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EVALUATION OF THE FINANCIAL PERFORMANCE OF PENSION FUNDS IN CROATIA

Abstract

The aim of this paper is to evaluate the financial performance of pension funds in Croatia. Although there are other factors which are important in the pension funds overall performance, this paper focuses on investment accomplishments. The purpose of measuring portfolio performance is to determine whether portfolio managers add value compared to passive investment strategies. The traditional approach to pension funds' performance evaluation underlines standard measures of financial performance (e.g. ratios such as Sharpe's, Sortino's, Treynor's, etc.) which quantify the ability of pension fund managers to deliver an active management risk premium, with respect to benchmarks.

In this paper, the previously mentioned traditional measures of risk-adjusted performance are applied to Croatian pension funds. Due to recent changes in pension systems in other Eastern European countries once again emphasis is put on this issue in Croatia. The analysis furthermore includes evaluation of pension funds' asset allocation. The period of analysis covers twelve years, from the establishment of pension funds in Croatia in 2002 until 2013. The main hypothesis of the paper states that Croatian pension funds underperform with respect to benchmark comparisons, set as return on the combined CROBEX/CROBIS portfolio. Results show that the main hypothesis does not hold.

The financial performance of pension funds directly influences their competitiveness, derived from the possibility of measuring their success in active portfolio management. In addition, pension funds are expected to support the national economy. By investing their accumulating assets, they can protect jobs and enhance economic growth. However, they can achieve that only if they are competitive in means of financial performance.

Keywords: Pension funds, financial performance, competitiveness, Croatia

1. Introduction

The pension system is a very important part of every economy. In addition to the social role, it also has an important role in the functioning of the market economy. Given that the pension funds are large investors in the domestic economy, by investing their accumulating assets in different securities, they can protect jobs and enhance economic growth. However, they can achieve that only if they are competitive and successful in means of financial performance. Therefore, it is very interesting to analyze their financial performance.

The contribution of this research lies in the presentation of the financial performance of Croatian mandatory pension funds from the perspective of risk-adjusted measures, in an attempt to determine whether pension funds in Croatia could contribute to raising the competitiveness of the whole economy. This paper also has the intention of encouraging further exploration of the various measures of the pension funds' performance in Croatia, as well as studying the impact of various legal provisions regulating Croatian pension system on its performance. The author is the first, to the best of his knowledge, to analyze the risk-adjusted financial performance of Croatian mandatory pension funds.

Based on the data provided by HANFA (the Croatian Financial Services Supervisory Agency) and mandatory pension funds, an analysis of the risk-adjusted financial performance of Croatian pension funds has been done. Risk-adjusted measures including the Sharpe ratio, the Treynor ratio, the Sortino ratio and the information ratio were used. The analysis furthermore includes evaluation of pension funds' asset allocation. The period of analysis covers twelve years, from the establishment of pension funds in Croatia in 2002, until 2013. The main hypothesis of the paper states that Croatian pension funds underperform with respect to benchmark comparisons. Return on the combined CROBEX/CROBIS portfolio is set as a benchmark, as it reflects a large proportion of the current investment structure of Croatian mandatory pension funds. Results show that the main hypothesis does not hold.

The paper consists of seven chapters. After the introduction, there is a chapter on previous researches with an overview of the previous papers in Croatia and worldwide that are to some extent connected with this paper's topic. In the chapter "discussion on appropriate benchmark", numerous examples of benchmarks are presented in order to understand their strengths and weaknesses and to understand the selection of the benchmark in this paper. The chapter "discussion on competitiveness" theoretically discusses the influence of the pension funds' success on the competitiveness of the economy, which is one of the reasons for the analysis. The chapter "methodology and data" which includes an overview of the methods and data used, is followed by a chapter that deals with the empirical analysis itself and research findings. Finally, there is the conclusion in which the hypothesis is rejected by the results of the analysis and the causes of such results are tried to be explained.

2. Previous researches

Pension systems today have numerous challenges. According to Puljiz (2011), demographic changes, pressures for competitiveness on the globalized market, labor market transformation and citizen resistance to pension reforms are just some of them. Pension systems in post-socialist countries have experienced radical changes in the last two decades, largely driven by "neo-liberal orthodoxy" promoted by the World Bank. The pension contributors were offered to invest a portion of their contributions into private funded pension funds. Hungary and Poland reformed the mandatory pension insurance. Bejaković (2012) pointed out that this model greatly influenced Croatia and other countries in the implementation of their pension reforms. On the other hand, Czech and Slovenian pension systems have not undergone fundamental changes since the number of pensioners and the unemployed was growing relatively slowly, so only a voluntary pension scheme was introduced (Puljiz, 2011). Since 1998, Croatia has established a tripartite pension system that has been in effect since 2002. The system now consists of the mandatory pay-as-you-go subsystem (defined benefit scheme, first pillar) and the compulsory and voluntary market capitalization subsystems (defined contribution schemes, the second and third pillars) (Potočnjak, Vukorepa, 2012). However, Puljiz (2011) noted several examples of pension systems returning to the pre-reform situation. Slovakia has enabled the return of retirees from the second, market capitalized into the first public pillar. By legislative change, Hungary seized

