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## Commodity Prices, Exchange Rates and Investment on Firm's Value Mediated by Business Risk: A Case from Indonesian Stock Exchange

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**Abstract:**

*This paper examines the influence of six commodity prices (Crude Oil, Coal, CPO, Gold, Nickel, Tin), exchange rates and investment on the firm's value during the period 2010-2014, both directly and indirectly through the mediation of business risk.*

*By applying Common Effect approach for panel data on path analysis model, we found the oil price and exchange rate (USD/IDR) are affect the firm's value, either directly or indirectly through business risk asmediation variable, but business risk does not mediate the effect of the investment on the firm's value.*

*The study's findings support previous research results and evidence of theories, especially about the relationship of commodity prices, exchange rates, risks and value of the company.*

*These results are useful for individual and institutional investors, managers and policy makers.*

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## **Introduction**

Economic globalization encourages the integration of the economic system and the integration of markets, where market integration has made interdependence between markets (stock markets, commodities and foreign exchange). This condition is not only an opportunity for the company but also expand business risk. The enterprise value reflected in stock market prices (Fama, 1978) more sensitive to the dynamics of global economic conditions, particularly multinationals and local companies that have international activity (exporters and importers), such as mining and plantation commodity company listed on the Stock Exchange Indonesia (IDX). The value of the company and the risk of non-financial companies, not only depend on internal factors such as a financial decision, but also in commodity prices and exchange rates (Bartram, 2005).

Indonesia is the world's largest producer and exporter of many commodities, however, commodity reference prices still refer to market prices and commodity exchange in other countries, as well as the sales price is denominated in US Dollars. Table 1 shows the commodities produced by companies engaged in commodity business that listed on the Indonesia stock exchange (IDX) and the price reference.

**Table 1.** *Commodities and Price Reference*

<b>No.</b>	<b>Commodities</b>	<b>Price Reference</b>	<b>Denomination</b>
1	Crude Oil	NYMEX-CME, Crude Oil Futures	<i>USD per-barrel</i>
2	Coal	New Castle Coal Index	USD per-ton
3	CPO	BMD Crude Palm Oil Futures	Ringgit/ton
4	Gold	Loco London Gold	USD per-troyounce
5	Nickel	<i>London Metal Exchange (LME) Nickel</i>	USD per-ton
6	Tin	<i>London Metal Exchange (LME) Tin</i>	USD per-ton

Risk is one of the factors that affect the firm's value, the risk affecting the firm's value through cash flow (Damodaran, 2006; Lusht, 1977), and also through company costs such as agency costs, compensation to managers, financial distress, bankruptcy and lack of investment management (Beatty, Petacchi et al., 2012; Naito and Laux 2011; Stulz, 2002; Allayannis *et al.*, 2012). Meanwhile, based on the viewpoint of financial management, efforts to increase the value of the company can be pursued by investing (Fama, 1978). So that four variables (business risks, commodity prices, exchange rates and investment) are an important variables that affect the firm's value in commodity business fields (mining and plantation).

## **2. Literature Review and Hypothesis Development**

### **2.1. Business Risk and Firm's Value**

The business risk is defined in various contexts (Doff, 2008), sometimes business risk is defined as the aggregate of all risks (Marshall and Marshall 2001), also

sometimes referred to as the residual risk type after all other risk types are identified (James, 1996 ; Van Lelyveld, 2006; Kuritzkes and Schuermann, 2006). The business risk is also defined as the equivalent of non-systematic risk (idiosyncratic or diversifiable) in the context of the capital asset pricing model (Amit and Wernerfelt, 1990; Conine, 1982). There are also defining business risks associated with revenue and sales value, such as Matten (2000), Schroeck (2002) and Crouhy *et al.* (2006) and Van Lelyveld (2006).

