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DURATION OF COMMODITY FUNDS OPERATIONS IN POLAND AND THEIR EFFECTIVENESS

CZAS FUNKCJONOWANIA FUNDUSZY SUROWCOWYCH W POLSCE A ICH EFEKTYWNOŚĆ

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Summary: The effectiveness of investment results is one of the basic and most frequently analyzed issues related to investment funds. Research on factors affecting the effectiveness of funds in both foreign and Polish literature is rare. In the case of research on commodity funds, this is difficult due to the relatively young, still developing market. This study attempts to determine whether the duration of operation of commodity funds has an impact on the investment results obtained by them. To this end, the effectiveness of nine commodity funds operating on the Polish financial market in the period 2007-2018 was analyzed. As a measure of fund effectiveness, the rates of return and risk-adjusted measures were used: the Sharpe and Treynor ratios. The obtained results indicate that there is no clear relationship between the time of operation of commodity funds and the rates of return they receive.

Keywords: investment funds, commodity funds, efficiency, time of functioning of investment funds.

Streszczenie: Efektywność wyników inwestycyjnych stanowi jedno z podstawowych i najczęściej analizowanych zagadnień związanych z funduszami inwestycyjnymi. W literaturze zarówno zagranicznej, jak i polskiej badania dotyczące czynników oddziałujących na efektywność funduszy są rzadkie. Badania dotyczące funduszy surowcowych są utrudnione ze względu na młody, wciąż rozwijający się rynek. W niniejszym opracowaniu podjęto próbę określenia, czy czas funkcjonowania funduszy surowcowych ma wpływ na uzyskiwane przez nie wyniki inwestycyjne. W tym celu przeanalizowano efektywność dziewięciu funduszy surowcowych funkcjonujących na polskim rynku finansowym w latach 2007-2018. Jako miary efektywności funduszy wykorzystano stopy zwrotu oraz miary skorygowane o ryzyko:

wskaźnik Sharpe'a oraz Treynora. Uzyskane wyniki wskazują, iż nie ma jednoznacznego związku między czasem funkcjonowania funduszy surowcowych a uzyskiwanymi przez nie stopami zwrotu.

Słowa kluczowe: fundusze inwestycyjne, fundusze surowcowe, efektywność, czas funkcjonowania funduszy inwestycyjnych.

1. Introduction

Investment funds are one of the most important forms of investing on the Polish financial market. Commodities, on the other hand, constitute an interesting group of alternative investments, which are mainly used to diversify the investment portfolio due to the low correlation with traditional instruments (e.g. shares, bonds) [Leitner et al. 2007]. At the end of December 2018 assets of commodity funds in Poland amounted to over PLN 822 million, which accounted for 0.3% of all assets in investment funds on the Polish financial market [IZFiA 2019].

The issue of fund effectiveness is widely discussed in world literature. Most often it concerns the assessment of effectiveness using different efficiency measures, but also the determination and estimation of factors affecting it. One of the determinants of the effectiveness of funds is the period of their functioning. This feature determines the life cycle of the fund and almost entirely depends on the skills and experience of the asset manager of the fund [Perez 2012, p. 275].

The issue of the efficiency of commodity funds on the market in Poland has been included, among others, in the research of W. Krawiec. The study concerned the effectiveness of commodity funds in Poland in 2008-2011. It was found that investments in the commodities markets are potentially characterized with high rates of return, but they are also exposed to large fluctuations, especially in shorter periods. Prices of commodities depend to a large extent on psychological and speculative factors, therefore a long-term investment period in commodity funds is recommended. This is confirmed by high long-term returns in 2008-2011 [Krawiec 2012]. High volatility of investment results of commodity funds is also confirmed by other studies of these funds in Poland.

The authors of this study found that in 2011-2015 investments in commodity funds were characterized by negative returns. This was the result of significant decreases in the prices of commodities, which have a large share in the investment portfolios of individual funds. Comparing the rates of return on market portfolios, the low efficiency of investments in commodity funds was indicated. Despite the unfavorable results of the commodity funds, the market developed due to the appearance of new funds investing both indirectly and directly on the raw materials market [Moskal, Zawadzka 2017b]. Other studies related to the effectiveness of commodity funds in Poland also included periods of bull and bear markets. The research results indicate that in the case of commodity funds offered on the

Polish market, it can be stated that the managers are mostly unable to adjust the portfolio composition to the changing market situation. As a result, in 2009-2016 commodity funds obtained negative returns, regardless of the current trend [Moskal, Zawadzka 2017a].

