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Analysis of Structural Regression in Method Approach Detecting the Economic Crisis of Selected Countries

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Abstract:- This study aims to determine the impact of the economic crisis in eight selected countries namely Indonesia, Hong Kong, USA, Australia, Brazil, Canada, India, and Japan. The variables in this study are Interest Rates, Inflation, Current Account, Reserve Asset, Foreign Direct Investment (FDI), Exchange Rates and Stock Prices. The analytical method used in this study is to use the Structural Regression model. Structural Regression research results are known that the Reserve Assets Variable and Reserve Assets have a significant effect on Exchange Rates whereas while Inflation, Gross Domestic Product, Current Account, and exchange rates do not significantly affect Stock Prices. This is due to the weakness of a country's economic fundamentals as well as the value of domestic interest rates in Indonesia which is closely related to international interest rates where domestic financial market access to international financial markets and exchange rate policies are less flexible.

Keywords:- *Interest Rates, Inflation, Current Account, Reserve Assets,Foreign Direct Investments, Exchange Rates, and Stock Prices.*

I. INTRODUCTION

An economic crisis is a situation where the economy of a country experiences a decline caused by a financial crisis. The financial crisis at the time of the economic crisis, the amount of money demand exceeds the amount of money supply, this means that banks and non-bank financial institutions experience to run out of liquidity. In the economic dynamics of all countries in the world that are currently increasingly globalized, there seems to be a universal tendency, when there is turmoil in a region of a country (such as in the United States), it will have an impact on the national economic order of life of other countries in the world. Financial crises are becoming more frequent than before. One of the main reasons is the progress in information technology which, to a certain extent, magnified the wave of the crisis and accelerated its spread to other regions or countries. Another reason is the rapid development of the financial sector. One example is the emergence of International Financial Integration (IFI). IFI refers to an economy that does not limit cross-border transactions, because an integrated financial system will cause domestic financial disturbances in a country, resulting in a domino effect on global financial turmoil.

The crisis of ASEAN countries continues with the decline in the value of the currencies of the Philippines (Peso), Malaysia (Ringgit), and Indonesia (Rupiah). The monetary crisis in Indonesia then continued to become an economic crisis. (Salamah, 2001). Meanwhile, Djiwandono (2000) saw that the crisis that hit Asia especially Indonesia was due to a combination of external forces and the weakness of the domestic financial and economic structure. The biggest financial crises occurred, namely the 1997 East Asian Financial Crisis and the 2008 Global Financial Crisis. The crises that occurred in 1997 and 1998 were caused by a large and generally short-term private foreign debt stock, with many weaknesses in the banking system in Indonesia. Then Tarmidi (1999) This prolonged crisis is a crisis of a sharp fall in the rupiah exchange rate, as a result of a sudden and repeated rush against the US dollar (speculation) and the maturity of large amounts of private foreign debt. If there had been no invasion of the US dollar, even though there were many distortions at the microeconomic level, the Indonesian economy would not have experienced a crisis. In other words, although the distortion at the microeconomic level is corrected, if there is still an onslaught against the rupiah, the crisis will also occur, because the existing Reserve Assets are not strong enough to withstand this onslaught.

In 2008, some people called it a global economic crisis, of course with a different cause than the crisis 10 years ago (Utaya D, 2008). The global financial crisis that occurred in 2008-2009 was the worst financial crisis in 80 years, even the world's economists call it the mother of all crises. The financial crisis that began with the occurrence of subprime mortgages in the United States turned out to have a deeper financial crisis. This condition turned out to be getting worse, widespread, and prolonged and not only felt by the US economy but also felt in various countries including Indonesia (Sugema, 2012). The cause of the 2008 global financial crisis occurred as a result; triggered rapid innovation in financial products such as securitization practices and "Credit Default Swap" (Jakovlev, M. 2007). The subprime mortgage crisis that started the current global financial crisis has also affected the national economy through several channels, including direct trade between Indonesia and the United States; Indonesia and Asia / Europe trade lane, lending (increase) borrowing costs, lane (appreciation) Rupiah exchange rate; and the US Central Bank's monetary policy path (interest rates) (Purna, Hamidi and Prima, 2009). Besides, the 2008 crisis also had a continuing impact on currency fluctuations and acute fiscal problems in the US and the European Union. But in fact,

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the 2008 global crisis had minimal impact, compared to the 1997 Asian financial crisis which caused serious damage to the national economy and triggered a national-scale socio-political crisis (Santosa, 2016).

