

The Dynamic

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**The Dynamics of the Relationship between
Current Account and Return of Composite Stock Price Index
in 1990-2014
(VAR-X Model Approach)
Eka Desy Purnama & Achmad Kemal Hidayat**

Abstract

Until recently, the dynamics of balance of payments is only analyzed in terms of international trade (exports and imports), but when viewed from the detailed components of the balance of payments, there are also Capital and Financial Account's Transactions to be concerned. In the capital and financial account, the improvement of fundamental economies are commonly acknowledged to encourage capital inflows, both direct investment and portfolio investment, which became two alternative sources of financing the current account deficit. It is also a common knowledge that the capital and financial transactions are related to investor activities in the stock market.

This study aims to analyze the role of capital markets on the dynamics of the current account in Indonesia. This study will also examine how the current account can help predicting stock market performance. This study draws on research by Marcel Fratzscher (2009) who studied the importance of asset prices and exchange rates as drivers of trade balance industrialized countries, G-7 during the period of 1974-2007 and found that asset price is an important driver of the US trade balance.

The econometric model employed in this study is the method of Vector Autoregressive-X (VAR-X), with rationale that in addition to macro variables as transmission variables: (i) inflation, (ii) exchange rates, and (iii) interest rates, there is also a need to incorporate several exogenous variables: (i) foreign stock exchange index and (ii) world oil prices, with concern that foreign investors dominate as investor in Indonesian stock exchange. Authors expect that the econometric model estimates will show that CSPI, dynamically and simultaneously influences the movement of the current account while, the dynamic of the current account also contributes to the CSPI.

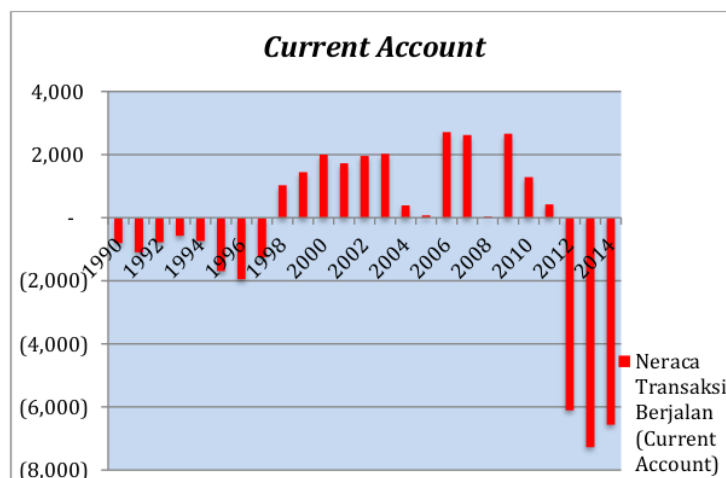
Keywords : Current Account and CSPI

Introduction

Indonesia's economy, in the perspective of macroeconomics, is categorized as "small open economy", thus the economic performance of Indonesia is not only influenced by domestic economy, but also global economy. Changes in the global economic condition spontaneously will have an effect on the economic performance of Indonesia through trade channel and financial market channel as well. The change through the trade channel can be measured in terms of exports and imports, while the change through the financial market channel can be identified in terms of foreign investment inflows and outflows by way of spending portfolios and stocks.

The transparency of economy through export-import activities has a direct impact on Indonesia current account. A current account is an element of balance of payments that gives a brief picture on the trade of goods and services and portrays income factor of a nation with other countries. The balance of payments records all transactions of payments of a country with the rest of the world. The transaction encompasses receipts from exports and payments for imports of goods and services, foreign investment inflows and outflows, and the payments of overseas investments. The balance of payments is an economic indicator that helps a country to measure its ability to support international transactions particularly in relation to the obligation of debt payment and export-import transactions.

The condition of Indonesia's macro-economy demonstrated from the current account has constantly been deficit since 2012. A two-year persistent deficit of the current account raised concerns on the sustainability of Indonesia's economic growth. A current account deficit indicates that the number of imports is greater than exports, whereas a current account surplus indicates that the number of exports is greater than imports.