2. Theoretical background

Most studies on the dependence of fund effectiveness on their operation time in international literature refer to American funds due to the size and importance of this market in the global investment fund market. M.A. Jones conducted a study based on monthly rates of return of funds from January 1996 until July 2006. The funds were divided into three groups whose operating time was successively: up to 2 years, 2-4-year funds and funds over 4 years. It was found that the youngest funds obtained the highest rates of return. The index containing the youngest funds obtained an annual return rate of 17.5% and an annual standard deviation of 5.57%. Funds operating from 2 to 4 years have an annual return rate of 14.10% with a standard deviation of 6.39% per year. In turn, the oldest funds generated an annual rate of return of 11.84% and an annual standard deviation of 6.32% [Jones 2009]. Similar results were obtained by D. Frumkin and D. Vandegrift. They included American hedge funds, which received higher rates of return than the S&P500 from May 2005 until June 2007. It was found that older funds obtain lower rates of return due to changes in the investment strategy during their operation. As the time of fund operation increases, managers are more likely to change strategies, resulting in lower rates of return. Increasing the time of fund operation by one month resulted in a reduction in the obtained rates of return by 0.64 percentage points, and the increase in beta by 1 resulted in an increase in the rate of return by 17.5 percentage points. It has been shown that the age of the fund has a negative correlation with their rates of return [Frumkin, Vandegrift 2009]. These conclusions are consistent with the studies of E. S. O'Neal and D. E. Page. Researchers analyzed 28 real estate funds in the US market in 1996-1998. It was found that the age of funds is negatively correlated with their effectiveness, and younger funds obtained higher rates of return [O'Neal, Page 2000]. Xiong and others, who included 4,321 hedge funds on the US market in the period 1995-2006 [Xiong et al. 2009], made similar claims. On the other hand, the studies of Busse et al. did not show a significant impact of operation time of the funds on their effectiveness, and the stability of the obtained rates of return differed depending on the adopted model for assessing their effectiveness. The analysis was carried out in a group of 1,448 American market funds operating in 1991-2008 [Busse, Goyal, Wahal 2010]. The issue of funds operation time and the investment results obtained on the European funds market was taken up by R. Otten and D. Bams. The obtained results were in line with the American market research. The analysis covered 506 mutual equity funds from five European countries (France, Italy, Germany, the Netherlands, the United Kingdom).

The study included monthly logarithmic rates of return from January 1991 until December 1998. It was found that the age of the fund is negatively correlated with their effectiveness expressed by risk-adjusted measures [Otten, Bams 2002]. Interesting conclusions were made by M. Ferreira, A. Keswani and others, who included 16,316 open funds from 27 countries in their study in the period from 1997 to 2007. It was found that the duration of the funds' operation is negatively correlated with investment results for non-US funds, and this relationship is statistically irrelevant to American funds. This means that younger non-US funds are more efficient when investing funds outside the United States [Ferreira et al. 2013]. Different results in the assessment of the effectiveness of funds measured by risk-adjusted measures were demonstrated by D. Webster for the US market. The study includes six three-year periods of fund operation. Only funds operating on the market from 20 to 31 years were considered. The research sample consisted of 55 randomly selected US market share funds. No link was found between the age of the fund and simple measures of effectiveness (rate of return). The situation was different in the case of risk-adjusted measures (the Sharpe ratio), where the oldest funds were the most effective [Webster 2002]. On the Polish market, the analyses taking into account the impact of funds operation time on their investment results were carried out, among others, by K. Perez. The research covered 162 equity funds and 96 hybrid funds of the Polish market operating in 2001-2010. Ambiguous conclusions regarding the impact of the size and time of the funds' operation on their effectiveness were obtained, because based on the Sortino ratio, the longer the mutual equity fund operation time, the worse results were obtained, and in the case of the modified Sharpe ratio, they were better [Perez 2012].

The aim of this study was to identify the impact of commodity funds operation time on their effectiveness in 2008-2018, and, if such an impact occurs, to determine its nature. On the basis of the literature review, a research hypothesis was formulated stating that commodity funds in Poland which operate on the market for a shorter time, are characterized by higher rates of return and thus higher efficiency than longer-functioning funds.

