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MODELS OF MEASURING THE PERFORMANCE OF MUTUAL FUND USING TREYNOR-MAZUY CONDITION APPROACH: THE CASES OF STOCK MUTUAL FUNDS IN INDONESIA

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Abstract: *This study aims to establish a model measuring the performance of stock mutual fund that can improve the weaknesses of the Jensen Alpha model. This study is based on three issues. The first issue, concerning the establishment of the Treynor-Mazuy Multi Factor model. The second issue of testing the validity and robustness of the Treynor-Mazuy Multi Factor model which will be compared with the Jensen Alpha model and Treynor-Mazuy conditional model. The third issue of testing the validity of the Treynor-Mazuy Multi-Factor model with varying beta conditions due to changes in market condition.The study used a sample of 30 equity mutual funds on period 2008-2012 in the Indonesian capital market. Testing a model using a nested model with two pass regression. This research resulted three empirical findings: First, constant beta testing produce the Treynor-Mazuy Two Factors model that have notgood model specification. Secondly, the Treynor-Mazuy Two Factors model more valid and robust than Jensen Alpha model and Treynor-Mazuy Unconditional model. Third, dual beta testing produce the Treynor-Mazuy five factors model that have a better model specification.*

Keywords: *Performance Measurement Model, Testing Model, Portfolio Performance,*

1. INTRODUCTION

Several empirical studies show that Jensen Alpha model which based on CAPM, has a weakness. The first weakness about theassumption of a linearrelation ship between the risk market with portfolio return. The second weakness, Jensen Alpha model using single factoris market risk.Treynor-Mazuy (1966) have shownthat therelation ship between market risk and portfolio returnis notal ways linear. Therefore, Treynor-Mazuy adda quadratictermat th emarket risk premiumin the regression equation Jensen

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Alpha. This was done to accommodate thenon-linear factors affecting the portfolio return. Treynor-Mazuy have opinion that the coefficient of market-risk premium squares can reflect market timing capability of investment manager of mutual fund managers. However, the Treynor-Mazuy model does not consider systematic risk factors other than market risk factors.This study proposes a the Treynor-Mazuy Conditional model that accommodates multi-factor Abritrage Pricing Theory (APT), Ross (1976). Empirical testing shows that APT model more realistically applied to predict stock returns such as the result of research from Fletcher (2010), Kan and Robotti (2008), Schrimpf, et al (2007). In the later development, the study of Ferson and Schadt (1996) implementing performance measurement model that accommodate changes in systematic risk factors. They found to measure portfolio performance should consider public information in the form of changes in economic conditions in the dynamic market changes. They initiated the conditional model of performance evaluation (CPE).

Thus, one of alternative mutual fund performance measurement model that will be proposed in this research is the development of Jensen Alpha model, which adds market timing variable and macroeconomic variables as predictor variables of portfolio return in the model distributed-lag. The next step is testing the validity and robustness of the Treynor-Mazuy multi factor model which has been formed. Tests using nested model, because Jensen Alpha model are nested model in the Treynor-Mazuy Multi Factor model. In other words, the Treynor Mazuy Multi-factor model is the development of Jensen Alpha model. In the next stage, the Treynor-Mazuy Multi Factor model will be tested based on conditions betp and beta down. Dual be tatesting needs to be done, because studies with single beta may cause conditions mutually off-set between up-beta and down-beta the potential to generate significantnon-beta slope tends to be flat. Research is conducted by Fabozzi and Francis (1979), Chen (1982), Faff (2001), Pagan and Sossounov (2003), and Sudarsono (2012) shows that there are differences in the value of up-beta and down-beta. In the up-beta conditions will forma positive beta, while the down-beta condition will forma negative beta.