the accumulated savings of the contributors, while Poland has shifted the long-term revenue from pension contributions, by reducing contributions to the second pillar. These measures are still not recommended as a way of crisis management. A better alternative to this kind of nationalization of pension savings is a reduction of contributions to the second pillar. Rudolph et al. (2010) argued that these actions appear to be primarily motivated by short-term fiscal considerations. Stańko (2003) in his study of the Polish pension system concluded that an investment in pension funds is worthless, at least at the present stage due to unsatisfactory returns, cost ineffectiveness, wrong measurement practices and lack of infrastructure.

Researches of pension funds are quite numerous, both globally and in Croatia, but in the Croatian case they are rarely considering performance measurement. Eror-Matić and Latković (2002) analyzed the performance of the biggest Croatian investment fund at that time, trying to understand investment operations of future pension funds. According to them, it is necessary to compare yields obtained with the risk level chosen, considering the given market portfolio or using various ratios like Sharpe's or Treynor's. Bakić (2002) analyzed the investment constraints of the pension funds, connected technical provisions and their appropriateness. Latković and Liker (2009) have calculated the fund's expected annual real return of 3.22% by using securities' returns in developed markets in the period from 1900 to 2008. As Croatian pension funds generally invest in riskier domestic assets, they adjusted the obtained values and considered a moderately conservative portfolio, suitable for the Croatian investment structure. On the other hand, Škember (2002) concluded that the pension model proposed by the World Bank is defective from the standpoint of social policy, and that is far from the certainty of strengthening economic growth. He believed that there was a certain dose of neoliberalism ideology in proclaiming these reforms which can neither protect the elderly, nor achieve faster economic growth. However, it does not dispute the serious difficulties that existing public pension systems are facing. Bahovec et al. (2011) explored the tendency in the movement of the concentration of total pension fund assets in Croatia and noticed a slight increasing trend of concentration. Bejaković (2012) stated that the average annual return of pension funds since their creation is 5.49%, which is 2.7% above inflation, but also more than the return set as the preferred when the pension reform began (2% above inflation). He also stated that Croatian pension funds returns are among the higher ones in the region and Europe. Thus, during 2010 the German pension funds achieved a return of 4-5%, the Austrian 6.6% and the Croatian 8.6%. However, the analysis is not complete without considering the investment structure. Thus, the Polish pension funds had a greater loss then the Croatian in 2008, although Poland was less affected by the crisis, due to significantly higher equity investment.

Ammann and Zingg (2008) investigated the performance of Swiss pension funds and investment foundations over the period of 1996 to 2006. Swiss pension funds follow a more active approach but it seems useless as the risk-adjusted performance is much better for the more passively managed investment foundations. Clare et al. (2009) also argued in favor of passive investment vehicles after analyzing performance of the pooled pension funds in the UK. Similar results for larger funds were obtained by Andonov et al. (2012). They analyzed active management components (asset allocation, market timing and security selection) in the risk-adjusted net performance of U.S. pension funds. Blake et al. (2009) studied decentralization in UK pension funds' investment management from 1984 to 2004. Over this time period, most pension funds shifted from balanced to specialist managers and from a single to competing multiple managers within each asset class. Schwaiger et al. (2009) examined the performance of alternative decision models for pension funds and used the Sortino and the Solvency ratio to measure their performance over time. Walker and Iglesias (2010) used monthly data to calculate the Sharpe ratio for the pension funds on a sample of 11 countries. Performance is calculated against four proxies for the risk-free rate: a short-term local rate, a local long-term rate, a short-term U.S. Treasury bills rate, and the annual return on long-term U.S. Treasury bonds. Rudolph et al. (2010) concluded that long-term profitability of equity investments is not derived from the instruments themselves, but from a well-diversified portfolio at the international level. Therefore, significant investing in domestic equity markets is risky for pension funds due to country risk.

3. Discussion on appropriate benchmark

After strong turbulences hit the global capital markets and the Zagreb Stock Exchange in 2008, the issue of pension contributors protection against the risks associated with pension funds' investments has become even more important (Potočnjak, Vukorepa, 2008). Investment rules are designed to limit the risk of a portfolio, but they do not guarantee achieving positive returns. This is why lifecycle portfolio modeling methods have been globally developing, based on the age of retirement. An individual's ability to withstand investment risks varies indeed with his age (Potočnjak, Vukorepa, 2012). This system was introduced in Croatia at the time of writing this paper.