Risk is one of the factors that affect the firm's value, the risk of affecting the firm's value through cash flow (Damodaran, 2006; Lusht, 1977), and also through company costs such as agency cost (Petacchi *et al.*, 2012; Naito and Laux 2011; Stulz, 2002), the compensation of the managers, a decrease in the cost of financial distress and bankruptcy and lack of investment management (Bartram, 2006; Carter, Rogers *et al.*, 2006; Bartram and Bodnar, 2007; Bartram *et al.*, 2009; Aretz and Bartram, 2010; Allayannis *et al.*, 2012; El-Charami, 2014; Thalassinios and Politis, 2011; Thalassinios *et al.*, 2012; 2013; Setyawati *et al.*, 2017; Glavina, 2015). The previous studies on the effect of risk on the firm's value, carried out in a variety of topics. Several studies have shown significant results that the risk affects the value of the company, or a reduction in the risk can increase the value of the company and reverse the increase in risk would decrease the firm's value, including research results Hamma, Jarboui *et al.* (2014), Basher and Sadorsky (2004), Jin and Jorion (2006), Bartram (2009), Allayannis and Ihrig (2001), Gjerde and Sættem (1999), Ferderer (1996), Huang *et al.* (1996). Thus, the following hypothesis is:

*H1: Business Riskis negatively influenced the firm's value.*

Meanwhile, the company risk profile is a plot showing the relationship between changes in prices of some goods (commodities), or exchange rates, interest rates and changes in the firm's value (Ross *et al.*, 2012), thus the business risk can be a mediating variable. Business risk can be a mediating variable of the relationship between the independent variable and the firm's value, when the independent variables have a significant influence on the business risks and the firm's value (Baron and Kenny, 1986; Theriou, 2015).

## **2.2. Commodity Prices, Business Risk and Firm's Value**

The influence of commodity prices on the firm's value, may be due to its relevance as input or output factors in the corporate production process. In addition, there is an indirect effect on the value of the company as a result of changes in commodity prices to customers, suppliers or competitors or competitive position (Bartram, 2005). Commodity price influence on stock prices depends on whether the company is a consumer or a producer of commodities or commodity related products (Basher and Sadorsky, 2006). For commodity producer company, the rise in commodity prices will increase firms's revenue (cash in inflow) and boost the share price. The empirical evidence on the relationship of commodity prices and the firm's

value, showed a significant and positive correlation of commodity prices and share market prices, which are: Huang *et al.* (1996), Gjerde and Sættem (1999), Chong, Miffre *et al.* (2009), Sadorsky (1999), Arouri and Fouquau (2009), Arouri and Rault (2012), Thuraishamy *et al.* (2013), Delatte and Lopez (2013); Hamma, Jarboui *et al.* (2014); and Adams and Glück (2015). Therefore, it can be hypothesized that:

*H2: Commodity Prices are positively related to the firm value.*

The influence of commodity prices on the business risks related to price uncertainty. Commodity prices fluctuations have an impact on the uncertainty of the selling price of products or commodities (Basher and Sadorsky, 2006). Uncertainty raises the price deviations on revenues and expenses, that companies face price risk, or risk exposure. Several studies on the effect of commodity prices on the company's risk found a significant effect of the commodity price fluctuations risk on the stock price, including the study by: Huang *et al.* (1996), Ferderer (1996), Sadorsky (1999), Gjerde and Sættem (1999), Basher and Sadorsky (2006), Oberndorfer (2009), Jin and Jorion (2006), Hamma, Jarboui *et al.* (2014). Thus, the following hypothesis is:

*H3: Commodity prices positively related to the firm's value, with mediating / intervening role of Business Risk.*

### **2.3. Exchange Rate, Business Risk and Firm's Value**

The relationship between the exchange rate and the firm's value, traditionally based on two approaches are flow-oriented approach (Dornbusch and Fischer, 1980) and stock-oriented approach (Branson, 1993; Frankel, 1983 and Gavin, 1989), as well as approach based on asset-market which implies weak / no relationship between stock prices and exchange rates, where the exchange rate is treated as an asset whose value is determined by the exchange rate is expected in the future (Sensoy and Sobaci 2014). Based on the Interest Rate Parity (IRP) theory, future expectations on the value of the currency led to a change in interest rates, both the interest rate in domestic currency and interest rates in foreign currencies will also affect the present value of the asset or the company (Nieh and Lee, 2002).

Researchs on the relationship between exchange rates and the firm's value, especially the stock market prices, showed a significant relationship, including the results of research by: Yau and Nieh (2009), Lin (2012), Parlapianoa and Alexeev (2012), Do, Brooks *et al.* (2015). Thus, the following hypothesis.

