0,009985
SPS	-0,00492	0,024975	-0,19713	0,843978
GRPS	-0,01116	0,008345	-1,33769	0,182908
SoS	-0,04524	0,013934	-3,24715	0,001422
SRMC	0,001307	0,001687	0,774739	0,439645
R=0,367959; R <sup>2</sup> =0,135394; Adjusted R <sup>2</sup> =0,108205; Std.Error of estimate: 1,250181				
F=4,979746 at the significance level p=0,00029				
Number of observations - 165				

Source: authors' calculations

To identify the dependencies, the average values of indicators used as regressors were used. This reduced the number of observations, but allowed to smooth out the influence of random factors and identify a number of patterns. The results of the formation of paired regression models are presented in table 5.

**Tab. 5: The influence of the selected factors on the effectiveness of managing pension accumulations of NPFs (paired linear regression), averaged data.**

	PS	SPS	GRPS	SoS	SRMC
Constant	-0,64387 (1,60037)	2,06811*** (0,699278)	-6,18336** (3,016016)	3,479954*** (0,680714)	4,639821** (1,882541)
Coefficient	0,025168 (0,01793)	-0,30639** (0,159994)	5,278694** (2,053064)	-0,39691*** (0,088267)	-0,44775* (0,247551)
R <sup>2</sup>	0,059764	0,105785	0,175767	0,394777	0,095459
Adjusted R <sup>2</sup>	0,029434	0,076939	0,149178	0,375253	0,06628
Std.Error of estimate	3,60851	3,519092	3,378584	2,895126	3,539353
F	1,97046	3,66727	6,610707	20,22077	3,271507
Importance F	0,170338	0,064757	0,015158	9,04E-05	0,080202
Number of observations	33	33	33	33	33

For reference: standard error in parentheses. Levels of significance of indicators \* -  $p < 0,1$ ; \*\* -  $p < 0,05$ ; \*\*\* -  $p < 0,01$

The following regressors have a significant impact on the effectiveness of managing the portfolio of pension savings: TPD, YES and, to a lesser extent, the DPN indicator. The remaining regressors do not significantly affect the level of portfolio management efficiency. The coefficient of determination, showing the contribution of these regressors, the formation of the final efficiency indicator, respectively, for DA is 0.39 and for TPR, respectively, 0.18. The indicators of F-statistics and t-statistics speak in general about the statistical significance of the models and a sufficient level of significance of the variables. Moreover, if the growth rate of pension savings has a positive impact on efficiency, then with an increase in the share of shares, management efficiency decreases - the inverse relationship (table 6).

**Tab. 6: The influence of the selected factors on the efficiency of pension savings management of NPFs (multi-factor linear regression), averaged data.**

Regressor	Coefficients	Standard error	t- statistics	P- Value
Constant	-1,19403	4,574465	-0,26102	0,796056956
PS	0,006086	0,016362	0,371937	0,712842774
SPS	0,076527	0,185632	0,412253	0,683409076
GRPS	3,246961	2,357503	1,377288	0,179734828
SoS	-0,31926	0,117765	-2,71102	0,011518487
SRMC	-0,14859	0,243113	-0,61122	0,546168911

Source: authors' calculations

This confirms the results already obtained earlier in other works that the use of risk strategies and the growth of equity instruments in the portfolio do not lead to an increase in the yield of pension portfolios

## Conclusion

Thus, the calculations showed an inverse relationship between the Sharpe ratio and the share of remuneration of management companies as a percentage of the income from investing pension savings in the reporting year. The result indicates the absence of economic incentives for the management company to increase the efficiency of investing pension savings.

The construction of a multifactor econometric model confirms the absence of a dependence of the performance indicator of the portfolio of pension savings on the share held



by pension funds in the market of pension savings, the amount of pension savings on one insured person, as well as the share of remuneration of pension funds paid by pension funds. At the same time, the model confirmed the influence of growth rates of pension savings and the chosen investment strategy, determined through the share of shares and investment units in the portfolio, on the Sharpe ratio, which determines the effectiveness of managing pension savings of NPFs.

## References

- Abramov, A. E., & Chernova, M. I. (2014). Analysis of the Effectiveness of Portfolios of Private Pension Funds and Mutual Funds in the Russian Federation. Retrieved from <https://cyberleninka.ru/article/n/analiz-kachestva-investirovaniya-pensionnyh-nakopleniy-v-rossii-s-ispolzovaniem-benchmark-metoda/viewer>
- Alserda, G. A. G., Bikker, J. A., & Van Der Lecq, F. S. G. (2018, July 12). X-efficiency and economies of scale in pension fund administration and investment. *APPLIED ECONOMICS*. doi: 10.1080/00036846.2018.1486011
- Chybalski, F. (2016). The Multidimensional Adequacy and Efficiency of European Pension Systems: the Ranking and Relationships. In *Proceedings of the 15th International Conference on Finance and Banking* (pp. 128–139). Silesian University in Opava, School of Business Administration in Karvina. Retrieved from <https://pdfs.semanticscholar.org/438c/dba0dd6fb85054dff21ced5beb1fc36ab17d.pdf>
- De la Torre-Torres, O. V., Galeana-Figueroa, E., & Álvarez-García, J. (2019, January 1). Efficiency of the Public Pensions Funds on the Socially Responsible Equities of Mexico. Sustainability. doi: 10.3390/su11010178
- Federova, E. A., Didenko, A. S., & Sedykh, D. A. (2016). Assessment of external and internal factors affecting the performance of companies managing pension savings. Retrieved from <https://cyberleninka.ru/article/n/otsenka-vneshnih-i-vnutrennih-faktorov-vliyauschih-na-effektivnost-deyatelnosti-kompaniy-upravlyayuschih-pensionnymi-nakopleniyami/viewer>
- Kompa, K., & Witkowska, D. (2015, June 8). Efficiency of private pension funds in Poland. Retrieved from <https://pdfs.semanticscholar.org/39ba/7857c9cc1e769619e873202cc4d3f76fadc4.pdf>
- Mlynarovič, V. (2016). LEGISLATIVE CHANGES EFFECTS ON SLOVAK PENSION FUNDS EFFICIENCY. In *Proceedings of the International Scientific Conference QUANTITATIVE METHODS IN ECONOMICS Multiple Criteria Decision Making XVIII*

(pp. 253–257). Letra Interactive, s. r. o. Retrieved from <http://www.fhi.sk/files/katedry/kove/ssov/proceedings/Zbornik2016.pdf>

Nogin, Y. B. (2017). The Efficiency Analysis of Pension Savings and Pension Reserves Under the Management of Russian Non-State Pension Funds. *Journal of Corporate Finance Research*, 11(1), 100–110. Retrieved from <https://cyberleninka.ru/article/n/analiz-effektivnosti-upravleniya-sredstvami-pensionnyh-nakopleniy-i-pensionnyh-rezervov-rossiyskimi-negosudarstvennymi-pensionnymi/viewer>

Tumanyants, K. A. (2013). The yield of pension savings in Russia: a comparative analysis. *Bulletin of VolSU*, 173–181. Retrieved from <https://cyberleninka.ru/article/n/dohodnost-pensionnyh-nakopleniy-v-rossii-sravnitelnyy-analiz/viewer>

Tumanyants, K. A., & Utuchenkova, M. V. (2014). Analysis of the Quality of Investing Pension Savings in Russia Using the Benchmark-Method. Retrieved from <https://cyberleninka.ru/article/n/analiz-kachestva-investirovaniya-pensionnyh-nakopleniy-v-rossii-s-ispolzovaniem-benchmark-metoda/viewer>

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