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Managers' Skills in Periods of Crisis: The Case of Proximity to Armed Conflict

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Abstract:

Purpose: *The skillful use of selectivity and market timing by investment fund managers is an important determinant of fund results. This is especially important in times of crisis, as making the right decisions can help minimize losses. The aim of the research is to find out whether investment fund managers skillfully use market timing during crisis periods.*
Design/Methodology/Approach: *The Treynor-Mazuy model for Polish market equity funds was used for the study. The choice of the Polish market was related to the proximity of the armed conflict, a crisis that has a powerful impact on the capital market. In addition, the stability of the results obtained during crisis periods was examined.*
Findings: *The results obtained for Polish market equity funds indicate that managers use a different strategy during crisis periods.*
Practical Implications: *The results obtained will help the investor make the appropriate investment decision in times of crisis.*
Originality/Value: *The added value of the work is the examination of the application of management skills in periods of crisis and the stability of the obtained results.*

Keywords: *Market timing and selectivity model, GARCH model, performance stability, pandemic, war in Ukraine.*

JEL codes: *G11, G12, C58.*

Paper type: *Research article.*

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1. Introduction

The skills of investment fund managers are an important issue addressed in the literature. This is because they are important factors affecting fund performance, which is of interest to both researchers and investors.

Since market timing models have been proposed, it has been an issue studied for different markets and periods of time. However, researchers focus on the time horizon and benchmark, studying how this affects results. What is lacking, however, is research related to the impact of crises on market timing results.

Thus, the work takes into account the well-known Treynor – Mazuy (TM) model (1966), which verifies the skills of managers in terms of skillful selection of assets for the portfolio, mimicking market trends, and making decisions about the right time to make transactions. In addition, due to higher volatility (Żebrowska-Suchodolska and Karpio, 2023) and higher dependence in crisis periods (Pruchnicka-Grabias and Żebrowska-Suchodolska, 2024), a GARCH class model was applied to the residuals of the TM model to ensure adequate modeling quality.

All stock funds existing on the Polish market since 2003 were adopted for the study. The choice of stock funds is dictated by the observation of the behavior of managers for the assets with the highest risk, increasing especially during periods of crisis. The choice of the Polish market, in turn, is related to the fact that it is the region closest to the conflict, which further reinforces the already existing high risk during the war.

The results obtained will give indications to investors regarding the use of managers' skills in periods of crisis that occur in financial markets. Adequate knowledge of managers' behavior will allow the investor to make appropriate portfolio diversification choices in the future.

In addition, the work fills the research gap regarding market timing in crisis periods and the stability of these results, extending the research started by Żebrowska-Suchodolska, Karpio, and Kompa (2021) and Żebrowska-Suchodolska, Karpio, and Nafkha (2022).

2. Literature Review

The issues of market timing were pioneered by Treynor and Mazuy (1966) and Henriksson and Merton (1981), who proposed models that examined selectivity and market timing (so-called market timing). Empirical studies conducted by Henrricson and Merton for funds from 1968-1980 indicated that there were only a few funds that were skillfully managed by managers.

Further verification of managers' skills was tested for different markets and periods. Some of the researchers obtaining negative values of market timing (Chang and

Lewellen, 1984) concluded that managers could not achieve good investment results. Positive values of market timing, but not statistically significant, were, in turn, found by Lee and Rahman (1990).

Ramesh and Dhume (2014) also confirmed the inability to beat the market. The occurrence of market timing to a small extent was indicated by Abdullah *et al.* (2007), Elfakhani *et al.* (2005), Pilbeam and Preston (2019) and Gupta (2001).

As for the use of selectivity, its existence was confirmed to a small extent by Chang and Lewellen (1984), Abdullah *et al.* (2007) or Elfakhani *et al.* (2005). On the other hand, Kao, Cheng, and Chan (1998) demonstrated managers' use of selectivity for the US market.

In an attempt to identify the cause of the discrepancy in results, the researchers concluded that it was largely influenced by the time horizon chosen by the researchers Goetzmann *et al.* (2000), Bollen and Busse (2001) or the benchmark adopted Dellva *et al.* (2001). In the case of daily data, a higher incidence of market timing was associated with a lower loss of information. The corresponding benchmark, in turn, indicated positive selectivity and negative market timing.

