The analysis of market timing, exchange rate of us dollar, and inflation to equity fund performance during 2011-2017

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Abstract

The objective of this paper is to explore return of equity fund, impact of market timing, inflation and Exchange rate of US Dollar. Henrikson and Merton as well as Treynor and Mazuy method is used to see return of equity fund, impact of market timing, inflation and Exchange rate of US Dollar. Inflation and exchange rate of US Dollar is added to Henrikson and Merton Model as well as Treynor and Mazuy Model. The result are equity fund return are affected by market return, market timing abiliy of investment manager are not significantly exist in equity fund. Inflation and exchange rate of US Dollar affect equity fund return so investor need to pay attention to both variable when investing in equity fund.

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1 Introduction

Since Government introduced mutual fund in 1996 to market and now become well known as an instrument to invest. Mostly the high networth understand to invest in Mutual Fund, because they got return more higher than time deposits. Eventhough, they has experience that the return is less than time deposits rate. Mutual Funds has return more higher than time deposits rate in Long

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term period. Based on that, performance mutual fund become hot discussion in investor.

Mutual fund can be classified into Bond Fund, Combination Bond and equity is called Mixed Fund, Equity fund and others. Equity Fund is a instrument that investor hope to get higher return for their investment. Equity fund has portfolio investment in Equity but there is small cash. Financial Services Agency stated

Mutual fund is managed by someone called Fund Manager to give results of return as required investor. Fund Manager has two skills when they manage the funds especially Equity Fund. The two skill are Stock Selection and Market timing. Manurung (2008, 157) define market timing as ability to predict market in bearish or bullish state then to build portfolio appropriate with the situation to fulfill investor requirement. Market timing also define as ability of investment manager to manage portfolio, investment manager that have market timing ability will buy stock when beta of the stock is above one that indicate market will go up, and will sell the stock when beta of the stock under 1 that indicate market will go down.

Research of equity fund has mostly been done by academician in developed market. Sharpe (1966) reported and suggested mutual fund performance. Treynor (1966) reported how to measure mutual fund performance. Jensen (1968) reported the empirical research of Mutual Fund Performance for period 1945 to 1964 in USA. Grinblat and Titman (1992) reported the persistence of mutual fund performance. Ippolito (1993) reported mutual fund performance for period 1965 – 1991 in USA. Ktohari and Warner (2001) reported Evaluating Mutual Fund Performance. Manurung (2002) reported performance of Indonesia's mutual fund and Effect of Size of Mutual Fund. Pollet and Wilson (2008) reported about How Does Size Affect Mutual Fund Behavior.

Mutual fund Manage by Investment Manager that he has skill in market timing and stock selection. Treynor and Mazuy (1966) suggested a model to see the market timing of Fund Manager. Then Henrikson and Merton (1981) also suggested a model of the market timing. Both model has different in forming the variable market timing in model.

Based on explanation above, there is limited research about equity fund in Indonesia, especially effect of macro-variable to equity fund performance. This research want to explore market timing but also want to explore the inflation and exchange rate variable to the equity fund performance. Inflation and exchange rate variable added to model of Henrikson and Merton Model and Treynor and Mazuy Model to see the both effect variable.

2 Theoritical Review

Mutual fund is a portfolio of instrument investment that it depend to type on instrument Investment. Discussion of mutual fund should discussion about it's return or sometimes called its performance. The performance of mutual funds is

always discussion about Capital Asset Pricing Model (CAPM). The CAPM is introduced by Sharpe (1964), Lintner (1965) and Mossin 1966) to explain return the stocks or portfolio that is affected by it's risk and others. The CAPM is as follows:

$$E(R_i) = R_f + \beta * \{E(R_m - R_f\} + \varepsilon \tag{1}$$

This model is sometimes called by One Factor Model. Then this model is critiqued by Ross (1976) and introduced Arbitrage Pricing Theory (APT) that said return a stock or portfolio affected by many factor.

Then Fama and French (1993) introduced a model that return of a stock or portfolio affected three factor is called Fama-French Three Factor Model. The model is as follows:

$$E(R_i) = R_f + \beta_1 * \{E(R_m - R_f\} + \beta_2 SMB + \beta_3 HML + \varepsilon \tag{2}$$

The Jagadesh and Timtan (1993) proposed Momentum factor which is a strategies which buy stocks that have performed well in the past and sell stocks that have performed poorly in the past generate significant positive returns over 3- to 12-month holding periods. Then Carharts (1997) combined Fama-French Three Factors Model and Momentum variabel from Jagadesh and Titman, and called as Carhart Four Factor Models. The Model is asfollows:

$$E(R_i) = R_f + \beta_1 * \{E(R_m - R_f\} + \beta_2 SMB + \beta_3 HML + \beta_4 Mom + \varepsilon \tag{3}$$

