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MUTUAL FUNDS AS INSTRUMENTS FOR PENSION SECURITY – THE CASE OF POLAND

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The main purpose of this article is to assess mutual funds as instruments for additional pension security on the example of Poland. In the paper, we characterized the operation of the third pillar of the Polish pension system, with particular emphasis on individual pension accounts and individual pension security accounts. In addition, we used the Sharpe ratio and carried out an assessment of investment efficiency of the mutual funds available under the third pillar for the period of 2009–2019. We also performed the Kruskal-Wallis test, finding that the type of fund had a significant impact on investment performance. Moreover, the post-hoc test showed that the highest investment efficiency is achieved by fixed income funds available under the third pillar.

Keywords: pension system, investment efficiency, third pillar, mutual fund

1. INTRODUCTION

1.1. Research aims, hypothesis and literature review

From the very beginning of the social security system's existence, the state was responsible for guaranteeing citizens protection against the risk of losing their income because of sickness or old age. The public social security system encompassed all entitled persons paying contributions to the system to being just a citizen of a given country and not requiring any active participation from them. The end of the 20th century brought radical changes in this respect as many countries started

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reforms of one of the subsystems of the social security system, i.e. the pension system. At the basis of these reforms there was a growing inefficiency of public pension systems, with increasing state subsidies, jeopardizing the sustainability of public finances, and the phenomenon of an aging society. A common feature of the implemented reforms was the limitation of the role of the state in ensuring the retirement income of citizens, while obliging them to consciously take care of their standard of living after the end of their professional activity. For this purpose, private financial institutions were admitted to the pension system, which had been monopolized by the state thus far, including those already operating on financial markets, i.e. insurance companies, banks, investment funds, entities providing brokerage services, as well as new ones, created especially for the needs of the pension system, i.e. occupational and individual pension funds.

In Poland, the reform of the pension system launched in January 1999 changed the state pension system into a three-pillar mixed system. The existing pay-as-you--go system has been accompanied by two pillars organized by private financial institutions. One of the consequences of these changes for insured persons is the need to make decisions regarding participation in the capital part of the system, the choice of the institution entrusted with retirement savings and the amount of contributions paid. These decisions are extremely difficult for many people due to lack of knowledge in the area of investing and functioning of capital markets. Moreover, in just two decades of the system's operation according to the new rules, the system's reform was not only uncompleted, but its main assumptions have been modified many times, which also raises the uncertainty of the insured and distrust of the system.

This article discusses issues related to the third pillar of the Polish pension system, including especially mutual funds operating in this part of the system. The aim of this paper is to investigate the performance of mutual funds that offer individual pension accounts and individual pension security accounts in the Polish third pillar of the pension system. The research period encompasses the years of 2009–2019. The following research hypothesis was verified in the article: the investment efficiency of pension accounts offered by mutual funds is higher than the effectiveness of open pension funds (OPF).

To the best of our knowledge, there are no scientific publications analyzing the performance of investment funds operating in a pension system. As far as performance of capital parts of the pension system is considered, most publications focus on pension funds that belong to the second pillar. Bohl, Lischewski and Voronkov (2011) compare the performance of Polish and Hungarian pension funds taking into consideration investment limits and performance regulations. The authors use performance measures, such as the Sharpe ratio, Treynor ratio, and Jensen's alpha. According to their findings, there are differences in the performance of pension funds in the analyzed countries as the Hungarian funds showed strong underperformance. Coggin, Fabozzi and Rahman (1993) analyze the investment perfor-

mance of the equity pension funds in the U.S. considering the security selection and market timing skill of active equity managers. The obtained results reveal that regardless of the choice of benchmark portfolio or estimation model, the average selectivity measure is positive, while the average timing measure is negative. Bikker and de Dreu (2006) examine the efficiency of Dutch pension funds. They include in their analysis the investment and administrative costs of pension funds as well as determinants of those costs. The main conclusion of their research is that the major determinant of the costs of Dutch pension funds is their size, i.e. the higher number of fund participants makes the pension fund more costly.

There can be found many publications dedicated to pension funds in Poland. Witkowska and Kompa (2015) examine the performance of Polish open pension funds using measures of risk and investment efficiency (Sharpe ratio, Treynor ratio, and Sortino ratio). The authors reveal, among others, that from the pensioners' point of view, pension funds obtained better results than the indexation of the Social Insurance Institution (responsible for pension benefit under the first pillar). Similar analyses using the same performance measures can be found in the works of Mikulec (2004), Ważna (2017), Czerwińska (2003). Karpio and Żebrowska-Suchodolska (2014) carry out a comparative analysis of open pension funds and open-end stable growth mutual funds and they conclude that investments of those entities are quite similar. In their later research, Karpio and Żebrowska-Suchodolska (2017) confirm previously obtained results using, however, different performance measures (Information Ratio and Sharpe-Israelsen ratio). Witkowska (2017) examines how changes in pension funds regulations affected their performance. Findings of her research prove that all considered changes resulted in increasing the risk of pension funds investment portfolios, which was not reflected in the increase in the rates of return on these portfolios.