In the case of the Polish market, market timing has been studied by Olbryś (2011), Zamojska (2009), Witkowska, Kompa and Grabska (2009), Swinkels and Rzezniczak (2009) as well as Jamróz (2011), Żebrowska-Suchodolska and Karpio (2022).

Olbryś (2011) and Zamojska (2009) indicated parameters responsible for selectivity that were not statistically significant for the Polish market. These results were also confirmed by Swinkels and Rzezniczak (2009) and Jamróz (2011). Additionally, a lack of market timing skills was observed. As in the case of studies of foreign markets, differences in results can be observed for the Polish market when the time horizon is changed.

Research by Żebrowska-Suchodolska and Karpio (2022) indicates that Polish market investment fund managers use little selectivity and market timing. Research by Thalassinos *et al.* (2015) indicates selection of securities of banks' pertfolio using M-GARCH modelling.

There are many studies in the literature related to the Covid-19 pandemic and its impact on various aspects of life. In the case of the capital market, studies include the correlation of index quotes and the number of illnesses (Heyden and Heyden, 2021), or the impact of political responses to the pandemic (Aharon and Siev, 2021).

The higher volatility of stock prices during periods of crisis, whether pandemic or war, is also an important aspect addressed in many studies. Studies for the pandemic

period were conducted by Zaremba *et al.* (2020), Albulescu (2021), Mazur, Dang and Vega (2021), among others.

Studies for the period of the occurrence of the Russian-Ukrainian conflict indicate even greater volatility in index prices for stock exchanges of countries close to the location of the conflict (Ahmed *et al.,* 2022; Żebrowska-Suchodolska and Karpio, 2023).

Since the research was conducted during crisis periods, variance modeling was needed. The application of GARCH class models to financial data appears in great numbers in the authors' works. This is because, in addition to interpreting the parameters of the GARCH model, an econometric model alone (such as ARIMA) is insufficient for financial data.

From the foreign literature, we can mention Cheteni (2016), and Ugurlu *et al.* (2014). Ugurlu *et al.* (2014) used the GARCH model and its variations (GJR-GARCH and E-GARCH). From studies for the Polish market, it is worth pointing out the works of Piontek (2001), Węgrzyn (2015), Szkutnik and Pichura (2009), Osińska (2006), Brzeszczyński and Kelm (2002).

Piontek (2001) used the AR(1)-GARCH(1,1) model to measure risk through Value at Risk. Węgrzyn (2015), on the other hand, analyzed stock price risk using GARCH, APARCH, EGARCH to AR class models. In GARCH models, he used parameters up to lag 2. In a study by Szkutnik and Pichura (2009), which analyzed futures volatility, the models that fitted the data well were ARCH(2) and GARCH(1,1).

Osińska (2006) also used ARCH and GARCH models to fit the return series of the WIG index, futures contracts. In their research, Brzeszczyński and Kelm (2002) confirmed the need for GARCH class models, which better explained the development of stock quotes than KMNK estimated models. They considered using a GARCH(1,1) model to be sufficient in their study.

The author's contribution is applying GARCH class models to market timing models. This is due to the need for better data modeling in crisis periods, such as a pandemic and a war. In addition, the research was on crisis periods, and such studies on market timing were not found in the literature.

Thus, there is a need to continue the studies conducted for the initial pandemic period by Żebrowska-Suchodolska, Karpio, and Kompa (2021), and Żebrowska-Suchodolska, Karpio, and Nafkha (2022).

In addition, the examined stability of results during crisis periods will answer whether the parameters of the market timing model during crisis periods can be similar to each other.

3. Research Methodology

The basis of market timing models is selectivity and market sense applied by managers. If applied, selectivity and market timing have the potential to improve the performance of fund share values. Researchers' and investors' search for high-performing funds leads to market timing research.

