RESEARCH
THE SENSITIVITY ANALYSIS OF CHANGES IN FOREIGN EXCHANGE RATE AND STOCK PRICE:
EMPIRICAL EVIDENCE OF INDONESIAN CAPITAL MARKET

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THE SENSITIVITY ANALYSIS OF CHANGES IN FOREIGN EXCHANGE RATE AND STOCK PRICE:

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The purpose of this study is to analyze the stock price sensitivity to changes in Rupiah / US Dollar, US Dollar / Euro, and US Dollar / Japanese Yen exchange rate as well as to analyze the differences in the level of stock price sensitivity to changes in Rupiah / US Dollar, US Dollar / Euro and US Dollar / Japanese Yen exchange rate. Ordinary least square regression and one way anova are used in establishing the sensitivity analysis between daily stock return of manufacturing firms listed in Indonesian Stock Exchange and daily exchange rate of Rupiah/US Dollar, Rupiah/Euro, and Rupiah/Japanese Yen in 2008. Similar to Jorion (1990), the daily return to a market portfolio is included in the model to control for the common macroeconomic influences on stock price.

Consistent with previous research, it is found that stock price is sensitive to change in foreign exchange rate. This study also revealed that Rupiah / Japanese Yen exchange rate give more significant effect to stock price than Rupiah / US Dollar and Rupiah / Euro exchange rate.

Keywords: stock price, foreign exchange rate, US Dollar, Euro, Japanese Yen
INTRODUCTION

Exchange rate variability plays important roles in influencing the development of a country’s economy affecting firms. In the recent years, where world trade and capital movements continually increase, the exchange rates have become one of the main determinants of business profitability and stock prices.

The US Dollar, Euro, and Japanese Yen are the most heavily traded currency today. US Dollar has been adopted and in some cases used as the official currency in many different territories and countries. According to many sources, Euro currency accounts for almost 37% of the daily transactions in the world. The Japanese Yen takes the third spot for about 20% of all transactions done in the foreign exchange market involve the Japanese Yen.

In 2008, the United States emerged in sub-prime mortgage crisis caused by a lot of bad debt in property sector, which later evolved into a global financial crisis. That crisis was having a domino effect that is starting to affect the economies of emerging countries, including Indonesia.

The global crisis caused depreciation of Rupiah exchange rate. The depreciation has had an impact on many manufacturing firms in Indonesia. A number of firms cut down on productions or even ceased their operation due to declining demands in their products and rose of commodities’ price.

That condition caused stock prices to decline, because the depreciation scared investors off domestic stock market. Although there were some investors looked at that situation as an opportunity for a cheap investment, depreciation still produced a slump in Indonesian stock prices.
Otherwise, deterioration of Rupiah’s exchange rate to the US Dollar benefited exporters. The demands for export goods were still high, since the price of Indonesian products abroad became very cheap. Exporters also earned additional gain from Rupiah depreciation.

The previous empirical studies reveal divergent views of researchers on the issue about the relationship between foreign exchange and stock prices. These inconsistencies and the limited research on the sensitivity of exchange rate changes against stock prices in Indonesia become motivation to conduct this research. Particularly, this study aims to analyze the stock price sensitivity to changes in Rupiah / US Dollar, US Dollar / Euro, and US Dollar / Japanese Yen as well as to analyze the differences in the level of stock price sensitivity to changes in Rupiah / US Dollar, US Dollar / Euro and US Dollar / Japanese Yen.

THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Exchange rate is the number of units of one country’s currency for each unit of other country currency (Utami and Rahayu 2003). Adler and Dumas (1984) states that even the firm is not engaged in international trade, does not have operations abroad, and has only domestic competitors; it may nevertheless be exposed to foreign exchange risk. The impact is come from its input and output prices that are influenced by currency movements.

Exchange rate shocks also affect industries’ competitiveness against the same industries in other countries (Griffin and Stulz 2001). A falling home currency will affect firms’ value through changes in the value of firms’ assets and liabilities denominated in foreign currency, then ultimately affecting firms’ profits and therefore the value of equity (Tabak 2006).

Higher volatility in the exchange dampens stock market activity. A depreciating currency has a negative impact on stock market returns. Such events will motivate investors to move funds
from domestic assets (stocks) towards foreign currency assets, depressing stock prices (Adjasi et al. 2008). The changes have important implications for financial decision-making and for firm profitability (Yucel and Kurt 2003).