As far as the performance of institutions operating in the third pillar and their pension products is considered, there can be found much less literature than in the case of pension funds. Dopierała (2017a, 2017b, 2018) examines the efficiency of pension products offered by life insurance companies. Similar research was carried out by Cwynar et al. (2016). However, those authors focus on one product offered by life insurance companies, i.e. unit-linked insurance funds. In 2012, the third pillar of the Polish pension system was extended as another form of voluntary pension savings was added. These were voluntary pension funds. Although this form of retirement saving is still a marginal part of the third pillar, publications on its functioning can be found. For example, Marcinkiewicz (2015) investigates the investment performance of voluntary pension funds. According to the best of our knowledge, performance of the mutual funds operating in the third pillar of the pension system has not been analyzed by researchers. However, there is a number of studies devoted to the mutual funds' performance using different methods and measures, for example: Agarwal and Pradhan (2018), Babalos et al. (2012), Bangash (2012), Cederburg et al. (2018), Edelen (1999), Wermers (2000), Hili, Pace and Grima (2016), Zamojska (2012), Christensen (2003).

This study was created in response to an empirical gap regarding the effectiveness of mutual funds as part of the voluntary part of the pension system.

1.2. Genesis and development of the third pension pillar in Poland

The reform of the pension system introduced in Poland in 1999 was largely forced by demographic trends, especially the extension of life and the decline in the fertility rate. There is no doubt that the pay-as-you-go pension system did not provide sufficient funds necessary to meet the demand resulting from the growing post-working age population, because it was on the verge of financial efficiency and there were serious fears that even small macroeconomic shocks could cause it to collapse. The steady increase in pension expenditures led to an increase in the allocation of resources to the older generation. The Polish society was aware of the need to reform the system not only because of the excessive burden of contributions to the Social Security Fund, but also because of the incontrovertible fact that increasingly expensive pension expenses, requiring continuous state subsidies, limited spending on other equally important social goals. Therefore, it was necessary to carry out thorough changes in the pension security system in such a way as to make it immune to macroeconomic crises and demographic processes. The essence of the reformed pension system is that the state ceased to be fully responsible for providing benefits for people who ended their professional activity and transferred it partly to employers and employees, by creating a system with three pillars, each representing a different concept of securing the future. The first pillar (Social Insurance Institution) and the second pillar (OPF) were universal and obligatory. The third pillar was of a voluntary nature; however, it was to be seen as an important and indispensable element of the new pension system. Strengthening the role of this part of the pension system is necessary due to the significant reduction of the replacement rate forecast for the mixed pension system (see for example Chorkowy (2018), Jajko-Siwek (2015), Szczepański (2015), Hausner (2002)).

In Poland, the third pillar includes three forms of collecting retirement savings: occupational pension schemes, individual pension accounts (IPA), and individual pension security accounts (IPSA). In the initial period of operation of the reformed pension system, there were only occupational pension programs. The possibility of saving on an individual pension account was introduced by the legislator in September 2004. Eight years later, in 2012, the third pillar was expanded with individual pension security accounts. This article analyzes the functioning of individual forms of saving, i.e. IPA and IPSA.

An individual pension account can be offered by an investment fund company; an entity conducting brokerage activities; an insurance company; a bank; and since 2012 by a pension funds society. Those forms of IPA differ among each other with the level of investment risk, the scope of possible investment strategies, the type

and amount of fees charged, or the method of securing savings in the case of bankruptcy of the managing entity. Thanks to this diversity, an insured person has the opportunity to choose the strategy for investing the entrusted funds, as well as to diversify investment risk and change investment policy by making transfers between various forms of IPA. Therefore, the legislator allowed people to adjust their pension plans and investment profile to the current economic situation and condition of the financial market, and most importantly – the wrong decision about choosing a specific form of IPA does not mean negative consequences until the end of the savings period.

From the beginning of the operation, the third pillar did not develop in line with the reformers' assumptions. According to government forecasts, in the first year of IPA operation, about 1.7 million to 3.5 million Poles would have to collect additional funds in this form worth around PLN 2–3 billion. The pessimistic scenario assumed the creation of around 600,000 accounts (Insurance and Pension Funds Supervisory Commission, 2006). The actual results turned out to be ten times lower than the lower limit of the forecast. From the beginning of September to the end of December 2004, just over 174,000 IPAs were created, for which a total of less than PLN 170 million was deposited. Retirement accounts offered by insurance companies enjoyed the greatest popularity – at the end of 2004, these institutions accounted for over 60% of the total number of accounts (almost 111 thousand), while the least interest was generated by IPAs offered by entities conducting brokerage activities (6,279 accounts). In subsequent years, IPA still did not bring the expected results. At the end of 2018, the number of individual pension accounts reached the level of just 995,651. Insurance companies still had the most accounts (almost 563 thousand), while the least were voluntary pension funds (5.3 thousand). The total value of savings deposited in IPAs amounted to PLN 8,691 million.