According to (Anonymous, 2007) the global crisis resulted in several factors including Crisis of trust from market participants, citizens, even between countries and business sectors of the macroeconomy does not go hand in hand with the micro economy. According to (Mishkin, 2009), there are six factors that play an important role as the cause of the financial crisis, namely financial market imbalances caused by a decrease in demand in the capital market, a decline in the exchange rate, a deterioration in the balance sheet of financial institutions, a banking crisis, an increase in the level of interest rates and government fiscal imbalances. This is to see the condition of the global economy after the global subprime mortgage crisis, in the United States. The following is a graph that shows the development of each of the eight selected countries' stock price indexes:

Fig 1:- Development of share prices in several World Countries

Based on Figure 1, it is known that financial market integration was formed, namely when the economy boomed against the 2008 global financial crisis. During the subprime mortgage crisis in America (2008), it was not only Asia that experienced a decline in its stock price index, but countries in other continents in the world such as Indonesia, Hong Kong, the United States, Australia, Brazil, Canada, India, and Japan are also affected. Shown in the picture when the crisis hit the United States (DJI), the other indices namely Indonesia (JKSE), Hong Kong (HSI), Australia (AORD), Brazil (BVSP), Canada (TSX), India (BSESN) and Japan (N225) also pushed to fall. The subprime mortgage crisis in America had an impact on the decline of the stock market in the United States and was followed by stock exchanges in other parts of the world. The subprime mortgage crisis has hurt the capital markets, especially developing country capital markets (Heilmann, 2010: Thao & Daly, 2012: Aswani, 2015).

Wangbangpo and Sharma (2002) found that exchange rates have a positive relationship with stock prices in Indonesia, Malaysia, and the Philippines, conversely negatively in Singapore and Thailand. The results of the study (Wangbangpo and Sharma, 2002) are also supported by research conducted by (Kandir, 2008) where the exchange rate affects positively the return of all existing portfolios. In contrast, Mok (1993) who examined the causal relationship between interest rates, exchange rates and stock prices on the open and closed stock markets in Hong Kong showed the results that there was no significant relationship between interest rates, exchange rates with stock prices. Following the development of the exchange rates of 8 world countries based on the graph:

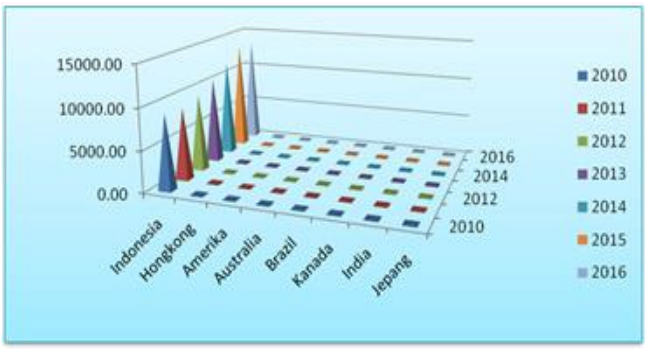

Fig 2:- Development of Exchange Rates in several World Countries

Based on Figure 2 it is known that the exchange rate movements of 8 countries in the world tend to be stable except Indonesia. This is inseparable from the Indonesian exchange rate system which still uses the floating system. In August 2015 the value of the rupiah broke through Rp 14,050 per 1 US $ due to the Yuan devaluation which also impacted the global financial market. This fluctuation in the value of the rupiah also has an impact on Indonesia's Reserve Assets, which will sell dollar stocks when the rupiah collapses. The exchange rate is one that affects the current account balance in Indonesia. If the rupiah exchange rate (exchange rate) experiences a depreciation (decrease in the value of the domestic currency) it will cause the price of foreign goods to rise so it tends to reduce imports so that the current account balance has a surplus. Conversely, if the rupiah exchange rate (exchange rate) experiences appreciation (an increase in the value of the domestic currency) it will cause the price of foreign goods to fall so that it will tend to increase imports and reduce exports. This affects the current account balance which will experience a deficit (Sukirno, 2010).

In the study of Gunsel (2009) analyzed the effect of inflation on the financial crisis in four different groups of countries, namely Argentina, Brazil, and Mexico as countries of the American group; Malaysia, the Philippines, South Korea and Thailand as countries of the East and Southeast Asian group; Russia and Turkey. Following the inflation rate of 8 world countries from 2010 to 2015 in the graph:

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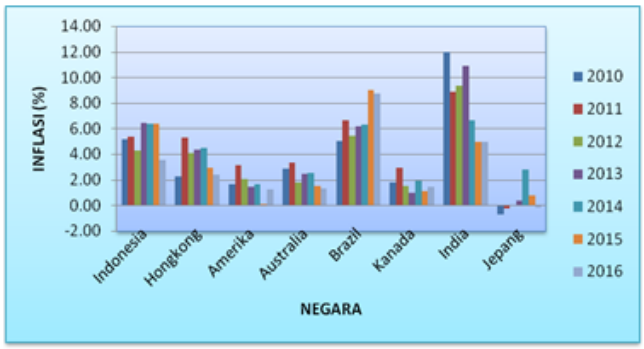

Fig 3:- Inflation Rates of 8 World Countries

From Figure 3 above it can be explained that an increase in inflation in Indonesia and Brazil in 2015 was caused by a massive corruption scandal in the Petrobras oil SOE and a political crisis that plagued Brazil's economy and continued to plunge into recession. Another case is the increase in inflation that occurred in Indonesia due to the CPI inflation component which includes some food items whose prices are very volatile (Volatile Food). According to (Madura, 2000) the rate of inflation and interest rates can have a significant impact on the exchange rate because at a time when the inflation rate of a country is relatively rising against the inflation rate of other countries the currency will decrease because of its declining exports. This resulted in high foreign exchange which eventually investors would prefer to invest their capital into foreign currencies rather than investing in stock prices which resulted in a significant stock price decline. (Samsul, 2006) concluded that high inflation would bring down stock prices in the market. While low inflation will result in very slow economic growth and ultimately stock prices will also move slowly. Based on the description above, the researcher will analyze interest rates, inflation, Gross Gross Domestic Product (GDP), current account, Reserve Assets and Foreign Direct Investment (FDI) effect on the exchange rate and stocks through the Model Regression Panel Approach in each of Indonesia, Hong Kong , USA, Australia, Brazil, Canada, India and Japan.

