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THE RELATION BETWEEN FISCAL AND CURRENT ACCOUNT DEFICITS: THE CASE OF FRAGILE FIVE

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ABSTRACT

The purpose of this study is to determine the causality between current account deficits and government expenditures for the 'Fragile Five' economies by showing the relation in the context of twin divergence and/or the deficit hypotheses. To do this, we employ the asymmetric causality test developed by Hatemi and Roca (2014) and the rolling windows causality test developed by Balcılar *et al.* (2010). Results obtained from all tests imply that each country has different characteristics and it is hard to classify in the context of twin deficit and/or convergence hypotheses.

1. INTRODUCTION

Acronyms have been popular among economists to group emerging market economies. BRIC, MENA and MINT are the most popular groups. They classify economies according to various indicators that do not change due to new economic conditions. "Fragile five" is a new classification created by Goldman & Sachs in 2013 that groups countries based on the fragileness levels of economies. Brazil, Turkey, South Africa, India and Indonesia are the members of fragile five that are vulnerable to external shocks. Different from other groups, fragile five countries can change due to improvements in the member economies. For example, while India and Indonesia may not seem to meet the fragile five criteria anymore because of improvements in the structure of their economies, Colombia and Mexico seem to be candidates for the vacant seats. On the other hand, Bloomberg (2015) claims the number of fragile five members should be increased to eight because of the slowdowns of economic growth in Russia, Colombia and Peru.

Although volatility in the national currencies of economies is an important characteristic of the fragile five countries, there are many other similarities between members including high external debt, financial fragilities, and more (see Can and Dincsoy (2016) for detailed comparison). High current account deficit has been one of the most critical problems among these economies in the post-crisis period. Despite the economic recovery in Indian and

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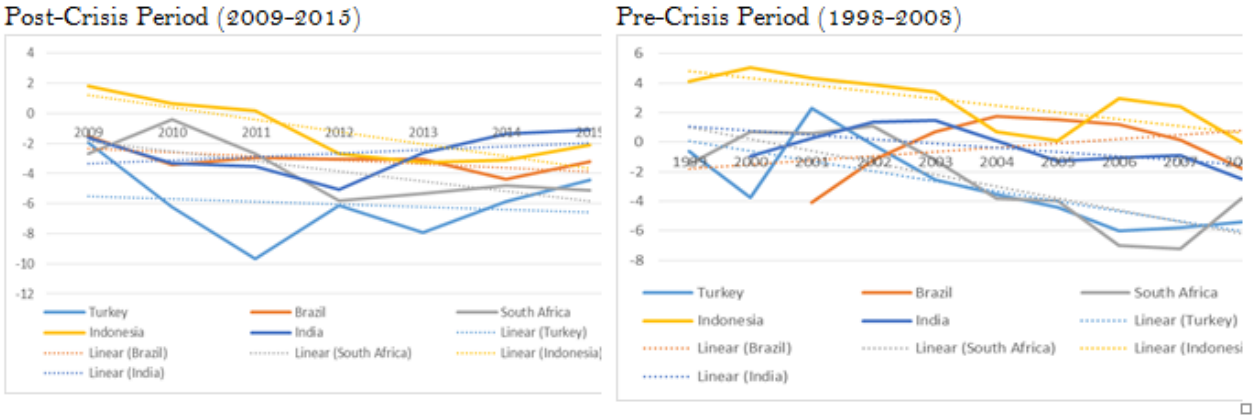
Indonesian economies, current account deficit is still a serious problem for them. In the following graph, change in current account is exhibited for the economies. As can be seen in graph 1, the ratio of current account to gross domestic product (GDP, hereafter) is negative after the global crisis as well as pre-crisis period (except Indonesia) and the ratio has a decreasing trend in both periods (including Indonesia).



Graph-1. Current Account Deficit in Fragile Five

In the scope of the current account deficit issue in the fragile five countries, it might be useful to investigate the budget deficit to see how governments affect current account deficits in the context of the twin deficit hypothesis. Theoretically, conventional wisdom on current account deficit claims that the source of deficit is the deficit in governments' budgets that is called the twin deficit hypothesis.

The effect of budget deficit on trade deficit can be explained by components of the budget. These are government expenditures and taxes. Standard economic reasoning suggests that government borrowing decreases the domestic supply of funds available to finance new investments, which leads to an inflow of funds from overseas. In short, budget deficit may well produce current account deficits (Bernheim, 1988).

On the other hand, the validity of the twin deficit hypothesis is questioned by different economists who found results that are not consistent with the twin deficit hypothesis. They found that the causal relationship is between current account deficit and government expenditures, rather than budget deficit. Mankiw (2006); Elwell (2008) and Kayhan *et al.* (2013) indicate that an increase in government expenditures rather than budget deficit might induce the trade deficit. In short, there is a uni-directional causality running from increasing government expenditures to increasing trade deficit and the main cause of increasing trade deficit is the increasing government expenditures, not budget deficit.

Moreover, Kim and Roubini (2008); Müller (2008) and Blanchard and Perotti (2002) prefer to use "twin divergence" instead of "twin deficit" hypothesis. They claim that the correlation between binary is negative which means an improvement in trade balance worsens the budget deficit or vice versa. They explain a convergence relation between fiscal policies and trade deficit via government expenditures.

Interestingly, the behavior of budget deficit in the fragile five economies differentiates contrary to other economic indicators similar in each economy. As can be seen in the graph 2, Turkey, South Africa and India have reduced the budget deficit in the post crisis period. Besides, the budget deficit seems to increase in Brazil and Indonesia in both the post crisis period and the whole period.

