

STABILITY OF STRATEGIES OF POLISH OPEN-END INVESTMENT FUNDS INVESTING IN GLOBAL MARKETS DURING THE FINANCIAL CRISIS*

Andrzej Karpio

Warsaw University of Life Sciences

Dorota Żebrowska-Suchodolska

University of Finance and Management in Białystok

Abstract. The authors have attempted to analyze the stability of investment strategy of the Polish open-ended funds, which invest assets in global markets. The study covered the period from 2006 to 2010, which also contain a period of financial crisis. The analysis was performed by statistical methods which use a regression line, Spearman rank correlation coefficient and contingency table. All three methods are based on alpha coefficients of the characteristic lines of funds taken as measures of active investment policy of the managers. For the purposes of study, the authors have constructed market factor based on the indexes of the largest stock exchanges. The results were compared with those obtained earlier for the Polish market and equity funds.

Keywords: open-ended investment fund, regression line, Spearman rank correlation coefficient, contingency table, investment effectiveness

INTRODUCTION

Looking for investment opportunities and the desire for portfolio diversification induce financial market participants to go beyond the boundaries of their own country. This trend is also caused by globalisation and, consequently, by the regulatory framework enabling the free movement of capital. Nowadays, investing abroad is particularly

* Scientific work financed from funds for science in the years 2010–2012 as research project N N111 277638.

Corresponding authors – Adres do korespondencji: Andrzej Karpio, Wydział Zastosowań Informatyki i Matematyki, Katedra Ekonometrii i Statystyki, ul. Nowoursynowska 159, 02-776 Warszawa, e-mail: andrzej_karpio@sggw.pl; Dorota Żebrowska-Suchodolska, Wyższa Szkoła Finansów i Zarządzania w Białymstoku, Katedra Metod Ilościowych, ul. Ciepła 40, 15-472 Białystok, e-mail: zdorota@o2.pl

easy, primarily because of the development of computer techniques, which have drawn stock exchanges closer on an unprecedented scale. Also, such a young market as the Polish one is drawing closer to the rest of the world of finance. Anyone who considers entrusting their savings to investment funds may take into consideration an offer of investment not only on the Polish or European market, but also in as far countries as China and Japan. The current global financial crisis is neither universal nor frequently appearing. In the stabilization period, when there is no financial-economic turmoil, the use of offers of investment in foreign markets creates an additional opportunity to earn money through the use of better economic conditions in some markets and avoidance of less attractive areas. For these obvious reasons, the Polish open-ended investment funds are increasingly offering potential customers access to foreign markets. Such funds are the focus of attention of the authors of this study.

The aim of this paper is statistical analysis of the Polish investment funds investing the assets in global markets, i.e. not only in European countries. It should be stipulated that from the funds point of view it is not a too rich offer, it appeared relatively recently, after Poland's accession to the European Union. This is fully understandable due to the fact that the Polish financial market is still in developmental stage, both in terms of number of investment proposals and their diversity. It should be admitted, however, that Poland is far ahead of other former Eastern bloc countries in many respects, including the size and diversity of offers, the amount of mutual funds, access to foreign markets, market capitalization of securities, etc. For these reasons, among other things, the authors conclude that it is worthwhile to look at global mutual funds. The analysis presented is based on the methodology used in earlier works, which, inter alia, allowed the comparison of results with those obtained for the Polish market.

METHODOLOGICAL ASSUMPTIONS

First of all, it should be mentioned that the authors' interest is the analysis of mutual fund market adaptation to variable economic conditions, which shall be explained below. In the traditional approach to assessing the effectiveness of funds, standard methods based on indicators, including Treynor, Sharpe, Jensen are used. This approach provides information about the skills of the management of individual funds portfolio, whereas the proposals for the overall market are the 'sum' of skill components. As previous research of the authors has shown [Karpio et al. 2008], due to the high variability of the positions occupied by leaders, the conclusions are not very representative for the market as a whole. Moreover, the efficiency may not be the sole criterion for choosing a mutual fund. Much more important is the ability to adapt the investment policy to a variable economic situation, that is conducting an active policy. It shall be called the stability of investment policies. Using the aforementioned technique takes into account the passive aspect of investment decisions taken by managers. The performance indicators are based on the example of beta coefficients in the characteristic lines of funds. By definition, it measures the correlation of changes in shares of the market index. Thus, its large value in the market growth is interpreted positively, and rightly so, but this is the imitation of the market and not in that much of the activity. The manager's opera-

