EVALUATING FINANCIAL PERFORMANCE OF PENSION FUNDS IN SLOVAKIA

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Abstract

Financial industry companies should inform financial services consumers clearly about performance of their funds and they should provide this information in a detailed manner. Based on this consideration, the paper presents a methodology of financial performance evaluation consisting of several performance indicators. We apply this methodology in evaluating the performance of pension funds in the 2nd pillar in Slovakia and to their benchmarks using monthly returns since the inception in 2005. We use two different benchmarks methodologies to compare pension funds' performance: static benchmark and dynamic benchmark, which allows us to compare fund s' performance based on the changes in portfolio structure over time. This paper provides a practical insight for savers which could be used during their decision making process.

Key words: *pension funds' performance, dynamic benchmark, Sharpe ratio, Sortino ratio, Treynor ratio, information ratio.*

1. Introduction

Pension funds and mutual funds are both a form of collective investment, where money collected in funds are invested based on investment policy design by portfolio manager. Pension or mutual funds are obviously actively or passively managed by portfolio managers. Active management is the use of portfolio managers to actively manage a fund's portfolio. In general, portfolio manager tries to beat the market and deliver better risk-reward parameters than the market. On the other side, portfolio manager who prefers passive management only copies predefined market indexes such a S&P 500, Dow Jones Industrial Average 30, Russell 3000 (US indexes) or Deutsche stock index (DAX). This approach corresponds to efficient market hypothesis (EMH) formulated by Eugen Fama in 1964 and further analyzed by Asch et al. (1986). According to the EMH, stocks always trade at their fair value on stock exchanges, making it impossible for investors to either purchase undervalued stocks or sell stocks at inflated prices. As such, it should be impossible to outperform the overall market through expert stock selection or market timing, and the only way an investor can possibly obtain higher returns is by purchasing riskier investments. During last fifty years, mainly

academics create plenty of methods or ratios which are inteded to measure the risk-adjusted fund performance. These ratios allow to answer the question every investor should ask before choosing any investment fund: "Is this portfolio manager able to outperform the market?"

In our paper we focus on measuring the risk-adjusted performance of pension funds in the 2nd (1bis) pillar in Slovakia. This is one of the biggest collective scheme in Slovakia. It has almost 6,8 bil. € in assets under management. Currently, there are 20 pension funds managed by 6 pension fund management companies in the 2nd pillar in Slovakia. The Act no. 43/2014 Coll. on old-age savings distinguishes two types of pension funds: guaranteed (bond funds) and non-guaranteed (equity, index and mixed funds). Bonds, equity and mixed funds are actively managed by portfolio managers and index funds are passively managed (replicating the performance of pre-selected market indexes).

Financial professionals employ plenty of different financial ratios to evaluate risk-adjusted performance of financial instruments. In our paper we work with ratios which allow us to evaluate risk-adjusted performance of 2nd pillar pension fund from an investor´s (saver´s) point of view. To evaluate pension fund performance, we implement two different approaches to the benchmark construction. Static approach allows us to copy selected market index (or relevant market ETF) at a constant weight during the analyzed period. Dynamic approach allows us to build a benchmark that adjusts to the pension fund portfolio structure on a monthly basis. Portfolio structure may change on a month-to-month basis as the pension fund portfolio manager executes his investment strategy. Dynamic benchmark thus copies the weight of asset classes in the pension fund portfolio. Further in the text we show, that these two approaches lead to different conclusions.

2. Theory, Data and Methodology

In this paper we work with discrete monthly returns for every pension fund in 2nd pillar in Slovakia since March 2005 till June 2016. The dataset consists of daily data on pension fund performance (officially CVPU – Current Value of Pension Unit), which have been extracted from the private database managed by the Institute of Savings and Investment (www.manazeruspor.sk).

The table below presents pension fund management company (PFMC) names and pension funds (PFs) category with acronym.

Table 1: Pension fund management companies, pension fund category and their acronym

PFMCs	PFMCs acronym	PFs category	PFs acronym
Aegon	AEG	Stock pension fund	SPF
Allianz	ALL	Mixed pension fund	MPF
AXA	AXA	Bond pension fund	BPF
Postova banka	PB	Index pension fund	IPF
NN	NN		
VUB Generali	VUB		

Source: the authors

To evaluate pension funds' performance, we employ financial ratios which have been widely used by financial industry for evaluation of funds (or more generally, any investment of financial instruments) performance for more than twenty years. We employ Beta coefficient, Jensen´s Alpha (α), Sharpe Ratio (SR), Information Ratio (IR), Treynor Ratio (TR) and Sortino Ratio (SR). We calculate every ratio for every month for last 12 months from beginning to end of our dataset.

