CAN THE CREDIBLE FISCAL POLICY EXPLAIN THE TRADE FLUCTUATION?

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Abstract

This paper examines the links between fiscal policy and terms-of-trade movement in the case of Indonesia over the period 2001-13. Unlike other researchers, this paper explores both the rules-based and discretionary fiscal policies. The former covers deficit rule and debt rule which are intended to measure the fiscal policy credibility. The later extracts residuals generated by fiscal reaction function following Fatás and Mihov (2003; 2006). The OLS estimation of quarterly data reveals that the less credible deficit rule policy and discretionary fiscal policy have a positive impact on the terms of trade. In contrast, the more reliable debt rule policy and government size tend to depreciate the terms of trade. These findings suggest that fiscal policy credibility matters in the context of international market. Furthermore, to mitigate the external risks, the government intervention to the international market debt should not be restricted.

Abstrak

Tulisan ini mengkaji kaitan antara kebijakan fiskal dan pergerakan ketentuan-perdagangan dalam kasus Indonesia selama periode 2001-13. Tidak seperti penelitian lain, makalah ini mengeksplorasi baik kebijakan fiskal berbasis aturan maupun kebijakan fiskal diskresioner. Yang pertama mencakup aturan defisit dan aturan utang yang dimaksudkan untuk mengukur kredibilitas kebijakan fiskal. Yang kedua mengekstrak residu yang dihasilkan oleh fungsi reaksi fiskal Fatás dan Mihov (2003; 2006). Estimasi OLS data kuartalan mengungkapkan bahwa kebijakan aturan defisit kurang kredibel dan kebijakan fiskal diskresioner memiliki dampak positif pada ketentuan-perdagangan. Sebaliknya, kebijakan aturan hutang yang lebih andal dan ukuran pemerintah cenderung mendepresiasi *term-of-trade*. Temuan-temuan ini menunjukkan bahwa kredibilitas kebijakan fiskal penting dalam konteks pasar internasional. Selanjutnya, untuk memitigasi risiko eksternal, intervensi pemerintah terhadap utang pasar internasional tidak boleh dibatasi.

1. INTRODUCTION

The term of trade is one of the most critical elative prices in the open macroeconomic framework. The ratio of prices of export to prices of import defines the net barter terms of trade, which measures the number of units of exports that can be exchanged for a unit of imports.Therefore, it is widely believed that the terms of trade is a key determinant of macroeconomic performance. Even, the terms of trade has an important impact on the real national income (Cashin and Pattillo, 2000).

The fluctuation of terms of trade in the last ten years has been attracting a considerable degree of attention. Various attempts have been undertaken to explain the behavior of the terms of trade as well as to assess the macroeconomic consequences of terms of trade shocks. In fact, the terms of trade fluctuations are twice as large in developing countries as in developed countries (Baxter and Kouparitsas, 2000). In addition, commodity price changes have also been asymmetric often with long troughs and sharp peaks, making it difficult to insulate the domestic economy from such shocks (Cashin et al., 2002).

The sharp change in terms of trade has prompted governments in developing countries to intervene in the economy in various ways (see: Ezema, 2012; among others) including an increase in government spending to compensate for increasing risk caused by possible international market turbulence (Rodrik, 1998). In this connection, the government sector is seen as a safe sector regardingemployment and income thereby making it easier to isolate its function over external risk by increasing its impact on the entire economy.

In contrast, in some countries, the public expenditure has not changed to mitigate the effect of increased income risks associated with greater openness (Islam, 2004). The fiscal surpluses observed during the commodity booms in 2003, for example, are far from reassuring since are based on inflated and unsustainable fiscal revenues due to transitory increases in the price of commodities leaving no funds for a rainy day (Kaminsky, 2010). When government revenues are estimated at the 'long-run' prices of commodities, the average fiscal position has deteriorated with deficits averaging 4 percent of GDP (IADB, 2008).

In the wake of the recent global financial crisis in the late 2007 along with the spike of world oil prices in March 2008, the macroeconomic stabilization in various countries has increasingly relied on fiscal policies (Christiano et al., 2011). Hence, the economic impacts have once again become the subject of extensive theoretical and empirical research. In one hand, some researchers advocate discretionary fiscal policy in the forms of fiscal stimuli to combat the economic fluctuations resulting in persistent deficits and pro-cyclical policies, rising debt levels, and, over time, a loss in policy credibility (Kumar and Ter-Minassian, 2007).

On the other hand, many scholars suggest implementing fiscal rules to address the excessive budget deficit. The fiscal rules are as formalized numerical restrictions on the relevant aggregate fiscal variables, such as revenue, expenditure, deficit, anddebt. All these rules share at least one feature in common: they seek to confer credibility to the conduct of macroeconomic policies by removing discretionary intervention (Kopits, 2001). Ultimately, fiscal rules are mechanisms to support fiscal credibility, sustainability, and counter-cyclical fiscal policies (Gutierrez, 2012).

The concurrence of the sharp instability in terms of trade raises the question as to the nature (permanent or temporary) of the relationship between the terms of trade with the government expenditures. In fact, emerging countries government policy tends to amplify business cycle fluctuations whereas in developed countries public policy tends to mitigate aggregate instability. Our question in mind is whether the credible fiscal policy in developing countries can also contribute to mitigate the terms of trade fluctuations.

