ANNALS OF FACULTY ENGINEERING HUNEDOARA – International Journal of Engineering
Tome XI (Year 2013) – FASCICULE 4 (ISSN 1584 – 2673)

1. Lidija BARJAKTAROVIC, 2. Dejan JECMENICA, 3. Maja PAUNOVIC

# BUSINESS ANALYSIS OF OPEN INVESTMENT FUNDS IN SERBIA

1. SINGIDUNUM UNIVERSITY, BELGRADE, SERBIA
2. WIENER STADTISCHE A.DO.O BELGRADE, SERBIA
3. UNIVERSITY UNION NIKOLA TESLA, FACULTY FOR MANAGEMENT, SREMSKI KARLOVCI, SERBIA

*ABSTRACT: The performance of open investment funds in Serbia in the period of 2007 to 2012 is the subject of this paper. It was found that the performances of Serbian investment funds are unsatisfactory by applying Sortino, Sharper and Treynor ratios. The topic of this paper is to analyze the performance achieved by the establishment of open investment funds in Serbia (in 2007) until 2013. Review of investment funds operations is based on the returns they bring and the risks they accept in the business. In Serbia, the equity funds, as the most risky funds, started to operate in 2007, while cash funds (as the least risky funds) were introduced in later phase after 3 years. At the moment there are 16 open investment funds (at the end of 2012), where value growth and value maintenance funds dominate. A total net asset of open investment funds is 2,324 million Dinars i.e. 20 million Euros (at the end of 2012).*
*KEYWORDS: open investment funds, return, risk, Sortino ratio, Sharper ratio, Treynor ratio*

## INTRODUCTION

*Open investment funds in Serbia started operations in 2007, in accordance with implemented regulation in the country. In accordance with it, types of open investment funds on Serbian market were: value maintenance funds, balanced funds, asset value growth funds and return funds. Market conditions influenced existence of value maintenance funds, balanced funds and asset value growth funds. The regulator emphasized importance of equity, portfolio management, limitations in investing and protecting assets of open investment funds. At the same time Law on equity markets defined necessary infrastructure for stable financial market, such as equity, qualified staff, equipment, financial instruments, terms and conditions for trade, risk management, etc. [22, 23, 26]*

*After 2007 there is a growth in the number of available open funds, and in the first two months of 2013 there were 16 open investment funds registered which are still managed by four of the management corporations (total assets under management are 24.1 million Euros on 02/28/2013; NBS, 2013). Meanwhile, six open investment funds were closed or merged with another fund. If we analyze market situation, we can conclude that the strongest and safest position on Serbian market have open investment funds established by commercial banks (such as Raiffeisen, Erste and Komercijalna bank). They hold 85.72% of market share in terms of assets under management on 02/28/13 [1,2]. Raiffeisen's open investment funds (World, Cash and EuroCash) hold 67.73%, Erste's open investment funds (Cash, EuroCash and EuroBalanced) hold 16.38% and Kombank Invest 2.21% [1,2]. It can be explained with strong support of mother bank, which provides good customer base and joint offer to the customer for a-vista or term deposit and cash fund offer. Currently, potential customer (investor) can get higher revenue with open investment fund than with commercial bank. However, there is clear message that they do not guarantee that the customer (investor) will not lose or win the invested sum of money [25].*

*The second strongest group of open investment funds in terms of continuity represents funds established by Slovenian (Ilirika's funds) and Croatian (Fima) owners (individuals) of investment funds in those countries [1,2] . It is important to mention that Slovenian funds expanding their activity on Serbian market on the basis of buying existing open funds, such as Delta, Citadel, Fima Novac, etc. Currently, Ilirika holds 8.38% and Fima 5.29% of Serbian market share in terms of assets under management.*

