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The efficiency of equity funds in Poland

Efektywność funduszy akcyjnych w Polsce

Key words: investment funds, efficiency, financial crisis, equity funds

Słowa kluczowe: fundusze inwestycyjne, efektywność, kryzys finansowy, fundusze akcyjne

Introduction

Investment funds have been operating on the Polish financial market since 1992. In essence, they can be reduced to management of funds from institutional or individual investors [Lee, Lee, 2006, p. 186]. The issue of investment funds is connected with the assessment of their effectiveness, which is important from the point of view of the attractiveness of the fund for a potential investor. Evaluation of the effectiveness of the investment fund is based on a comparison of its results to the results achieved by a proper benchmark. As a benchmark, one can use either stock index or a specific investment portfolio. Fund managers optimize portfolios based on a comparison to the benchmark [Dawidowicz, 2011, p. 58]. An effective fund can be described as a fund whose results in a given period are greater than the performance of the selected benchmark (e.g., stock market index). Similarly – an inefficient fund can be described as a fund which was characterized by weaker results than the accepted benchmark in a given period. To determine whether an investment fund is efficient, methods relating to the evaluation of investment portfolios are used. We can distinguish basic and complex (so-called risk-adjusted) measures of measuring the effectiveness of investment funds.

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In the literature, there are many publications, mostly international, devoted to the results of investment funds[1]. The most significant are the works of J.L. Treynor [Treynor, 1965], W.F. Sharpe [Sharpe, 1966] or M.C. Jensen [Jensen, 1968]. The authors conducted an in-depth analysis of the U.S. investment funds market, and the results of their work were the measures which are the basis for further research into the effectiveness of investment funds. S.J Kon and F.C. Jen [Kon, Jen, 1979] conducted a study on a group of 49 funds, taking into account the efficient market hypothesis. In contrast, M. Grinblatt and S. Titman [Grinblatt, Titman, 1989] demonstrated that the effectively managed funds where those, whose managers had a very aggressive investment objectives. In turn, Polish investment fund market was studied, among others, in: T. Miziołek [Miziołek, 1997], E. Ostrowska [Ostrowska, 2003], K. Perez [K. Perez 2012]. T. Miziołek conducted an analysis of the effectiveness of 9 funds in 1997, based on the rate of return, Sharpe ratio, Treynor ratio and Jensen's Alpha. He drew conclusions regarding the lack of effectiveness of the studied funds. Risk-adjusted measurements were used also by E. Ostrowska. The author concluded that the funds studied had investment performance significantly above average. In contrast, K. Perez has also taken into account the so-called survival effect.

The purpose of this article is to assess the effectiveness of selected equity funds in 2005–2012. At the same time, a thesis is postulated that during the crisis on the global financial markets in 2008–2009, there was a decrease in the effectiveness of equity funds in Poland.

1. The scope and methodology of the study

The scope of the study included open-ended funds and specialized open investment funds operating in Poland. The study does not contain closed-end funds, foreign funds and those that changed their investment policy during that period. The data used in the analysis focused on the period from 03 January 2005 until 28 December 2012, the values of the units were obtained from the websites of individual investment companies. Their monthly values were used[2]. Microsoft Excel 2010 was used for all the necessary calculations. As the risk-free rate (), the average yield on 52-week treasury bills in 2005–2012 was used. In order to carry out the necessary analyses, an index of equity funds was created, which included 33 funds and sub-funds operating on the domestic market[3]. The equity funds market consisted of 18 funds at the beginning

[1] An overview of the literature on the research results of investment funds, which have been conducted in the United States and in other countries can be found, inter alia, In: W.F. Sharpe, G.J. Alexander, J.V. Bailey, *Investments*, Prentice-Hall, Englewood Cliffs, 1995, pp. 823–824 and K. Perez, *Efektywność funduszy inwestycyjnych. Podejście techniczne i fundamentalne*, Difin, Warsaw 2012, pp. 256–257.

[2] The values of the last day of the month in which there was a quote.