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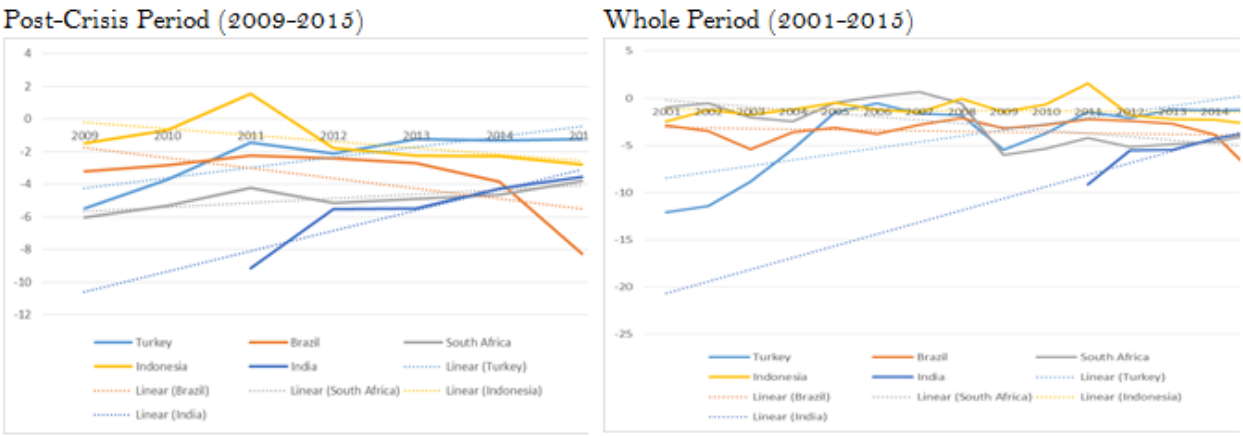

Graph-2. Budget Deficit in Fragile Five

Graph 3 presents the course of economic variables for each economy in a separate way. While the left column of the graph exhibits the whole period for the economy, the right column exhibits the post-crisis period to see if there is a modification in behavior of variables. In the first row, graphs belonging to the Turkish economy are presented. According to them, it is clear that there is an opposing relation between the budget deficit and the current account deficit. This might be evidence of the existence of the twin convergence hypothesis. In the second row, it is possible to imply movement of the variable in the same way as the case of Brazil. Despite the difference in slopes of trends, visual analysis supports the twin deficit for Brazil. In the third row, the South African case is presented. According to graphs, the relation between variables may be an opposed relation. The trend line of budget deficit is steeper in the whole period span than the post-crisis period. So the validity of twin convergence in the whole period may be possible.

In the case of Indonesia, both variables have negative slopes in the short term period. On the other hand, the trend line of the current account variable moves horizontally in the whole period. In the Indian economy, both variables' trend lines have positive slopes after the global crisis.

In light of the statements and illustrations above, it is worth investigating the relation between the current account and the budget deficits in fragile five economies to better understand the behavior of the current account deficit. The relation between economic indicators may differ among member economies of fragile five. Some of them may support twin deficit, while others may support twin divergence.

This study contributes the existing literature in two ways. By exploring the relationship between government expenditures and current account deficits, we will be able to understand the role of government in the current account deficit problem and we will investigate the validity of the twin deficit and also the divergence hypothesis. Second contribution of the study is the selection of the econometric methods employed in the study. While conventional causality analyses do not give information about the term of causality or the existence of causality in the case of positive and/or negative shocks, Hatemi and Roca (2014) causality test offers a way to analyze the effects of positive and negative shocks separately. This is useful when there is stickiness in economic variables and when there are asymmetric relations between variables. By following this method, it will be possible to test the validity of both hypotheses. Also, the rolling windows causality analysis provides exact dates when the causation linkage occurs.

In the next section, the theoretical framework regarding the relations between government expenditures and trade deficits will be described. In the third section the econometrical methodology is given. Empirical results are presented in fourth section. In the conclusion section, empirical results are interpreted and policy implications are presented.

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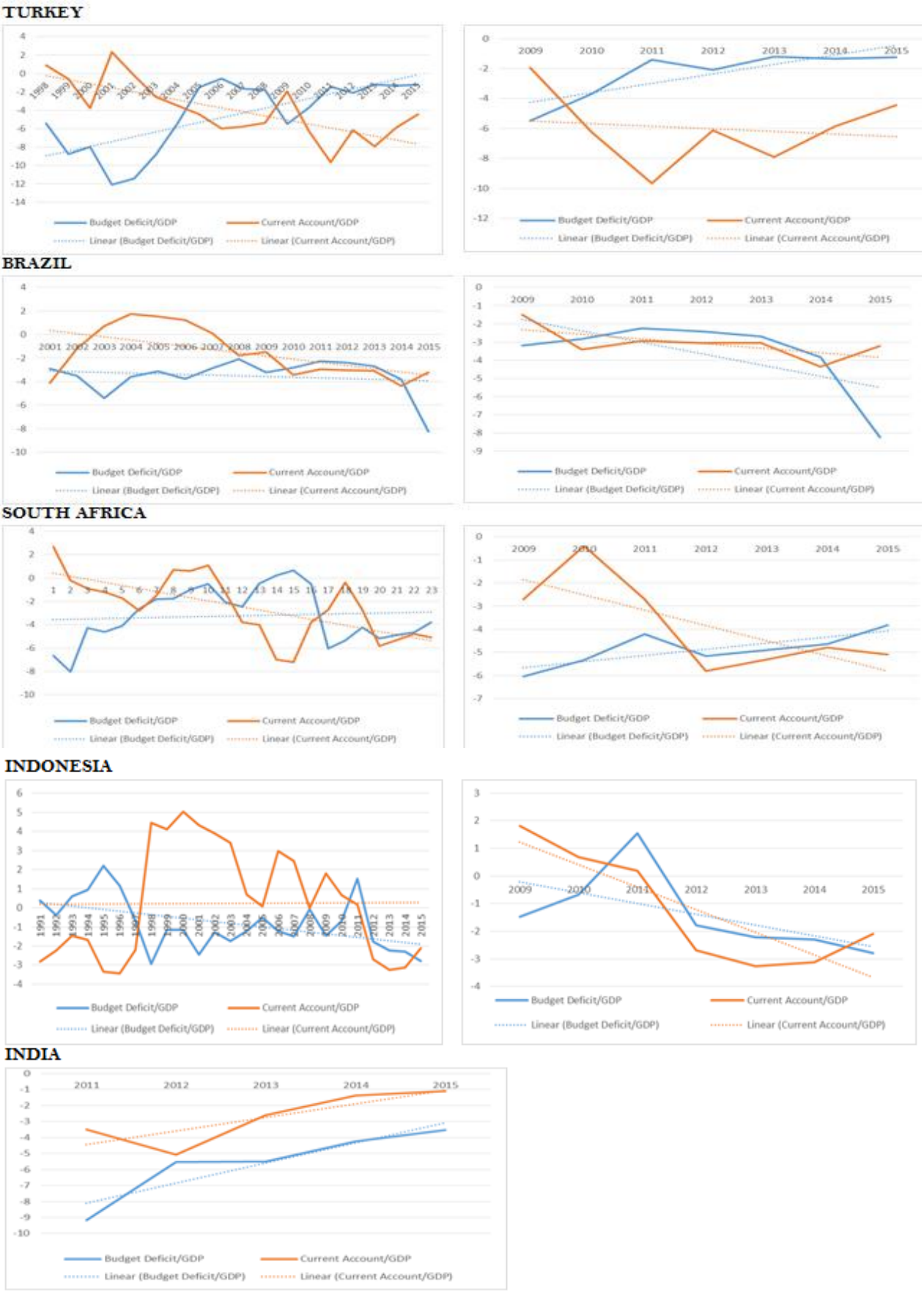

