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A Sectoral Stock Investment Strategy Model in Indonesia Stock Exchange

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Abstract

This study aims to obtain a stock investment strategy model based on the industrial sector in Indonesia Stock Exchange (IDX). This study uses IDX data for the period of January 1996 to December 2016. This study uses the Markov Regime Switching Model to identify trends in market conditions that occur in industrial sectors on IDX. Furthermore, by using the Logit Regression Model, we can see the influence of economic factors in determining trends in market conditions sectorally and the probability of trends in market conditions. This probability can be the basis for determining stock investment decisions in certain sectors. The results showed descriptively that the stocks of the consumer goods industry sector had the highest average return and the lowest standard deviation. The trend in sectoral stock market conditions that occur in IDX can be divided into two conditions, namely bullish condition (high returns and low volatility) and bearish condition (low returns and high volatility). Differences in the conditions are mainly due to differences in volatility. The use of a Logit Regression Model to produce probability of market conditions and to estimate the influence of economic factors in determining stock market conditions produces models that have varying predictive abilities.

Keywords: Investment Strategy, Markov Regime Switching Model, Logit Regression Model, Stock Market Conditions

JEL Classification Code: E37, G10, G11, G12, G17

1. Introduction

The investment strategy as an outline is a way to achieve the investment objectives made. One of the goals of investing is to obtain capital gains (positive price changes from the sale and purchase of shares). In this case, investors usually carry out an active strategy. The strategy is to move from one stock to another or replace the shares in the portfolio and take a position to buy and sell shares gradually by looking at market conditions, whether they are rising or falling. This

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requires attention to the development of information on the capital market and the economy that occurs continuously.

Stock market conditions are closely related to the economic conditions of a country. Stock market conditions and the ever-changing national economic conditions create uncertainty for investors to gain profits. This makes investors always careful to determine which strategic actions to invest in. The low frequency up and down trend has been known as bullish and bearish, respectively. Identification of bullish and bearish conditions can be used as input into investment decisions and risk assessments (Maheu et al., 2012). Stock market conditions are closely related to the economic and financial conditions of a country. Changes in economic and financial conditions will affect stock market conditions. This creates uncertainty for investors to invest their funds.

Some researchers try to link stock returns with several economic and financial risk factors, such as interest rate (Maysami & Koh, 2000; Gan et al., 2006; Rahmi et al., 2016), currency exchange rates (Lee & Zhao, 2014; Parsva & Lean, 2017; Lee & Brahmasrene, 2018) and oil prices (Jones & Kaul, 1996; Gan et al., 2006; Echchabi & Azouzi, 2017). From these studies, these variables are related to stock returns and are used to predict stock returns. In connection with the investment in common stock, investors will be faced with various choices of industrial sectors, both for

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single investment purposes and for portfolio investment. This indicates that investors need an analysis of various industrial sectors. Sectoral investment analysis is important to make it easier for investors to make investment choices (Jones, 2007).

All issuers listed on the Indonesia Stock Exchange (IDX) are classified into nine sectors, namely: the agricultural sector, the mining sector, the basic industrial sector and chemicals, the miscellaneous industry sector, the consumer goods industry sector, the property sector, real estate and buildings, infrastructure, utilities and transportation sector, financial sector, trade, services and investment sectors. Based on the description above, we researched and wrote a study entitled: Sectoral Stock Investment Strategy Models in the Indonesia Stock Exchange.

This research will focus on identifying stock market conditions by sector, whether it will be bullish or bearish. The results of identification of market conditions will then be used as dichotomous variables, in the logit regression model. The logit regression model will estimate the probability of a trend in market conditions by sector as a result of the influence of economic and financial variables. Furthermore, these opportunities are used as the basis for making stock investment decisions in certain sectors.

The economic and financial variables that will be included in the model are: interest rates, currency exchange rates, the price of crude oil (Indonesia crude price/ICP). The model allows the beta of economic and financial variables to vary in each sector in influencing market trends by sector. Therefore, this beta shows how the stock market conditions that occur sectorally respond to each economic and financial variables. The model to be obtained is used as a model for sectoral stock investment strategies in the Indonesia Stock Exchange.