3. Materials and methods

The analysis covered commodity funds operating on the Polish financial market and concerned the years of 2008-2018.¹ The time span of the study was dictated by the time of functioning of individual funds. At the end of December 2018, 14 commodity funds operated on the Polish market. Due to the relatively small and still growing market of commodity funds in Poland, those funds were considered as commodity funds which declare that at least 50% of assets are invested in financial instruments

¹ At least six-month periods of operation of individual funds in a given year of starting operations were taken into account.

based on commodity prices, including participation units of commodity funds and shares of companies related to commodities market.²

In order to maintain consistency and continuity of quotations in the valuation of fund share units, only mutual funds were included. Finally, nine commodity funds were assessed: Superfund Goldfuture, Skarbiec Rynków Surowcowych, Pekao Surowców i Energii, Investor Gold Otwarty, Rockbridge Rynków Surowcowych, QUERCUS Gold, Allianz Surowców i Energii, PKO Akcji Rynku Złota and Rockbridge Superior Rynek Surowców. A brief description of these funds is presented in Table 1.³

Commodity funds apply a diversified investment policy, which reflects the composition of individual portfolios, including exposure to a variety of commodities and markets, both domestic and foreign. Two funds do not have a specific benchmark. In this case, the managers focus on getting the highest absolute return rates. Diversified composition of investment portfolios and mapping standards became the premise for creating a weighted market index common to all commodity funds for the needs of the study. The market index had the following form: 90% CRB Commodity Index + 10% WIBID3M. The weights were determined based on comparison of the benchmarks indicated in the funds' fact sheets, also taking into account the share of particular types of financial instruments in the investment portfolios of the funds.

The study used both simple (rates of return, standard deviation) and risk-adjusted measures of the effectiveness of commodities funds (the Sharpe ratio, the Treynor ratio). One of the most popular risk-adjusted measures is the Sharpe ratio, which determines the average risk premium per unit of total risk taken, expressed as the standard deviation of the portfolio return surpluses. This relationship can be written as follows [Zamojska 2012, pp. 108-109]:

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

where: S_{pt} – Sharpe ratio value for a fund p in period t ; R_{pt} – rate of return value for fund p in period t ; R_{ft} – value of risk free rate in period t ; $R_{exp,t}$ – the value of the fund's p excess rate of return in period t , σ_{pt} – standard deviation of fund p return rate in period t .

When interpreting the Sharpe ratio, the principle is that the higher its value, the higher the efficiency of fund management and the better overall assessment of a given fund. If the value of the ratio for a given fund is higher than for the market portfolio, then such a fund is considered to be effective.

² The definition proposed by IZFA indicates that commodity funds include those entities that invest at least 66% of the value of assets in financial instruments related to commodity markets (e.g. stock of commodity companies or commodity derivatives).

³ Funds are put in order by their launch date from the oldest to the youngest.

Table 1. Characteristics of commodity funds operating on the Polish market

Fund	Launch date	Portfolio composition	Benchmark
Superfund Goldfuture	17.10.2007	<ul style="list-style-type: none"> up to 100% of the fund's assets are invested in Class Gold shares sold by Superfund Green A USD and up to 20% in Class Gold sold by Superfund Green B USD; – up to 30% of the fund's assets may be invested in: securities; money market instruments; receivables; currency; derivatives; deposits 	none
Skarbiec Rynków Surowcowych	07.01.2008	<ul style="list-style-type: none"> at least 66% of assets are invested in financial instruments based on prices of commodities, including shares of commodity funds and shares of companies whose activity is related to the extraction or processing of raw materials; – money market instruments, debt securities or deposits 	100% Reuters/Jefferies CRB Index, minus the management costs
Pełkao Surowców i Energii **	15.07.2008	<ul style="list-style-type: none"> up to 50% of assets are invested in the Pioneer Funds Commodity Alpha shares; – up to 50% in Pioneer S.F. – EUR Commodities; – up to 50% in Pioneer Funds Austria – Gold Stock; – up to 50% in Pioneer Funds Austria – Energy Stock; – up to 30% of funds may be invested in other Pioneer Funds, Pioneer S.F. and Pioneer Funds Austria; – bonds, money market instruments and bank deposits 	75% Thomson Reuters Core Commodity CRB Index + 10% AMEX Gold Miners Index (EUR) + 10% MSCI World Energy Index (EUR) + 5% WIBID
Investor Gold Otwarty	7.10.2008	<ul style="list-style-type: none"> shares issued by the DWS Invest Gold and Precious Metals Equities sub-fund of the foreign DWS Invest fund or the units of the foreign fund DWS Gold Plus (the share of units of these funds in assets can range from 70% to 100%) – debt securities; – money market instruments issued by the State Treasury, the National Bank of Poland, local government units and other public authorities (including EU Member States), enterprises; – bank deposits 	90% Gold (price of gold converted into Polish currency), 10% 6-month WIBID rate
Rockbridge Rynków Surowcowych**	16.12.2008	<ul style="list-style-type: none"> min. 50% of assets are invested in shares of companies related to the food and commodities sector, as well as instruments (including funds and derivatives) related to the prices of commodities; – up to 50% of assets are invested in debt instruments and currencies; – shares of companies related to the commodities market and instruments directly related to the prices of commodities 	75% Reuters/Jefferies CRB Excess Return Index + 25% WIBID3M
QUERCUS Gold	07.05.2012	<ul style="list-style-type: none"> gold futures traded on the COMEX market operated by the New York Mercantile Exchange; – other standardized derivatives listed on regulated or organized markets whose price depends directly or indirectly on the gold price 	none
Allianz Surowców i Energii	09.01.2014	<ul style="list-style-type: none"> from 60% to 100% of assets are invested in units and shares of funds investing in securities of companies operating in the field of exploration, extraction, processing or sourcing of raw materials (including: oil, gas and broadly defined energy) or imitating indices based on shares of such companies; – direct investments in equity and debt securities 	90% Bloomberg Commodity Index Total Return + 10% WIBID O/N
PKO Akcji Rynku Złota	15.05.2015	<ul style="list-style-type: none"> shares of selected companies operating on the gold and other precious metals market (mainly gold mining mines) 	100% Arca Gold Miners NYSE
Rockbridge Superior Rynku Surowców	11.05.2016	<ul style="list-style-type: none"> invests mainly in units of foreign funds whose policy assumes investing in instruments ensuring exposure to commodity exchange rates or raw materials indices; shares, units and other equity instruments related to the raw materials sector and derivative instruments for which the stock and share index bases constitute not less than 50% of the fund's assets. The remaining part of the deposits are debt instruments 	75% Thomson Reuters/Jefferies CRB Excess Return + 25% WIBID 3M