II. THEORIES

A. Financial System Stability

Financial System Stability does not have a standard definition that has been accepted internationally. Therefore, several definitions of the SSK emerge, which in essence say that a financial system enters an unstable phase when the system has endangered and impeded economic activity. Below are some definitions of SSK taken from various sources (Source: Bank Indonesia, 2017). "A stable financial system can allocate funding sources and absorb shocks that occur to prevent disruption to the activities of the real sector and financial system". "A stable financial system is a financial system that is strong and resistant to a variety of economic disturbances so that it is still able to perform the intermediary function, carry out payments and spread risk properly." "Financial system stability is a condition in which economic mechanisms in pricing, fund allocation, and management risk functions well and supports economic growth. "(Source: Bank Indonesia, 2017). The meaning of financial system stability can be understood by researching factors that can cause instability in the financial sector. Financial system instability can be triggered by various causes and shocks. This is generally a combination of market failure, both due to structural and behavioral factors. Market failure itself can be sourced from external (international) and internal (domestic). Risks that often accompany activities in the financial system include credit risk, liquidity risk, market risk and operational risk (Source: Bank Indonesia, 2017).

B. The Global Financial Crisis

The global economic crisis is an event in which all sectors of the world market economy collapse and affect other sectors throughout the world. The global economic crisis which caused a drastic decline in the performance of the world economy in 2008 is estimated to continue, even increasing in intensity in 2009. Slowing world economic growth, in addition to causing global trade volume to plummet in 2009, will also have an impact on many industries large threatened bankruptcy, a decline in production capacity, and a surge in world unemployment. For developing countries and emerging markets, this situation can damage economic fundamentals, and trigger an economic crisis.

In theory, there could be more than one factor that simultaneously caused the crisis to occur. For example, high rates or inflation rates; is this caused by the soaring prices of imported products due to the depreciation of the rupiah against the US dollar, or because the amount of money circulating in the Community (M1) is greater than the aggregate supply (economic capacity to meet domestic market needs). According to Fischer, the factors causing the crisis include internal and external factors in the economies of developed countries and global financial markets which cause global imbalances. Maintaining the Integrity of the Specifications.

In addition to internal and external factors (economic and non-economic), three alternative theories can also be used as a basic framework for analyzing the factors that cause the economic crisis in Asia. that is :

- *Conspiracy Theories*

The rationale of this theory is that the crisis was deliberately caused by certain developed industrial countries, especially the US because it did not like the attitude of ASEAN arrogance so far.

- *Contagion Theory*

The crisis in Asia shows a contagion effect, which is transmitted very quickly from one country to another. Starting in Thailand in the middle of 1997, then spread to Malaysia, Singapore, the Philippines, Indonesia, and South Korea. But among these countries, Thailand, Indonesia and South Korea are heavily infected because all three of them have the same problem. The process occurred mainly because of the attitude of foreign investors who after the crisis occurred in Thailand became afraid that the same

crisis would also befall neighboring countries such as Indonesia, Malaysia, and the Philippines.

➢ *Business Cycle Theory*

Business cycle theory or conjuncture, or tidal waves of an economy. The essence of this theory is that an economy whose processes are fully driven by market mechanisms (the forces of demand and supply) will surely experience ups and downs in a period that will experience lethargy and in the next period will be excited again and then lethargic again and so on. This theory implies that if the economic crisis in Asia is a symptom of the conjuncture, then the crisis will automatically disappear, with the condition that the process is entirely determined by market forces

.

C. Exchange Rates

According to Ekananda (2015), the exchange rate or exchange rate can be defined as the price of a country's currency against another country's currency. Because this exchange rate includes two currencies, the balance point is determined by the supply and demand sides of the two currencies, or in other words, the exchange rate is a sum of money from a certain currency that can be exchanged for one unit of another country's currency.

The supporting theory of exchange rates is the theory of Purchasing Power Parity (PPP). The Purchasing Power Parity (PPP) theory put forward by Swedish economist Gustav Cassel who introduced the purchasing power parity theory in 1918. Purchasing power parity connects foreign exchange rates with commodity prices in local currencies in the international market, namely that foreign exchange rates will tend to decrease in the same proportion as price increases (Baillie and MacMohan, 1994 in Ekananda 2015).