*It is important to say that in Serbia, the equity funds, as the most risky funds, started to operate in 2007, while cash funds (as the least risky funds) were introduced in later phase after 3 years. It is not in accordance with the world's trend. The effects of world economic crisis were visible during the second quartile of 2008. It also had bad impact on development of open investment funds* *in Serbia. It should be emphasized, that market trends, primarily due to the world economic crisis impact showed that the public began to lose confidence in open investment funds as a new investment alternative, which can be seen by the constant decrease in the number of investment units, the total value of property and large negative rate of return.*

*Open investment funds (13)subject of analysis will be: Delta Plus, Delta Dynamic, Erste Cash, Erste Euro Balanced, Fima Proactive, FimaNovac, Citadel Novcani fond, Citadel Triumph Balance, Citadel Triumph, Focus premium, Ilirika Global, Kombank In Fond and RaiffeisenAkcije. Out of scope are following investment funds: Raiffeisen cash and Raiffeisen World, because they started operations after 2010. The analysis will be done for the period from 2007 to 2010 (in which the open investment funds do not have the same length of business time), due to the continuity in terms of type of funds (new law on equity markets and revised law on investment funds were brought and implemented in 2011).*

*The performance analysis of 13 mentioned funds in Serbia (will be made based on the Sortino, Treynor and Sharpe ratios, which perceive the returns of investment funds in relation to the risks assumed (Microsoft Excel was used for the calculation). The analysis was performed: 1) for the period from 2007 to 2010, in which the open investment funds do not have the same length of business time and 2) only the 2010, given that all the funds operated for the same period at that time. The bases are the historical values of investment fund units taken from the official web site of the management corporations. All results are annualized.*

*The formula that will be used for the average unit of the funds analyzed is:*

$$Average\ unit\ of\ funds\ analyzed = \frac{Sum\ of\ total\ investment\ unit}{Number\ of\ the\ funds\ analyzed}$$

*Limitations to the analysis were: short period of investment funds existence in Serbia, different period of performing business in Serbia by all analyzed funds and appearance of the world's economic crisis*

## SORTINO RATIO

*Sortino ratio was developed by Frank Sortino in 1994 and it measures the returns adjusted to the targeted raturn rate and decline risk [21]. The applied formula is:*

$$S_0 = \frac{\vec{r}_i - MAR}{\delta_D(downside)}$$

*where: So- Sortino ratio, $\vec{r}_i$- The average rate of returns on the portfolio (investment fund) in a defined previous period, MAR – Minimal acceptable return rate (in this paper MAR is used as risk free return rate), D- Difference between $\vec{r}_i - MAR$, $\delta_D(downside)$- Standard deviation difference $\vec{r}_i - MAR$, which has a negative preceding sign.*

*The numerator shows the remuneration as the extra return (compared to MAR) and the denominator the risk expressed by standard deviation of negative extra returns, or the risk of declining value of an investment. Sortino realized that the standard deviation as a risk measure punishes investment also for achieving returns that are above the risk free rate, which is why he introduced the declining risk vale (Downside risk).*

*The results are interpreted as follows:*

1. *The ratio value shows how well the return on investment compensates the investors for the risk taken,*
2. *Positive values are good, negative bad, there is no optimal value,*
3. *A negative value of the extra return indicates that the fund return is worse than risk free rate (or some other MAR), hence the performance is bad.*

*For the analysis for this paper as a minimum acceptable rate of return a risk-free return rate will be used. Applying Sortino ratio on the open investment funds performance in Serbia it can be seen that only three open funds generated positive performance, and that ten analyzed funds had a bad performance. The returns of ten funds that had a bad performance by Sortino ratio were below the return of risk free rate which is set as the minimum acceptable return rate.*

*A large number of funds had a high risk of decline expressed by the standard deviation of the negative extra returns. The greatest potential for achieving negative returns had Raiffeisen Akcije open fund whose standard deviation of negative extra return was 26.5% per annum. The great potential of achieving negative return of Raiffeisen Akcije fund was confirmed during the entire period of its business, because its investment unit lost 49.8% of its value annually. As many as 8 out of 13 open funds analyzed had the risk of decline by more than 10% and 6 funds had a risk of decline more than 15%.*