tion comes to following the economic situation – it is the basis for index funds functioning. On the other hand, balanced equity funds of stable growth should be guided by other criteria than ‘imitation’ of the market. Therefore, in the present study, the basis of market assessment shall be alpha coefficients appearing in the equations:

$$r_{At} = \alpha_A + B_A r_{mt} + \varepsilon_{At} \quad (1)$$

where r_{At} , r_{mt} are the changes in t time, respectively: fund A and factor market m. According to this, as mentioned above, the coefficients α_A shall be the basis for the evaluation of active investment policy and, in further analysis, they shall just be focused on. Leaving aside, at this point, the problem of selecting a market factor to assess the market for funds, three methods shall be used. All tests require a period of division into sub-periods, in this study are the weeks. In each of them, for each fund, a regression model based on equation (1) shall be constructed to determine alpha coefficients as a measure of active investment policy.

In the first method, a measure of stability of mutual funds investment policy shall be a beta coefficient assigned from the equation:

$$\alpha_{A,t} = \alpha_A + \beta_A \alpha_{A,t-1} + \varepsilon_{A,t} \quad (2)$$

Its value close to zero shows negligible tendency to change the investment policy in the consecutive weeks. It should be noted that value of beta coefficient different from zero, no matter which direction, gives evidence of active management, but does not indicate whether it was profitable or not. This question should be answered by analyzing an additional rate of return achieved by the mutual funds during the period considered, but this is not a subject of interest in this work. In the next step, the average beta factor (arithmetic average) shall be calculated for all analyzed funds. Considering the fact that the accepted level of significance is different from zero or not, its interpretation is analogous to the above, and the proposals are for the entire market.

In the second method, each week, the funds are arranged with respect to the value of coefficients α_A , and then Spearman rank correlation coefficients are calculated for the consecutive weeks. The value relating to the size of the entire market shall be, at this time, the arithmetic average of values obtained, together with the test of its significance.

Another method is based on a contingency table consisting of four cells, which are assigned labels: previous loss / future loss, previous loss / future gain, future loss / previous gain, future gain / previous gain.

For example, the first cell (previous loss / future loss) gives the number of funds which, in any pair of consecutive weeks, could be characterized by the following behavior: in the first of them, the ratio α_A had a value lower than the median and in the second as well. If a fund in the first couple of weeks was characterized by a coefficient lower than the median and another – bigger, it would increase the value specified in the cell with the label: previous loss / future profit. At the end, a significance test verifies the hypothesis that the number given in at least one cell is equal to 25% of all values. The adoption of such a hypothesis demonstrates a lack of connection between the investment decisions taken in the following weeks – that is the investment stability of mutual fund market.

CONSTRUCTION OF FACTOR MARKET AND SELECTION OF FUNDS

The discussed methods for investment stability analysis are three ways of deduction on an active behaviour of the investment funds market, and they have been discussed in the works of [Cahart 1997], [Hendricks D. et al. 2008], [Derwall et al. 2008]. It should be noted that, in their original formulation for determination of active investment policy measures, a multi-index model was used. In this paper, the authors have decided to consider a variant that takes into account only one factor, which is an index constructed on the basis of indexes of twelve stock exchanges in different regions of the world. For the purposes of the study, the following indexes have been taken into account: All Ord Austral, B-Shares Shanghai, Buenos Aires, Budapest BUX, Frankfurt DAX, DJ Industrial, London FTSE 100, Hang Seng H.Kong, Mexic IPC, NASDAQ US, NIKKEI 225 Tokyo, TSE-300 Toronto. Budapest is a ‘representative’ of European stock exchanges on the basis of some arbitrary, but the authors wanted to avoid the consideration of Polish market, as mutual funds investing abroad have a few shares listed in Poland. The studies took into account the values of shares of funds investing in global developed markets and in global emerging markets. Therefore, the market factor constructed by the authors, includes indexes of the respective markets, stock exchanges, not all, but in our opinion – the representative ones. The mutual funds investing their shares in global emerging markets, in their informational brochures, also mention the countries of Central and Eastern Europe, Russia or Poland. Budapest Stock Exchange was chosen as a representative of those countries. Since the index stores and counting methodologies are different, the value of each of them is related to a base value, that is the value on the last day of December 2002. The global index is a weighted average of the components in which the weights are the shares of each index (after normalization to its base value) in the global index.