Possible fluctuations of future cash flows in home currency that are caused by changes in the exchange rate is called economic exposure (Schafer and Weidinger 2005). Allayanis (1996) define economic exposure to exchange rate movement as the regression coefficient of the real value of the firm on the exchange rate, across states of nature. It can be measured by looking at the sensitivity of expenses and revenue on various possible changes in foreign exchange rates.

The first study that examined the relationship between stock prices and exchange rates is a paper by Franck and Young (1972). They use correlation regression analyses, and point out no significant interaction between these two financial variables. Adler and Dumas (1984) show analytically that exposure to currency risk can be measured within a simple linear regression framework, in which the stock market return is regressed on a constant and the exchange rate. Jorion’s (1990) model is established by adding the return of the market to control for market movements, but can only find weak evidence of such a relation existing. Nevertheless, a number of studies, see for instance Choi and Prasad (1995), Allayannis (1996), Glaum et al. (2000), Griffin and Stulz (2001), Entorf and Jamin (2002), Bodnar and Wong (2003), Hsin et al. (2003), and Yucel and Kurt (2003), adopt the Adler and Dumas (1984) and Jorion (1990) approach.

Bartov and Bodnar (1994) investigate U.S. firms' exchange rate exposure and find that exchange rates have low explanatory power (as measured by $R^2$) for explaining individual stock returns. Using a sample of foreign exchange market in India, Nath and Samanta (2002) show that generally returns in foreign exchange and stock markets are not interrelated. Rahman and Uddin (2009) provide similar evidence for Bangladesh, India, and Pakistan.
In contrast, Choi and Prasad (1995) find that 60% of firms have significant exchange rate exposure. Allayannis (1996) find that in the long run, a 1% lagged appreciation of the US Dollar decreases the return on the equally weighted industry portfolio by 1.09%. The finding in this study is consistent with Dominguez (1998); Muhammad and Rasheed (2003); Bodnar and Wong (2003); Doidge et al. (2006) and Beirne et al. (2008). Kutty (2010) discover that stock prices lead exchange rates in the short run in Mexico.

Granger et al. (2000) prove that exchange rates lead stock prices with positive correlation in Japan and Thailand. Utami and Rahayu (2003) find that the exchange rate have significant effect on stock price changes in Indonesia. Yucel and Kurt (2003) reveal that 11.8% of Turkish examined companies have a positive and significant economic exposure for the examined period. For a comprehensive sample of German firms, the percentage of foreign sales is significant determinants of the exposure (Bartram 2004).

**The Sensitivity of Changes in Rupiah/US Dollar and Stock Price**

The US Dollar is most used currency on the market, and is chosen as the world's reserve currency. The world has depended on the US Dollar, and world trade in many products is priced in US Dollars. This means that US Dollar exchange rate affect firm's production decisions, sales volume, and cash flow. For instance, US Dollar volatility leads to a change in the profitability of firms and their stock prices.

Bartov and Bodnar (1994) find that lagged, and not contemporaneous, changes in US Dollar exchange rates, explain firms current stock returns. Dominguez and Tesar (2000) investigate the relationship between exchange rate movements and firm value in Netherlands, Chile, England, Italy, Germany, Japan, France and Thailand. They show that for five of the eight
countries in their sample, over 20% of firms are exposed to the US Dollar exchange rate movements. Consistent with Dominguez and Tesar (2000), the study of Dominguez (1998) and Doidge et al. (2006) also indicate that US Dollar exchange rate fluctuations do affect firm value. Cairns et al. (2007) find that sensitivity of the Indonesian Rupiah towards the VIX is equal to 0.112. It means that, on average, the currency would depreciate by 0.56% in the presence of a five point rise in the VIX. In contrast, Tabak (2006) states that no long run relationship between the nominal exchange rate of Brazilian Real / US Dollar and the stock price in Sao Paulo Stock Exchange.

**H1: Stock price is sensitive to changes in Rupiah / US Dollar exchange rate**

**The Sensitivity of Changes in Rupiah/Euro and Stock Price**

Although relatively new to the world stage, the Euro is quickly become the second most traded currency. As with the US Dollar, some of the world's currencies are pegged against the Euro. Changes in Euro exchange rate will affect firms that use Euro as a means of transaction.

Holder et al. (2001) analyze the Euro experience over the first two years of the Euro's introduction and report that the European Monetary Union has a substantial impact on securities markets. Solakoglu (2004) estimate the sensitivity of firm returns to Turkish Lira / Euro and Turkish Lira / USD exchange rate exposure in Turkish firms using panel data approach. For the period between 2001 and 2003, the study finds that the size of the firm and the level of international activity are significant in lowering the exposure, especially for exporters and importers. Similar result is obtained from Rees and Unni (2005) on pre-Euro exposure to exchange rate changes of sensitivity in the UK, France, and Germany. In contrast, Cheung and Westermann (2001) conduct a research in both German and US equity markets before and after
the introduction of the Euro. They report that a switch in exchange rate arrangement appears to have no significant implication for the causal relationships between the two equity markets. An insignificant result also obtained from Patnaik and Shah’s study (2009) in India.

