THE IMPACT OF MACROECONOMICS VARIABLES TO THE STOCK PRICE INDEX OF MINING SECTOR IN INDONESIA ON 2003-2014 (ERROR CORRECTION MODEL APPROACH)

Ria Rizky
riarizky24@gmail.com
Universitas Sebelas Maret Surakarta

Siti Aisyah Tri Rahayu
aisyahrahayu@yahoo.com
Universitas Sebelas Maret Surakarta

ABSTRACT

Recently, the existence of energy as supporting economic growth has become an interesting issue to be discussed. Energy is one of the basic needs of each country. Dwindling energy availability for consumption is greater than the production. Until now the problem to achieve the target of energy sector development is still to be faced by Indonesia. Dependence on petroleum energy, especially in the domestic consumption is still very high at 48%, while gas and coal at 18% and 30% respectively of the total national energy consumption.

In the last ten years (2003-2013), energy consumption in Indonesia increased from 79 million to 134 million TOE or growth 5.5% per year (Energy Outlook 2014.) The importance of energy for a country, the mining sector to be one the sectors most in demand by investors. The market capitalization of the mining sector recorded in JCI reached 13.9%. In addition, the mining sector also dominates the stock trading transactions in the amount of 39.7%.

This study analyzed the relationship between the stock price index of mining sector and macroeconomics variable on 2003-2014. There were five macroeconomics variables in this study such as crude oil price, inflation, exchange rate, interest rate, and economic growth.

Engle Granger Error Correction Model (EG-ECM) have been applied to explore the short and long run relationship. The analysis reveals that the macroeconomics variables and the stock price index of mining sector are co-integrated. Hence, there was a long run relationship exists between them. The result show that oil price is the only variable which has a positive significant correlation to the stock price index of mining sector in the long run. Furthermore, in the short run oil price still has a positive significant correlation. In the other hand, exchange rate has a negative significant correlation to the stock price index of mining sector.

Through this study, the government should have a great decision to controlled the impact of macroeconomics variable to the stock price index of mining sector. The investor in the mining sector should be more caution about the economy situation and pay more attention to the oil price that has a significant effect to the stock price index of mining sector to avoid the risk that might be happened.

Keywords: *Stock Price Index, Macroeconomics Factor, ECM.*

A. Introduction

Recently, the existence of energy as supporting economic growth has become interesting issue to be discussed. Energy is one of basic needs of each country. Energy avaibility is dwindling because energy consumption is greater than energy production. Until now the problem on achieving the target of energy sector development is still to be faced by Indonesia. Dependence on energy, especially petroleum energy, in the domestic consumption is still very high at 48%. Meanwhile gas and coal are at 18% and 30% respectively of the total national energy consumption.

In the last ten years (2003-2013), energy consumption in Indonesia increased from 79 million to 134 million TOE or growth 5,5% per year (*Outlook Energy*). Knowing the importance of energy for a country, the mining sector becomes one of sectors most in demand by investors. The market capitalization on mining sector is recorded at 13.9% in IHSG (Jakarta Composite Index). Moreover the mining sector also dominates the stock trading transaction, that is at 39,7%.

According to The Arbitage Pricing Theory (APT) developed by Chen and Ross (1976:122) some economic variables affect the world's capital market. APT has become the benchmark of previous studies on determining the price of an asset. By assuming if two investation opportunities have similarity on characteristic, then there are opportunities to arbitrate by buying asset at a low price and sell it at a high price so that profit can be obtained without any risks.

Besides, some variables of macroeconomic affect stock price movement such as global oil price, interest rate, Rupiah exchange rate, inflation, and economic growth. Indonesian economy according to Central Bureau of Statistics data in 2014 measured by gross domestic product (GDP) on the basis of price reached Rp. 10.542,57 trillion. Meanwhile GDP per capita reached Rp 41,8 million. Indonesian economy in 2014 was slowing at 5,02% compared with the prior year period that was 5,61%. The stability of macroeconomic condition is very important to be maintained so that economic agents can work well because a good macroeconomic condition is the indicator of welfare state.

