

## CAPITAL ASSET PRICING MODEL IN MARKET OVERREACTION CONDITIONS: EVIDENCE FROM INDONESIA STOCK EXCHANGE

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**Abstract:** Market overreaction is a phenomenon in stock markets characterized by a return reversal on the stocks which resulted winners into a losers, vice versa, losers into a winners. While the CAPM is the model of asset pricing which puts the market risk factor as the sole determinant of return. The purpose of this study is testing whether market overreaction occurred in Indonesia stock market and whether Capital Asset Pricing Model (CAPM) can explain the portfolio return of the winners and the losers. This study uses the stocks of non-financial sector companies in Indonesia Stock Exchange during the period July 2005-December 2015. Abnormal returns for each stock obtained by using a market model and the portfolio formed by using the method of 6-6 observation period. The results of this study are: (1) Market overreaction occurs in the Indonesia stock market characterized by a return reversal of the winners and the losers, and (2) CAPM which only considers the market risk factors in the model tend to be able to explain the portfolio return.

**Key words:** beta, CAPM, contrarian strategy, market overreaction, returns reversal

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### Introduction

Capital Asset Pricing Model (CAPM) is the asset pricing model stated that the market risk or systematic risk is the sole determining return factor in market equilibrium condition, in which the investor has no chance anymore to get abnormal return. However, some empirical findings provide evidence that the capital market tends to be efficient in weak form, which occurs in capital markets of developing countries, investors are still likely earn abnormal returns, for example of the market overreaction phenomenon that mentioning an anomaly of winner-loser. This anomaly is characterized by a return reversal of winners and losers. De Bondt and Thaler (1985) are the first researchers who found a return reversal in US stock markets. In these conditions, De Bondt and Thaler proposes the contrarian investment strategy that is the strategy of buying stocks loser and selling winner stocks, which for a certain period there will be a return reversal in these stocks. Several subsequent studies conducted by other researchers and produces the same findings, that a return reversal occurred in the stock market some countries, like in Europe (Chopra et al., 1992; Lakonishok et al., 1994;

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Schierreck et al., 1999), in Australia (Lee et al., 2003), and in some countries in Asia such as in Japan (Chang et al., 1995), in Taiwan (Yang, 1997), in Malaysia (Ruhani et al., 2011), and in Indonesia (Octavio and Lantara, 2014), who found that the return reversal occurs only on losers.

Some studies have also been conducted to test the ability of the CAPM model in explaining the portfolio return of winners and losers. Assefa et al. (2014) examined the ability of some asset pricing models, one of which is the CAPM, in explaining abnormal returns obtained through the contrarian strategy on winners and losers. Their research results showed that the winners stocks have a higher beta than the losers stocks and both value of alpha found positive significantly. But the findings of Chaudhury and Piccoli (2015) showed the opposite result, that the benefits from the application of the contrarian strategy is influenced by the performance of winners with beta are lower than losers.

Referring to conditions where the research results found to vary, the research was done in order to test: (1) Whether a return reversal occurs on the winners and the losers which is an indicator of the occurrence of the market overreaction phenomenon in Indonesia? and (2) Whether CAPM can explain the return of winners and losers?

## Literatures

### *Capital Asset Pricing Model (CAPM)*

Sharpe (1964), Lintner (1965), and Mossin (1969) introduced the Capital Asset Pricing Model (CAPM), which connects the expected return on a risky asset with the risk of the asset in an equilibrium market conditions. In an equilibrium market conditions, investors will not be able to obtain the abnormal return of the price level is, including for investors who conduct speculative trading. In these conditions all investors will be encouraged to choose the market portfolio, which consists of all the existing risky assets. The market portfolio is on the efficient frontier according to Markowitz model (1952), which called as an optimal portfolio. Thus the market portfolio is a portfolio that consists of all risk assets and is also an optimal portfolio. Therefore consists of all risk assets, then the market portfolio is a portfolio that was diversified so that the risk of the market portfolio will only consist of the systematic risk, namely the risk that cannot be eliminated by diversification. Systematic risks associated with economic factors that can affect all existing securities.