2. Literature Review

Fabozzi and Francis (1977) conducted a study using a modified Capital Assets Pricing Model (CAPM) with a single factor to the model for separate exposure of individual stocks in both market trends, namely up market and down-market conditions. They reached the conclusion that the level of market optimism does not significantly affect the intercept and the regression slope coefficient. This study found that the null hypothesis of no interaction with market type is correct. Khalid et al. (2013) conducted research on the Karachi Stock Exchange, Pakistan, using a model formulated by Fabozzi and Francis (1977). Their research results concluded that all oil sector stocks show a significant difference in beta between bullish and bearish conditions. In the banking sector, three out of eight stocks refused to show no difference. The results of this study indicate that stock returns may have different responses to the factors that influence different stock market conditions.

The market portfolio concept was criticized and a multi-factor asset pricing model was developed under the arbitrage

pricing theory (APT). This is seen as an alternative to CAPM as an efficient asset pricing in the capital market. The APT model is also called the risk factor model. The multi-factor asset pricing model is generally based on the assumption that stock returns are influenced directly or indirectly by a number of different economic factors. Information on economic and financial variables can predict an important part of stock returns (Butt et al., 2010).

One of the modeling-based methods for identifying stock market conditions is the Markov regime-switching model pioneered by Hamilton (1989). In this approach, the state of the stock market follows the first order of the Markov process with a certain number of regimes. The number of regimes can be set equal to two regimes (bullish and bearish) or greater. Turner et al. (1989), Maheu and McCurdy (2000), Ismail and Isa. (2008), and Panggabean (2010) using the Markov-switching model can capture non-linear structures in the mean and variance of returns. The model sorts return into two conditions, namely high and stable return conditions and low and volatile return conditions, which are then labeled as bullish conditions (high return and low volatility) and bearish conditions (low return and high volatility).

Financial time series data, especially stock prices, always experience shock events. This condition motivates the use of regime switching models (Ismail & Isa, 2008). Panggabean (2010) uses Markov regime switching model to identify Indonesian stock market conditions. Liu et al. (2011) used a three-factor model size, yield spread and credit spread, and used the dependent Markov switching model. They concluded that the response of sectoral stocks to changes in these factors varies based on market conditions that occur. Defrizal et al. (2015) identified the stock market in general then looked at how economic and financial factors affect sectoral stock returns based on different market conditions. He concluded that economic and financial factors simultaneously affect sectoral stock returns in both bullish and bearish conditions.

The multi-factor model to be studied is to make stock returns a dichotomous dependent variable (market conditions are bullish or bearish). Economic and financial variables are used as the independent variables model. Furthermore, the estimation results of the multi-factor model using logit regression models produce a probability magnitude of whether the stock market conditions in certain sectors will experience a bullish or bearish condition. The investment strategy is developed based on the probability values obtained from the model.

3. Research Method

This study will use monthly time series data from January 1996 to December 2016 (252 monthly data series). The fully observed data are secondary data which include: (1) sectoral stock price index (SSI); (2) Bank Indonesia Certificates interest rate; (3) The exchange rate of the rupiah against the

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United States dollar; (4) The price of Indonesian crude oil (Indonesia Crude Price/ICP).

3.1. Analysis Design

This research is carried out according to the line of thought which reveals that this research is based on the identification of the bullish and bearish periods on the Indonesia Stock Exchange using the Markov model switching regime. Furthermore, from the identification, a regression is carried out on the return of sectoral stocks on various economic and financial variables. This regression is to see the effect of various economic and financial variables on the condition of the stock market by sector in a bullish or bearish condition. This study uses a logit regression model approach

Stage 1. Performing Data Validity

At this stage the data validity was carried out through the stationarity test (Augmented Dickey-Fuller (ADF) test and normality (Jarque-Bera (JB) test) (Gujarati and Porter, 2009).

Stage 2. Conduct descriptive analysis of sectoral stock returns and economic and financial variables.

At this stage, a descriptive analysis is carried out on the research variables which include sectoral stock returns and economic and financial variables. The goal at this stage is to provide an overview in order to determine the characteristics of each research variable to be analyzed. This analysis uses descriptive statistical methods. The descriptive method is used to determine the mean and standard deviation return of sectoral stocks for each sector on the Indonesia Stock Exchange.

Stage 3. Identify the bullish and bearish periods.