Graph-3. Movement of Budget and Current Account Deficit in Fragile Five

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2. THEORETICAL BACKGROUND

In initial studies, the imbalance in current accounts has been explained via budget deficits implying that increasing budget deficits induce trade deficits in an open economy. Darrat (1988); Bahmani-Oskooee (1991); Abell (1990); Rosenweing and Tallman (1993); Vamvoukas (1997); Fidrmuc (2003); Pattichis (2004); Saleh *et al.* (2005); Baharumshah and Lau (2007) and Bagheri *et al.* (2012) support the twin deficits hypothesis in the international literature. In latter studies, Mankiw (2006) and Elwell (2008) explain the relation between government expenditures and trade deficit by using the well-known saving – investment identity approach.

On the other hand, Müller (2008) claims that an increase in government expenditures would appreciate the terms of trade and trade balance as indicated by Blanchard and Perotti (2002) and Kim and Roubini (2008). According to Blanchard and Perotti (2002) a temporary increase in government spending depreciates the nominal exchange rate, appreciates the terms of trade and increases net exports. The results show that there is a causation linkage between government expenditures and trade deficit running from government expenditures to trade deficit, but the relation is contrary to conventional view. In the case of worsening budget deficit, trade balance would recover. This is different from conventional relationship between the public's role in the economy and trade balance, as explained in the context of twin deficit hypothesis. Kim and Roubini (2008) call the situation in the U.S. economy as "twin divergence" instead of "twin deficit". Because they could not find any positive correlation between deficits, they explain the relation via endogenous movements of budget deficit and current account. According to them, during the recession, output falls and fiscal balance worsens. At the same time, the current account would improve when the fall in output leads to a fall in investment that is sharper than the fall in national savings. Therefore, the current account can improve as the fiscal balance worsens (Kim and Roubini, 2008).

3. METHODOLOGY

3.1. Hatemi (2012) Asymmetric Causality

P_{1t} and P_{2t} are two co-integrated variables Hatemi and Roca (2014)

$$P_{1t} = P_{1t-1} + \varepsilon_{1t} = P_{1,0} + \sum_{i=1}^{t} \varepsilon_{1i} \quad (1)$$

and

$$P_{2t} = P_{2t-1} + \varepsilon_{2t} = P_{2,0} + \sum_{i=1}^{t} \varepsilon_{2i} \quad (2)$$

t is t=1,2,…,T, $P_{1,0}$ and $P_{2,0}$ are constant terms, $\varepsilon_{1i}, \varepsilon_{2i} \sim iid(0, \delta^2)$. Positive and negative changes in each variables are $\varepsilon_{1i}^{+} = \max(\varepsilon_{1i}, 0)$, $\varepsilon_{2i}^{+} = \max(\varepsilon_{2i}, 0)$, $\varepsilon_{1i}^{-} = \min(\varepsilon_{1i}, 0)$ ve $\varepsilon_{2i}^{-} = \min(\varepsilon_{2i}, 0)$, respectively. We estimate results as $\varepsilon_{1i} = \varepsilon_{1i}^{+} + \varepsilon_{1i}^{-}$ and $\varepsilon_{2i} = \varepsilon_{2i}^{+} + \varepsilon_{2i}^{-}$. So,

$$P_{1t} = P_{1t-1} + \varepsilon_{1t} = P_{1,0} + \sum_{i=1}^{t} \varepsilon_{1i}^{+} + \sum_{i=1}^{t} \varepsilon_{1i}^{-} \quad (3)$$

$$P_{2t} = P_{2t-1} + \varepsilon_{2t} = P_{2,0} + \sum_{i=1}^{t} \varepsilon_{2i}^{+} + \sum_{i=1}^{t} \varepsilon_{2i}^{-} \quad (4)$$

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The accumulation of positive and negative shocks in each variable are $P_{1t}^{+}=\sum_{i=1}^{t}\varepsilon_{1t}^{+}$, $P_{1t}^{-}=\sum_{i=1}^{t}\varepsilon_{1t}^{-}$, $P_{2t}^{+}=\sum_{i=1}^{t}\varepsilon_{2t}^{+}$ and $P_{2t}^{-}=\sum_{i=1}^{t}\varepsilon_{2t}^{-}$, respectively (Hatemi and Roca, 2014). $P_t^{+}=(P_{1t}^{+},P_{2t}^{+})$ vector is used in order to test causation linkage between positive shocks. We denote the vector as stated below with lag k in a VAR (L) model.