To understand the relationship between risk and return in an equilibrium market, can be considered in the context of efficient portfolio and the context of individual assets or securities. The relationship between risk and return of efficient portfolio will produce a capital market line (CML), while the relationship between risk and return of individual asset or securities will produce a security market line (SML). SML is the line that connects the expected returns of securities with the systematic risk (as measured by beta) in an equilibrium market. If CML is used to assess

the expected return from an efficient portfolio on a risk level of efficient portfolio, the SML is used to assess the securities individually, which assesses the expected return of securities at the level of systematic risk (beta) particular. The expected return based on SML calculated by the equation:

$$E(R_i) = R_f + \beta_i [E(R_m) - R_f] \quad (1)$$

Equation (2.1) is called the Capital Asset Pricing Model (CAPM) which is based on the value that has not happened (ex ante) and therefore cannot be tested. The models that can be observed and tested are realizable value or historical value (ex post). The realizable value has errors, thus the model ex post also contains an error value for each value realization observed,  $e_i$ . Based on this condition, the equation (1) becomes:

$$R_i = R_f + \beta_i (R_m - R_f) + e_i \quad (2)$$

In CAPM, beta value greatly affects the expected returns of a securities or a portfolio. To calculate a portfolio beta, the value of stock beta,  $\beta_i$ , replaced by portfolio beta,  $\beta_p$ . The higher the beta value, the higher the rate of return required by investors. Thus there is a positive relationship between the beta and the expected returns of a securities or a portfolio.

### ***The Efficient Market Hypothesis***

CAPM theory is a theory that is relevant to the equilibrium market conditions, related to the concept of an efficient market that try to explain how the market processes the information to get a new equilibrium position. If the market reacts quickly and accurately to achieve a new equilibrium price which fully reflects the information available, the market condition is called the efficient market. These conditions efficient market related to information on where the market will react to the information available.

Fama (1970) presents the three main forms of market efficiency: weak form, semi strong form and strong form. The purpose for grouping the market forms is to classify empirical research on the market efficiency. The idea for testing the efficient market into a hypothesis called the efficient market hypothesis (EMH). The implication of whether capital markets are an efficient or an inefficient is that if investors believe the market would be efficient, it will tend to apply passive trading strategy, by establishing a portfolio that can replicate a market index (indexing) or invest in mutual funds. For the investors who believe the market would be inefficient will apply active trading strategy based on technical and fundamental analysis to obtain an abnormal return.

### ***Abnormal Return***

In an efficient market, the price of securities should reflect information about the risk and expected return in the future. But when the market becomes inefficient,

securities will produce an abnormal return as the difference between the expected return with the realizable return, formulated as follows:

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (3)$$

Realizable return,  $R_{i,t}$ , can be calculated based on the comparison between the relative current price to the previous price, or formulated into:

$$R_{i,t} = (P_t - P_{t-1}) / P_{t-1} \quad (4)$$

Brown and Warner (1980) proposed  $E(R_{i,t})$  based on the market model as follows:

$$E(R_{i,t}) = \alpha_i + \beta_i R_m + e_i \quad (5)$$

### **Market Overreaction**

De Bondt and Thaler (1985) states that the implications of the market overreaction conditions is that investors are advised to buy loser stocks and sell winner stocks because in the long run there will be a price reversal, which the losers stocks will provide higher returns compared with the winners stocks. Investors will seek to obtain abnormal returns by applying the active investment strategy that is relevant, and, that is contrarian strategy. Therefore overreaction implies that underperform stocks will be outperform in the next period, then the strategy is implemented by buying the losers stocks and immediately selling the winners stocks, or also called "buy low sell high" strategy. The advantage of the application of the contrarian strategy is obtained from the return reversal of stocks. Also, this strategy does not require an initial investment (zero cost) where investors will sell stocks that demanded by markets (winners) and using the funds obtained from the sale to buy stocks less attractive for the market (losers).

### **Methods**

The research objects are the entire active non-financial stocks that did not do a stock split in the Indonesia Stock Exchange (BEI) during the period July 2005-December 2015, while the unit of analysis is the company's stock price data on a monthly basis and the other company's fundamental data. Research data are secondary data obtained from various publications issued by financial institutions such as the central bank of Indonesia (BI) and Indonesia Stock Exchange (IDX).