2. LITERATURE REVIEW

CAPM is a equilibrium model which provides an overview of the relationship between the risk of an asset with its expected return. CAPM first introduced by Sharpe (1964), Lintner (1965) and Mossin (1969). In the CAPM, the market portfolio is a portfolio consisting of the optimal risky assets. Because the market portfolio consists of all risky assets, then the portfolio has

been well diversified portfolio. Therefore, the risk of the portfolio's market will only consist of a systematic risk, the risk that cannot be eliminated by diversification. This systematic risk related to macro-economic factors that can affect all securities. According to the theory of CAPM return is expected from a securities can be calculated using the formula:

$$E(R_i) = R_f + \beta_i [(E(R_m) - R_f)]$$

Where:

E(Ri) = expected return from securities-i

Rf = risk free

$E(R_m)$ = expected market risk.

βi = systematic risk from securities-i

Roll (1977) stated that the CAPM has a weakness because of the assumptions that are used to simplify the model to make it more easily understood and tested. In real conditions, the CAPM assumptions difficult to applied. Roll also dubious about the market portfolio which he can not be determined precisely. Testing the CAPM also face the problem of how to formulate something that has not happened (ex ante) is the expected return, based on past data (ex post) in the form of historical risk data. Fama and French (1996) even stated that the CAPM is irrelevant used as a basis for estimation of the stock return for not prove the presence of a relationship between beta with expected return. They found that the CAPM is valid only if the portfolio is formed by market capitalization. When stocks are grouped according to the size of the company in the same beta, beta can not be a guide to determine the return. Their results indicate that firm size and book to market value ratio can explain better return. Thereby, the results of these studies confirms that non systematic risk factors may better explain variation of portfolio returns than systematic risk factors. On the contrary, Lai and Stohs (2015) said that CAPM is dead.

However, some other researchers such as Black (1995), Kothari, Shanken, and Sloan (1995), Jagannathan and McGrattan (1995) still provide support toward the validity of the CAPM for research results that indicate beta with expected return have a positive linear relationship, as well as allow a beta which varies throughout the business cycle. Although the results of empirical research on the CAPM model is still open to dispute, until this day the CAPM equilibrium models are still often used to predict the portfolio return.

CAPM is a simple model (parsimony) which may describe or predict reality in a very complex market. CAPM model is a model of risk adjusted returns, on its development became the basis development performance measurement model of mutual fund. Model of performance measurement of Sharpe (1964), Treynor (1965) and Jensen (1968) is a development of the CAPM using risk adjusted performance. This performance measurement model is known as the unconditional performance measure models, because it does not set preconditions in the calculation of risk and only uses market risk. Jensen Alpha models initiated by Jensen (1968), is one measure of the performance of a mutual fund that shows the difference between actual rate of return earned by the portfolio if the expectation level of the portfolio is located in the capital market line, with the following equation:

$$\alpha_p = R_p - [R_f + (R_m - R_f)\beta_p]$$

where :

α_p = measure the performance of mutual funds from Jensen

R_p = the average return of the portfolio during the period of observation

R_f = the average risk-free investment returns during the period of observation

R_{mt} = market return in period t

β_p = beta portfolio p

Jensen Indexis an expansion of the CAPM that show excess portfolio returns above or below the security market line(SML). If Jensen indexis positive, it means that the portfolio is able to produce a higher return than the market return on certain systematic risk. Treynor and Mazuy (1966) presents a model of mutual fund performance measurement that is capable of measuring the ability of the stock selection and market timing of the investment manager. Thus, the performance of mutual funds is not only influenced by market risk factors, but is also influenced by the ability of the investment manager as the manager of the mutual fund assets. This modelis a developmentof CAPM, by addinga quadratictermin the regression equationtoaccommodatenon-linear factorsaffecting theexpected returns. The Treynor-Mazuy model equations :

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + \gamma_i(R_{mt} - R_{ft})^2 + e_{it}$$

where:

R_{it} = mutual fund return i in periodt

R_{ft} = risk-free investment returns

R_{mt} = market index return in period t

α_i = constantas a measure ofstockselection

β_i = *unconditional beta*

γ_i = *market timing coefficient*

Mutual fund performance reflected by the value of α_i (stock selection) and γ_i (market timing). Stock selection is reflected by α_I value that indicates ability of investment managers in selecting the right stocks that will be include do excluded from the portfolio of mutual funds. If α_I positive, it means that the investment manager is capable of forming optimal portfolio, on the other hand if α_i negative, means the investment manager is not capable of forming an optimal portfolio. While market timing ability is capability of fund managers to make adjustments the asset portfolio in order to anticipate changes or market price movements in general. If γ_i positive and significant indicating that the investment manager has the ability to market timing. Likewise, if γ_i negative and significant indicating that the investment manager does not have the ability to market timing. Investment managers who have the ability to do market timing will change its portfolio with a beta component that has a high value ($\beta > 1$) when the market is rising (Rm> Rf). Conversely when the market is in decline (Rm <Rf), the investment manager will change his portfolio with a beta components that have a low value ($\beta < 1$). (Sharpe, 1964). Thus, the market timing strategy is done by buying shares at the time of bullish market conditions and selling stocks when the market is bearish.

Research Nathani, et al (2011) conducted following the trade scandal adverse mutual funds investor in India. Research results indicate that the equity funds managed by private investment firms have better performance compared to mutual funds managed by government companies. However, research results Rao (2000), Skrinjaric (2013), Philippas, Nikolaos. (2011), Sheikh and Nooren (2012) showed weak market timing ability of mutual fund investment manager. Weak evidence of market timing ability is also found in the research (2008)which shows that in general there is no evidence

of market timing abilities were good, despite evidence that the investment manager of the mutual fund management have the ability to stock selection. Weak evidence of market timing ability was discovered by Cuthbert son, et al (2010) on the UK stock market. However, research result Murugan and an and Padmasani (2013) showed that mutual fund in india with daily data have no performance of market timing and stock selection.

In the later development, Ferson and Schadt (1996) recommends the use of conditional performance evaluation (CPE) as a measure of portfolio performance. They developed a model to incorporate conditional macroeconomic variables as a dynamic model This model can be applied to the capital markets that have semi-strong market efficiency, according to the condition of capital markets of developing countries. Ferson and Schadt rate, the CPE can cover the weaknesses of traditional performance measurement model. CPE model capable of capture the dynamic behavior of the return. Their results showed that the measurement of the performance of mutual funds to accommodate dynamic changes in macroeconomic produce better model, because controlling the variation of beta using market indicators. The variation is explained by the flow of funds in mutual funds that higher when the market return is higher. Thus, the CPE model is multi-factor models that allowing the use of multiple risk factors to predict the portfolio return. The model is inspired by multi-factor model APT. In the APT model (Ross, 1976), the portfolio return is not affected by the market portfolio because of the assumption that the expected return of a portfolio can be influenced by several sources other risks that are not only measured by beta.

Empirical testing results show that the APT model is more realistic applied to predict stock returns appropriate the result of research (Chen, 1982), Roll and Ross (1980), Ross (1976). Model APT is considered more realistic models to predict the return of portfolio than the CAPM model. However, there is also criticism to the APT model that presented by Roll (1977), Dhrymes, Friend and Gultekin (1984), due to difficulties in determining the risk factors that are relevant for inclusion in the model specification. In addition, risk factors used in the formation of the APT model uses historical data (post-ante), thus assessed will lead to a bias to predict the future return (ex-ante).Research using macro-economic variables in the model APT conducted by Flannery and Protopapadakis (2002) and Yoruk (2000); Tursoy, Gunsel, Rjoub (2008) and Zhu, 2012). Their results

prove that economic factors such as money supply (M2), the price of crude oil, the consumer price index, import, export, gold prices, exchange rates, interest rates, gross domestic product (GDP), foreign exchange, unemployment and market indexes affect the market price of the stock.

3. METHODOLOGY

This research uses explanatory survey method. Data in the form of secondary data sourced from various publications issued by financial institutions such as Bank Indonesia and the Indonesian Stock Exchange. Research observe the behavior of mutual fund shares within five years with monthly data. Samples were designated as the object is 30 mutual funds in the period 2008-2012 were determined by purposive sampling technique. Stages in the formation of the model begins with the testing of stationary data and testing the classical assumptions. Hereinafter, forming several alternative models of Treynor-Mazuy Conditional and test it using nested models. The next stage of testing the validity and robustness of the best model of Treynor-Mazuy Conditional in bull and bear market conditions. Tests using a two pass regression. The first regression using monthly time series data, followed by a second regression using cross section data. Testing the model separates the condition beta up and beta down following the formal procedure conducted by Pettengil et al. (1995).