Pension funds comparison and setting benchmarks for measuring success are problematic issues. Potočnjak and Vukorepa (2012) stated that due to major practical differences in investment strategy and the long-term character of investments, classic comparison of performance among the funds on an annual basis is not appropriate. Walker and Iglesias (2010) also counseled against international comparisons of traditional performance measures. Potočnjak and Vukorepa (2012) proposed the introduction of complex criteria for assessing the performance of each fund. The alternative is introducing investment performance measurement with respect to the risk degree. The main objective of pension funds' performance measurement is to ascertain whether fund managers added value compared to the passive strategy presented by a specific benchmark. If the Efficient Markets Hypothesis is taken into account, it can be assumed that the active fund management gives results very similar to the benchmark because it is not easy to beat the market (Walker, Iglesias, 2010). On the other hand, Latković and Liker (2009) argued that if the fund does not yield higher returns than those achieved by the passive portfolio (benchmark), for the amount of management fees, then the collective investment scheme is worthless for contributors.

Benchmarks used for evaluation of the risk-adjusted performance are various. The two main types of benchmarks used in the UK are external asset-class benchmarks and peer-group benchmarks (median return). When it was widely recognized that the objectives of different pension funds differ widely, customized benchmarks of external type became more common. The US has similar benchmarks as the UK. Benchmarking is usually done on an asset class basis against well-known total return indexes. Thus the performance is assessed relative to the S&P 500 total return index, the Lehman Aggregate Index (now the Barclays Capital Aggregate Bond Index), etc. (Blake, Timmermann, 2002). However, the popularity of S&P 500 as a large cap benchmark has significantly declined from 50% of large cap funds in 1996 to only 26% in 2006. Instead, funds are increasingly using the Russell 1000, Russell 3000 and Wilshire 5000. The Russell 2000 is the dominant small cap benchmark (Bauer et al., 2010). The other kind of benchmarking is relative to the average within a peer group. Other countries tend to use fixed or bond-based benchmarks. In Japan, the annual rate of return from the Treasury bond, with maturity in excess of 10 years, plus 0.1% is used. In Italy, a combination of well-known indices like JPM bond and MSCI stocks is used in varying proportions. The benchmark in Chile is the average of the return of the other pension funds (AFPs). The use of market indices has been rejected because the local market benchmarks are of questionable applicability (Blake, Timmermann, 2002). Stańko (2003) notes that the Polish system of performance measurement is similar to the Latin American. The results of pension managers are compared to the industry's average return (AR) calculated every three months as an arithmetic average of individual funds weighted by their market shares during the period (a peer-group index).

When it comes to the limitations on investment, especially outside the domestic market, with a hedging purpose, Potočnjak and Vukorepa (2008) point out that limitations encourage similar behavior of pension funds in terms of investment (investment herding), which consequently leads to similarities in the return level and possible losses. Blake and Timmermann (2002) agree by stating that "in effect, a target that uses a group's median will create an outcome very close to this median." Not knowing what the median fund manager result will be at the end of the period makes managers stick to one another so as not to deviate from the final result. That is why the results are not much higher than those obtained from passive investment strategies. This is also a reason why an external benchmark should be used. Finally, Stańko (2003) notes that "the guarantees of the minimal rate facility are illusionary as it is the client, after all, onto whom the cost will be passed in the long run." It is interesting that in 2002, when the

reference rate for pension funds in Croatia was not yet defined, Bakić (2002) warned that if a weighted average yield of pension funds were to be chosen, with weights proportionate to the size of the funds, it would lead to the herd effect, which causes inefficient allocation of resources for all funds. Twelve years after this note, the Croatian pension funds' performance shows the herd effect as reference rate has been wrongly defined. Blake and Timmermann (2002) conclude that "performance benchmarks are important for three key reasons: they help to measure the investment performance of institutional fund managers, they provide clients with a reference point for monitoring that performance, and they can also have the effect of modifying the behavior of fund managers. A good benchmark would be one that did not have built-in biases either in favor of or against particular asset classes. A good benchmark might therefore be based on a multiple of indices that covers all the key asset categories."