In order to compare the pension fund performance to its relevant market benchmark, we decided to construction two different types of benchmarks. Static benchmark is constructed by analyzing the portfolio structure and assigning fixed weights to each benchmark component. Static benchmark holds fixed weight of the components during the whole analyzed period. Benchmark is calculated as ratio between the representative of the stock component (MSCI WORLD index or EUROSTOXX 50 index) and representative of bond component of pension fund (ETF DBXQ or ETF SHY). Benchmark of bond pension funds was calculated only with bond representative, and benchmark of index pension funds was calculated only with stock representative in order to track the investment strategies of those pension funds. The following table presents the weights for stock and bond components of static benchmark for each type of pension funds.

Table 2: Static benchmark structure used for all types of pension funds in 2nd pillar in Slovakia

Pension fund category	Share of stock	Share of bonds
Stock pension funds	60%	40%
Mixed pension funds	40%	60%
Bond pension fund	0%	100%
Index pension fund	100%	0%

Source: authors

Static benchmark does not capture legislative interventions that affected investment strategies of pension funds managers. Secondly, static benchmark lacks the ability to capture the actual pension fund portfolio structure, which changes over time due to the existence of active management.

The construction of dynamic benchmark is based on tracking monthly changes in the pension fund portfolio structure. This approach was initially introduced by Kubaška and Virdzek (2015). When constructing dynamic benchmark, we focus on equity, bond and cash components in pension fund portfolio structure. The information is extracted from pension fund monthly reports on a monthly basis. The percentage of individual components determines the weights of individual asset classes in the construction of the benchmark. As with the static model, we constructed the benchmark for each component, and cash component we recalculated by rate of the ECB / NBS. By observing changes in asset classes on a monthly basis, dynamic benchmark allows us to focus on timing ability of portfolio managers as the pension fund performance is adjusted for the strategic allocation and the difference between the pension fund and benchmark performance is thus determined by tactic allocation (timing). The following table shows the components of dynamic benchmark.

Table 3: Dynamic benchmark composition relevant to portfolio structure of pension funds in 2nd pillar in Slovakia

Portfolio component	Financial tool	Duration
Stock	ETF IWRD	
	ETF MTA	From 1 to 3 years
Bond	ETF MTB	From 3 to 5 years
	ETF MTC	From 5 to 7 years
Cash	ECB/NBS rates	

Source: the authors

Finally, we use monthly yields of Slovak treasury bills from March 2005 to June 2016 as a risk free rate.

According to Fama and French (2004), Beta is a measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole. Beta is used in the capital asset pricing model (CAPM), which calculates the expected return of an asset based on its beta and expected market returns. Beta is calculated as

$$\beta = \frac{\mathrm{cov}(R_P, R_B)}{\sigma_B^2}, \tag{1}$$

where $\mathrm{cov}(R_P, R_B)$ *cov* is covariance between portfolio (fund) returns (R_P) and benchmark returns for (R_B) and variance of benchmark returns (σ_B^2).

Jensen´s Alpha (α) show us how skilled portfolio manager is, because they show us manager´s forecasting ability contributes to the fund´s returns. Because of this measure is based on theory of the pricing of capital assets by Sharpe (1964), Lintner (1965) or Jensen (1968). We use equation below

$$R_P - R_F = \alpha_{Jensen} + \beta_P (R_B - R_F), \tag{2}$$

where R_F is risk free rate, α_{Jensen} is the Jensen Alpha, β_P is the beta coefficient calculated according to equation (1) above. From equation (2) we express the Jensen Alpha as follow

$$\alpha_{Jensen} = R_p - R_F - \beta_P (R_B - R_F). \tag{3}$$

Next we continue with ratios which describes how much excess return investor receives for the extra volatility (risk) measure with different risk measures. Sharpe ratio was ushered by Sharpe (1994, 2007) and we calculate it as follow

$$SR = \frac{E[R_P - R_F]}{\sigma[R_P - R_F]}, \tag{4}$$

where E indicates average return from excess returns between portfolio (fund) returns R_P and risk free rate R_F and σ implies standard deviation from excess returns .