Indonesia provides a unique opportunity to assess the nature of fiscal policy in the context of the international setting. She is encountering several challenges as she is moving towards the globalization and

trade liberalization era. Hence, the consequences of fiscal expansion would best be studied in an open-economy framework. Such a framework allows us to explore the effects of fiscal policy changes on the terms of trade. Due to that, government intervention is essential in ensuring that the economy is resilience against the severe implications interms of trade movement primarily bythe implementation of ASEAN Economic Community in 2015.

Moreover, according to the Law No. 17/2003, since 2004 Indonesia has been adopting a fiscal rule based on maximum deficits and debt replacing the balance budget rule which had been implemented for the first time in 1967. Along with the evolution of public finance reformations which is currently taking place continually in that country, the fiscal rules commitment hopefully can systematically explain the external imbalances reduction. Therefore, this study aims at exploring the possible link connecting the credible fiscal policy to the terms of trade movement. To our best knowledge, this approach has not been used in the previous literature.

2. LITERATURE REVIEW

Terms of trade, economic openness, and government expenditure (broadly speaking: fiscal policy) are inter-connected. Theoretically, the terms of trade fluctuation existdue to the economic openness. The economic openness of a country is simply presented by the size of goods exported and imported. Since the terms of trade are the ratio of the prices of export to the prices of import, the higher trade openness leads to the higher fluctuation of the terms of trade.

Furthermore, since developing counties export primary commodities and import manufactured goods, the terms of trade tend to decrease due to a low elasticity of substitution between domestic and foreign goods as hypothesized by Prebish-Singer (1950). Empirically, Lutz and Singer (1994) and Easterly and Kraay (2000) found a strong correlation between terms of trade depreciation and trade openness.

In relation to fiscal policy, trade openness is recognized as one of the prime determinants of the magnitude of fiscal multipliers (see for example: Spilimbergo et al., 2009). Indeed, greater openness to international trade is generally predicted to reduce the effectiveness of the domestic fiscal policy. This is obviously true in the standard Keynesian or Mundell-Fleming models in which government spending has maximum potency when the economy is relatively closed and its effects are largely contained in the domestic economy (see for instant: Karras, 2014).

However, some empirical evidences show that openness to trade is positively associated with larger governments. This pattern was first unveiled by Cameron (1978) for 18 OECD countries and extended to a much broader sample in a seminal paper by Rodrik (1998). Also, Epifani and Gancia (2009) pointed out that in an open economy, the costs of taxation can be exported if changes in public spending influence the terms of trade. As a result, international trade and public sectors have grown together and a majority of countries that opened their markets have experienced significant increases in public expenditure.

In a different point of view, Alesina and Wacziarg (1998) argued that for whom public compensation against risk, as proposed by Rodrik (1998), does not explain the relationshipbetween trade openness and public expenditure. They posit the absence of a link between openness and public sector size if country size is taken into consideration. Their argument is that to take advantage of specialization, small countries need to open themselves to international markets more so than larger countries, and as they are unable to exploit scale economies in the provision of public goods, require a relatively higher public expenditure.

While the relationship between trade openness and government size tends to achieve convergence, the relationship between terms of trade and government expenditure seems to be inconclusive. Macroeconomic literature has found puzzling effects of government spending on the terms of trade. As a result, there is no consensus even on the direction of the response. Those disagreements are associated with methodological differences in terms of the basic assumption underlying estimation strategy as well as the ultimate goal of the analysis. It seems that the root of the problem probably is a different starting point of view.

Therefore, to analyze the impact of government spending, it is necessary to understand its own characteristics. According to Ahmed (1986), it is important to distinguish whether government expenditure is permanent or temporary. In the large open-economy inter-temporal framework, Ricardian equivalence theorem predicts that the temporary government spending has a larger effect on the trade deficit than the permanent ones. Investigating the relationship between government spending, the balance of trade, and the terms of trade using early British data, Ahmed (1987) provided some support for these hypotheses.

Basically, Ahmed (1986; 1987) supports to the conclusion that fiscal policy depreciates the terms of trade. His finding is in line with Ghosh (1992) that a rise of government expenditure on the foreign goods deteriorates the home country's terms of trade but improves its net foreign asset position. Whether a reduction in equity taxes improves or deteriorates the external balance depends upon the magnitude of a fiscal transmission effect. Macklem (1993) pointed out that fiscal policy can be used to dampen the short-run effects of the terms of trade shocks on consumption (implicitly saving) as the fiscal transmission mechanism as proposed by Ghosh.

While Ghosh (1992) looks at the external factor and Macklem (1993) focuses on the internal one, Pene (1997) further extends the analysis by incorporating government debt and deficit to finance the government spending. Taking the case of Cameroon, she found that the business fluctuation in that country can be explained mainly by the terms of trade deteriorations. Her results of dynamic simulation indicate that the fiscal policy is misleading; i.e.,fiscal policy that is aimed at reducing government debt and budget deficits can dampen the negative effects of terms of trade deterioration.

Reducing government debt and budget deficit can be substituted by increasing taxes. Bianconi (2003) presents a two-country dynamic perfect foresight Ricardian model with wealth effects to study the relationship between government spending financed by alternative taxation, the terms of trade, and welfare. An increase in domestic government spending financed by a distortionary capital income tax leads the real exchange rate initially to appreciate. But along the transitional path an inter-temporal terms of trade effect operates, the real exchange rate depreciates to a steady state value ultimately higher relative to the initial equilibrium.