*H4: Exchange rate positively influenced the firm's value, indirectly through the mediating variable business risk.*

The relationship between exchange rates and business risk is the revenues uncertainty from the sales of commodities, where the uncertainty of costs and revenues due to changes in exchange rates cause changes in the company cash flow

or the disclosure of the foreign exchange risk. Exchange rate movements will affect the expected cash flows and stock returns, due to changes in the value of the local currency against foreign currency income or expense, and in terms of competition for multinational corporations and local companies with activities of importers and exporters (Doukas *et al.*, 2003).

Business risk due to fluctuations in exchange rates or exchange rate exposure can be interpreted as the sensitivity of the company market value to exchange rates fluctuations (Dumas, 1978; Adler and Dumas, 1980, 1984; Doukas *et al.*, 2003), therefore business risk for non-financial company is an unexpected change and the effects of exchange rates and commodity prices (Bartram, 2005; Madura, 1989).

The previous study on the effect of exchange rates on the company's business risk based on the sensitivity of exchange rate uncertainties, showed results that were significant. Some of these studies by: Doukas *et al.* (2001), Allayannis and Weston (2001), Allayannis, Brown *et al.* (2003), Bartram and Karolyi (2006), Muller and Verschoor (2006), Nguyen *et al.* (2007), Hutson and O'Driscoll (2010), Choi, Fang *et al.* (2010). As well as the topic of hedging: Bartram, Brown *et al.* (2009), Allayannis and Ofek (2001), Graham and Rogers (2002). Thus, the business risk can act as an intervening variable in the relationship between exchange rate and firm's value, we suggest hypothesis.

*H5: Exchange rate is positively related to the firm's value, with mediating role of Business Risk.*

## **2.4. Investment, Business Risk and Firm's Value**

The relationship between investment and risk, ie each type of investment has a risk-return relationship that reflects the principle that safer investments tend to offer lower returns, whereas riskier investments tend to offer higher returns (Griffin and Ronald, 2008). Investment decisions take into account two parameters: risk and earnings (return) is expected from the assets, and the optimal portfolio is investment that provides maximum results at a certain level of risk, or a certain return on the minimal risk (Markowitz, 1968).

The previous study showed that investment positively influence the company value, several studies by: Lin and Su (2008), Stenbecka and Spear (2002), Chen, Ho *et al.* (2000), Kaestner and Liu (1998), Woolridge and Snow (1990), McConnell and Muscarella (1985).

The relationship between the investment and the firm's value, according to the theory of financial management, that the ultimate goal of company financial management policy is to maximize corporate value through investment decisions (Ross, 2004), in addition to the company investment policies must be based on factors that will increase profitability, cash flow or net worth companies (Modigliani

and Miller, 1958).Based on the theoretical and empirical findings, we suggest hypothesis.

*H6: Investmentis positively influenced the firm value.*

Based on the theory, implicitly shows that investment has significant and positive impact on the risk, it is also in accordance with the empirical findings of previous studies that the increase in investment resulted in increased risks, including the results of research: Fama (1978), Lin *et al.* (2008), Panousi and Papanikolaou (2012). Thus, the business risk can act as an intervening variable in the relationship between investment and firm's value.

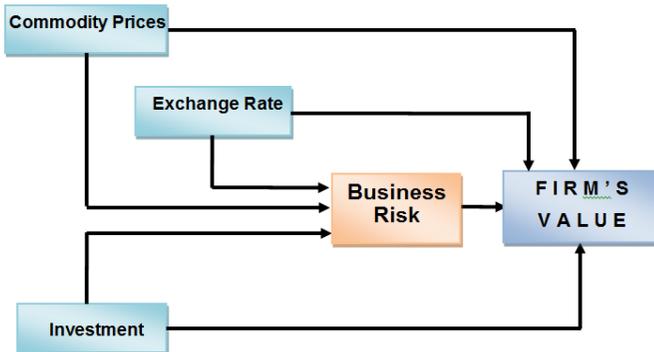
*H7: Investmentis positively related to the firm's value, with intervening role of Business Risk.*

### 3. Methodology

#### 3.1. Path Analysis Model

We developed a path analysis for the model in this study, as follows:

**Figure 1.**Path Analysis Model TheInfluence of Commodity Prices, Exchange Rates and Investments on Firm's Value with Business Risk as Mediated Variable



