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## The effect of Commodity Price Changes and USD/IDR Exchange Rate on Indonesian Mining Companies' Stock Return

### Abstract

There are many variables which will be influencing stock return. Some of those variables are come from the commodity market, such as gold, price and crude oil price changes, and also come from the exchange rate market. This study is about to test the effect of changes prices of gold, silver, crude oil, and exchange rate to the stock return of mining sector companies in Indonesia. There are 48 companies engaged in the mining sector listed on the Indonesia Stock Exchange (IDX). From 48 companies this study uses the purposive sampling method to choose a sample within the criteria, and 13 selected companies will be the object of this study. This study also used an analysis tool GARCH (1,1) to avoid abnormal data. Before advancing to GARCH (1,1) analysis, the data must be tested the stationary first by using Augmented Dickey-Fuller Test (ADF) to make sure the data stationary or not by using level, 1st difference, and two difference. The result shows that gold has a significant positive effect on stock return mining sector companies such as INCO, KKG, PTBA, and TINS. Silver has a significant positive effect on HRUM companies and negatively on RUIS. Crude oil has a significant positive effect on HRUM and PTBA firms. Exchange rates have a significant negative impact on companies. ANTM, CTTH, DOID, ELSA, HRUM, ITMG, and KKG.

**Keywords:** Crude Oil; Gold; Indonesia Stock Exchange; Mining Sector; Silver; USD/IDR Exchange Rate

**JEL Classification:** E03, F31, G11, G23

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### Abstrak

Penelitian ini akan menguji pengaruh perubahan harga emas, perak, minyak mentah, dan nilai tukar terhadap return saham perusahaan sektor pertambangan di Indonesia. Ada 48 perusahaan yang bergerak di sektor pertambangan yang terdaftar di Bursa Efek Indonesia (BEI). Dari 48 perusahaan penelitian ini menggunakan metode purposive sampling untuk memilih sampel dalam kriteria, dan ada 13 perusahaan yang dipilih yang akan menjadi objek penelitian ini. Penelitian ini juga menggunakan alat analisis GARCH (1.1) untuk menghindari data abnormal. Sebelum maju ke analisis GARCH (1.1), data harus diuji stasioner terlebih dahulu dengan menggunakan Augmented Dickey-Fuller Test (ADF) untuk memastikan data stasioner atau tidak dengan menggunakan level, perbedaan 1, dan dua perbedaan. Hasil penelitian menunjukkan bahwa emas memiliki pengaruh positif signifikan terhadap return saham perusahaan sektor pertambangan seperti INCO, KKG, PTBA, dan TINS. Perak memiliki efek positif signifikan pada perusahaan HRUM dan negatif pada RUIS. Minyak mentah memiliki efek positif yang signifikan pada perusahaan HRUM dan PTBA. Nilai tukar memiliki dampak negatif yang signifikan terhadap perusahaan. ANTM, CTTH, DOID, ELSA, HRUM, ITMG, dan KKG.

**Kata Kunci:** Minyak Mentah; Emas; Bursa Efek Indonesia; Sektor Pertambangan; Perak; Nilai Tukar Dolar/Rupiah

## 1. Introduction

Return is the profit gained and can be enjoyed by investors for the results of doing the stock investments. The higher of return, the higher of investor's interest to invest capital for the related company (Ayunda & Imo, 2014). According to Purnomo (2014), a good investment is an investment that gives a higher return than inflation of a country. When it comes to investing usually, investors will consider a high rate of return but with certain risk or certain return with a low risk (Pardede, Hidayat, & Sulasmiyati, 2016).

Gold is one of the precious metals commodities favored by investors as its value is resistant to inflation (Aclan, 2008; Robiyanto, 2018b). Gold can also be used by investors for hedging to reduce the risks (Afsal & Haque, 2016). Silver is also a precious metal that can be used as an investment instrument for investors who want to profit or diversify their investment portfolio or to hedge (Ciner, 2001). Other commodities that can affect stock returns of mining companies are crude oil. Crude oil is one of the mining products that can be the driving force of the world economy. This is because all industries in the world still use fuel oil. Fluctuating oil price movements can affect the Indonesian capital market. For oil exporters and mining companies, the rise in crude oil prices will benefit companies outside the mining sector, as it can increase operational costs and can be lost (Handiani, 2014).

