ISSN 2449-7479
eISSN 2543-8840
amme.wne.sggw.pl

Annals of Marketing Management & Economics
Vol. 3, No 1, 2017, 23–31
DOI 10.22630/AMME. 2017.3.1.3

CHANGES IN THE LEVEL OF RISK IN INVESTMENT FUNDS IN POLAND

Sylwester Kozak
Warsaw University of Life Sciences – SGGW, Poland

INTRODUCTION

The macroeconomic situation significantly impacts the demand for investment fund units and the risk of a fund's investment portfolio. In consequence, the performance of investment funds might affect, among other things, the level of prices on the capital markets and the size of household savings. Additionally, investment risk can also be tied to the quality of a fund's management. In making their pitch to individual customers, investment firms usually present the results of their operations using historical rates of return. In such a way they try to prove their ability to generate high returns and attract customers' attention. They tend to minimise their presentation of information on the risk level a particular investment faces. If the risk materialises, this information asymmetry could become a source of conflict between investment firms and investors, particularly individual customers. However, it should be emphasised that measuring risk is not an explicit and well-defined process. There is no strict definition of risk and no clearly defined way of measuring it.

This attests to the importance of analyzing risk measurement and how risk is evaluated during the different phases of the macroeconomic cycle. The analysis of risk accumulated in investment fund portfolios is important not only for investment firms, but also for households investing their savings. The former, once they become aware of the risk, might hedge their positions to minimise its negative effects. For their part, households which know their level of risk aversion would be better able to choose an appropriate investment.

The aim of this paper is to present changes in the risk level of investment fund portfolios in Poland in the years 2005–2015. The volatility of the macroeconomic situation during this period suggests the level of risk should be determined during different stages of the macroeconomic cycle:

– accelerated economic growth: 2005–2007;

– downturn and fallout from the global financial crisis: 2008–2011;
– recovery and moderate economic growth in the post crisis period: 2012–2015.

The study covers 29 funds with equity portfolios operating in Poland in the years 2005–2015. The data were taken from the following sources: values of the fund units from the Chamber of Fund and Asset Management (IZFiA), the WIG and WIG20 indexes[1] from the Warsaw Stock Exchange (WSE), rates of WIBOR ON and IRS 1Y[2] from the Bloomberg agency and macroeconomic data from the Central Statistical Office of Poland (GUS).

The remainder of the paper is structured as follows. The next section presents Poland's macroeconomic situation and the structure of the investment fund sector in 2005–2015. That is followed by a discussion of methods of measuring the risk of the investment fund portfolios, and changes that occurred to the risk level during the three periods. A comprehensive summary concludes the paper.

THE MACROECONOMIC SITUATION AND THE STRUCTURE OF THE INVESTMENT FUND SECTOR

That the value of assets of the investment fund sector increased significantly despite the sell-off that occurred during the financial crisis shows that investment funds play an important role in Poland's financial system and economy, the latter of which improved significantly during 2005–2015. Several factors – and first and foremost Poland's accession to the EU in 2004 – impacted the pace of growth. In subsequent years the country's economy grew at a much higher rate than those of Western European countries.

The largest decline in share prices of companies listed on the Warsaw Stock Exchange was recorded in 2007–2008. The process was more a result of uncertainty on the global markets than of the state of Poland's economy, which was growing at the time. The fall in share prices significantly impacted the value of equity investment fund portfolios. This period was characterised by significant volatility in the capital markets, which became an additional source of investment risk. Another period of significant deterioration in the economic climate and the increased volatility in the capital markets began in the second half of 2012. Due to the economic downturn in most Western European countries and the buildup of their public debt, the pace of the Poland's GDP growth fell significantly.

Construction company bankruptcies and a decrease in the value of exports to EU countries put negative pressure on the valuation of shares on the Warsaw Stock Exchange. Falling share prices decreased the value of these assets in investment fund portfolios and became a significant source of investment risk. Interest rate cuts made during this period by the National Bank of Poland were intended to accelerate growth of the non-financial sector and GDP boost. However, they did not stop the growing uncertainty and risk in the

[1] The WIG is the main index covering all companies quoted on the Warsaw Stock Exchange (WSE) while the WIG20 covers the 20 largest companies quoted on the WSE.