In 2014, stock performance in mining sector decreased significantly because of export ban applied by the government. It made the mining companies lost income by 30%. The cause of this weakening of stock performance was decline in commodity prices, including crude palm oil. Decline in oil price sharply in the end of 2008 was caused by the accumulated stocks of crude oil reserves. While oil producing countries reduced oil production, oil demand actually increased. This condition encourage the increasing oil price started in the beginning until the mid of 2009.

According to the economy outlook examined by *Bank Indonesia*, rising the oil price trigger the increase in fuel prices in Indonesia. In 2004-2005 the inflation rate was at its highest, reached 17,11%, following increase in interest rate by *Bank Indonesia* at 12,75%. It can happen because of the increase in global crude oil price so that the government decided to provide subsidies on fuel. In the research about influence of macroeconomic variable towards stock prices in the agricultural sector conducted by Yogaswari, Nugroho and Astuti (2012), it can be seen that inflation had good impact on stock prices. The result of research is different with the research conducted previously and different with the current assumption that the inflation rate had negative impact on stock prices.

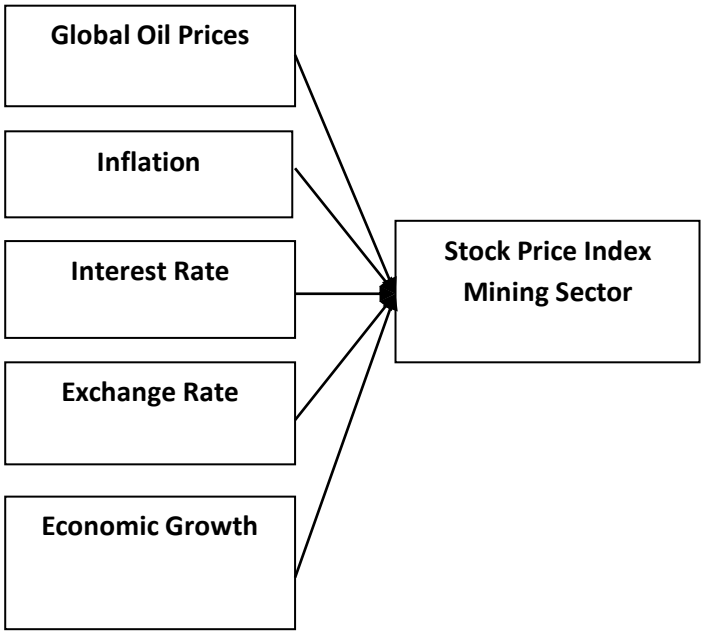

Figure 1. Research Framework

Issues discussed in this research can be formulated as follows: 1) How is the impact of global oil price towards stock price index in the mining sector in period of 2003-2014? 2) How is the impact of inflation towards stock price index in the mining sector in period of 2003-2014? 3) How is the impact of exchange rate towards stock price index in the mining sector in period of 2003-2014? 4) How is the impact of interest rate towards stock price index in the mining sector in period of 2003-2014? 5) How is the impact of economic growth towards stock price index in the mining sector in period of 2003-2014? Besides, the objectives of this research are based on the problem formulation above. The objective of this research are to analyze the impact of global oil price, inflation, exchange rate, interest rate and economic growth towards stock price index I the mining sector.

B. Methods of Research

The Scope of Research

This research was conducted to analyze macroeconomic variable impacted the changes in stock price index on the mining sector in Indonesia stock exchange by Error Connection Model analysis method. Variables which are expected to be influential in stock price index in the mining sector are global oil price, inflation, exchange rate, interest rate, and economic growth. The period used on this research is January 0f 2003 until December of 2014.

The Types and Sources of the Data

This research used secondary data in form of time series with monthly data from 2003 until 2014. Secondary data used in this research was obtained from the official websites of Indonesia stock exchange, OPEC, Thomson Reuters, Bank of Indonesia, and Central Bureau of Statistics.

Analysis Method

The method used in this research was Error Connection Model analysis method. According to Kuncoro, Adji and Prayitno in Rahayu (2007:139-140), Granger Representation Theorem emphasizes that contributed system always has error correction mechanism. If the dependent and independent variables contributed to each other, then there is long-term relationship between variables. If the regression residual is cointegrating and stationer, residual can form shorts-term ECM model developed by Engle Granger (Rahayu, 2007:156).