With regard to the persistent shocks characteristics of government spending, Corsetti and Müller (2006; 2007) consider their impact in a multi-sector, multi-country model in a single country. Since government spending is mainly directed at domestically-produced goods, a positive fiscal shock drives up domestic prices and improves the terms of trade. Similarly, Monacelli and Perotti (2008) demonstrate that an increase in government spending produces an increase in both the manufacturing and the services sector resulting inthe terms of trade appreciate. Müller (2008) documented that an increase in government spending significantly depreciates the nominal exchange rate and appreciates the terms of trade.

Employing more sophisticated econometric devices, Hatemi and Irandoust (2012) investigated the long-run relationship between real government expenditure and the volatility of the terms of trade in multiple countries; the US, Canada, Japan, and Australia covering the period 1960-2008. They found asymmetric co-integration between the two variables suggesting that the size of the public sector might play a risk-reducing role in economies with significant amounts of external risk. In particular, public expenditure is considered to be an important fiscal policy instrument when the terms of trade volatility arehigh.

The different impact of government expenditure on the terms of trade can also be associated with its category. Baldi (2013) offers an intuitive explanation for these divergent results by distinguishing between productive and unproductive government spending. He showed within a calibrated two-sector DSGE model that the two categories of government spending have different effects on private consumption, the real exchange rate, and the terms of trade. Hence, his findings suggest that the composition of government spending matters not only for long-run growth, but also impacts on the short-run.

Those studies above do not consider credibility aspects of fiscal policy to address the terms of trade shocks. In principle, the credible fiscal policy helps private agents to learn the systematic behavior of the fiscal authorities and to reduce the negative effects of prices shocks. Medina and Soto (2014) analyzed how lack of credibility and transparency undermines the effectiveness of macroeconomic policies. They show that the

responses of output, aggregate demand, and inflation to an increase in commodity price are magnified when these policy rules are imperfectly credible and lack transparency. Also, their results indicate that having an explicit fiscal rule and an inflation targeting regime contribute isolatingthe economy in terms of trade fluctuations.

In the case of Indonesia, the related study regarding this issue is limited. Based on the ARDL approach, Kueh et al. (2009) estimated the trade openness and government expenditure nexus in four South East Asian countries including Indonesia. They indicate that there is an existence of a significant positive long-run linkage between trade openness and government expenditure of all the ASEAN-4 countries. This means that government intervention in an open economy is crucial as to cushion the risks associated with trade liberalization.

Other previous studies have been characterized by the inward-oriented types. They focused on the impact of fiscal policy partially on the inflation rate (Snyder, 1985; Kuncoro, 2015), exchange rate (Abimanyu, 1998), and interest rates (Adiningsih, 2009). Recently, Simorangkir and Adamanti (2010) analyzed the economic impact of fiscal stimulus, Basri and Rahardja (2011) assessed the fiscal position, and Surjaningsih et al. (2012) observed output and prices volatility in accordance with the global financial crisis. In fact, there are no studies dealing with the relative prices.

This paper contributes to the literature in two ways. First, it reassessesthe impact of fiscal policy on relative prices instead of single price. More specifically, we focus on the terms of trade fluctuations. According to Doraisami (2013), Indonesia seemingly needs to be cognizant of specific structural and institutional features when employing fiscal policy as an economic stabilization tool. Therefore, second, we expand fiscal policy in term of its credibility. This is because the fiscal policy credibility has been widely mentioned as one of the most important fundamentals of macroeconomic policy (Kuncoro, 2015).

3. RESEARCH METHODOLOGY

To avoid various problems regarding fiscal policy credibility, in this paper, we assume that budgetary projections have to be regarded as the announcements of a political target. Analogously to Annett (2006) and Pina and Venes (2011), the credibility of fiscal policy (Et) is measured as the difference between its actual budget balance in year t (At), and its most recent target for the budget balance for year t in t-1 (Pt), or thus:

$$Et = At - Pt \qquad (1)$$

Positive values of Et mean a better-than-projected policy execution, yielding a higher surplus or a lower deficit. Negative values indicate that governments achieved results that were worse than projected or that forecasts were optimistic, that is, underestimations of the deficit or overestimations of the surplus.

In the similar way, we might construct the credibility of fiscal policy index (CI) as follows:

$$CI = \frac{At}{Pt} \qquad (2)$$

Based on this formula, the accuracy of fiscal policy is indicated by a score of 1. If the budget realization were less than what has been targeted before, the credibility index would be indicated less than 1. Meanwhile, if the budget realization exceeds the projected figures, the index will be more than 1.

We will use both the two measures in the context of deficit and debt rule policy credibility. Furthermore, budget deficit (Def) is the difference between government revenue (Rev) and government expenditure (Exp). This applies for the actual (subscript A) and the planned (subscript P) budgets:

$$Def_A = Rev_A - Exp_A \qquad (3)$$

$$Def_P = Rev_P - Exp_P \qquad (4)$$

Refer to (1), the deficit rule policy is said to be credible if there is a little difference between the actual and the projected fiscal measures (Naert, 2011; Naert and Goeminne, 2011). Hence, we define Z1 as the ratio of the actual deficit to the planned deficit which represents the deficit rule policy credibility.

$$Z1 = DefA \div DefP \qquad (5)$$

As (2), the accuracy of deficit rule policy is indicated by a score of 1. If the deficit budget realization in the current period is less than what has been targeted before, the budget deficit credibility index would be indicated less than 1. Meanwhile, if the budget deficit realization exceeds the projected figures, the index will be more than 1.