4. Discussion on competitiveness

Some governments argue that competition among pension funds helps to optimize individual retirement plans. Fund managers would compete for available funds and contributors would choose a pension fund whose investments match their risk aversion. This competition disadvantages pension funds that cannot show good short-term returns in comparison to those competitors that can, simply by investing in short-term deposits. Such a situation creates a bias against investing in long-term instruments that cannot provide an immediate return, which is a significant problem as pension funds should be long-term oriented. In addition, in order for the system to function in practice, the contributors should be able to assess the funds' performance which is not common. The information is often inaccessible and incomprehensible for the majority of contributors (Rudolph et al., 2010). Investment restrictions, the prudent person rule and the different forms of asset protection in mandatory capital-funded pension schemes from the negative or insufficient return (like relative return guarantee) aim at increasing pension contributions' security due to the return risk. As responsibility is shifted to the individual, his awareness of the benefits and risks of the capital-funded pension system is extremely important and, according to Potočnjak and Vukorepa (2008), it is the state's responsibility to provide him with such information. Furthermore, although various investment restrictions do not encourage competition, they are of high importance. The question of the prohibition for Croatian pension funds to invest in real estate was very interesting considering the tourism development of the country. However, after a sharp drop in real estate prices due to the 2008 crisis, it was obviously an extremely wise idea. Potočnjak and Vukorepa (2008) conclude that considering the second pillar of the pension system only from the standpoint of its contribution to the development of financial markets and economic growth is unacceptable. The approach that emphasizes the importance of this system for social security in old age is at least of the same importance.

When it comes to future investments of pension funds, pension companies want to invest in profitable and secure new development projects in Croatia. Creative ideas are the most important while possible technical adjustment of legislation should not be a problem. Pension companies are aware of the need for redefinition of pension fund investments in the Croatian economy as it is a very important issue for the further development of the pension system. Pension companies are willing to participate in future large infrastructure projects if the risk-return ratio is acceptable. Pension companies are interested in the future privatizations and other ownership transformation forms (especially the recapitalization) and wish to continue engaging in corporate governance (UMFO, 2011). Considering the large funds available for their further investments, mandatory pension funds are definitely a natural partner for Croatian companies as a significant source of new equity.

5. Methodology and data

The performance of any fund can be measured using different measures. Among the most used ones are the Sharpe ratio, the Sortino ratio, the information ratio and the Treynor ratio. These risk-adjusted performance measures are used by fund managers to rank and compare their portfolio performance with other managers (Schwaiger et al., 2009). All methods used in this paper are based on the papers by Schwaiger et al. (2009) and Tonks (2006), with some adjustments for the purposes of this paper.

In order to assess the portfolio returns, Sharpe proposed computing the following ex post ratio for the portfolio under consideration and also for the benchmark portfolio, to enable comparison

$$S_H \equiv \frac{\bar{D}}{\sigma_D} \tag{1}$$

$$\bar{D} \equiv \frac{1}{T}\sum_{t=1}^{T} D_t \tag{2}$$

$$D_t \equiv R_{Pt} - R_{It} \tag{3}$$

$$\sigma_D \equiv \sqrt{\frac{\sum_{t=1}^{T}(D_t-\bar{D})^2}{T}} \tag{4}$$

where R_{Pt} is the return on the portfolio, R_{It} is the risk-free rate, and σ_D is the standard deviation of the excess returns of the portfolio. The Sharpe ratio actually measures the excess return per unit of risk (variability) of the investment. If the benchmark is the same, investments with higher Sharpe ratios are the better ones.

The Treynor ratio measures the returns earned in excess of which could be earned on a riskless investment, compared to the portfolio beta. The Treynor ratio T is given by

$$T = \frac{(r_p - r_f)}{\beta_p} \tag{5}$$

$$\beta = \frac{Cov\,(R_P,R_M)}{Var(R_M)} = \frac{\sum(x-\bar{x})(y-\bar{y})}{\sum(x-\bar{x})} \tag{6}$$

where r_p is the portfolio return, r_f is the risk free rate and β is the beta of the portfolio. Again to assess the performance of the portfolio, T is computed for both the portfolio and the benchmark. A higher Treynor ratio means better performance of the fund strategy. Both the Sharpe and Treynor ratios are based on the capital asset pricing model (CAPM) (Schwaiger et al., 2009).

The information ratio is similar to the Sharpe ratio but compares the performance of the portfolio to its benchmark

$$I = \frac{(r_p - r_b)}{\sigma_{ER}} \tag{7}$$

where r_p is the average return for the portfolio p over some period, r_b is the average return on the benchmark portfolio over the same period, so that $(r_p - r_b)$ is the excess return on the portfolio over the benchmark; σ_{ER} is called the tracking error, and is the standard deviation of the excess returns during the period. The information ratio compares the return over the benchmark with the 'risk' taken where risk is the deviation from the benchmark (Tonks, 2006). The standard deviation can be calculated in the following way

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \bar{x})^2} \tag{8}$$

where $\bar{X}$ is the mean of returns and *N* is the number of observations.

