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Analysis of the Effect of Supply Chain Management and Pricing Theory on Excess Return of Stocks

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Abstract- **The primary purpose of this study is to compare Capital Asset Pricing Model with Arbitration Pricing Theory by considering the supply chain strategy. Another objective of this study is to determine the effect of Capital Asset Pricing Model (CAPM) and Arbitration Pricing Theory (APT) on excess returns and to determine the best asset pricing model in terms of ability to explain the estimation of excess return. This study examines the effect of variables in asset pricing models and compares the ability of asset pricing models in explaining excess return. The population in this study are Kompas 100 stock for periods 2013 to 2017, and the sampling method of this study is purposive sampling. Then, it is obtained as many as 46 companies selected as research samples. To compare the accuracy between the CAPM model and APT is calculated with R^2 or R Square and the Prob. values (F-statistic). Based on the results, the best model that can be used in assessing asset pricing model is Arbitration Pricing Theory, this is evidenced by the value of R^2 or R Square of 33.41 % and Prob. (F-statistic) value 0.000000, this value is better than the value of R^2 Capital Asset Pricing Model of 2.68% and Prob. (F-statistics) value 0.007354.**

Keywords- *Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT), supply chain strategy, the excess return*

1.   Introduction

Based on statistical data released by the Central Statistics Agency (BPS), Indonesia's economic growth tends to be stable at around 5 percent in the last three years and has an upward trend even though it is small. However, if studied more deeply, the structure of Indonesia's economic growth has experienced significant improvements in recent years. The very prominent growth is the growth of investment and exports, which grew 6.15 and 9.09 percent in 2017, respectively, compared to the growth of these two components in 2016 which is only amounted to 4.47 and -1.57 percent. Meanwhile, in the Asian perspective, Indonesia's average economic growth in the last three years is still better than Thailand, Hong Kong, South Korea and Singapore (news.detik.com). Investment is one of the crucial things and must be done by everyone. Investment is a way to increase income and a way to achieve financial goals. There are many investment choices, from types of real assets (property, precious metals) and paper assets (stocks, mutual funds, bonds, etc.). The number of investors in the Indonesian capital market has not shown a significant increase even though the Indonesian capital market is 25 years old. Based on data from the Indonesian Central Securities Depository (KSEI), the number of Indonesian capital market investors as of March 2018 reached 1.21 million*single investor identification* (SID), up 36 percent from the 2016 realization of 894,116 SID. Despite grows in double digits, the number of Indonesian investors is relatively small compared to the total population of 258 million people. Pitted with neighboring countries, Indonesia is also defeated by Malaysia 2,49million investors and Singapore 1.5 million investors. The small number of Indonesian capital market investors is unfortunate, especially since the

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development of the domestic capital market is promising. In the last five years, the JCI has grown 48 percent, from 4,453 (January 1, 2013) to 6,605 (January 1, 2018). The average growth of 9.6 percent per year, according to the Head of Capital Connection Research, two things cause the rapid growth of the capital market investors. *First*, macroeconomic conditions. For some people, investment is not yet a mandatory thing to set aside. *Second*, the slow literacy process regarding the capital market evenly. Inevitably, people's understanding of the capital market is still low so they prefer conventional investment products, such as deposits and gold. Investment in the capital market is indeed quite promising as a means to improve people's welfare. However, that alone is not enough to attract people to invest in the capital market. The community must also be given the convenience of being able to access it. The exchange authority assesses that investors in the Indonesian stock market are currently faced with uncertainty. It makes market participants refrain from investing in the stock market. Some things that investors perceive as uncertainty in the Indonesian stock market, including the Eid holiday which was initially considered too long, then the transition of the leadership of Bank Indonesia (BI) in the event of rupiah volatility, regional head elections (elections) and 2019 presidential elections. The demand for the rupiah will increase again for Eid, Asian games, and the World Cup. It will result in the funds being withdrawn causing investment in the stock market to be not steady, for example for the world cup money from the capital market is gone 4% - 5%. (www.cnbcindonesia.com) When investors conduct investment activities there are at least three basic factors of making investment decisions that are first, the rate of return (return), a reasonable thing if the investor demands a return on the funds he has invested; second, the risks to be faced (Risk), the direct correlation between returns and risks, namely: the higher the return, the higher the risk; third, the time period (The Time Factor), investors can invest their capital in the short term, medium term, or long term. The basis of investment decisions consists of the expected rate of return, level of risk and the relationship between return and risk. Return is the main reason for people to invest. A certain level of return is very reasonable for investors who invest their funds. The return expected by the investor from