[2] WIBOR ON (Warsaw Interbank Offered Rate – overnight contracts) is the reference interest rate on loans for the Polish interbank market for one-day contracts; IRS 1Y is the Interest Rate Swap for one-year contracts.

capital markets. Additionally, deterioration of the regulatory environment in the banking sector, the crisis with Polish mortgages taken in Swiss francs and the crisis in the oil market drove down prices of all shares on the WSE, especially in 2015.

The investment fund sector experienced pronounced growth in the early 2000s. Approval of the Act of 27 May 2004 on investment funds created a favourable environment for the development of these institutions. The improving financial situation was bolstered by the increasing capacity of Poland's economy. All these factors drove demand for investment fund units, causing the funds' assets to grow nearly throughout the 2005–2015 period (Table 1).

TABLE 1. Assets of the investment fund sector in Poland in 2005–2015

Specification	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Assets (bn PLN)	61	100	134	74	93	122	118	151	195	220	273
Share of assets in GDP (%)	6.2	9.3	11.3	5.7	6.8	8.4	7.5	9.3	11.8	12.8	15.3

Source: the author based on CSO and IZFiA data.

In the first part of the period, the funds' assets had their highest values in 2007 (Table 1). This was followed in 2008 by a dramatic drop, which was partially the result of the fall in prices on the Warsaw Stock Exchange and the lower valuation of investment portfolios (a drop of 31.3 billion PLN, i.e. 52% of the total impact) and the shifting of funds to other financial sectors (a decline of 28.6 billion PLN, i.e. 48% of the impact) [NBP 2008]. In subsequent years, investment funds gradually recovered and regained their position in the economy to become an important household savings vehicle. According to NBP data, in 2013–2015, household financial assets accumulated in investment funds increased annually by, respectively: 18, 13 and 10 billion PLN [NBP 2016]. This inflow of capital had a positive impact both on the profitability of the funds and the investment portfolio risk level.

MEASURES OF RISK IN THE FUND PORTFOLIOS

The full evaluation of the funds' activities entails assessing their profitability adjusted for the size of a risk taken. Typically, fund management firms compare their performance with the benchmark, which can be constituted by a group of similar investments, or markets of their operations or supposedly risk-free instruments [Perez 2012]. In some cases, the level of profitability expected by investors can be treated as a reference point. In analyzing such issues, the rate of return and the magnitude of the risk must be defined.

The profitability (or rate of return) of investment funds at time t is measured by the logarithmic rate of return r_t defined by the formula [Witkowska 2009]:

$$r_t = \ln\left(\frac{p_t}{p_{t-1}}\right) \tag{1}$$

where:

p_t – value of the units on day (month, quarter etc.) t.

In classical methods of evaluating the operations of investment funds, the risk level is determined using the standard deviation of the rates of return σ(r):

$$\sigma(r) = \sqrt{\frac{1}{T-1}\sum_{t=1}^{T}(r_t - \overline{r})^2} \tag{2}$$

where:
T – total investment period;
r_t – rate of return at time t;
$\overline{r}$ – expected (average) value of the rate of return in period T.

Another frequently used measure of risk is the β coefficient, which can be understood as the average increase in the rate of return on assets that has been caused by an increase in the growth rate of the benchmark by 1 percentage point [Borowski 2011]. From another perspective, the β coefficient indicates how the rate of return on a fund differs from the profitability of the overall market [Tarczyński 1997, Czekaj et al. 2001]. For fund I, the β_i coefficient is calculated using the following formula:

$$\beta_i = \frac{\sum_{t=1}^{T}(r_{mt} - \overline{r}_i)(r_{mt} - \overline{r}_m)}{\sum_{t=1}^{T}(r_{mt} - \overline{r}_m)^2} \tag{3}$$

where:

r_{it}, r_{mt} – rate of return for, respectively, fund i and the overall market (usually represented by the main stock index) at time t;

$\overline{r}_i$, $\overline{r}_m$ – mean value, respectively, of the average rate of return on fund i and the entire market in period T.