$$P_t^{+}=v+A_1P_{t-1}^{+}+A_2P_{t-2}^{+}+...+A_LP_{t-k}^{+}+u_t^{+} \tag{5}$$

In equation above, v is 2 x 1 vector of constant variables, u_t^{+} is 2x1 vector of error terms where positive shocks take place, A_r is 2x2 parameter matrix and r=1,2, …, k (Hatemi, 2012). Optimal lag length is identified by test statistics developed by Hatemi (2003;2008).

$$HJC=In(\left|\hat{\Omega}_f\right|)+k2T^{-1}(m^2InT+2mIn(InT)) \tag{6}$$

$\left|\hat{\Omega}_f\right|$ denotes the error terms co-variance matrix in the case of lag length k, m denotes the equivalence number in the VAR model and T is sample size (Hatemi and Roca, 2014). The null hypothesis is determined as kth column and jth row of A_r matrix equals to zero. Detailed Wald statistics can be found in Lütkepohl (2005). If the test statistics are bigger than critical values, the null hypothesis which implies non-causality is rejected.

3.2. Balcılar *et al.* (2010) Bootstrap Rolling Window Causality

Balcılar *et al.* (2010) apply the corrected likelihood ratio (LR) causality test based on the residual based bootstrap method. The LR Granger causality test based on bootstrap process employs the VAR (p) model with two variables and t=1,2,…,T;

$$y_t=\Phi_0+\Phi_1y_{t-1}+...+\Phi_py_{t-p}+\varepsilon_t \tag{7}$$

In equation 13, $\varepsilon_t=(\varepsilon_1,\varepsilon_2)\sim iid(0,\sigma^2)$ with nonsingular covariance matrix Σ. Optimal lag length is identified by AIC. $y_t=[y_{1t},y_{2t}]_{2x1}$ is a matrix and the VAR(p) model can be identified as;

$$\begin{bmatrix}y_{1t}\\y_{2t}\end{bmatrix}=\begin{bmatrix}\phi_{10}\\\phi_{20}\end{bmatrix}+\begin{bmatrix}\phi_{11}(L) & \phi_{12}(L)\\\phi_{21}(L) & \phi_{22}(L)\end{bmatrix}\begin{bmatrix}y_{1t}\\y_{2t}\end{bmatrix}+\begin{bmatrix}\varepsilon_{1t}\\\varepsilon_{2t}\end{bmatrix} \tag{8}$$

In equation 14, $\phi_{ij}(L)=\sum_{k=1}^{p}\phi_{ij,k}L^k$ and i,j=1,2. Also we identify lag operator as $L^kx_t=x_{t-k}$. The null hypothesis of the test is y_{2t} does not Granger cause of y_{1t} while $\phi_{12,i}=0$. Balcılar *et al.* (2010) use rolling window Granger causality based on modified bootstrap process developed by Kayhan *et al.* (2013) and Shukur and Mantalos (2000) in order to handle problems caused by sample size and possible structural changes in variables. In this case;

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$Y := (y_1, y_2, ..., y_T)$ 2xT

$B := (\Phi_0, \Phi_1, ..., \Phi_T)$ (2x(2p+1))

$Z_T := (1, y_t, y_{t-1}, ..., y_{t-p+1})$ ((2p+1) x 1)

$Z := (Z_0, Z_1, ..., Z_{T-1})$ ((2p+1) x T)

$\eta := (\varepsilon_1, \varepsilon_2, ..., \varepsilon_T)$ (2xT)

Φ_0 is the constant term and t is t=1,2,…,T. We estimate the VAR (p) model by estimating B in $Y = BZ + \eta$ model using least squares estimation. With error terms η_U of the unconstrained model and error terms η_R of the constrained model, the cross products are $S_U = \eta_U' \eta_U$ and $S_R = \eta_R' \eta_R$. The test statistics are,

$$LR = (T - k)\text{In}(\frac{\det S_R}{\det S_U}) \quad (9)$$

T denotes the number of observation, k=2x(2p+1)+p denotes the correction term in small samples and p denotes lag length of the VAR model. After the calculation of test statistics, we obtain $Y^* = BZ^* + \eta^*$ regressions by employing OLS error terms $(\eta_R - \overline{\eta}_R)$. The number of the calculated LR* probability value is N_b. In the last phase, in addition to applying to full sample we repeat the above steps for rolling sub-sample $t = \tau - l + 1, \tau - l, ..., l$, $\tau = l, l+1, ..., T$ where l is the size of the Rolling window.

4. EMPIRICAL RESULTS

In this study, we employ the ratio of current account to GDP in order to measure real change in the current account (CA hereafter) and government expenditures to GDP (GE hereafter) to see real change in government expenditures. While current account data is considered standard data, the definition of government expenditures covers different expense items. So we employ government's expenses in the budget of central government. According to existing literature, it is the broadest definition covering all government expenditures. The time period analyzed for each economy is different because of data availability. In this regard, quarterly data for Turkey covers the period between 1998Q4 and 2015Q2. The time period for Brazil is between 1995Q4 and 2015Q4. The time period for Indonesia is between 1991Q4 and 2016Q1. The longest time period belongs to South Africa and covers the span from 1980Q3 to 2015Q1. On the other hand, the shortest interval is 2005Q1-2015Q2 for the case of India. The current account to GDP ratio is downloaded from Bloomberg data terminal. The government expenditures and GDP data in national currencies are collected from the International Financial Statistics published by International Money Fund.