4. RESULTS AND DISCUSSION

The focus of this research is the formation of a model the performance of mutual funds which is the development of the Jensen Alpha model and the Treynor-Mazuy model. This study establish the model by integrating several empirical models, ie the Jensen Alpha model, the Treynor-Mazuy models, Abritrage Pricing Theory (APT), and the model Conditional Performance Evaluation (CPE).

Testing results of Stationarity Data: Testing of stationarity of data in this study using the Augmented Dickey-Fuller (ADF) test. Stationarity problems visible from p-value. If the p-value equal to 1%, or 5% means that the data is stationary or stationary problem-free. Conversely, if the p-value is greater than 5% means that the data does not contain stationary problem. The data are not stationary at the data level can be overcome by doing a first-difference, second-difference and so on. Stationarity test results data to be used in the study are as follows:

Table 1.
Results of Stationarity Testing Data

Variable	*ADF Value*		*Explanation*
	t-stat	*Prob*	
Excess Return Portfolio	-4.801978 **	0.0000	Stasioner
Risk Market Premium	-4.708294 **	0.0003	Stasioner
Market Index	-6.758265 **	0.0000	Stasioner in *First Difference*
Risk Free	-4.634264 **	0.0004	Stasioner
Interest Rate	-4.051546 **	0.0122	Stasioner in *First Difference*
Inflation	-4.485752 **	0.0006	Stasioner
Money Supplay	-7.657420 **	0.0000	Stasioner in *First Difference*
Kurs	-3.231882 **	0.0888	Stasioner in *First Difference*
Market Index Return	-5.617844 **	0.0000	Stasioner
Portfolio Return	-5.681074 **	0.0000	Stasioner

Table 1 indicates that based on the Augmented Dickey-Fuller (ADF) test, all research variable is significant on the level of 5%, although the data is stationary happens to the data level or first difference. Data of variables of excess return portfolio, market risk premium, risk-free, inflation, the market index return and portfolio return, stationary on the data level. While the data of variable of market index, interest rates, money supply and the exchange rate is stationary in the first difference. This indicates that data of all "research variables" are stationary and valid so that it can be used for building estimation model. Thus it can be said that the relationship between the dependent variable and the independent variables in the model is a relationship that can be predicted by theory

Formation of Several Alternative Models of Treynor-Mazuy Multi Factor: Model Treynor-Mazuy Multi Factor is formed with purpose of improving weaknesses Jensen Alpha models, particularly on the assumption of a linear relationship between return and risk, and assuming there is only one risk factor that affects the portfolio return. Based on the results of previous empirical studies, models Treynor-Mazuy Unconditional proven capable of overcoming the weaknesses of the first assumption. Efforts to overcome the weaknesses of the second assumption will refer to the models Abritrage Pricing Theory (APT) multi factors. It is considering the results of empirical studies that prove that the APT model with several systematic risk factors may better explain the variation in portfolio returns, compared to the model one factor.This study proposes some alternative models of the performance of mutual funds that integrate the model of Treynor-Mazuy

conditional with APT model and CPE model as a development model of Jensen Alpha. Several alternative models proposed Treynor-Mazuy Multi Factors to be tested, are:

Model of Treynor-Mazuy Multi Factor Without Market Risk Factors

Model of Treynor-Mazuy Multi Factors Including Market Risk Factors

Model of Treynor-Mazuy Multi Factor With Market Risk as a Moderating Variable

Modelof Treynor-Mazuy MultiFactorinDistributed-Lag Models

Selection of the best model based on the results of testing nested models with discerning and discrimination approach that conducted through two-pass regression. The test results of various alternative the Treynor-Mazuy Multi Factor model on the second pass regression can be seen in Table 2 the following:

1. ModelTreynor-Mazuy MultiFactorWithoutMarket RiskFactors

$$\overline{Rp - Rf\iota} = \alpha_0 + \gamma_1(\beta_{RM})_i + \gamma_2(\beta_{INF})_i + \gamma_3(\beta_{SBI})_i + \gamma_4(\beta_{M2})_i + \gamma_5(\beta_{KURS})_i + \gamma_6(\beta_{MT})_i + \varepsilon_i$$

2. Model Treynor-Mazuy Multi Factors Including Market Risk Factors

$$\overline{Rp - Rf\iota} = \alpha_0 + \gamma_2(\beta_{INF})_i + \gamma_3(\beta_{SBI})_i + \gamma_4(\beta_{M2})_i + \gamma_5(\beta_{KURS})_i + \gamma_6(\beta_{MT})_i + \varepsilon_i$$

3. Model Treynor-Mazuy Multi Factor With Market Risk as a Moderating Variable

$$\overline{Rp - Rf\iota} = \alpha_0 + \gamma_1(\beta_{RM})_i + \gamma_2(\beta_{INF})_i x(RM) + \gamma_3(\beta_{SBI})_i x(RM) + \gamma_4(\beta_{M2})_i x(RM) + \gamma_5(\beta_{KURS})_i x(RM) + \gamma_6(\beta_{MT})_i x\ (RM\_ + \varepsilon_i$$

4. Model Treynor-Mazuy Multi Factor in Distributed-Lag Models

$$\overline{Rp - Rf\iota} = \alpha_0 + \gamma_1(\beta_{RM})_i + \gamma_2(\beta_{INFt-1})_i + \gamma_3(\beta_{SBIt-1})_i + \gamma_4(\beta_{M2t-1})_i + \gamma_{5(\beta_{KURSt-1})_i} + \gamma_6(\beta_{MTt-1})_i + \varepsilon_i$$

Table 2.
Results of Testing Nested Model of Treyn or Mazuy Multi Factor

	Exp Sign	*Model Treynor-Mazuy Multi Factor Without Market Risk Factors* (A)	*Model Treynor-Mazuy Multi Factors Including Market Risk Factors* (B)	*Model Treynor-Mazuy Multi Factor With Market Riskas a Moderating Variable* (C)	*Model Treynor-Mazuy Multi Factorin Distributed-Lag Models* (D)
C		0.010086	0.024867**)	0.049958**)	0.025316 ***)
$\gamma_{1\beta RM}$	+	0.005671		– 0.031137	-0.005803
$\gamma_{2\beta INF}$	+	0.150572	-0.008064	– 0.038498***)	0.178002
$\gamma_{3\beta SBI}$	–	0.001219***)	0.000940***)	– 0.000207*)	-2.28E-05
$\gamma_{4\beta M2}$	–	-359988.1***)	-350762.7***)	– 56549.56	-187927.8**)
$\gamma_{5\beta KURS}$	–	-158.2418	4.711345	– 332.6373*)	-318.7254
$\gamma_{6\beta MT}$	+	-0.000949	-0.000683	– 0.002104	-0.001291
R^2		0.608796	0.499992	0.311522	0.384804
Adj R^2		0.506743	0.395824	0.131919	0.217023
AIC		-8.412176	-8.233448	– 7.846922	-8.281426
SIC		-8.307583	-7.953208	– 7.519976	-7.951389
F- Test		5.965475 *)	4.799844***)	1.734504	2.293493 ***)

***) signifikan at level 1%; **) signifikan at level 5%; *) signifikan at level 10%

$\gamma_{1\beta RM}$ is market risk factor; $\gamma_{2\beta INF}$is inflation risk factor;

$\gamma_{3\beta SBI}$is interest rate risk factor; $\gamma_{4\beta M2}$ is money supply risk factor ;

$\gamma_{5\beta KURS}$is kurs risk factor; $\gamma\beta_{6MT}$is market timing factor