This Research is to explore evaluation of Equity fund performance in Indonesia. Evaluation performance has suggested by Sharpe (1966), Treynor (1965) and Jensen, Information Ratio and M2. Because this research want to explore the market timing skill of Fund Manager and Inflation and Exchange rate factor. Market timing skill model proposed by Henrikson and Merton (1981) and Treynor and Mazuy (1966) as follows:

Henrikson and Merton model:
$$R_i - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * D * (R_m - R_f) + \varepsilon \tag{4}$$

Treynor and Mazuy Model:
$$R_i - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * (R_m - R_f)^2 + \varepsilon \tag{5}$$

ε is other factor, that it entered variable macroeconomics such as Inflation and Exchange rate. Inflation has positive effect to stock return and also Exchange rate has positive effect to stock return or portfolio return.
Sharpe (1966) has explored equity fund performance for and suggested mutual fund performance. His suggestion become a measurement of equity fund performance. Treynor (1966) reported how to measure mutual fund performance. His suggestion become a measurement of equity fund performance. Jensen (1968)

did research of the empirical research of Mutual Fund Performance for period 1945 to 1964 in USA. He found that there is very little evidence that any individual fund was able to do significantly better than that which we expected from mere random chance. Grinblat and Titman (1992) explored the persistence of mutual fund performance. They found that that there is positive persistence in mutual fund performance. Ippolito (1993) reported mutual fund performance for period 1965 – 1991 in USA. He found that return of equity fund that managed by investment manager are not better than berchmark return. Ktohari and Warner (2001) reported Evaluating Mutual Fund Performance. They concluded that It is hard to detect abnormal performance, particularly for a fund whose style characteristics differ from those of the value-weighted market portfolio. Manurung (2002) explored performance of Indonesia's mutual fund and Effect of Size of Mutual Fund. He found that Size of mutual fund affected equity fund performance. Pollet and Wilson (2008) did research about How Does Size Affect Mutual Fund Behavior. They found that size affected mutual fund performance.

3 Methodology

As mentioned in the title, the paper want to see determinant equity fund return, so Equity fund return is calculated as follows:

$$R_t = \frac{NAV_t - NAV_{t-1} + D_t}{NAV_t} \tag{6}$$

where

   R_t = return equity fund at t
   NAV_t = Net Asset Value at t
   D_t = distribution income at t

Then, this research want to explore market timing for the equity fund to see the fund manager's skill. Market timing is included in the model by using dummy variable (D). If market return is higher than risk-free rate, D = 1; others D = 0. There are two model to see it such as:

   a. Henrikson and Merton Method
       Henrikson and Merton (1981) introduced a model to explore market timing. Their method suggest that high beta (β, positive) portfolio is to be expected in market with good performance, and lower beta portfolio is also to be expected in market with worse performance. The model as follows:
       $$R_i - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * D * (R_m - R_f) + \varepsilon \tag{7}$$
        When β_2 is positive, it indicates that market timing ability exist in portfolio performance.

   b. Treynor – Mazuy Method
       Treynor and Mazuy (1966) introduce a model to explore market timing. Their propose a model as follows:

$$R_i - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * (R_m - R_f)^2 + \varepsilon \qquad (8)$$

When β_2 is positive, it indicates that market timing ability exist in portfolio performance

Because this research want to explore effect of variable Exchange rate and inflation to Equity fund return, so Henrikson and Merton (1981) and Treynor and Mazuy (1966) model are modified as follows:

Henrikson and Merton Model

$$R_i - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * D * (R_m - R_f) + \beta_3 ER + \beta_4 Inf + \varepsilon \qquad (9)$$

Treynor and Mazuy Model

$$R_i - R_f = \alpha + \beta_1 * (R_m - R_f) + \beta_2 * (R_m - R_f)^2 + \beta_3 ER + \beta_4 Inf + \varepsilon \qquad (10)$$

4 Data

Data is used monthly data of NAV (net Assets Values) that it is published by Fund Manager of the equity fund. Data of NAV equity fund is collected from Financial Services Agency (Otoritas Jasa Keuangan, in Indonesia Language). The period of data is January 2011 until Desember 2017. Data of Inflation is gathered from Central Bureau of Statisitcs. Data of Exchange rate is collected from Bank Indonesia.

5 Analysis

The analysis of this research will divide into two part such as descriptive analysis that will be explained in the first analysis and causal-effect analysis that will be explained after descriptive analysis.

Descriptive Analysis

This analysis will explained about the descriptive data that it be used in paper. Table 1 below show the descriptive data. Equity fund rate of return are varies from -0,281% to 99,84%. There are seven out of twenty three equity fund that resulted negative in rate of return and sixteen equity fund resulted in positive rate of return. Among seven equity fund that resulted in negative rate of return are from -0,281% to -0,0692%. Meanwhile equity fund that resulted in positive rate of return are varied from 0,0171% to 99.84%. From minimum return perspective, shown fluctuate from -26,93% to -9,88%, but there are one equity fund with rate of return equal to 0%. Maximum return resulted in 109,63%, that resulted from equity fund with the highest average rate of return.