The Sortino ratio is widely used in industry since it only penalizes a portfolio's underperformance via the downside deviation. The Sortino ratio is calculated by

$$S \equiv \frac{R_P - R_I}{\sigma_d} \tag{9}$$

where R_P is the return on the portfolio, R_I is the risk-free rate and σ_d is the standard deviation of the negative returns on the portfolio.

The dataset used in this paper consists of monthly values of mandatory pension funds' units of account. These values represent the basis for calculating mandatory pension funds yields, as discussed in the previous chapter. Data for all four existing mandatory pension funds in Croatia was collected for the period since they were founded in April 2002 up to June 2014. The dataset primarily consists of official data published by HANFA (the Croatian Financial Services Supervisory Agency). However, one smaller part of the data was provided by the mandatory pension funds themselves as HANFA does not provide data for the period before it was es-

tablished in 2005. Data for CROBEX and CROBIS, the Croatian equity and bond index respectively, is taken from the Zagreb Stock Exchange. The source of monthly inflation data is the Croatian National Bank and data on the risk-free rate is provided by the Croatian Ministry of Finance.

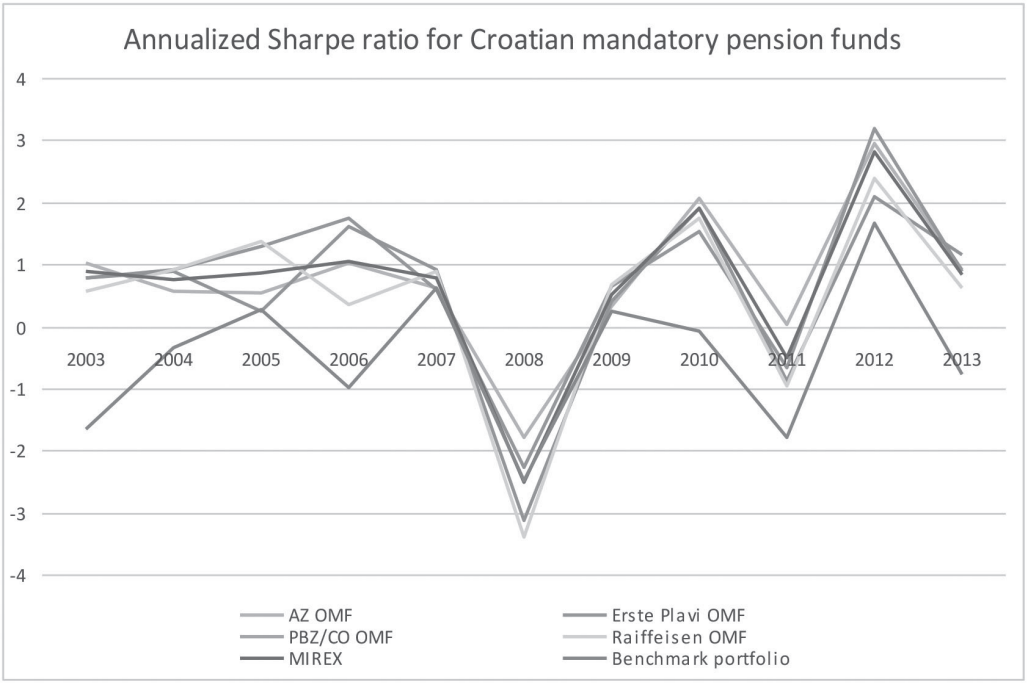
When it comes to pension funds' asset allocation data, it is also published by HANFA. The pension funds' investment portfolios are allocated across several asset classes: domestic shares and GDRs, domestic government bonds, domestic corporate and municipal bonds, domestic open-end and closed-end funds, domestic short-term securities, domestic deposits, foreign shares, foreign government bonds, foreign corporate and municipal bonds, foreign open-end and closed-end funds, and other.

According to HANFA, the rate of return is the difference between the values of the unit of account on the last day of the reporting period and the last day of the previous period, expressed as a percentage. The reference rate of return is defined as a weighted arithmetic mean of all mandatory pension funds average rates of return in previous three calendar years, reduced by two percentage points. MIREX represents the value of the unit of account of an average OMF, and is calculated as a weighted arithmetic mean. The weight represents OMFs' share of total net assets.

6. Empirical analysis and results

The analysis was conducted on the basis of monthly values of mandatory pension funds' units of account. Through them, the monthly funds' returns are calculated, as described in the previous section. But before applying risk-adjusted measurements, the monthly returns are adjusted for inflation, and depending on the particular calculation, for the risk-free interest rate.