The effect of changing the exchange rate to firms are differ depending on the tendency of exporting or importing activity. For the importer company, when the domestic exchange rate depreciate it will have a lower income than usual and can directly affect its stock price (Krugman & Obstfeld, 2009). Previous research conducted by Kilian & Park (2007), Wang & Huang (2010), and Chan et al. (2011), and stated that there is significant influence between oil prices on stock market performance. Other research conducted by Twite (2002), Witjaksono (2010), and Sadri &

Tayebisani (2012) support that gold positively significant effect on the stock market. Harper et al. (2011) said that the price of fluctuating silver has a positive effect on stock prices. Michelis & Ning (2010) and Sujit & Kumar (2011) have found that exchange rates have a significant positive effect on stock prices.

On the other hand, research from Caesariana & Gandakusuma (2014), Suriani et al. (2015), and Lestari, Widarno, & Harimurti (2016), states that the exchange rate has a significant negative effect on stock returns. The results of the study of Adebisi et al. (2009), Filus, Chabachib, & Muharam (2012), and Arfaoui & Rejeb (2017) states that world oil prices have a significant negative effect on stock prices. According to Lucey & Tully (2005), Najaf & Najaf (2016), and Shobba (2017) stated that there is no influence between the change in the price of gold to stock prices.

Based on the above description, there is still a gap between the previous studies. This is because the analytical tool has been used is a regression when the data tend not abnormal, so it is not appropriate. Therefore a more appropriate research tool is Generalized Autoregressive Conditional Heteroskedasticity (GARCH). Then, the absence of which examines the effect of changes in commodity prices (gold, silver, and crude oil) and the USD/IDR exchange rate against stock returns in the mining sector simultaneously. Then, research on silver is still very minimal, whereas silver is also one of the investment instruments that can be profitable.

The formulation of the problem is to be tested how the effect of changes in commodity prices (gold, silver, and world oil) and the USD/IDR exchange rate against the stock return of the mining sector companies in Indonesia 2011-2017. The purpose of this study is to test further on the effect of price changes on commodities (gold, silver, and world oil) and changes in USD/IDR exchange rates against stock returns of the mining sector companies in Indonesia in 2011-2017. So that later can be useful to provide views on the factors that may affect the stock return of the mining sector in Indonesia.

### 2. Hypotheses Development

Arbitrage Pricing Theory (APT) introduced by Ross (1976) is a pricing model of security (asset) that generalizes the relationship of price determination in the CAPM (Capital Asset Pricing Model) and is developed based on separate distribution intuitions (Constantinides, Harris, & Stulz, 2003). Huberman & Wang (2005) suggested that APT is a one-period model in which investors believe that matters related to stochastic the level of profit of a particular capital asset are consistent with the factor structure. The formulation of APT has important implications in determining asset prices. APT states that one or several explanatory variables will influence the profit level of an asset. But APT does not mention (explicitly) what variables influence the level of profit (Wahyudi et al., 2017).

Stock prices are influenced by high demand and supply. However, when providing stock price assessment, it should be with the company's operational data (audited financial statements, future corporate performance, and economic conditions). There are at least two approaches in valuing stock prices namely fundamental and technical approaches. According to Jogiyanto (2010), he defines the return is a result obtained when investing. Samsul (2006) argues that the return is the income received and can be expressed in the percentage of initial capital when investing. Conditions in which investors earn profits are called capital gains while the condition of losses is called capital loss. According to Brigham & Houston (2006), the return is the difference between the amount received and invested by the amount invested. From the above description can be concluded that the return is the level of stock acquisition obtained by investors when investing or buying and selling shares (Taliawo & Atahau, 2007; Taungke & Supramono, 2015).

Precious metals such as gold are resistant to corrosion or oxidation. The price of this precious metal is high due to its rare and corrosion resistant properties (Robiyanto, Wahyudi, & Pangestuti, 2017b). According to Sunariyah (2006), gold is one of the risk-

free investment instruments. This statement is supported by the statement of Apriyanti (2011) stating that investing in gold, the wealth of investors will remain intact. Gold has several advantages as one of the investment instruments that are not affected by inflation; there is no government intervention in price determination, high liquidity level, and tax-free.