Equity fund considered to be risky can be seen from its standard deviation. Standard deviation of these equity fund are varied from 1,8% to 6,9%. This varieties of standard deviation shows how risky to invest in equity fund.

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Table 1: Descriptive of Statistics Equity Fund, Inflation and Exchange rate

	ACTD	BDP	BDS	BDSO	BNPPE	BNPPIP	BNPPMS	BNPPP	BNPPS	BRDB	CIMBPTER	DEP	DMAR	DRM	DRMF10	FSTIDYF	FSTIPF	FSTISF	FSTIVSF	G2P	INFLASI	KURS	MDS	MICB	MSA	PASAR	PDM	PDP	PSR2
Mean	0.001150	0.000223	0.002461	0.001779	0.000344	0.000171	0.000908	0.000852	-0.001187	-0.001595	-0.000692	0.000948	0.015304	0.000700	-0.002810	0.001373	0.001475	0.000463	-0.001339	0.000241	0.430794	0.005146	-0.001077	0.998380	-0.001029	0.001884	0.000642	0.001080	0.001431
Median	0.008076	0.007904	0.007507	0.008858	0.005744	0.007734	0.004052	0.007866	0.006930	0.005112	0.008703	0.010690	0.008164	0.004560	0.009164	0.007637	0.007887	0.007389	0.005947	-0.000495	0.380417	0.002982	0.004745	1.002896	0.006289	0.008164	0.006584	0.005899	0.000594
Maximum	0.079507	0.084147	0.082119	0.083151	0.085434	0.086069	0.084220	0.077281	0.087972	0.082242	0.084514	0.091568	0.072018	0.078142	0.072710	0.076803	0.080114	0.077849	0.077727	0.447154	0.732500	0.066139	0.077544	1.096268	0.082874	0.072018	0.121731	0.097650	0.009119
Minimum	-0.104147	-0.115770	-0.102556	-0.113997	-0.104796	-0.103964	-0.106572	-0.106683	-0.119896	-0.131098	-0.128447	-0.111734	0.000000	-0.098828	-0.115368	-0.102846	-0.106652	-0.102583	-0.105613	-0.261913	0.005850	-0.069455	-0.093838	0.860231	-0.107343	-0.095493	-0.136522	-0.131682	4.34E-08
Std. Dev.	0.041411	0.045677	0.039953	0.043792	0.043104	0.045122	0.042585	0.041584	0.046351	0.048297	0.045411	0.047006	0.018145	0.040169	0.043267	0.041128	0.042694	0.041808	0.042376	0.069599	0.145354	0.022688	0.039682	0.046908	0.044590	0.038015	0.049770	0.045651	0.002103
Skewness	-0.826354	-0.748729	-0.750892	-0.817318	-0.753395	-0.781301	-0.728056	-0.823419	-0.767028	-0.737756	-0.866513	-0.675478	1.181.204	-0.672561	-0.812844	-0.749760	-0.744615	-0.754656	-0.622186	2.461.258	0.304066	0.086286	-0.754196	-0.736048	-0.711528	-0.881037	-0.431057	-0.589837	1.857.222
Kurtosis	3.351.202	3.031.227	3.337.823	3.380.254	3.281.384	3.147.970	3.223.152	3.296.441	3.117.606	3.121.181	3.281.440	2.934.895	3.661.177	3.194.843	3.091.338	3.189.860	3.293.153	3.189.601	2.917.383	2.361.703	2.696.669	4.548.743	3.182.023	3.580.315	3.003.580	3.309.106	3.266.510	3.217.388	5.706.134
Jarque-Bera	9.991.749	7.851.745	8.293.178	9.858.186	8.223.572	8.622.663	7.595.196	9.799.837	8.285.059	7.671.380	1.078.905	6.402.615	2.106.343	6.465.611	9.279.206	7.996.128	8.063.103	8.098.901	5.443.510	1.572.525	1.616.421	8.499.354	8.079.320	8.763.408	7.087.851	1.120.157	2.849.932	5.036.106	7.392.088
Probability	0.006766	0.019725	0.015818	0.007233	0.016378	0.013416	0.022425	0.007447	0.015883	0.021586	0.004541	0.040709	0.000027	0.039447	0.009662	0.018351	0.017747	0.017432	0.065759	0.000000	0.445655	0.014269	0.017603	0.012504	0.028900	0.003695	0.240517	0.080616	0.000000
Sum	0.096580	0.018754	0.206724	0.149448	0.028891	0.014375	0.076251	0.071575	-0.099707	-0.134000	-0.058145	0.079616	1.285.552	0.058790	-0.236011	0.115327	0.123903	0.038855	-0.112439	0.020235	3.618.668	0.432264	-0.090491	8.386.393	-0.086402	0.158276	0.053941	0.090756	0.120243
Sum Sq. Dev.	0.142337	0.173172	0.132486	0.159173	0.154210	0.168987	0.150518	0.143528	0.178318	0.193608	0.171157	0.183391	0.027327	0.133927	0.155378	0.140397	0.151293	0.145078	0.149045	0.402049	1.753.616	0.042723	0.130696	0.182633	0.165026	0.119945	0.205592	0.172974	0.000367
Observations	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84