Treynor and Mazuy (1966) and Henriksson and Merton (1981) models provide tools for studying this aspect of collective investment fund performance. The TM model has the form of an equation:

$$r_{A,t} - r_{f,t} = \alpha_A + \beta_A\left(r_{M,t} - r_{f,t}\right) + \delta_A\left(r_{M,t} - r_{f,t}\right)^2 + \varepsilon_{A,t}, \qquad (1)$$

where $r_{A,t}$,$r_{f,t}$, $r_{M,t}$ are the returns in period t of the portfolio of fund A, the risk-free stock and the benchmark M. The coefficient α_A is a measure of the portfolio management skill in asset selectivity, δ_A in the use of market timing, and β_A is a measure of the use of market trends. The ε_A term is the random component of the model describing off-market risk. In the case of the δ_A, coefficient, an entity characterized by a larger value of δ_A than another is better at selecting the moments of making transactions.

Thus, the manager, by skillfully choosing the moments to change the composition of the portfolio, increases investment efficiency when the portfolio is characterized by a larger positive δ_A coefficient. Of course, the situation is unfavorable when this coefficient is negative because then the manager incompetently chooses the moments to make transactions.

Consequently, the evaluation of investment efficiency in terms of market sense boils down to an examination of the significance of the δ_A parameter and its sign when, from a statistical point of view, it is different from zero.

Due to the high distribution variability and the presence of the variance clustering effect, a GARCH class model was also applied to the error variance. The GARCH(p,q) model has the following form:

$$\begin{gathered} y_t = \mu_t + \epsilon_t, \varepsilon_t \sim N(0, \sigma_t^2), \\ \sigma_t^2 = \alpha_0 + \alpha_1 e_{t-1}^2 + \cdots + \alpha_p e_{t-p+}^2 \beta_1 \sigma_{t-1}^2 + \cdots + \beta_q \sigma_{t-q}^2 \end{gathered} \qquad (2)$$

Thus, the TM-GARCH(1,1) model will be of the form:

$$\begin{gathered} r_{A,t} - r_{f,t} = \alpha_A + \beta_A\left(r_{M,t} - r_{f,t}\right) + \delta_A\left(r_{M,t} - r_{f,t}\right)^2 + \varepsilon_{A,t}, \\ \varepsilon_{A,t} \sim N(0, \sigma_t^2) \\ \sigma_t^2 = \alpha_0 + \alpha_1 e_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \end{gathered} \qquad (3)$$

The results obtained will allow more accurate estimates of the model parameters and give an interpretation as to the impact of past shocks on the variance.

To compare the results for crisis periods concerning their stability, Spearman's rank correlation coefficient was determined from the created rankings for each parameter. Spearman's rank correlation coefficient is determined by the formula (Luszniewicz, Słaby 2003):

$$r_S = 1 - \frac{6\sum_{i=1}^{n} d_i}{n(n^2-1)}, \tag{4}$$

where d_i is the difference between the ranks.

The test statistic $t = \frac{r_S}{\sqrt{1-r_S^2}}\sqrt{n-2}$ has a *t-Student* distribution with $\nu = n-2$

degrees of freedom. No grounds for rejecting the null hypothesis will mean that the rank correlation coefficient is statistically insignificant at the set level of significance, while the rejection of the null hypothesis will show that the correlation coefficient is statistically significant.

4. Research Results and Discussion

All stock funds existing on the Polish market since 2003 were accepted for the study. They were as follows: Allianz Selektywny Polskich Akcji (Allianz), Esaliens Akcji (Esaliens), Generali Korona Akcje (Generali), Goldman Sachs Akcji (Goldman), Investor Fundamentalny Dywidend i Wzrostu (Investor), Millennium Akcji (Millennium), PKO Akcji Polskich (PKO), Pzu Akcji Krakowiak (Pzu), Rockbridge Akcji (Rockbridge), Santander Akcji Polskich (Santander), Skarbiec Akcji Polskich (Skarbiec).

An ordinary rate of return was determined for daily unit valuations. The WIBOR Overnight rate was taken as the risk-free rate.

