MARKET TIMING ABILITY OF MUTUAL FUNDS WITH TESTS APPLIED ON SEVERAL CROATIAN FUNDS

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Abstract

Performance of mutual funds industry has been in spotlight ever since it started to develop in previous century all over the world. Different measures have been designed in order to evaluate those performances. Market timing ability is one of them. This paper attempts to find evidence of market timing ability of Croatian funds, estimating Treynor-Mazuy and Henriksson-Merton model over the sample of ten mutual funds. The results, expectedly, have indicated a lack of market timing abilities of selected funds.

Key words: *Fund performance, Croatian funds, Market timing, Stock market*

1. INTRODUCTION[1]

Market-timing strategy in its simplest form is usually explained as a strategy of choosing the right moment to invest. A certain portfolio, i.e. its structure is shaped in accordance with the co-movements of the market as whole, and in accordance with the price movements. This strategy refers to predicting whether the market will be bullish or bearish. The structure of the portfolio is shaped with respect to these predictions. An investor using this strategy is trying to outwit the market most of the time. In other words, this strategy implies that an investor is forecasting the direction of future market trends. Usually, this ability is linked to investment funds and managers, especially mutual funds in the United States. Empirically, authors try to evaluate the ability of mutual funds in successful timing of investing into various securities. Prigent (2007) defines a „market-timing“strategy as a strategy linked to beta[2] greater than 1 when the market is bullish, and smaller than 1 when the market is bearish.

[1] The author would like to thank Ministry of Finance on forwarded data on interest rates before year 2005, as well as to Internet portal hrportfolio.com on forwarded data on net asset values of investment funds.
[2] He refers to the beta from the usual CAPM model.

Two of the pioneering models, usually discussed in the literature are Treynor-Mazuy (1966) and Henriksson-Merton (1981) model. The main emphasis of this paper will be on these two models, with an application on Croatian investment funds. The investment funds industry in Croatia began in late 1990s. Although an infant industry, it had its explosion in the last couple of years, before the financial crisis. A great expansion of number of investment funds took place in 2007, when most of the equity funds were founded (HANFA 2011). Net assets grew rapidly until 2008. Nevertheless, the investors withdrew large amounts of money, and a slow recovery is being in place ever since. For many decades, questions were made regarding the performance of mutual funds in many countries. Do investment managers really have certain skills which enable them to outperform the market? Same questions can be explored for the past decade of Croatian investment fund industry. This paper will attempt to evaluate the performance of several Croatian mutual funds, using the two mentioned models, since there has been a scarcity of papers dealing with these issues in Croatia. The structure of the paper is given as follows. In Section 2 we discuss the theoretical background and the results of previous empirical analysis. Section 3 provides results of empirical analysis performed over ten chosen investment funds in Croatia. Conclusions are given in the final, fourth Section.

2. THEORETICAL BACKGROUND AND PREVIOUS RESEARCH

2.1. Theoretical background

Treynor and Mazuy (1966) were pioneers in research of market timing ability of funds. In their paper, they have suggested a simple method of testing the presence of market timing ability of investment managers. However, they did not find any evidence to support the belief that mutual fund managers can outguess the market. Based on the discussion in their paper, other researchers have quantitatively expressed the Treynor-Mazuy model in the following form:

$$R_{it} - R_{ft} = \alpha + \beta\left(R_{tt} - R_{ft}\right) + \gamma\left(R_{tt} - R_{ft}\right)^2, \qquad (1)$$

where R_{tt} denotes return on stock market at time t,

R_{it} denotes return on assets of the selected fund at time t,

R_{ft} denotes risk free return rate at time t,

α denotes a selectivity ability, and

γ denotes the parameter measuring the market timing performance, $\gamma > 0$ if a fund is successful[3].

