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RISK THRESHOLD FOR SUSTAINABLE CURRENT ACCOUNT BALANCE OF PAYMENTS: AN INDONESIAN CASE

Abdul Hakim[1]
Jaka Sriyana[2+]

[1,2]*Department of Economics, Faculty of Business and Economics, Islamic University of Indonesia, Indonesia.*
[1]*Email: jakasriyana@uii.ac.id Tel: +62247881546*
[2]*Email: abdul.hakim@uii.ac.id*

(+ Corresponding author)

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ABSTRACT

The objective of this study was to model the behavior of the Current Account Balance of Payments (CAB) for Indonesia. It also calculated the conditional Value at Risk (VaR) as a measure of the risk level of the CAB. An ARDL (Autoregressive Distributed Lag) model and an EGARCH (Exponential Generalized Autoregressive Conditional Heteroskedasticity) model were used to estimate the CAB behavior for the annual data 1985-2018. The research found that exchange rates, growth of gross domestic product, inflation, total reserves, and unemployment are essential in determining the behavior and volatility of the CAB. The VaR calculated based on the conditional standard deviation that resulted from the EGARCH estimation shows that most of the time the Indonesian CAB is in safe conditions. However, the VaR has been violated by the actual CAB several times, and the violations coincide with various macroeconomic shocks. The Central Bank of Indonesia could calculate the VaR threshold using this method to evaluate the risky nature of the current account deficit. This study provides an alternative procedure to analyze and assess the current account balance risk to mitigate the impact of macroeconomic shocks.

Contribution/ Originality: This study contributes to the existing literature in the area of international economics, specifically in the issue of the current account balance of payments. The study is one of very few to have investigated the estimation of the current account risk to avoid macroeconomic instability.

1. INTRODUCTION

The current account balance of payments (CAB) is a record of a nation's transactions vis-a-vis the rest of the world. The CAB covers net trade in goods and services, net earnings on cross-border investments, and net transfer payments. The CAB records the transactions for a certain period, such as a year. The world has been witnessing widening current account deficits in emerging markets, which might have been contributing to macroeconomic instability (Makanza & Dunne, 2015; Sriyana, 2015). By conventional wisdom or the rule of thumb, a current account deficit of more than 5% of GDP is a warning that the economy is not safe (Collins, De Simone, & Hargreaves, 1999). However, we should not take this as the only signal of macroeconomic risk since some countries with a current account deficit of more than 5% of their GDP, such as South Africa, can have a sustainable current account balance. In comparison, some countries with less than 5% current account deficit, such as India, do not have a sustainable current account balance (Tastan & Aric, 2016).

Georgescu (2007) has discussed the implications of the current account deficit on country risk. He found that the current account deficit led to a higher risk for the sustainability of a country's financial position. Blanchard, Giavazzi, & Sa (2005) have modeled the relation of the current account with exchange rates and other factors, as well as what might happen in alternative future scenarios. They argued that there have been two variables that determined the US current account deficits from 1996-2005, namely an increase in US demand for foreign goods and an increase in the international market for US assets. Borio & Disyatat (2011) suspected that current account imbalances at the global level were an essential factor behind the global financial crisis. Agarwal (2013) found an influence of the current account deficit on economic growth in various developing economies. Another critical issue is the current account balance sustainability. Because long-run current account deficits might jeopardize the economy, there is growing discussion about the sustainable level of the current account deficit (Zombanakis, Stylianou, & Andreou, 2009).

Considering the importance of the deficit current account balance, it is surprising that not many studies estimate or calculate the risk level of the current account deficit. For that reason, this study modeled the thresholds for current account levels that are considered unsafe. Of the available measures in the literature, the study uses the Value at Risk (VaR). The VaR accommodates the possibility of using conditional standard deviation. We can calculate such conditional standard deviation using the GARCH (Generalized Autoregressive Heteroskedasticity) family models. However, estimating the GARCH model requires us to model the conditional mean. For this purpose, this study used a time series regression model, which considers the possibility of non-stationary series as well as the possibility of the presence of dynamic issues in such series. This study analyzes the data of Indonesia, which has suffered many crises since the 1980s.