Figure 1 Annualized Sharpe ratios for Croatian mandatory pension funds from 2003 to 2013



Source: HANFA, mandatory pension funds; author's calculations

The risk-free interest rate is presented by a return on 91-day Croatian T-bills. Certain calculations also required establishing a benchmark. After detailed analysis of the various benchmarks, set out in a separate chapter, the author has chosen the return on the combined portfolio comprised of Croatian equity and bond indexes - CROBEX and CROBIS - to be a benchmark. The weights of each of the indexes in the portfolio are based on an analysis of the equity and bond instruments' proportions in the pension funds' portfolios for each year under consideration.

Concerning the analysis results, the risk-adjusted performance of Croatian mandatory pension funds is surprisingly positive. Focusing on the Sharpe ratio shown in Figure 1, calculated for each year in order to take into account the differences in the portfolio structure over the years, it can be seen that all pension funds significantly outperformed the benchmark results. Only in 2008, during the crisis, the Sharpe ratio of the benchmark is around the pension funds' average. In addition, it is interesting that the Sharpe ratio of all funds is about 1 on average, which can be described as a good performance. However, in 2012 it was above 2, for one fund even above 3, which is considered as a very good and excellent result, respectively.

The data in Figure 1 (and in Table 2 in the appendix) shows also the apparent presence of the herd effect, which has previously been discussed. The Sharpe ratios of all funds are similar because funds are trying not to be worse than MIREX (a weighted average of all funds). Such a state causes considerable loss in funds' competitiveness, both at the level of their struggle for new contributors, and at the level of the overall pension system success as it is completely irrelevant in which fund one invests - all funds give nearly the same results.

Similar trends can be observed also from the data in Table 1. In fact, when one looks at the funds' information ratio for the entire period, it is evident that the funds' results were moving in a narrow range - from 0.28 to 0.36 units of return above the benchmark per every unit of risk taken (standard deviation of these returns). This is graphically visible on Figure 2 in the appendix.

Additional evidence of pension funds' outperformance compared to the benchmark are levels of the Treynor and Sortino ratios, also shown in Table 1. In case of the Sortino ratio, compared to the Sharpe ratio, only one ratio is calculated for the entire period. The reason is the fact that the Sortino ratio considers only the negative returns in the calculation of standard deviation. As negative returns are very unevenly distributed throughout the analyzed years, calculating the ratios for each year would not provide a reasonable basis for comparison. Therefore, only one Sortino ratio for the entire period was calculated. The average equity and bond instruments' proportions in pension funds' investments for the whole period under consideration were taken as CROBEX and CROBIS weights in the benchmark portfolio. The Treynor ratio is also calculated for the entire period, but for practical reasons. The Sortino ratios of the least successful fund PBZ/CO OMF and of the benchmark, 0.12 compared to -0.13, show this significant outperformance of pension funds. However, both the Treynor and Sortino ratios also show presence of the herd effect.

Finally, before drawing conclusions, it is necessary to focus on the analysis of mandatory pension funds (OMF) total assets investment structure in years under consideration. Based on this analysis, a calculation of the weights for the benchmark portfolio was made. The data in Figure 3 and Figure 4 in the appendix shows that the proportion of investment in domestic bonds is by far the largest - from 67.95% in 2003 to 63.43% in 2013. The total investment in shares is much lower - from less than 6% in 2003

Table 1 Information ratio, Treynor ratio and Sortino ratio for Croatian mandatory pension funds for analyzed period

	AZ OMF	Erste Plavi OMF	PBZ/CO OMF	Raiffeisen OMF	MIREX	Benchmark portfolio
Information ratio	0.330679	0.361446	0.28742	0.316293	0.33369	-
Treynor ratio	0.004488	0.003395	0.00261	0.004261	0.00392	-0.00189
Sortino ratio	0.218066	0.158211	0.12286	0.218239	0.19258	-0.13701

Source: HANFA, mandatory pension funds; author's calculations

up to 21.5% in 2013. Other investments count for a small proportion too, but their impact on performance should not be underestimated.

7. Conclusion

The aim of this paper was to evaluate the financial performance of pension funds in Croatia. As Croatian mandatory pension funds outperform the customized external benchmark, set as a return on the combined portfolio of CROBEX and CROBIS, the main hypothesis of this paper does not hold. Their risk-adjusted performance results, measured by the Sharpe, Treynor, information and Sortino ratios, are more than satisfactory. Since the benchmark largely reflected the funds' investment structure, these results are really surprising. As an explanation, two alternatives could be offered. Specifically, as the benchmark does not fully reflect the structure of pension funds' investments, it is possible that the actual return on the rest of the portfolio is responsible for the difference in performance. On the other hand, it is possible that it is all about the accounting practices. Specifically, CROBEX and CROBIS are market indexes, which means that they reflect changes in the market in line with the mark-to-market rule. On the other hand, pension funds might not use the mark-to-market rule for their portfolio in the same sense due to various accounting policies. It is obvious that further research, perhaps in collaboration with pension fund administrators, is needed to find solutions for these issues. In addition, although international comparisons are not recommended, more research might result in some adequate international benchmark. It might enable a proper international comparison of pension funds - something this paper unfortunately was not able to deliver. Finally, this paper also attempted to determine whether pension funds in Croatia could contribute to raising the competitiveness of the whole economy. Considering their positive financial performance, their wish to participate in future development projects in Croatia and their 8,3 billion EUR assets, they are certainly a great potential for economic growth. However, they have to be careful in investment strategy as the social security of pensioners is at least as important as contributing to the economic growth and capital markets development.