the investment made is compensation for opportunity costs and the risk of decreasing purchasing power due to the influence of inflation. Differentiating between the expected return and the actual return is necessary. The expected return is the level of return anticipated by investors in the future, while the return that occurs or the actual return is the rate of return that has been obtained by investors in the past. Another important and fundamental concept in the science of investment is called the equilibrium model. Using the equilibrium model, we will be able to understand how the overall behavior of investors as well as how the mechanism of formation of prices and market returns in a simpler form. The equilibrium models are the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT). The CAPM is the same as the APT model which only considers one risk factor, namely the systematic risk. According to [1], CAPM is one of the equilibrium models that can determine the relationship between the level of expected return of a risky asset and the risk of the asset in a balanced market condition. [2] said that "Beta calculated based on historical data can be used to estimate beta in the future." The arbitration price formation theory or what is often called arbitrage pricing theory was formulated in 1976 by Stephen Ross, [3] states that the Arbitration Pricing Theory (APT) the securities return is not only influenced by the market portfolio because of the assumption that several other sources of risk can influence the expectations of a security. APT explains the relationship between expected returns from securities, assuming there is no opportunity to generate profits from arbitration investments without risk [4]. Arbitration Pricing Theory (APT) uses thinking that two investment opportunities which have identical characteristics cannot be sold at different prices. In this research, the selected group shares are part of Kompas 100 index which is made and published by the Indonesia Stock Exchange. This Index is composed of 100 companies whose shares have high liquidity, and they are selected through some criteria. Kompas 100 Index is one of the indicators of shares index in the IDX, and it can be made as a reference for the performance trading stock. Between shares in the Indonesian capital market, Kompas 100 shares are idolized by investors besidesLq 45 Index shares. Based on stocks that *listed* on the Kompas 100 index and after reselected corresponding with the

criteria, it shows the 100 companies that listed on Kompas 100 in periods 2013-2017, 46 companies were selected. Even though the shares in Kompas 100 are included in category preferred stocks; it is found that the majority of the stocks produce negative return consecutively.

Based on the calculation results of the development of the stock return in 2013-2017, Kompas 100 shares are active shares; therefore it could experience the price stock change constantly which later will affect the stock return value. From the information, there are fluctuations in stock *return* 2013-2017 periods. From the 46 companies that were used as the study sample, there were 25 companies that had a dominant *negative* return, 18 companies with fluctuating *returns*, and 3 companies that always had positive return during the study period. These happen because the stock *return* is influenced by the demand and offer of the investors. These phenomena are the reason this research about estimating excess stock return is conducted.

2. Literature Review
2.1. Capital Asset Pricing Model(CAPM)

[5] explain that the Capital Asset Pricing Model (CAPM) is the main outcome of the modern economy. Capital Asset Pricing Model (CAPM) provides the correct prediction between the risk of an asset and the level of return expectation (Expected Return). Capital Asset Pricing Model (CAPM) assumes that investors are planners in a single period who have the same perception of market conditions and look for mean-variance of optimal portfolios. [6] said CAPM is a balanced model of the relationship between risks and back when the market is in balancethen the profit level of a stock is affected by the risk of the stock itself. The ideal stock market is a massive stock market, and investors are price-takers, there are no taxes or transaction fees, all assets can be traded in general, and investors can borrow or lend unlimited amounts of interest at risk (fixedrisk-freerate). With this assumption, all investors have portfolios with identical risks. Capital Asset Pricing Model (CAPM) states that in an equilibrium state, the market portfolio is tangential from the average portfolio variance. Therefore, an efficient strategy is a passive strategy. Capital Asset Pricing

Model (CAPM) implies that the risk premium of an individual asset or portfolio is the product of premium risk in the market portfolio and beta coefficient. According to the theory of Capital Asset Pricing Model (CAPM) the level of income expected from security can be calculated using the formula:

$E(Ri) = RF + \beta i[\ E(RM) - RF\ ]$

$E(Ri)$: Expected level of income from securities i

RF : Risk-free income level

$E(RM)$: The level of income expected from the market portfolio

βi : Risk measures that cannot be diversifying from securities i

2.2. Arbitration Pricing Theory (APT)

[3] states that in the Arbitration Pricing Theory (APT) model securities returns are not only influenced by the market portfolio because of the assumption that several other risks can influence the expectations of security. Arbitration Pricing Theory (APT) uses the idea that two investment opportunities that have identical characteristics cannot be sold at different prices. Arbitration Price Theory (APT) uses thinking that says two investment opportunities that have identical characteristics can be sold at different prices [7]. Arbitration Pricing Theory (APT) assumes that the rate of profit is influenced by various factors in the economy and industry. The arbitration process will take place when two assets have similar characteristics but different returns, so it is possible to buy cheaper assets and sell the more expensive assets. The Arbitration Pricing Theory (APT) is compiled from five basic assumptions, which are: (1) capital markets are in perfect competition condition, (2) investors have the same return expectation of each stock, (3) this return expectation comes from a number of linear influential factors, (4) loading factor that accommodates all systematic risks from the aspects analyzed so that the error term is not related to the cross-sectional or the time series, and (5) the number of general factors is far less than the number of assets analyzed [8]. The Arbitration Pricing Theory (APT) model can be formulated with the basic principle of believing that day and securities will be determined by a factorial model with risk factors, the suggested APT model is as follows [9]:

$E(Ri) = a_0 + b_{i1}F_1 + b_{i2}F_2 + \ldots + b_{in}F_n$

$E(Ri)$: Return Expectations of securities i

a_0 : Return expectations of securities if the systematic risk is 0

b_{in} : Coefficient that shows the magnitude of the influence of factors on security Returns i

F : Risk premium for a factor

2.3.   Macroeconomic Factors

• Inflation

Inflation is a tendency to increase the prices of goods that are general and occur continuously [10]. Inflation has a positive and negative impact depending on whether inflation is high or not. When inflation is low, it has a positive influence in the sense that it can push the economy towards a better direction, but if inflation is too high, it will cause chaos. High inflation rates are usually associated with *overheated* economic conditions.

• Exchange rate

According to [11] the exchange rate is the price of a currency relative to another country's currency. Exchange rate plays a vital role in spending decisions for the exchange rate makes it possible to translate the prices of various countries into a common language. If all other conditions are assumed consistent, then the depreciation of a currency against all other currencies (an increase in the price of foreign exchange for the country concerned) causes cheaper exports and more expensive imports. While appreciation (a decrease in the price of foreign exchange in the country concerned) makes exports more expensive and imports are cheaper .

• Export

Exports are traded by sending the goods from a country to overseas with several regulations. A country's exports occur because of the benefits obtained from foreign trade transactions. [12] states "Export is shipping goods out Indonesian customs area. Export means selling goods/services to foreign countries. Export is the activity of sending goods and services from Indonesia's customs inspection [13]. According to [14], the benefits of export activities are expanding the market for Indonesian

products, increasing foreign exchange and expanding employment. [15] explained that export activities are divided into two, direct export and indirect exports.

• Economic growth

Economic growth is an increase in the economic activities of the community which causes an increase in the production of goods and services or an increase in national income. Also, economic growth can also be interpreted as the process of continuously changing the economic condition of a country towards a better condition in a certain period. Economic growth according to [14] is the development of activities in the economy that led to the goods and services produced in the community grows. This addition is due to production factors that will always experience an increase in the number and quality. Economic growth can indicate the success of economic development in people's lives. One way to calculate economic growth is reflected in the gross domestic product (GDP). In general, the calculation of economic growth is carried out every three months and yearly. Moreover, according to Kuznets in [16] economic growth is a long-term increase in a country's ability to provide more and more types of economic goods to its population.

3.   Research Methodology

In this study, the authors took on stocks included in Kompas 100 for the period 2013-2017 as a research object. According to [17], the research method is a scientific way to obtain data for particular purpose and objective. From this understanding, it can be said that the research method is a scientific method and procedure to obtain data, systematically, and it is a procedure of how a study is carried out. The reason for selecting the sample using purposive sampling method in this study is because not all of the samples have the criteria with which the authors specify. For example, a company that is registered consistently during the study period. Based on the calculation, the number of samples used in this study is 46 companies. The research method in this study is quantitative methods. Data processing is conducted using Eviews 9.0 software. To clarify the variables , from what was formulated in the description above, that if the problem studied is the Capital Asset Pricing Model with beta (X_1), Arbitration Pricing theory with exports (X_1), inflation (X_2), exchange rates (X_3), economic

growth (X_4) and excess return (Y). While the value of R^2 or R Square and value Prob(F-statistic) is used to see a better model in predicting or explaining excess return.