2. RELATED LITERATURE

Many studies have modeled the behavior of the current account using various variables and methods of analysis. The current account balance is, naturally, influenced by a large number of variables, both domestic and international. Among the variables used by scholars in modeling the current account balance are savings gap, savings, budget deficit, investment, export, import, credit expansion, income, expenditure on final goods, capital accumulation, terms of trade volatility, GDP growth, oil-exporting countries, money supply, crises, reserves-to-GDP ratio, domestic credit growth, external debt, index of capital mobility, capital flows, the income of foreign consumer, excess demand of the local economy, government budget balance, net oil export balance, GDP deflator, and net foreign assets. Akbas and Lebe (2016) used the savings gap to model the current account balance. Two studies, namely Akbas and Lebe (2016) and Merza, Alawin, & Bashayreh (2012), used the budget deficit to predict the current account balance. Various studies have used savings to predict the current account, such as Borio and Disyatat (2011); Brissimis, Hondroyiannis, Papazoglou, Tsaveas, & Vasardani (2010); Calderon, Chong, & Loayza (2000); Ca'zorzi and Rubaszek (2008) and Chinn and Ito (2005). Various studies have used the other variables to explain the current account balance, such as Cavallo (2005); Chinn and Ito (2005); Danmola and Olateju (2013); Edwards (2005); Fry, Claessens, Burridge, & Blanchet (1995); Henry and Longmore (2003); Huntington (2015); Kollmann, Ratto, Roeger, Veld, & Vogel (2014); Makanza and Dunne (2015); Medina, Prat, & Thomas (2010); Merza et al. (2012) and Suresh and Gautam (2015).

Scholars have used various techniques to estimate the impact of variables on the current account, namely panel regression, GLS (generalized least squares), VAR (vector autoregression) with cointegration or impulse response, and the second-moment regression using GARCH family models. Various studies have used the panel regression model to estimate the current account balance, such as Akbas and Lebe (2016); Calderon et al. (2000); Chinn and Ito (2005); Edwards (2005) and Medina et al. (2010). Huntington (2015) used the GLS method to model the current account balance. Various papers have used the VAR with Granger causality test and impulse response model such as Chinn and Ito (2005); Fry et al. (1995); Makanza and Dunne (2015) and Suresh and Gautam (2015). The GARCH model has been used by Brissimis et al. (2010). Ca'zorzi and Rubaszek (2008) considered calculating benchmarks for current account imbalances, using the Bayesian model along with some sensitivity analysis.

Few studies use the GARCH model to model the current account, or use the result of the GARCH model to calculate VaR for the current account balance. This study tries to fill the gap by estimating an EGARCH model and using the conditional standard deviation that results from the estimate to construct the conditional VaR. An EGARCH model was chosen in view of certain advantages it has. In addition to the GARCH model of Bollerslev (1986) to estimate conditional volatility, the EGARCH model allows for the asymmetric effects between positive and negative shocks on the conditional variance (Lama, Jha, Paul, & Gurung, 2015). Nelson and Cao (1992) suggest that whereas there are non-negativity constraints on the parameters of the process in the GARCH model of Bollerslev (1986), there are no restrictions on the parameters in the EGARCH model. Such conditional VaR has been used to model different thresholds such as in measuring the public debt threshold, or by So and Yu (2006) in measuring the exchange risk threshold.

This study uses five variables to represent most variables in the literature, namely exchange rates (*ER*), inflation (*INF*), GDP growth (*GG*), total national reserve (*RESV*), and unemployment level (*UNEM*). *ER* was chosen as one of the explanatory variables for the following reasons. The depreciation of local currency makes imports more expensive and exports cheaper, thus reducing imports and increasing exports and leading to a reduction in CAB. Nedeljkovic, Varela, & Zangrandi (2015) find evidence that an appreciation of the Indonesian rupiah contributed to a decrease in the current account balance. Nedeljkovic et al. (2015) also find that the surge in commodity prices had a strong and positive contribution over 2005-2011 in Indonesia, signaling that inflation is a variable that explains the behavior of CAB. The increase in commodity prices between 2005 and 2007 added 67% of GDP to the current account balance during the period. This study uses GDP growth because robust economic growth, which is faster than that of Indonesia's main trading partners, has increased imports and decreased exports, resulting in an increase in the current account deficit (Nedeljkovic et al., 2015). This study also uses the total national reserve as one of the independent variables because one of the reasons for a Central Bank to hold foreign reserves is to keep the local currency cheaper than foreign currency. By doing this, the Central Bank can make exports exceed imports; therefore, it will influence the CAB. Keeping foreign reserves is also crucial in maintaining foreign exchange stability, which makes the CAB manageable (Archer & Halliday, 1998). The unemployment level might also influence the CAB. Muharremi (2015) found that unemployment, along with the devaluation of the local currency, can stimulate domestic production, which can lead to an improvement in the trade balance.