*Mostly open funds belonging to the value maintenance funds had the low value of the standard deviation of negative extra return, and which the most of their assets invest in debt securities with a* *low variability of return. Very small risk of return decline had the open investment funds Fima Novac and Citadel Novcani Fond, whose standard deviation of negative return was only 0.3% annually during the entire analyzed period. Both funds are funds of assets value maintenance, which should have, because of the composition of their assets, a small negative return volatility even in the conditions of markets' decline.*

*Table 1. Sortino ratio for open investment funds in Serbia (from the beginning of operations until 2010)*

| Name OIF | Extra return | σ negative extra return | Sortino ratio | rang |
|---|---|---|---|---|
| Delta Plus | -0.171 | 0.101 | -1.689 | 6 |
| Delta Dynamic | -0.384 | 0.173 | -2.219 | 11 |
| Erste Cash | -0.003 | 0.004 | -0.924 | 4 |
| Erste Euro Balanced | 0.045 | 0.027 | 1.638 | 2 |
| Fima Novac | -0.011 | 0.003 | -3.402 | 13 |
| Fima ProActive | -0.317 | 0.182 | -1.742 | 7 |
| Citadel Novčani Fond | 0.021 | 0.003 | 7.588 | 1 |
| Focus Premium | -0.439 | 0.165 | -2.652 | 12 |
| Triumph Balance | 0.024 | 0.036 | 0.672 | 3 |
| Ilirika Global | -0.315 | 0.176 | -1.783 | 9 |
| Kombank InFond | -0.193 | 0.108 | -1.777 | 8 |
| Raiffeisen Akcije | -0.498 | 0.265 | -1.880 | 10 |
| Triumph | -0.231 | 0.175 | -1.320 | 5 |
| Average unit of the funds analyzed | -0.163 | 0.111 | -1.471 | / |

*Source: [see: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15]*

*Open investment funds that had the best performance by Sortino ratio were Citadel Novcani Fond, ratio value 7.588, Erste Euro Balanced, ratio value 1.638, and Trimuph Balance 0.0672. These three funds are also the only three funds with a positive ratio values. Open funds Fima Novac, Focus Premium and Delta Dynamic had the worst performance.*

## TREYNOR RATIO

*Jack Treynor has developed this ratio in 1966, and it shows extra returns per risk unit (as a measure of risk it uses systematic risk, rather than overall risk portfolio). Treynor split the total risk of the total portfolio into two components: 1) The risk that fluctuations of the whole market make (market, macroeconomic, systematic), 2) risk arising from fluctuations of securities in the portfolio (individual, specific).Formula applied in the paper is [27]:*

$$T = \frac{\bar{r}_i - \bar{r}_f}{\beta}$$

*where: T - Treynor ratio, $\bar{r}_i$ - the average rate of returns on the portfolio (investment fund) in a defined previous period, $\bar{r}_f$ - the average returns risk on risk free security in a defined previous period, β - beta coefficient of portfolio (investment fund) relative to the market (benchmark that is used as an approximation of the market).*

*The numerator shows the award as an extra return, and the denominator the risk expressed by beta coefficient of the fund, or market risk. The disadvantage of this measure is that it is possible in two cases Treynor ratio shows wrong performance:*

1. *In circumstances where the market has a downward trend the negative beta coefficient value combined with positive rate of an extra return will give a negative value of Treynor ratio,*
2. *The negative value of extra return and negative value of beta coefficient will give a positive value of Treynor ratio.*

*The results are interpreted as follows:*

1. *The ratio value shows how well the return on investment compensates the investors for the systematic risk taken,*
2. *Positive values are good negative bad, there is no optimal value,*
3. *A negative value of the extra return indicates that the return of the fund is worse than the risk free rate, hence the performance is bad.*

*With the implementation of Treynor ratio on the performance of open investment funds in Serbia, we find that only two funds made positive value of Treynor ratio in the period from the beginning of their operations to the end of 2010 (Table 2).*