**H2: Stock price is sensitive to changes in Rupiah / Euro exchange rate**

**The Sensitivity of Changes in Rupiah/Japanese Yen and Stock Price**

Japanese Yen is the third most-traded currency in the foreign exchange market after the Euro and the US Dollar. Japanese Yen is highly sensitive to rising energy costs. This is because Japan imports all its oil and being an export-dependent nation heavily dependent on imported raw material supply.

A study on the relationships between the local currency of Bahraini Dinar / Japanese Yen is conducted by Tahir and Ghani (2004). The result shows that exchange rate movements Bahraini Dinar / Japanese Yen will affect the value of trade, which in turn will affect the value of the firm in Bahrain. Doidge et al. (2002) find that in Hong Kong, Malaysia, and Singapore, the changes in Japanese Yen exchange rate against local currencies pose a significant economic impact for the firm. Bartram (2004) also state that the analysis of exposure to the firm in Germany greatly influenced the exchange rate of US Dollar and the Japanese Yen. A later study of interrelationships among the stock prices of Taiwan and Japan and the NTD / Japanese Yen exchange rate by Yau and Nieh (2006) finds similar results. Stock prices of Taiwan and Japan impact each other for short durations and there appears to be no long-term relation between NTD / Japanese Yen exchange rate and the stock prices of Taiwan and Japan.

**H3: Stock price is sensitive to changes in Rupiah / Japanese Yen exchange rate**
The Difference between Sensitivity of Changes in Rupiah / US Dollar, Rupiah / Euro, Rupiah / Japanese Yen and Stock Price

Various literature states that US Dollar, Euro, and Japanese Yen are the three most active currencies traded worldwide. However, the influence of changes in exchange rates of each currency against stock return differently in individual countries and at all times. The influence is caused by macro and micro economic conditions of a country and depends on the ability of local currency to survive the impact of foreign currency movements. Therefore, this study is aimed to know which changes in currency exchange rates that most likely cause for the change in stock returns in Indonesia's capital markets.

Most of the stock price index in the world countries is sensitive to changes in US Dollar, Euro, and Japanese Yen exchange rate against the local currency, either partially or simultaneously. A study is made by Wei (2008) in China stock market. The empirical results of the CCC-MGARCH model show the negative correlation between both the USD-RMB and the Yen-RMB unexpected exchange rate shocks, while that for the Eurodollar-RMB unexpected exchange rate shock is not. Kettering (2009) investigates the effect of eight foreign currencies, including the Euro and Japanese Yen, upon US stock prices. The results of the study demonstrate that the indexes are currency insensitive, and the relationships changed as different time periods are observed. Rahman and Uddin (2009) examine data from Bangladesh, India and Pakistan over January 2003 to June 2008 time period. Empirical result shows that Bangladesh’s local currencies against US Dollar, Euro, Japanese Yen, and Pound exchange rates and stock prices data series are non stationary and integrated of order one. Result also shows that there is no co integrating relationship between stock prices and exchange rates. Finally, the outcome shows
there is no way causal relationship between stock prices and Bangladesh Taka / US Dollars and Bangladesh Taka / Japanese Yen exchange rates.

**H4: There is a difference in the level of stock price sensitivity to changes in the exchange rate of Rupiah / US Dollar, Rupiah / Euro and Rupiah / Japanese Yen**

**RESEARCH METHOD**

This study uses the sample of 102 manufacture firms listed in the Indonesia Stock Exchange (IDX) based on purposive sampling method. Daily data is used to estimate exchange rate sensitivity of the stock price for the period from January to December 2008.

Daily stock returns of manufacture firms ($R_{it}$) are measured by using the ratio between stock price changes and stock price of the previous day. Percentage of change in the Rupiah / US Dollar exchange rates ($S_i$) are measured by using the ratio between Rupiah / US Dollar exchange rate changes and Rupiah / US Dollar exchange rate of the previous day. The same equation also use to measure percentage of change in the Rupiah / Euro exchange rates ($€_i$) and Rupiah / Japanese Yen exchange rates ($¥_i$). Daily market return on Indonesia Stock Exchange ($R_{mt}$) is measure by using the ratio between closing prices of Jakarta Composite Stock Price Index (CSPI) changes and closing prices of CSPI of the previous day.