In 2012, the possibility of saving money in individual pension security accounts was introduced. IPSA operates on principles similar to IPA and can be offered in the same forms, however, tax solutions have been constructed differently, thanks to which a larger number of potential clients may find a product that is appropriate to their needs and expectations. It should be noted that one person can have both an IPA and IPSA at the same time. The introduction of another form of pension saving has also not encouraged Poles to take advantage of the third pillar. At the end of 2018, the number of IPSA amounted to 730,389 and total value of saving collected in these accounts was PLN 2,314 million. Taking into consideration the structure of pension savings in the form of IPSA, the most popular are accounts offered by insurance companies (in 2018, 447,303 IPSA).

As it was mentioned above, one person can have both an IPA and IPSA simultaneously. For this reason, when analyzing the level of development of the third pillar, one should not sum up the statistics for these two forms of saving. However, even adding the number of IPA and IPSA, we obtain less than 2 million pension accounts, which means that less than 10% of eligible persons use this part of the pension system. Among the factors that inhibit the development of IPA and IPSA,

the most common are lack of awareness of the need to collect individual retirement savings and low knowledge among potential customers about the products offered. In this respect, institutions offering voluntary individual pension accounts have great opportunities to take actions to attract customers, because it depends on their promotional and informational activity, as well as on the attractiveness of their products, as perceived by potential customers.

1.3. Mutual funds in the third pillar in Poland

Individual pension accounts and individual pension security accounts offered by mutual funds companies are the second most-used pension product in the third pillar in Poland, following pension accounts offered by insurance companies. In 2018, 32% of people having an IPA account and 20% of those having an IPSA account chose to save in a mutual fund.

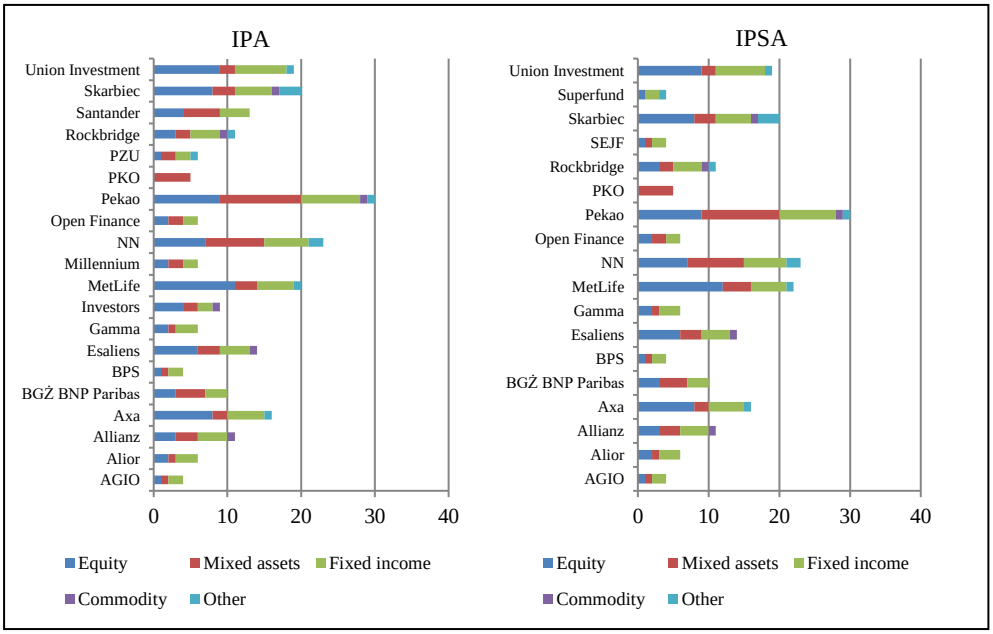

Fig. 1. The number of particular mutual funds in the individual pension accounts offer and in the individual pension security accounts offer (as of 30.01.2019). Own study based on data regarding the investment funds provided by https://www.analizy.pl (30.01.2019)

According to the data of the Chamber of Fund and Asset Management (2019), in January 2019, there were 42 investment fund companies operating on the Polish

capital market. Those entities offered 1,223 different types of mutual funds. However, less than half of investment fund companies decided to introduce pension accounts into their offer, i.e. 20 of them offer IPA and only 18 IPSA (see Figure 1). In total, 239 mutual funds were dedicated for individual pension accounts and 215 for individual pension security accounts. There were different types of mutual funds, i.e. equity, mixed assets, fixed income, commodity and other. In the case of individual pension accounts, the largest number of mutual funds (30) was offered by the Pekao investment company, including mainly mixed assets and equity funds. MetLife, Nationale Nederlanden and Skarbiec investment companies offered around 20 mutual funds as IPA (mainly equity funds).

The IPSA market looks similar to IPA. Pekao investment company once again offers the biggest number of mutual funds in this area (also 30). Similarly, MetLife, Nationale Nederlanden and Skarbiec investment companies have had in their offer around 20 mutual funds as IPSA, and also mainly as equity funds. Therefore, the offer of mutual funds in the third pillar of the Polish pension system is not very diverse despite the large potential of this market.