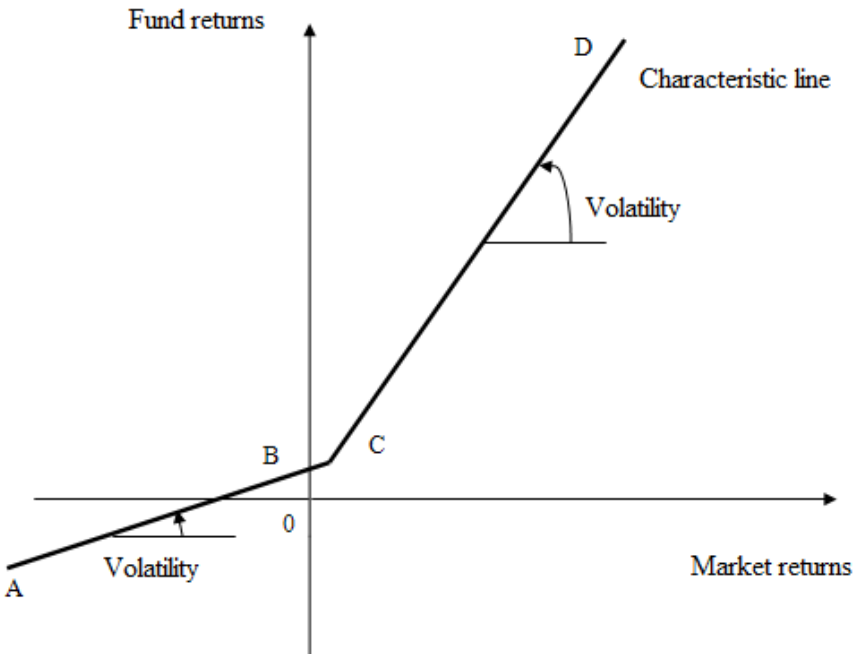
The difference between the standard CAPM model and this one is obvious. An addition of the term $\gamma\left(R_{tt} - R_{ft}\right)^2$ changes the linear relationship between returns on market and a security into a quadratic

[3] β is the usual CAPM beta.

one. Now, when the return on a stock market (minus the risk free rate) rises for one percentage point, the change in the average return on assets of selected fund is given as

$$\beta + 2\gamma\left(R_{tt} - R_{ft}\right). \tag{2}$$

It is even clearer now how reactions of an investor using market timing strategy depend on the level of the stock market returns. Treynor and Mazuy did not explicitly derive the relation given in (1) in their paper. They described it using several graphical representations. In order to enhance understanding of the market timing ability, this paper addresses one of the graphical presentations in particular.



Source: Treynor and Mazuy (1966)

Figure 1. The characteristic line of a fund which constantly outwits the market

Figure 1 shows the characteristic line of a fund which constantly outwits the market. It chooses a fund composition with high volatility (the CD characteristic line) when the market is rising, and when there is a fall on the market, a low volatility composition is in place (AB characteristic line). Consequently, in periods when the market is rising, the returns on the fund's equity will be greater in relation to the market returns. Thus, the slope of the CD characteristic line is greater than one. The fund's returns are above average. Conversely, when the market is falling, the structure of fund's equity is shaped in a way that the realized losses will be smaller in relation to the losses realized on the market. Of course, the slope of the AB characteristic line is smaller than one. The characteristic line in this model is

broken, as opposed to the linear line in standard CAPM model. Research papers dealing with the measurement of fund's performance have been using the equation given in (1) for testing the Treynor-Mazuy model. The quadratic relationship means that a fund cannot outperform the market one hundred percent of the time, yet most of the time, so the fund's assets structure is constantly being adjusted.

The other model observed in this paper is the Henriksson-Merton model. Following Merton's paper (Merton, 1980), Henriksson and Merton (1981) provided further procedures for testing the previously developed theory. The procedures consist of non-parametric tests, as well as parametric. The non-parametric test refers to situations where the market timer's forecast can be observed by others. Since this is not always possible, the parametric test for evaluating market timing abilities is given with the following expression:

$$R_{it} - R_{ft} = \alpha + \beta\left(R_{tt} - R_{ft}\right) + \delta D_t\left(R_{tt} - R_{ft}\right), \tag{3}$$

where δ denotes the parameter measuring market timing ability. If δ proves positive, it implies the existence of a timing ability, and

D_t denotes the dummy variable, $D_t = \begin{cases} 0, \text{if } R_{tt} - R_{ft} > 0 \\ -1 \text{ otherwise.} \end{cases}$