Researchers also use coefficient β to study the strength and direction of volatility. Values of β greater than one were achieved by funds with higher volatility than the market (the WIG index is often recognized as an indicator of the market) while β values below one but greater than zero characterised funds with standard reduced volatility [Wieloch 2015].

ASSESSING THE LEVEL OF RISK IN INVESTMENT FUND ACTIVITIES

The sample includes 29 open equity investment funds that operated in Poland throughout the 2005–2015 period (Table 2). The analysis was carried out using monthly data for the four periods: 2005–2007, 2008–2011, 2012–2015 and 2005–2015. The rate of return for the entire market was calculated using WIG, the main index of the WSE representing the share prices of all listed companies. Rates of return on funds were also related to the profitability of investments regarded as risk-free. In the research, the rate of IRS 1Y was applied as a risk-free investment. The study covered 3,828 observations, of which there were 1,044 in 2005–2007 and 1,392 for both 2008–2011 and 2012–2015.

In the first stage of the study, the values of logarithmic monthly rates of return for each fund (eq. 1) and the market were calculated. The level of risk was assessed using the standard deviations of the funds' rates of return (eq. 2) and the β coefficient (eq. 3) for the four periods (Table 3).

TABLE 2. List of funds covered by the study

Fund number	Fund name	Year of establishment
1	Allianz Akcji	2004
2	Arka BZ WBK Akcji Polskich	1998
3	Aviva Investors Aktywnej Alokacji	2004
4	Aviva Investors Polskich Akcji	2002
5	Aviva Investors Stabilnego Inwestowania	2002
6	BPH Akcji	1999
7	BPH Akcji Dynamicznych Spółek	2000
8	BPH Akcji Europy Wschodzącej	2001
9	BPH Zrównoważony	1999
10	ING Akcji	1998
11	ING Akcji 2	2001
12	ING Średnich i Małych Spółek	2001
13	Investor Akcji Dużych Spółek Dywidendowych	1998
14	Investor Akcji	1998
15	Investor Top 25 Małych Spółek	2002
16	Investor Zrównoważony	1998
17	KBC Aktywny	2002
18	KBC Beta Dywidendowy	2000
19	Legg Mason Akcji	1999
20	MetLife Akcji	2004
21	Novo Akcji	1998
22	Novo Zrównoważonego Wzrostu	1998
23	Pioneer Akcji Amerykańskich	2000
24	Pioneer Akcji Europejskich	2004
25	Pioneer Akcji Polskich	1995
26	Pioneer Zrównoważony	1992
27	PZU Akcji Krakowiak	1999
28	Skarbiec – Akcja	1997
29	UniKorona Akcje	1996

Source: IZFiA.

The standard deviation values of the funds' rates of return indicate that the impact of the crisis was the strongest source of uncertainty on the capital markets. The values of standard deviation were highest in 2008–2011, and represented a significantly high risk accumulated in the funds' portfolios (Table 4). The much higher values of the β coefficient during this period compared to other periods further confirms that 2008–2011 was the period with the highest risk.

Dynamic growth of the price of shares on the stock market is another significant source of risk. Standard deviation and the β coefficient values are high, though much lower than in the crisis period. Characteristically for this period, the spread between the

TABLE 3. Standard deviation values of the funds' rate of return (SD) and the β coefficients