2. PROFITABILITY AND INVESTMENT EFFICIENCY OF MUTUAL FUNDS AVAILABLE UNDER THE THIRD PILLAR

2.1. Data and methodology

In this article, we used the data obtained from Refinitiv to assess the investment efficiency of mutual funds available under the third pillar of the Polish pension system. The data included weekly valuation of participation units of the following types of funds: equity, mixed assets and fixed income. In our research, we also took into consideration OPF, which will be transformed into open-end investment funds operating under IPA in line with Polish government plans in 2020. We conducted a long-term analysis in the period of 2009–2019 and a medium-term analysis, using data from 2014–2019. The long-term analysis is the most useful for the assessment of pension instruments. The medium-term analysis was used to assess the impact of legislative changes on the investment efficiency of mutual funds. The mentioned amendments, implemented from 2014, were connected with the share of government debt instruments in OPF portfolios. The sample covers years of 2009–2019 consisted of 114 funds and the set of data encompasses the period of 2014–2019 covered 161 funds.

For the profitability assessment, we used a simple rate of return calculated by formula (1):

$$r_{i,t,} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}, \tag{1}$$

where:
$r_{i,t,}$ is the simple rate of return of fund *i* at time *t*,
$P_{i,t}$ is the value of participation units of fund *i* at time *t*,
$P_{i,t-1}$ is the value of participation units of fund *i* at time $t - 1$.

However, the evaluation of the investment efficiency should also take into account the risk. In our article, we used the Sharpe ratio (Sharpe, 1966), expressed in a formula (2):

$$S_{it} = \frac{R_{it} - R_{ft}}{\sigma_{it}}, \tag{2}$$

where:
S_{it} is the Sharpe ratio for fund *i* in period *t*,
R_{it} is the average rate of return of fund *i* in period *t*,
R_{ft} is the average value of risk-free rate in period *t*,
σ_{it} is the standard deviation of rate of return of fund *i* in period *t*.

The Sharpe ratio is considered to be a classic measure of efficiency that determines the risk by the variability of the rate of return. In addition, the most important advantage of the Sharpe ratio is the simplicity of the interpretation. For that reason, it is one of the most commonly used measures of investment efficiency. The application of standard deviation as a risk measure requires the normal distribution that occurs in relation to the rates of fund return. However, the Sharpe ratio provides significant results also in the absence of this assumption, as presented in the Eling and Schuhmacher study (2007). The fund rankings obtained from the Sharpe ratio were almost exactly correlated with the rankings created on measures that did not require a normal distribution. Their research was based on hedge fund data, where the distribution of rates of return was significantly different from the normal one.

In our study, we adopted as a risk-free rate the Polish Overnight Index Average (POLONIA rate), which is calculated as the weighted average of overnight transaction in Poland.

In our research, to assess the impact of a fund type on its profitability and investment efficiency, we performed a non-parametric Kruskal-Wallis test (Kruskal, Wallis, 1952). The parametric equivalent of this test is the ANOVA, which we did not conduct due to non-normal distribution of the analyzed parameters and the variance heterogeneity in certain group of funds. The following hypotheses are formulated in the Kruskal-Wallis test:

$$H_0: \theta_1 = \theta_2 = \cdots = \theta_k,$$

H_1: θ_j are not all equal (j = 1, 2, ..., k).

The test statistic *H* is given by the formula (3):

$$H = \frac{1}{C}\left(\frac{12}{N(N+1)}\sum_{j=1}^{k}\left(\frac{\left(\sum_{i=1}^{n_j} R_{ji}\right)^2}{n_j}\right) - 3(N+1)\right), \tag{3}$$

where:
$N = \sum_{j=1}^{k} n_j$,
n_j is the number of observation in group for (j = 1, 2, …, k),
R_{ji} is the rank assigned to the variable value for (i = 1, 2, …, n_j), (j = 1, 2, …, k),
$C = 1 - \frac{\sum(t^3 - t)}{N^3 - N}$ is a correction factor for tied ranks,
t is the number of type observations in the group.

To perform the post-hoc multiple comparisons, we used a test proposed by Siegel and Castellan (1988), where z values for each comparison between groups u and v are computed as (4):

$$z_{u,v} = \frac{|\overline{R_u} - \overline{R_v}|}{\sqrt{\frac{N(N+1)\left(\frac{1}{n_u} + \frac{1}{n_v}\right)}{12}}} , \tag{4}$$

where:
$\overline{R_u}$, $\overline{R_v}$ are the average ranks for the two groups,
n_u, n_v are the number of observations in the two groups.

2.2. Results and discussion

The annual return is the first parameter analyzed in our research. We presented the descriptive statistics in Table 1.