So basically, we are dealing with two equations of market timing behavior. When the market is bullish, the change in the average return on assets of a selected fund is given as

$$\beta. \tag{4}$$

On the other side, the behavior of the fund when the markets are bearish are represented with

$$\beta - \delta. \tag{5}$$

2.2. Short literary survey

Empirical papers have been emerging ever since theoretical background has been developed. Researchers have been trying to comprehend whether investment fund managers have these abilities in various countries. In their fundamental paper, Treynor and Mazuy (1966) have performed an analysis over 57 open-end mutual funds for the period from 1953 to 1962 and did not find evidence of market timing abilities. Henriksson (1984) evaluated 116 mutual funds for the period from 1968 to 1980. He also did not find any support of successful timing strategy. Many authors have been exploring the capabilities of fund managers not only in developed countries, but in emerging markets as well. This section focuses on papers dealing with Croatian funds. Previous papers dealt mostly with the description of the fund industry. For example, Morić Milovanović and Galetić (2005) gave a good overview of the current situation in the mentioned industry. Valdevit et al. (2008) have dealt with

inequality indices of the funds industry. Sajter (2011) explored the performance of Croatian fund managers, however not within the market timing ability framework, but by calculating Jensen alphas. They have indicated underperformance of the funds when compared to the market returns. These results indicate that measuring timing abilities within this particular framework will also confirm a lack of thereof. Balen et. al. (2007) analyzed the performance of Croatian, Slovenian and Bosnian and Herzegovinian funds and did not find any significant results of aforementioned abilities. They analyzed Treynor-Mazuy model for various periods from the year 1999 to 2005. Only 1 out of 14 Croatian funds showed to have a statistically significant timing coefficient and for other two countries they found rare exceptions. They have explained such results with a defensive behavior of funds, because most of the estimated betas in considered models were smaller than one. It can be concluded that there is a scarcity of papers dealing with market timing abilities, and secondly, a lack of aforementioned skills of funds is to be expected.

3. METHODOLOGY AND EMPIRICAL ANALYSIS

3.1. Data and methodology

This section provides econometric analysis of the two discussed models. Data were obtained from the Ministry of Finance (2012), web portal hrpotfolio.com (2012) and Zagreb Stock Exchange (2012). It refers to monthly data on net asset values of ten equity funds in Croatia. Funds were chosen based on the value of their assets[4]. Since some of the funds were established later in relation to others, the data for all funds were not available for the same period, and table 1 gives information on the time span of data on net asset values.

Furthermore, data on CROBEX index were collected, as well as data on interest rates on domestic treasury bills with maturity of 91 days. They refer to monthly data from December 2002 – November 2011. Returns on net asset value are defined as:

$$R_{it} = ln\left(\frac{NAV_t}{NAV_{t-1}}\right), \tag{6}$$

where R_{it} denotes return on net asset value of fund i at month t,
NAV_t denotes net asset value at month t,
NAV_{t-1} denotes net asset value at month t-1, and
ln denotes natural logarithm.

[4] Ten funds with biggest assets in years 2010 and 2011 in Croatia.

Table 1. Time span of data on net asset value of ten chosen funds

Fund	Time span	Abbreviation
OTP index fund	February 2008 – November 2011	Otpif
Erste Adriatic Equity fund	November 2005 – November 2011	Erstae
Erste Total East fund	November 2007 – November 2011	Erstt
ZB Trend fund	December 2002 – November 2011	Zbt
ZB Euroaktiv fund	June 2004 – November 2011	Zbeu
ZB Aktiv fund	July 2006 – November 2011	Zba
ZB Bric+ fund	May 2010 – November 2011	Zbb
Raiffeisen Central Europe fund	May 2005 – November 2011	Rce
PBZ Equity fund	October 2005 – November 2011	Pbzef
PBZ I-Stock fund	August 2007 – November 2011	Pbzis

Source: hrportfolio.com and author

Market returns were approximated with the following expression:

$$R_{tt} = ln\left(\frac{CROBEX_t}{CROBEX_{t-1}}\right), \tag{7}$$

where R_{tt} denotes market return at month t,

$CROBEX_t$ denotes the value of index CROBEX at month t, and

$CROBEX_{t\text{-}1}$ denotes the value of index CROBEX at month t-1.

