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MULTIFACTOR ON MACROECONOMIC FUNDAMENTALS TO EXPLAIN THE BEHAVIOR OF SECTORAL INDICES IN INDONESIAN STOCK EXCHANGE

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Abstract

The purpose of this study is to investigate the impact of macro-fundamentals using factor approach on sectoral indices on Indonesia Stock Exchange. This study used monthly data of the returns of sectoral indices and utilized the Seemingly Unrelated Regression (SUR) analysis with multifactor model. The results show that macro economic variables can be classified into 2 common factors, Monetary Macro Factor (MMF) and Real Macro Factor (RMF). These factors give different effect to sectoral indices. Due to different characteristics embodied in each sector, sectors then respond differently towards the change in macroeconomic conditions in Indonesia. The MMF is dominated by variables: BI Rate, inflation, and the exchange rate, while the MRF by other variables: foreign exchange reserves, exports, and Indonesia crude oil prices. The MMF negatively affects indexes of: basic industry and chemical, consumer goods, infrastructure, manufacturing, mining, miscellaneous industry, property and trade, while the RMF has negative effect on mining sector. By applying the multifactor model combining with auto regression component of the factor of dependent variables, the model provides higher predictive power for the price behavior in each sector. This study suggests for researchers for comparing multifactor model and other methods such as CAPM, and Five Factor Model of Fama and French.

Keywords: Macroeconomic, Sectoral Indices, Macro-fundamental, Factor Approach, Multifactor, Fama and French

1. Introduction

Macro-economy has complicated impact on capital market. Abundantly macro variables have direct or indirect effects on capital market in a country. The impact can be investigated in terms of the change in returns (Angelidis, Sakkas *et al.* 2015, Apergis 2015, Bekiros and Gupta 2015, Aissia 2016, Bouri, Awartani *et al.* 2016), The change in returns becomes the concern of investors. In the midst of uncertainty economic conditions, people are likely to secure the potential of their assets, and consider how to take advantage of its assets in order to remain valuable in long term (Isyuk 2013, Hung, Azad *et al.* 2014, Bouri 2015, Couch and Wu 2016). One kind of investment is trading in capital market. Capital market have important roles in economy as for funding business and for investment. People can invest in available financial instruments such as stocks, bonds and mutual fund. Thus, the public can put its own funds based on the characteristics of the benefits and risks of different instruments. Macroeconomic conditions and

the performance of capital markets have a strong relationship. Capital markets can describe macro economic conditions due to macroeconomic conditions affected the investment value. When in 2008 during the global crisis, Indonesian economy weakened by the high inflation rate 11%, followed by capital market conditions weakened described by JCI (Jakarta Composite Index) value 1355 points. In 2009 after the crisis, economic conditions in Indonesia got better, followed by the increasing of JCI (Jakarta Composite Index). It can show how macroeconomic conditions relates to capital markets.

In addition to the analysis of economic conditions, investors can use analysis of the industry or sector. In sectoral analysis, investors can compare the performance of various sectors, in order to know which sectors have good prospects for investment. There are 10 sectors Indonesian stock market that can be used for investment: agriculture, mining, basic industry, miscellaneous industries, consumer goods, property, infrastructure, finance, trade and services, manufacturing. After conducting industry analysis, investors can use the information as a strategy to choose which sectors will be included in the portfolio to be formed. Similarly to JCI, macroeconomic conditions may affect sectoral indices, because macroeconomic can affect the performance of a company. In the end company's performance can affect the price of stocks and of sectors. Research about the effect of macroeconomic factors to sectoral indices have been investigated by Hasan (2011) to see the effect of macroeconomic factors: GDP growth, the growth of money supply, inflation and interest rates of index return of ten sectors in Bangladesh. The results of this research are all of macroeconomic variables affect the financial sector. All macroeconomic variables do not affect investment sector, engineering, garment, paper & production, services, insurance and miscellaneous industries. Inflation and interest rates effect food sector and sector of medicine and chemistry.