[3] These were: Selective Allianz, Allianz Equity Plus FIO, FIO Shares of Allianz, Allianz Allocation FIO, FIO Amplico Umbrella Domestic Shares, Arka BZ WBK Equity FIO, Aviva Investors FIO Modern

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of the analyzed period. However, in the years 2006–2008, another 15 funds have joined. At the end of 2012, 33 equity funds operated in Poland[4].

When assessing the effectiveness of the funds by basic methods, the following indicators and risk measures were used: the return rate (R_p), standard deviation (s_p) and coefficient of determination (R^2). These measures were calculated for the average equity fund. In turn, the reference measurements for the benchmark of a given fund was calculated for the return rate (R_m) and standard deviation (s_m). The study used the following risk-adjusted measures: Sharpe ratio (Sp), Jensen's Alpha (J), the Modigliani-Modigliani measure (M^2).

As a measure of total risk, standard deviation was assumed. The method of calculation is given in the formula [Bernstein, Damodaran, 1999, pp. 84–85]:

$$S_p = \sqrt{\frac{\sum(R_t - R)^2}{(n-1)}}$$

where:

s_p – the standard deviation of return of an investment fund,

R_t – the rate of return realized by the investment fund in t–the period,

R – expected (average) rate of return of the investment fund,

n – number of periods.

The standard deviation takes values greater than or equal to zero. It shows the average deviation of the rate of return from the expected rate of return (the average) generated by the fund for collective investment. The higher the standard deviation, the greater the total risk of an investment fund [Dębski, pp. 490–493].

To determine the market risk (i.e. systematic risk), *a beta* coefficient was used, which is given in the following formula [Maginn, Tuttle, 2007, p. 596]:

$$\beta = \frac{\sum_{i=1}^{n}(R_{pt} - R_i)(R_{mt} - R_m)}{\sum_{i=1}^{n}(R_{mt} - R_m)^2}$$

where:

β – beta coefficient

R_{pt} – the rate of return of *i*-this investment fund in period t,

Technologies, Aviva Investors Polish Equities, BNP Paribas FIO Paribas Shares, Credit Agricole Equity FIO, Idea Equity, Idea Raw Plus, Investor Equities Large-Cap FIO, FIO Investor Equities, Investor SFIO Infrastructure and Science Sector, Equity Portfolio NCB, NCB Equities, Legg Mason Equity FIO, FIO Millennium Equity, Noble Funds Equity FIO, Noble Funds Timing FIO, Novo Fund Equity Novo FIO, Pioneer Polish Equity FIO, Pioneer Active Allocation FIO, Equity PKO FIO, PKO Umbrella SFIO Equity Plus, PZU Equities FIO KRAKOWIAK, Umbrella Quercus SFIO Quercus Aggressive, SKARBIEC FIO Equities – EQUITY, SKARBIEC TOP Funds Equities SFIO, SKOK Parasol FIO S Equities, UniFunds FIO UniEquities Sectors of Growth, UniFunds FIO UniKorona equities.

[4] The number of funds that satisfies the assumptions proposed in the research.

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R_i – the average rate of return on the *i*-this investement fund in period *t*,
R_m – the rate of return of the market index in period *t*,
R_{mt} – arithmetic average return of the market index.

The *beta* coefficient is a measure of unlimited scale. Most often, however, it takes values from 0 to infinity.

One of the risk-adjusted measures is the Sharpe ratio, one of the most commonly used measures of the effectiveness of mutual funds. The value of the Sharpe ratio is calculated by dividing the excess return of the fund, which is a bonus for taking investment risk, by the standard deviation of the rate of returns of the fund. This relation can be written as follows [Perez, 2012, pp. 146–147]:

$$S_{pt} = \frac{R_{pt} - R_{ft}}{\sigma_{pt}} = \frac{R_{ex_p t}}{\sigma_{pt}}$$

where:
S_{pt} – the value of the fund's Sharpe ratio *p* in period *t*,
R_{pt} – the rate of return of the fund *p* in period *t*,
R_{ft} – the value of risk-free rate *(the benchmark)* in period *t*,
$R_{ex_p t}$ – the value of the excess return of the fund *p* in period *t*,
σ_{pt} – the standard deviation of returns of the fund *p* in period *t*.