The hypotheses are tested using Adler and Simon (1986) model. Economic exposure is measured as the slope coefficient from a regression of stock returns on exchange rates.

\[ R_{it} = \alpha_i + \beta_i e_t + e_{it} \]

The second model refers to Jorion (1990). This model includes the return to a market portfolio to control for the common macroeconomic influences on total exposure elasticity.

\[ R_{it} = \alpha_i + \beta_{1i} e_t + \beta_{2i} R_{mt} + e_{it} \]
where:

\( R_{it} \) = stock return
\( \alpha_i \) = intercept
\( \beta_i \) = the coefficient
\( e_i \) = exchange rate movement
\( R_{mrf} \) = market return
\( e_{it} \) = error term

Because the exchange rates used in this study were divided into three parts (Rupiah / US Dollar, Rupiah / Euro, and Rupiah / Japanese Yen), notation \( e_i \) in both equation above is replaced with \( S_i, \epsilon_i \) and \( ¥_i \). Then the equations that are used in this study can be divided into four parts:

**Equation to test the sensitivity of stock price to changes in Rupiah / US Dollar**

\[
R_{it} = \alpha_i + \beta_i S_i + e_{it} \quad (1.1)
\]

\[
R_{it} = \alpha_i + \beta_{1i} S_i + \beta_{2i} R_{mrf} + e_{it} \quad (1.2)
\]

**Equation to test the sensitivity of stock price to changes in Rupiah / Euro**

\[
R_{it} = \alpha_i + \beta_i \epsilon_i + e_{it} \quad (2.1)
\]

\[
R_{it} = \alpha_i + \beta_{1i} \epsilon_i + \beta_{2i} R_{mrf} + e_{it} \quad (2.2)
\]

**Equation to test the sensitivity of stock price to changes in Rupiah / Japanese Yen**

\[
R_{it} = \alpha_i + \beta_i ¥_i + e_{it} \quad (3.1)
\]

\[
R_{it} = \alpha_i + \beta_{1i} ¥_i + \beta_{2i} R_{mrf} + e_{it} \quad (3.2)
\]

**Equations to examine differences in the level of stock price sensitivity to changes in Rupiah / US Dollar, Rupiah / Euro and Rupiah / Japanese Yen exchange rate**

\[
R_{it} = \alpha_i + \beta_{1i} S_i + \beta_{2i} \epsilon_i + \beta_{3i} ¥_i + e_{it} \quad (4.1)
\]
The first, second, and third hypotheses are estimated using *ordinary least square* (OLS) regression. The fourth hypothesis is estimated by using One Way Analysis of Variance (ANOVA) to test whether the average of two or more samples are significantly different or not, and to test whether the samples have the same population variance or not.

**EMPIRICAL RESULTS**

**Descriptive Statistics**

Table 1 provides descriptive statistics analysis do through SPSS statistical software. Stock return has the mean of -0.0016 with standard deviation of 0.1227. Rupiah / US Dollar exchange rate has the mean of 0.0006 and standard deviation of 0.0124. Rupiah / Euro exchange rate is having a mean of 0.0005 and standard deviation of 0.0125. Rupiah / Yen exchange rate is having a mean and standard deviation of 0.0016 and 0.0192 respectively. Market return is having a mean and standard of -0.0030 and 0.1332 respectively. The values of median and variance are also given for all five variables in the Table 1.

**Assumptions of Classical Linear Regression Model**

Table 2 summarizes assumption of classical linear regression model test results. Since the probability associated with the test of normality is more than the level of significance (p-value = 0.05), it is conclude that the data is normally distributed. VIF (Variance Inflation Factor) is used by this study to detect multicollinearity problems. VIF for each of variable is smaller than 5 (VIF < 5) indicating that multicollinearity problems do not exist. Glesjer test indicates that there is no heteroscedasticity. The empirical analysis has also indicated that autocorrelation problems do not exist (DW = 2.115).
**Regression Analysis**

Table 3 until table 6 shows the coefficient of regression, standard errors, t-value, and p-value of each variable observed in this study. The coefficient of regression values indicate the sensitivity of stock returns to changes in exchange rates.

Table 3 shows the regression coefficient of Rupiah / US Dollar exchange rate for model 1.1 is 0.074 with t-value of 3.953 and p-value 0.000 indicating that there is a significant relationship between Rupiah/US Dollar exchange rate and stock price. The value of F test of model 1.1 is 15.624 with p-value 0.000 indicating that the F-test is significant. It means the model of this study is fit. The value of coefficient of determination is 0.1%.