Unlike to Sharpe Ratio, Treynor ratio compare excess return of portfolio to portfolio Beta. Treynor ratio was developed by Treynor (1965) and is calculated as

$$TR = \frac{E[\mathrm{R}_P - \mathrm{R}_F]}{\beta_P}, \tag{5}$$

Sortino ratio was introduced by Frank Sortino in 1968 and described by Sortino and van der Meer (1991) and Sortino et al. (1999). As the Sharpe or Treynor ratio, this ratio measure the risk-adjusted return of portfolio. The Sortino ratio is a variation of the Sharpe ratio that differentiates harmful volatility from total overall volatility by using the asset's standard deviation of negative asset returns, called downside deviation or target downside deviation (TDD). We used Sortino ratio providing by Pedersen and Ruddholm-Alfin (2003) or Pekár et al. (2016) as follows

$$SoR = \frac{E[R_P - R_F]}{TDD}, \tag{6}$$

where *TDD* can be calculated as follows

$$TDD = \sqrt{\frac{1}{T}\sum_{t=1}^{T} \min(0, (\mathrm{R}_{P_t} - R_F))^2}. \quad (7)$$

Last ratio used to evaluate pension fund performance is Information ratio.

$$IR = \frac{E[R_P - R_B]}{\sigma[R_P - R_B]}, \quad (8)$$

This ratio is similar to Sharpe ratio, however *IR* follows average excess returns between portfolio (fund) returns and benchmark returns with their standard deviation. This ratio was introduced by Goodwin (1998). The information ratio is used to assess the risk-adjusted performance of active portfolio managers and can be used to evaluate the added value of active management from the perspective of the overall risky portfolio.

In our cases we are working with monthly returns for last 12 months and calculate every ratio in monthly bases.

3. Results and discussion

In this paper we work with average monthly returns for every type of pension funds, because Karkošiaková et al. (2016) demonstrate strong correlation between monthly stock returns of pension funds in the same category. In table below we provide correlation analyses between monthly returns for pension funds in 2nd pillar in Slovakia with their static (Table 4) and dynamic (Table 5) benchmarks.

Table 4: Correlation between monthly returns of pension funds in 2nd pillar in Slovakia and their appropriate static benchmark

Company name and pension fund	Correlation coefficient	Company name and pension fund	Correlation coefficient	Company name and pension fund	Correlation coefficient	Company name and pension fund	Correlation coefficient
Aegon SPF	0,67	Aegon BPF	0,22	Aegon IPF	0,99	PB MPF	0,64
Allianz SPF	0,61	Allianz BPF	0,22	AXA IPF	0,99	NN MPF	0,61
AXA SPF	0,71	AXA BPF	0,12	PB IPF	0,96	VUB MPF	0,64
PB SPF	0,61	PB BPF	0,34	NN IPF	0,98		
NN SPF	0,61	NN BPF	0,14	VUB IPF	0,98		
VUB SPF	0,67	VUB BPF	0,12				

Source: the authors

We demonstrate stronger correlation between pension funds´ monthly returns and dynamic benchmark than static benchmark. This is due to the fact, that dynamic benchmark better reflects pension fund structure and its changes on a month-over-month basis which also influences benchmark performance.

Table 5: Correlation between monthly returns of pension funds in 2nd pillar in Slovakia and their appropriate dynamic benchmark

Company name and pension fund	Correlation coefficient	Company name and pension fund	Correlation coefficient	Company name and pension fund	Correlation coefficient	Company name and pension fund	Correlation coefficient
Aegon SPF	0,87	Aegon BPF	0,48	Aegon IPF	0,99	PB MPF	0,76
Allianz SPF	0,94	Allianz BPF	0,56	AXA IPF	0,99	NN MPF	0,84
AXA SPF	0,95	AXA BPF	0,69	PB IPF	0,90	VUB MPF	0,90
PB SPF	0,82	PB BPF	0,61	NN IPF	0,83		
NN SPF	0,86	NN BPF	0,55	VUB IPF	0,99		
VUB SPF	0,95	VUB BPF	0,31				

Source: the authors

In tables below we provide descriptive statistic of 136 observations (index funds have only 51 observations, because they have been operational only since April 2012) for Beta coefficient calculated separately for static and dynamic benchmarks. In general we will work with aggregate values for each indicator and primary analyze indicator values greater than 0, less or equal than 0 and Greater than 1 for both type of benchmarks.