4. Results and Discussion
4.1. CAPM Panel Data Regression Results

Table1. Results of CAPM Panel Data Regression

Dependent Variable: EXCESS_RETURN				
Method: Panel EGLS (Cross-section random effects)				
Date: 03/11/19 Time: 10:30				
Sample: 2013 2017				
Periods included: 5				
Cross-sections included: 46				
Total panel (balanced) observations: 230				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.517500	2.79E-05	90167.71	0.0000
BETA	2.28E-05	9.11E-06	2.507698	0.0128
R-squared	0.031086	Mean dependent var		2.517561
Adjusted R-squared	0.026837	S.D. dependent var		0.000193
S.E. of regression	0.000191	Sum squared reside		8.29E-06
F-statistic	7.315117	Durbin-Watson stat		2.825824
Prob(F-statistic)	0.007354			

Excess Return = **2.517500 + 2.28E-05 + e**

a. Constant = **2.517500** states that if Beta equal to zero and there is no change, then excess *return* (Y) is **2.517500**.

b. The value of the regression coefficient beta (X_1) is positive for **2.28E-05** which means that every increase of 1 unit of beta (X_1) will be increase *return* (Y) as big as **2.28E-05** unit.

Based on the Data Panel Regression Results, the prob value (F-statistic) is 0.007354 <from the alpha value (0.05); therefore, H0 is rejected, meaning that there is significant influence

between beta (X) on *excess return* (Y). Also based on the Data Panel Regression Result the magnitude of the effect of beta (X_1) on *excess return* (Y) is 0.026837 or 2.68 % while the remaining 97.32 % is influenced by other factors outside the variables studied. Partial hypothesis testing is carried out to show the influence of individual independent variables on the dependent variable constantly, by comparing the Sig. Probability t_{count} and value sig. you have predetermined (α). It can be explained that there is a significant effect between beta (X_1) on *excess returns* on companies' shares listed as Kompas 100.

4.2. Results of the APT Data Panel

Table2. Results of the APT Data Panel

Dependent Variable: EXCESS_RETURN				
Method: Panel Least Squares				
Date: 03/11/19 Time: 10:08				
Sample: 2013 2017				
Periods included: 5				
Cross-sections included: 46				
Total panel (balanced) observations: 230				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27.39077	3.826860	7.157506	0.0000
Export	0.154122	0.390137	0.395045	0.6932
Inflation	-0.462018	0.059473	-7.768489	0.0000
Exchange rate	-37.07490	5.428918	-6.829152	0.0000

Economic Growth	-4.563522	0.665197	-6.860407	0.0000
R-squared	0.345730	Mean dependent var		1.197794
Adjusted R-squared	0.334099	S.D. dependent var		0.018038
S.E. of regression	0.014720	Akaike info criterion		-5.577757
Sum squared resid	0.048751	Schwarz criterion		-5.503016
Log-likelihood	646.4420	Hannan-Quinn criteria.		-5.547608
F-statistic	29.72374	Durbin-Watson stat		2.640699
Prob(F-statistic)	0.000000			

Excess Return = 27.39077 + 0.154122X_1 - 0.462018X_2 - 37.07490X_3 - 4.563522X_4 + e

a.   The constant = **27.39077** states that if the export variable (X_1), inflation (X_2), exchange rate (X_3), and economic growth (X_4) equal to zero and there is no change, then the value of *excess return* (Y) is **27.39077**.

b.   Regression coefficient value of exports (X_1) is positive, amounting to **0.154122** which means that every increase in 1 unit of export (X_1) will be increase *excess return* (Y) value **0.154122** unit.

c.   The regression coefficient of inflation (X_2) has a negative sign of **0.462018** which means that every increase in 1 unit of inflation (X_2) will be decrease *excess return* (Y) value **0.462018** unit.

d.   The regression coefficient of the exchange rate (X_3) has a negative sign of **37.07490** which means that every increase in 1 unit of exchange (X_3) will decrease *excess return* (Y) value **37.07490** unit.

e.   The regression coefficient of economic growth (X_4) is negative **4.563522** which means that every increase in 1 unit of economic growth (X_4) will decrease *excess return* (Y) value **4.563522** unit.