The above methods merely based on the planned budget which is typically predetermined in the previous year. In the case of Indonesia as explained by Blöndal et al. (2009), in fact, there are many adjustments in the current period. To accommodate them, we estimate the actual budget using the key macroeconomic variable (i.e.GDP). In this case, we may construct a regression model linking the two variables.

Regarding the government expenditure (G), fiscal policy is a possible automatic stabilizer. The most important fiscal policy lever in the hands of the Indonesian government is government consumption. It would be worthwhile to see how a change in government consumption impacts the final output in the economy in general and the terms of trade in particular. Following methodology used by Akitoby et al. (2006), we suppose there is a steady-state (or long-run path) relationship between actual budget and GDP variable given by:

$$G_t = C \, GDP_t \delta \qquad (6)$$

Equation (6) can also be written in the logarithmic linear form:

$$Log \, G_t = Log \, C + \delta \, Log \, GDP_t + \mu_t \qquad (7)$$

Transforming into first-difference, (7) becomes:

$$\Delta Log \, G_t = \delta \Delta Log \, GDP_t + v_t; \qquad v_t = \Delta \mu_t \qquad (8)$$

where C and z are the parameter to be estimated. μ_t and v_t are independent and identically distributed disturbance terms with mean 0 and variance $\sigma 2$. They also represent the forecasting error given available information of GDP in period t.

Furthermore, according to Fatás and Mihov (2003; 2006), the term of v_t in equation (8) above is a quantitative estimate of the discretionary policy shock in government spending. We also extract the unsystematic component of government expenditure as a measure to identify the power of discretionary fiscal policy.

$$Z2 = v_t \qquad (9)$$

The similar idea is applied to debt because debt is a legacy of past deficits. Unfortunately, neither flow nor stock of the planned debt for each year in Indonesia is unavailable. Hence, we estimate the projected total debt level using (7).

$$(Log \, Debt)GDP_t = Log \, K + \delta \, Log \, GDP_t + \upsilon_t \qquad (10)$$

where K is a constant parameter. The ratio between the fitted value and the actual one (Z3GDP) presents the debt rule credibility:

$$Z3GDP = (Log \, Debt)At \div (Log \, Debt)GDP_t \qquad (11)$$

In cases where δ is different from unity, there is no steady-state relationship between fiscal variable and output. According to Aizenman and Marion (1993), therefore, the unexpected effect of fiscal policy can be calculated by fitting a first-order autoregressive process (subscript AR) and ρ is best estimated by omitting the output variable such that:

$$(\text{Log Debt})AR_t = \text{Log } A + \rho \text{ Log Debt}_{t-1} + \varepsilon_t \tag{12}$$

whereA is a constant parameter. The ratio between the fitted value and the actual one (Z3AR) presents the debt rule credibility:

$$Z3AR = (\text{Log Debt})A_t \div (\text{Log Debt})AR_t \tag{13}$$

Alternatively, we also use the debt gap using Hodrick-Prescott (subscript HP) filter procedure which widely used to estimate the potential output trend (see for example: Startz, 2015). The ratio between the trend value and the actual one (Z3HP) presents the debt rule credibility:

$$Z3HP = (\text{Log Debt})A_t \div (\text{Log Debt})HP_t \tag{14}$$

Eventually, we can construct the change in terms of trade (TOT) model that is a function of deficit rule credibility (Z1), discretionary government expenditure (Z2), debt rule credibility (Z3∈ Z3GDP, Z3AR, and Z3HP), and government size:

$$\text{Log (TOT)}_t = \theta + \varphi_1 Z1_t + \varphi_2 Z2_t + \varphi_3 Z3_t + \phi G/GDP_t + \xi_t \tag{15}$$

Since we concern with credibility, we need reliable and long span time series data on fiscal policy comprising revenue, expenditure, and, consequently, the deficit. Unfortunately, the quarterly or monthly data of government budget are publicly unavailable. Data on monthly cash disbursement of functional government budget has never been released by Ministry of Finance to the public. In addition, the cash inflow of tax received only published only for some recent months.

Regarding to the limitation, in this paper, we used annual data and interpolated them into quarterly basis. This is because the planned budget is established once time even though then revised in the midyear. In the mid-year budget revision, the government does not announce the new targeted budget. Therefore, we analyze the difference between the accumulation of actual budget (before and after budget revision) and the original planned budget.

The annual data (let say, Y) might be interpolated into quarterly basis (Q) using formula (Insukindro, 1992):

$$Q_t = \left\{ \frac{Y_t}{4} + \frac{(T-2,5)}{4} \times (Y_t - Y_{t-1}) \right\} \text{ for } T = 1, 2, 3, 4 \tag{16}$$

As a comparison, we also analyze the quarterly data on government expenditure derived from the national income account standard based on the expenditure approach. This is intended that our study will be comparable to similar studies in other countries.