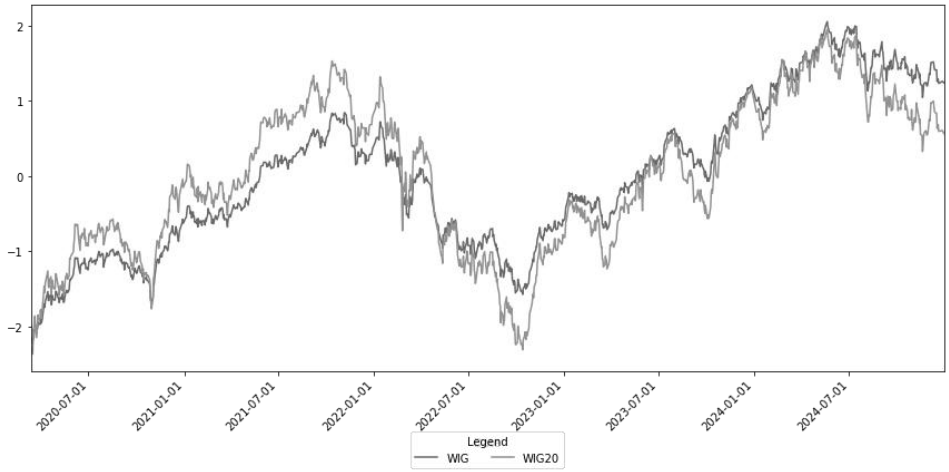
The crisis sub-periods were divided based on the trends of the WIG and WIG20 indices. Their graphs are shown in Figure 1.

Due to the similar shapes of the quotation charts, the WIG index was chosen as the benchmark for further research. The stock index charts were also the basis for determining crisis periods.

Thus, the following crisis periods were specified: I: 13.03.2020-23.02.2022; II: 24.02.2022-30.12.2024.

TM models were constructed to assess the market timing skills of mutual fund portfolio managers for each crisis period. First, the parameters were estimated using the classical least squares method. The results are shown in Table 1.

Figure 1. *WIG and WIG20 indices quotations in the period 13.03.2020-30.12.2024*



Notes: *The chart shows the daily quotations of the WIG and WIG20 indices for the period 13.03.2020-30.12.2024. The data have been standardized.*
Source: *Author's calculations.*

Table 1. *Parameters of TM model during pandemic and war*

	period I			**period II**		
	alpha	**beta**	**delta**	**alpha**	**beta**	**delta**
Allianz	0.000	0.789***	-0.082	-0.001***	0.783***	-0.241
Esaliens	-0.000	0.638***	-0.578	-0.001***	0.858***	0.557**
Generali	0.000	0.765***	-1.915**	-0.001***	0.903***	0.072
Goldman	0.000*	0.859***	-0.868**	-0.000***	0.934***	0.014
Investor	-0,000	0.630***	2.009**	-0.001***	0.726***	0.970***
Millennium	-0.000	0.830***	-0.374	-0.001***	0.836***	0.014
PKO	-0.000	0.888***	0.541**	-0.000***	0.904***	0.133
Pzu	-0.000	0.779***	-1.706***	-0.001***	0.872***	0.560***
Rockbridge	0.000**	0,792***	-1.596***	-0.001***	0,879***	1.363***
Santander	0.000	0.901***	-0.084	-0.000***	0.941***	0.256***
Skarbiec	0.000	0.872***	-1.463**	-0.000	0.945***	-0.472**

Notes: **, **,*** denotes a statistically significant value at the significance level 0.1, 0.05, and 0.01, respectively.*
Source: *Author's calculations.*

The values of the determination coefficients for *period I* ranged from 55% to 97%, and for *period II* - from 83% to 99%. During the pandemic period, managers mostly did not use an active investment approach. Most values are statistically insignificant

and close to zero. This may indicate that during a crisis period like the pandemic, managers do not try to make changes in the portfolio corresponding to the market situation to increase the fund's income. Instead, they use a passive approach during this time, mimicking the benchmark, as all *beta* coefficients are statistically significant. In many cases, fund managers traded against the market's direction, leading to losses, as evidenced by negative, statistically significant *delta* coefficient values. The exceptions are PKO and Investor.

During the war period, a shift from passive to active strategy is observed, as evidenced by statistically significant almost all *alpha* coefficients. Following the market trend is even stronger, as evidenced by higher beta coefficient values. The active investment approach and the right timing of portfolio changes yield positive results for funds that use market timing. The delta coefficient values for Esaliens, Investor, Pzu, Rockbridge, and Santander are positive and statistically significant. The value is negative only for the Skarbiec fund.

Due to the presence of the variance clustering effect observed with the ACF function and the LM test, the variance of the TM model error was adjusted with a GARCH class model in the next step. Various types of GARCH class models were tested, especially those that account for the asymmetry of the distribution.