* First quotations are available from 01.01.2009, **Known before as: Pioneer Surowców i Energii; ***Known before as: BPH Globalny Żywności i Surowców, next as Rockbridge Globalny Żywności i Surowców.

Source: own study based on funds' fact sheets.

Another popular measure is the Treynor ratio, which is based on the assumption of the dominant role of systematic risk. This indicator can be written as [Czekaj 2008, p. 446]:

$$T = \frac{R_{pt} - R_f}{\beta_i},$$

where: T – Treynor ratio; R_{pt} – average rate of return of fund in t th period; R_f – average rate of return from risk free instruments in t -th period, β_i – beta index.

It is assumed that the higher the Treynor ratio, the more attractive the investment portfolio. This indicator determines the rate of return from the risk premium per unit of risk in the portfolio under examination. Typically, the Treynor ratio for a given portfolio is compared with the value of this measure for the market portfolio.

4. Results and discussion

Funds were studied in two groups: older and younger. The group of older funds includes commodity funds established in 2007-2013,⁴ and the rest to the group of younger funds (created after 01.01.2014⁵). The division of funds into groups resulted from the recommended time of investing in commodity funds, which is five years. The indices of fund groups constitute the average of the individual measures of effectiveness of commodity funds. The results of the effectiveness of commodity funds in 2008-2018 are presented in Table 2.

The obtained values indicate that the group of younger funds gained higher rates of return than the market. This conclusion is identical to results of research conducted on the American market by M.A. Jones [Jones 2009], by D. Frumkin and D. Vandergrift [Frumkin, Vandergrift 2009], and in line with the hypothesis assumed in the study. The difference in rates of return ranged from 0.2 percentage point (p.p.) to 10 p.p. However, in 2017, the only ineffective period in the group of younger funds, the older funds group obtained a result 3 pp. higher than the pattern. Similarly, for the Sharpe ratio with a difference of 67 p.p. – in 2017 the group of younger funds obtained lower Sharpe's ratio values than the market model by nearly 120 p.p., whereas the group of older funds indicated a higher efficiency by 44 p.p. The performance results measured by the Treynor ratio in the group of older funds indicate lower values than the pattern only in 2015, the difference was around 66 pp. In the same year, a group of younger funds was more effective by almost 7 p.p. A simple measure of effectiveness, which is the historical rate of return, indicates a higher efficiency of the group of younger funds than older funds. On the other hand, in the case of risk-adjusted measures, such regularity cannot be stated as both

⁴ Superfund Goldfuture, Skarbiec Rynków Surowcowych, Pekao Surowców i Energii, Investor Gold Otwarty, Rockbridge Rynków Surowcowych, QUERCUS Gold.

⁵ Allianz Surowców i Energii, PKO Akcji Rynku Złota, Rockbridge Superior Rynku Surowców.