The selected key macroeconomic variable is GDP. The GDP is traditionally used the main factor by the government to set the state budget projection for the next year. The GDP data are available in quarter basis. Those variables are presented in 2000 constant price. The terms of trade are calculated from implicit export prices to implicit import prices ratio also derived from the national income account standard both in current and constant prices. The sample periods were chosen for this study extend from 2001(1) to 2013(4). The total observation is 52 sample points. All of the data are taken from the Central Bank of Indonesia (www.bi.go.id) and Central Board of Statistics (www.bps.go.id). Most of the results are calculated in econometric program Eviews 9 (Startz, 2015).

4. RESULTS AND DISCUSSION

Table 1 presents the elementary statistics covering mean, median, and extreme (maximum and minimum) values for all variables of interest. The average value of the terms of trade is 0.88. In addition, they are not highly fluctuated ranging from 0.70 to 1.00. The tight standard deviation compared to its mean value supports to the conclusion that the movement of the terms of trade considerably does not vary.

The deficit rule credibility indicates that the deviation of the actual deficit from the planned one is substantal. The average of Z1 suggests that the actual deficit is 75 percent of the planned deficit indicating downward deficit bias. However, when we look at the positive value of skewness index, most of the series data locate on the right side and thus imply upward deficit bias; inconsistent with the previous measurement. Applying one-sample test presents that the null hypothesis that the mean value equals to unity can be rejected at 5 percent confidence level. Those figures imply that the deficit rule is incredible.

As expected, the average value of the discretionary fiscal policy ($Z2$) is zero. The median value is closer to the maximum rather than the minimum value suggesting that the most data series lay on the left side of the mean value. The negative value of skewness (-1.05) proves that the series is not symmetric or normal distribution but skewed to the left confirming to the Jarque-Bera normality test.

In contrast to the deficit rule, the average values of debt rule for the three measurements are close to each other. Each the median value is not far enough to the respective mean. Also, each the maximum value is also relatively close to the minimum value. Given the relatively small standard deviation of the four measurements, they are normally distributed except $Z3GDP$. Again, one-sample test proves that each measurement of debt rule credibilitystatistically equals to unity. Therefore, we can infer that the debt rule policy is more credible than the deficit rule policy.

TABLE-1: Descriptive Statistics

	LOG(TOT)	Z_1	Z_2	Z_3GDP	Z_3AR	Z_3HP	G/GDP
Mean	-0.1361	0.7457	0.0000	1.0013	1.0001	0.9987	0.1856
Median	-0.1033	0.7180	0.0542	0.9843	0.9994	0.9943	0.1767
Maximum	0.0017	3.0792	0.3099	1.4270	1.0449	1.0899	0.3888
Minimum	-0.3574	0.4397	-0.5730	0.8204	0.9315	0.9338	0.0759
Std. Dev.	0.0976	0.6621	0.2284	0.1441	0.0209	0.0348	0.0845
Skewness	-0.7107	0.9996	-1.0463	1.1335	-0.1941	0.4207	0.5935
Kurtosis	2.4150	5.1961	3.4408	4.1358	4.2492	2.6828	2.4242
Jarque-Bera	5.0204	18.7424	9.7177	13.6621	3.6364	1.7185	3.6984
Probability	0.0813	0.0001	0.0078	0.0011	0.1623	0.4235	0.1574
Observations	51	51	51	51	51	51	51

The mean value of government size represented by the ratio government expenditure to GDP is relatively small (18 percent) compared to other South East Asian countries. Furthermore, when we relate the government size to the terms of trade, it seems that there is a synchronized pattern between the two variables of interest in the opposite direction. Figure 1 presents the evolution of the government size and terms of trade for all the sampled periods. In one hand, the government size (even though fluctuated in the recent years) tends to increase. On the other hand, the terms of trade seem to be gradually decreasing as hypothesized by Prebish-Singer (1950).

To ensure whether the relationship is rigorous or not, we calculate the coefficient of correlation. The correlation between government size and terms of trade is strong, -0.81, and statistically significant (Table 2). When we divide our observation into pre- and post-global financial crisis, the conclusion does not substantially change. The coefficient of correlation between the two variables is -0.15 and -0.49 respectively. It implies that after the global financial crisis, the terms of trade have been decreasing faster than those in the pre-global financial crisis in line with the increase in government expenditure to revive economic activity through various fiscal stimulus measures.