Silver is also a precious metal that can be used as an instrument in investing. Silver can be an alternative for investors to diversify investment instruments and seek profits or simply to hedge. Silver prices are not only influenced by market demand in other commodities but also because of the investment objective (Harper et al., 2011). Robiyanto, Wahyudi, & Pangestuti (2017a; 2017b) stated that silver is another precious metal that is also often classified as an investment instrument.

Oil is often called the head of the commodity market, whereas oil prices change, it will affect other commodity prices, not to mention the price of oil. The high oil prices will lead to declining stock prices (Kilian, 2009; Hersugondo et al., 2015; Rahmanto, Riga, & Indriana, 2016). World oil becomes the primary energy source for all industries in the world, so it is needed for many parties (Pardede, Hidayat, & Sulasmiyati, 2016). For a country that is an oil producer (exporter), rising oil prices will add to the welfare of the country as the income of the local community also increases (Filus, Chabachib, & Muharam, 2012).

The exchange rate is an exchange between two currencies in each different country. The exchange is a comparison between the value or price between the currency of a country and another country (Triyono, 2008; Wahyudi et al., 2017). The place for the occurrence of currency interactions of a country with other countries is in the foreign exchange market. The foreign exchange rate can be interpreted as the amount of domestic money needed to obtain one unit of currency in another country. Tsen (2011) said that this exchange rate plays an important role in the world of investment and buying and selling system internationally.

The Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model was developed by Bollerslev (1986) which is the development of the ARCH model. This model was built to avoid orders that are too high on the ARCH model based on the principle of parsimony or choosing a simple model so that it will guarantee a positive variance. This GARCH model is widely used in financial research, especially those related to stock returns and stock market returns because it can accommodate data abnormalities and heteroscedasticity problems as found in the research done by Richardson & Smith (1993), Corhay & Rad (1994), Aparicio & Estrada (1997), Kamath, Chakornpipat, & Chatrath (1998), Rachev et al. (2004), Chion, Veliz, & Carlos (2008), and Canedo & Cruz (2013).

The basic GARCH model is as follows:

$$Y = \alpha + \beta_1 X_1 + \varepsilon_t \quad (1)$$

With

$$\varepsilon_t = \phi_t \varepsilon_{t-1} + \dots + \phi_t \varepsilon_{t-p} + \eta_t \quad (2)$$

$$\eta_t = \sigma_t \varepsilon_t \quad (3)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \eta_{t-1}^2 + \dots + \alpha_p \eta_{t-p}^2 + \beta_1 \eta_{t-1}^2 + \dots + \beta_q \sigma_{t-q}^2 \quad (4)$$

$\varepsilon_t$  is independent and identical distributed  $N(0,1)$  and independent from previous error from  $\eta_{t-p}$  or in the other word residual is white noise/ stationer.

The GARCH model will be adjusted to the variables used in this study.

Research on gold prices and stock returns refers to two main theories. First is the theory of gold price movement and modern portfolio theory. The first theory refers to gold as a safe asset that investors can have especially in times of world crisis and the weakening of the world economy. Therefore, gold can be used to minimize portfolio risk (Robiyanto, Wahyudi, & Pangestuti, 2017b). Modern portfolio theory fits well into investment decision making. This theory is

based on an efficient investment option with maximum return capacity and reduced risk for investors (Hlupo, 2017).

Le & Chang (2012) stated that there is a significant positive influence between the return and the price of gold and stated that a good stock return would increase the price of gold. Nangolo & Musungwini (2011) argue that there is a positive relationship between gold and stock returns. Gilmore et al. (2009) indicate that there is a significant positive influence among French stock exchanges with the price of gold. Smith (2001) states that there is a significant influence among Malaysian Stock Exchanges with gold prices and recommends investors to invest in gold compared to the stock exchange. Based on the description above, then the hypothesis to be tested is as follows:

$H_1$ : gold price's change has a positive effect on mining stock return

Silver is a precious metal that acts as an investment instrument that can reduce risk in the portfolio. These commodities have used such as silver can be converted into metals in electronic devices, x-rays, and photography, because of the uniqueness of both appearance and substance. Silver is also suitable for investors who want to hedge or hedge or want to speculate (Ciner, 2001). According to Draper, Faff, & Hillier (2002) portfolios containing silver will move better than on another equity portfolio. Based on the description above, the hypothesis to be investigated is as follows:

$H_2$ : silver price's change has a positive effect on mining stock return

The increasing demand for crude oil along with the emergence of newly industrialized nations will directly affect world crude oil prices. This is if associated with economic activity then the price of oil will affect the economy of a country. According to Hersugondo et al. (2015), the impact of the increase in oil prices has varied relatively with the economy in general and the capital market in particular.