The stages of data analysis design and hypothesis testing are as follows:

- a. Determining the observation periods consist of the formation periods and the testing periods for the portfolios formed in the formation periods. The observation periods during July 2005 – December 2015 which the prior six months are the formation periods and the subsequent six months are the testing periods (6-6). Through a process of overlapping, obtained 20 observation periods.
- b. Forming portfolio for winner and loser, with the steps:
  - 1) Calculating the monthly stock return,  $R_{i,t}$ , and the monthly market return,  $R_{m,t}$ .

- 2) Calculating the abnormal return of each stock based on market model.
- 3) Sorting abnormal returns,  $AR_{i,t}$ , of all stocks for each testing period, from the lowest to the highest abnormal return, and then calculating the average value. Stocks with abnormal return below the average value are grouped into the losers, while stocks with abnormal returns above the average value are grouped into the winners.
- 4) Forming the portfolio of winners and losers with the following stages:
  - (a) Identifying the stocks that experienced a return reversal, which stocks in the formation period are the loser or the winner, then in the testing period experienced a return reversal in where the losers become the winners and the winners become the losers.
  - (b) Sorting and calculating the average value of abnormal return of the losers and the winners that identified to experience return reversal, for the entire periods of observation (20 periods).
  - (c) Determining 20 the losers and 20 the winners consisting of stocks in each portfolio group with abnormal return value is higher than the average value.
- c. Calculating the cumulative of abnormal returns,  $CAR_{p,t}$ , for winners or losers with the length of periods cumulated six months.  
 $CAR_{p,t}$  is formulated by the equation:  $CAR_{p,t} = \sum AR_{i,t}$
- d. Calculating the average cumulative of abnormal returns,  $ACAR_{p,t}$ , for each winners or losers, for all six periods.  
 $ACAR_{p,t}$  is formulated by the equation:  $ACAR_{p,t} = \sum CAR_{p,t} / n$
- e. Formulating and testing the hypothesis ( $H_a$ ) related to the return reversal of winners and losers, as follows:
  - $Ha_{1-1}$ :  $ACAR_w < 0$  (return reversal occurs in winners)
  - $Ha_{1-2}$ :  $ACAR_L > 0$  (return reversal occurs in losers)
  - $Ha_{1-3}$ :  $ACAR_L - ACAR_w > 0$  (losers return bigger than winners return)
- f. Formulating and testing the hypothesis ( $H_a$ ) related to the ability of CAPM in explaining the return of winners and losers, as follows:
  - $Ha_{2-1}$ :  $\beta_w > 0$  (Market return has a positive effect on the return of winners)
  - $Ha_{2-2}$ :  $\beta_L > 0$  (Market return has a positive effect on the return of losers)

## Results

### *Forming Winners and Losers for Testing Market Overreaction*

Referring to the purposes of this study, the first thing to be done is forming the portfolio of winners and losers. Based on the results of data processing, the average value of the entire abnormal return of portfolios of the observation period entirely are as in Table 1.

The results in Table 1 show that both portfolios (losers and winners) experienced a return reversal during the observation periods. The negative value of average cumulative of abnormal return (ACAR) of the losers in the formation periods

turned to be positive on the testing periods. On the contrary, the positive value of ACAR of the winners in the formation periods turned to be a negative value on the testing periods.