Table 1. Annual return – descriptive statistics

Fund type	*N*	Mean	Median	Min	Max	SE	Skewnes	Kurtosis
2009–2019								
Equity	43	0.065	0.066	0.009	0.117	0.027	–0.016	–0.501
Mixed assets	31	0.042	0.041	0.005	0.096	0.024	0.477	–0.311
Fixed income	30	0.039	0.038	0.026	0.106	0.014	3.479	15.970
OPF	10	0.059	0.060	0.055	0.066	0.004	0.323	–0.542
2014–2019								
Equity	61	0.021	0.022	–0.196	0.143	0.057	–1.263	4.299
Mixed assets	40	0.001	0.011	–0.234	0.095	0.060	–2.846	10.074
Fixed income	50	0.020	0.024	–0.182	0.054	0.031	–5.593	36.111
OPF	10	0.038	0.037	0.031	0.046	0.005	0.291	–1.155

Own elaboration.

The results for the long period indicated that the highest rates of return were generated by the equity funds with the highest mean and median values at the 6.5% and 6.6% levels, respectively. However, the investment results in this group of funds were the least homogeneous. The annual return was lower in the case of mixed assets funds and the fixed income funds. This occurrence is related to the stock market trend that has been positive for the equity funds in the last ten years (see Figure 2).

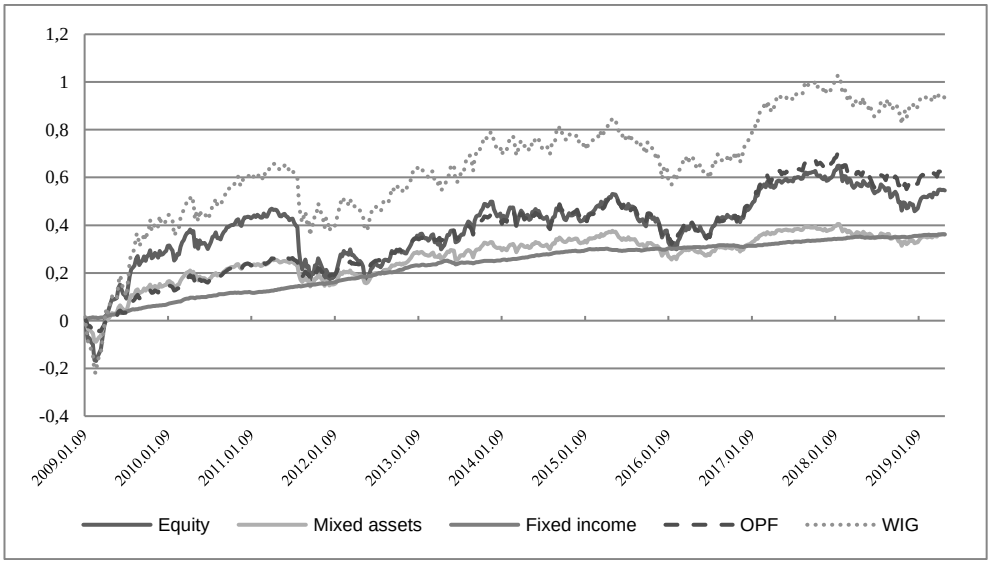

Fig. 2. Cumulative median of the weekly rate of return by fund type and cumulative weekly rate of return of WIG index. Own elaboration

However, it cannot be claimed that the rate of return of the average equity fund achieved a particularly high level, because the annual return of a passive portfolio based on the WIG index (Warsaw Stock Exchange Index) reached 8.5% in the same period. In addition, it is interesting to note that the results of the OPF profitability analysis showed the mean and median values of annual return at the 5.9% and the 6.0% levels, respectively, in the same period.

Our study also revealed that the particularly high profitability of OPF occurred in the period of 2014–2019. The reason for this is probably that, since 2014, the investment portfolio of OPF has mainly included shares, which caused the increase profitability in the favorable period of the business cycle. Moreover, the investment results of OPF were on average better than those obtained for the equity funds available under the third pillar. This observation may also be related to expansion in the share of foreign instruments in the OPF portfolio, which began in 2012 and increased especially after the prohibition of investing in debt securities of the

Polish government (Adamska-Mieruszewska, Mosionek-Schweda, 2017). Figure 2 shows that the median profitability of OPF achieved a value close to the median profitability of mixed assets fund until 2012. Since 2012, the median rate of return OPF has indicated a similar value to the median rate of return equity fund, and from 2017 even higher.

We also performed the Kruskal-Wallis test (see Table 2), which indicated that the impact of the fund type on its profitability is statistically significant at the 1% level. Moreover, we conducted a post-hoc multiple comparisons analysis, showing that differences occurred between equity funds and mixed assets funds, equity funds and fixed income funds as well as OPF and fixed income funds in the period 2009–2019, statistically significant at the 5% level.