*As many as 11 funds had a negative Treynor ratio value, which indicates that open investment funds in Serbia have a weak coordination of returns and market risk in the current market circumstances in which the market was volatile and during one part of the period observed it has made a major decline. A negative Treynor ratio value is a result of negative returns the funds made. However, Erste Euro Balanced open fund had a negative Treynor ratio value of -1.789 even though it* *had the best return of all open funds. Erste Euro Balanced Fund had the highest extra return of 4.5% and the lowest market risk, beta -0.135, but is nevertheless ranked on the last place. The reason for this is that Treynor ratio avanges negative values of beta coefficient i.e. negative risk. Erste Euro Balanced Fund had a negative value of beta coefficient, which means that its returns moved in the opposite direction from the returns of the market. This fund was established after the financial crisis, which means that it did not operate at a time of great decline of the market benchmark values, and during its operating the market benchmark was rapidly recovering, having achieved an average annual return rate of 28%. Given that the fund was operating in a high growth market circumstances, negative Treynor ratio value caused by the negative beta coefficient reflects the true performance of the Erste Euro Balanced Fund in relation to the systematic risk. If at any chance the market, at the time of operation of this fund, had a downward trend, then the value of Treynor ratio would be a wrong performance indicator.*

*Table 2. Treynor ratio for the open investment funds in Serbia (from the beginning of their operations to the end of 2010)*

| OIF Name | Extra return | Beta | Traynor ratio | rang |
|---|---|---|---|---|
| Delta Plus | -0,171 | 0,337 | -0,508 | 5 |
| Delta Dynamic | -0,384 | 0,547 | -0,703 | 8 |
| Erste Cash | -0,003 | 0,006 | -0,529 | 6 |
| Erste Euro Balanced | 0,045 | -0,025 | -1,789 | 13 |
| Fima Novac | -0,011 | 0,015 | -0,705 | 9 |
| Fima ProActive | -0,317 | 0,428 | -0,742 | 10 |
| Citadel Novčani Fond | 0,021 | 0,020 | 1,051 | 1 |
| Focus Premium | -0,439 | 0,520 | -0,843 | 11 |
| Triumph Balance | 0,024 | 0,107 | 0,227 | 2 |
| Ilirika Global | -0,315 | 0,773 | -0,407 | 3 |
| Kombank InFond | -0,193 | 0,405 | -0,476 | 4 |
| Raiffeisen Akcije | -0,498 | 0,353 | -1,409 | 12 |
| Triumph | -0,231 | 0,390 | -0,592 | 7 |
| Average unit of the funds analyzed | -0,163 | 0,554 | -0,294 | / |

*Source: [see: 3,4,5,6,7,8,9,10,11,12,13,14 and 15]*

*The three highest-ranked open investment funds in Serbia according to the Treynor ratio are Citadel Novcani Fond, Triumph Balance and Ilirika Global. Citadel Novcani Fond and Triumph Balance made a similar extra return with very low market risk. Given that both funds operated during the financial crisis and that both funds had a low beta coefficient, they were not greatly exposed to the impact of market decline in that period. Money market funds are much less dependent on the movement of market indices made up mostly of the shares and long-term bonds, thus the low beta coefficient of Citadel Novcani Fond is expected. Open fund whose returns were largely sensitive to the volatility of a market benchmark return is Ilirika Global with a beta coefficient of 0.773. A large part of the Ilirika Global fund portfolio, about 60%, is shares of companies listed on Belgrade Stock Exchange and foreign stock exchanges.*

