Analysis Factors Affecting Indonesia Stock Market (Case Studies on Consumer Goods Index)

Analýza faktorů ovlivňujících trh indonéských akcií (případová studie závislosti na indexu spotřebitelských cen)

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Abstract

This study aims to examine the effect of exchange rate and inflation on the stock market. The exchange rate used is the Rupiah against the US Dollar and the Consumer Price Index as a measure of inflation. While the sector used as a stock market case study is the Consumer Goods Index Sector. The study period during 2010–2017. The method used multiple linear regression with R software. The classic assumption test results show the existence of autocorrelation problems, but can be correcting by the Cochrane-Orcutt method on Eviews after 8 model iterations. The results of multiple linear regression tests showed that the exchange rate has a significant negative effect, while inflation has no significant effect on the Consumer Goods Index.

Keywords

exchange rate, inflation, stock market, consumer goods index

JEL Codes

E22, E31, E44

DOI

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Abstrakt

Cílem této studie je zkoumat vliv kurzu a inflace na akciový trh. Použitý směnný kurz je rupiáš vůči americkému dolaru a index spotřebitelských cen jako míra inflace. V případové studii je využit sektor spotřebního zboží v letech 2010–2017. Jako metoda je využita vícelineární regrese R softwarem. Klasické výsledky testů prokazují existenci autokorelačních problémů, které ale lze korigovat metodou Cochrane-Orcutt na Eviews po 8 modelových iteracích. Výsledky více lineárních regresních testů ukázaly, že směnný kurz má významný negativní účinek, zatímco inflace nemá významný vliv na index spotřebitelských cen.

Klíčová slova

směnný kurz, inflace, akciový trh, index spotřebního zboží

1 Introduction

Investment is a speculative activity to get profits in the future. Mortenson (2010) said that investment is every plausible economic activity or asset and efforts to equalize the present value with the expected income in the future (Eklund, 2013). We can apply the investments in the real sector and the monetary sector.

In the monetary sector, investment can be done on stock market. The stock market is the center of the capital market which reflects the economic trend (ICSI, 2013). It valuation plays a key role in Q-type models of investment determination (Tease, 1993). Some variables that are thought to affect the stock market include inflation and exchange rates.

There are several factors that are thought to affect the stock market, two of them are inflation and exchange rates. Ammer, (1994) said that rising inflation causes real dividends and required equity returns to be lower. One of the goals of investing is to increase long term purchasing power, but high inflation can failing it and making the economy overheated (PIMCO, 2011). In classical theory, exchange rate movements can affect competitiveness in international markets and the position of a country's trade balance and ultimately affect the flow of investment funds and the stock market (Phylaktis and Ravazzolo, 2005).

In Indonesia, stocks are traded on the Jakarta Stock Exchange (JSX) with Jakarta Composite Index (JCI) as the benchmark index of JSX. JSX has nine joint sectoral index, consist of Agriculture, Mining, Basic Industry, Various Industries, Consumer Goods, Property, Infrastructure, Finance, Trade and Services. In recent years, Consumer Goods Index always shows a rapid growth.

OJK (2010) Reported during 2009 Consumer Goods Index showed a sharp increase. At the end of April 2016, the JCI movement continued to strengthen in the green zone with the Consumer Goods Index as the backbone of the JCI (Suhendra, 2016). Consumer Goods Index has the highest index among the other sectors. It supporting more than 50% of the JCI.

Many research has been conducted before but shows heterogeneous results. Delgado, Delgado and Saucedo (2018) shows that the exchange rate and inflation has a negative and statistically significant effect on the stock market index. The appreciation of the currency leads to the increasing on the stock market index. Blau (2018) showed the similar evidence that between currency market and stock market there is an important link. In China, the RMB index and stock market liquidity are cross-correlated and demonstrate strong and positive persistence (Li et al, 2018). Related to inflation, Tiwari et al., (2015) added that inflation does not necessarily mean that the stock is in stock in the long run. Gavriilidis and Kgari (2016) have similar result, and they found no evidence of a statistically significant relationship between stock market returns and inflation. However Brown, Huang and Wang (2016) showed different result that inflation is significant in pricing portfolios formed on investment.

Based on background, the author wants to examine the influence of exchange rates and inflation on the stock market. The author focuses on the Consumer Goods Index with the exchange rate of the Rupiah against the US Dollar and the Consumer Price Index as a measure of inflation. The focus of the research was in 2010–2017. In that period there was shocks to the Indonesian economy that is shock of increasing on world oil prices in 2013–mid 2014 as Indonesia is an oil importing country.