Table 2. Annual return – Kruskal-Wallis test and *p*-value for post-hoc multiple comparisons

2009–2019				
Kruskal-Wallis test: H (3, N = 114) = 29.612 $\mathbf{p = 0.000}$				
Fund type	**Equity Average rank: 75.14**	**Mixed assets Average rank: 45.26**	**Fixed income Average rank: 38.57**	**OPF Average rank: 76.40**
Equity		$\mathbf{p = 0.001}$	$\mathbf{p = 0.000}$	p = 1.000
Mixed assets	$\mathbf{p = 0.001}$		p = 1.000	p = 0.057
Fixed income	$\mathbf{p = 0.000}$	p = 1.000		$\mathbf{p = 0.010}$
OPF	p = 1.000	p = 0.057	$\mathbf{p = 0.010}$	
2014–2019				
Kruskal-Wallis test: H (3, N = 161) = 16.222 $\mathbf{p = 0.001}$				
Fund type	**Equity Average rank: 82. 89**	**Mixed assets Average rank: 62.00**	**Fixed income Average rank: 85.00**	**OPF Average rank: 125.50**
Equity		p = 0.166	p = 1.000	$\mathbf{p = 0.044}$
Mixed assets	p = 0.166		p = 0.120	$\mathbf{p = 0.001}$
Fixed income	p = 1.000	p = 0.120		p = 0.073
OPF	$\mathbf{p = 0.044}$	$\mathbf{p = 0.001}$	p = 0.073	

Own elaboration.

In the classical portfolio theory, a rational investor should take into account not only the profitability, but also investment risk (Markowitz, 1952). Referring to this concept, in our study, the Sharpe ratio indicated that fixed income funds showed

the average highest efficiency in the long and medium term as detailed in Table 3. Moreover, mixed assets funds achieved the lowest average efficiency. One of the most important elements in our research is the high investment efficiency of OPF connected with the relatively high quality of assets management in comparison with equity funds and mixed assets funds. In addition, it is interesting to note that the Sharpe ratio reached 0.048 for a passive portfolio based on the WIG index in 2009–2019, which means that the majority of OPF achieved the above average investment efficiency in this period.

Table 3. Sharpe ratio – descriptive statistics

Fund type	***N***	**Mean**	**Median**	**Min**	**Max**	**SE**	**Skewnes**	**Kurtosis**
2009–2019								
Equity	43	0.035	0.036	–0.015	0.078	0.024	–0.050	–0.633
Mixed assets	31	0.023	0.021	–0.051	0.088	0.038	–0.071	–0.811
Fixed income	30	0.062	0.067	–0.018	0.146	0.041	–0.039	–0.444
OPF	10	0.051	0.051	0.044	0.062	0.006	0.764	–0.027
2014–2019								
Fund type	*N*	Mean	Median	Min	Max	SE	Skewnes	Kurtosis
Equity	61	0.009	0.006	–0.074	0.100	0.042	0.103	–0.557
Mixed assets	40	–0.012	–0.013	–0.167	0.113	0.056	–0.018	0.696
Fixed income	50	0.092	0.072	–0.084	0.983	0.153	4.156	23.648
OPF	10	0.029	0.027	0.020	0.040	0.006	0.359	–1.104

Own elaboration.

The results of the Kruskal-Wallis test are presented in Table 4. Our research found that the type of fund had an impact on the investment performance achieved, which is statistically significant at the 1% level in the long period of 2009–2019 as well as 2014–2019. In both cases, differences between fixed income funds and equity funds as well as between fixed income funds and mixed assets fund are statistically significant at the 5% level. It means the higher efficiency of safe funds compared to those based on equities. However, this is mainly related to the poor management quality for most equity funds and mixed assets funds, which did not achieve a rate of return proportional to the risk incurred. Moreover, only a small group of funds are able to match or exceed the results of passively managed benchmarks, which is in line with the results of Jurek-Wasilewska (2014) based on the data of open mutual funds from 2001–2010 and with the results of Dopierała (2018) based on the insurance unit-linked funds available under IKE in the period of 2005–2015.

Table 4. Sharpe ratio – Kruskal-Wallis test and *p*-value for post-hoc multiple comparisons

2009–2019				
Kruskal-Wallis test: H (3, N = 114) = 18.083 ***p* = 0.004**				
Fund type	**Equity Average rank: 51.74**	**Mixed assets Average rank: 43.26**	**Fixed income Average rank: 75.93**	**OPF Average rank: 71.00**
Equity		p = 1.000	***p* = 0.013**	p = 0.572
Mixed assets	p = 1.000		***p* = 0.001**	p = 0.123
Fixed income	***p* = 0.013**	***p* = 0.001**		p = 1.000
OPF	p = 0.572	p = 0.123	p = 1.000	
2014–2019				
Kruskal-Wallis test: H (3, N = 161) = 38.211 ***p* = 0.000**				
Fund type	**Equity Average rank: 70.79**	**Mixed assets Average rank: 55.00**	**Fixed income Average rank: 112.16**	**OPF Average rank: 91.50**
Equity		p = 0.576	***p* = 0.000**	p = 1.000
Mixed assets	p = 0.576		***p* = 0.000**	p = 0.161
Fixed income	***p* = 0.000**	***p* = 0.000**		p = 1.000
OPF	p = 1.000	p = 0.161	p = 1.000	

Own elaboration.

In our view, it is worth emphasizing the positive assessment of OPF portfolio management as their investment efficiency was closest to the investment efficiency of fixed income funds.