Market Timing

This research want to explore market timing the equity fund using Henrikson and Merton Model and Treynor and Mazuy Model. Henrikson and Merton Model will be explained first before Treynor and Mazuy Model. Tabel 2 show Henrikson and Merton Model (equation 4) which is in β_2 positive stated market timing. R^2 stated that variation of dependent variable could be explained by variation of all independent variable. Value of R^2 for equity fund have at least 84% except for equity fund of Grow-2 Prosper is 22.65%. All model are significantly different from zero by significant level of 1%.

Table 2: Henrikson and Merton Model (Equation 4)

NO	Equity Fund	α	β1	β2	R2	F Statistic
1.	Bahana Dana Prima	-0,000575	1,167554	-0,091609	0,890439	329,1574
	- T Statistic	-0,210707	1,657767	-0,620861		
2.	Batavia Dana Saham Optimal	0,000315	1,121065	-0,042360	0,920760	470,6052
	- T Statistic	0,141690	19,52261	-0,352109		
3.	Batavia Dana Saham	-0,001592	0,926644	0,150736	0,876071	286,3007
	- T Statistic	-0,627430	14,14346	1,098165		
4.	BNI Reksa Dana Berkembang	-0,003464	1,199408	-0,025586	0,877192	289,2822
	- T Statistic	-1,134424	15,21264	-0,154897		
5.	BNP Paribas Equity	-0,002631	1,089939	0,060213	0,962591	1.042,114
	- T Statistic	-1,749597	28,06528	0,740059		
6.	BNP Paribas Maxi Saham	-0,002347	1,061587	0,081956	0,950809	782,8261
	- T Statistic	-1,377395	24,12864	0,889134		
7.	BNP Paribas Pesona	-0,001242	1,074170	0,004572	0,967304	1.198,199
	- T Statistic	-0,915560	30,66715	0,062308		
8.	CIMB-Principal Total Return Equity Fund	0,000184	1,201398	-0,205155	0,889814	327,0619
	- T Statistic	0,067599	17,10965	-1,394588		
9.	Danareksa Mawar	-0,003677	0,957460	0,168104	0,933935	572,5359
	- T Statistic	-1,974150	19,90744	1,668324		
10.	First-State Indoequity Sectoral Fund	-0,002592	1,051384	0,070118	0,960136	975,4527
	- T Statistic	-1,721047	27,03852	0,860713		
11.	First-State Indoequity Value Select Fund	-0,001496	1,032339	0,060365	0,950761	782,0105
	- T Statistic	-0,908727	24,28293	0,677750		
12.	First-State Indoequity Dividend Yield Fund	-0,001496	1,032339	0,060365	0,950761	782,0105
	- T Statistic	-0,908727	24,28293	0,677750		

13.	Grow-2-Prosper	-0,010948	0,604869	0,656613	0,226531	11,86149
	- T Statistic	-0,991475	2,121359	1,099185		
14.	Mandiri Investa Cerdas Bangsa	0,997078	1,175217	-0,059602	0,873399	279,4017
	- T Statistic	331,1599	15,11550	-0,365907		
15.	Manulife Dana Saham	-0,001423	1,042938	-0,105845	0,925279	501,5144
	- T Statistic	-0,726997	20,64045	-0,999857		
16.	Manulife Saham Andalan	-0,003329	1,127979	0,011430	0,931753	552,9301
	- T Statistic	-1,584168	20,78722	0,100543		
17.	Panin Dana Maksima	-0,001307	1,178261	-0,017686	0,800953	162,9698
	- T Statistic	-0,326371	11,39133	-0,081616		
18.	Panin Dana Prima	-0,000905	1,109559	-0,006889	0,849756	229,0616
	- T Statistic	-0,283456	13,46091	-0,039893		
19.	AXA Citra Dinamis	-0,001216	1,062770	0,023742	0,967703	1.213,491
	- T Statistic	-0,905834	30,65585	0,326892		
20.	BNP Paribas Infrastruktur Plus	-0,002087	1,150644	0,005883	0,943320	674,0372
	- T Statistic	-1,076951	2,299391	0,056113		
21.	BNP Paribas Solaris	-0,002190	1,163196	-0,077686	0,865847	261,3945
	- T Statistic	-0,715031	1,470852	-0,468887		
22.	Dana Ekuitas Prima	-0,002824	1,143913	0,105602	0,916225	442,9406
	- T Statistic	-1,150538	18,04938	0,795337		
23.	Danareksa Mawar Fokus 10	-0,003798	1,104891	-0,071484	0,897964	356,4171
	- T Statistic	-1,523161	1,716169	-0,529980		