In model 1.2, market return is included and the regression coefficient of Rupiah / US Dollar exchange rate becomes not statistically significant. Market return itself has a significant relationship to stock price, since the regression coefficient is 0.508 with t-value of 14.21 and p-value 0.000. The value of F test is 0.018 with p-value 0.000 and the value of coefficient of determination is 1.8%.

Regression coefficient of Rupiah / Euro exchange rate variable for model 2.1 is 0.073 with t-value of 3.269 and p-value 0.000 indicating that there is a significant relationship between Rupiah/Euro exchange rate and stock price. The similar relationship is found when market return is added in model 2.2. The values of F-test of model 2.1 and model 2.2 are 10.683 (p-value=0.001) and 16.630 (p-value=0.000). The value of coefficient of determination $R^2$ for both model are 0.1% and 0.3%, respectively. This means that only 0.1% and 0.3% of the change in Rupiah / Euro exchange rate can be explained by the interest rate differential while the other 99.9% and 99.7 will be explained by other factors.
Table 5 shows that the effect of change in Rupiah / Japanese Yen exchange rate on stock price is statistically significant at $\alpha=5\%$ ($p$-value $= 0.05$). Regression coefficient of Rupiah / Japanese Yen exchange rate for model 3.1 is 0.238 while in model 3.2 is 0.229. The values of F-test and t-test of both models are 0.000. The value of coefficient of determination for model 3.1 and 3.2 are 0.2% and 0.3% respectively.

ANOVA Test

The fourth hypothesis is carried out using test of homogeneity of variance, one way ANOVA and post hoc tests. Provision of foreign exchange group symbol is 1 for US Dollar, 2 for Euro, and 3 for the Japanese Yen. Test results are summarized in Table 6 below.

Based on standard deviation values, it is known that the largest sensitivity level are changes in Rupiah / Japanese Yen exchange rate, then change in Rupiah / US Dollar exchange rate, and the late is change in Rupiah / Euro exchange rate. Levene Statistic test show that the significance of the model is 0.052 ($p$-value=$0.05$), which indicates equal variances and the F statistic is used to test the hypothesis. One-way ANOVA test’s significance is below the desired alpha, and then at least one group is significantly different from another group. These differences need to be studied deeply by using the dependent variable testing or Post Hoc Test.

Post Hoc Test, both Bonferroni test methods and Turkey test, provides significant value for each variable tested. This result suggests that changes in Rupiah / US Dollar exchange rate affect changes in Rupiah / Euro exchange rate and changes in Rupiah / Japanese Yen exchange rate. The same effect is also obtained from change in Rupiah / Euro exchange rate to changes in Rupiah / US Dollar exchange rate and changes in Rupiah / Japanese Yen exchange rate as well
as from changes in Rupiah / Japanese Yen exchange rate to changes in Rupiah / US Dollar exchange rate and changes in Rupiah / Euro exchange rate.

Discussion

Table 7 summarizes the empirical results of H₁, H₂, H₃ and H₄. Based on the sensitivity of stock price to changes in Rupiah / US Dollar, Rupiah / Euro, and Rupiah / Japanese Yen exchange rate, the test results are statistically significant, except for model 1.2. It means that stock prices are sensitive to changes in Rupiah / US Dollar, Rupiah / Euro, and Rupiah / Japanese Yen exchange rate.

Financial theory predicts an impact of exchange rate changes on stock price due to corporate foreign currency cash flows originating, for example, from export and import transactions, foreign debt, cash flows of foreign subsidiaries and foreign portfolio investments. This section will analyzed the impact of exchange rate changes in domestic and multinational firms, as well as in importer and exporter firms. Then it will analyzed how stock price is affected by such that change.

Domestic firms can be influenced by changes in Rupiah exchange rates since they may import a part of their inputs (Aydemir and Demirham 2009). A devaluation of Rupiah will makes imported raw materials more expensive, increases firms’ expected future cash out-flows and leads to a high cost of goods manufactured; meaning lower sales and decreasing in profits. Thus, devaluation will make negative effect for firms.

However, Rupiah depreciation implies an increase in domestic price of foreign goods. This condition makes the local firms more competitive, and encourages consumers to buy more local products. An increase in sales volume of local products results in growth of firms’ wealth.
A multinational firm combines the financial statements from international subsidiaries. In such firm, changes in Rupiah exchange rates will result in both an immediate change in value of its foreign subsidiaries and a continuing change in the profitability of its foreign subsidiaries reflected in successive income statements (Aydemir and Demirham 2009).