3. METHODOLOGY

The study started the analysis by testing the stationarity of the variables in search of the appropriate model. If all variables were $I(0)$, a long-run model would be estimated. If all variables were $I(1)$ and if there was evidence of cointegration, the study would estimate an ECM (error correction model). If, however, all variables were $I(1)$ but there was no evidence of cointegration, the study would estimate a short-run model. If some variables were $I(0)$ and some others were $I(1)$, an ARDL model would be estimated. Also, if there was evidence of cointegration based on a bounds test, the study would estimate a conditional ECM.

This study also evaluated whether the current account deficit is sustainable for the economy by modeling the maximum deficit that brings the tolerable risk, namely the Value at Risk. Such a technique has been used by various scholars such as Satchkov (2010) to model financial risk in financial institutions and by Nocetti (2006) to measure the performance of a Central Bank. This study calculated the conditional VaR in which the standard deviation is modeled using second-moment regression from the GARCH model. VaR at a level α for a random variable y_t is the corresponding empirical quantile at $(1-\alpha)$. Because quantiles are direct functions of the variance in parametric models, GARCH-class models immediately translate into conditional VaR models. For random variable y_t, the conditional variance follows univariate GARCH specification (Equation 1),

$$y_t = E(y_t | F_{t-1}) + \varepsilon_t \quad (1)$$

$$\varepsilon_t = \eta_t \sqrt{h_t} \quad (2)$$

$$h_{it} = \omega_i + \sum_{l=1}^{r} \alpha_i \varepsilon_{i,t-l}^2 \sum_{l=1}^{s} \beta_i h_{i,t-l} \ . \quad (3)$$

The VaR threshold for y_t can be calculated as expressed in Equation 4:

$$VaR_t = E(y_t | F_{t-1}) - z\sqrt{h_t} \quad (4)$$

where z is the critical value from the distribution of ε_t to obtain the appropriate confidence level; The error term (ε_t), the residual of y_t is equal to $\eta_t \sqrt{h_t}$ (Equation 2); η_t is the standardized residual; F_t is the information that available at time *t*; h_t is the conditional variance. Alternatively, h_t can be replaced by estimates of various GARCH family models to obtain an appropriate VaR (Equation 3).

Since the introduction of Engle's (1982) Autoregressive Conditional Heteroskedasticity (ARCH) and Bollerslev's (1986) Generalized ARCH (GARCH) models, a plethora of models have been proposed to investigate conditional variance (or volatility). Volatility modeling is an important topic, especially in finance and financial modeling, where volatility is used as a proxy of risk. Among the bulk varieties of univariate GARCH models, this study considers an EGARCH (Exponential GARCH) model by Nelson (1991). The univariate EGARCH model of Nelson (1991) is expressed in Equation 5:

$$\ln(h_t^2) = \omega + \beta \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}^2}} + \gamma \ln(h_{t-1}^2) + \xi_t \quad (5)$$

Where $\eta_t \sim iid(0,1)$, F_t are information available at time *t*. This model also considers the possible presence of the asymmetric effect of a negative shock compared to the positive ones. Various studies have used this model, such as Alberg, Shalit, & Yosef (2008) in estimating asymmetric stock price volatility and by Hansen and Huang (2012) in modeling realized measures of volatility.