2 Theoretical Concepts

2.1 Relationship Between Exchange Rate and The Stock Market

The effect of exchange rate to stock market show different result, depends on the few factors. Whether the country export oriented or import oriented; the size of the industry or company in the country; the exchange rate regime which adopt by the country; and degree of openness of a country's economy.

For exporting countries, the depreciation of the currency has positive impact on stock market. Based on Mankiw (2016), exchange rate depreciation can increase competitiveness in the international market so that the export value increases. Thus the profits of a company will increase as well as the stock price (Phylaktis and Ravazzolo, 2005). Otherwise, for importing countries, the depreciation leads to increase on production cost and reduce the profit. Thus the investor attractive less to invest in this countries.

The changes in exchange rates in the bigger industries have a greater impact on the stock market than small industries. Mollick and Sakaki, (2018) shows that commodity currencies strongly depreciate with positive global equity shocks. However, changes in exchange rates will not price in the US stock market if the company portfolio is not classified as an industry with a strong asset structure (Du and Hu, 2012).

Related to exchange rate regime, Chkili and Nguyen (2014) in their research in Brazil, Russia, India, China and South Africa (BRICS) show that the stock market response to changes in exchange rates evolve in two different regimes, namely a low volatility regime and a high volatility regime. Zolfaghari and Sahabi (2017) reinforced that exchange rate significantly affect Stock Return of Operating Companies in the Oil Industry (SROCOI) in Iran's stock market during different regimes. In financial crisis 1997, countries with an exchange rate peg experienced significantly greater currency depreciation and significantly lower stock returns (Grier and Grier, 2001).

In small open economic country, the exchange rate volatility has the greater impact on stock market than the big one. For small open economies such as Asia Pacific, exchange rate shocks instantaneously affect prices on the stock market. However, in countries with higher economic freedom, shows that market efficiency is very large, that is why the exchange rate shocks cause less short-run volatility in Singapore's and Hong Kong's Stock Markets (Yang, 2017). Wong (2017) added that exchange rate movements is an important factors that affect the stock market.

2.2 The Relationship Between Inflation and Stock Market

Inflation is a general increase in overall price level and simultaneously. One method of measuring inflation is the Consumer Price Index (CPI). The CPI is the average level of "consumption basket of goods" (Garín, Robert and Sims, 2018). The basket of consumer goods and services which measures in CPI will tells us about the value of the money in our pocket (Parkin, 2012).

In developed countries, the average inflation rate is low. Based on IMF data, China recorded CPI inflation averaging 2.6% over the past ten years. In the United States average inflation annually at 3.28% from 1914 to 2017 (KDA Forex, 2018). However for developing countries almost lived through high-inflation and hyperinflation period (Calderón and Schmidt-Hebbel, 2009). According to World Bank (2013), for developing countries as a whole, have inflation rate at 5.1 percent annualized rate in the three months through December 2012 from an average 7.2 percent in 2011 and have expected inflation at 6.3% in 2013. In recent years, Indonesia has average inflation at 5%.

Gokal and Hanif (2004) Said that the inflation making uncertainty about the future profitability of investment. Furthermore Brown, Huang and Wang, (2016) found that inflation is a significant factor in the formation of portfolio prices which related to asset growth, investment desire and book to market ratio in thus portfolio. However, for high inflation countries, stock price is irrelevance for investment decisions, because stock price is significantly less sensitive than countries with lower inflation (Farooq and neveen, 2018).

In Egypt, inflation rate generally had an impact on the stock market in the short run and long run (Omran and Pointon, 2001). In the United States, correlations between the inflation and Stock Market are varies overtime (Antonakakis, Gupta and Tiwari, 2016). In UK the inflation rate has the varying impact too on stock market depends on inflationary regimes (Li, Narayan and Zheng, 2010). (Oxman, 2012) added that the relationship between inflation and stock market depends on the measure of inflation and the model used.

3 Research Method

This study uses multiple linear regression with time series data from 2010 to 2017. In multiple linear regression on time series data, a few assumptions must be fulfilled as follows:

a. No multicollinearity: there be no exact linear relationship among independent variables (Gujarati, 2003).
b. No heteroschedasticity: Data sets have heteroscedastic problem when they have disturbances in different variances (Greene, 2003). While in the OLS regression, the disturbances must be assumed to be uncorrelated across observations or called homoscedastic.
c. No Autocorrelation: the covariance value between observations to Ui and Uj has a correlation value equal to 0 for i ‡ j (Greene, 2003).