Table 6: CAPM Beta calculations results

	SPF-static	BPF-static	IPF-static	MPF-static	SPF-dynamic	BPF-dynamic	IPF-dynamic	MPF-dynamic
Greater than 0	94,85%	80,15%	98,04%	96,32%	97,06%	91,18%	98,04%	88,24%
Less or equal than 0	5,15%	19,85%	1,96%	3,68%	2,94%	8,82%	1,96%	11,76%
Greater than 1	0%	18,38%	0,00%	1,47%	2,94%	52,21%	11,76%	42,65%
Average	0,2218	0,3138	0,9094	0,2983	0,7755	0,9451	0,8853	0,7390
SD	0,2545	0,4230	0,1463	0,3072	0,3168	0,6328	0,1532	0,6574
5 % percentile	0,0003	-0,0756	0,8151	0,0141	0,2202	-0,2732	0,7379	-0,9692
95 % percentile	0,8248	1,0423	0,9927	0,9615	0,9909	1,9102	1,0246	1,1996
MAX	0,8286	1,4934	0,9944	1,0511	2,8570	2,2530	1,0349	1,3189
MIN	-0,3584	-0,0998	0,0000	-0,2950	-0,3003	-0,7946	0,0000	-2,1495

Source: the authors

We observe differences between Betas calculated based on static and dynamic benchmark, respectively. When the dynamic benchmark is employed, we observe higher Beta coefficient than for static benchmark. We also observe difference in the results between stock, bond and mixed pension funds when we use static and dynamic benchmark. Nevertheless, higher Beta factor calculated with dynamic benchmark does not necessarily indicate better performance of pension funds compared to the market, as pension funds still have lower sensitivity than market (because Beta is smaller than 1).

Jensen´s Alpha indicates high skills portfolio manager who possesses the ability to beat the market. According to the average value of this ratio for every pension funds category, whether we use static or dynamic benchmark, we get almost the same returns. Actively managed pension funds in the 2nd pillar in Slovakia are thus not able to deliver additional return above market return, while passively managed index funds are able to deliver higher returns than actively managed funds.

Table 7: Jensen´s Alpha calculations results

	SPF-static	BPF-static	IPF-static	MPF-static	SPF-dynamic	BPF-dynamic	IPF-dynamic	MPF-dynamic
Greater than 0	64,71%	60,29%	68,63%	68,38%	66,18%	63,24%	70,59%	72,79%
Less or equal than 0	35,29%	39,71%	31,37%	31,62%	33,82%	36,76%	29,41%	27,21%
Greater than 1	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Average	0,0008	0,0008	0,0136	0,0012	0,0012	0,0009	0,0141	0,0016
SD	0,0212	0,0032	0,0612	0,0159	0,0224	0,0030	0,0625	0,0163
5 % percentile	-0,0356	-0,0027	-0,0851	-0,0290	-0,0386	-0,0028	-0,0835	-0,0298
95 % percentile	0,0293	0,0060	0,0877	0,0228	0,0335	0,0060	0,1023	0,0280
MAX	0,1022	0,0097	0,1772	0,0691	0,1070	0,0081	0,1858	0,0690
MIN	-0,0972	-0,0134	-0,1713	-0,0644	-0,1007	-0,0112	-0,1746	-0,0611

Source: the authors

The idea of the Sharpe ratio is to see how much additional return investor receives for the additional volatility of holding the risky asset over a risk-free asset - the higher the better.

In Table 8 below we observe, that investors receive higher profit for additional volatility in index pension funds, the lowest in stock pension funds. Comparing SR calculated separately for static and dynamic benchmark, we observe lower values for dynamic benchmark than for static benchmark (based on numbers of SR observations greater than 0). SR results are almost the same in every observation for static and dynamic benchmarks, but we could see different value in average and SD.