4. RESULTS AND INTERPRETATION

As discussed, this study modeled the behavior of CAB (current account balance of payment) using a time series econometric model. The independent variables were *ER* (exchange rates), *INF* (inflation), *GG* (GDP growth), *RESV* (total reserve), and *UNEM* (unemployment). The data are taken from KNOEMA, World Data Atlas, accessible from https://knoema.com/atlas. The CAB is in USD billion, the *ER* is in terms of Indonesian rupiah (IDR)/USD, *both INF* and *GG* are in percentages, *RESV* is in USD, and *UNEM* is in percentage of the total labor force. Figure 1 depicts the series. We can conclude that some series show a positive trend, which is a sign that they are not stationary, while the others show a horizontal path, which is a sign that they are stationary. It seems that the series is a mixture of both *I*(0) and *I*(1) series. Therefore, the possible model to be used is the ARDL model. However, we need to test the stationarity nature by formal unit root tests.

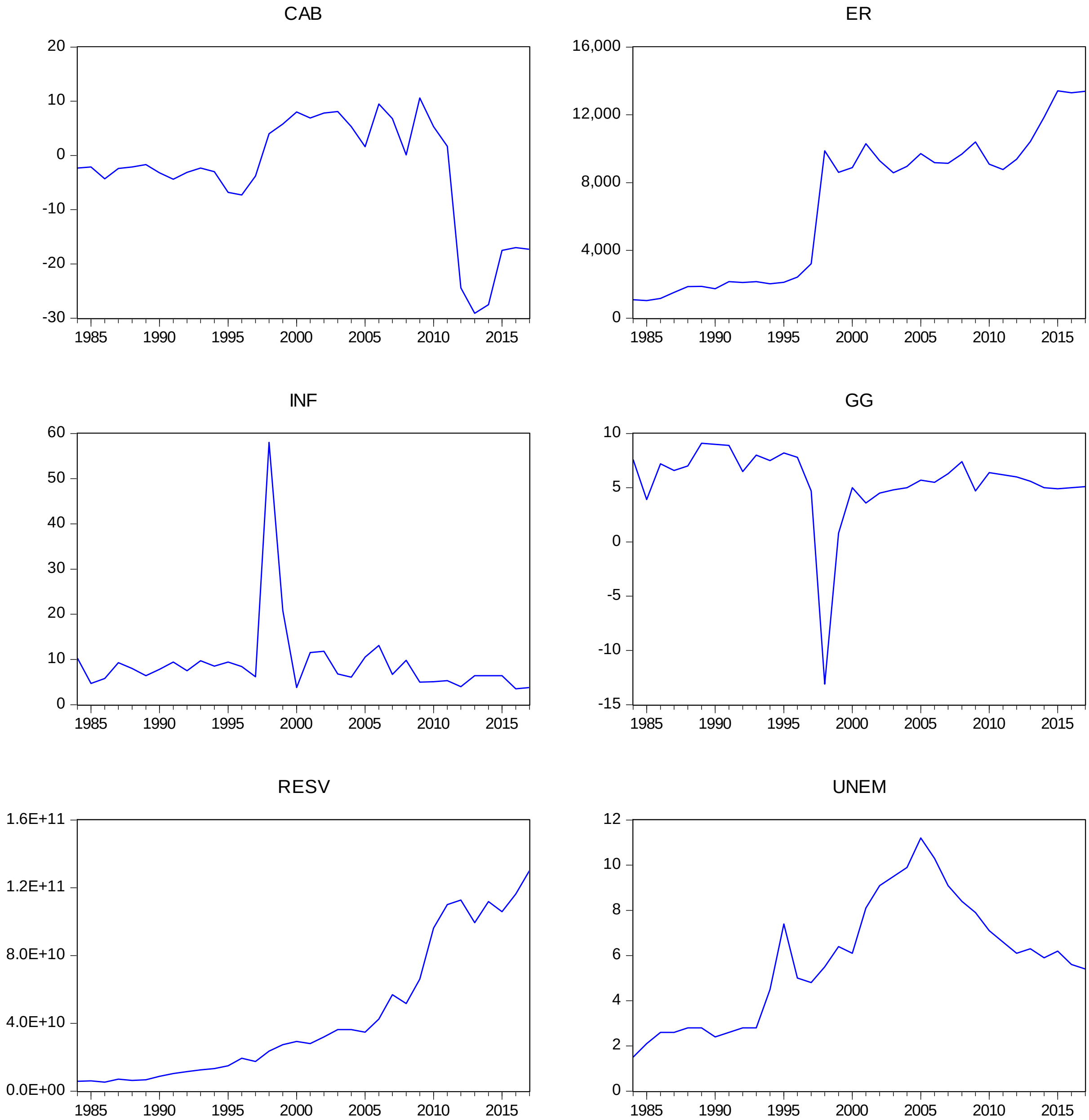


Figure-1. Graphs of the variables in the model

Before considering the unit root test, it is worthwhile looking at the statistics of the series in Table 1. It shows that the mean of CAB is -2.99, which means that most of the time Indonesia experiences a current account deficit. The maximum is 10.6, which shows the strong position of the current account balance. However, the minimum is -29.1 — a substantial current account deficit that might threaten the whole economy. The exchange rates experience high growth; the minimum is 1,038.4, and the maximum is 13,405.4. Based on Figure 1, inflation and GDP growth were steady during the period except in 1997 due to the Asian financial crises. The total reserves show sustained and robust growth, while unemployment shows positive growth even though it decreases at the end of the period (from the year 2005 onward).

Table-1. Statistics of variables in the model

Statistical Indicators	CAB	ER	GG	INF	RESV	UNEM
Mean	-2.944	6726.3	5.482	9.30	4.39E+10	5.81