However, since the parameter associated with asymmetry was statistically insignificant, the GARCH(1,1) model was considered sufficient. In addition, the need to model the conditional variance was due to autocorrelation and heteroskedasticity for financial data, which can distort the estimation results using the classical least squares method. The parameter values of the TM-GARCH(1,1) model are given in Table 2.

Table 2. *TM-GARCH(1,1) model parameters during pandemic and war*

	period I					
	alpha	**beta**	**delta**	**alpha0**	**alpha1**	**beta1**
Allianz	-0.000	0.764***	0.034	0.000	0.026***	0.968***
Esaliens	-0.000	0.616***	-0.578	**The convergence criterion has not been achieved**		
Generali	0.000	0.872***	-1.191**	0.000	0.099***	0.892***
Goldman	0.000*	0.871***	-0.332	0.000**	0.144***	0.828***
Investor	-0,000	0.600***	-0.263	0.000	0.104***	0.885***
Millennium	-0.000	0.845***	-0.325	0.000	0.076***	0.911***
PKO	-0.000	0.888***	0.541**	**The convergence criterion has not been achieved**		
Pzu	-0.000**	0.810***	-1.586***	0.000	0.034***	0.962***
Rockbridge	0.000**	0,816***	-2.036***	0.000	0.094**	0.869***
Santander	0.000	0.902***	-0.237	0.000***	0.806***	0.194***
Skarbiec	-0.000	0.925***	-2.501**	0.000	0.097***	0.901***
	period II					

Allianz	-0.001***	0.782***	-0.324	0.000***	0.148***	0.453***
Esaliens	-0.001***	0.902***	0.526**	0.000**	0.040***	0.943***
Generali	-0.000***	0.910***	0.102	0.000*	0.296***	0.540***
Goldman	-0.000***	0.935***	-0.007	0.000	0.013	0.979***
Investor	-0.001***	0.706***	0.775***	0.000	0.055***	0.939***
Millennium	-0.001***	0.836***	0.022	0.000	0.009	0.889***
PKO	-0.000***	0.896***	0.234**	0.000**	0.084***	0.885***
Pzu	-0.001***	0.896***	0.234**	0.000**	0.084***	0.885***
Rockbridge	-0.001***	0,859***	1.288***	0.000	0.075***	0.912***
Santander	-0.000***	0.943***	0.272***	0.000	0.047**	0.899***
Skarbiec	-0.000	0.939***	-0.423**	0.000	0.022**	0.954***

Notes: **, **,*** denotes a statistically significant value at the significance level of 0.1, 0.05, and 0.01, respectively.*
Source: *Author's calculations.*

Modelling the conditional variance of the residuals of the TM model yielded better model quality through smaller errors in statistically significant parameter evaluations. In addition, the values of *alpha1* and *beta1* coefficients are statistically significant in most cases, and the values of *beta1* coefficients significantly exceed the values of *alpha1* coefficients.

This means that the conditional variability in a given period is largely determined by the variability of the previous period.

Therefore, the response to emerging new shocks (*alpha1*) is smaller than the response to a long-term trend. Comparing results across sub-periods reveals a stronger response to new shocks in the pandemic period and a stronger long-term response to emergent volatility in the war period.

The final step was verifying the results' stability in the two sub-periods studied. Thus, the Spearman correlation coefficient between the sub-periods was determined for the rankings created based on the parameters of the TM model. These are presented in Table 3.

Significant correlations between sub-periods occurred only in the case of the beta coefficient, indicating that the funds mimicked the benchmark per their adopted investment policy regardless of the crisis period. Other parameters are unstable due to the different needs to act in the face of different crises.

Table 3. *Spearman's rank correlation coefficient values*

coefficient	**period I/period II**
beta	0.743**
delta	0.009

Notes: *** denote a statistically significant value at the significance level of 0.05.*
Source: *Author's calculations.*

5. Conclusions

Research related to evaluating the skills of investment fund managers is an important part of investment-related research. It is the investor looking at the performance of a fund that decides to choose it.

However, the final result, i.e. the performance of the fund, consists of many factors. One very important factor is the skills of managers and their decision-making.

Studies for different markets often show different results depending on the market, the time horizon chosen or the benchmark. However, there is a lack of research highlighting the application of managers' skills during crisis periods and the stability of these results during periods of heightened volatility.