Table 8: Sharpe ratio calculations results

	SPF-static	BPF-static	IPF-static	MPF-static	SPF-dynamic	BPF-dynamic	IPF-dynamic	MPF-dynamic
Greater than 0	70,59%	63,24%	96,08%	71,32%	70,59%	63,24%	94,12%	70,59%
Less or equal than 0	29,41%	36,76%	3,92%	28,68%	29,41%	36,76%	5,88%	29,41%
Greater than 1	0,00%	0,00%	0,00%	1,47%	0,00%	0,00%	0,00%	1,47%
Average	0,1288	0,2147	0,3640	0,2087	0,1301	0,2166	0,3438	0,2108
SD	0,3002	0,3666	0,2611	0,4493	0,2960	0,3636	0,2744	0,4467
5 % percentile	-0,3948	-0,3665	0,0773	-0,4442	-0,3829	-0,3447	0,0668	-0,4355
95 % percentile	0,5250	0,7157	0,6205	0,9351	0,5193	0,7148	0,6205	0,9349
MAX	0,6397	0,8017	0,6618	1,0585	0,6397	0,8017	0,6618	1,0585
MIN	-0,6054	-0,6377	-1,0643	-1,7003	-0,6054	-0,6377	-1,0643	-1,7003

Source: the authors

Unlike the Sharpe ratio, Sortino ratio throws away the zero underperformance data points and removes the ratio’s sensitivity to frequency of underperformance. In Table 9 we could see different average level of Sortino ratio for every type of pension funds. Whether we employ with static or dynamic benchmark, the highest excess return above TDD still belongs to the index pension funds, followed by bond and mixed pension funds and the lowest for the stock pension funds.

Table 9: Sortino ratio calculations results

	SPF-static	BPF-static	IPF-static	MPF-static	SPF-dynamic	BPF-dynamic	IPF-dynamic	MPF-dynamic
Greater than 0	71,32%	66,18%	96,08%	71,32%	71,32%	66,18%	94,12%	70,59%
Less or equal than 0	28,68%	33,82%	3,92%	28,68%	28,68%	33,82%	5,88%	29,41%
Greater than 1	25,74%	36,03%	41,18%	30,88%	25,74%	36,03%	41,18%	30,88%
Average	0,6297	0,7870	0,8347	0,9388	0,6314	0,7893	0,8263	0,9397
SD	0,9481	1,2020	0,5024	1,6252	0,9466	1,2007	0,5237	1,6243
5 % percentile	-0,4450	-0,5375	0,1374	-0,5058	-0,4420	-0,5212	0,1096	-0,5027
95 % percentile	2,1895	2,4793	1,4728	4,6057	2,1893	2,4792	1,4728	4,6047
MAX	4,7518	7,5155	1,6005	7,8542	4,7518	7,5155	1,6005	7,8542
MIN	-0,5035	-0,8375	-1,0643	-1,7003	-0,4885	-0,8354	-1,0643	-1,7003

Source: the authors

As we see in Table 10, Treynor ratio with static benchmark in SPF and BPF is different from SPF a BPF in dynamic benchmark. Average Treynor ratio in static benchmark is close to the zero value, which indicates very low excess profit to unit of risk measured by Beta. On the other side, calculated Treynor ratio with dynamic benchmark is higher as what as Sharpe ratio, higher Traynor ratio indicates better performance of pension fund to the investor.

Table 10: Treynor ratio calculations results

	SPF-static	BPF-static	IPF-static	MPF-static	SPF-dynamic	BPF-dynamic	IPF-dynamic	MPF-dynamic
Greater than 0	58,82%	83,09%	96,08%	69,85%	70,59%	63,24%	94,12%	70,59%
Less or equal than 0	41,18%	16,91%	3,92%	30,15%	29,41%	36,76%	5,88%	29,41%
Greater than 1	0,74%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	1,47%
Average	0,0053	0,0138	0,0093	0,0085	0,1301	0,2166	0,3438	0,2108
SD	0,2837	0,0650	0,0050	0,0465	0,2960	0,3636	0,2744	0,4467
5 % percentile	-0,0258	-0,0036	0,0027	-0,0174	-0,3829	-0,3447	0,0668	-0,4355
95 % percentile	0,1085	0,0551	0,0139	0,0650	0,5193	0,7148	0,6205	0,9349
MAX	2,4575	0,7386	0,0149	0,2667	0,6397	0,8017	0,6618	1,0585
MIN	-1,8466	-0,0136	-0,0174	-0,3333	-0,6054	-0,6377	-1,0643	-1,7003