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For oil-producing countries (exporters), rising oil prices illustrate the displacement of welfare from oil importing countries to oil-exporting countries (Kilian & Park, 2007; Abdelaziz, Chortareas, & Cipollini, 2008; Filis, Degiannakis, & Floros, 2011; Robiyanto, 2018a). This will have an impact on the acceptance and welfare of the community. Furthermore, it will have an impact on the economy (Rahmanto, Riga, & Indriana, 2016). Haldane (1997) argues that high economic activity will suppress inflation and appreciate currencies in oil-exporting countries. Basher, Haug, & Sadorsky (2012) states that there is a positive influence on world oil prices on stock returns in the short term. Munoz & Dickey (2009) their research results that the effect of world oil prices on stock returns in the short term. Based on the above description, the hypothesis to be studied is as follows:

H<sub>3</sub>: crude oil price's change has a positive effect on mining stock return

The exchange rate of the Rupiah (IDR) against the US Dollar (USD) is one of the macroeconomic indicators that have recently experienced a depreciation trend (Robiyanto, 2018b). Eitman, Stonehill, & Moffert (2010) argue that any company that has assets and uses foreign currencies to transact as well as companies with overseas branches will face foreign exchange exposure. At a company like this will cause any movement of the exchange rate will affect the performance of the company.

The foreign exchange rate is a measure of the potential for changes in profitability, the market value of the firm, and net cash flow due to changes in the exchange rate. This raises the link between the exchange

rate drivers and the company's stock performance. The economic crisis in 1997 caused the Rupiah to depreciate too deeply and caused almost all economic activity in the country to be disturbed and resulted in the prices of the capital market falling drastically and the investors losing (Siti, 2016).

The linkage between stock returns and exchange rates has been documented in many studies. Vejzagic & Zarafat (2013) in his research states that there is a significant influence of the exchange rate on stock returns. Research from Wasserfallen (1990) and Edison (1991) states that there is a significant negative effect on exchange rates with stock returns. Based on the description above, then the hypothesis to be tested is as follows:

H<sub>4</sub>: USD/IDR exchange rate's change has a negative effect on mining stock return

### 3. Method, Data, and Analysis

The type of this research is associative research, which is to prove the hypotheses that exist and to know the influence between 4 independent variables (gold, silver, crude oil, and exchange rate) to one dependent variable (stock return) in mining company from 2011-2017. This research uses quantitative research data using monthly stock return data of mining sector companies period 2011-2017. This study uses secondary data. Gold data retrieval is from [www.investing.com](http://www.investing.com), the world's crude oil sourced from the US Energy Information Administration (USEIA) world, while silver and stock returns of the mining sector from Yahoo Finance, and the exchange rate USD/IDR is taken from the middle exchange rate that is on Bank Indonesia (BI).

**Table 1.** Sampling Process

| Criteria   | Number of Companies |
|--|---------------------|
| Mining companies listed on IDX   | 48                  |
| Mining sector companies listed on IDX and have recording returns from 2011-2017                          | 25                  |
| Companies that are always active in buying and selling transactions in the capital market from 2011-2017 | 13                  |

The population of this research is companies engaged in the mining sector listed on the Indonesia Stock Exchange (IDX). There are 48 mining sector companies listed on the BEI. Sampling by purposive sampling technique where the selection criteria are shown in Table 1.

So from 48 companies, which included in the research criteria, there are 13 companies such as ADRO, ANTM, CTTH, DOID, ELSA, HRUM, INCO, ITMG, KKGI, MEDC, PTBA, RUIS, and TINS.