3. CONCLUSIONS

The collection of additional retirement savings is a highly-current research issue, especially in the context of the progressive aging of societies. In countries such as Poland, where the replacement rate from the first pillar will be decreasing, the third pillar of the pension system should be treated more significantly. Despite the lack of sufficient development of additional pension schemes, it is an important issue to determine the level of efficiency from the point of view of future pensioners.

Our research proves that in Poland the type of mutual fund has a significant impact on investment efficiency. However, the hypothesis that the investment efficiency of pension accounts offered by mutual funds is higher than the effectiveness

of OPF, has been only partially positively verified. The highest investment efficiency is achieved by fixed income funds available under the third pillar. Equity funds and mixed asset funds have a lower investment efficiency than OPF. This occurrence is in line with the low assessment of the management level of investment funds in Poland, analyzed in previous studies. This conclusion is important especially in the context of planned changes in the activities of OPF, which will be transformed into mutual funds and will be operate as IPA. In this situation, it will be possible to transfer funds from OPF to other institutions offering IPA, also to those whose investment efficiency is much lower. Ultimately, this may cause a slower increase in retirement savings.

LITERATURE

Adamska-Mieruszewska, J., Mosionek-Schweda, M. (2017). Foreign investments in the portfolio of the Polish open pension funds in 1999–2016. *Zeszyty Naukowe Politechniki Poznańskiej*, seria „Organizacja i Zarządzanie", 73, 5–21.

Agarwal, P.K., Pradhan, H.K. (2018). Mutual Fund Performance Using Unconditional Multifactor Models: Evidence from India. *Journal of Emerging Market Finance*, 17 (2 suppl), 157–184.

Babalos, V., Philippas, N., Doumpos, M., Zopounidis, C. (2012). Mutual funds performance appraisal using stochastic multicriteria acceptability analysis. *Applied Mathematics and Computation*, 218(9), 5693–5703.

Bangash, R. (2012). Evaluation of European Mutual Funds Performance. *World Journal of Social Sciences*, 2(1), 154–173.

Bikker, J., de Dreu, J. (2006). *Pension fund efficiency: the impact of scale, governance and plan design* (No. 109). Netherlands Central Bank, Research Department.

Bohl, M.T., Lischewski, J., Voronkova, S. (2011). Pension funds' performance in strongly regulated industries in Central Europe: Evidence from Poland and Hungary. *Emerging Markets Finance and Trade*, 47 (sup 3), 80–94.

Cederburg, S., O'Doherty, M.S., Savin, N.E., Tiwari, A. (2018). *Conditional Benchmarks and Predictors of Mutual Fund Performance*. Available at SSRN 2733254.

Chamber of Fund and Asset Management (2019). *Reports. Assets of investment funds*. Warsaw: Chamber of Fund and Asset Management. https://www.izfa.pl/en/reports (15.05.2019).

Chorkowy, B. (2018). Obowiązkowa część systemu emerytalnego – jaka będzie wysokość emerytury przeciętnego Polaka? *Studia Ekonomiczne*, 349, 36–46.

Christensen, M. (2003). *Evaluating Danish mutual fund performance*. Århus: Institut for Finansiering, Handelshøjskolen.

Coggin, T.D., Fabozzi, F.J., Rahman, S. (1993). The investment performance of US equity pension fund managers: An empirical investigation. *The Journal of Finance*, 48(3), 1039–1055.

Cwynar, A., Cwynar, W., Kaźmierkiewicz, P., Ostrowska-Dankiewicz, A. (2016). Efektywność ubezpieczeniowych funduszy kapitałowych w Polsce. *Ekonomia. Rynek, Gospodarka, Społeczeństwo*, 45, 29–51.

Czerwińska, T. (2003). Pomiar i ocena efektywności inwestycyjnej otwartych funduszy emerytalnych. *Bank i Kredyt*, 56.

Data regarding the investment funds offer retrieved from https://www.analizy.pl (03.01.2019).

Dopierała, Ł. (2017a). Efektywność produktów emerytalnych oferowanych przez zakłady ubezpieczeń na życie na przykładzie IKE. *Finanse i Prawo Finansowe*, 2(14), 23–39.

Dopierała, Ł. (2017b). Efektywność zarządzania oszczędnościami emerytalnymi przez zakłady ubezpieczeń. *Zeszyty Naukowe Politechniki Poznańskiej*, seria „Organizacja i Zarządzanie", 73, 51–61.

Dopierała, Ł. (2018). *Indywidualne konta emerytalne prowadzone przez zakłady ubezpieczeń. Efektywność inwestycyjna i zasady funkcjonowania*. Gdańsk: Wyd. Uniwersytetu Gdańskiego.

Edelen, R.M. (1999). Investor flows and the assessed performance of open-end mutual funds. *Journal of Financial Economics*, 53(3), 439–466.

Eling, M., Schuhmacher, F. (2007). Does the choice of performance measure influence the evaluation of hedge funds? *Journal of Banking & Finance*, 31(9), 2632–2647.

Hausner, J. (2002). Poland: Security through diversity. In: *Social security pension reform in Europe*, 349–364. Chicago–London: University of Chicago Press.