*Table 3. Treynor ratio for open investment funds in Serbia in 2010*

| Name of OIF | Extra return | Beta | Treynor ratio | rang |
|---|---|---|---|---|
| Delta Plus | -0,069 | 0,068 | -1,028 | 9 |
| Delta Dynamic | -0,155 | 0,106 | -1,458 | 11 |
| Erste Cash | -0,018 | 0,010 | -1,861 | 12 |
| Erste Euro Balanced | 0,040 | -0,135 | -0,294 | 8 |
| Fima Novac | -0,030 | 0,007 | -4,276 | 13 |
| Fima ProActive | -0,029 | 0,328 | -0,087 | 4 |
| Citadel Novčani Fond | -0,008 | 0,035 | -0,239 | 7 |
| Focus Premium | -0,316 | 0,221 | -1,429 | 10 |
| Triumph Balance | -0,013 | 0,129 | -0,098 | 5 |
| Ilirika Global | -0,006 | 0,707 | -0,009 | 3 |
| Kombank InFond | -0,101 | 0,665 | -0,151 | 6 |
| Raiffeisen Akcije | -0,614 | -1,728 | 0,355 | 2 |
| Triumph | -0,058 | -0,034 | 1,688 | 1 |
| Average unit of the funds analyzed | -0,058 | 0,070 | -0,838 | / |

*Source: [see: 3,4,5,6,7,8,9,10,11,12,13,14 and 15]*

*In 2010 only two open investment funds recorded a positive value of Treynor ratio. Funds Triumph and Raiffeisen Akcije are an excellent example of how in certain market conditions Treynor ratio can give results that may mislead investors who make decisions based* *on this criteria. Both these open funds had returns that were lower than the risk free rate (in the case of Serbia, risk-free rate is the weighted average return on three-month state records of the Republic of Serbia), which is enough for their performance to be unsatisfactory. Also, both funds had a negative beta coefficient in the year the market grew by 13.75%, indicating that their returns went in the opposite direction from the return of the market, or their portfolio managers did not adjust fund portfolio to the market growth trend. Both of these funds had a negative value of remuneration and a negative value of systematic risk in the market growth conditions, but minus in both numerator and denominator in the formula created the positive value of the ratio. A positive Treynor ratio value of these two funds does not reflect their true performance. Open fund Erste Euro Balanced was the only one to have the positive value of renumeration, an extra return of 4%, but nevertheless it had a negative Treynor ratio value due to the negative beta coefficient in the market growth conditions. This result of Erste Euro Balanced fund reflects its true performance because the fund was sanctioned for the negative value of systematic risk in the market growth conditions.*

## SHARPE RATIO

*Sharpe ratio was developed by the Nobel Prize Winner William Sharpe in 1966, and it is based on the CAPM model (Capital Asset Pricing Model) and on the editing of the returns for risk [20]. The applied formula for the calculation is:*

$$S = \frac{\bar{r}_i - \bar{r}_f}{\delta_D}$$

*where: S - Sharpe ratio, $\bar{r}_i$ - Expected return rate on portfolio (investment fund) in the forthcoming period, $\bar{r}_f$ - Expected return rate on the risk free securities in the forthcoming period,*

*D – Difference between $\bar{r}_i$ and $\bar{r}_f$ , $\delta_D$ - Standard deviation $\bar{r}_i - \bar{r}_f$ .*

*The numerator shows the remuneration as an additional contribution, and the denominator the risk expressed by standard deviation of extra return, or total risk. Accordingly, we can immediately see that the returns of investment funds in practice often do not have normal distribution, which is the lack of method. The results are interpreted as follows:*

1. *The ratio value shows how well the return on investment compensates the investors for the risk taken,*
2. *Positive values are good, negative bad, there is no optimal value,*
3. *A negative value of the extra return indicates that the fund return is worse than risk free rate, hence the performance is bad.*

*Applying Sharpe ratio on open investment funds performance in Serbia, it is evident that only three open investment funds have had a positive value of this ratio, and all other funds, including the average unit of the analyzed funds achieved a negative value (Table 4).*