**Table 1. Average abnormal return for winners and losers**  
*(Results of data processing, 2016)*

Portfolio	Losers		Winners		Losers minus Winners
	Formation Periods	Testing Periods	Formation Periods	Testing Periods	
1	-0.0839	0.1722	0.0427	-0.0275	0.1997
2	-0.0934	0.1465	0.0525	-0.0371	0.1836
3	-0.0809	0.4799	0.0573	-0.0080	0.4879
4	-0.1350	0.1862	0.1754	-0.1587	0.3449
5	-0.2968	0.3165	0.0670	-0.0176	0.3155
6	-0.0766	0.1562	0.1395	-0.0788	0.2351
7	-0.2947	0.2778	0.0822	-0.0086	0.2864
8	-0.1026	0.1187	0.1640	-0.0795	0.1982
9	-0.1221	0.1750	0.0351	-0.0107	0.1795
10	-0.1036	0.3264	0.0641	-0.0231	0.3495
11	-0.0454	0.1864	0.0727	-0.0416	0.2280
12	-0.0715	0.0667	0.0745	-0.0585	0.1252
13	-0.1567	0.1281	0.0237	-0.0257	0.1538
14	-0.0862	0.2351	0.0714	-0.0627	0.2978
15	-0.1290	0.1559	0.0243	-0.0170	0.1729
16	-0.0666	0.1057	0.0866	-0.0963	0.2020
17	-0.1905	0.1132	0.0278	-0.0316	0.1448
18	-0.0544	0.0383	0.0496	-0.0429	0.0812
19	-0.0964	0.1288	0.0485	-0.0568	0.1856
20	-0.1266	0.0845	0.0520	-0.0564	0.1409

The occurrence of abnormal return and the return reversal can be explained by the fact that investors will overreact to the existing information. The capital market tends to set stock price too high to the received good news and instead will give the price is too low for the received bad news. Furthermore this phenomenon will turn around when the market realizes it has been overreact. The return reversal is shown by the decline in stock price of winners drastically and the increase in stock price of losers. Furthermore, after ACAR values obtained for each portfolio, then performed statistical tests to test the hypotheses that have been proposed by using one sample t-test model. Results obtained are as in Table 2.

The results in Table 2 are used to answer hypotheses have been proposed. Hypothesis 1-1 and 1-2 stated about the return reversal of losers and winners which have proved statistically significant. The winners and the losers experienced a return reversal during the test period. Furthermore the hypothesis 1-3 which states that the return of losers outperformed the return of winners during the test

period, in which the statistical test results proving that the return of losers are significantly greater than the return of winners. The advantage of the difference in return between the two portfolios was found to be greater than the return of losers.

**Table 2. Results of testing the return reversal on winners and losers**  
(Results of data processing, 2016)  
(One-Sample Test)

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
ACAR <sub>w</sub>	-5.743	19	0.000	-0.04696	-0.06407	-0.02984
ACAR <sub>L</sub>	7.760	19	0.000	0.17867	0.13048	0.22686
ACAR <sub>L</sub> - ACAR <sub>w</sub>	10.499	19	0.000	0.22563	0.18064	0.27061

These test results prove that the phenomenon of market overreaction occurs in the Indonesian stock market, which is characterized by a return reversal of the winners and the losers. These findings support the results of research that has been proposed by previous researchers, especially those doing research in the capital markets of developing countries or emerging markets, especially in Indonesia.

**CAPM on Market Overreaction Conditions**

The next step of this study is to test whether the Capital Asset Pricing Model (CAPM) can explain the return of winners and losers. CAPM is a regression model adopted from ordinary least squares (OLS) model, which requires the use of stationer data. Therefore, before doing the regression process based on CAPM, the data stationery test must do with the following results in Table 3.

**Table 3. Result of test stationary data** (Results of data processing, 2016)

Variables	ADF Value	Statement
Return Winners ( $R_{pw} - R_f$ )	-8.296450***)	Stationary at level
Return Losers ( $R_{pL} - R_f$ )	-8.296450***)	Stationary at level
Return Market ( $R_M - R_f$ )	-8.380614***)	Stationary at level

\*\*\*) significant at  $\alpha = 1\%$

The results in Table 3 show that all data is stationer so that the process of regression can be performed. The process of time series regression based on the CAPM model by placing the market return as the independent variable and the average portfolio return as the dependent variable was conducted to determine the sensitivity of the movement of the market return on the portfolio return and the ability of contrarian investment strategy in generating abnormal returns. The regression results are shown in the Table 4.

The results in Table 4 are used to answer hypothesis 2-1 and hypothesis 2-2 that have been proposed. The value of beta of portfolio,  $\beta_p$ , in Table 4.4 shows that the market returns (or market premium) positively affect to the average return of the portfolio, in accordance with the conditions required in the CAPM.