The following is the initial model for long-term equation used in this research according to the model used on scientific journal in study of literature by Prasetiono (2010):

$$LIHS = a + \beta_1 LOIL - \beta_2 INF - \beta_3 IRATE - \beta_4 LXRATE + \beta_5 PE \text{ ...(3.1)}$$

Note: LIHS is stock price index, a is Constanta, LOIL is global oil price, INF is inflation. LIRATE is interest rate, LXRATE is Rupiah exchange rate, and PE is economic growth.

Interrelation between cointegration test with ECM is traced through ECT statistical test which is statistically significant. On the other hand, if the ECT coefficient is not significant, specification model is invalid. (Insukindro 1992 in Rahayu, 2007:140). In ECM Engle Granger (ECM EG) if the coefficient of ECT(-1) is significant and negative, specification model which is used is valid. Meanwhile, in standard ECM, specification model is valid if the coefficient of ECT (-1) is positive and significant (Rahayu, 2007).

After aforementioned steps, the thing to do is analyzing data using Error Correction Model (ECM) Engle Granger, with short-term equation as follows:

$$\Delta LIHS = \beta_1 \Delta LOIL_t - \beta_2 \Delta INF_t - \beta_3 \Delta IRTAE_t - \beta_4 \Delta LXRATE_t + \beta_5 \Delta PE_t - ECT_{t-1}$$

Note: $\Delta LIHS$ is the dependent variable on 1st difference, $\Delta\beta$ is the independent variable on 1st difference, and ECT_{t-1} is short-term residual equation in period of t-1.

C. Variable and Hypothesis

Some variables used in this research will be explained on the table below (table 1)

Table 1. Operational Definition of Variables

Variable	*Definition*	*Source*	*Measurement*	*Hypothesis*
Dependent :				
LIHS	Stock Price Index of Mining Sector	idx mining.com	Rupiah	
Independent:				
LOIL	World Crude Oil Price	Thomson Reuter	Dollar per Barrel	(+)
INF	Inflation	Bank Indonesia	Percent (%)	(-)
LXRATE	Exchange Rate	Bank Indonesia	Rupiah per Dollar US	(-)
IRATE	Interest Rate	Bank Indonesia	Percent (%)	(-)
PE	Economic Growth	BPS	Percent (%)	(+)

D. Result and Data Analysis

Analysis method used in this research is Error Connection Model (ECM) to correct the regression equation which is not stationer in order to restore on its equilibrium value for a long-term.

Unit Root Test and Integration Degree Test

Unit root test and integration degree test are done to find out the stationary level of a data. In order to proceed to ECM test, the data must be stationer on the equal level (Ajija and Shochul, 2011)

Table 2. Unit Root (Level)

VARIABLE	t-statistic	PROB.	STATUS
LIHS	-2.937933	0.7466	Not Stationer
LOIL	-1.877494	0.6610	Not Stationer
INF	-2.799581	0.2000	Not Stationer
XRATE	-1.465725	0.8386	Not Stationer
IRATE	-1.497999	0.0634	Not Stationer
PE	-1.456326	0.8394	Not Stationer

Table 3. Integration Degree Test (First Difference)

LIHS	-12.17849	0.0000	Stationer
LOIL	-8.393408	0.0000	Stationer
INF	-9.505316	0.0000	Stationer
XRATE	-10.97293	0.0000	Stationer
IRATE	-4.357476	0.0035	Stationer
PE	-5.802560	0.0000	Stationer
	DF Value:	1% -4.023975	
		5% -3.441177	
		10% -3.145474	

The table of integration degree test shows that each variable on the root test with first difference, with value of prob.F = 0.0000 is smaller than level of α, that is 5%, with value of ADF is lower than DF Critical Value.

The Result of Long-Term ECM

After estimating Error Correction Model (ECM), then the result can be interpreted as follows:

$$LIHS_t = 3.044629 + 1.535094LOIL_t - 0.010251INF_t - 0.301996LXRATE_t - 0.067350IRATE_t + 1.807273PE_t$$

Interpretation of Statitistic

1) Analysis of global oil price estimation, coefficient of global oil price (LOIL) towards share price index on mining sector (LIHS) is positive with coefficient = 1.53509 and significant probability value means that for every increase of 1% in global oil price will increase share price index on mining sector of 1.535094%. It is aligned with the existed theory which explains that global oil price will impact share price index on mining sector because rising oil price will rise the mineral price. Besides, it also conforms to previous research conducted by Prasetiono (2010) where global crude oil price affect the share price index of LQ45. In this research, global oil price positively and significantly affect on both long-term and short-term because oil price has the main role in the performance of mining stock and crude oil is one of the factors that affect the world's stock exchange.