*Table 4. Sharpe ratio for open investment funds in Serbia (from the beginning of their operations to the end of 2010)*

| NameOIF | Extra return | σ extra return | Sharpe ratio | rang |
|---|---|---|---|---|
| Delta Plus | -0,171 | 0,164 | -1,044 | 5 |
| Delta Dynamic | -0,384 | 0,206 | -1,866 | 11 |
| Erste Cash | -0,003 | 0,005 | -0,754 | 4 |
| Erste Euro Balanced | 0,045 | 0,044 | 1,017 | 2 |
| Fima Novac | -0,011 | 0,004 | -2,620 | 13 |
| Fima ProActive | -0,317 | 0,216 | -1,469 | 9 |
| Citadel Novčani Fond | 0,021 | 0,010 | 2,067 | 1 |
| Focus Premium | -0,439 | 0,196 | -2,239 | 12 |
| Triumph Balance | 0,024 | 0,081 | 0,300 | 3 |
| Ilirika Global | -0,315 | 0,220 | -1,428 | 8 |
| Kombank InFond | -0,193 | 0,150 | -1,281 | 7 |
| Raiffeisen Akcije | -0,498 | 0,276 | -1,802 | 10 |
| Triumph | -0,231 | 0,216 | -1,068 | 6 |
| Average unit of the funds analyzed | -0,163 | 0,172 | -0,946 | / |

*Source: [see: 3,4,5,6,7,8,9,10,11,12,13,14 and 15]*

*A large number of funds with negative Sharpe ratio values show that there is a mismatch between total risk and funds return. Only three open investment funds have achieved rate of return above the rate recorded at the same time by risk-free assets, which indicates that majority of open funds in Serbia did not have return in accordance with the risks involved. Risk-free assets have had better performance than the 10 of the 13 analyzed funds.*

*In addition to the large negative rate of return there is another feature of the investment funds in Serbia - a total investment risk they carry, expressed through the great variability of extra returns of this investment alternative. Even nine open investment fund had a standard deviation of extra returns over 15% annually, and 5 had more than 20%. That open investment funds in Serbia had a poor performance based on the adjustment of extra returns for the overall risk, shows the average unit of the analyzed funds. Sharpe ratio of the average unit of the analyzed funds had a negative value of -0.946 with an extra return of -16.3% and the variability of extra return of 17.2% per year.*

*Ranking of the open funds according to Sharpe ratio indicates that the best performance was achieved by Citadel Novcani Fond, Erste Euro Balanced and Triumph Balance, funds that were the only with positive ratio value. Although the Citadel Novcani Fond generated more than half less the rate of extra return than Erste Euro Balanced, its low risk expressed by the standard deviation of the extra return of only 1% per annum positioned it in the first place according to Sharpe ratio.*

*An excellent example of a case in which a higher rate of return does not automatically mean better Sharpe ratio performance is the relation of open funds ranked in the first and third place. These funds had very similar rates of extra return, Citadel Novcani Fond 2.1% and Triumph Balance 2.4% , but the Triumph Balance fund achieved this return with much greater variability of 8.1% compared to 1% which was achieved by Citadel Novcani Fond. Extra value achieved by Citadel Novcani Fond is the result of wise investment decisions of the fund portfolio manager. It should be taken into consideration that Citadel Novcani Fond is assets value maintenance fund and it has low variability because the majority of assets it invests in short-term debt instruments, while the Triumph Balance fund is a balanced type of fund and its standard deviation is not too large considering that part of the assets it invests in shares that have much more risk than money market instruments.*

*Table 5. Sharpe ratio for open investment funds in Serbia in 2010*

| Name OIF | Extra return | σ extra return | Sharpe ratio | rang |
|---|---|---|---|---|
| Delta Plus | -0,069 | 0,042 | -1,643 | 9 |
| Delta Dynamic | -0,155 | 0,086 | -1,790 | 11 |
| Erste Cash | -0,018 | 0,003 | -5,998 | 12 |
| Erste Euro Balanced | 0,040 | 0,039 | 1,017 | 1 |
| Fima Novac | -0,030 | 0,003 | -11,765 | 13 |
| Fima ProActive | -0,029 | 0,095 | -0,300 | 4 |
| Citadel Novčani Fond | -0,008 | 0,011 | -0,801 | 6 |
| Focus Premium | -0,316 | 0,185 | -1,711 | 10 |
| Triumph Balance | -0,013 | 0,045 | -0,283 | 3 |
| Ilirika Global | -0,006 | 0,140 | -0,043 | 2 |
| Kombank InFond | -0,101 | 0,119 | -0,842 | 7 |
| Raiffeisen Akcije | -0,614 | 0,427 | -1,438 | 8 |
| Triumph | -0,058 | 0,102 | -0,564 | 5 |
| Average unit of the funds analyzed | -0,058 | 0,031 | -1,872 | / |