Table 2. The results of the effectiveness of commodity funds divided by younger and older fund groups in 2008-2018

Year	Effectiveness measure*	Younger funds	Older funds	Benchmark
2008	r_p	–	–0.1199	–0.3780
	σ_p	–	0.0474	0.09511
	S_p	–	–1.276	–3.928
	T_p	–	–1.242	–0.374
2009	r_p	–	0.1046	0.2850
	σ_p	–	0.0519	0.04522
	S_p	–	5.278	8.237
	T_p	–	1.121	0.372
2010	r_p	–	0.257774	0.252537
	σ_p	–	0.0428	0.05425
	S_p	–	7.306	5.222
	T_p	–	0.449	0.283
2011	r_p	–	–0.0340	–0.1054
	σ_p	–	0.0528	0.05013
	S_p	–	–3.690	–4.430
	T_p	–	–0.196	–0.222
2012	r_p	–	–0.0428	–0.0556
	σ_p	–	0.0473	0.04370
	S_p	–	3.659	3.595
	T_p	–	0.248	0.157
2013	r_p	–	–0.2256	–0.0787
	σ_p	–	0.0502	0.02423
	S_p	–	3.714	8.886
	T_p	–	0.107	0.215
2014	r_p	0.072779	–0.0815	–0.1884
	σ_p	0.0304	0.0365	0.04152
	S_p	11.629	5.325	2.238
	T_p	0.635	0.432	0.093
2015	r_p	–0.18755	–0.1968	–0.1945
	σ_p	0.0637	0.0398	0.04817
	S_p	–1.082	–2.473	–1.927
	T_p	–0.027	–0.686	–0.093
2016	r_p	0.260284	0.0648	0.1543
	σ_p	0.0657	0.0458	0.03868
	S_p	3.376	1.349	2.676
	T_p	0.327	0.167	0.104
2017	r_p	–0.0351	0.0444	0.0095
	σ_p	0.0296	0.0219	0.02162
	S_p	–0.757	1.110	0.441
	T_p	–0.092	0.106	0.010
2018	r_p	–0.13209	–0.1602	–0.1396
	σ_p	0.0377	0.0290	0.02706
	S_p	–4.978	–5.799	–5.610
	T_p	–0.249	192.364	–0.152

* r_p – the average annual rate of return of the fund index; σ_p – the standard deviation of the return rate of fund index; S_p – Sharp ratio of fund index; T_p – Treynor ratio of fund index.

Source: own study.

effective and ineffective funds were present in both groups. The ambiguity of the obtained results is confirmed by the existing studies on the Polish investment funds market, including the study of K. Perez [Perez 2012]. The funds from the younger group showed the higher effectiveness of fund management measured by the Sharpe ratio, while the older funds were more effective in terms of the Treynor ratio. The reasons can be seen in the managers of commodity funds, who were probably able to better adjust the investment policy in the group of older funds in terms of specific risk. It is worth noting that the group of older funds was characterized by a lower level of risk measured by standard deviation, and the differences with the market portfolio fluctuated from 0.03 p.p. to 0.02 p.p., while in the group of younger funds the difference was from 0.1 p.p. to 3 p.p. The standard deviation of return rates of the group of older funds in the period 2008-2013 changed only slightly from 4.74% to 5.02%, however since 2014 there was a significant reduction in the risk level from 3.65% to 2.9% in 2018. Therefore, it can be stated that the managers of the group of older funds have reduced the risk level of portfolios with longer duration of the fund's operation, while reducing the effectiveness of these funds. Analyzing the results of return rates of the group of older commodity funds in 2008-2013, it can be noticed that they obtained lower rates of return than the market portfolio in only two periods – in 2009 and 2013. The assessment of effectiveness using the Sharpe ratio was similar. These results indicate difficulties with maintaining the stability of investment results obtained by the managers of commodity funds, along with the extension of the funds duration. This may be due to the adjustment of the investment policy after the recommended period of investing in commodity funds. This relationship cannot be seen when assessing efficiency using the Treynor ratio, as this measure indicates higher efficiency than the market in both 2008-2013 and 2014-2018.

5. Conclusion

Discrepancies in the obtained results indicate that the interpretation of the impact of the length of the operation period of commodity funds on the investment results they obtain may vary depending on what measure of effectiveness is taken into account. This result is consistent with the research conducted so far in relation to investment funds in Poland. The study was an introduction to the assessment of factors determining the effectiveness of commodity funds in Poland. Therefore, further stages of research on the influence of fund duration on their effectiveness will focus on the use of further measures of investment funds' effectiveness such as the Sortino ratio and the Jensen alpha measure. Commodity funds have been present for a relatively short time on the Polish investment funds market, and the prospects for increasing the popularity of this group of alternative funds depend largely on the investment results obtained by fund managers.

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