Multinational firms that incur most of their cost of production in Indonesia and sell in foreign markets will benefit from a depreciation of Rupiah. This benefit arises due to an increase in the Rupiah value of foreign revenue. In contrast, firms that use their foreign subsidiaries principally to import finished goods and sell them in Indonesia find that their products become less competitive in domestic markets, and their domestic sales revenues decline with any depreciation of the Rupiah. Similarly, multinational firms with net exposed liabilities abroad will lose with a depreciation of Rupiah, while firms with net exposed assets gain (Choi and Prasad 1995).

As the Rupiah exchange rate depreciates, the cost in Rupiah of imported goods increases. Importers will lose their competitiveness in domestic market, and make a reduction in the sales, cash flows, and profits of importers. A different condition occurs in importer firms with a unique, proprietary products and services. The higher price will have no effect to sales volume. Thus, a new equilibrium price will be stated.

Rupiah depreciation in exchange rate make exporters has advantage against other countries’ exporters. Export prices will decline, their exports cheaper in international comparison, and make the firms more competitive in international market. Increase in export volume may lead to increase in export earnings.

On the macro level, Rupiah depreciation will positively affects macro-economic performance, since Indonesian firms are more likely to be multinational and export oriented.
This condition will boost investor confidence to Indonesian market and attract investors (especially foreign direct investment) to invest in Indonesia.

Changes in business conditions and changes in investors view about Indonesian capital market as mentioned above should increase the value of Indonesian firms and hence the stock prices. This result is consistent with the view that exchange rate is one of the factors that influence stock prices, and stock prices is a reflection of the simultaneous impact of major events in the economy.

The findings of this study support the previous research, Yucel and Kurt (2003), which states that 11.8% of samples firms in Turkey have positive and significant economic exposure. This study also supports the results of similar studies conducted by previous researchers, Granger et al. (2000), Glaum et al. (2000), Bodart and Reding (2001), Utami and Rahayu (2003), as well as Rahman and Uddin (2009).

The first hypothesis which states that stock returns are sensitive to changes in Rupiah / US dollar exchange rate is in line with the results of research conducted by Choi and Prasad (1995), Dominguez (1998), Bodnar and Wong (2003), Doidge et al. (2006), and Cairns et al. (2007). Support to research conducted by Holder et al. (2001), Solakoglu (2004) and Rees and Unni (2005) state in the fulfillment of the second hypothesis assumed that stock returns are sensitive to changes in Rupiah / Euro exchange rate. The third hypothesis that expected stock returns are sensitive to changes in Euro / Japanese Yen exchange rate support the previous studies conducted by Khoo (1994), Mathieson and Moles (1999), Doidge et al. (2002), Bartram (2004), and Tahir and Ghani (2004), and Yau and Nieh (2006).
US Dollar, Euro, and Japanese Yen are the major currency that used in a considerable part of transactions in the world. This research finds that the three currencies have different influences on Indonesian economics, especially against firm value.

Stock prices tend to be more sensitive to changes in Rupiah / Japanese Yen exchange rate compared with two other exchange rate changes. These results can be seen from descriptive statistics which show that changes in Japanese Yen exchange rate has the greatest mean, followed by US Dollar and Euro. Similar results are obtained from the standard deviation and standard error Anova test, where Japanese Yen still has the greatest value.

Results from the fourth hypotheses support statements from Cairns et al. (2007) that the Japanese Yen and Euro tend to appreciate against US Dollar when there is higher volatility in the equity markets. But the results of this study are contrast with Rahman and Uddin (2009), which state that the exchange rate of local currencies against the US Dollar Bangladesh, Euro, Japanese Yen, and Pound are not stationary and not integrated with each other. In this study, Rupiah exchange rate against US Dollar, Euro, and Japanese Yen exchange rate are integrated one to another.

CONCLUSION, LIMITATION, AND IMPLICATION

Conclusion

This study investigates the sensitivity of stock price to Rupiah / US Dollar, Rupiah / Euro, and Rupiah / Japanese Yen exchange rate movement. Based on the empirical result of this study, it can conclude that Indonesian firms experience an increase in stock returns when the Rupiah depreciates against the US Dollar, Euro, and Yen. This is because exchange rate has an
important impact on cash flow, investment and profitability of firms reported in their financial statements.

Change in exchange rates of Rupiah / US Dollar, Rupiah / Euro, and Rupiah / Japanese Yen have a different influence to Indonesian capital market. The biggest influence is come from Rupiah / Japanese Yen exchange rate. This condition is caused by the tendency Japanese Yen has appreciated against other currencies, including Euro, even in the global crisis. This phenomenon also shows that Japan's position in the world economy, especially in Asia, is getting stronger.