Sharpe ratio is equal to the risk bonus per unit of total risk attributable to this investment [Haugen 1996, p. 380]. When interpreting the Sharpe ratio, a principle is used where the higher the value, the higher the efficiency of fund management and the better overall assessment of the fund. If the value of the indicator for the trust fund is higher than the market portfolio, then such a fund is considered as effective [Gabryelczyk, Truszkowski, 2010, p. 164].

Another indicator of efficiency of investment funds is the Jensen's Alpha factor. M.C. Jensen, based on the work of Treynor and Sharpe in 1968 estimated a measure with the following formula [Perez, 2012, p. 372]:

$$\alpha_p = (R_{pt} - R_{ft}) - \beta_p (R_{Mt} - R_{ft}) - u_{pt}$$

where:
α_p – Jensen's Alpha coefficient,
R_{pt} – the rate of return of the fund *p* in period *t*,
R_{ft} – the value of risk-free rate *(the benchmark)* in period *t*,
β_p – the beta coefficient for fund *p*,
R_{Mt} – realized rate of return of the market portfolio in period *t*,
u_{pt} – the expected value of the random component.

It should be noted that the expected value of the random component is zero, i.e. $E(u_{pt}) = 0$. Jensen's Alpha coefficient determines the added value achieved by the fund manager, in relation to the whole market [Bernstein, Damodaran, 1999, p. 372]. De-

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termination of the effectiveness of investments based on Jensen's Alpha coefficient involves aligning it (α_p) to zero. A positive value means that a specific investment might be interesting, and vice versa – with a negative value. Positive values indicate how the results of the investment fund are greater than expected, and negative mean that the fund has achieved results worse than expected. The higher the value of the Jensen's Alpha coefficient, the better the investment fund management rating, because the changes in the results of the fund are not directly caused by the changes taking place in the stock market [Dębski, 2007, pp. 539–540].

Modigliani-Modigliani measure [Modigliani, Modigliani, 1997], called in short M^2 or MM, it is one of the newer measures of assessing the effectiveness of investment funds and is one of the alternatives to the Sharpe ratio. This measure determines the risk-adjusted efficiency of the fund, relative to the portfolio with the same risk exposure, which is characterized by the benchmark [Zamojska, 2012, pp. 110–111]. Index M^2 is given by [Muralidhar, 2000, p. 64]:

$$M^2 = \frac{S_m}{S_p}(Rp - Rf) + Rf$$

where:
M^2 – Modigliani-Modigliani measure,
s_m – the standard deviation of return of the benchmark,
s_p – the standard deviation of return of an investment fund,
R_p – rate of return of an investment fund,
R_f – the rate of return considered free of risk.

Benchmark for the M^2 measure is the rate of return of the benchmark. If M^2 is higher, the fund is considered to be effective; otherwise it is considered inefficient.

2. Results and Discussion

The rate of return is the simplest method used to measure the performance of investment funds. Results of the achieved returns of the average equity fund[5]

[5] The average equity fund was constructed according to the formula:

$$Indeks_{FIXt} = \sum_{i=1}^{n}\left(\frac{P_{j.u.i,t}}{P_{j.u.i,t-1}}\right) xI(t-1)$$

where:
IndeksFIXt – the value of indext of the shares of investment funds in period t,
Pj.u.i,t – evaluation of investment fund units i in period t,
Pj.u.i,t – 1 – evaluation of investment fund units i in period t–l
n – number of investment funds in the index,
I(*t* – 1)– the value of index in the period t–l.

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(R_p) are summarized in Table 1, together with the rate of the benchmark (R_m). As the benchmark for the average equity fund, an index was assumed consisting in 90% of the changes in the WIG index quotes and in 10% of the changes in profitability of 52-week treasury bills [Ostrowska, Merchel, 2002, p. 60].

Table 1. Rates of return (R_p) and standard deviation (s_p) of the average equity fund, rate of return of the benchmark (R_m) and standard deviations of the benchmark (s_m) [in %] and the beta (β) coefficient and the coefficient of determination (R^2) of the portfolio of an average equity fund.