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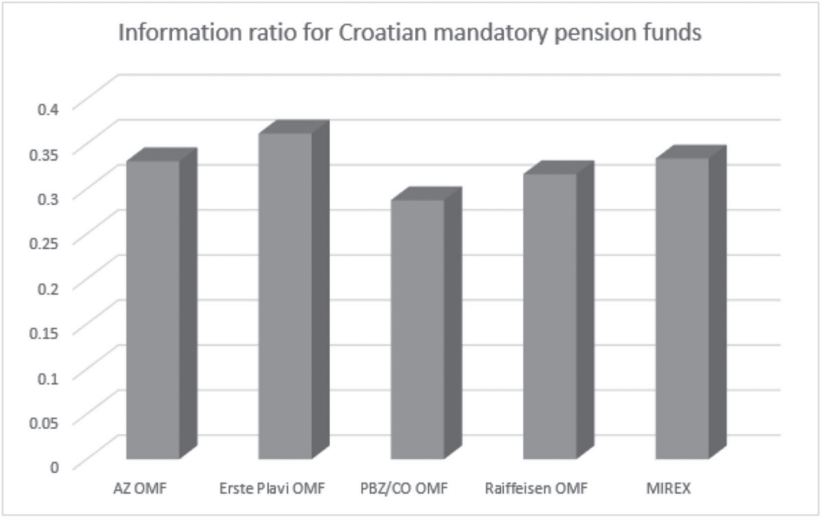
Appendix

Table 2 Annualized Sharpe ratios for Croatian mandatory pension funds from 2003 to 2013

	AZ OMF	Erste Plavi OMF	PBZ/CO OMF	Raiffeisen OMF	MIREX	Benchmark portfolio
2003	1.043373	0.802276	0.786222	0.562581	0.889356	-1.64316
2004	0.570308	0.926131	0.901749	0.921976	0.772389	-0.32654
2005	0.539934	1.284416	0.251035	1.371771	0.882139	0.27924
2006	1.034214	1.742093	1.616341	0.366436	1.063813	-0.98005
2007	0.641632	0.613758	0.920071	0.894874	0.793041	0.64205
2008	-1.786646	-2.248409	-3.104145	-3.387013	-2.500867	-2.47351
2009	0.324879	0.645273	0.420628	0.692644	0.513113	0.26473
2010	2.064022	1.542038	1.905858	1.765322	1.918561	-0.06346
2011	0.026945	-0.650376	-0.861728	-0.9414703	-0.501541	-1.76932
2012	2.944969	3.204869	2.100845	2.403713	2.825592	1.67192
2013	0.920157	0.898974	1.157776	0.626488	0.843322	-0.76615

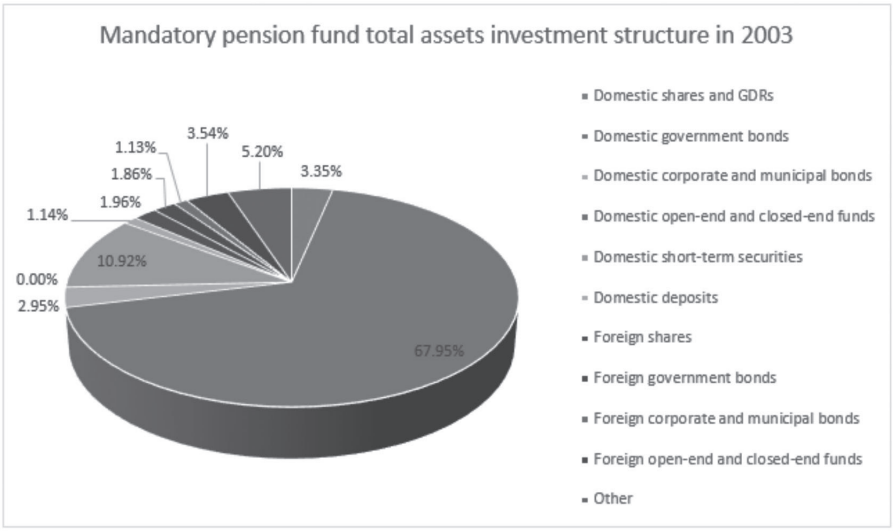
Source: HANFA, mandatory pension funds; author's calculations