The chart shows the course of the index in the study period, i.e. from 31 May 2006 to 30 April 2010. The 31 May 2006, is the date of the first quotation of funds – Arka BZ WBK Funduszy Akcji Zagranicznych FIO (FIO Foreign Equity Funds). This period was

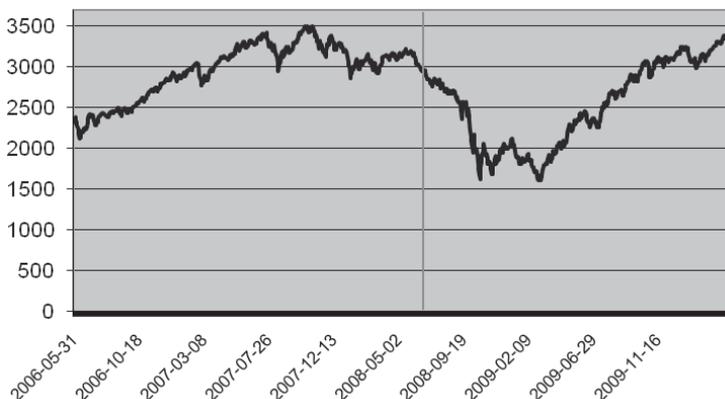


Fig. 1. Chart of the global market index
Rys. 1. Wykres indeksu rynku globalnego.

Source: Own study based on data from Bossa.pl

Źródło: Opracowanie własne na podstawie danych z Bossa.pl

divided into two sub-periods: I from 31 May 2006 to 27 June 2008 and II from 30 June 2008 to 30 April 2010. The division takes place in conventional mid-crisis, and it is intended. An active policy means taking into account the situation on financial markets, the search for profitable investments, which always exist, and not giving up to the trend. In each of the sub-periods, three methods of analysis of activity have been used, separately for the funds declaring investment in developed markets and emerging markets. In Table 1, the names of the funds that were listed in different periods are placed.

Table 1. Funds investing in global developed and emerging markets in I and II period
Tabela 1. Fundusze inwestujące w globalne rynki rozwinięte i wschodzące w I i II okresie

	Funds investing in global developed markets	Funds investing in global emerging markets
I Period	Arka BZ WBK Funduszy Akcji Zagranicznych FIO (FIO Foreign Equity Fund)	Allianz Globalny SFIO Subfundusz Allianz Akcji Rynków Wschodzących (Emerging Markets Equity Allianz Subfund)
	Skarbiec Top Funduszy Zagranicznych FIO (FIO Foreign Funds)	Ampliko SFIO Parasol Światowy Ampliko Subfundusz Akcji Rynków Wschodzących (Emerging Markets Equity Subfund Ampliko World Umbrella) Pionier FG SFIO subfundusz Akcji Rynków Wschodzących (Emerging Markets Equity Subfund) PKO ŚFW – SFIO Subfundusz Rynków Wschodzących (Emerging Markets Subfund)
II Period	ALIOR SFIO Subfundusz Alior Stabilnych Spółek (Stable Companies Alior Subfund)	Allianz Globalny SFIO Subfundusz Allianz Akcji Rynków Wschodzących Ampliko SFIO Parasol Światowy (Emerging Markets Equity Allianz Subfund Ampliko SFIO World Umbrella)
	Arka BZ WBK Funduszy Akcji Zagranicznych FIO (FIO Foreign Equity Funds)	Ampliko Subfundusz Akcji Rynków Wschodzących (Emerging Markets Equity Subfund)
	BPH FIO Parasolowy Subfundusz BPH Subfundusz BPH Akcji Globalnych (Global Equity BPH Subfund BPH Umbrella Subfund)	ING SFIO Subfundusz Rynków Wschodzących (Emerging Markets Subfund)
	ING SFIO Subfundusz Globalny Spółek Dywidendowych (Dividend Companies Global Subfund)	INF SFIO Subfundusz VIP Funduszy Akcji Rynków Wschodzących (Emerging Markets Equity Funds VIP Subfund)
	PZU SFIO Globalnych Inwestycji PZU Subfundusz Akcji Rynków Rozwiniętych (Developed Markets Equity Subfund PZU Global Investments)	Pionier FG SFIO Subfundusz Akcji Rynków Wschodzących (Emerging Markets Equity Subfund)
	SKARBIEC Top Funduszy Zagranicznych FIO	PKO ŚFW – SFIO Subfundusz Rynków Wschodzących (Emerging Markets Subfund)
	UniFundusze FIO Subfundusz UniMaxZagranica (UniMaxForeign Subfund FIO Unifund FIO Foreign Top Funds)	

Source: Own study based on Money.pl

Źródło: Opracowanie własne na podstawie Money.pl.