The basis of this theory is the comparison of the value of one currency with the value of other currencies determined by the purchasing power of the money against goods and services in each country (Nopirin, 2009: 182). Furthermore Dornbush, Stanley & Richard (2008: 528) states that the purchasing power parity theory (Purchasing Power Parity) is the movement of the exchange rate mainly due to differences in inflation rates between countries then by using the real exchange rate, PPP theory is mentioned when Pf and P change, e changed to keep the Pf / P e constant. Thus from the definitions of the theory of Purchasing Power Parity, it can be concluded that the exchange rate is highly determined by the price level of a country so that it can show that the rupiah exchange rate has a positive relationship with the inflation rate. If the rupiah exchange rate increases, inflation increases or the value of inflation depreciates and vice versa if the rupiah exchange rate decreases, inflation decreases or appreciates.

D. Stock Prices

The definition of stock prices according to Jogiyanto (2010), is: stock prices occur in the stock market at a certain time determined by market participants and determined by the demand and supply of the relevant stock prices in the capital market. According to Widoatmojo (1996) in Satria (2008) stock prices can be divided into 3 (three):

➢ *Nominal Price*

The price listed in the stock prices certificate determined by the issuer to assess each stock price issued. The size of the nominal value gives importance to the stock because minimum dividends are usually set based on the nominal value.

➢ *Prime Price*

This price is the price at the time the stock price was listed on the stock exchange. Stock prices on the primary market are usually determined by underwriters and issuers. Thus it will be known how much the stock price of the issuer will be sold to the public, usually to determine the initial price.

➢ *Market price*

If the initial price is the selling price of the issuance agreement to investors, then the market price is the selling price of one investor with another investor. This price occurs after the stock prices are listed on the exchange. Transactions here no longer involve issuers and underwriters of this price which are referred to as prices in the secondary market and this price truly represents the price of the issuing company, because, intransactions in the secondary market, there is very little negotiation between investor prices with the issuing company. Prices that are announced daily in newspapers or other media are market prices.

III. METHODOLOGY

The approach of this research is quantitative research with the Structural Regression Method (Simultaneous Regression). According to Rusiadi (2013), Quantitative research is a research that aims to determine the degree of relationship and patterns/forms of influence between two or more variables, wherewith this research a theory will be built that serves to explain, predict and control a symptom. To support quantitative analysis, the Structural Regression model is used, where the model used in analyzing data is the economic model, namely the method of analysis using two simultaneous equations, namely the exchange rates of European Countries, Indonesia, USA, Australia, Hong Kong, India, and Japan. The ATX, JKSE, DJI, AORD, HSI, BSSEN and Nikke stock price indexes are as follows:

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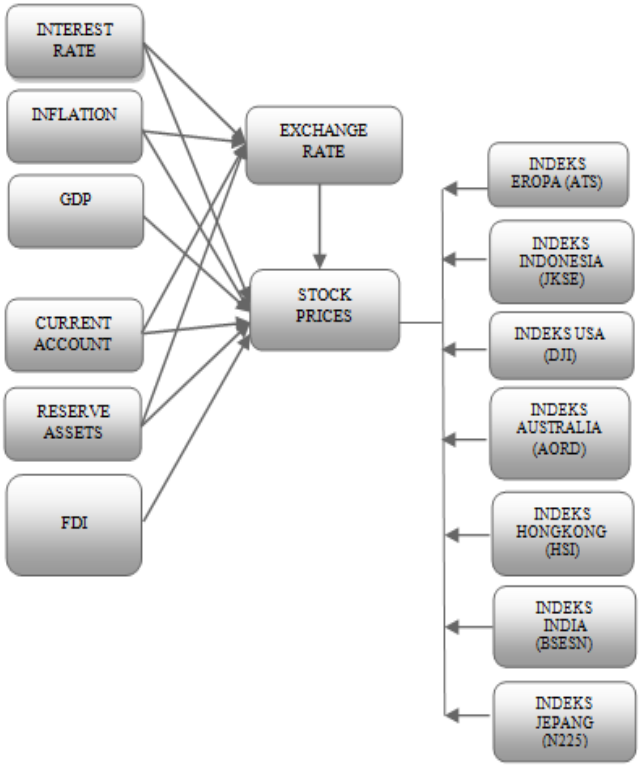

Fig 4:- European, Indonesian, US, Australian, Hong Kong, Indian and Japanese Exchange Rates = f (IR, INF, CA, RA)

Equation 2: Stock Prices ATX, JKSE, DJI, AORD, HIS, BSESN, N225 = f (IR, INF, GDP, TB, RA, FDI)

The two equations are transformed into the form of the economic equation as follows:

Equation 1:

$$Log(ER) = C(10) + C(11)*Log(IR) + C(12)*Log(INF) + C(13)*Log(TB) + C(14)*Log(CD) + \varepsilon_1$$

Where :

ER	= Exchange Rates (Rupiah/US$)
IR	= Interest Rates (%)
INF	= Inflation (%)
CA	= Current Account (Billion US$)
RA	= Reserve Assets (Billion US$)
$\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4$	= Regression Coefficient
ε_1	= term error

Equation 2 :

$$Log(SP) = C(20) + C(21)*Log(IR) + C(22)*Log(INF) + C(23)*Log(GDP) + C(24)*Log(CA) + C(25)*Log(RA) + C(26)*Log(FDI) + C(27)*Log(ER) + \varepsilon_2$$

Where :