Fund number	2005–2007		2008–2011		2012–2015		2005–2015	
	SD	β	SD	β	SD	β	SD	β
1	0.037	0.475	0.069	0.805	0.035	0.718	0.051	0.716
2	0.121	0.495	0.080	0.985	0.035	0.714	0.083	0.854
3	0.023	0.251	0.034	0.345	0.023	0.232	0.027	0.181
4	0.055	0.715	0.078	0.928	0.032	0.661	0.059	0.846
5	0.057	0.948	0.031	0.354	0.014	0.226	0.028	0.793
6	0.050	0.573	0.068	0.793	0.038	0.750	0.055	0.750
7	0.062	0.195	0.077	0.929	0.036	0.697	0.061	0.741
8	0.029	0.109	0.061	0.716	0.038	0.372	0.046	0.531
9	0.029	0.371	0.039	0.454	0.021	0.413	0.031	0.433
10	0.053	0.629	0.070	0.833	0.036	0.765	0.056	0.784
11	0.049	0.616	0.061	0.709	0.035	0.758	0.050	0.701
12	0.058	0.697	0.070	0.824	0.040	0.850	0.060	0.835
13	0.097	0.263	0.090	0.874	0.033	0.578	0.077	0.697
14	0.052	0.648	0.071	0.837	0.060	0.743	0.063	0.796
15	0.062	0.729	0.077	0.919	0.040	0.743	0.064	0.880
16	0.031	0.411	0.047	0.539	0.025	0.367	0.036	0.488
17	0.033	0.432	0.045	0.500	0.024	0.437	0.035	0.472
18	0.045	0.601	0.062	0.727	0.037	0.713	0.050	0.696
19	0.055	0.698	0.067	0.799	0.035	0.799	0.055	0.788
20	0.054	0.667	0.075	0.901	0.041	0.834	0.060	0.850
21	0.050	0.625	0.132	0.945	0.048	0.719	0.089	0.835
22	0.031	0.405	0.045	0.562	0.034	0.535	0.038	0.528
23	0.145	0.540	0.044	0.228	0.109	0.268	0.103	0.207
24	0.027	0.038	0.046	0.454	0.027	0.265	0.035	0.325
25	0.055	0.705	0.090	1.054	0.037	0.780	0.067	0.948
26	0.032	0.398	0.064	0.711	0.034	0.541	0.047	0.620
27	0.049	0.676	0.070	0.835	0.042	0.865	0.056	0.810
28	0.048	0.663	0.082	0.575	0.048	1.611	0.029	0.756
29	0.061	0.617	0.069	0.813	0.037	0.688	0.057	0.753
Min	0.023	0.038	0.031	0.228	0.014	0.226	0.027	0.181
Max	0.145	0.948	0.132	1.054	0.109	1.611	0.103	0.948
Median	0.050	0.601	0.069	0.799	0.036	0.713	0.055	0.750
Average	0.053	0.524	0.066	0.722	0.038	0.643	0.054	0.676
Market	0.049	–	0.070	–	0.034	–	0.054	–

Source: the author, based on the data from IZFiA and Bloomberg.

TABLE 4. Distribution of standard deviation of rates of returns (SD) and the β coefficients

Statistics	2005–2007		2008–2011		2012–2015		2005–2015	
	SD	β	SD	β	SD	β	SD	β
Minimum	0.023	0.038	0.031	0.228	0.014	0.226	0.027	0.181
Maximum	0.145	0.948	0.132	1.054	0.109	1.011	0.103	0.948
Median	0.050	0.601	0.069	0.799	0.036	0.713	0.055	0.750
Average	0.053	0.524	0.066	0.722	0.038	0.643	0.054	0.676

Source: the author, based on IZFiA, WSE and Bloomberg data.

lower and the higher risk of the funds' portfolios is the largest. This may be attributable to the varied investment skills of fund managers and their ability to take advantage of the favourable situation on the capital market.

The lowest level of risk was found in the post crisis period. Moderate economic growth and quite stable conditions on the capital markets did not generate excessive investment risk. Both the standard deviation and the β coefficient are significantly lower here than in other periods. The downturn on the market in 2015 was a likely source of additional risk in this period.

Closer values of the standard deviation for funds and the market for the period 2012––2015 indicate that the average and the median funds took on a similar amount of risk in their portfolios. This indicates that, on average, funds and investors across the entire market followed a similar investment policy in terms of exposing their portfolios to investment risk.