Source: Bank of Indonesia (data analysed) 2015

From the beginning of the first quarter of 2012 to the end of the fourth quarter of 2014, Indonesia current account suffered deficit, while the economic growth was quite strong. The growth that was fairly strong had created an increasing demand for imported products. On the contrary, exports tended to decrease due to the sluggish growth of global economic and the limitation of local product competitiveness in

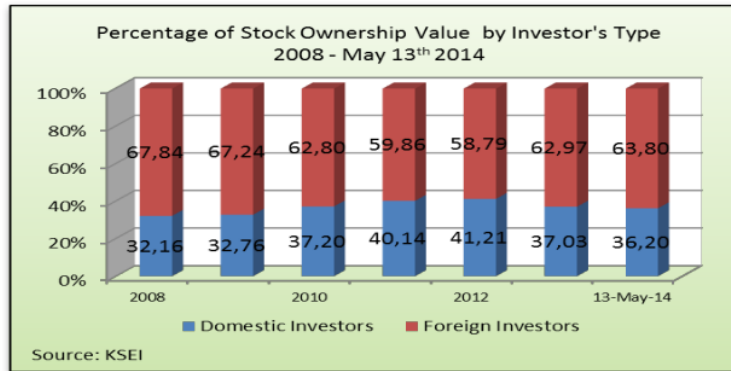
global markets. It gave rise to the balance of trade in goods depressed and subsequently caused a current account deficit. The dynamics of the current account are also driven by changes in the balance of services. The number of imports of goods and services that is greater than exports created the need of foreign exchanges for importing goods and services that is greater than the availability of foreign exchanges resulted from export. As a result, the supply of foreign currencies decreases which may impact further to the expectation of rupiah weakening and disturb the stability of overall economy. Such condition will provoke foreign investors to regard that Indonesia's risk of investments is increasing. Consequently, it can impact on the decline of foreign investment inflows and outflows.

The intertemporal approach of current account explains that the choice between savings and investments is the result of decision from the calculation of expectation, which is based on expected values from various macro-economic factors (Obstfeld and Rogoff, 1995). Referring to the theory of intertemporal: *Expected Income* from return stock will stimulate investors to consume imported goods that can trigger a current account deficit. The rise of CSPI (Composite Stock Price Index), on the one hand, prompts foreign investors to buy stock. Therefore, it creates a current account surplus. On the other hand, however, both gain and dividend acquired from foreign investors give impacts to capital outflows. Thus, it results in a current account deficit.

From the capital market side, the enactment of deregulation policy of financial sector at the end of 1980s had made foreign capital inflows to Indonesia so attracting that made Indonesia's capital market one of the foreign investor destinations for investing capitals. The implication of global economic fluctuation is reflected in the movement of foreign capital inflows that finally affects the performance of financial sector.

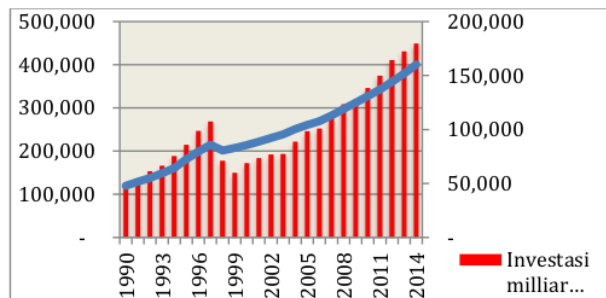
Investor behaviour in allocating investment funds has a strong influence to the fluctuations of CSPI movement. Since the enactment of stock market liberalization, stock ownership by foreigners has been rising. It results in the development of capital markets that is influenced by the composition of stock owned by not only local investors, but also foreign investors. Based on the composition of local and foreign investors since 2008, foreign investors having dominated more than 60% on average of the total market capitalization is prominently influential in stock fluctuations of Indonesia stock exchange.