Source: Result Data Processing

Testing with nested models aims to prove that there is more than one factor that can explain the variation of equity fund returns. Determination of risk factors suspected to affect the return of equity funds based on the results of empirical studies. Systematic risk factors that included in the model are the factors of macroeconomic, namely the factor of inflation, interest rates, money supply and exchange rates, in addition to market risk factors and market timing.The results of testing the validity of the model A shows that only coefficient γ3βSBI (interest rate risk factor) and γ5βKURS (exchange rate risk factors) are significant at 1% level. Testing of the model together indicate

that the model A significant at 10% level. These test results indicate that there are two (2) systematic risk factors, ie factors SBI rates and the money supply that can explain the variation of the excess return of stock mutual fund. Testing the validity of the model B produce coefficient γ3βSBI (interest rate risk factor) and γ4βM2 (a risk factor in the money supply) were significant at 1% level. Testing of the model together indicate that the model B is significant at the 1% level. These test results indicate that there are two systematic risk factors : factors of interest rates and the money supply (M2) that can explain the variation in returns of mutual fund shares.

The results of testing the validity of the model C shows that coefficient γ2βINFLASI (inflation risk factors), γ3βSBI (interest rate risk factor) and γ5βKURS (exchange rate risk factor) is significant at the level of 1% and 10%. However, based on the model test results together indicate that the C model is not significant. This indicates that the systematic risk factors that make up the C model can not explain the variation returns of mutual fund shares. The test results of the model C indicate that the variable excess return marke is not acting as a moderating variable that strengthen or weaken the relationship between risk factors with the return of stock mutual fund.The results of testing the validity of the model D shows that only coefficient $\gamma_{4\beta M2}$ (money supply risk factor) faktor risiko jumlah uang beredar) is significant at level 5%. Based on the model test results together indicate that the model D is significant at 1% level. Thus by testing the model D, there is only one systematic risk factors are factors, the money supply (M2), that can explain the variation in returns of mutual fund shares. Model D is the model of Treynor-Mazuy Multi Factor in the form of distributed-lag models. The formation of this model assumes that investment managers require interval time to respond change of systematic risk to changing the composition of the portfolio of mutual funds under his management. Thus, the results of testing of the model D shows that the investment manager responds to changes in the money supply at an interval of 1 (one) next month as the basis in decision to changes mutual fund portfolio.

Results of testing the robustness (robustness) models with discerning approach shows that the model of Treynor-Mazuy Multi Factor (model A) meets the criteria as the best model compared with the three models Treynor Multi-Mazuy other factors (models B, C and D). Model Treynor-Mazuy Multi Factor meets the criteria goodness of fit that have the highest value for R2 :

60.87% and Adj R2 : 50.67% and have value of AIC -8.307583 and value of SIC-8.412176 the lowest compared with three model other. Thus, the results of testing nested models indicate that that the model A is the best model because generating the largest value of R2 and Adj R2 and the smallest value of AIC and SIC. This can be seen from the value of R2 equal to 60.87% and the value of the Adj R2 equal to 50.67%. While the value of AIC -8.4121 and -8.3075 for the value of the SIC. The model showed that the risk factors that significantly affect the portfolio return is the interest rate and the money supply. However, the Treynor-Mazuy two factors model indicate the relationship between the interest rate factor with mutual fund returns are positive, which means it does not consistently supported the theory. While the correlation between money supply (M2) with a mutual fund returns are negative, which means that consistently support the theory. The Treynor-Mazuy two factors model also indicate that the market risk factors and other systematic risk factors was not significant in explaining the variation in returns of mutual funds. This occurs because the use of a single beta which assumed constant throughout the study period. Several studies show that beta that is not constant throughout the study period, potentially resulting in biased beta. In the process of two-pass regression, beta bias the results of the first regression produces mispesifikasi models that indicated by the beta coefficient values are not consistent with the theory. Research results from Maheu and McCurdy (2000), Tandelilin (2001), Pagan and So ssounov (2003), supports research on the presence of varying beta in bull and bear market conditions. When using dual beta testing resulted in the conclusion which more consistent with the theory. Therefore, advanced testing the Treynor-Mazuy Multi Factors model, necessary to consider varying beta during the study period due to the bull and bear market.