2) Analysis of inflation estimation, coefficient of inflation (INF) towards share price index on mining sector (LIHS) is negative with coefficient = -0.010251 means that for every increase of 1% on inflation (*ceteris paribus*) will decrease share price index of 0.010251 but this effect

is not significant. This research is supported by the research conducted by Kewal (2012) that shows inflation has negative impact but not so significant. According to the inflation data in this research period, the average obtained is 6.6% so that market still can accept if the level of inflation is below 10%. Because when inflation reaches more than 10%, BI will increase BI rate that will make investors will transfer their assets to the banking sector.

3) Analysis of exchange rate estimation, coefficient of exchange rate (LXRATE) towards share price index on mining sector is negative with coefficient = -0.301996 means that for every increase of 1% on exchange rate (*ceteris paribus)* will decrease share price index on mining sector of 0.301996%. According to Sunariyah (2011:23), deprecation of rupiah will increase the cost of raw material imports and interest rate although it also can increase export rate. Depreciation of rupiah towards foreign currencies has negative impact to economy and capital market. The research conducted by Prasetiono (2010) shows that there is negative connection of exchange rate towards share price index. Therefore analysis result in this research conforms to the previous theory and research.

4) Analysis of interest rate estimation, coefficient of interest rate (IRATE) towards share price index on mining sector (LIHS) is negative with coefficient = 0.067350 means that for every increase of 1% on interest rate will insignificantly decrease share price index on mining sector of 0.067350. In the research conducted by Al-Majali and Al-Massaf (2014), Prasetiono (2010), Acikalin (2008) and Naik and Padhi (2012) show that interest rate negatively affects the stock price on both long-term and short-term. Moreover this research is also supported by Kewal (2012) where variable of interest rate negatively affects the stock price but not significant. Variable of interest rate that not affect the stock price due to the investors in Indonesia prefer to conduct stock transaction in the short term, so that investors tend to do profit taking expected to obtain high capital gain. This action will affect on IHSG and stock index on mining sector has large enough weight on IHSG.

5) Analysis of economic growth estimation, coefficient of economic growth (PE) towards share price index on mining sector (LIHS) is positive with coefficient = 1.807273 means that for every increase of 1% on economic growth (*ceteris paribus)* will insignificantly increase share price index on mining sector of 1.807273. This result of research is supported by research conducted by Kewal (2012), where PDB has positive impact but not significant. It is because improvement on prosperity caused by economic growth enhancement that lead to the investment development expansion in the real sector which is not followed by investment development in the capital market. Moreover improvement on PDB does not necessarily improve per capita income of each individual so that the investment pattern in the capital market is not affected by improvement on PDB.

Short Term ECM Estimation

After estimating long term ECM, then the next step is estimating short term ECM EG to find out the impact of each independent variable towards dependent variable.

$$\Delta LIHS_t = 0.598157\Delta LOIL_t - 0.004695\Delta INF_t - 1.161915\Delta IRATE_t - 0.053822\Delta LXRATE_t + 0.656008\Delta XPE_t - 0.250317\, u_{t-1}$$

Coefficient of ECT (-1) = -0.250317 with significance of 0.0053 conforms to the theory that explain coefficient of ECT (-1) is negative and significant, so that ECM EG can be used. Coefficient of ECT (-1) shows that only about 0.25% of the incompatibility between long term and short term that can be corrected. Therefore specification model used in this research is valid and ECM EG has passed the classical assumption test.

Interpretation of Statistic

1) Coefficient of oil price (LOIL) towards share price index on mining sector (LIHS) is positive with coefficient of 0.598157, means that for every increase of 1% on oil price (LOIL) (*ceteris paribus*) will increase share price index on mining sector of 0.598157%. Global oil price significantly affects share price index on mining sector. It can be shown that probability value of 0.0000 where the value is lower than the level of confidence a 0.05.