Both models will be estimated using ordinary least squares method of estimation. Treynor-Mazuy model will be estimated using the following equation:

$$R_{it} - R_{ft} = \alpha + \beta\left(R_{tt} - R_{ft}\right) + \gamma\left(R_{tt} - R_{ft}\right)^2 + \varepsilon_t, \tag{8}$$

and Henriksson-Merton is going to be estimated using the equation:

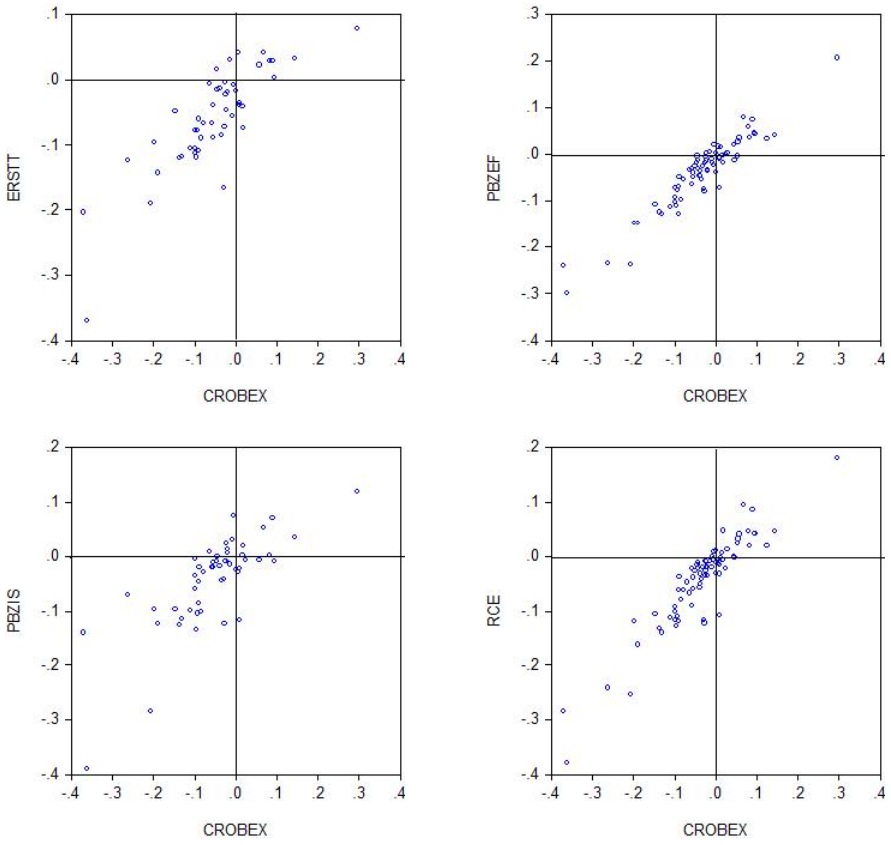
$$R_{it} - R_{ft} = \alpha + \beta\left(R_{tt} - R_{ft}\right) + \delta D_t\left(R_{tt} - R_{ft}\right) + u_t, \tag{9}$$

$$D_t = \begin{cases} 0, \text{if } R_{tt} - R_{ft} > 0 \\ -1 \text{ otherwise.} \end{cases}$$