The paper therefore fills a gap in this regard, due in part to the fact that Żebrowska-Suchodolska, Karpio, and Kompa (2021) focus on improving the quality of stock market data fit with the GARCH model, and Żebrowska-Suchodolska, Karpio, and Nafkha (2022) present results for the initial pandemic period. The results obtained for Polish market equity funds indicate that managers use a different strategy during crisis periods. It changes from a passive policy to an active policy.

This is because it is required by a period of war, characterized by higher volatility associated with uncertainty in a market located near an armed conflict and a stronger long-term response to the volatility that occurs. This results in the instability of the results obtained, except for the funds' imitation of the benchmark adopted in their policies.

6. References

Abdullah, F., Hassan, T., Mohammad, S. 2007. Investigation of Performance of Malaysian Islamic Unit Trust Funds. Managerial Finance, 33(2), 142-153.

Aharon, D.Y., Siev, S. 2021. COVID-19, Government Interventions and Emerging Capital Markets Performance, Research in International Business and Finance, Volume 58 (2021), 101492, DOI:10.1016/j.ribaf.2021.101492.

Ahmed, S., Hasan, M.M., Kamal, M.R. 2022. Russia–Ukraine Crisis: The Effects on the European Stock Market. European Financial Management. https://doi.org/10.1111/eufm.12386.

Albulescu, C.T. 2021. COVID-19 and the United States Financial Markets' Volatility. Finance Research Letters, Volume 38, 101699. DOI:10.1016/j.frl.2020.101699.

Bollen, P.B.A., Busse, J.A. 2001. On the Timing Ability of Mutual Fund Managers. The Journal of Finance, 56(3), 1075-1094.

Brzeszczyński, J., Kelm, R. 2002. Ekonometryczne modele rynków finansowych, WIG-Press.

Chang, E.C., Lewellen, W.G. 1984. Market Timing and Mutual Fund Performance. Journal of Business, 57(1), 57-72.

Cheteni, P. 2016. Stock Market Volatility using GARCH Models: Evidence from South Africa and China Stock Markets. Journal of Economics and Behavioral Studies Vol. 8, No. 6, pp. 237-245.

Dellva, L.W., DeMaskey, A.L., Smith, C.A. 2001. Selectivity and Market Timing Performance of Fidelity Sector Mutual Funds. The Financial Review, 36, 39-54.

Elfakhani, S., Hassan, M.K., Sidani Y. 2005. Comparative Performance of Islamic Versus Secular Mutual Funds. Presented at the 12th Economic Research Forum Conference. University of New Orleans, USA.

Lee, C.F., Rahman, S. 1990. Market Timing, Selectivity, and Mutual Fund Performance: An Empirical Investigation. The Journal of Business, 63(2), 261-278.

Goetzmann, W.N., Ingersoll, J., Ivkovic, Z. 2000. Monthly Measurement of Daily Timers. Journal of Financial and Quantitative Analysis, 35(3), 257-290.

Gupta, A. 2001. Mutual Funds in India: A Study of Investment Management. Finance India, 15(2), 631-637.

Henrrikson, R., Merton, R. 1981. On Market Timing and Investment Performance. II Statistical Procedures for Evaluating Forecasting Skills. Journal of Business 54, No. 4, 513-533.

Heyden, K.J., Heyden, T. 2021. Market Reactions to the Arrival and Containment of COVID-19: An Event Study. Finance Research Letters, 38, 101745. DOI:10.1016/j.frl.2020.101745.

Jamróz, P. 2011. Parametryczna ocena umiejętności selektywności i wyczucia rynku zarządzających OFI akcji. Zeszyty Naukowe Uniwersytetu Szczecińskiego, Nr 639, Finanse, Rynki finansowe, Ubezpieczenia, 37, 221-231.

Kao, G., Cheng, L., Chan, K., 1998. International Mutual Fund Selectivity and Market Timing During Up and Down Market Conditions. The Financial Review, 33(2), 127-144.

Luszniewicz, A., Słaby, T. 2003. Statystyka z pakietem komputerowym STATISTICA PL, Wydawnictwo. C.H. BECK, Warszawa.