Source: the authors

Information ratio is the last ratio employed in our analysis. In table below presents not only positive but also negative low values of this indicator. Goodwin (1998) state that value of IR equal to 0,5 could be considered as a good value to the investor, 0,75 as a better and values above 1 as the best added value. No pension fund with the comparison to the static or dynamic benchmark category have been able to deliver high value of this indicator. Unfortunately, SPF, BPF and MPF compared to the static benchmark and SPF and IPF to dynamic benchmark have negative average values. A negative value of this ratio indicates that the yield of the fund did not exceed the benchmark return. In this case, we see very low performance of all pension funds in all categories according to this indicator.

Table 11: Information ratio calculations results

	SPF-static	BPF-static	IPF-static	MPF-static	SPF-dynamic	BPF-dynamic	IPF-dynamic	MPF-dynamic
Greater than 0	21,32%	13,24%	54,90%	18,38%	44,12%	54,41%	39,22%	44,12%
Less or equal than 0	78,68%	86,76%	45,10%	81,62%	55,88%	45,59%	60,78%	55,88%
Greater than 1	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Average	-0,1723	-0,2161	0,0639	-0,2190	-0,0120	0,0871	-0,0548	0,0318
SD	0,2640	0,1808	0,2356	0,2550	0,1608	0,3545	0,1802	0,3619
5 % percentile	-0,5196	-0,5222	-0,1687	-0,5671	-0,2493	-0,5469	-0,3194	-0,4117
95 % percentile	0,2903	0,0270	0,6435	0,2270	0,3118	0,5840	0,1596	0,7748
MAX	0,8382	0,0978	1,0000	1,0000	0,3820	0,6775	0,7743	0,9083
MIN	-0,5743	-0,6454	-0,1838	-0,6646	-0,2690	-0,7659	-0,3803	-1,0636

Source: the authors

In the table below, we have lined up the value of each category of funds greater than 0 for individual indicators. Almost in every ratio, the highest number of CAPM beta above zero has IPF dynamic and static. On the other side, we could see the smallest Beta in BPF dynamic and MPF static. In Jensen´s Alpha, Sharpe ratio and Sortino ratio, we get the same rank for static and dynamic benchmark. Furthermore, we calculate average rank for each PF category and type of benchmark. From this average values we construct final rank for each category. This ratio told us which category of pension funds has the best aggregate risk-adjusted performance according to all indicators. We found the same order for both dynamic and static benchmark categories of pension funds. IPF, followed by SPF or MPF (because of similar portfolio structure), reached the best performance, and BPF was the last one.

Table 12: Comparison of the results of the evaluation categories of funds for individual indicators

	SPF-static	BPF-static	IPF-static	MPF-static	SPF-dynamic	BPF-dynamic	IPF-dynamic	MPF-dynamic
CAPM Beta	2	3	1	4	3	4	1	2
Jensen´s Alpha	3	4	1	2	3	4	1	2
Sharpe ratio	2	4	1	3	2	4	1	3
Sortino Ratio	2	4	1	3	2	4	1	3
Treynor ratio	4	3	1	2	4	2	1	3
Information ratio	2	1	4	3	2	4	1	3
Average rank for each PF category	3	3	2	3	3	4	1	3
Final rank	2	4	1	3	3	1	4	2

Source: the authors

4. Conclusion

The aim of the paper was to present the methodology consisting of indicators using in financial industry to evaluate performance of financial instruments. We use indicators which are used in financial industry to evaluate financial instrument performance with different approach to risk measurement as well as to the benchmark. Static and dynamic approach toward constructing the relevant benchmarks is the important part of our analysis. We applied indicators on the pension funds monthly returns since March 2005 till June 2016. We cannot choose the best perform pension funds category based on one indicator. According to average

rank for each PF category, we found almost equal order for group of pension funds in dynamic and static benchmark category. IPF funds performed the best, and were followed by SPF and MPF (similar performance due to similar portfolio structure) and lastly by BPF.

The results presented in the last part of our work has demonstrated a very low level of pension fund performance, especially among actively managed pension funds. Passively managed pension funds (in our case index pension funds) are these funds, which provide interesting risk-adjusted returns to investors. Investors should deeply analyze pension fund performance according to several proposed indicators, not only one.

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