SP	= Stock Prices (US$)
IR	= Interest Rates (%)
INF	= Inflation (%)
GDP	= Gross Domestic Product (%)
CA	= Current Account (Billion US$)
RA	= Reserve Assets (Billion US$)
FDI	= Foreign Direct Investment (Billion US$)
ER	= Exchange Rates (Rupiah/US$)
$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \beta_6$	= Regression Coefficient
ε_2	= term error

The basic assumption of regression analysis is that the variable on the right in the equation does not correlate with disturbance terms. If the assumptions are not met, Ordinary Least Square (OLS) and Weighted Least Square become biased and inconsistent. There are several conditions where the independent variable correlates with disturbances. Classic examples of these conditions, among others:

a. There are endogenous variables in the range of independent variables (the variable to the right in the equation).
b. Right-hand-side variables are measured incorrectly. In summary, variables that correlate with residuals are called endogenous variables and variables that do not correlate with residual values are exogenous or exterminated variables.

The basic approach in the case where right-hand side variables correlate with residuals is to estimate the equation using instrumental variables regression. The idea behind instrumental variables is to find out a set of variables, called instruments, which (1) correlate with explanatory variables in the equation and (2) do not correlate with disturbances. This instrument eliminates the correlation between right-hand side variables and disturbance. Under these conditions, the analysis using ordinary regression (OLS) has the potential to produce biased and inconsistent estimates. Furthermore, it is said that the 2 SLS method is more appropriate for simultaneous analysis, considering that in this analysis all variables are taken into account as a whole system. Two-stage-least-square (2SLS) is a special tool in instrumental variable regression. As the name suggests, this method involves 2 stages of OLS.

Stage 1. To eliminate the correlation between endogenous variables and error terms, a regression is performed on each equation in the predetermined variables only (reduced form). So that the estimated value of each endogenous variable can be estimated.
Stage 2. Regress the original equation (structural form), replacing the endogenous variable with its estimated value (obtained from the 1st stage.

A. Simultaneity Identification

To see the relationship between endogenous variables, the first step is to identify equations. This identification is intended to find out whether the equation is in one of the following conditions: under-identified, exactly-identified or over-identified. For the 2SLS method to be applied to the equation system, the identification requirements must meet the exact identified or over-identified criteria (Koutsoyiannis, 1977). Besides, the 2SLS method has other procedures, including there is no correlation of residual terms (endogenous variables), the Durbin-Watson test

states that there are no variables on the right-hand side that correlate with error terms. The effects of autocorrelation on regression estimation are:

- The residual variant (error term) will be obtained lower than it should be, resulting in a higher R2 than it should.
- Hypothesis testing using t statistics and F statistics will be misleading.

Besides that, it must be ensured that there is no heteroscedasticity, for that the classical assumption test is performed to find whether there are autocorrelation and heteroscedasticity. The classical assumption test results state that the residual value correlation between endogenous variables is very small or it can be said there is no autocorrelation and it is proven that there is no heteroscedasticity, so the 2SLS method is applied. The over-identification condition states that (for the equation to be identified) the difference between the total variables and the number of variables in one equation (endogenous and exogenous), must have a minimum amount equal to the sum of the equations minus one.

Before entering the 2SLS analysis stage, each equation must meet the identification requirements. An equation is said to be identified only if the equation is expressed in a unique statistical form, and produces a unique parameter estimate (Sumodiningrat, 2001). Based on this Gujarati, (1999) said that to meet these requirements, a variable in equation one must not be consistent with other equations. In this case, the identification of equations can be done by adding or adding, or removing some exogenous (or endogenous) variables into the equation (Sumodiningrat, 2001). The identified conditions are divided into two namely: exactly identified and over identified. Determination of exactly identified and over-identified conditions is carried out with the following formula:

K-k <m-1: called under-identification
K-k = m-1: called exact identification
K-k> m-1: is called over-identification

Where ;
K = number of predetermined exogenous variables in the model
m = number of predetermined exogenous variables in the equation
k = number of endogenous variables in the equation.

Based on the above criteria, the identification equation in this study is as follows:

Log (ER) = C(10) + C(11)*Log(IR) + C(12)*Log (INF) + C(13)*Log (CA) + C(14)*Log (RA) + ε_1

"K= 6, k = 2,dan m = 4"

Log (SP) = C(20) + C(21)*Log (IR) + C(22)*Log (INF) + C(23)*Log (GDP) + C(24)*Log (CA) + C(25)*Log (RA) + C(26)*Log (FDI) + C(27)*Log (ER) +ε_2
"K= 7, k = 2,dan m = 6"

Based on the formula above, the four equations can be tested for identification as follows:

Equation	K - k	m – 1	Result	Identification
Exchange Rate	6 – 2	4 – 1	4 > 3	*Over Identification*
Stock Prices	7 - 2	6 - 1	5 = 5	*Exact Identification*

Table 1:- Test identification of simultaneous equations

B. Two-Stage Least Squares

The analytical method uses Two-Stage Least Squares or two-stage regression models, namely:
Stage 1: Reduce Form Equation