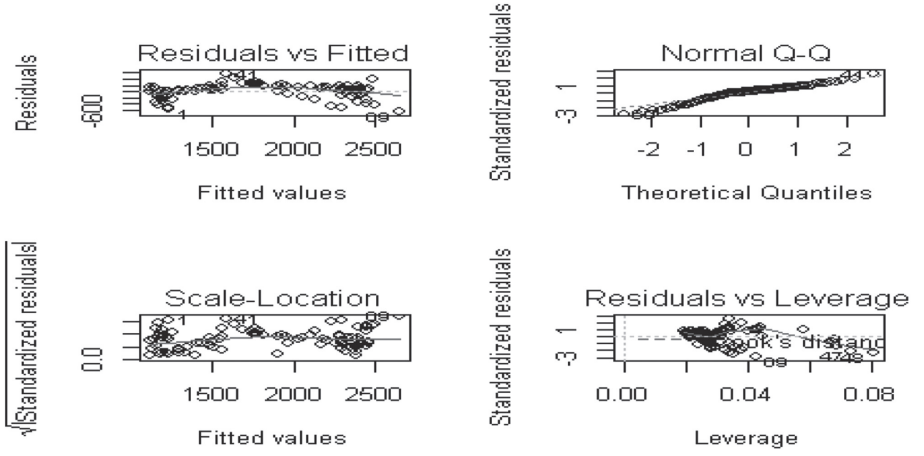
d. Normality: in OLS regression all samples must meet the normal distribution assumptions. If not, the result test will be inaccurate, and consequently, the t and F tests are not generally valid in finite samples (Das and Rahmatullah Imon, 2016).

4 Result and Discussion

4.1 Statistical Result

Based on the results of the classic assumption test conducted with R studio software, the results show that the three assumption tests have been fulfilled. They are no multicollinearity, no heteroschedasticity and have normal distribution (see figure 1). However, there is an autocorrelation problem (see Figure 2a), marked by a scatter plot forming two linear line. In time series data, especially in financial data, the problem of autocorrelation is a common problem that often happens. Sewell (2011) found that in the stock market data there is often an autocorrelation relationship, especially in stock returns.

Figure 1: Result of Classic Assumption



Source: Output of R Software

Figure 2: The Autocorrelation Problem

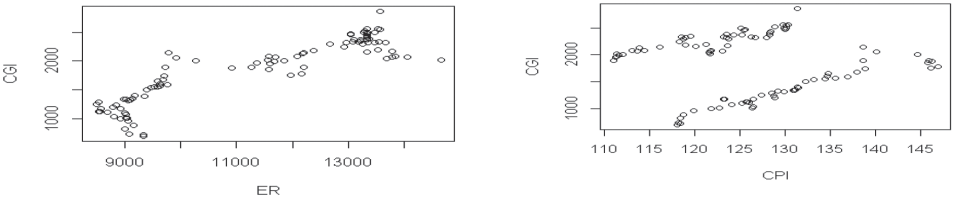


Figure 2.a **Figure 2.b**

Source: Output of R Software

According to Mcguirk and Spanos (2002), to solve the problem of autocorrelation in a linear regression model is use of AR (1) process, and then use GLS to estimate the model. The AR (1) model provides a good approximation to the spectral density over a thin frequency band (Muller, 2014). However, on the estimation model that has been done by the author using autoregressive, the problem of autocorrelation is indeed solved, but a new problem arises, namely heteroscedasticity. In Table 1 and 2 we can see the addition of CGI lags (1) to overcome autocorrelation, showing significant results and free from autocorrelation. However, in Table 3, the VIF value in ER and (CGI, 1) lag is greater than 5, which indicates the presence of heteroscedasticity symptoms.

Table 1: Result of Removal Autocorrelation by added AR (1)

lm(formula = CGI ~ ER + CPI + lag(CGI, 1), data = data1)				
Residuals:				
Min	1Q	Median	3Q	Max
-2.681e-13	-2.818e-14	-5.980e-15	1.074e-14	1.705e-12
Coefficients:				
	Estimate	Std. Error	t value	Prob
(Intercept)	-2.513e-12	3.925e-13	-6.402e+00	6.35e-09 ***
ER	2.462e-16	2.409e-17	1.022e+01	<2e-16 ***
CPI	9.756e-15	2.470e-15	3.950e+00	0.000153 ***
lag (CGI, 1)	1.000e+00	8.518e-17	1.174e+16	<2e-16 ***
Signif. codes	0 '***'	0.001 '***'	0.01 '*'	0.05 '.'