This research uses Generalized Autoregressive Conditional Heteroscedasticity (GARCH) (1,1) to know the influence of independent variable to dependent variable and will be done by using monthly time series data at the closing price of mining sector company since early January 2011 until December 2017. Antoniou, Koutmos, & Pericli (2005) mentions that the GARCH analysis technique (1,1) is used to avoid the spread of non-stationary returns. GARCH (1,1) is a development of the ARCH model and developed by Bollerslev (1986). The level of significance ( $\alpha$ ) is at 1 percent, 5 percent, and 10 percent. The following is the research model used:

$$R_t = \beta_0 + \beta_1 gold_t + \beta_2 silver_t + \beta_3 oil_t + \beta_4 e_t + \sigma_t^2 + \varepsilon_t \quad (5)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_p \varepsilon_{t-p}^2 + \lambda_1 \sigma_{t-1}^2 + \dots + \lambda_q \sigma_{t-q}^2 \quad (6)$$

Whereas,

$R_t$  : mining stock return

$gold_t$  : gold price return

$silver_t$  : silver price return

$oil_t$  : crude oil return

$e_t$  : exchange rate

$\varepsilon_t$  : error term

$\alpha_1 \varepsilon_{t-1}^2$  : volatility of previous period (ARCH component)

$\lambda_1 \sigma_{t-1}^2$  : volatility of the previous period (GARCH component)

Before performing GARCH analysis (1,1) must test the data stationarity first by using the Augmented Dickey-Fuller Test (ADF). This is done so that the variables that are processed are stationary variables. This stationarity test uses level, 1st difference, and 2<sup>nd</sup> difference. The result of this ADF will be compared with

**Table 2.** Descriptive Statistics

| Variable       | Mean     | Maximum  | Minimum     | STDEV    |
|----------------|----------|----------|-------------|----------|
| RADRO          | 0.022054 | 1.781818 | -0.5        | 0.233375 |
| RANTM          | 0.005036 | 2.079365 | -0.61733764 | 0.276586 |
| RCTTH          | 0.008402 | 0.454545 | -0.22535211 | 0.109198 |
| RDOID          | 0.095581 | 7.225806 | -0.66486486 | 0.836044 |
| RELSA          | 0.010257 | 0.52518  | -0.58507463 | 0.162463 |
| RHRUM          | 0.01126  | 2.130435 | -0.58928571 | 0.286759 |
| RINCO          | 0.00397  | 1.054711 | -0.58720201 | 0.200505 |
| RITMG          | 0.008554 | 1.37037  | -0.64520368 | 0.218473 |
| RKKGI          | 0.016577 | 1.483333 | -0.51807229 | 0.234924 |
| RMEDC          | 0.031854 | 1.585387 | -0.82767224 | 0.251958 |
| RPTBA          | 0.001208 | 0.297778 | -0.28571429 | 0.11779  |
| RRUIS          | 0.005262 | 0.307692 | -0.21311475 | 0.081044 |
| RTINS          | -0.00342 | 0.298246 | -0.24725386 | 0.120523 |
| RGOLD          | 0.000348 | 0.122925 | -0.12153846 | 0.050509 |
| RSILVER        | 0.037798 | 0.92436  | -0.07176201 | 0.140894 |
| ROIL           | -0.02599 | 0.239713 | -0.5618547  | 0.136732 |
| REXCHANGE_RATE | 0.006914 | 0.124546 | -0.04256772 | 0.022911 |

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$\alpha$ . The data is said to be stationary if the probability is less than  $\alpha$  (prob < 0.01). Test GARCH (1,1) in this research will be said to have a significant effect if the result of probability is smaller than  $\alpha$  (prob < 0.01).

### Results

#### Descriptive statistics

Table 2 can be seen the results of descriptive statistics of the variables used in this study. The stock that has the highest average return during the study period are DOID stock, while a stock that has an average negative return is TINS stock. Stock that has the largest standard deviation is DOID stock. This shows that DOID stock has the largest average return but also have the greatest risk compared to other stocks. RUIS is stock with the smallest standard deviation.