*Source: [see: 3,4,5,6,7,8,9,10,11,12,13,14 and15]*

*Raiffeisen Akcije open fund had the biggest risk whose standard deviation of extra return on the annual level was 27.6%. It should be noted that all funds started operations at different times, and that while some funds operated, others were not established. Much greater variability had the funds that did business in other half of 2008 and the first half of 2009, because it was a period of great market decline that led to the reduction of investment units of all funds. Funds that began their work after a period of great market decline had significantly lower variability.*

*Sharpe ratio results for 2010 show the same situation. Only one open investment fund achieved positive value of Sharpe ratio in 2010. Although the returns of open funds were significantly better in 2010 compared to the period from the beginning of operations, only one open fund managed to outperform risk free rate of return. The standard deviation of extra returns of open funds was significantly lower in 2010; eight funds had a standard deviation of the extra return below 10%. The average unit of the analyzed funds in 2010 had a negative Sharpe ratio value -1.872 achieving negative rate of extra return of -5.8% with low standard deviation of extra return of 3.1%.*

## CONCLUSIONS

*Open investment funds should be investment alternative for individuals and companies. Currently, Serbian citizen in average invests 1 euro in open investment fund [24] and 1000 euro in deposit with the bank (authors calculation on the basis of available data on the source 1 and 2). It can be explained with the level of education of the citizens in terms of possible investment alternatives, previous experience on the market and financial (ratio) performance of open investment funds.*

*In the period of 2007 to 2010, open investment funds showed very negative trend of assets reduction that they managed, as well as the number of investment units they issued. The analysis, based on the use of three ratios (Sortino, Sharpe and Treyner ratios) for measuring performance based* *on the (high) risk and return showed that the returns of most open investment funds in Serbia are low.*

*We can make a conclusion that the performance of open investment funds in Serbia is bad.*

- *Results of Sortino ratio suggest a high risk of open investment funds assets value decline, which is conditions of market decline came to the fore through the negative rates of returns of most funds (which is consistent with the analysis by Sharpe ratio).*
- *No open investment fund had a positive value of all three indicators in the period in which it operates.*
- *A positive value of at least one performance measure had only three open investment funds, i.e., ten open funds did not achieve a positive value on at least one performance measure.*
- *Open investment funds in Serbia have total investment risk in accordance with the analysis of the performance by Sharpe ratio.*

*Finally, the negative results of performance measurement in the vast majority of analyzed open funds, large total investment risk and the risk of decline, which they had, the inability to reach a risk-free rate of return and the market benchmark rate of return, indicate poor operating results of open investment funds in Serbia.*

## ACKNOWLEDGEMENT

*This Research Paper was the part of the project* "Advancing Serbia's Competitiveness in the Process of EU Accession"*, no. 47028, in the period 2011-2015, financed by Serbian Ministry of Science and Technological Development.*