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Table-1. Descriptive Statistics of Variables

Country	Date	Variable	Mean	Std.Dev.	Coef of Var.	Skewness	Kurtosis	Jarque-Bera
Brazil	1995:Q4-2015:Q4	CA	-1.912	1.970	-1,030	0.549	2.018	7.332 (0.02)**
		GOV	19.209	1.456	0,0757	0.741	2.492	8.301 (0.01)**
India	2005:Q1-2015:Q2	CA	-2.256	1.33	-1.696	-0.751	2.282	4.857 (0.08)*
		GOV	10.973	1.520	7.219	-0.182	2.132	1.540 (0.460)
South Africa	1980:Q1-2015:Q1	CA	-1.304	3.804	-2,91	0.443	3.980	10.261(0.00)***
		GOV	18.845	1.506	0,079	-1.372	5.119	70.671 (0.00)**
Turkey	1998:Q4-2015:Q2	CA	-4.049	3.005	-0,746	0.323	2.421	2.102 (0.349)
		GOV	13.200	2.095	0,158	0.422	2.379	3.062 (0.216)
Indonesia	1991:Q4-2016:Q1	CA	0.322	2.802	8,701	0.148	1.675	7.449 (0.02)**
		GOV	8.226	1.770	0,215	0.954	3.895	17.783(0.00)***

Notes: Coefficient of variation is the ratio of standard deviation to mean.

Before the presentation of empirical results, it is prudent to check the statistical properties of the time series employed in the analysis. In Table 3, we summarize descriptive statistics of series belonging to variables included in the model. According to Table 1, current account series are skewed to the right except India. Similarly, government expenditures are skewed to the right except India and South Africa. Kurtosis values indicate that the series are considerably flat.

Prior to the identification of possible causality between variables, it is necessary to determine the degree of integration between them. In this respect, we employ a battery of the unit root tests developed by Dickey and Fuller (1979) (henceforth ADF) and Phillips and Perron (1988) (henceforth PP). Results imply that the series have to be included into analysis in their first difference.

Asymmetric causality test results imply different implications for each economy. First of all there is no linkage between current account deficit and government expenditures in case of South Africa and Brazil. That means government expenditures do not increase (decrease) current account deficit, and vice versa. A reduction in government expenditures induces a decrease in current account deficit in Turkey. But an increase does not induce an increase in current account deficit. The relation is asymmetric and it gives some hint about the twin deficit hypothesis. On the other hand, an increase in current account deficit causes a reduction in government expenditures in the Turkish economy. This result is contrary to initial findings. In the case of India, uni-directional causality from increasing current account deficit to decreasing government expenditures is valid in India.

Different from India and Turkey, uni-directional causality running from current account deficit to government expenditures is asymmetric in Indonesia. It appears in the case of reductions in the current account deficit. It induces reduction in government expenditures. On the other hand, when government expenditures increase, current account deficit reduces. This confirms the twin divergence hypothesis in Indonesia.

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Table-2. Results for Unit Root Test

Levels	Country	Vrb.	ADF	PP	First-Differences	ADF	PP
Intercept	Brazil	CA	-1.814 (1) [0.371]	-1.301 (5) [0.625]	Intercept	-3.718 (0) [0.00]***	-3.817 (4) [0.00]***
		GOV	-2.597 (4) [0.097]*	-10.876 (9) [0.00]***		-5.273 (3) [0.00]***	-34.104 (13) [0.00]***
	India	CA	-1.576 (5) [0.484]	-1.875 (3) [0.340]		-3.942 (4) [0.03]**	-4.749 (2) [0.00]***
		GOV	-6.313 (1) [0.00]***	-6.181 (7) [0.00]***		-9.390 (2) [0.00]***	-15.124 (12) [0.00]***
	South Africa	CA	-2.614 (1) [0.092]*	-5.424 (8) [0.00]***		-16.751 (0) [0.00]***	-17.024 (2) [0.00]***
		GOV	-3.472 (2) [0.010]**	-3.833 (7) [0.00]***		-13.144 (1) [0.00]***	-16.579 (5) [0.00]***
	Turkey	CA	-3.536 (1) [0.00]***	-2.013 (4) [0.280]		-4.776 (2) [0.00]***	-3.814 (2) [0.00]***
		GOV	-0.042 (4) [0.950]	-7.590 (3) [0.00]***		-5.634 (3) [0.00]***	-50.194 (12) [0.00]***
	Indonesia	CA	-1.971 (1) [0.298]	-1.660 (5) [0.447]		-5.761 (0) [0.00]***	-5.895 (3) [0.00]***
		GOV	-1.088 (4) [0.717]	-7.873 (2) [0.00]***		-5.882 (3) [0.00]***	-38.196 (15) [0.00]***
Trend and Intercept	Brazil	CA	-1.833 (1) [0.679]	-1.233 (5) [0.896]	Trend and Intercept	-3.617 (0) [0.034]**	-3.720 (4) [0.026]**
		GOV	-2.226 (4) [0.468]	-10.953 (10) [0.00]***		-5.409 (3) [0.00]***	-35.187 (13) [0.00]***
	India	CA	-1.555 (5) [0.790]	-1.319 (2) [0.869]		-3.150 (4) [0.04]**	-4.721 (2) [0.00]***
		GOV	-2.072 (3) [0.544]	-6.230 (8) [0.00]***		-9.219 (2) [0.00]***	-14.427 (12) [0.00]***
	South Africa	CA	-3.144 (1) [0.100]	-6.203 (8) [0.00]***		-16.654 (0) [0.00]***	-16.920 (2) [0.00]***
		GOV	-3.153 (2) [0.098]*	-3.977 (7) [0.011]**		-13.314 (1) [0.00]***	-16.894 (5) [0.00]***
	Turkey	CA	-5.347 (1) [0.00]***	-2.633 (4) [0.267]		-4.784 (2) [0.00]***	-3.864 (2) [0.01]**
		GOV	-2.509 (4) [0.322]	-11.534 (6) [0.00]***		-5.725 (3) [0.00]***	-50.870 (12) [0.00]***
	Indonesia	CA	-1.998 (1) [0.594]	-1.629 (5) [0.774]		-5.884 (0) [0.00]***	-6.021 (3) [0.00]***
		GOV	-2.583 (4) [0.288]	-8.650 (1) [0.00]***		-6.283 (3) [0.00]***	-41.282 (14) [0.00]***