**Table 4. Result of regression time series based on CAPM**  
 (Results of data processing, 2016)

$(R_p - R_f) = \alpha_p + \beta_p*(R_m - R_f) + e_i$		
Portfolio	$\alpha_p$	$\beta_p$
Winners	-0.0072**)	0.8796***)
Losers	0.0113***)	0.7032***)

\*\*\*) significant at  $\alpha = 1\%$ ; \*\*) significant at  $\alpha = 5\%$

While the value of the intercept,  $\alpha_p$ , shows that contrarian investment strategies significantly generate positive abnormal return on losers and the negative abnormal return on winners. These results support the previous researches that stated about the return reversal. Such as the findings of Assefa (2014) that mention about a return reversal on the winners and the losers, and that the beta of winners is greater than the beta of losers. This result also support the findings of Gibbons et al. (1989) which states that a portfolio with a higher beta yield lower return (indicated by negative alpha), and conversely, a portfolio with a lower beta yield higher return (indicated by positive alpha).

### Conclusions

This study aims to test whether market overreaction occurred in Indonesia stock market for the period from July 2005 to December 2015. We also test whether Capital Asset Pricing Model (CAPM) can explain the portfolio return of the winners and the losers.

Based on the results of this research, it can be concluded that: first, market overreaction occurs in the Indonesian stock market, which characterized by a return reversal on both of the portfolio, the winners or the losers. Contrarian investment strategy is also profitable that indicated by the return difference value of winner and losers that greater than the return of losers. The results are consistent with the findings of several previous researches that mention about market overreaction in some countries in Asia or developing countries including in Indonesia (Chang et al., 1995; Yang, 1997; Ruhani et al., 2011; Octavio and Lantara, 2014).

The second conclusion is that CAPM model can explain the return of winners and losers, indicated by a positive and significant beta value which explain that the market premia or excess return of market affect positively to the return of winners and losers. Beta of winners found greater than losers while yield found lower. The result indicated that in market overreaction conditions, a portfolio with a higher beta yield lower return and a portfolio with a lower beta yield higher return. It is also support the findings of Assefa (2014) and Gibbons et al. (1989).

As other studies, this study also had some limitations that can be used by other researchers for further research. First, this research uses of the observation period 6-6, which is for testing the consistency of the results, further research can use the observation period 12-12. Also needs to be examined whether market overreaction occurs in the short term or long term. Second, in this study, the CAPM model is used to determine the relationship between the market factor and portfolio return. For the development of the research result, in a further research, it needs to test another factors or model in determining the variation return of winners and losers.

## References

- Assefa T.A., Esqueda O.A., Galariotis E.C., 2014, *Overreaction Evidence from Large Cap Stocks*, "Review of Accounting and Finance".
- Chang R.P., McLeavy D.W., Rhee S.G., 1995, *Short Term Abnormal Returns of the Contrarian Strategy in the Japanese Stock Market*, "Journal of Business Finance and Accounting", 22(7).
- Chaudhury M., Piccoli P., 2015, *How Do React to Extreme Market Events? Evidence from Brazil*, McGill – Desautels Faculty of Management, Working Paper.
- Chopra N., Lakonishok J., Ritter J.R., 1992, *Measuring Abnormal Performance. Do Stocks Overreact?* "Journal of Financial Economics", 31.
- De Bondt W.F.M., Thaler R.H., 1985, *Does the Stock Market Overreact?* "Journal of Finance", 40.
- Fama E.F., 1970, *Efficient Capital Market: A Review of Theory and Empirical Works*, "Journal of Finance", 25(2).
- Gibbons M., Ross S., Shanken J., 1989, *A Test of the Efficiency of a Given Portfolio*, "Econometrica", 57.
- Lakonishok J., Shleifer A., Vishny R., 1994, *Contrarian Investment, Extrapolation, and Risk*, "The Journal of Finance", 49.
- Lee D., Chan R.W., Kalev P.S., 2003, *Short Term Contrarian Investing-Is It Profitable? Yes and No*, "Journal of Multinational Financial Management".
- Lintner J., 1965, *The Valuation of Risk Assets and The Selection of Risky Investments in Stock Portfolios and Capital Budgets*, "Review of Economics and Statistics", 47(1).
- Markowitz H., 1952, *Portfolio Selection*, "Journal of Finance", VII(1).
- Mossin J., 1969, *Equilibrium in Capital Asset Market*, "Econometrica", 34(4).
- Octavio D.Q., Lantara W.N., 2014, *Market Overreaction, Size Effect, a tau Liquidity Effect?* "Studi pada Bursa Efek Indonesia. Jurnal Manajemen Bisnis dan Kewirausahaan", 8(1).
- Ruhani A., Zamri A., Shanghari A., 2011, *Stock Market Overreaction and Trading Volume: Evidence from Malaysia*, "Asian Academy of Management Journal of Accounting and Finance Volume", Evidence from Malaysia.
- Schiereck D., De Bondt W., Weber W., 1999, *Contrarian and Momentum Strategies in Germany*, "Financial Analysts Journal".
- Sharpe W.F., 1964, *Capital Asset Prices: A Theory of Market Equilibrium Under Condition of Risk*, "Journal of Finance", XIX(3).
- Yang J.J.W., 1997, *Does the Contrarian Investment Strategy Work in Taiwan? An Integrated Study*, "Proc. Natl. Sci. Council", ROC (C), 9(3).