In this model there are some regression equations, the results of the regression equations must meet the requirements of path analysis methods.We adopted the concept from Baron and Kenny (1986), the regression equations are as follows:

1.  $Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$
2.  $Z = \beta_4 X_1 + \beta_5 X_2 + \beta_6 X_3 + e$
3.  $Y = \beta_7 Z + \beta_8 X_1 + \beta_9 X_2 + \beta_{10} X_3 + e$

Where, the dependent variable is firm's value (Y), the independent variables are commodity prices ( $X_1$ ), exchange rates ( $X_2$ ), Investment ( $X_3$ ), and mediating variable is business risk (Z). Approachingselection that is used for the panel data by

the Chow test, Hausman test and Lagrange Multiplier (LM) test; the results of all three tests showed that a Common Effect approach is the most appropriate. while the significant test for the influence of the independent variable on the dependent variable through mediating variables, we used Sobel test (Sobel, 1982; 1986).

To estimate firm value most researchers in the literature use some version of Tobin's Q (Chung and Pruitt, 1994; Allayannis and Weston, 2000; Jankensgård *et al.*, 2014). We compute Tobin's Q as Total Book Value of Assets minus Book Value of Equity plus Market Value of Assets divided by Total Book Value of Assets. while the commodity price and exchange rate proxied by the regression coefficient of the influence of commodity price and exchange rate fluctuations on stock returns, this is follows methology by Haushalter *et al.* 2002; Jin and Jorion, 2006; Bodnar and Wong 2003. To gauge investment, we use proxied by the ratio of Capital Expenditure to Book Value of Assets (CAP/BVA), and risk business proxied by Degree Operating Leverage (DOL) as used by previous researchers (Dagogo, 2014; Gritta, 2003, Gahlon and Gentry 1982).

### 3.2. Data

The population is 55 companies engaged in commodity business (mining and agriculture), that are listed on the Indonesia stock exchange (IDX) in the period of 2010 to 2014. The final sample consists of 25 firms which fulfill these requirements; a balanced panel data for five years with 125 observations is employed as a sample for the current study. Commodity prices is the price of commodities produced by 25 companies that are crude oil, coal, crude palm oil (CPO), gold, nickel and tin. Meanwhile, the exchange rate used US Dollar to Indonesian Rupiah (USD/IDR). Data for compute Tobin's Q and investment were obtained from Indonesia Stock Exchange (IDX), while data for commodity prices and exchange rate were obtained from Thomson Reuters Datastream.

### 4. Empirical Results

Based on the regression results, requirements of data analysis and path analysis model (Table 2), the commodity prices that meets the requirements is crude oil only, so the first hypothesis test (H1) uses only the crude oil prices as the commodity prices variable.

**Table 1.** Requirements Selection for Path Analysis

Commodity	Coefficient	Prob	Significance	Findings
Crude Oil	0.1177	0.0152	Significant	Qualify
Coal	0.0663	0.0976	Not Significant	Not qualify
CPO	0.0666	0.7719	Not Significant	Not qualify
Gold	-0.2030	0.0033	Significant	Not qualify
Nickel	0.0654	0.8450	Not Significant	Not qualify

Tin	-0.0567	0.8448	Not Significant	Not qualify
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Based on the hypothesis test on Table 3, the direct effect of business risk, commodity (prices crude oil), exchange rates and investment is all exhibited significantly, so a hypothesis 1, 2, 4 and 6 are proved. These results also indicate that varaibel lines were eligible for analysis.

**Table 3.** *Direct Impact Hypothesis Testing Results*

Ha	Relationship Between Variables	Coefficient	Prob.	Findings
H1	$Z \rightarrow Y$	-0.040941	0.0382	Significant
H2	$X_1 \rightarrow Y$	0.117668	0.0152	Significant
H4	$X_2 \rightarrow Y$	0.142713	0.0429	Significant
H6	$X_3 \rightarrow Y$	0.095845	0.0310	Significant

Based on the hypothesis test on path analysis (table 4), the indirect impacts of commodity prices (crude oil) and exchange rate on the firm's valuethrough the mediation of business risk is exhibited significantly, so a hypothesis 3 and 5 proved. But the effects of the investment on the firm's value through business risk showed isnot significant.