Mazur, M., Dang, M., Vega, M. 2021. COVID-19 and the March 2020 Stock Market Crash. Evidence from S&P500. Finance Research Letters, 38, 101690. DOI:10.1016/j.frl.2020.101690.

Pilbeam, K, Preston, H. 2019. An Empirical Investigation of the Performance of Japanese Mutual Funds: Skill or Luck? International Journal of Financial Studies, 7(1), 1-16.

Pruchnicka-Grabias, I., Żebrowska-Suchodolska, D. 2024. Inter-Connectedness between Developed and Visegrad Stock Markets during Covid-19 Pandemic and Russia-Ukraine War. Torun International Studies, 1(19), 65-90.

Olbryś, J. 2011. Obciążenie estymatora współczynnika alfa Jensena a interpretacja parametrów klasycznych modeli market-timing. Przegląd Statystyczny, 58(1-2), 42-59.

Osińska, M. 2006. Ekonometria finansowa. Polskie Wydawnictwo Ekonomiczne.

Piontek K. 2001. Heteroskedastyczność szeregu stóp zwrotu a koncepcja pomiaru ryzyka metodą VaR, Prace naukowe. Akademii Ekonomicznej w Katowicach, 339-349.

Ramesh, B., Dhume, P.S.S. 2014. Market Timing Ability of Fund Managers-Indian Experience. The Indian Journal of Commerce, 67(1), 1-15.

Swinkels, L., Rzezniczak, P. 2009. Performance evaluation of Polish Mutual Fund Managers. International Journal of Emerging Markets, 4(1), 26-42.

Szkutnik, W., Pichura, M. 2009. Analiza wewnątrzsesyjnej zmienności wartości kontraktów terminowych z zastosowaniem modeli klasy ARCH/GARCH, Prace naukowe Uniwersytetu Ekonomicznego we Wrocławiu nr 38, Ekonometria 24, 72-83.

Thalassinos, I.E., Venediktova, B., Zampeta, V. 2015. Applications of M-GARCH Model for the Selection of Securities of Banks' Investment Portfolio. Applied Economics and Finance, 2(2), 1-13.

Treynor, J.L., Mazuy, K. 1966. Can Mutual Funds Outguess the Market? Harvard Business Review, 44, 131-136.

Ugurlu, E., Thalassinos, E., Muratoglu, Y. 2014. Modeling Volatility in the Stock Markets using GARCH Models: European Emerging Economies and Turkey. International Journal in Economics and Business Administration, Volume II, Issue 3.

Węgrzyn, T. 2015. Efektywność funduszy inwestycyjnych stosujących aktywne strategie zarządzania portfelem. Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, nr 239, 141-152.

Witkowska, D., Kompa, K., Grabska, M. 2009. Badanie informacyjnej efektywności rynku w formie silnej na przykładzie wybranych funduszy inwestycyjnych. Metody Ilościowe w Badaniach Ekonomicznych, 10(1), 265-285.

Zamojska, A. 2009. Timing – metody pomiaru i empiryczna weryfikacja na przykładzie polskich funduszy inwestycyjnych. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 60, 525-532.

Zaremba, A., Kizys, R., Aharon, D.Y., Demir, E. 2020. Infected Markets: Novel Coronavirus, Government Interventions, and Stock Return Volatility Around the Globe. Finance Research Letters, Vol. 35, 101597. DOI:10.1016/j.frl.2020.101597.

Żebrowska-Suchodolska, D., Karpio, A. 2022. Study of the Skills of Balanced Fund Managers in Poland. Contemporary Economics, 16(2), 151-167.

Żebrowska-Suchodolska, D., Karpio, A. 2023. Comparison of the Financial Market Conditions in Poland and Selected Countries During the Pandemic and the Russian-Ukrainian War. Journal of Banking and Financial Economics, 2(20), 80-92.

Żebrowska-Suchodolska, D., Karpio, A., Kompa, K. 2021. COVID-19 Pandemic: Stock Markets Situation in European Ex-Communist Countries. European Research Studies Journal, Volume XXIV, Issue 3, Part 1, 1106-1128.

Żebrowska-Suchodolska, D., Karpio, A., Nafkha, R. 2022. Improving the Quality of Modeling the Efficiency of Managing Portfolios of Polish Open-ended Investment Funds in 2018-2021. Procedia Computer Science, 207, 779-789.