Log (ER) = C(10) + C(11)*Log(IR) + C(12)*Log (INF) + C(13)*Log (CA) + C(14)*Log (RA) + ε_1
Log (SP) = C(20) + C(21)*Log (IR) + C(22)*Log (INF) + C(23)*Log (GDP) + C(24)*Log (CA) + C(25)*Log (RA) + C(26)*Log (FDI) + C(27)*Log (ER) +ε_2

Stage 2: The second stage of the 2SLS analysis is to regress each equation using the exchange rate and the stock with its predicted value. The equation for Exchange and stock will change to:

Log (ER) = β_0 + β_1Log(IR) + β_2Log (INF) + β_3Log (CA) + β_4Log (RA) + μ_1

Log (SP) = β_0 + β_1Log (IR) + β_2Log (INF) + β_3Log (GDP) + β_4Log (CA) + β_5Log (RA) + β_6Log (FDI) + β_7Log (ER) + μ_2

C. Test the Suitability (Test of Goodness of Fit)

Estimation of the model is done by using the methods available in the statistical program Eviews version 5.1. The resulting coefficient can be seen in the regression output based on the data analyzed for later interpretation and seen the significance of each variable studied, namely:

- R^2 (coefficient of determination) aims to determine the strength of the independent variable (independent variable) to explain the dependent variable (dependent variable).
- Partial test (t-test), intended to find out the statistical significance of partial regression coefficients. If thit> t table, then H0 is rejected and H1 is accepted.
- Concurrent test (F-test), intended to determine the statistical significance of the regression coefficients

simultaneously. If Fhit> Ftable, then H0 is rejected and H1 is accepted.

D. Classical Assumption Deviation Test

After regression testing, an evaluation is carried out. This evaluation is intended to determine whether the use of multiple linear regression models in analyzing has met the classic assumptions required. The classic assumptions used in this study are as follows:

➢ *Normality test*

The classical linear regression model assumes that the confounding factor μ has an average value equal to zero, is uncorrelated and has constant variance. With this assumption, the OLS estimator or estimator will fulfill desirable traits, such as unfamiliarity and minimum variance. This test uses the estimation results of residuals and X^2 probability distribution, by comparing the value of JBcount or X^2count with X^2table. The decision criteria are as follows:

- If the value of JBcount> X^2table (Prob <0.05), then the hypothesis stating that the residual UI is normally distributed is rejected.
- If the value of JBcount <X^2 table (Prob> 0.05), then the hypothesis stating that the residual ui is normally distributed is accepted.

➢ *Multicollinearity Test*

Multicollinearity is used to show the linear relationship between variable-variable in the regression model. The interpretation of the linear regression equation is explicitly dependent that the different variables in the equation do not correlate with each other. If the independent variables correlate perfectly, they are called perfect multicollinearity. Multicollinearity can be detected by the obtained regression quantities, namely:

- Large variations (from OLS estimates)
- Wide confidence interval (because of large variations, the standard error is large so the confidence interval is wide)
- T-test is not significant. A free variable is substantial or statistically if a simple regression is made to be insignificant due to large variations due to colinearity. When the error standard is too large the probability of a regression coefficient is not significant.
- R^2 is high but there are not many significant variables from the t-test.
- Sometimes the estimated value of the coefficient obtained will have a value that is not by the substance so that it can mislead interpretation.

- Autocorrelation Test

The autocorrelation test is intended to determine whether there is a correlation between residuals (members) in a certain set of observations in a certain period. In the multiple linear regression model must also be free from autocorrelation. There are various methods used to test the presence or absence of autocorrelation symptoms. In this study, the Watson Durbin Test method was used. According to Durbin Watson, the magnitude of the Durbin Watson coefficient is between 0-4. If the Durbin Watson coefficient is around 2, it can be said there is no correlation, if the magnitude is close to 0, then there is a positive autocorrelation and if the magnitude is close to 4 (four) then there is a negative autocorrelation (Gujarati, 2000).

IV. RESULT AND DISCUSSION

❖ *Structural Regression Results*

Estimation to determine the effect of variables in 2 simultaneous equations is done using the Two-Stage Least Squares model. The estimation results of the equation system with Two-Stage Least Squares are shown in the table below. From the table, it is known 2 (two) simultaneous model equations:

$$\text{Log (ER)} = C(10) + C(11)*(IR) + C(12)*(INF) + C(13)*(CA) + C(14)*\text{Log}(RA) + \varepsilon_1$$

$$\text{Log (SP)} = C(20) + C(21)*(IR) + C(22)*(INF) + C(23)*(GDP) + C(24)*(CA) + C(25)*\text{Log}(RA) + C(26)*\text{Log}(FDI) + C(27)*(ER) + \varepsilon_2$$

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System: SIMULTAN
Estimation Method: Two-Stage Least Squares
Date: 07/04/17 Time: 11:24
Sample: 1996 2016
Included observations: 21
Total system (balanced) observations 42