**Table 4.** *Hypothesis Testing Results Indirect Influence*

Ha	Relationship Between Variables	Coefficient	Z-value	Findings
H.3	$X_1 \rightarrow Z \rightarrow Y$	0.1113	2.0892	Significant
H.5	$X_2 \rightarrow Z \rightarrow Y$	0.1308	2.3896	Significant
H.7	$X_3 \rightarrow Z \rightarrow Y$	0.0972	-1.9910	NotSignificant

## 5. Discussion and Conclusion

The business risks have significantly negative influence on firm value. It explains that the capital market stock price is formed based on the perception of risk and investors' expectations. While in the commodity business fields, in addition to seeing the company's business risk investors also see investment policy taking into account the trend in commodity prices and exchange rate today and in the future. Commodity prices (crude oil) have significantly positive influence on firm's value, directly and indirectly through the mediation of business risk, this is consistent with the findings of Arouri and Rault (2012), Thuraisamy *et al.* (2013), Delatte and Lopez (2013), Hamma, Jarboui *et al.* (2014) and others. The effect of exchange rate on on firm's value is found to be significant and positive, directly and indirectly through the mediation of business risk, this result is consistent with Doukas *et al.* (2001), Allayannis and Ofek (2001), Graham and Rogers (2002), Muller and Verschoor (2006), Nguyen *et al.* (2007), Bartram, Brown *et al.* (2009), Hutson and O'Driscoll (2010), but differs from the earlier studies of Guay and Kothari (2003), Parlapianoa

and Alexeev (2012), Mollick and Assefa (2013). The company's revenues from the sale of commodities, is heavily influenced by commodity prices and exchange rate fluctuations.

The crude oil prices fluctuations triggered to changes other commodity prices such as coal and palm oil as an energy source substitution of petroleum, as well as nickel and fellow minerals. On the other hand, the price of gold often has a separate trend direction related to the function of gold as a safe haven assets and investments. The larger the business, the greater the risk of variation of gain due to changes in the value of sales of exchange rate fluctuations and commodity prices produced by the company, and ultimately affect the value of the company or the market value of all outstanding shares (MVS).

Investment directly influence the value of the company positively and were significant, but through the mediation of business risk is not significant or business risk does not mediate investment influence on firm value, contrary to theory (Lin *et al.*, 2008; Panousi and Papanikolaou, 2012). Increased investment aims to increase sales through higher production volume, so that the higher the company's cash inflow which in the end increase the firm's value reflected in the company's stock market price or the market value of all outstanding shares (MVS). Investment indirectly does not increase the firm's value through the mediation of business risk, this is because companies engaged in commodity business (agriculture and mining) has specific characteristics compared to others businesses.

These companies produce commodities for export-oriented that the company's revenue from the sale of commodities greatly influenced by the exchange rate and commodity prices, and therefore the company's business risk tends to be dominant by the two factors. Inaccuracy investments based on commodity prices and exchange rate conditions, does not result in a major impact on the value of sales, business risk, as well as the value of the company. Related to the production period, the period of investment in the plantation sector is also long so that the investment does not affect instantly in the volume and value of sales. However, prices of mining commodities for the period of 2010 to 2014 occur the downward trend, this results in a lot of investment that is not used properly.

Based on these results, it may be advisable to management, investors or owners; and also for the next researcher, as follows: fluctuations and trends in commodity prices, especially crude oil is very important to be considered for companies in the business of commodities (agriculture and mining) in planning, strategy and financial decisions. Financial decisions (such as investments) are taken at time commodity prices are experiencing a decreasing trend (bearish) causes the results do not match expectations. In addition to commodity prices, the trend rate of USD / IDR is also very important to be considered. It is associated with the receipt of proceeds from the sale of commodities, that despite an increase in commodity prices but if Rupiah has appreciated, the revenue from the sale of the amount will be reduced. The

company's value and business risk in the business of commodities is very vulnerable to fluctuations in commodity prices and exchange rates. Therefore, to cope with uncertainty (risk exposure) of commodity prices and currency exchange rate, the company should do hedging. For further research could study other independent variables and recommended to use longer period of study and includes an increasing commodity prices trend, so that it can confirm the findings that the business risk does not mediating investment influence on firm value.

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