Limitations

This study uses year 2008 as the study period. In this year, economic conditions are instable due to the global economic crisis so there is the possibility of biased research data. But because purpose of the study is to examine the impact of the global economic crisis on stock prices, the year 2008 is still chosen as the research year.

Stock prices and exchange rates can have two-way relationship (interdependence), from stock prices to exchange rate or from exchange rate to stock price. However, this study uses regression analysis so that the relationship is assumed to occur from changes in exchange rate and then affect stock prices. Although it does not describe all possible relationships that occur, the regression test still used for this study in accordance with the formulation of the research problem and purpose of this study.

Implication

Further research can be done in a longer period of time. Further research could also use a different test tools, such as Granger Causality test, panel data test with Generalized Least Square
method, or test by using different statistical software. With a longer time period and a difference test method, it is expected that the further research can provide more accurate results.

For practitioners, this study’s results can be used as a reference about the risk of exchange rate movements on stock prices. Thus, practitioners can choose the best strategy alternative in order to maximize their return.

The results of this study can also be used as a consideration for the improvement of foreign exchange trade mechanism. It is known that the stock market has a strategic position strengthening a country's economic condition. Therefore, the government, especially BAPPEPAM, can make more favorable policies for firms and investors based on this study.
REFERENCES


APPENDIX

Table 1
Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Dev. Std.</th>
<th>Variance</th>
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</thead>
<tbody>
<tr>
<td>$R_{it}$</td>
<td>-0.0016</td>
<td>0.0000</td>
<td>0.1227</td>
<td>0.0151</td>
</tr>
<tr>
<td>$S_i$</td>
<td>0.0006</td>
<td>0.0002</td>
<td>0.0124</td>
<td>0.0002</td>
</tr>
<tr>
<td>$€_i$</td>
<td>0.0005</td>
<td>0.0002</td>
<td>0.0125</td>
<td>0.0002</td>
</tr>
<tr>
<td>¥$i$</td>
<td>0.0016</td>
<td>0.0006</td>
<td>0.0192</td>
<td>0.0004</td>
</tr>
<tr>
<td>$R_{mt}$</td>
<td>-0.0030</td>
<td>0.0000</td>
<td>0.1332</td>
<td>0.0177</td>
</tr>
</tbody>
</table>

Where:

$R_{it}$ = daily stock return

$S_i$ = Percentage change in the daily exchange rate Rupiah / US Dollar

$€_i$ = Percentage change in the daily exchange rate Rupiah / Euro

¥$i$ = Percentage change in the daily exchange rate Rupiah / Japanese Yen

$R_{mt}$ = daily market return (CSPI)

Table 2
Test Results For Assumptions of Classical Linear Regression Model

<table>
<thead>
<tr>
<th>Var</th>
<th>Normality</th>
<th>Multicollinearity</th>
<th>Heteroskedasticity</th>
<th>Autocorrelation</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>K-S</td>
<td>VIF</td>
<td>Sig Glejser Test</td>
<td>D-W</td>
</tr>
<tr>
<td>$R_{it}$</td>
<td></td>
<td></td>
<td></td>
<td>1.827</td>
</tr>
<tr>
<td>$S_i$</td>
<td>1.386</td>
<td>0.203</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$€_i$</td>
<td>1.540</td>
<td>0.516</td>
<td></td>
<td></td>
</tr>
<tr>
<td>¥$i$</td>
<td>1.106</td>
<td>0.132</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R_{mt}$</td>
<td>1.193</td>
<td>0.957</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Res</td>
<td>Sig 0.177</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where:

$R_{it}$ = daily stock return

$S_i$ = Percentage change in the daily exchange rate Rupiah / US Dollar

$€_i$ = Percentage change in the daily exchange rate Rupiah / Euro

¥$i$ = Percentage change in the daily exchange rate Rupiah / Japanese Yen

$R_{mt}$ = daily market return (CSPI)
Table 3  
Regression Analysis Result of Hypothesis 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Variable</th>
<th>Koef. Regression</th>
<th>Std. Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_t = \alpha_i + \beta_i S_i + \epsilon_t$</td>
<td>Rupiah/US Dollar</td>
<td>0.004</td>
<td>0.001</td>
<td>2.875</td>
<td>0.004*</td>
</tr>
<tr>
<td>$R_t = \alpha_i + \beta_1 S_i + \beta_2 R_{mt} + \epsilon_t$</td>
<td>Rupiah/US Dollar</td>
<td>0.004</td>
<td>0.001</td>
<td>3.103</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td>Market Return</td>
<td>0.001</td>
<td>0.019</td>
<td>0.070</td>
<td>0.944</td>
</tr>
</tbody>
</table>