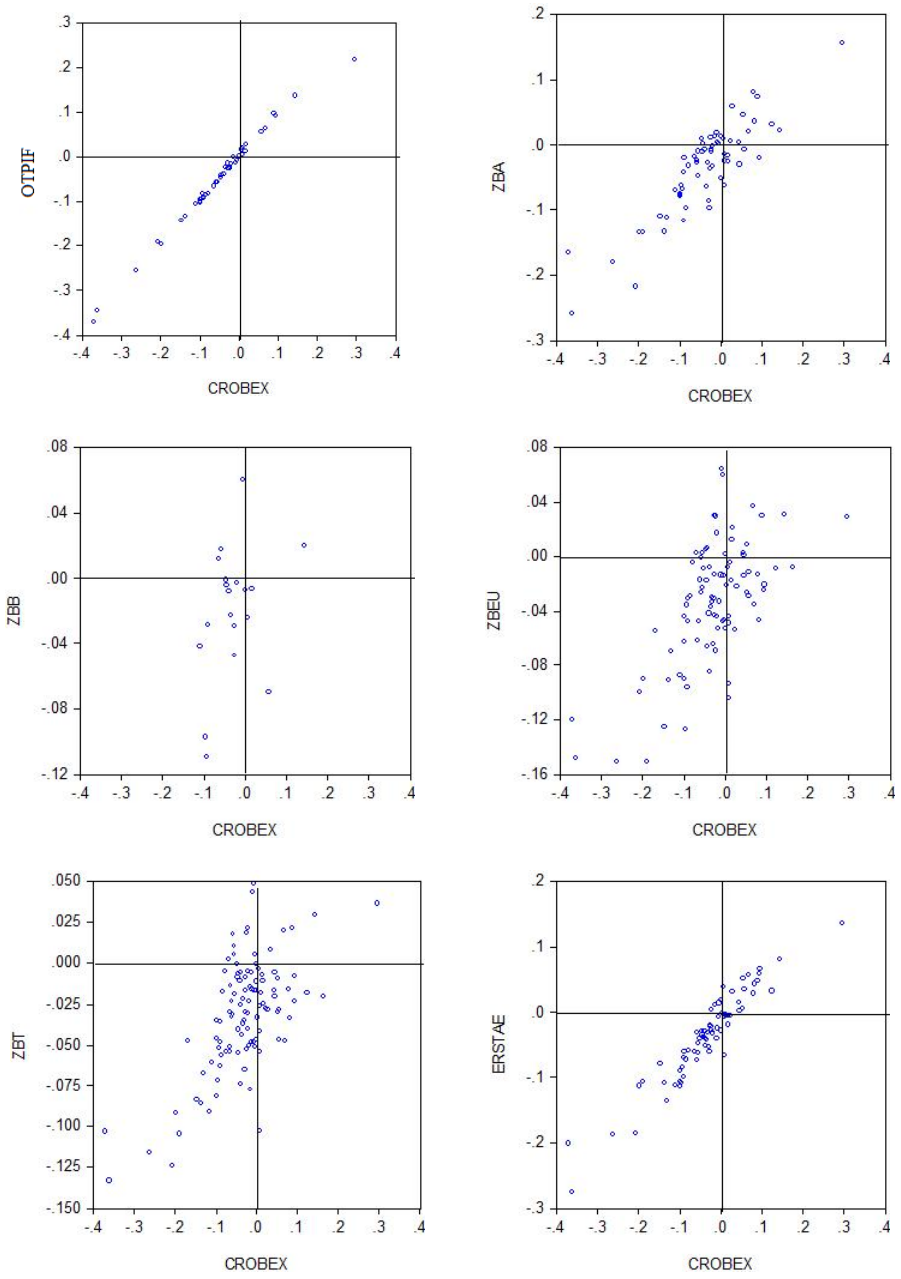
Significantly positive terms γ and δ imply that there exist market timing abilities of fund managers. Models (8) and (9) will be estimated using OLS method of estimation, in software EViews7.

3.2. Results of estimation

Before estimation, all of the variables were tested for unit roots, using Augmented Dickey Fuller test, and on one percent level to be found stationary[5]. Secondly, scatter plots were made in order to graphically evaluate a possibility of a non-linear relationship between the certain fund's return and the stock market return. A first glance at figures 2-11 suggests that there is no other than a linear relationship between the observed returns. Thus, there is little graphical evidence on the existence of market timing strategy of the observed funds. However, such results should be formally verified.



[5] The results are available on request.



Source: author

Figure 2-11. Scatter plot of returns regarding returns of chosen funds and return on CROBEX

Based on the models given in (8) and (9), the results of the estimation are given in tables 2 and 3, along with the results of the tests of autocorrelation, heteroskedasticity and normality.