**Image 2: The Percentage of Stock Ownership Value by Investor's Type
KSEI-2014**



The balance of current account is driven not only by the positions of exports and imports of goods, but also other factors such as rates of interest, inflation, and foreign currency exchange. Marcel Fratzscher dan Roland Straub studying the relation between asset prices (stock) and current account relate the effects of wealth growth acquired from stock markets to private consumption.

Image 4: The Growth of Consumption and Investment, 1990-2014



Referring to the data of Indonesia's consumption, from the first quarter of 1990 to 2014, Indonesia's consumption had been rising. The rise of consumption indicates the advance of income of Indonesian people. The growth of investors' wealth gained from stock market will stimulate private consumption, both local products and imported products. Such condition will lead to the rise of inflation and interest rates (Marcel Fratzscher dan Roland Straub, 2008) and subsequently has an effect on current account.

The other economic variable influencing current account is investment. From the data of the growth of investment in Indonesia during 1990–2014, the investments had been quite significantly rising. This reflects investor confidence toward domestic economy.

Sweder Van Wijnbergen in his research entitled *Oil Price Shocks, Unemployment, Investment and the Current Account: An Intertemporal Disequilibrium Analysis*, argues that the decision of investments and savings is based on intertemporal optimization.

Referring particularly to the research of Fratzscher, who studies the importance of asset prices and exchange rates as drivers of trade balance of the G7 industrialized countries, and other related previous researches, the present paper aims to investigate whether stock price shock resulted from the falling of asset prices has an effect on the position of Indonesia's current account by way of the channels of consumption, investments, and government spending during 1990–2014.

Economic fluctuation is influenced by both internal and external factors, considering Indonesia's system of economy that is open economy. Fluctuation in world oil prices is one of the external factors that could greatly influence current account movement. The weakening and strengthening of the world oil prices will determine the balance of trade.

Image 3. The Current Account of World Oil Prices, 1990-2014

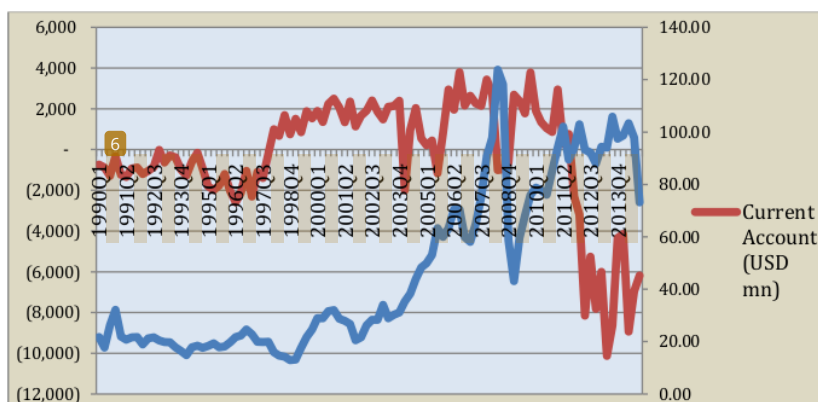
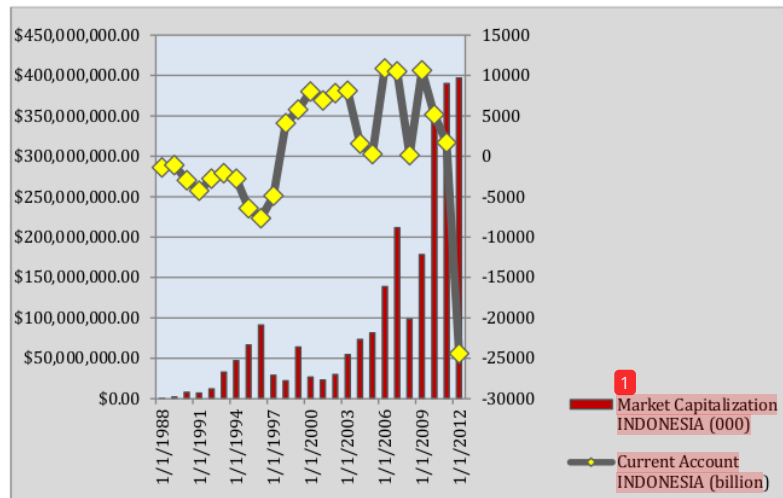