The study covers the period from 2006 to 2010, because not until this period did the offering funds investing in foreign markets begin to appear, before this, it occurred occasionally and did not occupy much attention. Moreover, only after Poland's accession to the EU in 2004 and changing foreign exchange law did the opportunity of investing outside the home country arise.

MARKET STABILITY TEST OF POLISH FIO INVESTING IN GLOBAL MARKETS

According to the assumptions set out in the discussion of methodological assumptions, the starting point was to determine the characteristic line for each fund based on weekly changes of shares, equation (1). In the next step, beta coefficients appearing in equation (2) were found. In both cases, the structural parameters were estimated with the use of classical least squares method. It should be noted that verification of both regression models have not always confirmed the fulfillment of all assumptions. However, taking into account the fact that in further research the average value of beta coefficients and Spearman average coefficients appeared, it can be assumed that the negative aspects of lack of positive verification of individual assumptions of Classical Least Squares are averaged and do not have a major impact on the results obtained.

The effects of the application of I method is shown in Table 2. With the exception of the first period for mutual funds investing in global developed markets, for all the others, the null hypothesis that the average beta value is zero was not rejected at significance level of 0.05.

It can therefore be concluded that, apart from the exception mentioned, the analyzed market funds show no tendency to actively adapt to changing market conditions. A correlation between markers of active investment policy, such as alpha coefficients, is zero. The only exceptions are funds investing in developed markets and only in the first period considered, which contains the beginning of financial crisis. Indeed, a different from zero beta value indicates a correlation, but it does not indicate whether the described changes in policy were beneficial to customer of mutual funds. But looking at the change of units, it can be unambiguously stated that it was unfavorable. Consequently, the result can be interpreted to the detriment of the management. Indeed, a different from zero, the value of average beta coefficient for market funds which invest assets in developed markets testifies to the fact that the crisis was reflected in those funds particularly negatively.

Table 2. Average values of beta coefficients and standard errors

Tabela 2. Średnie wartości współczynników beta i błędy standardowe

I period (from 31-05-2006 to 27-06-2008)		II period (from 30-06-2008 to 30-04-2010)	
Emerging markets	Developed markets	Emerging markets	Developed markets
-0.111	-0.109	0.023	0.046
Standard deviation			
0.239	0.011	0.083	0.062

Source: Own study.

Źródło: Opracowanie własne.

Table 3 presents average values of Spearman coefficients. In case of mutual funds investing in global developed markets, it was not possible to determine the value of the coefficient in I period (due to insufficient data), hence no values are indicated in the table. The null hypothesis of insignificance of average rank correlation coefficients, with the adopted level of significance, was not rejected for all test periods, for which it was possible to designate the coefficient of Spearman.

Table 3. Spearman rank average correlation coefficient

Tabela 3. Średnie wartości współczynników korelacji rangowej Spearmana

I period (from 31-05-2006 to 27-06-2008)		II period (from 30-06-2008 to 30-04-2010)	
Emerging markets	Developed markets	Emerging markets	Developed markets
0.235	No data	0.042	-0.121
Standard deviations			
0.544		0.447	0.457

Source: Own study.

Źródło: Opracowanie własne.

The obtained results fully confirm the conclusions from I method. Of course, with the exception of developed markets funds, which this time do not appear. As a consequence, the lack of correlation between measures of active investment policy in the consecutive weeks can be observed. This conclusion applies to both periods, both the formation of financial crisis (I period), and the upturn (II period).

Tables 4 and 5 present the results of the last method, using a contingency table. Using the chi-square statistics, the null hypothesis test assumes that the value of the table is 25% in all of its cells. The null hypothesis in all cases where such a table could be determined was not rejected.

Table 4. Contingency table for I period

Tabela 4. Tablica kontyngencji dla I okresu

	Future loss		Future gain	
	Emerging markets	Developed markets	Emerging markets	Developed markets
Previous loss	29.41%	–	23.53%	–
Previous gain	23.53%	–	23.53%	–

Source: Own study.

Źródło: Opracowanie własne.

Table 5. Contingency table for II period

Tabela 5. Tablica kontyngencji dla II okresu

	Future loss		Future gain	
	Emerging markets	Developed markets	Emerging markets	Developed markets
Previous loss	26.98%	30.61%	23.02%	26.53%
Future gain	23.02%	26.53%	26.98%	16.33%

Source: Own study.

Źródło: Opracowanie własne.

The results obtained using a contingency table fully confirm previous findings, with the sole responsibility, it can be confirmed that they are not optimistic in terms of customer funds.