## REFERENCES

[1] National Bank of Serbia (2013) Quarterly report of movement of financial stability indicators of Repbulic of Serbia for the 4th quartile of 2012
[2] National Bank of Serbia (2013) My money [www.mojnovac.rs/fondovi.1.thml]
[3] Prospect of open investment fund Citadel Novčani Fond [http://www.citadel-am.com/files/Prospekti/Prospekt-Novcani-31-03-11.pdf]
[4] Prospect of open investment fund Delta Dynamic [http://www.deltainvestments.rs/upload/images/Prospekt%20Delta%20Dynamicx.pdf]
[5] Prospect of open investment fund Delta Plus [http://www.deltainvestments.rs/upload/images/Prospekt%20Delta%20Plusx.pdf]
[6] Prospect of open investment fund Erste Cash [http://www.ersteinvest.rs/Erste_CASH/Prospekt/sPortal.portal;jsessionid=hrqJL58MTvzVVfJY0w9dt1JbPtNgY6SPYbh81LKs2cXH6GnpZx7K!407568366?_windowLabel=LABEL_MENU&_urlType=action&LABEL_MENU_]
[7] Prospect of open investment fund Erste Euro Balanced [http://www.ersteinvest.rs/Erste_CASH/Prospekt/sPortal.portal;jsessionid=hrqJL58MTvzVVfJY0w9dt1JbPtNgY6SPYbh81LKs2cXH6GnpZx7K!407568366?_windowLabel=LABEL_MENU&_urlType=action&LABEL_MENU]
[8] Prospect of open investment fund Fima Novac [http://www.fimainvest.com/download/Prospekt%20FIMA%20NOVAC%2031.12.pdf]
[9] Prospect of open investment fund Fima Proactive [http://www.fimainvest.com/download/Prospekt%20FIMA%20ProActive%2031.12.pdf]
[10] Prospect of open investment fund Ilirika global [http://www.mojnovac.rs/upload/documents/prospekti_prezentacije/ilirika/PROSPEKT_-_ILIRIKA_GLOBAL.pdf ]
[11] Prospect of open investment fund Kombank InFond [ http://www.kombankinvest.com/pdf/InFond_duzi2.pdf]
[12] Prospect of open investment fund Raiffeisen Akcije [http://www.raiffeiseninvest.rs/bgrbaiinv/web/public/prospekt]
[13] Prospect of open investment fund Triumph [http://www.mojnovac.rs/upload/documents/prospekti_prezentacije/truimph/Prospekt-OIF-31-08-10.pdf]
[14] Prospect of open investment fund Triumph Balance [http://www.citadel-am.com/files/Prospekti/Prospekt-Balans-31-03-11.pdf]
[15] Prospect of open investment fund Focus Premium [http://www.citadel-am.com/files/Prospekti/Prospekt-Premium-31-08-10.pdf]
[16] Security Commission of Republic of Serbia, Report on activities of Security Commission of Republic of Serbia and movements on organized Serbian security market in period January – December 2007, 2008
[17] Security Commission of Republic of Serbia, Report on activities of Security Commission of Republic of Serbia and movements on organized Serbian security market in period January - December 2008. Belgrade, 2009

[18] *Security Commission of Republic of Serbia, Report on activities of Security Commission of Republic of Serbia and movements on organized Serbian security market in period January – December 2009. Belgrade, 2010*
[19] *Security Commission of Republic of Serbia, Report on activities of Security Commission of Republic of Serbia and movements on organized Serbian security market in period January – December 2010. Belgrade, 2011*
[20] *Sharpe W., Mutual fund performance, Journal of business vol. 39, 1996*
[21] *Sortino F, Satchell S., Managing downside risk in financial markets. Oxford, Butterwoth-Heinemann, 2001*
[22] *The official gazette of Republic of Serbia, Law on Investment funds [www.sec.gov.rs], 2011*
[23] *The official gazette of Republic of Serbia, Law on equity markets [www.sec.gov.rs], 2011*
[24] *The site of Bifoline, News [www.bifoline.rs], 2012*
[25] *The site of Raiffeisen bank a.d. Belgrade, Investment funds [www.raiffeisenbank.rs], 2013*
[26] *The site of Security Commission of Republic of Serbia, Participant on Serbian financial market [www.sec.gov.rs], 2013*
[27] *Treynor J., How to rate management of investment fund. Harvard Business Review vol 43, 1965*
[28] *Vejnovic, N., Analysis of performance of Serbian investment funds, Belgrade, FEFA, 2011*

*ANNALS of Faculty Engineering Hunedoara*

*– International Journal of Engineering*