At this stage, the identification of bullish and bearish stock market conditions by sector is carried out using the Markov Switching Model. Here it will be seen whether there is a sectoral switching on the stock market for each sector on the Indonesia Stock Exchange. We will also describe the condition of the stock market sectorally on the Indonesia Stock Exchange during the observation period. At this stage, bullish and bearish periods will be determined for each sector on the Indonesia Stock Exchange. Furthermore, based on this data, logit regression analysis is carried out to see how economic and financial variables can affect the likelihood that the stock market will experience a bullish or bearish condition. Parametric method based on the Markov Switching Model (MSM) was introduced in economics by Hamilton (1989). Hamilton & Lin (1996); Maheu & McCurdy (2000) and Chen (2009) use this approach to identify bullish and bearish regimes and study volatility dynamics and make portfolio decisions.

r_{it} = *return* from SSI in sector i time t, calculated from the logarithm of change in SSI_{it} (Y_{it})

$r_{it} = 100. \ln (Y_{it}/Y_{it-1})$

S_t = i, is the market condition variable, i = 0; 1 S_t = 0, *bearish* condition

S_t = 1, *bullish* condition

Then the Markov-Switching Model with two conditions, where both *mean* μ_{S_t} and the variance-covariance Ω_{st} varies with the condition S_t, given by,

$$r_{it} = \mu_{S_t} + \varepsilon_t$$

ε_t i. i. d~N(0, Ωst) The condition variable S_t is assumed to be governed by the first order Markov chain process with the transition probability, p_{ij}, given by

$$p_{ij} = P\{S_t = j \mid S_{t-1} = i\}$$

i,j = 0,1 in particular, p_{11} = P{ S_t = 1 │ S_{t-1} = 1} indicates the possibility of starting in a *bullish* condition and ending in the same condition and p_{00} = P{ S_t = 0 │ S_{t-1} = 0 } is the probability of a *bearish* condition given that the previous conditions were also *bearish*. The survival of the regime can be counted as 1 / (1 - p_{11}) for *bullish* and 1/(1 - p_{00}) in case of bearish conditions. Parameters and probabilities are estimated through maximum likelihood.

Stage 4. Build a predictive model to estimate the likelihood that market conditions will be bullish or bearish due to changes in economic variables.

Furthermore, the results of the identification of stock market conditions by sector are measured using the Markov switching model. You will get periods of stock market conditions for each sector when it is bullish and bearish.

Model logit:

$$Logit = \ln\left(\frac{p}{p} - 1\right) = \beta_0 + \beta_1 IR + \beta_2 ER + \beta_3 ICP$$

Information:

Market Condition = *Bullish* = 1

Bearish = 0

p = probability of a bullish condition

IR = Interest Rate

ER = Currency Exchange Rate

ICP = Indonesian Crude Oil Price

Stage 5: Develop an alternative sectoral stock investment strategy

The probability value generated by the model above can be used as a basis for investment decisions that should be made by investors. With a number of investment funds owned by a potential investor, he can build an investment portfolio based on the logit model. The amount of probability is used as the proportion of investment that investors must invest in common Stocks in the sector, while the remaining proportion can be invested in assets with relatively low risk, such as Bank Indonesia Certificate.

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Table 1: Operational variable

Variables	Variable Concept	Indicators	Unit
Stock Market Conditions	The market trend that occurs, whether an uptrend (bullish) or a down trend (bearish)	Bullish = 1 Bearish = 0 Identifying conditions using markov regime switching model	
Sectoral stock returns	General returns from stocks by sector in the Indonesian capital market	$r_i = (lnSSI_{it} - lnSSI_{it-1}) * 100$ SSI_{it} = sector i stock price index in month t	%
Interest rate	The interest rate for a one-month Bank Indonesia certificate as the benchmark interest rate in Indonesia	Proxy of interest rate for Bank Indonesia Certificates in month t	%
Currency exchange rates	The exchange rate of the rupiah against the United States dollar	Proxy of the rupiah exchange rate against the US dollar in month t	Rp
Crude oil price	World crude oil price in US dollars per barrel	Proxy of Indonesian crude oil price in month t	$

4. Results and Discussion

4.1. Data Validation

Stationarity of data and normality of data can be seen in table 2.

Based on the results of data processing it can be seen that all research variables of stock market returns, interest rates, currency exchange rates and Indonesian crude oil prices as well as sectoral stock returns on the stock exchange Indonesia's effect in stationary conditions. Meanwhile, the normality of all data on the research variables was not normally distributed.

4.2. Descriptive Statistics

Descriptive statistics of return on sectoral stocks in the 1996-2016 period can be seen in Table 3..