Abnormal return often occurs in stock market because of the delivery of the information that cause market anomaly. Based on random walk theory, stock prices move randomly and unpredictable. In an efficient market, the information disseminated by the market will respond quickly and rationally, so it is possible for emergence of anomalies and earned abnormal returns. In an efficient market there is no “over information”, because the market price is formed based on the reflection of all the information. In an efficient market, the seasonal pattern of returns that can be predicted by the investor should not occur. It is against the empirical theory of efficient markets that states "no one can beat the market". The conditions that can not be predicted with paradigm or empirical theory in stock market is called market anomalies. In other words, market anomaly is a symptom of irregularities or inconsistency of the capital market hypothesis.

However, previous studies indicate that anomaly conditions are often found in capital market. Keong et al (2010) found that there is evidence of anomalies in certain months that different from one country to another. Research on stock markets in developed countries ever undertaken by Marrett and Worthington (2013). The results showed that the stock market return of the Australian have a maximum return in April, July and December for stocks with large market capitalization value. For a group of stocks with small market capitalization value will have a maximum return in January, August and December. Meanwhile in Indonesia conducted research by Sanjoko (2013) showed there is monthly effect to stock return in Indonesia Stock Exchange on November and December. Another study conducted by Pujiharjanto (2010) which showed a positive effect to Jakarta Composite Index in October and November. Based on the above exposition author need to develop a research about effect of macroeconomic factors on stock price indices of ten sectors and month of the year effect phenomenon on stock price index of ten sectors, since previous research gave various results regarding macroeconomic factors on stock price index and there has been no discussion about effect of macroeconomic factors and month of the year effect phenomenon to each sector in Indonesia.

2. Literature Review

Capital market is a market for a variety of long-term financial instruments that can be traded, either in the form of debt or equity capital (Husnan, 2003: 3). According to Tandelilin (2001: 3) investment is a commitment to sacrifice current consumption to enlarge consumption in the future. Investment can be associated with save funds on real assets such as land, gold, houses and other real assets. Or in financial assets such as: deposits, stocks, bonds, and other securities. Stock is one of investment instruments in capital markets. Stock can be used as an investment for

investor. Investment in stocks is more advantageous compared to other instruments. In Indonesia, capital market investment is growing every year because of many foreigners (outside Indonesia) see the stock market of Indonesia is prospective and may evolve in the long term.

Before investing in stock market, investor needs to do an analysis of the stock to obtain information about the stock that will be used as an investment. There are two techniques: technical analysis and fundamental analysis. According to Wira (2014: 3) fundamental analysis is an analysis that use various factors such as the performance of the company, business competition analysis, industry analysis, analysis of macro-economic and micro-markets. Analysis of macroeconomic or market conditions. At this stage, investors see macroeconomic conditions and the condition of the capital market as a whole. Investors analyze various alternative decisions about the allocation of investment. In industry analysis, based on the analysis of macroeconomic and market determine the industry / sector what can be used as an investment option, that would have good prospects in the future and provide optimum profits for investors. According to Tandelilin (2001: 209) company's prospects are highly depend on economy as a whole, so that in stock valuation analysis, investors should pay attention to macro variables that can affect the company's ability to generate profits. Basically there is a correlation between macroeconomic and sectoral conditions. Macroeconomic could affect daily activities of the company, the impact will affect the performance of each company. At the end, it will affect sectoral indices and JCI.

Macro-economic conditions can affect the capital markets through interest rate. According to Bodie (2014: 241) high interest rates can reduce the present value of future cash flows, so the attractiveness of investment will decrease. The high interest rate, in this case BI rate as the benchmark of interest rate may lead investors to move their funds and invest it in savings accounts or deposits. The increase of BI Rate level led the bank interest rates particularly deposits also increased, it will attract the investors to invest in bank rather than in stock market. Foreign exchange reserves may affect the stock price index. Foreign exchange reserves is a measure that can be seen to measure a country's level of income. If a country's foreign exchange reserves is high, the income received by these countries is also high. Foreign exchange reserves are closely related to the balance of payments. When the balance of payment is surplus, it will be positive sentiment for investors. Investors are keen to invest in the capital market, because the economic conditions are good and stable.