Notes: The figures in parenthesis denote the lag length selected by the Schwarz criterion. ***, **, and * denote statistical significance at the 1%, 5% and 10% level of significance, respectively. Values within the brackets show the probability ratios. For the ADF test: The figures in parenthesis denote the results of Dickey Fuller test in the case of zero lag length and lag length chosen due to SIC criteria. For the ADF test, the MacKinnon (1996) critical values for model with constant -.3.485, -2.885, -2.579 at the 1 %, 5 % and 10 % levels. The critical values for the model with constant and trend -4.035, -3.447 and -3.148 at the 1 %, 5 % and 10 % levels, respectively. For the PP test: Values in the parenthesis show bandwidths obtained according to Newey-West using Bartlett Kernel criteria. For the PP test MacKinnon (1996) critical values for model with constant -3.483, -2.884, -2.579 at the 1 %, 5 % and 10 % levels. The critical values for model with constant and trend -4.033, -3.446 and -3.148 at the 1 % 5 % and 10 % levels, respectively.

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Table-3. Hatemi and Roca (2014) Asymmetric Causality Test Results

	Hypothesis	MWALD	%1 BCV	%5 BCV	%10 BCV	Hypothesis	MWALD	%1 BCV	%5 BCV	%10 BCV
Brazil	$(CA)^{+} \neq> (GOV)^{+}$	1.552 (0.460)	12.354	7.559	5.947	$(GOV)^{+} \neq> (CA)^{+}$	0.287 (0.867)	15.412	8.069	5.721
	$(CA)^{+} \neq> (GOV)^{-}$	0.209(0.648)	7.570	4.488	3.028	$(GOV)^{+} \neq> (CA)^{-}$	1.312 (0.519)	12.609	6.694	5.091
	$(CA)^{-} \neq> (GOV)^{-}$	0.368 (0.544)	8.460	4.485	2.909	$(GOV)^{-} \neq> (CA)^{-}$	0.334 (0.563)	7.356	4.234	2.908
	$(CA)^{-} \neq> (GOV)+$	0.020 (0.887)	8.368	4.150	2.892	$(GOV)^{-} \neq> (CA)^{+}$	1.893 (0.388)	14.774	8.697	6.296
India	$(CA)^{+} \neq> (GOV)^{+}$	0.048 (0.976)	13.304	7.366	5.215	$(GOV)^{+} \neq> (CA)^{+}$	4.584 (0.101)	15.276	8.083	6.209
	$(CA)^{+} \neq> (GOV)^{-}$	3.627 (0.057)*	11.096	4.832	3.064*	$(GOV)^{+} \neq> (CA)^{-}$	0.054 (0.816)	7.900	4.654	3.155
	$(CA)^{-} \neq> (GOV)^{-}$	0.111 (0.739)	10.911	4.921	3.111	$(GOV)^{-} \neq> (CA)^{-}$	1.073 (0.300)	10.703	5.782	3.627
	$(CA)^{-} \neq> (GOV)+$	0.269 (0.604)	10.396	4.666	3.049	$(GOV)^{-} \neq> (CA)^{+}$	1.506 (0.220)	7.863	4.680	3.164
South Africa	$(CA)^{+} \neq> (GOV)^{+}$	0.791 (0.374)	7.753	3.986	2.701	$(GOV)^{+} \neq> (CA)^{+}$	0.057 (0.812)	7.570	4.114	2.875
	$(CA)^{+} \neq> (GOV)^{-}$	1.166 (0.280)	9.065	4.726	3.201	$(GOV)^{+} \neq> (CA)^{-}$	0.308 (0.579)	6.477	4.084	2.726
	$(CA)^{-} \neq> (GOV)^{-}$	0.000 (0.998)	6.733	4.083	2.776	$(GOV)^{-} \neq> (CA)^{-}$	2.950 (0.086)*	8.891	4.700	3.266
	$(CA)^{-} \neq> (GOV)+$	0.224 (0.636)	6.636	4.294	2.845	$(GOV)^{-} \neq> (CA)^{+}$	1.015 (0.314)	7.335	3.917	2.801
Turkey	$(CA)^{+} \neq> (GOV)^{+}$	2.876 (0.237)	11.078	7.428	5.463	$(GOV)^{+} \neq> (CA)^{+}$	4.231 (0.121)	10.672	6.498	5.191
	$(CA)^{+} \neq> (GOV)^{-}$	10.444 (0.00)***	10.739***	6.990**	5.438*	$(GOV)^{+} \neq> (CA)^{-}$	0.406 (0.816)	13.614	7.677	5.339
	$(CA)^{-} \neq> (GOV)^{-}$	2.424 (0.489)	15.428	9.742	7.354	$(GOV)^{-} \neq> (CA)^{-}$	45.784 (0.00)***	13.704***	8.904**	6.859*
	$(CA)^{-} \neq> (GOV)+$	4.063 (0.131)	14.132	7.323	5.167	$(GOV)^{-} \neq> (CA)^{+}$	3.539 (0.170)	8.761	5.635	4.477
Indonesia	$(CA)^{+} \neq> (GOV)^{+}$	0.612 (0.737)	13.522	7.825	5.468	$(GOV)^{+} \neq> (CA)^{+}$	0.248 (0.883)	11.130	6.344	5.108
	$(CA)^{+} \neq> (GOV)^{-}$	0.581 (0.446)	8.230	4.094	3.055	$(GOV)^{+} \neq> (CA)^{-}$	8.536 (0.014)**	12.676	7.419**	5.419*
	$(CA)^{-} \neq> (GOV)^{-}$	6.050 (0.049)**	10.749	6.735	4.954*	$(GOV)^{-} \neq> (CA)^{-}$	2.240 (0.326)	11.886	7.238	5.180
	$(CA)^{-} \neq> (GOV)+$	1.850 (0.174)	7.365	3.971	2.788	$(GOV)^{-} \neq> (CA)^{+}$	0.522 (0.770)	12.967	7.346	5.443

Note: $\neq>$ denotes the null hypothesis claiming there is no causality. Value in parenthesis shows asymptotically probability. ***,**, * denotes significance level of causality between variables in 1 %, 5 % and 10 %, respectively. The number of bootstrap is 10.000.