Median	-2.200	8830.7	5.850	7.15	2.87E+10	6.00
Maximum	10.60000	13405.4	9.100	58.00	1.30E+11	11.20
Minimum	-29.100	1038.4	-13.100	3.50	5.26E+09	1.50
Std. Dev.	10.45215	4297.6	3.716	9.24	4.06E+10	2.69
Skewness	-1.051	-0.1	-3.786	4.53	0.893229	0.16
Kurtosis	3.420412	1.5	19.710	24.23	2.279105	2.02
Jarque-Bera	6.506086	3.5	476.786	754.53	5.257419	1.50
Probability	0.038656	0.2	0.000	0.00	0.072172	0.47

Table 2 presents the result of the stationarity test. It shows that two variables are $I(0)$, namely *GG* and *INF*, while the rest are $I(1)$. Regarding this condition, the appropriate estimation model would be the ARDL (autoregressive distributed lag) model. Using the Hannan-Quinn model selection criteria, with the maximum lag included of three (due to the limited number of observations), the chosen model is ARDL (1,3,0,3,2,3). Table 3 reports the results of ARDL estimation.

Table-2. Stationarity test result summary ($\alpha = 5\%$)

Variable Code	In-level			In first difference			Stationarity
	t-stat	*t*-crit	Result	*t*-stat	*t*-crit	Result	
CAB	-1.406	-2.954	NS	-4.896	-2.957	S	$I(1)$
ER	-0.679	-2.954	NS	-5.970	-2.957	S	$I(1)$
GG	-3.904	-2.954	S	-	-	-	$I(0)$
INF	-4.641	-2.954	S	-	-	-	$I(0)$
RESV	1.265	-2.954	NS	-4.666	-2.957	S	$I(1)$
UNEM	-1.690	-2.954	NS	-5.013	-2.957	S	$I(1)$

Note: *t*-stat = *t*-statistic; *t*-crit = *t*-critical; S = Stationary; NS = Non-stationary.

Table-3. ARDL estimation result

Variable	Coefficient	t-Statistic	Prob.
CAB(-1)	-0.085	-0.427	0.676
ER	0.000	0.129	0.899
ER(-1)	0.000	0.127	0.901
ER(-2)	0.004	2.971	0.011**
ER(-3)	-0.003	-2.227	0.044**
GG	-1.558	-2.813	0.015**
INF	-0.753	-2.958	0.011**
INF(-1)	-0.017	-0.109	0.915
INF(-2)	-0.456	-2.553	0.024**
INF(-3)	0.266	2.541	0.025**
RESV	0.000	0.553	0.590
RESV(-1)	0.000	-0.014	0.989
RESV(-2)	0.000	-4.236	0.001**
UNEM	-0.156	-0.237	0.816
UNEM(-1)	0.508	0.588	0.567
UNEM(-2)	-2.408	-2.214	0.045**
UNEM(-3)	3.867	4.015	0.002**
C	13.609	2.103	0.056
R-squared	0.976	F-statistic	30.760
Adjusted R-squared	0.944	Prob(F-statistic)	0.000

Note: *** and ** indicate significant at 1% and 5% level respectively.