Exports may affect the stock price index. According to Hariyanto in Tandelilin (2001: 214) balance of trade effect on the capital market. When the trade balance deficit, it becomes a negative signal for investors. One component of the balance of trade is exports. When the amount of export has increased, it will be positive sentiment for investors. If balance of trade surplus, investors will choose to invest in the stock market because the economic condition is good and stable. Indonesia's crude oil price may affect the stock price index. When crude oil prices increase, stock prices of mining sector will increase. Crude oil is one of the sub-sectors of mining and mineral sector. It will increase the stock prices of mining and it led to increase in the stock price index. The increase in crude oil prices is positive sentiment for investor, especially mining stocks is one of the sector that dominate the capital markets in Indonesia. Investors tend to buy shares of mining companies.

Inflation rate may affect the stock price index. According to Hariyanto in Tandelilin (2001: 214) inflation negatively affect the stock price. Inflation caused investors become pessimistic about the ability of capital to generate profits in future. Inflation make the investors tend to release the ownership of their stock. Inflation will make the profitability of companies become lower, and it will effect stock demand, so the stock price will decline. Exchange rate could affect the stock price index. According to Hariyanto in Tandelilin (2001: 214) the strengthening of rupiah against US dollar is a positive signal for economy especially in capital market. According to Roisondo (2015) when exchange rate continues to weaken it will raise production costs, especially the cost of imported raw materials and will be followed by higher interest rates, it will effect production costs and profits. This causes the dividend that received by the investor decreased. So it will be negative sentiment for investors before investing.

Market anomaly is a technique or strategy that seems contradict to efficient market. For example fundamental anomalies, calendar anomalies, momentum and overreaction anomalies and anomaly Initial Public Offering (IPO's anomalies). Calendar anomalies is one of anomaly in time series anomalies category because of abnormal return in

certain periods. Calendar anomalies consist of weekend effect, holiday effect, monthly effect as December effect, January effect, and others (Sean Cleary et al. in Sanjoko, 2013). Pujiharjanto (2010) stated that monthly effect is one of calendar anomaly that occurs because the return of one or several months bigger than in other months. Market anomaly condition proved that there is a contradict from efficient market hypothesis. The existence of a market anomaly in stock market show that the condition of stock market is not fully efficient.

3. Methodology

The research investigate the effect of macroeconomic factors and month of year effect phenomenon to sectoral stock price indices in Indonesia Stock Exchange, using monthly data from 2007 to 2014. The data type is secondary data obtained from Indonesian Bank, Indonesia Stock Exchange, Indonesian Ministry of Trade, and Ministry of Energy and Human Resources. Variables of this research are the return of sectoral indices listed on Indonesia Stock Exchange: agriculture, basic industry and chemical, consumer goods, finance, infrastructure, manufacturing, mining, miscellaneous industries, property, and trade as dependent variable. The independent variables of this study are BI rate, foreign exchange reserves, exports, inflation, Indonesian crude oil price, exchange rates, and dummy variable that describe month of the year as independent variables. The approach used in this study is a multifactor model which is a class of APT theory. Thus all variables should be classified into groups called factors, then the estimation is done on the dependent variables against the factors of the independents, and of the predetermined ones.

The methods and stages of analysis in this study, include: establishment of factor with Principal Component Analysis (PCA), and Seemingly Unrelated Regression (SUR). Principal Component Analysis (PCA) is a technique to make new variables, which is linear combinations of the original variables. This analysis is used to create a set of new variables, or variable components, or latent variables, or factors, replacing a number of original variable. This research formed six independent variable (X) into two factors and ten sectors into one factor (Y) to be used as independent variables. Seemingly Unrelated Regression (SUR) is a regression that consists of multiple regression equation (regression equation system). SUR method is used when there is a correlation between the regression equation. SUR can be used if the error or residual between the different equations are correlated, or in other words there is a contemporaneous correlation between the components. SUR test is applied in 12 months to see the month of the year effect phenomenon. Hypothesis test using t test determine the significance of the effect of the independent variable on the dependent variable. The coefficient of determination to see the ability of independent variables to explain the effect on the dependent variable.