CONCLUSIONS

The study covers 29 equity investment funds operating in Poland during the years 2005–2015. The results indicate that the state of the country's economy as determined by GDP, the labour market and other macroeconomic conditions, and the situation on the capital market affected the amount of risk accumulated in the funds' portfolios.

During the financial crisis (2008–2011), lower profits in the enterprise sector, growing household risk aversion, high volatility on the capital markets, and the dramatic outflow of capital from the investment fund sector caused a significant increase in the level of risk accumulated in the funds' portfolios.

A slightly lower level of risk was recorded in the funds' portfolios in the period of dynamic economic growth preceding the crisis (2005–2007). Here too the volatility on the stock market could be considered a significant source of investment risk. Additionally, the largest spread in rates of return on funds was observed at that time, which may confirm the presence of aggressive investment policies (so-called flight for yield) and attest to the differentiated skills of fund managers in taking advantage in the favourable market situation.

The lowest level of investment risk accumulated in the funds' portfolios during the period of moderate economic growth (2012–2015). Moderate non-financial sector profitability and the balanced development of emerging markets provided stability in the performance of the capital markets in Poland. Stabilisation of the investment conditions could be considered a main factor in reducing the risk of the funds' portfolios.

REFERENCES

The Act of 27 May 2004 on investment funds, Journal of Laws of 2004 no 146, item 1546 [in Polish].

BOROWSKI K., 2011. Teoria i praktyka benchmarków (Theory and practice of benchmarks) [in Polish], Difin, Warszawa.

CZEKAJ J., WOŚ M., ŻARNOWSKI J., 2001. Efektywność giełdowego rynku akcji w Polsce (The efficiency of the stock exchange market in Poland) [in Polish], Wydawnictwo Naukowe PWN, Warszawa.

NBP, 2005–2014. Rozwój systemu finansowego w Polsce (Financial System Development in Poland) [in Polish]. Narodowy Bank Polski, Warszawa.

NBP, 2016. Sytuacja finansowa sektora gospodarstw domowych w III kw. 2015 r. (The financial situation of the household sector in the third quarter of 2015) [in Polish], Narodowy Bank Polski, Warszawa.

PEREZ K., 2012. Efektywność funduszy inwestycyjnych. Podejście techniczne i fundamentalne (The efficiency of investment funds. A technical and fundamental approach) [in Polish], Difin, Warszawa.

TARCZYŃSKI W., 1997. Rynki kapitałowe – Metody ilościowe. Tom 2 (Capital markets – Quantitative Methods. Volume 2) [in Polish], Agencja Wydawnicza Placet, Warszawa.

WIELOCH M., 2015. Persistence of beta of mutual funds operating in Poland, Journal of Management and Financial Sciences 8, 45–56.

WITKOWSKA D., 2009. Efektywność wybranych funduszy akcyjnych w latach 2005–2007 (The efficiency of selected equity funds in 2005–2007) [in Polish], Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie, Ekonomika i Organizacja Gospodarki Żywnościowej 74, 39–61.

Summary. The paper analyzes changes in risk of investment fund portfolios in different phases of the macroeconomic cycle. Twenty nine equity investment funds operating during the period of 2005–2015 were examined. The risk was assessed by the standard deviation of rates of return on funds and the β coefficient. The research indicates that the exposure of fund portfolios to risk changed in response to macroeconomic conditions and the situation on the capital market. Risk hit its highest level during the financial crisis years (2008–2011),

followed by the dynamic macroeconomic growth years (2005–2007). The moderate growth years (2012–2015) exposed funds to the lowest risk. For the entire period the average and the median funds and the market were exposed to a similar amount of investment risk.

Key words: capital market, investment funds, investment risk

JEL: O16, G23, G32

Corresponding author: Sylwester Kozak, Warsaw University of Life Sciences – SGGW, Faculty of Economic Sciences, Nowoursynowska 166, 02-787 Warsaw, Poland, e-mail: sylwester_kozak@sggw.pl