Source: Output of R Software

Table 2: Durbin-Watson Test

data: M_CGI1
DW = 2.2239, p – value = 0.791
alternative hypothesis: true autocorrelation is greater than 0

Source: Output of R Software

Table 3: Result of Heteroscedasticity Test

Breusch-Pagan test	>vif(M_CGI1)		
data: M_CGI1	ER	CPI	lag (CGI,1)
BP = 237.33, df = 3, p – value < 2.2e-16	6.172089	1.229494	5.906916

Source: Output of R Software

The author tries another way to eliminate autocorrelation with the Cochrane-Orcutt. Jaggia and Kelly-Hawke, (2008) said that to correct for autocorrelation one often uses GLS procedures such as the Cochrane-Orcutt. This method is a popular method for correcting autocorrelation in time series regression model (Dielman, 2009). First, the author used Cochrane-Orcutt in R, but the results show that the variables did not converge (Table 4). Author continued the Cochrane-Orcutt method in stata, but the results showed that

convergence was not achieved (Table 5). Finally, the Cochrane-Orcutt on Eviews, the autocorrelation problem can be resolved, and the AR model (1) have been reached after eight iterations (Table 6). The results of show that the exchange rate has a significant negative effect on the Consumer Goods Index (CGI). However, inflation have negative correlation to CGI but insignificant on the CGI.

Table 4: Cochrane-Orcutt in R

Cochrane-orcutt estimation for the first order autocorrelation			
call: lm(formula = CGI ~ ER + CPI, data = data1)			
number of interaction: 100 rho 0.993657			
Durbin-watson statistic			
(original):	0.31918	p-value:	5.535e-29
(transformed):	NA	p-value:	NA
Coefficients:	NA		

Source: Output of R Software

Table 5: Cochrane-Orcutt in Stata

Source	SS	df	MS	Number of obs = 95 F (2, 92) = 6.51 Prob > F = 0.0023		
Model Residual	69038.9076 407076.968	2 92	34519.4538 5924.63697			
Total	556915.875	94	5924.63697			
CGI	Coef	Std.Err	t	p>(t)	(95% Conf. Interval)	
ER	-.1019274	.0305649	-3.33	0.001	-.1626319	-.041223
CPI	-2.590222	1.984262	-1.31	0.195	-6.531137	1.350693
_cons	7635.011	1332.841	5.73	0.000	4987.874	10282.15
rho	.9936566					
Durbin-Watson statistic (original) 0.319176 Durbin-Watson statistic (transformed) 2.032953						
convergence not achieved						

Source: Output of Stata

Table 6: Cochrane-Orcutt in Eviews

Dependent Variable: CGI Method: Least Square Included observations: 95 after adjustment Convergence achieved after 8 iterations				
Variable	Coefficients	Std. Err	t-stat	prob
C	7793.672	7999.376	0.974285	0.3325
ER	-0.102009	0.030990	-3.291648	0.0014
CPI	-2.589229	1.995840	-1.297313	0.1978
AR (1)	0.993878	0.010596	93.79564	0.0000
R-squared	0.981811			
Inverted AR roots 0.99				

Source: Output of Eviews

4.2 Economical Discussion

4.2.1 The Effect of Exchange Rate to Stock Market

The result of this study is that the exchange rate has a significant negative effect on the stock market. The result is consistent with the theory put forward by Dornbusch, who said that the exchange rates cause movements in stock prices (Dilrukshan, Simpson and Evans, 2009). Aydemir & Demirhan (2009) and Delgado, Delgado & Saucedo (2018) has similar result, which stated that exchange rate negatively affect stock market. However, the impact of the exchange rate fluctuations on the stock market depends on whether the country is export-based or import-based.

According to Tang and Yao (2018) in export-based countries, the exchange rate is positively related to the stock market because they undervalue their currency exchange rates to encourage the economic activity and raises the stock prices. While in import-based countries, the exchange rate negatively related to the stock market because they overvalued their exchange rates, so stock prices rise with economic growth.

In an export-based country, appreciation of domestic currency negatively affect the export sales (Ma and Kao, 2008) decline the firm's profit and so does its stock price (Dilrukshan, Simpson and Evans, 2009; Imna, Amin and Janor, 2016). Otherwise, the exchange rate depreciation has a positive impact on the export sales. (Muhammad and Rasheed, 2002) said domestic currency depreciation makes local firms more competitive in international market, leading to an increase in the exports which in turn raises the stock prices.

For a country which has many importing firm, the depreciation of the exchange rate increases the price of imported goods and inflation in the domestic market (Ma and Kao, 2008). Indonesia itself still utilizes around 75% of imported raw materials on its production

and industrial processes (Appa, 2014). The data from the Central Statistics Bureau and the Trade Ministry reinforced it, overall during 2013–2017 the import value of raw materials reached 75%–77% of import value.