Figure 2 Information ratio for Croatian mandatory pension funds for the analyzed period



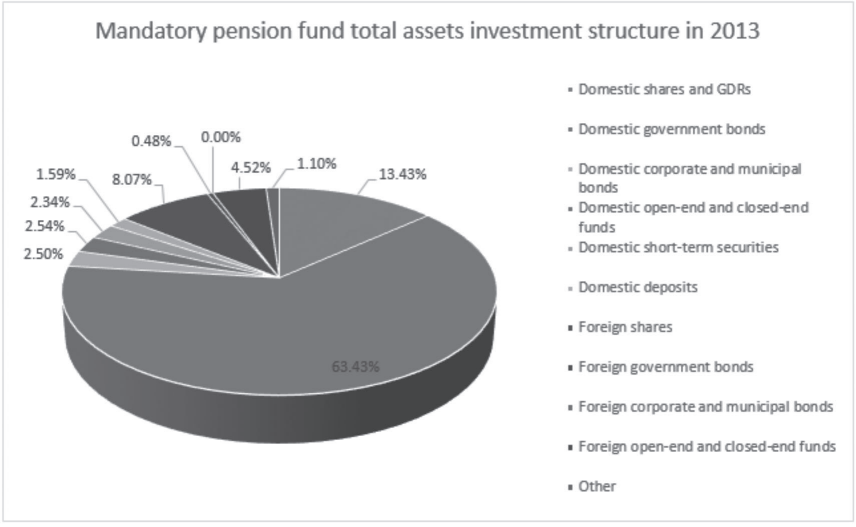
Source: HANFA, mandatory pension funds; author's calculations

Figure 3 Mandatory pension funds total assets investment structure in 2003 (at the end of the period, in %)



Source: HANFA, mandatory pension funds; author's calculations

Figure 4 Mandatory pension funds total assets investment structure in 2013 (at the end of the period, in %)



Source: HANFA, mandatory pension funds; author's calculations

Dražen Novaković

Evaluacija financijske uspješnosti mirovinskih fondova u Hrvatskoj

Sažetak

Cilj je ovog rada ocijeniti financijsku uspješnost mirovinskih fondova u Hrvatskoj. Iako postoje i drugi čimbenici koji su važni za ukupnu uspješnost mirovinskih fondova, ovaj je rad okrenut investicijskoj uspješnosti. Općenito govoreći, svrha mjerenja uspješnosti portfelja jest utvrditi dodaju li menadžeri portfelja vrijednost u odnosu na pasivne investicijske strategije. Tradicionalni pristup ocjenjivanju uspješnosti mirovinskih fondova naglašava standardne mjere financijske uspješnosti (npr. omjere poput Sharpe-a, Sortino-a, Treynor-a itd.). Ova mjerila kvantificiraju sposobnost menadžera mirovinskih fondova da ostvare premije rizika za aktivni menadžment, s obzirom na određenu referentnu vrijednost.

U ovome radu, prethodno spomenute tradicionalne mjere uspješnosti prilagođene za rizik primjenjuju se na hrvatskim mirovinskim fondovima. Nedavne promjene u mirovinskim sustavima drugih istočnoeuropskih zemalja i zemalja u razvoju stavljaju naglasak još jednom na ovo pitanje i u Hrvatskoj. Analiza nadalje uključuje evaluaciju ulagačke strukture mirovinskih fondova. Promatrano razdoblje obuhvaća dvanaest godina, od osnivanja mirovinskih fondova u Republici Hrvatskoj 2002. godine do 2013. godine. Glavna hipoteza rada navodi da hrvatski mirovinski fondovi podbacuju u odnosu na referentnu vrijednost, postavljenu kao povrat na portfelj sastavljen od indeksa CROBEX i CROBIS. Rezultati odbacuju glavnu hipotezu.

Financijsko poslovanje mirovinskih fondova izravno utječe na njihovu konkurentnost, proizlazeći iz mogućnosti mjerenja njihovoga uspjeha u aktivnom upravljanju portfeljem. Osim toga, od mirovinskih fondova se očekuje da će podržati nacionalno gospodarstvo. Ulaganjem svoje rastuće imovine u različite vrijednosne papire, oni mogu zaštititi radna mjesta i poduprijeti gospodarski rast i na lokalnoj i na regionalnoj razini. Međutim, to mogu postići samo ako su konkurentni i uspješni u smislu financijske uspješnosti.

Ključne riječi: mirovinski fondovi, financijska uspješnost, konkurentnost, Hrvatska