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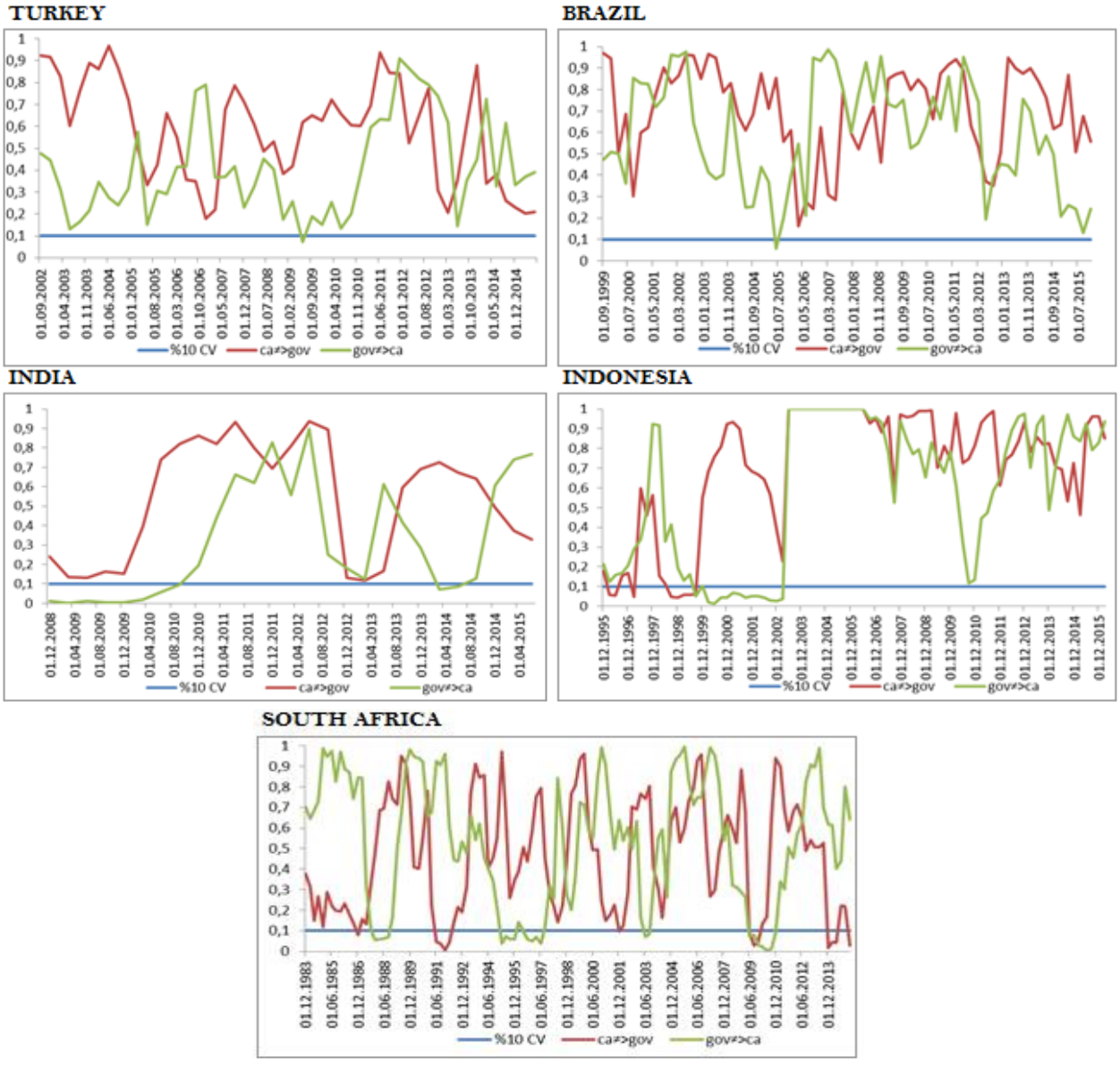
In the second step, we employ the rolling windows causality test. Results of the test are presented in the figure 5. According to results, causation linkage running from current account to government expenditures does not occur in the case of India, Brazil and Turkey. Moreover, uni-directional causality running from government expenditures to current account appears only in a quarter for Brazil and Turkish economies. It is in second quarter of 2005 for Brazil and second quarter of 2009 for Turkey. Uni-directional causality from government expenditures to current account deficit exists after the global finance crisis for two years. The same causation linkage also occurs in 2014.

It is possible to imply uni-directional causality for South Africa and Indonesia. But uni-directional causality running from current account deficit to government expenditures and reverse causality do not occur in the same period in the case of Indonesia. Uni-directional causality running from current account to government expenditures occurs between 1996 and 1999. On the other hand, reverse causality occurs between years 2000 and 2003. In South Africa, bi-directional causality occurs in different time periods.



Graph-4. Rolling Windows Causality Test Results

5. CONCLUSIONS

In this study, we investigate the relation between current account and government expenditures in fragile five countries. In this regard, we employ asymmetric causality and the rolling windows causality methods. Asymmetric

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causality methods imply that the causation linkage differs among countries and results belonging to Turkey and India may offer evidence of the existence of the twin divergence hypothesis. Rolling windows causality test results show that the relation between variables does not exist permanently in all countries.

When we examine the results in the context of validity of twin deficit and/or twin convergence hypothesis, it is possible to imply that the twin divergence hypothesis is valid in Indonesia. But the relation is asymmetric. That means a reduction in government expenditures would not increase current account deficit. The twin deficit hypothesis is valid in the case of Turkey and it is asymmetric too.