	Coefficient	Std. Error	t-Statistic	Prob.
C(10)	1.257415	0.255484	4.921691	0.0000
C(11)	0.001780	0.002536	0.702046	0.4882
C(12)	0.000792	0.001249	0.633826	0.5312
C(13)	0.001680	0.000817	2.055605	0.0489
C(14)	0.085406	0.022492	3.797107	0.0007
C(20)	-3.632309	2.733493	-1.328816	0.1943
C(21)	-0.045923	0.023656	-1.941272	0.0620
C(22)	0.023762	0.018266	1.300908	0.2035
C(23)	-0.004728	0.065170	-0.072542	0.9427
C(24)	-0.004002	0.007033	-0.569067	0.5737
C(25)	1.049292	0.296574	3.538042	0.0014
C(26)	0.179502	0.098629	1.819970	0.0791
C(27)	-0.235645	0.237695	-0.991378	0.3297
Determinant residual covariance		3.45E-05		

Equation: LOG (ER) = C(10) + C(11)*(IR) + C(12)*(INF) + C(13)*(CA) + C(14)*LOG(RA)
Instruments: C IR INF GDP CA RS FDI ER SP
Observations: 21

R-squared	0.607311	Mean dependent var		2.203133
Adjusted R-squared	0.509138	S.D. dependent var		0.049053
S.E. of regression	0.034367	Sum squared resid		0.018898
Durbin-Watson stat	0.537337			

Equation: LOG (SP) = C(20) + C(21)*(IR) + C(22)*(INF) + C(23)*(GDP) + C(24)*(CA) + C(25)*LOG(RA) + C(26)*LOG(FDI) + C(27)*(ER)
Instruments: C SB INF GDP TB CD FDI KURS SAHAM
Observations: 21

R-squared	0.959121	Mean dependent var		7.273720
Adjusted R-squared	0.937110	S.D. dependent var		0.992070
S.E. of regression	0.248791	Sum squared resid		0.804660
Durbin-Watson stat	1.806863			

Table 2

Based on the results of the structural equation output, it can be seen that there are 2 equations.

A. Equation 1 test results:

The first equation is the equation used to measure Interest Rate, Inflation, Current Account, and Reserve Assets simultaneously affect the Exchange Rates of the Countries of Indonesia, Hong Kong, USA, Australia, Brazil, Canada, India, and Japan with the following equations as follows:

Log (ER) = C(10) + C(11)*(SB) + C(12)*(INF) + C(13)*(CA) + C(14)*Log (RA) + ε_1

Based on the equation, the results of the output eviews with the Two-Stage Least Square model are as follows:

LOG (ER) = 1,2574 + 0,0017*(IR) + 0,0007*(INF) + 0,0016*(CA) + 0,0854*LOG(RA)

Based on the estimation results above can show that R2 = 0.607311 which means that the IR, INF, CA, and RA variables can explain the exchange rate of 60.73% and the remaining 39.27% exchange rate is influenced by other variables outside the estimation in the model. Based on the estimation results obtained by the t-count value, there are 2 (two) variables which significantly influence the exchange rate variable, namely CA, and RA at alpha = 10 percent, CA with a prob value of 0.0489 <0.1, prob value of RA 0 , 0007 <0.1, so that CA, and RA have a significant effect on the ER variable while IR and INF do not significantly affect Exchange Rate where the IR prob value is 0.4889> 0.1 and the Prob value of INF is 0.5312> 0.1.

➢ *Interest Rates coefficient*

Based on the regression results it is known that the regression coefficient for positive IR 0.0017 means that for every increase of IR by 1 percent, the ER will increase by 0.0017 percent.

➢ *Inflastion coefficient*

Based on the regression results it is known that the regression coefficient for a positive INF of 0,0007 means that for every increase of INF of 1 percent, the exchange rate reserves will increase by 0,0007 percent.

➢ *Current Account coefficient*

Based on the regression results it is known that the regression coefficient for a positive CA 0.0016 means that for every increase of CA by 1 percent, the ER will decrease by 0.0016 percent.

➢ *Reserve Assets coefficient*

Based on the regression results it is known that the regression coefficient for a negative RA of 0.0854 implies that for every increase of RA by 1 percent, the exchange rate will decrease by 0.0854 percent

B. Equation 2 Test Results:

The second equation is the equation used to measure Interest Rate, Inflation, GDP, Current Account, Reserves Assets, Foreign Direct Investment and Exchange Rates simultaneously influence the STOCK of Indonesia, Hong Kong, USA, Australia, Brazil, Canada, India, and Japan with the following equations as follows:

Log (SP) = C(20) + C(21)*(IR) + C(22)*(INF) + C(23)*(GDP) + C(24)*(CA) + C(25)*Log(RA) + C(26)*Log(FDI) + C(27)*Log (ER) +ε_2

Based on the equation, the results of the output eviews with the Two-Stage Least Square model are as follows:

LOG (SP) = -3,6323- 0,0459*(SB) + 0,0237*(INF) + -0,0047*(GDP) – 0,0040*(CA) + 1,0492*LOG(RA) + 0,1795*LOG(FDI) – 0,2356*(ER)

Based on the estimation results above can show that R2 = 0.959121 which means that IR, INF, GDP, CA, RA, FDI and ER variables are able to explain stock prices at 95.91% and the remaining 4.09% stock prices are influenced by other variables outside the estimation in model. Based on the estimation results obtained by t-count, there are 3 (three) variables which significantly influence the STOCK variable, namely IR, CA and FDI at alpha = 10 percent, IR with prob value 0.062 <0.1 prob value CD 0.0014 < 0.1 and FDI with a prob value of 0.0791 <0.1 so that IR, CA and FDI have a significant effect on the stock variables while INF, GDP, CA, and the exchange rate does not significantly affect Stock Prices where the INF prob value is 0.2035> 0, 1 prob GDP value 0.9427> 0.1 CA prob value 0.5737> 0.1 and prob ER value 0.3297> 0.1.