Source: Compile by Authors

Using Henrikson and Merton model, as presented in Table 2, market return closely correlated with equity fund return. Based on the analysis of equity funds listed above, there are no equity funds presented in the table are with market timing ability of its investment manager, there are some equity funds are affected negatively by its investment manager poor market timing ability as shown in negative figure of market timing coefficient (β_2).

Treynor and Mazuy Model

Table 3 show the Treynor and Mazuy Model (equation 5) which is in β_2 positive to state market timing. R^2 stated that variation of dependent variable could be explained by variation of all independent variable. Value of R^2 for equity fund have at least 84% except for equity fund of Grow-2 Prosper is 22.65%. All model are significantly different from zero by significant level of 1%. This result are similar with Henrikson and Merton model that has been explained above.

Table 3: Treynor and Mazuy Model (Equation 5)

NO	Equity Fund	β_0	β_1	β_2	R2	F Statistic
1.	Bahana Dana Prima	-0,001360	1,122532	-0,371677	0,890127	3,281079
	-T Statistic	-0,621832	2,145150	-0,392934		
2.	Batavia Dana Saham Optimal	0,000126	1,096785	-0,289135	0,920777	470,7123
	- T Statistic	0,071016	25,74562	-0,375472		
3.	Batavia Dana Saham	-0,001440	1,023352	1,378033	0,877989	291,4378
	- T Statistic	-0,714348	2,121701	1,580569		
4.	BNI Reksa Dana Berkembang	-0,004102	1,195153	0,177970	0,877198	289,2999
	- T Statistic	-1,678048	20,43159	0,168314		
5.	BNP Paribas Equity	-0,002323	1,123653	0,383936	0,962589	1.042,056
	- T Statistic	-1,929065	38,99577	0,737121		
6.	BNP Paribas Maxi Saham	-0,001725	1,103473	0,386978	0,950590	779,1785
	- T Statistic	-1,262023	33,72904	0,654370		
7.	BNP Paribas Pesona	-0,001220	1,076758	0,030102	0,967305	1.198,203
	- T Statistic	-1,123264	41,43321	0,064079		
8.	CIMB-Principal Total Return Equity Fund	-0,001184	1,092815	-1,095165	0,889009	324,3930
	- T Statistic	-0,541695	20,90008	-1,158712		
9.	Danareksa Mawar	-0,002772	1,050704	1,042063	0,933794	571,2264
	- T Statistic	-1,856612	29,41306	1,613796		
10.	First-State Indoequity Sectoral Fund	-0,002282	1,091620	0,480165	0,960189	976,7957
	- T Statistic	-1,893748	37,86253	0,921347		
11.	First-State Indoequity Value Select Fund	-0,004900	1,092896	1,049527	0,909420	406,6197
	- T Statistic	-2,660209	24,79401	1,317214		
12.	First-State Indoequity Dividend Yield Fund	-0,001279	1,067975	0,447102	0,950855	783,5933
	- T Statistic	-0,971546	33,89117	0,784923		
13.	Grow-2-Prosper	-0,006484	0,950658	3,446293	0,222749	11,60673
	- T Statistic	-0,731601	4,482781	0,899021		
14.	Mandiri Investa Cerdas Bangsa	0,996179	1,153621	0,018834	0,873190	278,8750
	- T Statistic	412,9034	19,98202	0,018048		
15.	Manulife Dana Saham	-0,001948	0,983344	-0,686053	0,925302	501,6830
	- T Statistic	-1,243646	26,23392	-1,012535		
16.	Manulife Saham Andalan	-0,003236	1,133699	0,049846	0,931748	552,8904

	- T Statistic	-1,923394	28,15840	0,068491		
17.	Panin Dana Maksima	-0,001871	1,177747	0,205246	0,800991	163,0081
	- T Statistic	-0,583400	15,34813	0,147969		
18.	Panin Dana Prima	-0,001587	1,118538	0,390885	0,849985	229,4730
	- T Statistic	-0,621319	18,30357	0,353857		
19.	AXA Citra Dinamis	-0,000994	1,074062	0,083579	0,967673	1.212,338
	- T Statistic	-0,924012	41,73813	0,179679		
20.	BNP Paribas Infrastruktur Plus	-0,002077	1,154342	0,051166	0,943322	674,0607
	- T Statistic	-1,338795	31,09156	0,076240		
21.	BNP Paribas Solaris	-0,003105	1,129978	-0,147158	0,865515	260,6487
	- T Statistic	-1,264947	19,23439	-0,138576		
22.	Dana Ekuitas Prima	-0,002460	1,206565	0,792659	0,916471	444,3599
	- T Statistic	-1,253892	25,69720	0,933934		
23.	Danareksa Mawar Fokus 10	-0,004470	1,070954	-0,249565	0,897715	355,4525
	- T Statistic	-2,236752	22,3930	-0,288682		