A bounds test was conducted to find evidence of cointegration in the variables. Table 4 presents the results. The table shows that the F-statistic (6.069) is higher than the *I*1 bound, even at a 1% significance level (4.68). Therefore, we can reject the null hypothesis that there is no cointegration in the model.

Table-4. Cointegration test (bounds test)

ARDL bounds test. Null Hypothesis: No long-run relationships exist		
Test statistic	Value	*k*
F-statistic	6.069***	5
Critical value bounds		
Significance	I0 bound	I1 bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Note: *** indicates significant at 1% level.

After providing the evidence of cointegration, we estimated the conditional error correction model. Table 5 reports the result. This table has two parts, of which the top part presents the error correction term (ECT), namely CointEq(-1). The probability that the ECT is zero suggests that there is a bound between the long-run and short-run equations. The sign of the ECT is negative, showing that the disequilibrium in the short run converges into the long-run equilibrium. The short-run estimation suggests that all variables significantly influence the dependent variable at some lags. Even though *DREVS* does not significantly influence *DCAB*, *DREVS*(-1) does. Even though *DUNEM* does not significantly influence *DCAB*, *DUNEM*(-1) does.

The table also shows the long-run estimation result, reported in the bottom part. We can see that all variables in the long run significantly influence the dependent variable, even though *INF* is significant at an 8% significance level. We can conclude that the model can capture the behavior of the CAB quite well.

Table-5. ARDL cointegrating and the long-run form estimation result

Cointegrating form			
Variable	**Coefficient**	***t*-Statistic**	**Prob.**
D(ER)	0.0002	0.129	0.899
D(ER(-1))	-0.0043	-2.971	0.011**
D(ER(-2))	0.0034	2.227	0.044**
D(GG)	-1.5584	-2.813	0.015**
D(INF)	-0.7527	-2.958	0.011**
D(INF)	0.4559	2.553	0.024**
D(INF)	-0.2663	-2.541	0.025**
D(RESV)	0.0000	0.553	0.560
D(RESV(-1))	0.0000	4.236	0.001**
D(UNEM)	-0.1564	-0.237	0.816
D(UNEM(-1))	2.4082	2.214	0.045**
D(UNEM(-2))	-3.8672	-4.015	0.002**
CointEq(-1)	-1.0851	-5.452	0.000***
Cointeq = *CAB* - (0.001*ER -1.436*GG -0.884*INF -0.000*RESV + 1.670*UNEM + 12.542)			
Long-run coefficient			
Variable	Coefficient	t-Statistic	Prob.
ER	0.001	1.939	0.075*
GG	-1.436	-2.955	0.011**
INF	-0.884	-1.947	0.073*
RESV	-0.000	-7.254	0.000***
UNEM	1.670	2.793	0.015**
C	12.542	1.941	0.074*

Note: *** and ** indicate significant at 1% and 5% level respectively.

After estimating the conditional ECM, the study proceeded to the estimation of the second-moment regression model to examine current account balance volatility. The result of the second-moment regression was then used to calculate the VaR (Value at Risk) of the CAB. Table 6 presents the result of the second-moment regression estimation. This study also accommodates the possible influence of an autoregressive term by including *CAB*(-1) into the equation.

Table-6. EGARCH estimation result

Variable	Coefficient	t-Statistic	Prob.
C	2.552	2.406	0.016
CAB(-1)	0.698	13.752	0.000
ER	0.001	239.673	0.000
GG	-0.417	-6.561	0.000
INF	-0.094	-3.239	0.001
RESV	-1.15E-10	-10.717	0.000
UNEM	-0.251	-2.060	0.040
Variance Equation			
C(8)	-0.855	-1.061	0.289
C(9)	2.992	4.162	0.000
R-squared	0.795	Adjusted R-squared	0.748

Note: Entries in bold are significant at 5% significance level.