Table 2. Results of Treynor-Mazuy model estimation for chosen funds

FUND	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\gamma}$	$\bar{R}^2$	Q(12)	$Q^2(12)$	JB
zbt	-0.02*	0.22*	-0.25***	0.42	7.52 (0.82)	15.75 (0.20)	1.01 (0.60)
zbeu	-0.02*	0.24*	-0.31***	0.43	4.49 (0.97)	10.85 (0.54)	0.09 (0.96)
rce	-0.01*	0.72*	-0.42**	0.86	22.13 (0.04)[a]	50.67 (0.00)[b]	15.7 (0.00)[c]
pbzef	-0.01*	0.71*	-0.11	0.89	10.68 (0.56)	32.66 (0.00)[b]	4.5 (0.11)
erstae	-0.01*	0.63*	-0.06	0.89	11.49 (0.49)	8.75 (0.73)	0.02 (0.99)
zba	-0.01**	0.57*	-0.12	0.78	16.08 (0.19)	36.59 (0.00)[b]	1.47 (0.48)
pbzis	-0.01	0.52*	-0.43	0.59	11.39 (0.50)	45.63 (0.00)[b]	7.53 (0.02)[c]
erstt	-0.03*	0.51*	-0.45***	0.71	11.40 (0.50)	18.74 (0.10)	3.57 (0.17)
otpif	0.001	0.90*	-0.29*	0.99	28.63 (0.00)[a]	12.03 (0.44)	0.55 (0.76)
zbb	-0.01	0.27	-1.90	0.09	16.37 (0.18)	13.40 (0.34)	0.51 (0.78)

Table 3. Results of Henriksson-Merton model estimation for chosen funds

FUND	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\delta}$	$\bar{R}^2$	Q(12)	$Q^2(12)$	JB
zbt	-0.02*	0.11***	-0.21**	0.44	8.98 (0.70)	16.34 (0.18)	1.18 (0.56)
zbeu	-0.02*	0.12	-0.27**	0.45	3.82 (0.98)	10.77 (0.55)	0.19 (0.91)
rce	-0.01**	0.58*	-0.28**	0.86	28.44 (0.01)[a]	54.93 (0.00)[b]	20.41 (0.00)[c]
pbzef	-0.01**	0.63*	-0.14	0.90	10.77 (0.55)	36.59 (0.00)[b]	3.91 (0.14)
erstae	-0.01*	0.57*	-0.09	0.90	11.73 (0.47)	8.36 (0.72)	0.06 (0.97)
zba	-0.01	0.47*	-0.16	0.78	15.27 (0.23)	38.27 (0.00)[b]	1.17 (0.56)
pbzis	-0.002	0.34**	-0.33	0.60	13.29 (0.35)	45.56 (0.00)[b]	8.92 (0.01)[c]
erstt	-0.02**	0.37*	-0.28***	0.70	11.31 (0.50)	17.96 (0.12)	7.11 (0.03)[c]
otpif	0.01*	0.79*	-0.21*	0.99	18.61 (0.09)[a]	12.61 (0.40)	2.42 (0.3)
zbb	0.002	-0.07	-0.61	0.12	15.99 (0.19)	14.91 (0.25)	0.59 (0.74)

Source: authors' calculation

Note: *, ** and *** denote statistical significance on one, five and ten percent, respectively. $Q(12)$ refers to the value of Ljung-Box test statistic for problem of autocorrelation, including twelfth lag. $Q^2(12)$ refers to the value of Ljung-Box test statistic for problem of heteroskedasticity, including twelfth lag. JB denotes Jarque Bera test statistics for the problem of non-normality. The values in parentheses are corresponding p-values. [a] – refers to the existence of problem of autocorrelation, [b] – refers to the existence of problem of heteroskedasticity, [c] – refers to the existence of problem of non-normality. $\bar{R}^2$ denotes adjusted *R*-squared.

As it is shown in tables 2 and 3, one half of the estimated models had some of the tested problems, while the other half did not yield any proof of market timing skills. All of the estimated parameters γ and δ are negative, meaning there is a lack of managerial capability according to these two theories.

Moreover, a lack of selectivity ability is present, as estimated α are either negative, or positive but not statistically significant. By looking at the betas, the conclusion can be drawn that the behavior of considered funds is defensive since all values are smaller than one.

4. CONCLUSIONS

This paper explored the possibility of market timing strategies of mutual funds. The results of the estimation of models in Treynor-Mazuy and Henriksson-Merton framework suggest that there is no timing ability of Croatian fund industry managers. Considered sample of ten funds indicates a lack of good forecasting abilities, and a presence of a defensive behavior. This is in line with previous domestic research. We hope this paper will, along with previous ones, awake a bigger interest of academic and practical circles for a more detailed examination of funds industry performance. Moreover, it seems that small investors on the domestic stock market do not have to fear of the superiority of mutual funds.

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