2) Coefficient of inflation (INF) towards share price index on mining sector (LIHS) is negative with coefficient of -0.004695, means that for every increase of 1% on inflation will decrease share price index on mining sector of -0.004695%. Inflation insignificantly affects share price index on mining sector. It can be shown that probability value of 0.6139, more than 0.05.

3) Coefficient of exchange rate (LXRATE) towards share price index on mining sector (LIHS) is negative with coefficient of -1.161915, means that for every increase of 1% on exchange rate will decrease share price index on mining sector of 1.161915%. Exchange rate significantly affects share price index on mining sector. It can be shown that probability value of 0.0020 where the value is lower than level of confidence a 0.05.

4) Coefficient of interest rate (IRATE) toward share price index on mining sector (LIHS) is negative with coefficient of -0.053822, means that for every increase of 1% on interest rate (*ceteris paribus*) will decrease share price index on mining sector of -0.053822%. Interest rate insignificantly affects share price index on mining sector with probability value of 0.1620.

5) Coefficient of economic growth (PE) towards share price index on mining sector (LIHS) is positive with coefficient of 0.656008, means that for every increase of 1 % on economic growth will decrease share price index on mining factor of -0.656008.

E. Conclusion

Based on the results of analysis and discussion, it can be concluded that: 1) Global oil prices on both long term and short term show that it positively and significantly impact share price index on mining sector. 2) On both long term and short term, inflation negatively and insignificantly impact share price index on mining sector. 3) Changes in exchange rate negatively and insignificantly impact share price index on mining sector on long term. On the other hand, exchange rate negatively and significantly impacts share price index on mining sector. 4) Interest rate on both long term and short term negatively and insignificantly impacts share price index on mining sector. 5) Economic growth positively and insignificantly impacts share price index on mining sector on both long term and short term.

REFERENCES

Ajija R, Shochul (dkk). (2011). Cara Cerdas Menguasai EViews. Jakarta:Salemba Empat

Al-Majali, A Ahmad. Al-Assaf, I Ghazi. (2014). Long Run and Short Run Relationship between Stock Market Index and Main Macroeconomic Variables Performance in Jordan. *European Scientific Journal*, Volume 10 No.10 (hlm.156-171).

Chen, N.F.,R.Roll dan S. Ross. (1986). Economic Forces and Stock Market.*Journal of Business*, Volume 59(3) (hlm.122-131).

In.investing.com. *IDX Minning.* Diakses pada 25 Desember 2015

Kewal, Suci S. (2012). Pengaruh Inflasi, Suku Bunga, Kurs, dan Pertumbuhan PDB terhadap IHSG. *Jurnal Economica*, Volume 8 No.1 (hlm.53-64).

Monthly Oil Market Report. Diperoleh pada 25 Desember 2015 dari www.opec.org

Naik, Kumar. Padhi, Puja. (2012). The Impact of Macroeconomic Fundamentals on Stock Prices Revisted: Evidence from Indian Data*. Eurasian Journal Of Business and Economics*, Volume 5 No.10 (hlm.25-44).

Prasetiono, WD. (2010). Ánalisis Pengaruh Faktor Fundamental Ekonomi Makro dan Harga Minyak terhadap Saham LQ45 dalam Jangka Pendek dan Jangka Panjang. *Journal of Indonesian Applied of Economics* , Volume 4 No.1 (hlm.11-25).

Rahayu, Tri SA. (2007). *Modul Laboratorium Ekonometrika*. Surakarta: Universitas Sebelas Maret.

Sunariyah. (2011*). Pengantar Pengetahuan Pasar Modal (6th ed).* Yogyakarta: UP-STIM YKPN.

Thomson Reuters. *Europe Brent Spot Price FOB (Dollars per Barrel).*Diperoleh pada 25 Desember 2015 dari http://tonto.eia.gov

Yogaswari, Dwijayanti.,dkk. (2012). *The Effect of Macroeconomic Variables on Stock Price Volatility: Evidence from Jakarta Composite Index, Agriculture, and Basic Industry Sektor.* IPEDR V.46 (Hlm. 96-100).

www.bi.go.id. Diakses pada 25 Desember 2015

www.bps.go.id. Diakses pada 25 Desember 2015