Hili, J., Pace, D., Grima, S. (2016). Equity mutual fund performance evaluation: an emerging market perspective. In: *Contemporary Issues in Bank Financial Management*, 93–132. Emerald Group Publishing Limited.

Insurance and Pension Funds Supervisory Commission (2006). Rynek indywidualnych kont emerytalnych. Analiza. *Biuletyn Miesięczny*, 3(80).

Jajko-Siwek, A. (2015). Równoległe ścieżki emerytalne – koncepcja kalkulacji świadczeń dla osób z różnych typów gospodarstwa domowego. *Problemy Polityki Społecznej. Studia i Dyskusje*, 29, 35–46.

Jurek-Wasilewska, K. (2014). Efektywność inwestowania w otwartych funduszach inwestycyjnych w Polsce w latach 2001–2010. *Finanse i Prawo Finansowe*, 1, 20–34.

Karpio, A., Żebrowska-Suchodolska, D. (2014). Efektywność inwestycyjna funduszy emerytalnych na tle FIO stabilnego wzrostu. *Metody Ilościowe w Badaniach Ekonomicznych*, 15(4), 26–36.

Karpio, A., Żebrowska-Suchodolska, D. (2017). Efektywność inwestycyjna polskich funduszy emerytalnych przy zmianie benchmarku rynkowego. *Annales Universitatis Mariae Curie-Skłodowska, sectio H–Oeconomia*, 51(5), 149.

Kruskal, W.H., Wallis, W.A. (1952). Use of ranks in one-criterion variance analysis. *Journal of the American Statistical Association*, 47(260), 583–621.

Marcinkiewicz, E. (2015). Dobrowolne fundusze emerytalne w Polsce – analiza działalności i wyników inwestycyjnych. In: F. Chybalski, E. Marcinkiewicz (Eds.). *Współczesne problemy systemów emerytalnych. Wybrane zagadnienia*, 196–209. Łódź: Wyd. Politechniki Łódzkiej.

Markowitz, H. (1952). Portfolio selection. *The Journal of Finance*, 7(1), 77–91.

Mikulec, A. (2004). Ocena efektywności inwestowania otwartych funduszy emerytalnych. *Wiadomości Statystyczne*, 9, 26–39.

Polish Financial Supervision Authority (2019). *Pension System Statistics*. Warsaw: Polish Financial Supervision Authority. https://www.knf.gov.pl/publikacje_i_opracowania (14.05.2019).

Sharpe, W.F. (1966). Mutual fund performance. *The Journal of Business*, 39(1), 119–138.

Siegel, S., Castellan, N.J. (1988). *Nonparametric Statistics for Behavioral Sciences*, 213–214. New York: McGraw-Hill.

Szczepański, M. (2015). Ryzyko ubóstwa osób starszych a konstrukcja zreformowanego systemu emerytalnego w Polsce. *Zeszyty Naukowe Uniwersytetu Szczecińskiego. Finanse. Rynki Finansowe. Ubezpieczenia*, (73), 441–451.

Ważna, E. (2017). Efektywność inwestowania otwartych funduszy inwestycyjnych w Polsce w latach 2007–2014. *Zeszyty Naukowe Uczelni Vistula*, 56 (5) Ekonomia XV, 64–83.

Wermers, R. (2000). Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses. *The Journal of Finance*, 55(4), 1655–1695.

Witkowska, D. (2017). *Zmiana warunków funkcjonowania a efektywność inwestycyjna otwartych funduszy emerytalnych*. Warszawa: Difin.

Witkowska, D., Kompa, K. (2015). Ocena efektywności funduszy emerytalnych z wykorzystaniem metod porządkowania liniowego. *Metody Ilościowe w Badaniach Ekonomicznych*, 16(4), 191–200.

Zamojska, A. (2012). *Efektywność funduszy inwestycyjnych w Polsce. Studium teoretyczno-empiryczne*. Warszawa: C.H. Beck.

FUNDUSZE INWESTYCYJNE JAKO INSTRUMENT ZABEZPIECZENIA EMERYTALNEGO NA PRZYKŁADZIE POLSKI

Streszczenie

Głównym celem artykułu jest ocena funduszy inwestycyjnych jako instrumentów dodatkowego zabezpieczenia emerytalnego na przykładzie Polski. W artykule scharakteryzowano funkcjonowanie trzeciego filaru polskiego systemu emerytalnego ze szczególnym uwzględnieniem indywidualnych form zabezpieczenia emerytalnego. W celu oceny efektywności inwestycyjnej funduszy dostępnych w ramach trzeciego filaru w latach 2009–2019 wykorzystano wskaźnik Sharpe'a. Ponadto przeprowadzono test Kruskala-Wallisa, dzięki któremu wykazano, że typ funduszu jest czynnikiem wpływającym istotnie na jego efektywność. Testy *post-hoc* wykazały, że największą efektywnością inwestycyjną cechują się fundusze oparte na instrumentach dłużnych.

Słowa kluczowe: system emerytalny, efektywność inwestycyjna, trzeci filar, fundusze inwestycyjne