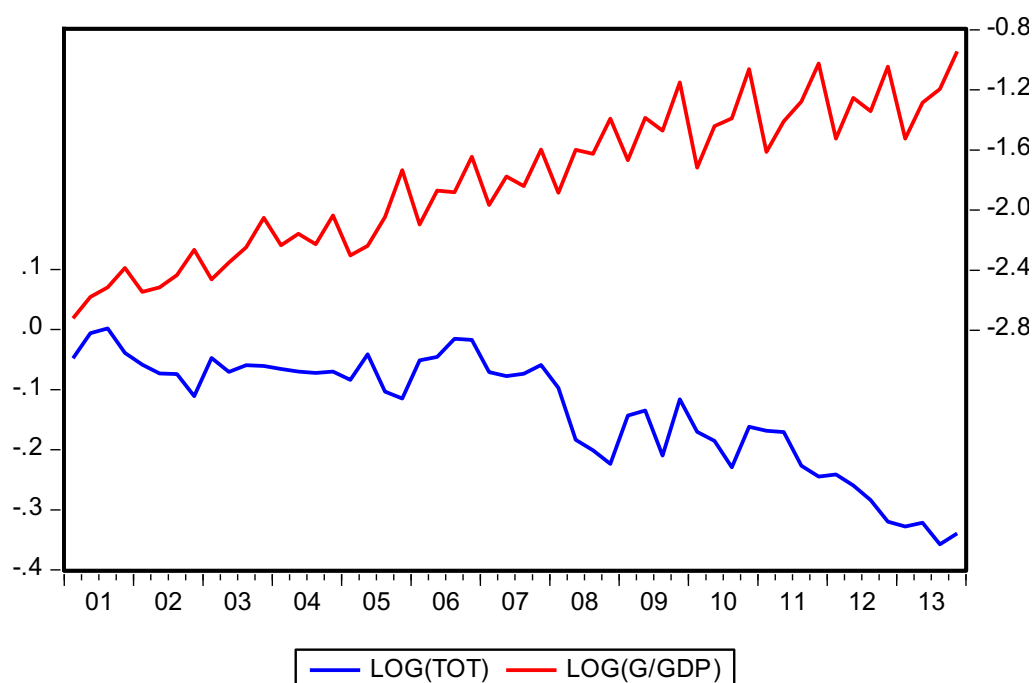**FIGURE-1: Log Terms of Trade and Log Government Size**

TABLE-2: Coefficient of Correlation

	LOG(TOT)	Z_1	Z_2	Z_3GDP	Z_3AR	Z_3HP	G/GDP
LOG(TOT)	1.0000	-0.0994	-0.0357	-0.4375	-0.4064	-0.2873	-0.8083
Z_1	-0.0994	1.0000	0.0385	0.4936	0.3967	0.3921	0.1208
Z_2	-0.0357	0.0385	1.0000	0.0745	-0.1217	0.0158	0.2580
Z_3GDP	-0.4375	0.4936	0.0745	1.0000	0.5934	0.6149	0.1246
Z_3AR	-0.4064	0.3967	-0.1217	0.5934	1.0000	0.4948	0.1784
Z_3HP	-0.2873	0.3921	0.0158	0.6149	0.4948	1.0000	0.0302
G/GDP	-0.8083	0.1208	0.2580	0.1246	0.1784	0.0302	1.0000

So far, though, we have focused on correlations and not causality. Correlation does not mean causality. Therefore, Granger causality test highlights the presence of at least unidirectional causality linkages as an indication of some degree of integration. Unidirectional causality informsabout leader-follower relationships regardingadjustments. An optimal lag order of 4 and 5 were selected for the VAR models by minimizing the LR and SC criteria and FPE, AIC, and HQ criteria respectively, where a maximum of 6 lags is considered.

ByGranger causality test results presented in Table 3, long run unidirectional causality from government size to terms of trade is detected. However, the presence of a similar relation in the opposite direction is denied. These results suggest that government expenditure to GDP ratio factor is growing in significance at the terms of trade. This is a plausible result since substantial portion of government consumption comes from abroad in the higher prices. The increases in government consumption,therefore,have declined the terms of trade.

This finding above is contradictive to Rodrik (1998). While hefound that causality should run from exposure to external risk to and positively affects government spending increases, this research obtains the opposite direction. We support Alesina and Perotti (1997), a larger public sector may lead to a loss of

international competitiveness. This, in turn, may reduce the demand for exports and employment because a competitive international market limits price variability thereby reducing the stabilizing role of prices. Thus, the demand for public insurance and transfers may increase in terms of trade decline.

Those results raise a preliminary hypothesis that the government expenditure relative to GDP is ineffective to maintain the terms of trade stabilization suggesting that the discretionary fiscal policy could be a constraint to address this problem. Accordingly, we hypothesize that the rule-bases policy matters to drive up the terms of trade. We shall recheck itempirically later using econometric tools as specified in the previous section.

TABLE 3: Pair-Wise Granger Causality Tests

Lags: 4 (LR and SC criteria)			
Null Hypothesis:	Obs.	F-Stat	Prob.
G/GDP does not Granger Cause Log (TOT)	48	2.1863	0.0885
Log (TOT) does not Granger Cause G/GDP		0.2698	0.8957
Lags: 5 (FPE, AIC, and HQ criteria)			
G/GDP does not Granger Cause Log (TOT)	47	2.6129	0.0408
Log (TOT) does not Granger Cause G/GDP		0.5494	0.7377

In the proceeding section, we focus on the time series properties of each series. Many studies point out that using a non-stationary macroeconomic variable in time series analysis causes superiority problems. It is well known in the literature that applying regression on a set of non-stationary series is likely to produce a spurious estimation. Thus, a unit roots test should precede any empirical study employing such variables. The conventional DF and ADF unit roots tests present that all series data do not have the same degree of stationary (Table 4).