The findings of empirical analyses present that the relation may differ according to country specific conditions such as fiscal programs, economic stability and others. As a result, it is not possible to classify the economies in the context of relation between government expenditures and current account deficit. But the results show that fiscal discipline reduces the possible twin deficit relation. So, fiscal discipline may be an important tool for controlling trade deficit too.

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REFERENCES

Abell, J.D., 1990. Twin deficits during the 1980s: An empirical investigation. Journal of Macroeconomics, 12(1): 81-96. *View at Google Scholar | View at Publisher*

Bagheri, F., K. Piraee and S. Keshtkaran, 2012. Testing for twin deficits and Ricardian equivalence hypotheses: Evidence from Iran. Journal of Social and Development Sciences, 3(3): 77-84. *View at Google Scholar*

Baharumshah, A.Z. and E. Lau, 2007. Dynamics of fiscal and current account deficits in Thailand: An empirical investigation. Journal of Economic Studies, 34(6): 454-475. *View at Google Scholar | View at Publisher*

Bahmani-Oskooee, M., 1991. On the effects of us federal deficits on its trade flows. Journal of Post Keynesian Economics, 14(1): 72-82. *View at Google Scholar | View at Publisher*

Balcılar, M., Z.A. Özdemir and Y. Arslantürk, 2010. Economic growth and energy consumption causal nexusa viewed through a bootstrap rolling window. Energy Economics, 32(6): 1398-1410. *View at Google Scholar | View at Publisher*

Bernheim, B.D., 1988. Budget deficits and the balance of trade. Tax Policy and the Economy, 2: 1-32. *View at Google Scholar | View at Publisher*

Blanchard, O. and R. Perotti, 2002. An empirical characterization of the dynamic effects of changes in government spending and taxes on output. Quarterly Journal of Economics, 117(4): 1329-1368. *View at Google Scholar | View at Publisher*

Bloomberg, 2015. Peso going from best to bust as oil drop exposes Colombia's risk. Retrieved from https://www.bloomberg.com/amp/news/articles/2015-06-26/peso-going-from-best-to-bust-as-oil-drop-exposes-colombia-s-risk [Accessed 10.01.2017].

Can, H. and M.O. Dincsoy, 2016. Kırılganlık göstergeleri ve kırılgan besli ülkeleri üzerine bir inceleme. ASOS Journal, 4(22): 199 - 217.

Darrat, A.F., 1988. Have large budget deficits caused rising trade deficits? Southern Economic Journal, 54(4): 879–887. *View at Google Scholar | View at Publisher*

Dickey, D.A. and W.A. Fuller, 1979. Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association, 74(366): 427-431. *View at Google Scholar | View at Publisher*

Elwell, C.K., 2008. The U.S. trade deficit: Causes, consequences and cures. CRS Report for Congress, Congressional Research Service.

Fidrmuc, J., 2003. The Feldstein-Horioka puzzle and twin deficits in selected countries. Economics of Planning, 36(2): 135-152. *View at Google Scholar | View at Publisher*

© 2017 AESS Publications. All Rights Reserved.

Hatemi, J.A., 2003. A new method to choose optimal lag order in stable and unstable VAR models. Applied Economic Letters, 10(3): 135-137. *View at Google Scholar | View at Publisher*

Hatemi, J.A., 2008. Forecasting properties of a new method to choose optimal lag order in stable and unstable VAR models. Applied Economic Letter, 15(4): 239–243. *View at Publisher*

Hatemi, J.A., 2012. Asymmetric causality test with an application. Empirical Economics, 43: 447-456.

Hatemi, J.A. and E. Roca, 2014. BRICs and PIGS in the presence of uncle sam and big brothers: Who drive who? Evidence based on asymmetric causality tests. Griffith Business School Discussion Papers Finance.

Kayhan, S., T. Bayat and B. Yuzbasi, 2013. Government expenditures and trade deficits in Turkey: Time domain and frequency domain analyses. Economic Modelling, 35: 153 – 158. *View at Google Scholar | View at Publisher*

Kim, S. and N. Roubini, 2008. Twin deficit or twin divergence? Fiscal policy, current account and real exchange rate in the U.S. Journal of International Economics, 74(2): 362 – 383. *View at Google Scholar | View at Publisher*

Lütkepohl, H., 2005. New introduction to multiple time series analysis. Berlin: Springer.

MacKinnon, J.G., 1996. Numerical distribution functions for unit root and cointegration tests. Journal of Applied Economics, 11(6): 601–618. *View at Google Scholar | View at Publisher*

Mankiw, N.G., 2006. Reflections on the trade deficit and fiscal policy. Journal of Policy Modeling, 28(6): 679-682. *View at Google Scholar | View at Publisher*

Müller, G.J., 2008. Understanding the dynamic effects of government spending on foreign trade. Journal of International Money and Finance, 27(3): 345-371. *View at Google Scholar | View at Publisher*

Pattichis, C., 2004. Budget and trade deficits in Lebanon. Applied Economic Letters, 11(2): 105-108. *View at Google Scholar | View at Publisher*

Phillips, P.C.B. and P. Perron, 1988. Testing for a unit root in time series regression. Biometrica, 75(2): 335-346. *View at Google Scholar | View at Publisher*

Rosenweing, J.A. and E.W. Tallman, 1993. Fiscal policy and trade adjustment: Are the deficits really twins? Economic Inquiry, 31(4): 580 - 594. *View at Google Scholar | View at Publisher*

Saleh, A.S., M. Nair and T. Agalewatte, 2005. The twin deficits problem in Sri Lanka: An econometric analysis. South Asia Economic Journal, 6(2): 221-239. *View at Google Scholar | View at Publisher*

Shukur, G. and P. Mantalos, 2000. A simple investigation of the Granger-causality test in integrated-cointegrated VAR systems. Journal of Applied Statistics, 27(8): 1021–1031. *View at Google Scholar | View at Publisher*

Vamvoukas, G.A., 1997. Have large budget deficits caused increasing trade deficits? Evidence from a developing country. Atlantic Economic Journal, 25(1): 80-90. *View at Google Scholar | View at Publisher*

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