Year	R_p	R_m	s_p	s_m	β	R^2
2005	24,110	36,961	**3,601**	5,044	0,703118979	0,9698734
2006	31,426	33,171	**4,096**	5,979	0,676995812	0,9765569
2007	**2,846**	1,999	**5,182**	6,000	0,811196535	0,8821118
2008	**–40,185**	–42,973	**6,004**	7,504	0,788855666	0,9721997
2009	48,385	61,981	**6,206**	8,966	0,676518308	0,9554225
2010	16,976	18,552	**3,563**	4,705	0,751868439	0,98578
2011	–20,751	–20,275	**4,079**	4,882	0,826022108	0,9774564
2012	5,893	15,960	**3,529**	4,360	0,786763749	0,9448115

Source: own.

The figures in bold in the table indicate the periods in which the average equity fund earned higher returns and lower standard deviations than the accepted benchmark. This means that in those years the average equity fund was efficient. As we can see, the rate of return in the examined time period was characterized by high volatility. Significant impact on this had the changes in exchange rates on the Stock Exchange in Warsaw. This is also evident in the rates of return obtained by the adopted benchmark. The rates of return ranged from the lowest rate of –40,185% in 2008, to the highest 48,385%, which was recorded in 2009. It should be noted that the lowest rates of return occurred in 2008, when, as a result of the global crisis, economic slowdown occurred in Poland. However, a year later, there was a significant spike, which resulted in the highest recorded rate of return during the period – both of the average equity fund, as well as the benchmark.

Large variations in the rates of return were associated with the risk of investment occurring in the market of equity funds. A reflection of this can be seen in the obtained standard deviations (Table 1). Standard deviation values were in the range of the lowest in 2012, of 3,529% to the highest 6,206% in 2009, with the largest deviations occurring in the years 2007–2009, a period of high volatility rates on the Warsaw Stock Exchange. However, the average total risk of an equity fund, measured with the standard deviation, was less than the total risk recorded for the adopted benchmark in the given period.

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The *beta* coefficient of the average equity fund represents the value of systematic risk (Table 1). Due to the fact that throughout the period, the *beta* coefficient values developed in accordance with the inequality $0 < \beta < 1$, the rate of return of an investment fund reacted to the changes in the market only slightly. We can therefore conclude that the average equity fund was a defensive fund [Mikulec, 2004, p. 83]. The *beta* coefficient is an imperfect measure of risk for the funds which are characterized by undiversified investment portfolio. However, the average equity fund tested was characterized by a strong diversification, so the use of *beta* coefficient was justified. To assess the diversification of investment portfolios, the coefficient of determination (R^2) was used (Table 1). The least diversified investment portfolio of the average equity fund took place in 2007, in which the coefficient of determination was 0.88. In contrast, the most diversified portfolio occurred in 2011, when the value of the coefficient remained at a level close to 0.98.

Table 2 shows the values obtained for the Sharpe ratio. Based on the results, it can be concluded that the average equity fund was effective in 2006–2007 and 2009–2010. In these periods, Sharpe ratio values were greater than for the benchmark. The largest value of the ratio took place in 2006 and amounted to 7.63, but an equally high value was recorded in 2009 – 7.38. This means that in both of these periods, the bonus per unit of risk taken was high.

Table 2. Sharpe ratio values for the average equity (S_p) the benchmark (S_m) values of Jensen's Alpha (J) coefficient and Modigliani-Modigliani (M^2) measure

Year	S_p	S_m	J	M^2
2005	5,825765	7,947537	–0,07207	26,258
2006	**7,631987**	5,575984	**0,086903**	45,463
2007	**1,06557**	–0,11285	**0,06071**	**9,069**
2008	–6,56822	–5,82666	–0,04942	–48,538
2009	**7,380597**	7,200461	**0,021252**	**63,596**
2010	**4,694189**	3,997129	**0,02585**	**21,831**
2011	–4,89176	–4,3172	–0,02543	–23,080
2012	1,581694	3,731966	–0,0722	6,585

Source: own.

According to Jensen's Alpha values (Table 2), the average equity fund was characterized by the effectiveness of management in 2006–2007 and 2009–2010. In these periods values were positive, and the highest value was close to 0,087 in 2006. This is the value for which the results of the average equity fund were higher than expected. The last of the applied risk-adjusted measures – the M^2 measure (Table 2)

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indicates the efficiency of the equity fund in 2007 and in 2009–2010. The discrepancy, when compared to other indicators, can be seen in 2006. According measure M^2 during this period the average equity fund was not effective, and the index value is less than the benchmark[6].