During the research period, the average return of gold is 0.0348 percent lower than the average return of silver with value of 3.7798 percent. The same condition also applies for the gold and silver standard deviation (gold 's standard deviation is 0.050509 and silver's standard deviation is 0.140894). This means that although silver has a higher return than gold, silver also has a higher risk than gold. A different condition found in the oil return, the average of oil return is -2.599 percent with standard deviation value 0.136732 that show that during the research period, oil price tends to decline with higher risk than gold. On the contrary, the exchange rate return during the research period is 0.6914 percent with a standard deviation value 0.022911. This means that the exchange rate tends to weaken gradually with mild changes.

#### The result of Augmented Dicker Fuller Test

Table 3 is the result of the ADF test. Based on Table 3, it can be seen that the value of Prob of the variables tested was significant at a significance level of 1 percent. Therefore it can be concluded that all data used in the study is stationary and passes on the ADF test.

**Table 3.** The result of the Augmented Dickey-Fuller Test

| Variable       | Prob.  | Conclusion |
|----------------|--------|------------|
| RADRO          | 0.0000 | Stationary |
| RANTM          | 0.0000 | Stationary |
| RCTTH          | 0.0000 | Stationary |
| RDOID          | 0.0000 | Stationary |
| RELSA          | 0.0000 | Stationary |
| RHRUM          | 0.0000 | Stationary |
| RINCO          | 0.0000 | Stationary |
| RITMG          | 0.0000 | Stationary |
| RKGGI          | 0.0000 | Stationary |
| RMEDC          | 0.0000 | Stationary |
| RPTBA          | 0.0000 | Stationary |
| RRUIS          | 0.0000 | Stationary |
| RTINS          | 0.0000 | Stationary |
| RGOLD          | 0.0000 | Stationary |
| RSILVER        | 0.0001 | Stationary |
| ROIL           | 0.0000 | Stationary |
| REXCHANGE_RATE | 0.0000 | Stationary |

#### The result of GARCH (1,1) Analysis

The results of the GARCH analysis (1,1) are listed in Table 4. The probability test results (Prob) in GARCH analysis (1,1) show that there is a significant probability of commodities and exchange rates for mining companies at a significance level of 10 percent, 5 percent, and even 1 percent. Therefore it is concluded that this study received  $H_1$ ,  $H_2$ ,  $H_3$ , and  $H_4$  which states that there is influence between commodity (gold, silver, and oil) and the exchange rate at the stock return of Indonesian mining sector.

The results of GARCH (1,1) analysis show that there is a significant influence of oil, gold, silver and exchange rates on mining companies in Indonesia. Then we can see together that overall the mining companies studied has significant ARCH except for ANTM, DOID, KGGI, and MEDC. This means that the predicted errors in the capital market, commodity markets, and foreign exchange markets are affected by the preceding quadratic residuals, except for ANTM, DOID, KGGI, and MEDC. The results of this study also show that overall there are significant GARCH coefficients except on ANTM, DOID, KGGI, and MEDC. This means that the stock market, commodity markets, and foreign exchange markets are affected by the volatility of the past.

## Discussion

There is influence between gold, silver, oil, and exchange rates against mining companies in Indonesia. Gold has a significant positive effect on INCO, KKGI, PTBA, and TINS companies; this is because most of these companies are companies in the precious metals subsector (or produce commodities which highly related with precious metals' price. For example, INCO is nickel producer, and the nickel price is highly related to other metals' price. Overall, these findings support by Ibrahim & Baharom (2012) and Robiyanto (2018c)

Silver has a significant positive effect on HRUM companies and is negatively significant on RUIS. This finding supports Robiyanto, Wahyudi, & Pangestuti (2017a), who found that silver cannot be an asset because it has a positive relationship with the stock market. World oil has a significant positive effect on HRUM and PTBA firms; this is because the company is heavily related to oil. This finding consistent with Filis, Degiannakis, & Floros (2011), Hersugondo et al. (2015), and Robiyanto (2018a). Exchange rates have a significant negative impact on companies. ANTM, CTTH, DOID, ELSA, HRUM, ITMG, and KKGI; this is because these companies are active in

import-export activities, even some companies must pay their costs in Dollar (i.e., ELSA and DOID). The higher exchange rate will lead to a lower stock return. This finding supports Frensidy (2009), Kurniawati (2015), Triyono & Robiyanto (2017), and Robiyanto (2018b). Also supports Caesariana & Gandakusuma (2014), Suriani et al. (2015), and Lestari, Widarno, & Harimurti (2016). Overall, these findings support the APT which states that one or several explanatory variables will influence the profit level of an asset. In this case, by commodities' price and the exchange rate.