Stocks that are members of the consumer goods industry sector are those that have the highest average rate of return, followed by stocks, shares in the agricultural sector, respectively amounting to 1.2 percent per month or 14.2 percent per year and 1.06 percent per month or 12.72 percent per year. Meanwhile, stocks of the basic industry sector and the property sector were the sectors with the lowest average monthly returns of 0.62 percent and 0.64 percent, respectively. The level of risk in stock investment can be seen from the standard deviation of the return. Based on this measure, shares in the consumer goods industry and basic industrial sectors are stocks that have the lowest relative risk of 8.13 percent and 8.90 percent, respectively. The stocks with the highest level of risk were agriculture and mining sectors, with the risk level of 11.92 percent and 11.33 percent, respectively. Based on these two descriptive statistical measures, in general the consumer goods industry sector is the best sector for investors to choose in investing in stocks in the Indonesian capital market because it has the relatively highest return rate with the lowest level of risk.

4.3. Stock Market Trend by Sector

The identification of stock market trends by sector using Markov switching regression model can be seen in Table 4. In general, market switching from bullish to bearish and vice versa occurs in the Indonesian stock market. From the results of attachment 3 it can be concluded that regime switching occurs in all existing sectors.

Regime switching in the Indonesian stock market occurs due to the differences in market volatility. This can be seen from the results of Table 4 standard deviations. All are significant in every existing sector. Bullish market conditions are indicated by the average return on *bullish* conditions (μ_1) which is greater than *bearish* conditions (μ_2). Meanwhile, from the risk level which is also a measure of return volatility, a bullish condition is characterized by a *bullish* standard deviation (S_1) which is lower than the standard deviation of a *bearish* condition (S_2).

Bearish market conditions are indicated by the average return (μ_2) in this condition is smaller than bullish conditions (μ_1). Meanwhile, from the risk level which is also a measure of return volatility, bearish conditions are characterized by *bearish* volatility (S_2) which is higher than *bullish* volatility (S_1).

4.4. Building a Prediction Model

Estimation is to be made for the probability value of market conditions to be *bullish* or *bearish* in relation to changes in economic variables using a logit regression model. The results of data processing from the logit model can be seen in Table 5.

Table 2: Data Validity

Variables	JB *Test*		ADF *Test*	
	Jarque-Bera	Prob.	t-stat	Prob
IR	3161,7	0,000	-7.362	0.000
ER	22915,0	0,000	-13.970	0.000
ICP	73,7	0,000	-11.337	0.000
r_Agriculture	368,9	0,000	-11.537	0.000
r_Mining	211,6	0,000	-12.695	0.000
r_Basic Industry	65,6	0,000	-11.708	0.000
r_ Miscellaneous Industry	210,1	0,000	-13.692	0.000
r_Consumer Goods Industry	134,8	0,000	-13.222	0.000
r_Property	108,6	0,000	-13.006	0.000
r_Infrastructure	581,3	0,000	-13.244	0.000
r_Finance	143909,8	0,000	-12.554	0.000
r_Trade	142174,7	0,000	-14.719	0.000

Table 3: Descriptive Statistics (Average and Standard Deviation) of Sectoral Stock Returns for the period of January 1996 - December 2016

Variable	Mean	Standard Deviation
r_Agriculture	**1.057**	11,920
r_Mining	1,029	11,337
r_Basic Industry	0,620	9,312
r_ Miscellaneous Industry	1,033	8,898
r_ Consumer Goods Industry	**1,202**	**8,130**
r_Property	0,635	11,027
r_Infrastructure	0,882	10,340
r_Finance	0,797	9,068
r_Trade	0,795	9,440

Table 4: The Estimation of Parameters of Markov Regime Switching Model of Sectoral Stock Return

Sectoral Stock	Parameters			
	μ_1	μ_2	S_1	S_2
Agriculture	1,660**	-3,677	1,706***	3,173***
Mining	2,765	0,568	2,046***	1,972***
Basic Industry	1,432***	-2,023	1,914***	2,671***
Miscellaneous Industry	1,621	-2,460	2,047***	2,726***
Consumer Goods Industry	1,333***	0,489	1,751***	2,749***
Property	1,852***	-4,779	2,099***	2,897***
Infrastructure	1,255***	0,114	1,687***	2,790***
Finance	1,706***	-2,845	1,877***	2,710***
Trade	1,494***	-2,947	1,791***	2,863***

***) significant at 1% level   **) significant at 5% level

Table 5: Summary of Estimation of Variables Influence on Stock Market Trends by Sector