Image 3 shows that the pattern of current account movement and the world oil prices move toward an opposite direction such as in the second quarter of 2011 the current account was falling, but at the same time the oil prices were precisely rising. Likewise the other way around, in the fourth quarter of 2008 when the world oil prices were falling, the current account was exactly rising from the previous quarter.

The development of stock markets can be observed from the development of stock market capitalization (market capitalization listed company) that gives a picture about the value of shares recorded in Indonesia Stock Exchange multiplied by stock prices.

Image 4: The Development of Indonesia Market Capitalization and Current Account, 1988-2012



Source: World Bank, OECD Statistics

The growth of Indonesia's current account until 2010 followed the pattern of market capitalization growth, but starting in 2011 the rise of market capitalization had been indicated by the dramatic falling of current account. As a result, it achieved a considerable deficit. The rise in market capitalization is driven by the rise in transactions of foreign capital flows, from both developed and developing countries, due to capital market liberalization. The growth in capital flow is driven as well by the improvement of Indonesia's economic growth. The amount of foreign investor composition of trade in Indonesia Stock Exchange makes foreign exchange index the external factor that affects the movement of Stock Price Index. Observed from the composition of local and foreign investors since 2008, dominance of foreign investors in more than 60% on average of the total market capitalization has been noticeably influence the stock fluctuations in Indonesia Stock Exchange (Image 2)

The relationship between capital market and current account is also discussed by Bertaut who argues that the rise in wealth effect of stock will have a considerable

influence on private consumption, which in turn will be the cause of the increasing demand to import (Bertaut, 2002). The growth of imports that is imbalance with the growth of exports will encourage a current account as a part of balance of payments to suffer deficit.

The present research examines the influence of Stock Price Index toward the dynamics of current account by using a unique dataset consisting of current account and rupiah exchange rates against US dollar, inflation level, interest rates, the amount of consumption, investments, government spending, CSPI data, Foreign Exchange Index, and world oil prices. Subsequently, the impact of those variables' movements on the movement of CSPI is studied. In addition, the study also investigates how current account can be used to help predicting stock market performance in which the current account are derived from optimal portfolio and consumption savings, investments and government spending. The current account must cover and reflect all relevant information concerning stock market performance in the future.

The substantial question of the research is how CSPI and the macro variables exert influence structurally and simultaneously on current account movements.

The objective of the study is to analyze the role of capital markets on the dynamics of the current account and examine how the structural and simultaneous influence of CSPI and macro variables (interest rates, inflation, and exchange rates) on current account movements.

2. VAR-X Estimation and Data

The present research employs *VARX (Vector Auto Regression X)* method for data analysis. The VARX method is a time series multivariate method used to explore models and capture the dynamics of the relation between endogenous and exogenous variables. It is developed from VAR method that includes exogenous variable in its equation in which the exogenous variable is regarded as the independent variable, input, predictor or regressor. The VAR-X is employed to find the dynamics of the relation between exogenous and endogenous variables. The equation of VAR-X is applied to explore the interconnection among economic variables that connect with monetary transmission. The application of VAR-X method is due to the limitation of economic models that are commonly used to explain the relation among variables, which influence each other in a simultaneous equation, and to explore models and the dynamics of the relationship between exogenous and endogenous variables.