Table 6 shows that all variables influence the dependent variable in the conditional mean equation. The result provides proof of volatility, which can be seen from the EGARCH estimation result (the variance equation), namely the coefficient of (9), which has the probability of zero. Holding the evidence of this volatility, we can proceed by calculating the VaR. Table 7 presents the calculation of the VaR. The table shows years of violations, namely years in which the actual current account deficit is greater than the threshold (both are in absolute values). These years are 1986, 2005, 2008 and 2012. Possible reasons for these violations are discussed below.

In 1986, oil prices decreased when Saudi Arabia set off a price war. As a result, oil-exporting countries, including Indonesia at that time, experienced a decline in revenue from oil exports. This event might be the source of the violation in 1986 (Arndt & Hill, 1988). The violation in 2005 might have been due to the decline in the world economy during that year, after robust expansion in 2004. The decline was due partly to large global imbalances correlated with the rising external deficit of the United States and the growing surpluses in the Asian, European, and oil-exporting economies. We should note that in 2005, Indonesia was no longer a reliable oil exporter (United Nations, 2006).

The violation in 2008 might correlate with the mortgage-backed securities crisis in the US capital market. During December 2007 and November 2008, the Indonesian rupiah saw a 16% depreciation against the US dollar. Typically, such a phenomenon would improve export competitiveness. However, Indonesia did not experience such an advantage due to the declining global demand for East Asian export products, including Indonesian export products (Shirai, 2009).

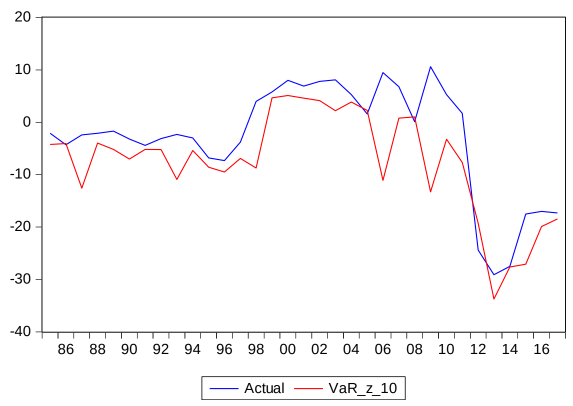
The violation in 2012 might have been due to the drop in the prices of Indonesia's export commodities. Also, from 2009 to 2014, Indonesia experienced robust growth in its GDP, which was higher than that of its trading partners. These worsened the Indonesian current account balance by almost three quarters (Nedeljkovic et al., 2015).

Figure 2 depicts the series of actual current account balance and the corresponding VaR assuming normal and *t* distribution using 5% and 10% significance levels.