## MODEL WYCENY AKTYWÓW KAPITAŁOWYCH W WARUNKACH NADMIERNEJ REAKCJI RYNKU: PRZYPADEK GIELDY PAPIERÓW WARTOŚCIOWYCH W INDONEZJI

**Streszczenie:** Nadmierna reakcja rynku jest zjawiskiem spotykanym na giełdach papierów wartościowych cechujących się zmianą sytuacji rynkowej papierów wartościowych, co czyni ze zwycięzców przegranych i odwrotnie, z przegranych zwycięzców. Model Wyceny Aktywów Kapitałowych (ang. CAPM) jest modelem wyceny aktywów, który stawia czynnik ryzyka rynkowego jako jedyny wyznacznik zwrotu. Celem tego badania jest przetestowanie, nadmiernej reakcji rynku, która wystąpiła na indonezyjskiej giełdzie papierów wartościowych oraz określenie, czy model wyceny aktywów kapitałowych (CAPM) może wyjaśnić zwrot portfela zwycięzców i przegranych. Niniejsze badanie wykorzystuje akcje spółek sektora niefinansowego na giełdzie papierów wartościowych w Indonezji w okresie od lipca 2005 do grudnia 2015. Nieprawidłowe zwroty od każdego papieru wartościowego uzyskano za pomocą modelu rynku i portfela wykonanego przez użycie metody 6-6 okresu obserwacji. Wyniki tego badania są następujące: (1) nadmierna reakcja rynku pojawiająca się na giełdzie w Indonezji charakteryzuje się odwróceniem zwrotu zwycięzców i przegranych, oraz (2) model CAPM, który uznaje tylko czynniki ryzyka rynkowego ma tendencję do wyjaśnienia zwrotu portfela.

**Słowa kluczowe:** beta, CAPM, przeciwstawna strategia, nadmierna reakcja rynku, zmiana zwrotu

### CAPM在市場過度反彈條件：證據在印度尼西亞股票交易所

**摘要：**市場過度反應是股票市場中的一種現象，其特徵是股票回報反轉，導致贏家進入輸家，反之亦然，輸家成為贏家。雖然CAPM是資產定價的模型，它把市場風險因素作為唯一決定因素的回報。這項研究的目的是測試市場過度反應是否發生在印度尼西亞股市，以及資本資產定價模型（CAPM）是否可以解釋贏家和輸家的投資組合回報。本研究在2005年7月至2015年12月期間使用印尼證券交易所非金融部門公司的股票。使用市場模型獲得的每個股票的異常回報以及使用6-6觀察期的方法形成的投資組合。這項研究的結果是：

(1) 市場過度反應發生在印尼股票市場，其特徵是贏家和輸家的回報反轉，(2) CAPM只考慮模型中的市場風險因素，傾向於能夠解釋投資組合的回報。

**關鍵詞：**beta, CAPM, 逆向策略, 市場過度反應, 回報逆轉