## Conclusion, Limitations, and Suggestions

### Conclusion

This research examines the relationship between gold, silver, world oil, and exchange rate on mining sector companies in Indonesia from 2011-2017. During this period, by using the level of significance ( $\alpha$ ) at 1 percent, 5 percent, and 10 percent, gold has a significant positive effect on stock return mining sector companies such as INCO, KKGI, PTBA, and TINS. Silver has a significant positive effect on HRUM companies and negatively on RUIS. World oil has a significant positive effect on HRUM and PTBA firms.

**Table 4.** The result of GARCH (1,1) Analysis

| Variable | Constant    | Gold       | Silver       | Gold        | Exchange Rate | ARCH         | GARCH       | ADJ. R SQUARED |
|----------|-------------|------------|--------------|-------------|---------------|--------------|-------------|----------------|
| ADRO     | 0.006015    | 0.269227   | 0.068587     | 0.099709    | -1.013289     | -0.060306*** | 1.104129*** | -0.006122      |
| ANTM     | 0.056033    | -0.469398  | 0.095025     | 0.293624    | -4.656624**   | -0.024347    | 0.570784    | 0.087887       |
| CTTH     | 0.011074    | -0.014663  | -0.092909    | -0.071329   | -1.392004***  | -0.076873*** | 1.120124*** | 0.037263       |
| DOID     | 0.240048    | -4.617228  | 0.251458     | 1.004643    | -12.95425**   | -0.020225    | 0.553361    | 0.054088       |
| ELSA     | 0.019295    | -0.35608   | 0.03886      | -0.005206   | -1.518823**   | 0.13938      | 0.81624***  | 0.057629       |
| HRUM     | -0.003651   | 0.03651    | 0.271708*    | 0.465382*** | -2.841888***  | 0.876521***  | 0.405913*** | 0.064128       |
| INCO     | -0.009048   | 0.703142** | 0.271708     | 0.151724    | -0.783613     | -0.089724*** | 1.11126***  | 0.01583        |
| ITMG     | -0.004184   | 0.304167   | -0.023984    | 0.124313    | -1.006365**   | -0.090325*** | 1.144794*** | 0.024032       |
| KKGI     | -0.004129   | 0.575353*  | 0.188411     | 0.326709    | -2.322413**   | -0.090325*** | 1.144794    | 0.061873       |
| MEDC     | 0.018967*** | 1.185611   | 0.198633     | 0.338323    | 1.474765      | 0.158572     | -0.579093   | 0.002824       |
| PTBA     | 0.001451*** | 0.303102*  | 0.097791     | 0.244766**  | -1.124141     | 0.17212      | 0.771881*** | 0.102354       |
| RUIS     | 0.4131      | 0.118725   | -0.213518*** | -0.054852   | -0.212793     | 0.340382**   | 0.637589*** | 0.020644       |
| TINS     | -0.015111   | 0.66638*** | 0.038334     | 0.155824    | -0.52145      | -0.132705**  | 1.109781*** | 0.078732       |

\*\*\* significant at 1 percent level of significance

\*\* significant at 5 percent level of significance

\* significant at 10 percent level of significance



## The effect of Commodity Price Changes and USD/IDR Exchange Rate...

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Exchange rates have a significant negative impact on companies. ANTM, CTTH, DOID, ELSA, HRUM, ITMG, and KKG. This impact shows that the external factors of mining companies can affect the stock return. This research presents that there is evidence that changes commodities prices and USD/IDR exchange rate affect the stock return of mining sector companies. The results of this study imply that investors must consider the external factors such as the change of gold and silver price, oil price, and exchange rate when they were investing in mining stocks listed in IDX.

### Limitations and suggestions

The limitation of this study is the period using monthly time series and only from 2011-2017. This research has not conducted a separation between potential research period contains an effect of turmoil in the capital markets such as the global financial crisis in 2008. Therefore future research recommended considering the separation between normal periods with a period of crisis in studies that examine the same topic. Using the internal factor of companies can be appropriate and relevant to do.

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