R² model 1.1 : 0.001  
F value model 1.1 : 15.624 with p-value = 0.000*  
R² model 1.2 : 0.018  
F value model 1.2 : 10.947 with p-value = 0.000*  

* Statistically significant at p<0.01  
** Statistically significant at p<0.05  
*** Statistically significant at p<0.1

Table 4  
Regression Analysis Result of Hypothesis 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Variable</th>
<th>Koef. Regression</th>
<th>Std. Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_t = \alpha_i + \beta_i \epsilon_i + \epsilon_t$</td>
<td>Rupiah/Euro</td>
<td>0.009</td>
<td>0.002</td>
<td>4.570</td>
<td>0.000*</td>
</tr>
<tr>
<td>$R_t = \alpha_i + \beta_{1i} \epsilon_i + \beta_{2i} R_{mt} + \epsilon_t$</td>
<td>Rupiah/Euro</td>
<td>0.009</td>
<td>0.002</td>
<td>4.714</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Market Return</td>
<td>0.069</td>
<td>0.022</td>
<td>3.110</td>
<td>0.002*</td>
</tr>
</tbody>
</table>

R² model 2.1 : 0.001  
F value model 2.1 : 10.683 with p = 0.001 *  
R² model 2.2 : 0.003  
F value model 2.2 : 16.630 with p = 0.000 *  

* Statistically significant at p<0.01  
** Statistically significant at p<0.05  
*** Statistically significant at p<0.1
Table 5
Regression Analysis Results of Hypothesis 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Variable</th>
<th>Koef.Regression</th>
<th>Std. Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_t = \alpha + \beta_1 Y_t + \epsilon_t$</td>
<td>Rupiah/Japanese Yen</td>
<td>0.003</td>
<td>0.001</td>
<td>4.095</td>
<td>0.000*</td>
</tr>
<tr>
<td>$R_t = \alpha + \beta_1 Y_t + \beta_2 R_{mt} + \epsilon_t$</td>
<td>Rupiah/Japanese Yen</td>
<td>0.003</td>
<td>0.001</td>
<td>3.901</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Market Return</td>
<td>0.229</td>
<td>0.036</td>
<td>6.343</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.016</td>
<td>0.003</td>
<td>4.693</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

R² model 3.1 : 0.002
F value model 3.1 : 3.787 with p = 0.000 *
R² model 3.2 : 0.003
F value model 3.2 : 3.927 with p = 0.000 *

* Statistically significant at p<0.001
** Statistically significant at p<0.05
*** Statistically significant at p<0.1

Table 6
ANOVA Test Results

<table>
<thead>
<tr>
<th>Std. Dev</th>
<th>Test of Homogeneity of Variances</th>
<th>ANOVA</th>
<th>Post Hoc Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Levene Statistics</td>
<td>Sig.</td>
<td>F</td>
</tr>
<tr>
<td>Currency 1 and 2</td>
<td>2.978</td>
<td>0.052</td>
<td>21.533</td>
</tr>
<tr>
<td>Currency 1 and 3</td>
<td>0.04802</td>
<td>0.04304</td>
<td>0.001*</td>
</tr>
<tr>
<td>Currency 2 and 3</td>
<td>0.05594</td>
<td>0.014*</td>
<td>0.012*</td>
</tr>
</tbody>
</table>

* Statistically significant at p<0.001
** Statistically significant at p<0.05
*** Statistically significant at p<0.1

Table 7
The Empirical Results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Model</th>
<th>Test Result</th>
<th>Regression Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₁</td>
<td>1 positiv sigificant</td>
<td>$R_{it} = 0.004 + 0.074 S_i$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 positive insignificant</td>
<td>$R_{it} = 0.004 + 0.001 S_i + 0.508 R_{mt}$</td>
<td></td>
</tr>
<tr>
<td>H₂</td>
<td>1 positiv sigificant</td>
<td>$R_{it} = 0.009 + 0.073 E_i$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 positiv sigificant</td>
<td>$R_{it} = 0.009 + 0.069 E_i + 0.061 R_{mt}$</td>
<td></td>
</tr>
<tr>
<td>H₃</td>
<td>1 positiv sigificant</td>
<td>$R_{it} = 0.003 + 0.238 ¥_i$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 positive sigificant</td>
<td>$R_{it} = 0.003 + 0.229 ¥<em>i + 0.016 R</em>{mt}$</td>
<td></td>
</tr>
<tr>
<td>H₄</td>
<td>1 differ significantly</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>