Sectoral Stocks	Parameters					
	Constant	βIR	βER	βICP	LR$_{Stat}$	R$^2_{McF}$
Agriculture	6.826***	0.402***	0.001***	0.059***	94.58***	0.634
Mining	3.360***	0.091***	-0.001	-0.010	27.73***	9.115
Basic Industry	4.999***	0.330***	0.000	0.007	86.22	0.315
Miscellaneous Industry	4.686***	-0.085**	0.000	-0.022	5.10	0.124
Consumer Goods Industry	-2.584	-0.076	0.000	0.215**	119.9***	0.581
Property	0.267	-0.139*	0.000	0.112**	114,1***	0,535
Infrastructure	16.26***	1.518***	0.001***	0.333***	262.5***	0.853
Finance	2.384**	0.162***	0.000	0.019	80.71***	0.3429
Trade	4.082***	0.285***	0.000*	0.002	89.90***	0.3895

***) significant at 1% level   **) significant at 5% level *) significant at 10% level

This prediction model describes how stock market conditions respond sectorally to changes that occur in economic and financial variables. In general, the prediction model results are satisfactory. This can be seen from the fairly good predictive ability of the model. The McFadden R-squared value for all sectors is above 30 percent except for the mining sector, 11.4 percent, and the miscellaneous industrial sector, 12.4 percent.

The effect of negative interest rates on the probability that sectoral stock market conditions will be bullish occurs in all sectors on Indonesia Stock Exchange. This means that if there is an increase in the benchmark interest rate, it will have an impact on the decrease in the probability that market conditions to be bullish in all sectors on the Indonesia Stock Exchange. Partially the interest rate has a significant effect at a significant level of one (1) percent in all existing sectors. This condition reflects that the Bank Indonesia benchmark interest rate is a variable that largely determines the direction of sectoral movement of the stock market to be bullish on Indonesia Stock Exchange.

The effect of negative currency exchange rates on the probability of bullish conditions on the stock market occurs in the mining sector, the consumer goods industry sector and the infrastructure sector. This means that if there is an increase in the exchange rate, it will have an impact on the decrease in the probability that market conditions to be bullish in these sectors. The effect of positive currency exchange rates on the probability of a bullish sectoral stock market condition occurs in the agricultural sector, basic industrial sector, various industrial sectors, property sector, financial sector and trading sector. This means that if there is an increase in the exchange rate, it will have an impact on the probability of increasing market conditions to be bullish in these sectors. Currency exchange rates have a significant effect on the agricultural sector, the infrastructure sector and the trade sector.

The negative effect of Indonesian crude oil prices on the probability that the stock market conditions will be bullish in the agricultural sector, the mining sector, the basic industrial sector, various industrial sectors and the trade sector. This means that if there is an increase in the price of Indonesian crude oil, it will reduce the probability of market conditions becoming bullish in these sectors. The effect of Indonesia's crude oil price is positive on the probability of a bullish condition on the stock market in the consumer goods industry, the property sector, the infrastructure sector and the financial sector. This means that if there is an increase in the price of Indonesian crude oil, it will have an impact on the probability of increasing market conditions to be bullish in these sectors. The price of Indonesian crude oil has a significant effect on the agricultural sector, the consumer goods industry sector, the property sector and the infrastructure sector.

4.5. Sectoral Stock Investment Strategy

Investors can carry out sectoral stock investment strategies by predicting market conditions in certain sectors to be bullish. Any changes in economic variables will affect the stock market conditions sectorally. The results of the probability prediction of a bullish stock market condition will be used as the basis for determining the proportion of investors' investment portfolios in that sector.

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5. Conclusion

Based on the results and discussion, it can be concluded that:

1. Stocks of the consumer goods industry and agriculture sector are stocks that have the highest average return. The stocks of the basic industrial sector and the property sector are stocks that have the lowest yields. The level of risk is reflected in the standard deviation of the return. Stocks that have a low risk are stocks from the consumer goods industry and basic industries, while stocks that have a high risk are stocks from the agricultural and mining sectors. The consumer goods industry sector stocks are the best stocks because they have a high average return and low risk.

2. The condition of the Indonesian stock market in a sectoral manner experiences a switching regime so that it can be divided into two conditions, namely a bullish condition (a condition where the average return is high and the level of risk is low/stable) and a bearish condition (a condition where the average return is low and the level of risk is high/volatile). Differences in sectoral stock market conditions turned bullish and bearish mainly due to the differences in volatility.

3. The logit regression model is generated to predict the possibility of a bullish market condition for each sector on the Indonesia Stock Exchange as a result of changes in economic and financial variables which have varying predictive abilities.

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