FINAL REMARKS

It is worth noting that the study of the effectiveness of entire markets, not individual mutual funds, provide global information, because shares of each mutual fund are averaged. This does not preclude the possibility of achieving a 'fair' profit by individual funds. And so this is what is happening. There are relevant investments, which translate into an increase in shares in a short period of time, even in bear markets, but often do not translate into the results of the entire market. The study of randomness of investment performance [Karpio et al. 2008] clearly indicates that such a behaviour is generally random, it is difficult to distinguish strong leaders maintaining their position in the long term. Such conclusions apply to both equity and balanced funds, so those that have particularly a lot of opportunities for the portfolio selection of assets. Polish stock market provides many opportunities for doing so, but everything indicates that managers do not work very carefully on their commission.

Previous studies of the authors on the Polish market of equity and balanced mutual funds performed using the three methods described above yielded slightly different results [Karpio et al. 2009]. In the years 2003–2009, the equity market was characterized by an activity displaying significantly different from zero the values of average coefficient of Spearman. The same conclusion stemmed from the third method. In this case, only equity funds were analyzed, but, as it turns out, the balanced fund market behaves identically. In the case of Polish market, investment opportunities, on the one hand, are quite large, since the stock market gives the possibility of selection of profitable assets even in a poor economic condition. On the other hand, the interest in the funds on the part of customers translate into their assets of the order of 90, or in the best period of almost 140 billion PLN, which makes the Polish market small. Hence, an investment opportunity in foreign markets becomes interesting. However, greater care of the managers in selecting investments should go hand in hand, and active management – should lead to very different results than those observed in this study. The authors hope that in the future the situation shall change, because awareness of the investment of Polish society is rapidly increasing, and the pressure on managers must bring a positive effect to their benefit and to the investment fund market. Global markets offer greater opportunities for customers to multiply money by selecting the portfolio of growing companies, even during the financial crisis.

REFERENCES

- Carhart M., 1997. On persistence in mutual funds performance, *Journal of Finance* 52, pp. 57–82,
Hendricks D., Patel J., Zeckhauser R., 1993. Hot hands in mutual funds: Short run persistence of relative performance, 1978-1988, *Journal of Finance* 48, pp. 93–130.

- Derwall J., Huij J., 2008. "Hot Hands" in bond funds, *Journal of Banking and Finance* 32, pp. 559–572.
- Karpio A., Żebrowska-Suchodolska D., 2008. Losowość wyników inwestycyjnych osiągniętych przez FIO funkcjonujące na polskim rynku kapitałowym, [in:] *Matematyczne Aspekty Ekonomii, ryzyko-reasekuracja- równowaga*, W. Kulpa (ed.), Wydawnictwo Uniwersytetu Kardynała Stefana Wyszyńskiego, Warszawa, pp. 61–74.
- Karpio A., Żebrowska-Suchodolska D., 2009. The investigation of short term persistence in the relative performance of equity mutual funds operating on polish capital market, *Polish Journal of Environmental Studies* vol. 18, No. 5B, pp. 220–226.
- Malkiel B., 1995. Returns from investing in equity funds 1971 to 1991, *Journal of Finance* 50, pp. 549–572.

STABILNOŚĆ STRATEGII POLSKICH OTWARTYCH FUNDUSZY INWESTYCYJNYCH INWESTUJĄCYCH NA RYNKACH GLOBALNYCH W OKRESIE KRYZYSU FINANSOWEGO*

Streszczenie. Autorzy podjęli próbę analizy stabilności strategii inwestycyjnych polskich otwartych funduszy inwestycyjnych lokujących aktywa na rynkach globalnych. Badania objęły lata 2006–2010, czyli również okres kryzysu finansowego. Analizę przeprowadzono metodami statystycznymi wykorzystującymi linię regresji, współczynnik korelacji rangowej Spearmana oraz tablicę kontyngencji. Wszystkie trzy metody oparte są na współczynnikach alfa w liniach charakterystycznych funduszy traktowanych jako miary aktywnej polityki inwestycyjnej zarządzających. Na cele pracy autorzy skonstruowali czynnik rynkowy oparty na indeksach największych giełd. Uzyskane wyniki porównano z tymi, które otrzymano wcześniej dla rynku polskiego i funduszy akcyjnych.

Słowa kluczowe: otwarty fundusz inwestycyjny, linia regresji, współczynnik korelacji rangowej Spearmana, tablica kontyngencji, efektywność inwestycyjna.

Accepted for print – Zaakceptowano do druku 28.08.2011

* Praca naukowa finansowana ze środków na naukę w latach 2010–2012 jako projekt badawczy N N111 277638.