TABLE-4: Unit Roots Test

	Level		First Difference		Degree of Integration
	t-test	Prob.	t-test	Prob.	
LOG(TOT)	-2.9304	0.1620	-8.9216	0.0000	I(1)
Z_1	-11.1907	0.0000	-4.1372	0.0108	I(0)
Z_2	-4.2761	0.0075	-28.7374	0.0000	I(0)
Z_3GDP	-0.8952	0.9480	2.1538	1.0000	-
Z_3AR	-4.2144	0.0085	-8.4971	0.0000	I(0)
Z_3HP	-1.5047	0.8148	-5.6878	0.0001	I(1)
G/GDP	-2.4870	0.3329	-4.2833	0.0073	I(1)

Dealing with the different level of data stationary, we conduct the co-integration test. Using Johansen's maximum likelihood approach, we test the bi-variate among the five variables with 1 lag in all cases with intercept and no deterministic trend. The trace statistics together with maximum eigen-value (λmax) for testing the rank of co-integration are shown in Table 5. The four tests perform the presence of the co-integrating equations (from none to at most 3) between the non-stationary (or stationary at the different levels) series which means that the linear combinations of them are stationary and, consequently, those series tend to move towards the equilibrium relationship in the long-run.

TABLE-5: Co-integration Test

Hypothesized No. of CE(s)	Eigen-value	Trace Statistic	0.05 Critical Value	Prob.**
Unrestricted Co-integration Rank Test (Trace): Log (TOT) Z_1 Z_2 Z_3GDP G/GDP				
None *	0.8697	165.8310	69.8189	0.0000
At most 1 *	0.4264	65.9591	47.8561	0.0004
At most 2 *	0.3353	38.7208	29.7971	0.0036
At most 3 *	0.3158	18.7052	15.4947	0.0158
At most 4	0.0022	0.1079	3.8415	0.7425
Unrestricted Co-integration Rank Test (Trace): Log (TOT) Z_1 Z_2 Z_3AR G/GDP				
None *	0.8653	146.7918	69.8189	0.0000
At most 1 *	0.3700	48.5444	47.8561	0.0430
At most 2	0.3245	25.9013	29.7971	0.1317
At most 3	0.1012	6.6765	15.4947	0.6155
At most 4	0.0291	1.4478	3.8415	0.2289
Unrestricted Co-integration Rank Test (Trace): Log (TOT) Z_1 Z_2 Z_3HP G/GDP				
None *	0.8643	140.4853	69.8189	0.0000
At most 1	0.3239	42.6259	47.8561	0.1419
At most 2	0.2985	23.4458	29.7971	0.2249
At most 3	0.0921	6.0728	15.4947	0.6869
At most 4	0.0270	1.3407	3.8415	0.2469
* denotes rejection of the hypothesis at the 0.05 level				
** MacKinnon-Haug-Michelis (1999) *p*-values				

After ensuring that all of the variables of interest are co-integrated, we move on the analysis of the magnitude of influence for each independent variable on the terms of trade behavior. Table 6 reports the OLS estimation results of three regression models as specified by equation (15) in the previous section. Most the hypothesized variables are found to be statistically significant at 5 percent. In some cases, the significance lies at 1 percent confidence level. They are confirmed by the high coefficient of determination ($R2$) and F statistic values.

The model (1) is well fitted as it passes all the diagnostic tests, namely Jarque-Bera (JB) normality of the residuals test, ARCH test, Breusch-Godfrey-Pagan (BGP) serial correlation LM tests, and Ramsey RESET specification test. This indicates that the residuals of the estimated model are serially uncorrelated and normally distributed with constant variance in a correct functional form. Unfortunately, models (2) and (3) suffer serial correlation problem at 1 percent confidence level. Hence, we advance our analysis primarily based on the earlier ones.

The terms of trade equation aregenerally in line with the existing literature. The results show that the deficit rule policy credibility is statistically significant especially in the model (1). Since the increase regarding trade is desirable, the result informs that the credibility of deficit rule policy improves the terms of trade for about 0.03 on the average. The positive impact of deficit rule policy credibility may be attributed to the fact that upward deficit bias is highly driven by the large amount of oil subsidy. The oil price is set by the government under government subsidy. Despite the fact that Indonesia is exporting oil, the country also imports oil from other countries.

The surplus of importing value over the exporting value makes Indonesia a net oil importing country. Therefore, the repercussions from the price increase in the world oil market could not be avoided from spill-over to the local market. As a net oil importer country, Indonesia faces a dilemma when the world crude oil price increases. In one hand, the central government revenue increases substantially due to oil and gas taxes. On the other hand, the central government has to spend more subsidies to avoid the increase of domestic fuel prices.

Being a government control item, the event of oil price surge has inflicted a soaring fuel subsidy bill to the government. This situation pressured the Indonesia's government to review its policy on oil prices and finally decides implement oil price increase in the local market. The government's decision to slowly liberalize the local oil market has triggered mixed responses from the public, particularly households and business units. As a result, the budget deficit decreases after the government reduced subsidy through increases the domestic oil prices. The unpredictability world oil prices and subsidy and hence deficit generates uncertainty in the domestic market. This finding is in line with Basri and Rahardja (2011).

The discretionary fiscal policy alsohas a positive impact on the terms of trade movements. The corresponding coefficient is statistically significant only for the last model specification. The counter-cyclical type of discretionary fiscal policy particularly in the post-global financial crisis periods in the forms of export promotion and import substitution strategies supports to induce the terms of trade. This finding is still consistent with Pene (1997) in the case of Cameroon and Surjaningsih et al. (2012) in the case of Indonesia. In addition, most studies found that the discretionary fiscal policy significantly appreciatesthe exchange rates as well as the terms of trade. Compared to deficit rule policy credibility, it seems that economic agents are more responsive and pay more attention to discretionary expenditures rather than budget deficit as found by Kuncoro (2015).