Source: Compile by Author

Based on analysis above with Treynor and Mazuy to detect market timing ability as presented in Table 3, market return closely correlated with equity fund return. As for market timing, there are no indication that investment manger market timing ability significantly affect equity fund return, even there are some equity fund return which negatively affected by investment manager market timing ability.

Based on analysis from Table 2 and Table 3 founded that all equity fund have market timing that positively affect equity fund return, but also some equity fund negatively affected by market timing, which mean market timing reduce equity fund return. After all, these coefficients are not significantly affecting equity fund return, which indicate investment manager does not have market timing ability.

Inflation and Exchange Rate
This research also want to explore effect Inflation and Exchange rate to equity fund. As mentioned above, this research added inflation and exchange rate variable to Henrikson and Merton Model, and Treynor and Mazuy Model to explore effect of both variable. Table 4 below show coefficient of Henrikson and Merton Mode, R^2 and F Statistic. Value of R^2 for equity fund have at least 85,9% except for equity fund of Grow-2 Prosper is 24%. It is higher than R2 is in Henrikson and Merton Model without inflation and exhange rate variabel. All model are significantly different from zero by significant level of 1%. This result are similar with Henrikson and Merton model that has been explained above.

Table 4: Henrikson and Merton model with additional variable Inflation, and exchange

rate of US Dollar (Equation 3)

NO	Equity Fund	β_0	β_1	β_2	β_3	β_4	R^2	F Statistic
1.	Bahana Dana Prima	0,000615	1,083905	-0,131127	0,002563	-0,297675	0,905041	188,2338
	- T Statistic	0,116807	15,29860	-0.935804	0,228469	-3,455790		
2.	Batavia Dana Saham Optimal	-0,006523	1,070805	-0,091947	0,020642	-0,233315	0,932696	273,6938
	- T Statistic	-1,534339	18,72507	-0,812983	2,279313	-3,355840		
3.	Batavia Dana Saham	0,002913	0,859653	0,131238	-0,006929	-0,212790	0,887629	156,0078
	- T Statistic	0,581145	12,75207	0,984347	-0,649000	-2,596297		
4.	BNI Reksa Dana Berkembang	-0,002393	1,185138	-0,029358	-0,001758	-0,044522	0,877553	141,5441
	- T Statistic	-0,378343	13,93161	-0,174495	-0,130469	-0,430480		
5.	BNP Paribas Equity	-0,007948	1,086129	0,040038	0,013699	-0,052281	0,964794	541,2359
	- T Statistic	-2,626122	26,68006	0.497285	2,124951	-1,056312		
6.	BNP Paribas Maxi Saham	-0,007493	1,025488	0,045536	0,015420	-0,169273	0,957564	445,6553
	- T Statistic	-2,282652	23,22396	0,521430	2,205186	-3,153106		
7.	BNP Paribas Pesona	-0,006317	1,040100	-0,030546	0,015105	-0,161326	0,973844	735,3412
	- T Statistic	-2,510134	30,72497	-0,456242	2,817596	-3,919812		
8.	CIMB-Principal Total Return Equity Fund	0,001082	1,134427	-0,131127	0,002563	-0,297675	0,905041	188,2338
	- T Statistic	0,116807	15,29860	-0,935804	0,228469	-3,455790		
9.	Danareksa Mawar	-0,007584	0,943794	0,147616	0,010790	-0,078198	0,936212	289,8683
	- T Statistic	-1,997564	18,48168	1,461602	1,334283	-1,259524		
10.	First-State Indoequity Sectoral Fund	-0,007292	1,037965	0,047043	0,012781	-0,083019	0,962819	511,4346
	- T Statistic	-2,417211	25,57933	0,586185	1,988954	-1,682780		
11.	First-State Indoequity Value Select Fund	-0,007849	0,957409	0,133182	0,008293	-0,175731	0,915387	213,6658
	- T Statistic	-1,701667	15,43079	1,085347	0,844044	-2,329614		
12.	First-State Indoequity Dividend Yield Fund	-0,008831	1,015987	0,026749	0,019638	-0,112748	0,956747	436,8677
	- T Statistic	-2,758890	23,59780	0,314144	2,880254	-2,153952		
13.	Grow-2-Prosper	-0,023021	0,522211	0,572234	0,036039	-0,389670	0,240051	6,238591