Testing of the Validity and Robustness of the Model Treynor-Mazuy Multi Factor in Condition Up Beta and Down Beta: The test aims to test the validity and robustness of the Treynor-Mazuy Multi Factor model in up-beta and down-beta as an impact of differences in the volatility of the bull market and bear market. Testing is done with two pass regression. First pass regression using monthly data time series, detect up-beta market conditions were 36 observations. While the down-beta market conditions were 24 observations. Test results the Treynor-Mazuy Multi Factor model in condition up-beta anddown-beta can be seen in Table 3.

(a) The Treynor-Mazuy Multi Faktor Model (*Single Beta*)

$$\overline{Rp - Rf_i} = \lambda_0 + \lambda_1(\beta_{RM})_i + \lambda_2(\beta_{INF})_i + \lambda_3(\beta_{SBI})_i + \lambda_4(\beta_{M2})_i + \lambda_5(\beta_{KURS})_i + \lambda_6(\beta_{MT})_i + e$$

(b) The Treynor-Mazuy Multi Faktor Model (*Up-Beta*)

$$\overline{Rp - Rf_i} = \gamma_0 + \gamma_1(\hat{\beta}_{upRM})_i + \gamma_2(\hat{\beta}_{upINF})_i + \gamma_3(\hat{\beta}_{upSBI})_i + \gamma_4(\hat{\beta}_{upM2})_i + \gamma_5(\hat{\beta}_{upKURS})_i + \gamma_6(\hat{\beta}_{upMT})_i + e$$

(c) The Treynor-Mazuy Multi Faktor Model (*Down-Beta*)

$$\overline{Rp - Rf_i} = \gamma_0 + \gamma_1(\hat{\beta}_{dwRMdw})_i + \gamma_2(\hat{\beta}_{dwINF})_i + \gamma_3(\hat{\beta}_{dwSBI})_i + \gamma_4(\hat{\beta}_{dwM2})_i + \gamma_5(\hat{\beta}_{dwKUR})_i + \gamma_6(\hat{\beta}_{dwMT})_i + e$$

(d) The Treynor-Mazuy Multi Faktor Model (*Dual Beta)*

$$\overline{Rp - Rf_i} = \gamma_0 + \gamma_1(\hat{\beta}_{RMdual})_i + \gamma_2(\hat{\beta}_{INFdual})_i + \gamma_3(\hat{\beta}_{SBIdual})_i + \gamma_4(\hat{\beta}_{M2dual})_i + \gamma_5(\hat{\beta}_{KURSdual})_i + \gamma_6(\hat{\beta}_{MTdual})_i + e$$

Dual beta testing is done to accommodate different beta behavior during bull and bear market conditions. Model testing procedure that separates the condition of up-beta and down-beta follow a formal procedure conducted by Pettengil et al. (1995, 2002). The test results will produce estimation model which out of trouble bias beta. Test results on the validity and robustnesss for the Treynor Mazuy Multi factor model which separates condition of up-beta with down-beta, resulting in interesting findings. Dual beta testing produce a valid and robust models as well as more consistent in support the theory. The test results that separate between the up-beta and down-beta proves that the market risk factors, interest rates, money supply and the exchange rate and market timing of mutual funds significantly affect stock returns. The results showed that the multi-factor models with five risk factors, valid and robust as a performance measurement model of stock mutual fund. The findings in this study support research results of Maheu and McCurdy (2000), Tandelilin (2001), Pagan and Sossounov (2003), Gregoriou (2003),Sudarsono,et al (2012) and Paramita,et al (2015, in press)which supports research results on the presence of different beta

(varying beta) which states that testing the model by separate between up-beta and down-beta produces a better estimation model.