Recognizing the analysis of VAR is started from the simple bivariate system as follows:

$$Y_t = a_{10} + a_{11}Y_{t-1} + a_{12}Z_{t-1} + a_{13}Y_{t-2} + a_{14}Z_{t-2} + e_{yt} \dots\dots\dots (3.2)$$

$$Z_t = a_{20} + a_{21}Y_{t-1} + a_{22}Z_{t-1} + a_{23}Y_{t-2} + a_{24}Z_{t-2} + e_{zt} \dots\dots\dots (3.3)$$

where:

Y_t = Current Account at year t

Z_t = Composite Stock Price Index at year t

Y_{t-n} = Current Account at year t-n

Z_{t-n} = Composite Stock Price Index at year t-n

a_{10}, a_{20} = constant

e_{yt}, e_{zt} = disturbance factor

The method of research:

$$\bullet \text{NTB}_t = \alpha_1 + \beta_{11}\text{NTB}_{t-1} + \beta_{12}\text{CSPI}_{t-1} + \beta_{13}\text{SB}_{t-1} + \beta_{14}\text{Inf}_{t-1} + \beta_{15}\text{NT}_{t-1} + e_1 \dots\dots\dots (3.4)$$

$$\bullet \text{CSPI}_t = \alpha_2 + \beta_{21}\text{NTB}_{t-1} + \beta_{22}\text{CSPI}_{t-1} + \beta_{23}\text{SB}_{t-1} + \beta_{24}\text{Inf}_{t-1} + \beta_{25}\text{NT}_{t-1} + e_2 \dots\dots\dots (3.5)$$

$$\bullet \text{SB}_t = \alpha_3 + \beta_{31}\text{NTB}_{t-1} + \beta_{32}\text{CSPI}_{t-1} + \beta_{33}\text{SB}_{t-1} + \beta_{34}\text{Inf}_{t-1} + \beta_{35}\text{NT}_{t-1} + e_3 \dots\dots\dots (3.6)$$

$$\bullet \text{Inf}_t = \alpha_4 + \beta_{41}\text{NTB}_{t-1} + \beta_{42}\text{CSPI}_{t-1} + \beta_{43}\text{SB}_{t-1} + \beta_{44}\text{Inf}_{t-1} + \beta_{45}\text{NT}_{t-1} + e_4 \dots\dots\dots (3.7)$$

$$\bullet \text{NT}_t = \alpha_5 + \beta_{51}\text{NTB}_{t-1} + \beta_{52}\text{CSPI}_{t-1} + \beta_{53}\text{SB}_{t-1} + \beta_{54}\text{Inf}_{t-1} + \beta_{55}\text{NT}_{t-1} + e_5 \dots\dots\dots (3.8)$$

The present study relates Foreign Exchange Index and world oil prices to CSPI, in which the exogenous variables are the Foreign Exchange Index and the world oil prices. The model constructed in this study is vector autoregressive model with exogenous variables (VAR-X method) in the equation of:

$$Y_t = a_0 + A_1 Y_{t-1} + \dots + A_p Y_{t-p} + B_1 X_{t-1} + \dots + B_q X_{t-q} + C_1 X_{t-1} + \dots + C_q X_{t-q} + U_t$$

The domestic endogenous variable is Y_t and the exogenous variable is X_t (foreign exchange index and world oil prices) in the above equation. The model assumes that the equation system has endogenous and exogenous variables and that there is no cointegration among the variables.

The VAR-X is used to recognize the dynamics of the relation between exogenous and endogenous variables. The VAR-X equation is applied to find the relation among economic variables connecting with monetary transmission. In addition, the VAR-X is considered as the proper method for the research because of the limitation of economic models that are commonly applied to explore the interconnection among variables, which influence each other in a simultaneous equation, and to discover models and the dynamics of the relationship between endogenous and exogenous variables.

The research makes use of secondary data derived quarterly in time series within the period of January 1990 to December 2014.