Based on the Data Panel Regression Results, it is known that the probability value (F-statistic) is 0.00000 0 <from the alpha value (0.05), therefore H0 is rejected, meaning that there is a significant influence between exports (X_1), inflation (X_2), exchange rates (X_3), and economic growth (X_4) to *excess return* (Y). Furthermore, the magnitude of the effect of exports (X_1), inflation (X_2), exchange rate (X_3), and economic growth (X_4) on *excess return* (Y) is 0.334099 or 33.41 % while other factors other than the variables influence the remaining 66.59 %. Partial hypothesis testing is carried out to show the influence of individual independent variables on the dependent variable regularly, by comparing the Sigprobability t $_{count}$ and sig value. It haspredetermined (α). Based on the results of data regression panel, it can be explained that (1) there is no significant effect between exports (X_1) to the *excess return* on stocks of listed companies on Kompas 100. (2) there is a significant effect between inflation (X_2) on *excess returns* on companies' shares listed on Kompas 100. (3) there is a significant effect between exchange rates (X_3) on the *excess return* of company stocks that are listed on Kompas 100. (4) there is a significant effect between economic growth (X4) on *excess returns* on shares of companies listed as Kompas 100.

5.   Discussion

5.1.   Effect of Capital Asset Pricing Model on excess stock return (Y)

From this study, it was found that beta variables affect*excess* stock *returns.* However, the magnitude of the effect of the beta variable on stock *excess return* (Y) is only equal to 2.68 % which means the ability to explain variations in *excess return* very small. CAPM is considered not good enough to be used to estimate returns because the market return is taken only by using the JCI value. While it is known that the Indonesian capital market is not yet an efficient capital market so it will cause bias. [18] state that if the beta value is getting higher, then the expected increase will be even smaller. Also, in calculating the JCI value, the stocks that are not actively traded will also be counted. As a result, it will cause the possibility of failure of empirical CAPM testing and the portfolio formed does not reflect the overall possibility of the existing portfolio.

Based on results our study, it argues that beta is not the right measurement tool for measuring risk because of the taxes effects, abnormal returns, no risk-free assets and differences in interest rates on loans and deposits. However, we believe that the CAPM is still a useful estimation tool because it can be used as a benchmark. The small effect of CAPM certainly implies that there are other factors outside the research model that affect the excess return from Kompas 100. The other factors can be company performance, company size or other factors. However, investors can use the beta as an indicator to consider that stock returns which can be a basis for the decision to invest but, referring to the results of this study, the accuracy is deficient. The results of other studies supporting this research were carried out by Ezekiel Oseni and [19]; [20].

5.2. Effect of Arbitration Pricing Theory on excess stock return (Y)

From this study, it was found that the export variable (X_1), inflation (X_2), exchange rate (X_3), and economic growth (X_4) had a joint effect on *excess return* stock. The amount of export variable (X_1), inflation (X_2), exchange rate (X_3), and economic growth (X_4) on stock *excess return* (Y) is 33.41 % while other factors outside the variable influence other 66.59 %. It means that investors can use the value of exports, inflation, exchange rates, and economic growth as indicators to consider stock returns, especially in the Kompas 100 index. It can be used as a basis for making decisions to invest. Also, there are also various internal factors that are not available in this study, so that this causes the ability to explain the return is not optimal. Company internal factors that can be used are company performance, company size, and other factors. The results of other studies supporting this research were conducted [18]; [21].

6. Conclusions & Suggestions

In this study, the researcher has a goal to predict stock excess return by comparing the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) models in Kompas 100 shares on the Indonesia Stock Exchange (IDX). This study concludes that the Arbitrage Pricing Theory (APT) model can be developed to improve the weaknesses of the previous estimation model (CAPM). It is because the assumptions in the CAPM model often cannot be fulfilled in the real world. Also, because the factors that affect stock returns in the CAPM model only use market returns as a basis for determining returns in the future. However, the APT model shows better performance when compared to the CAPM model. APT model in estimating the stock returns uses some macroeconomic variables that may affect the relationship between return and risk of a company; therefore, this is a better model to determine the future returns for an investor. Based on the results of the research, discussion, and conclusions of the author, this study still contains several limitations and is expected to be refined in subsequent studies, such as expanding the research focus and extending the research period so that the results obtained will be more comprehensive [22, 23]. Also, it can add risk factors for determining the returns. The Arbitrage Pricing Theory (APT) method can be applied because this method assumes more than one determinant factor that affects the stocks return. Unlike the Capital Asset Pricing Model (CAPM) method which only assumes only one risk factor, namely systematic risk or market risk.

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