No.	Name						R^2	F Statistic
	- *T Statistic*	-1,013942	1,709948	0,947419	0,745161	-1,049491		
14.	Mandiri Investa Cerdas Bangsa	0,998112	1,115453	-0,087205	0,001365	-0,211348	0,880410	145,3978
	- *T Statistic*	164,4255	13,66101	-0,540012	0,105569	-2,128996		
15.	Manulife Dana Saham	-0,005008	0,991452	-0,144942	0,012498	-0,214353	0,935798	287,8706
	- *T Statistic*	-1,331095	19,58996	-1,448064	1,559389	-3.483.664		
16.	Manulife Saham Andalan	-0,004492	1,071313	-0,022078	0,006717	-0,215851	0,939689	307,7212
	- *T Statistic*	-1,096240	19,43625	-0,202531	0,769492	-3,221023		
17.	Panin Dana Maksima	-0,003998	1,080379	-0,077897	0,013325	-0,377759	0,820543	90,30434
	- *T Statistic*	-0,506697	10,18033	-0,371139	0,792844	-2,927825		
18.	Panin Dana Prima	0,000720	1,039488	-0,037844	0,000559	-0,244827	0,859795	121,1148
	- *T Statistic*	0,112573	1,208133	-0,222392	0,041014	-2,340445		
19.	AXA Citra Dinamis	-0,005729	1,060591	0,007167	0,011558	-0,040514	0,969366	624,9498
	- *T Statistic*	-2,112200	29,07050	0,099326	2,000451	-0,913394		
20.	BNP Paribas Infrastruktur Plus	-0,004713	1,121201	-0,018446	0,008603	-0,126732	0,946282	347,9093
	- *T Statistic*	-1,204383	2,129926	-0,177176	1,032034	-1,980214		
21.	BNP Paribas Solaris	-0,001403	1,083362	-0,116596	0,003329	-0,286614	0,878921	143,3661
	- *T Statistic*	-0,232510	13,34473	-0,726193	0,258974	-2,903874		
22.	Dana Ekuitas Prima	-0,005938	1,084045	0,063751	0,011864	-0,241640	0,925466	245,2305
	- *T Statistic*	-1,236502	16,78228	0,499021	1,159788	-3,076930		
23.	Danareksa Mawar Fokus 10	-0,002873	1,053532	-0,095085	0,001084	-0,181368	0,904039	186,0637
	- *T Statistic*	-0,572868	1,561618	-0,712637	0,101460	-2,211225		

Source: Compile by Author.

Based on Henrikson and Merton model with additional inflation variable and exchange rate of US Dollar, there are only six equity fund affected by inflation, which are positive correlation and significant. There are fifteen equity fund affected by exchange rate of US Dollar which are negative and significant

Treynor and Mazuy Model with Inflation and US Dollar conversion rate
Table 5 below show coefficient of Henrikson and Merton Model adding inflation and exchange rate of US Dollar variable, R^2 and F Statistic. Value of R^2 for equity fund have at least 85,9% except for equity fund of Groq-2 Prosper is 23.73%. It is higher than R^2 is in Henrickson and Merton Model without inflation and exhange rate variable. All model are significantly different from zero by significant level of

1%. This result are similar with Henrikson and Merton model that has been explained above.

Table 5: Treynor and Mazuy Model with additional inflation and exchange rate of US

Dollar variable. (Equation 4)