4. Results and Discussion

PCA and SUR: The formation of factors used Principal Component Analysis (PCA) results that X's factor-1 is referred to Monetary Macro Factors (MMF), consist of BI rate, inflation, and exchange rates. While belonging X's factor-2 is Real Macro Factor (RMF) referred to real factor, consist of foreign exchange reserves, export, Indonesian crude oil prices. In addition to the establishment of independent factors (MMF, and RMF), this study also formed dependent factor (FY). Formation of Y factor (FY) includes return of ten sectors' indices. FY is the formation of new variables to describe the return of the ten sectors. This study uses Seemingly Unrelated Regression (SUR) because there is a correlation between the residual error or different equations are correlated, or in other words there is a contemporaneous correlation between sectors. The result is as follows:

$$R_{agri} = 1.70 - 1.58MMF_t - 2.60\ RMF_t - 3.77\ D1 + 5.94\ FY_{t-1} \qquad R^2 = 0.86626$$
$$(1.59)\ (\text{-}1.28)\ \ (\text{-}1.36)\ \ (\text{-}1.02)\ \ (2{,}05)^{**}$$

$$R_{basic} = 1.39 - 2.52MMF_t - 0{,}44\ RMF_t + 4.17\ D1 + 1.43\ FY_{t-1} \qquad R^2 = 0.72336$$
$$(1.72)^{***}\ (-2.68)^{*}\ (-0.30)\ \ (1.49)\ \ (0{,}65)$$

$$R_{cons} = 1.77 - 2.18MMF_t + 0.48\ RMF_t + 2{,}41\ D1 + 1{,}45\ FY_{t-1} \qquad R^2 = 0.76231$$
$$(3{,}29)^{*}\ (-3{,}50)^{*}\ \ (0{,}50)\ \ (1.30)\ \ (0{,}99)$$

$$R_{fin} = 1.12 - 1.62MMF_t - 0{,}18\ RMF_t + 6{,}22\ D1 + 0{,}92\ FY_{t-1} \qquad R^2 = 0.89626$$
$$(1.50)\ (-1.88)^{***}\ (-0{,}14)\ \ (2{,}41)^{**}\ \ (0{,}45)5$$

$$R_{infrastr} = 0{,}24 - 1.43MMF_t + 0{,}09\ RMF_t + 5.72\ D1 + 0{,}79\ FY_{t-1} \qquad R^2 = 0.82622$$
$$(0{,}39)\ (-2{,}01)^{**}\ \ (0{,}08)\ \ (2{,}70)^{*}\ \ (0{,}47)$$

$$R_{Manuf} = 1.53 - 2.59MMF_t - 0{,}23\ RMF_t + 4{,}29\ D1 + 1{,}10\ FY_{t-1} \qquad R^2 = 0.89911$$
$$(2{,}38)^{**}\ (-3{,}47)^{**}\ (-0{,}20)\ \ (1.93)^{**}\ \ (0{,}63)$$

$$R_{mining} = 1.06 - 3{,}35MMF_t - 4{,}37\ RMF_t + 0{,}02\ D1 + 4{,}89\ FY_{t-1} \qquad R^2 = 0.74626$$
$$(0{,}95)\ (-2{,}58)^{*}\ \ (-2{,}20)^{**}\ \ (0{,}00)\ \ (1{,}61)$$

$$R_{Miscel} = 1.57 - 2{,}96MMF_t - 1{,}33\ RMF_t + 6{,}55\ D1 + 0.94\ FY_{t-1} \qquad R^2 = 0.67826$$
$$(1.73)^{***}\ (-2.81)^{*}\ (-0{,}82)\ \ (2{,}09)^{**}\ (0{,}38)$$

$$R_{property} = 1.52 - 2{,}22MMF_t + 1{,}23\ RMF_t + 4{,}99\ D1 + 1{,}68\ FY_{t-1} \qquad R^2 = 0.84536$$
$$(1.67)^{***}\ (-2{,}10)^{**}\ (0{,}76)\ \ (1.58)\ \ (0{,}68)$$

$$R_{trade} = 1.41 - 2{,}71MMF_t + 1{,}73\ RMF_t + 0.95\ D1 + 3{,}78\ FY_{t-1} \qquad R^2 = 0.87426$$
$$(1.91)^{***}\ (-3{,}17)^{*}\ \ (1{,}32)\ \ (0{,}37)\ \ (1{,}89)^{***}$$