Conclusions

The decrease in trading on the Stock Exchange in Warsaw in 2008, triggered by the crisis in the global financial markets, was reflected in reduced efficiency of equity investment funds. This confirms the thesis postulated in this study. In 2008, the rate of return on average capital fund amounted to –40,185%, but a year later it rebounded to the level of 48,385%. This situation is also confirmed by other measures used in the analysis. The obtained results based on risk-adjusted measures, clearly indicated that the average equity fund was effectively managed in the years 2006–2007 and 2009–2010.

Investment fund managers adjust their management strategies to the market situation. Equity funds, which were characterized by an active (risky) management policy, partly decided on a more passive (safer) policy of investing capital. As a result, at the time of the largest drop in stock market, mutual funds allowed investors to minimize losses.

Polish investment funds market is still developing. Investment Fund Companies (TFI) compete for the most attractive offer to investors. It is worth mentioning the interest rates, which are an additional incentive for potential customers of TFI to invest in investment funds. These and other factors affect the continuous influx of capital into investment funds[7].

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[6] The benchmark reference for M^2 is the rate of return achieved by the benchmark.

[7] At the end of November 2013, the net asset value of investment funds on the Polish market exceeded 182.8 billion PLN (http://www.izfa.pl/files_user/rap_mies/2013-12-11_fi_aktywa.pdf).

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The efficiency of equity funds in Poland

Investment funds appeared on the Polish financial market in 1992. Over the years, we can observe the dynamic development of this form of capital investment. The key question for investors when choosing an investment fund is the selection of the most effective funds offered by the Investment Funds Companies (TFI). This article focuses on the analysis of the effectiveness of equity funds in the period 2005–2012, with particular emphasis on the period of the largest declines in the financial markets in 2008–2009. When assessing the effectiveness of the funds the following indicators and risk measures were used: the return rate, standard deviation and coefficient of determination. The study also used the following risk-adjusted measures: Sharpe ratio, Jensen's Alpha, the Modigliani-Modigliani measure. A thesis was postulated that during the mentioned period equity funds recorded a decrease in their effectiveness. In the course of the study, the above statement was proved correct. The analysis, based on selected measures of the efficiency of investment funds, allowed to draw a conclusion that the results of Polish equity funds are characterized by approximately two-year delay in the range of impacts on the global economic crisis.

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Efektywność funduszy akcyjnych w Polsce

Fundusze inwestycyjne pojawiły się na polskim rynku finansowym w 1992 r. Na przestrzeni lat możemy zaobserwować dynamiczny rozwój tej formy lokowania kapitału. Kluczową kwestię dla inwestora przy wyborze funduszu inwestycyjnego stanowi wybór najbardziej efektywnych funduszy oferowanych przez Towarzystwa Funduszy Inwestycyjnych (TFI). W niniejszym artykule skupiono się na analizie efektywności funduszy akcyjnych w latach 2005–2012, ze szczególnym uwzględnieniem okresu największych spadków na rynkach finansowych w latach 2008–2009. W badaniu wykorzystano następujące wskaźniki oraz miary ryzyka stosowane przy ocenie efektywności funduszy inwestycyjnych: stopa zwrotu, odchylenie standardowe, współczynnik determinacji. Posłużono się także takimi miarami skorygowanymi o ryzyko jak wskaźnik Sharpe'a, alfa Jensena, miara Modigliani&Modigliani. Postawiono tezę, że we wspomnianym okresie fundusze akcyjne odnotowały obniżenie swojej efektywności. W toku przeprowadzonych badań udowodniono powyższe stwierdzenie. Dokonana analiza, na podstawie wybranych miar efektywności funduszy inwestycyjnych, pozwoliła na wysnucie wniosku, iż wyniki polskich funduszy akcyjnych charakteryzują się około dwuletnim opóźnieniem w zakresie oddziaływania na nie kryzysu w światowej gospodarce.