- *Interest Rate Coefficient*

Based on the regression results it is known that the regression coefficient for a negative Interest Rates of 0.0459 implies that for every increase of IR by 1 percent, stock prices will experience a decrease of 4.59 percent.

- *Inflation Coefficient*

Based on the regression results it is known that the regression coefficient for a positive inf of 0.0237 implies that for every increase of inf of 1 percent, stock prices will experience an increase of 2, 37 percent.

- *Gross Domestic Product Coefficient*

Based on the regression results it is known that the regression coefficient for GDP is negative 0.0047 which means that for every increase of GDP by 1 percent, stock prices will experience a decrease of 0.47 percent.

- *Current Account Coefficient*

Based on the regression results it is known that the regression coefficient for ca is negative 0.0040 which implies that for every increase of ca by 1 percent, stock prices will experience a decrease of 0.4 percent.

- *Reserve Assets Coefficient*

Based on the regression results it is known that the regression coefficient for positive Reserve Assets is 1.0492 which means that for every increase of RA by 1 percent, stock prices will experience an increase of 10.49 percent.

- *Foreign Direct Investment Coefficient*

Based on the regression results it is known that the regression coefficient for positive RA is 0.1795 which means that for every increase of RA by 1 percent, stock prices will experience an increase of 17.95 percent.

- *Exchange Rate Coefficient*

Based on the regression results it is known that the regression coefficient for ER is negative 0.2356 which means that for every 1% decrease in er, stock prices will experience an increase of 23.56 percent.

3. Classical Assumption Test

➢ *Normality test*

Exchange Rates and Stock Prices Residual Normality Test Table

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System Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 07/07/17 Time: 17:05
Sample: 1996 2016
Included observations: 21

Component	Skewness	Chi-sq	Df	Prob.
1	-0.828841	2.404423	1	0.1210
2	-0.428793	0.643522	1	0.4224
Joint		3.047945	2	0.2178
Component	Kurtosis	Chi-sq	Df	Prob.
1	2.533641	0.190304	1	0.6627
2	2.596749	0.142285	1	0.7060
Joint		0.332589	2	0.8468
Component	Jarque-Bera	df	Prob.	
1	2.594727	2	0.2733	
2	0.785807	2	0.6751	
Joint	3.380534	4	0.4963	

Table 3

In this study, to test the normality of data the Jarque-Bera test was used. The criteria used is if the Jarque-Bera (JB) test probability value> alpha 0.05, then the data is said to be normal. In the table note that the probability value of 0.2733> 0.05 so that the assumption of normality has been fulfilled.

➢ *Autocorrelation Test*

To detect the presence or absence of serial correlation in this research model, the Residual Tests for Autocorrelations was conducted. Assuming there is no autocorrelation effect if the value of prob> 0.05.

System Residual Portmanteau Tests for Autocorrelations
Null Hypothesis: no residual autocorrelations up to lag h
Date: 07/04/17 Time: 12:09
Sample: 1996 2016
Included observations: 21

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	10.02328	0.0400	10.52444	0.0325	4
2	12.81922	0.1182	13.61470	0.0924	8
3	14.53425	0.2679	15.61556	0.2095	12
4	21.22309	0.1701	23.87825	0.0922	16
5	29.27139	0.0826	34.44164	0.0233	20
6	34.96731	0.0689	42.41593	0.0116	24
7	37.98869	0.0986	46.94800	0.0139	28
8	41.19282	0.1280	52.12390	0.0138	32
9	46.87417	0.1060	62.06627	0.0044	36
10	51.24691	0.1096	70.41422	0.0021	40
11	53.07737	0.1640	74.25819	0.0029	44
12	53.95623	0.2572	76.30887	0.0058	48

*The test is valid only for lags larger than the System lag order.
df is degrees of freedom for (approximate) chi-square distribution

Table 4:- Autocorrelation Test Table

Based on the results of df is degrees of freedom for (approximate) chi-square distribution above, it can be seen that all lags movement indicators from time to time do not show any autocorrelation effect in data movement, where the values of the prob Q-stat and prob Adj Q-stat are all over 0.05 or 0.10 so it is proven that nothing in the data has an autocorrelation effect.

V. CONCLUSION

- Based on the results of the study note that the Variable Current Account and Reserve Assets significantly influence Exchange Rates while Interest Rates and Inflation does not significantly influence Exchange Rates
- Based on the results of the study note that the Interest Rates, Reserve Assets, and Foreign Direct Investment have a significant effect on stocks while Inflation, Gross Domestic Bruto, Current Account, and the exchange rate does not significantly affect the Stock prices.

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