Table-7. Calculation of VaR threshold

Obs	Actual	Fitted	Residual	GARCH	SD	VaR_z_05	VaR_z_10	VaR_t_05	VaR_t_10
1985	-2.1	-1.466	-0.634	4.628	2.151	-5.016	-4.241	-5.153	-4.304
1986	-4.3	-2.747	-1.553	1.027	1.013	-4.419	**-4.055**	-4.484	**-4.084**
1987	-2.4	-4.262	1.862	41.644	6.453	-14.910	-12.587	-15.323	-12.774
1988	-2.1	-2.665	0.565	1.008	1.004	-4.322	-3.961	-4.386	-3.990
1989	-1.7	-3.213	1.513	2.291	1.514	-5.711	-5.166	-5.807	-5.210
1990	-3.2	-3.263	0.063	8.465	2.909	-8.064	-7.017	-8.250	-7.101
1991	-4.4	-4.315	-0.085	0.454	0.674	-5.427	-5.184	-5.470	-5.204
1992	-3.1	-4.196	1.096	0.620	0.787	-5.495	-5.212	-5.545	-5.234
1993	-2.3	-4.186	1.886	27.327	5.228	-12.811	-10.929	-13.146	-11.081
1994	-3	-3.938	0.938	1.251	1.119	-5.783	-5.381	-5.855	-5.413
1995	-6.8	-5.641	-1.159	5.224	2.286	-9.413	-8.590	-9.559	-8.656
1996	-7.3	-7.692	0.392	1.937	1.392	-9.988	-9.487	-10.077	-9.527
1997	-3.8	-5.612	1.812	0.987	0.993	-7.251	-6.893	-7.314	-6.922
1998	4	4.146	-0.146	99.735	9.987	-12.332	-8.737	-12.971	-9.027
1999	5.8	5.522	0.278	0.444	0.666	4.422	4.662	4.379	4.643
2000	8	6.674	1.326	1.483	1.218	4.665	5.103	4.587	5.068
2001	6.9	8.900	-2.000	11.057	3.325	3.413	4.610	3.200	4.514
2002	7.8	6.193	1.607	2.571	1.603	3.547	4.124	3.444	4.078
2003	8.1	5.975	2.125	8.536	2.922	1.154	2.206	0.967	2.121
2004	5.3	6.372	-1.072	3.747	1.936	3.178	3.875	3.055	3.819
2005	1.6	4.206	-2.606	2.231	1.494	**1.741**	**2.279**	**1.646**	**2.236**
2006	9.5	0.331	9.169	78.641	8.868	-14.301	-11.108	-14.868	-11.365
2007	6.8	4.732	2.068	9.376	3.062	-0.321	0.782	-0.517	0.693
2008	0.1	3.339	-3.239	3.209	1.791	**0.383**	**1.028**	**0.268**	**0.976**
2009	10.6	-0.712	11.312	95.047	9.749	-16.798	-13.288	-17.422	-13.571
2010	5.3	1.542	3.758	13.686	3.699	-4.562	-3.230	-4.799	-3.338
2011	1.7	-3.828	5.528	8.884	2.981	-8.746	-7.673	-8.936	-7.759
2012	-24.4	-5.816	-18.584	109.222	10.451	**-23.060**	**-19.297**	**-23.728**	**-19.600**
2013	-29.1	-21.732	-7.368	86.940	9.324	-37.117	-33.760	-37.713	-34.030
2014	-27.5	-24.894	-2.606	4.523	2.127	-28.404	-27.638	-28.540	-27.700
2015	-17.5	-21.841	4.341	16.616	4.076	-28.567	-27.100	-28.828	-27.218
2016	-17	-15.769	-1.231	10.291	3.208	-21.063	-19.908	-21.268	-20.001
2017	-17.3	-16.966	-0.334	1.340	1.158	-18.876	-18.460	-18.950	-18.493

Note: Entries in **bold** show that there are violations towards the VaR (the threshold).



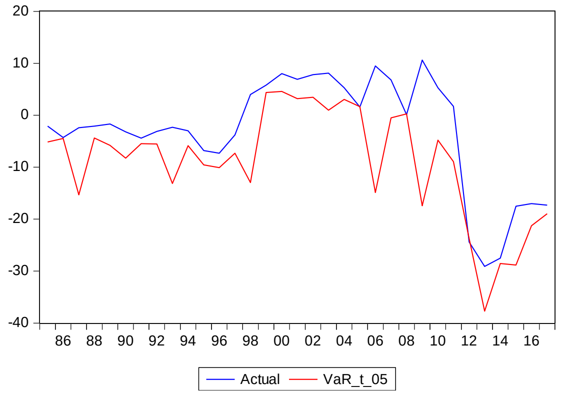


Figure-2. The actual and VaR of CAB

Note: (1) Graphs with *z* and *t* assume normal and *t* distributions, respectively. (2) Graph with 05 or 10 symbols assumes 5% and 10% significance levels, respectively.

5. CONCLUSION

The current account balance of payments of Indonesia was analyzed using an ARDL model. It was found that all variables included in the model, namely exchange rates (*ER*), growth of gross domestic product (*GG*), inflation (*INF*), total reserve (*RESV*), and unemployment (*UNEM*) are essential in determining the behavior of the CAB. This study also estimated an EGARCH model and found evidence of volatility in the current account, which makes it possible to calculate the conditional VaR. The calculated conditional VaR effectively provides the threshold for the risky states in the current account deficit. The VaR also successfully captures the violations of the VaR. Comparing the violations with actual economic situations reveals that the violations truly have some relationship to the state of the world economy.

We can infer that calculating such a threshold is essential in evaluating the risk of the current account deficit. With more extended series, it will be possible to conduct the forecast of the threshold as well as testing the forecast. Unfortunately, such data are rarely available in developing countries such as Indonesia. As time goes by, the data will be available, and more studies will conduct such forecasts.

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