3. The Procedure of Estimation

A VAR model estimation requires data in stationary condition (Gujarati, 2003:853). Non-stationary data will generate a spurious regression. The spurious regression is a regression with high value of determination coefficient but low value of Durbin Watson statistic. For that reason, a prior test is needed before analysis. The test is intended to get efficient estimation result without errors. The stages of testing are as follows:

1. Stationary test is intended to make mean data stable and to get random error = 0, in which the regression model has a powerful ability to predict without spurious regression (Gujarati 1995).
2. Unit root test is an important statistical test to examine whether data of a variable is stationary or not because it is only a stationary data that can be used for estimation. The stationary data has the characteristic where its variation is not too big. The test is carried out on the data having a tendency to approach mean of all variables used in VAR (*Vector Autoregression*) equation. Analysing a stationary time series data by means of unit root test in this study employs the method of Dickey-Fuller (DF). According to Gujarati (2003), stationary test by means of Dickey-Fuller test is initiated from autoregression process of the first order. If the testing result shows that the data has been stationary in the first order, VAR method subsequently can be applied.
3. DF test is applied to identify stationary level of data. If the coefficient of DF statistic is larger than *Critical Value McKinnon* (1%, 5%, 10%), it means that H_0 is rejected. On the contrary, if the coefficient of DF statistic is smaller than *Critical Value McKinnon* (1%, 5%, 10%), it means that H_0 can be rejected which means that a series does not have root unit in which the variable is non-stationary.
4. *Granger Causality* is employed to evaluate whether a variable has a bidirectional or unidirectional causal relation. In addition, the statistical test is used to observe to what extent the influence of past events to recent condition. The method of *Granger Causality* test is also applied to find if an independent

variable can improve the forecasting performance of a dependent variable.

5. The empirical model of the research makes use of VAR-X model (*Vector Auto Regression-X*). The model functions as an alternative to anticipate if there is causal relation among variables in the research that cannot be solved by OLS model (*Ordinary Least Square*). The VAR model can be used not only to identify causal relation, but also to determine projection model (forecast).
6. Stability test describes a model which is stable in order to make the estimation result remain unchanged although the period is extended, making the estimation result more valid (Gujarati 2004). The stability test is a requirement in VAR analysis because of the reason that if the test result from VAR model is not stable, *Impulse Response Function* analysis becomes invalid.
7. *Autocorrelation function* (ACF) test is examining the presence of autocorrelation in lag -1, lag-2, lag-3, etc. In this test, autocorrelation problem happens when there is a lag in ACF plot that is out of significance limit.
8. Normalization test is applied to investigate if residual is distributed normally.
9. *Impulse Response* is an approach to show a long-term dynamic response among variables in case there is a one-standard-deviation shock in every equation until several periods after the shock. The approach aims to examine responses of every endogenous variable every time shock occurs.
10. *Variance Decomposition* analysis is applied to identify the most influential variable in explaining the change of a variable. The analysis explains the role of a variable toward other economic variable shocks. The *Varian Decomposition* separates variation from several variables that are estimated as the elements of shock.

4. *Granger Causality Test*

Granger Causality is used to investigate if a variable has a bidirectional or unidirectional causal relation. The test is also applied to observe to what extent the influence of past events to recent conditions. The method of *Granger Causality* test functions as well to analyze whether an independent variable can improve forecasting performance of a dependent variable. The test is done before the analysis of VAR. If causal relation is found through the Granger test, the analysis of regression (OLS) cannot be done because the result of estimation will be bias. According to Gujarati (1994), the most proper method for a causal relation is the VAR method.

Table 4.2. Summary of *Pairwise Granger Causality Test Result*

Ho : X does not Granger cause Y	probability value
CSPI → Current Account	0.0056***
Current Account → CSPI	0.0063***
WTI → Current Account	0.0550*
Neraca Transaksi Berjalan → WTI	0.0680*
DJIA → Current Account	0.4373
Current Account → DJIA	0.2662

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 * : confidence level 10%
 ** : confidence level 5%
 *** : confidence level 1%

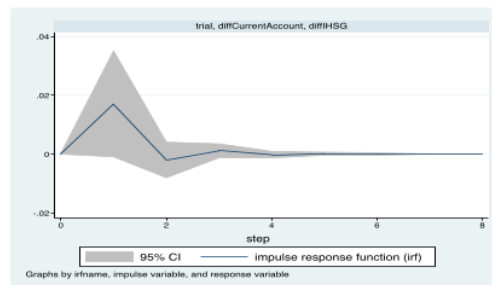
5. Impulse Response Function

VAR data analysis makes use of *Impulse Response*. Chart of the *Impulse Response* demonstrates the responses of a variable caused by shock from other variables until several periods after the shock. The *Impulse Response* generates direction of relationship of the amount of influence among endogenous variables. A variable containing shock because of new information will influence the variable itself dan other variables in VAR system.