In contrast and interestingly, the debt rule policy credibility deteriorates the terms of trade. It holds for all of the three model specifications. This is a plausible result for some reasons. First, most of the government debt comes from domestic financial resources. The allocation of the domestic debt is focused on infrastructures which in turn boost productioncapacity to export. Second, the foreign debt mostly takes in the form of program assistance rather than project assistance. Hence, the need for foreign goods and services that should be imported from the creditor countries at the higher price has increased. All of the two factors are compounded in the case of Indonesia and ultimately the credible debt rule represses the terms of trade.

It implies that even though the government debt ratio has been decreasing since 2004, the narrow gap between the actual debt level and its target generates substantial shocks for economic agents. Then, economic agents will take into account the current state to make some adjustments in the long-run. In other words, uncertainty in the future when the debt must be repaid is transformed into higher risk in the prices level. Eventually, the behavior of terms of trade tends to decline in the long-run, as found by Abimanyu (1998) in the case of the budget deficit to exchange rates and Adiningsih (2009) in the case of a government bond to interest rates relationships respectively.

Furthermore, looking at the control variable, the estimated coefficient of the government size is statistically significant. It suggests that the terms of trade movement is conversely related to the degree of government size as found in the causal analysis. The higher the government size, the lower terms of trade fluctuation. This result is consistent with the previous studies concluding that government intervention to the international market should be limited so that both the public expenditure and foreign government debt can dampen the decrease in terms of trade. However, the negative and significant effects of degree of government size point out to the sensitivity of exchange rates fluctuation to external shocks which are beyond from monetary and fiscal authority's control. In short, we can infer that fiscal policy in Indonesia puts too much emphasis on the domestic stabilization thus leading to benign neglect of stabilizing its external risk, ultimately resulting in the decrease in terms of trade.

TABLE-6:Estimation Results of Terms of Trade, 2001(1)-2013(4)

Dep. Var:	(1)		(2)		(3)	
LOG (TOT)	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
C	0.3278	0.0000	1.3786	0.0007	0.9052	0.0001
Z_1	0.0322	0.0022	0.0158	0.1877	0.0176	0.1318
Z_2	0.0872	0.0015	0.0565	0.0944	0.0798	0.0146
Z_3GDP	-0.3095	0.0000	-	-	-	-
Z_3AR	-	-	-1.3541	0.0010	-	-
Z_3HP	-	-	-	-	-0.8708	0.0002
G/GDP	-0.9591	0.0000	-0.9283	0.0000	-0.9950	0.0000
R^2		0.8424		0.7520		0.7673
R^2-adj		0.8287		0.7305		0.7471
SEE		0.0404		0.0506		0.0491
F		61.4551		34.8788		37.9230
DW		1.6112		1.4634		1.3541
N		51		51		51
JB-test	2.7128	0.2576	0.1326	0.9358	1.3522	0.5086
ARCH(1) Test	2.3406	0.1326	0.1254	0.7248	0.0806	0.7777
	2.3248	0.1273	0.1302	0.7182	0.0838	0.7722
BG(2) LM Test	1.3434	0.2714	2.4254	0.1002	3.7405	0.0316
	2.9350	0.2305	5.0642	0.0795	7.4111	0.0246
BGP	2.4720	0.0575	2.9581	0.0295	4.5940	0.0033
LM Test	9.0233	0.0605	10.4345	0.0337	14.5579	0.0057
Ramsey(1) Test	1.6480	0.1063	0.6256	0.5348	0.3677	0.7148
	2.7160	0.1063	0.3913	0.5348	0.1352	0.7148

5. CONCLUDING REMARKS

Instability interms of trade is an undesirable feature of economic openness. The smooth time profile of terms of trade enhances economic growth and justifies the quest for institutional solutions conducive to steady fiscal policy stance. Discretionary and rules-based fiscal policies are among the most widespread legislative measures implemented to that end. The paper aimed to provide direct empirical evidence on the relationship between the two types of fiscal policy and the terms of trade movement in the case of Indonesia over the period 2001–2013.

The primarymotivation behind this research is in one hand, a negative and robust correlation of terms of trade and trade openness and there is no conclusion between trade openness and government expenditure documented in several papers and on the other hand – relatively small number of works that discuss possible relation to the credibility. To the best our knowledge, this is the first study that investigates the effectiveness of fiscal policy in Indonesia by linking fiscal rules deviation and terms of trade.

We use the ordinary least squares method to analyze the quarterly data on discretionary fiscal policy, deficit rule, debt rule policy, and government expenditure to GDP ratio and their impact on the terms of trade stabilization. Based on statistical analysis, we found that deficit rule policy is less reliable compared with the debt rule policy. However, our pragmatic approach proves that both the less credible deficit rule policy and discretionary fiscal policy have a positive impact on the terms of trade. Meanwhile, the more credible debt rule policy and government size tend to depreciate the terms of trade. These findings suggest that fiscal policy credibility does matter partially in the context of the international market. However, to mitigate the external risks, government intervention to the international market should not be limited.

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