Notes: figures in parenthesis is t statistics
*** is significant at 1% level, ** at 5% level, and * at 10% level.

The above results show that MMF (consist of BI Rate, inflation, exchange rates) negatively affects basic industry and chemical, consumer goods, infrastructure, manufacturing, mining, miscellaneous industries, property,

and trade.While RMF, which consists of foreign exchange reserves, exports, Indonesian crude oil price, negatively affects mining sector. The effect of each variable can be determined by multiplying the coefficient of factor and the responding factor loading. After obtaining factors (using Principal Component Analysis), then the estimation of Seemingly Unrelated Regression is conducted. The movement of the return of each sector in the previous period (FY_{t-1}) has positive effect for agricultural sector and for trade. Macroeconomic factors in terms of monetary (MMF) consisting of BI Rate, inflation, exchange rate more dominant sectoral indices. BI Rate, inflation, exchange rates has negative effect on basic industry and chemical, consumer goods, infrastructure, manufacturing, mining, miscellaneous industry, property and trade. It goes inline with findings of research conducted by Okky (2012) and Kewal (2012) which states that the exchange rate negatively affects the stock price index in Indonesia. The study also supports research conducted by Hsing (2011) which states that interest rates, inflation, exchange rates impacts negatively on the stock price index of a country.

Macroeconomic factors in real terms(RMF) consist of foreign exchange reserves, exports, Indonesia's crude oil price also negatively affects mining sector. It supports the findings of Ozcan (2012) and Basci (2013) which states that export affects the stock price index. There are several reasons behind this, because of the characteristics is different, it will respond differently to economic conditions. For mining sector, the Indonesian Ministry of Energy and Resources issued the regulation contained in Law No. 4 of 2009 on mineral and coal mining policy. The regulation's content is the banning on export of raw minerals or raw materials mines abroad that createed negative sentiment for investor. Indonesian crude oil price movements will affect world crude oil price movements. When Indonesian crude oil price increase, it will decrease mining sector index return. Because crude oil is substitution for mineral and coal mines. Meanwhile the policy about export banning of raw material, causes prices of mining and mineral decreases, at the end stock prices of coal mineral subsectors decreased and decrease stock price of mining sector.

5. Conclusion

Macro-economic conditions will affect daily activities of the company which will affect stock prices and sectoral conditions in capital market. The characteristics of each sector / industry is different and it will respond differently to economic conditions. Based on this research, the monetary macroeconomic factor (BI rate, inflation, exchange rate) negatively affects basic industry and chemical, consumer goods, infrastructure, manufacturing, mining, miscellaneous industry, property and trade. The Real macro economic factor (foreign exchange reserves, exports, Indonesian crude oil prices), on the other hand, negatively influences mining sector. Monetary macroeconomic factor hasa more dominant effect on sectoral indices, monetary variables will affect the environment and the company's performance, which will affect the respective sectors.

Based on above results, there are some suggestions that should be considered:

1. Investors have to look over the results of macroeconomic analysis and sectoral analysis before invest in stock market. This can be used to determine which sectors that can be used as investment option. So investor can spread their investment in several sectors, it will reduce or minimize the risk of loss in stock market.

2. The government is expected to maintain macroeconomic conditions, especially in of monetary terms, because it directly affect company's performance to remain stable, and it can affect the performance of capital market especially sectoral indices. Government can make some policies to encourage the performance of the capital markets so that capital market conditions in Indonesia would be stable and growing.

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