A. Response to *Current Account*

IRF test for Current Account exhibits every single shock caused by all variables that will be responded by Current Account variables.

The Response of CSPI to *Current Account*



From image 1, it can be seen that CSPI shock triggers a current account surplus in the first quarter, but then it continues to fall lower in the second quarter. After the second quarter onwards, the movement tends to persistent heading to convergent. It indicates that the influence of CSPI stays responded by current account

although the response is not permanent. The current account will suffer self-correcting after the fourth quarter.

Investors' responses to the rise of CSPI constantly create good performance and as a result both local and foreign investors tend to add their investments in capital markets by buying stocks. Such condition allows new capital inflow to increase and consequently creates a current account surplus. This case reflects a volatile stock market that is supported by Arch and Garch evidence. By means of Arch and Garch test, the result acquired is as below:

Table ARCH

Index	GARCH (1,1)		
	ω	α	β
CSPI	3.18e-06***	0.1344***	0.8636***

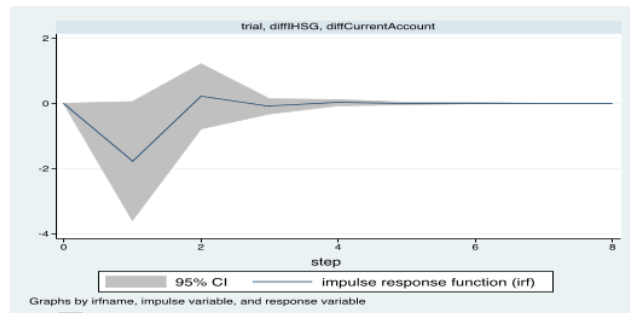
The table shows that all coefficients of CSPI have significant values indicating CSPI volatile.

That situation, however, does not last long. After the second quarter, investors reconsider from fundamental aspect and macro economic condition in order to make the condition of current account back to the starting condition.

B. Response to Composite Stock Price Index (CSPI)

The IRF test for Composite Stock Price Index (CSPI) demonstrates that every single shock triggered by all variables will be responded by the variables of Composite Stock Price Index (CSPI).

Responses from Current Account to Composite Stock Price Index (CSPI)



In the first quarter, shocks on the current account resulted in the falling of CSPI. Then, the current account had risen up to the second quarter and its movement tended to be

persistent after the second quarter onwards. This indicates that the influence of current account will stay responded by CSPI although it is not permanently responded. The responses of current account movement to CSPI signify a current account surplus that causes net capital inflows into the country; some of the net capital comes in through capital markets making CSPI to rise.

Conclusion

From the analysis of VAR model, the conclusions that can be drawn are as follows:

1. CSPI and the macro variables (interest rates, inflation, and currency exchanges) structurally and simultaneously contribute (give an influence) to the movement of current account. On the contrary, the current account movement gives rise to CSPI movement as well. This condition indicates a good signal for stock investors to invest by considering current account movement.
2. The Foreign Market Index as the exogenous variable does not influence the movement of CSPI.
3. The world oil prices as the exogenous variables give an effect on the movement of CSPI

Suggestion and Policy Implication

The government institution (OJK) related to fiscal and the stability of economy should form a board to monitor the movement of interest rates, inflation, currency exchanges, and CSPI movement in order to anticipate any changes to build national financial stability. Then, in relation to the dynamics of oil prices, which is an external factor influencing capital markets, OJK as the regulator should have been alert since the beginning. Considering the role of OJK that is micro prudential oriented, while the role of micro prudential is operated by Bank of Indonesia, both of the institutions significantly need a strong coordination.

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