Another factor which make negative relation between exchange rate and Indonesia stock market is the exchange rate regime which adopt by Indonesia. During the study period, Indonesia adopt free floating exchange rate regime. According to (Chortareas, Cipollini and Eissa, 2012), the changes in the exchange rate regime from pegged to floating exchange rate regime has a significant impact. When a floating exchange rate regime is applied, the stock market is very sensitive to exchange rate devaluations.

In a floating exchange rate regime, the exchange rate depends entirely on market demand and supply which making high uncertainty and risk. Moreover, the impact of real assets changes in assets are also uncertain (Glen and Jack, 2002). Also, Indonesia is small open economic country and has interdependent among another countries related to trading and economic activity. (Labonte, 2004) said if a country's economy is highly reliant on its neighbors for trade and investment when there is economic shocks on its neighbors, it will has similar effect to the country. It indicates that Indonesia still has a large risk of exchange rate volatility, further affect the level of uncertainty in the profits obtained on investment.

4.2.2 The Effect of Inflation to Stock Market

In this study, the results show that inflation negatively related to the stock market but not significant. It is in line with Lukisto and Anastasia (2014), the results show that SBI interest rate and the Rupiah Exchange Rate against the US dollar significantly influence the stock price index, but inflation and GDP growth have no significant effect. Furthermore, they explained that the average of inflation rate during the study period is 0.6% per month. It signifies the stock market still accept if the monthly inflation rate which is around 0.6%. Kewal (2012) reinforced stated that if inflation below 10%, it will not be disturbed the stock market. Gokal and Hanif (2004) added that but the decline in growth associated with an increase from 10% to 20% inflation. In the author's research period, the average annual inflation rate during 2010–2017 was 5.22% percent or 0.43% per month.

Another explanation why inflation did not significant affect the stock market especially Consumer Goods Index is the presence of large industries which are categorized as the largest issuers in the Consumer Goods Index. Besides, they have many subsidiary and have a big number of export in many countries. According to report from OJK (2017), in the Consumer Goods Industry sector, there are five largest issuers with the largest assets and the largest income (see table 7).

Table 7: 5 Largest Issuer in Indonesia Consumer Goods Industry

Issuer	Income (in million)	Assets (in million)
PT HM Sampoerna Tbk	Rp. 95.466.657	42.508.277
PT. Gudang Garam Tbk	Rp. 76.274.147	62.951.634
PT. Indofood Sukses Makmur Tdk	Rp. 56.750.317	82.174.515
PT. Unilever Indonesia Tbk	Rp. 40.053.732	16.745.695
PT. Indofood CBP Sukses Makmur Tbk	Rp. 34.466.069	28.901.948

Source: cited from OJK, 2017

PT Indofood Sukses Makmur Tbk (Indofood) is a company in the Consumer Goods Industry with the largest assets. Up to 2014, PT Indofood Sukses Makmur Tbk has expanded and invested in 40 countries (Sukmana, 2014). One of PT Indofood's products, Indomie, recorded a large export value in 100 countries (Anonymous, 2015). For PT Unilever Tbk, it's engaged in many fields such as food, beverages, household appliances, and personal care. Unilever has headquarter in Amsterdam and has many subsidiaries regarding investment and ownership of production located in Europe, America, South Asia, Asia & Pacific including Indonesia, Africa and Middle East (Paul Elshof, 2005).

For Tobacco Industry, Indonesia have PT. Gudang Garam Tbk and PT. Sampoerna Tbk. PT. Gudang Garam has many subsidiaries spread throughout Indonesia. It has the main export destination countries such as Malaysia, the Middle East and Japan (Anonymous, 2014). PT. Sampoerna has headquartered in Surabaya and has around 59 subsidiaries in Indonesia. In 2005 40% of the shares were affiliated by Philip Morris, the original cigarette producer from United States (Wibowo, n.d.).

Conclusion

The main results of this study found that the exchange rate of Rupiah against U$S has significant negative effect on the stock market. The depreciation of the Rupiah currency leads to decline on stock market (Consumer Goods Index). The main cause is the large proportion of Indonesia's imported raw materials. 75% of industries still rely on imported raw materials for the production process. Morover, Indonesia adopt free floating exchange rate and categorized as small open economic country. So, when there is economic shocks on its neighbours, it will has similar effect to Indonesia and making high volatility of Indonesia currency. However, the inflation volatility does not have a significant effect on the stock market. Indonesia has the annual inflation rate in Indonesia below 10%. During the study period, from 2010–2017, Indonesia had an average annual inflation rate of 5.22%.

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