NO	Equity Fund	β_0	β_1	β_2	β_3	β_4	R2	F Statistic
1.	Bahana Dana Prima	-0,000252	1,019348	-0,567525	0,002045	-0,294181	0,904472	186,9965
	- *T Statistic*	-0,049157	17,64070	-0,632882	0,182134	-3,410727		
2.	Batavia Dana Saham Optimal	-0,006982	1,021490	-0,526630	0,020387	-0,231753	0,932586	273,2178
	- *T Statistic*	-1,689769	21,94943	-0,729188	2,254381	-3,336208		
3.	Batavia Dana Saham	0,002958	0,946494	1,274842	-0,007004	-0,211412	0,889446	158,8953
	- *T Statistic*	0,612799	17,40774	1,510863	-0,662961	-2,604914		
4.	BNI Reksa Dana Berkembang	-0,002922	1,179739	0,160836	-0,002116	-0,041755	0,877540	141,5278
	- *T Statistic*	-0,475781	17,05394	0,149819	-0,157409	-0,404373		
5.	BNP Paribas Equity	-0,007818	1,109498	0,289593	0,013760	-0,052545	0,964826	541,7370
	- *T Statistic*	-2,661542	33,53160	0,563976	2,140101	-1,063900		
6.	BNP Paribas Maxi Saham	-0,007207	1,048303	0,209696	0,015590	-0,170399	0,957494	444,8892
	- *T Statistic*	-2,258952	29,17180	0,376020	2,232608	-3,176749		
7.	BNP Paribas Pesona	-0,006512	1,024871	-0,138268	0,014989	-0,160554	0,973810	734,3543
	- *T Statistic*	-2,663022	37,20745	-0,323464	2,800505	-3,904994		
8.	CIMB-Principal Total Return Equity Fund	-0,000225	1,010697	-1,250105	0,001443	-0,233953	0,898204	174,2654
	- *T Statistic*	-0,042711	17,04337	-1,358392	0,125233	-2,643032		
9.	Danareksa Mawar	-0,006960	1,026001	0,941965	0,011119	-0,080041	0,936212	289,8699
	- *T Statistic*	-1,887921	24,70821	1,461749	1,378027	-1,291354		
10.	First-State Indoequity Sectoral Fund	-0,007175	1,066375	0,370544	0,012827	-0,083121	0,962904	512,6479
	- *T Statistic*	-2,452162	32,35493	0,724460	2,002833	-1,689580		
11.	First-State Indoequity Value Select Fund	-0,007344	1,033130	0,899226	0,008548	-0,177053	0,915538	214,0834
	- *T Statistic*	-1,641046	20,49567	1,149531	0,872737	-2,353150		
12.	First-State Indoequity	-0,008855	1,034603	0,288966	0,019598	-0,112266	0,956848	437,9348

	Dividend Yield Fund							
	- T Statistic	-2,852388	29,58642	0,532487	2,884251	-2,150828		
13.	Grow-2-Prosper	-0,019872	0,821145	3,023895	0,037841	-0,401142	0,237339	6,146175
	- T Statistic	-0,899757	3,300744	0,783254	0,782790	-1,080260		
14.	Mandiri Investa Cerdas Bangsa	0,997232	1,080733	-0,116287	0,000801	-0,207224	0,879988	144,8168
	- T Statistic	168,8803	16,24849	-0,112660	0,061949	-2,087246		
15.	Manulife Dana Saham	-0,005679	0,912318	-0,874554	0,012133	-0,212197	0,935617	287,0097
	- T Statistic	-1,552276	22,13746	-1,367455	1,515139	-3,449519		
16.	Manulife Saham Andalan	-0,004614	1,059789	-0,116380	0,006647	-0,215406	0,939679	307,6672
	- T Statistic	-1,159440	23,64329	-0,167306	0,763156	-3,219473		
17.	Panin Dana Maksima	-0,004802	1,049834	-0,088963	0,012808	-0,373972	0,820240	90,11891
	- T Statistic	-0,626236	12,15538	-0,066374	0,763175	-2,900853		
18.	Panin Dana Prima	2,697636	1,033478	0,237517	7,164463	-0,241051	0,859792	121,1119
	- T Statistic	0,000434	14,77136	0,218755	0,005270	-2,308163		
19.	AXA Citra Dinamis	-0,005653	1,063338	0,006185	0,011607	-0,040877	0,969362	624,8708
	- T Statistic	-2,146067	35,84081	0,013434	2,013385	-0,923037		
20.	BNP Paribas Infrastruktur Plus	-0,004851	1,112534	-0,066687	0,008519	-0,126150	0,946267	347,8102
	- T Statistic	-1,276253	25,98746	-0,100377	1,024129	-1,974133		
21.	BNP Paribas Solaris	-0,002368	1,031183	-0,338532	0,002729	-0,282362	0,878280	142,5073
	- T Statistic	-0,402967	15,57951	-0,329581	0,212170	-2,858004		
22.	Dana Ekuitas Prima	-0,005878	1,125214	0,586982	0,011854	-0,241194	0,925721	246,1377
	- T Statistic	-1,262721	21,45899	0,721345	1,163448	-3,081616		
23.	Danareksa Mawar Fokus 10	-0,003555	1,008156	-0,365881	0,000670	-0,178520	0,903647	185,2253
	- T Statistic	-0,728516	18,33989	-0,428897	0,062695	-2,175679		

Source: Compile by Author

Based on Treynor and Mazuy Model with additional inflation and exchange rate of US Dollar variable, there are only seven equity fund which affected by inflation, which are positive correlation and significant. There are sixteen equity fund which affected by exchange rate of US Dollar variable, which they are negative and significant.

This finding research mostly support the previous research but investor should take care to invest in mutual funds. The next research should use another methodology to see the good results for example Panel data Model and Vector Autoregressive Methods.

6 Conclusion

Based on previous analysis, there are several recommendation:

1. Investor can chose equity fund without think about investment manager ability.
2. When Exchange Rate of US Dollar decrease, investor can sell their equity fund unit, because equity fund are overprice in this position.
3. Government need to make new policy regarding exchange rate of US Dollar so that equity fund return are not decreasing in value.

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