Table 3.
Testing Results on Validity and Robusstnes of The Treynor-Mazuy Multi Factor Model Based on Conditions Up-Beta and Down-Beta (*Second Pass Regression)*

Koef	*Regression Results*				
	Exp Sign	*Single Beta*	*Up Market Beta*	*Down Market Beta*	*Dual Beta*
C		0.010086	0.043384***)	-0.018715	0.037169***)
λ1βRM	+	0.005671			
λ2βINF	+	0.150572			
λ3βSBI	_	0.001219***)			
λ4βM2	_	-359988.1***)			
λ5βKURS	+	-158.2418			
λ6βMT	+	-0.000949			
γ1βup/dwRM	+/-		0.032920***)	-0.057089***)	0.005036
γ2βup/dwINF	+		0.002147	0.377874	0.026092
γ3βup/dwSBI	_		0.000684***)	0.000673*)	0.000243
γ4βup/dwM2	_		-286374.1***)	-272555.6***)	-232868.4***)
γ5βup/dwKURS	-/+		-363.3559**)	394.0255***)	260.1966
γ6βupMT	+		0.006221***)	0.010147*)	0.013085***)
R2		0.608796	0.833713	0.648123	0.774118
Adj R2		0.506743	0.790334	0.556329	0.715193
AIC		-8.4121	-8.0122	-7.0302	-8,2334
SIC		-8.3075	-7,9188	-6.9368	-8.2776
F- Test		5.965475*)	19.21919***)	7.060623***)	13.13721
Prob Fstat		0.000712***)	0.000000***)	0.000235***)	0.000002

***) signifikan at level 1%; **) signifikan at level 5%; *) signifikan at level 10%;
$\lambda_{1\beta RM}$; γ1βup/dwRM is market risk faktor; $\lambda_{2\beta INF}$; γ_{2INF} is inflation risk factor
$\lambda_{3\beta SBI}$; $\gamma_{3\beta up/dwSBI}$ is interest rate risk factor ;$\lambda_{4\beta M2}$; $\gamma_{4\beta up/dwM2}$ is money supply risk factor ;
$\lambda_{5\beta KURS;}$ $\gamma_{5\beta up/dwKURS}$ is kurs risk factor; $\lambda_{6\beta MT}$; $\gamma_{6\beta up/dwMT}$ is market timing factor
Source: Result Data Processing

5. CONCLUSION

The focus of this research is to produce a model of performance measurement stock mutual fund that seeks to improve the weaknesses of the Jensen's Alpha model and Treynor-Mazuy Unconditional model. The conclusion of this study is:First, testing of various alternative the Treynor-Mazuy multi factor model shows that the best model is the Treynor Mazuy two factor model. This model indicates that the risk factors that affect the returns of mutual funds is interest rate factor and money supply factor.Second, assuming single beta testing indicates that the Treynor-Mazuy Two Factors model do not have a good model specification. The relationship between risk factors and portfolio return indicates the direction that is not consistent with the theory. Four of the six risk factors formers model of Treynor-Mazuy do not significant. This indicates that the market risk factors and other systematic risk factors formers the model, does not affect return of stock mutual fund.

Third, testing the Treynor Mazuy Multi-Factor model on condition up-betaand down-beta produce the Treynor-Mazuy Five Factors model. Risk factors affecting mutual fund returns are market risk factors, interest rate, money supply, exchange rate and market timing. The Treynor-Mazuy Five factors model able to improve specification the Treynor-Mazuy Two Factor model. Five of the six risk factors formers model tested significantly affect the returns of mutual funds and direction of the correlation between variables is consistent with the theory. Result of this research repair the results testing with constant beta which concludes only two risk factors that can explain the variation in returns of mutual funds.Thereby, this research prove that the Treynor-Mazuy Five Factor model is performance measurement model of mutual fund are appropriate for use in different conditions, namely the bull and bear market conditions.

6. RECOMMENDATIONS:

As a follow up to the findings of research that has been delivered at the conclusion of the above research, the authors give the following recommendations: First, research on the formation and testing of fund performance measurement model should consider varying beta to produce a model that is not biased. Subsequent research is advised consider time-varying beta volatility caused by the characteristics of the data that is heterokedastik or autoregressive and the presence of a structural break in the economy. Second, at the time of measuring or estimating the performance of equity fund returns, investors and investment managers should use the

Treynor-Mazuy Five Factors model that separates up-beta and down-beta. Thereby, results of measurement performance of mutual fund is more accurate so as to predict return in the next period.

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