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Twin deficits in Cambodia: An Empirical Study

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Abstract

This study examines the inter-linkages between Government budget balance, and external balance for a transition economy in South East Asia – Cambodia. The empirical results of the quarterly data between 1996 and 2006, support twin deficits hypothesis that is the budget deficits do cause external deficits, in the short run. These two macroeconomics variables are moving together in the long run. For implication, these findings provide an insight for the Cambodia"s policy design and formulation.

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1. Introduction

Numerous researchers have theoretically and empirically examined the possible linkages between government budget deficit (BD) and current account deficit (CAD) – twin deficits hypothesis. The twin deficits hypothesis initially depicts the effect of budget deficit on external balances (trade balances or current account deficits), in which the latter is caused by real exchange rate appreciation. Generally speaking, the 'twin deficits hypothesis' arose during the "Reagan fiscal experiment" in the 1980s, marked a period of strong appreciation of the dollar with unusual shift hike in current account deficits. In Europe, Germany and Sweden faced similar problems emerged in the early part of the 1990s where the rise in the country's government budget deficit was accompanied by real appreciation of their national currencies which adversely affect the current accounts position (see Ibrahim and Kumah, 1996). By and large, it is not an exception for developing countries as most have also experienced problem with their current account balances in early 1980s[1]. Several observations have confirmed that the unsustainable budget deficit during these periods has widened the external account deficits (i.e. trade account balances and current account balances). Despite been an age-old issue, there has been a revival of interest in the twin-deficit phenomenon into the forefront of the policy debate especially for the US economy in the new millennium (see Bartolini and Lahiri, 2006; Coughlin *et al*., 2006). Also, a series of papers in the special issue of *Journal of Policy Modeling* (Vol. 28 No.6, pp. 603-712, 2006) are dedicated to the debate on "*Twin deficits, growth and stability of the US economy*". The interest arose due to the recent declines in the US current account and fiscal balances and the impact to the world economic instability. Definitely, the twin deficits issue presented here is found to be relevant for other countries including transition economy as well.

The objective of this study is to study the existence of a causal relationship between the current account and the government budget for a transition economy in South- East Asia, namely Cambodia. In other words, the twin deficits hypothesis is tested for four possible causal patterns, namely (1) government budget deficit does Granger-cause current account deficit, (2) current account does Granger-cause government budget deficit, (3) no causal relationship between these variables, and (4) bi-directional causal pattern between government budget deficits and current account balances.

Cambodia is an interesting sample to examine the twin deficits hypothesis. Cambodia has undergone several episodes of transition in the 1990s from war to peace, from communism to electoral democracy, and from command economy to free market.[2] Based on the World Bank's statistics (as showed in Table 1), the Cambodian government has experienced budget deficits in the recent years ranging 2% to 4% of GDP between 2002 and 2006, except for a balanced budget in 2005. Meanwhile, the trade imbalances (net exports) are reported in

[1] The widening of CAD in a number of the Association of Southeast Asian Nations (ASEAN) countries (Indonesia, Malaysia, the Philippines and Thailand) over the past decades has generated policy concerns (Baharumshah *et al*., 2006; Baharumshah and Lau, 2007). Authors like Edwards (2001) and Obstefeld and Rogoff (2004) address the twin deficits issue from the point of view of macroeconomic stability of the country. They underlined that the negative implications of a combination of adverse factors (e.g. twin deficits, high interest rates and exchange rate depreciation) would increase the vulnerability of a country and that the fiscal instruments are crucial for sound macroeconomic policy for transition and developing countries. Therefore, twin deficits should be avoided.

[2] http://search.barnesandnoble.com/Political-Economy-of-the-Cambodian-Transition/Caroline-Hughes/e/9780700717378 (13 April, 2009)

deficits with 10 % (per GDP) in 2003, and the current account deficits are also in deficits with a range of between 3% and 6 % as ratio to GDP for the period 2002-2006.

Insert Table 1 about here

This paper proceeds as follows. Section 2 presents the theoretical paradigms and related literature on the connection between the two deficits. This is followed by the data and the empirical findings, while concluding remarks and further implications for empirical research is presented in Section 4 of the paper.

2. Theoretical Framework and Empirical Literature

2.1 Theoretical Framework

The conceptual understanding of the twin deficits hypothesis is mathematically built from the commonly documented - national income identity. Conventionally, the twin deficits hypothesis can be expressed in the following relation.

$$CAB = S^P + BD - I \quad (1)$$

where CAB stands for current account balance, S^p is private saving which is derived from Y – T – C, BD is government budget is in deficits, and I is investment.

A precise focus on this relation yields two theoretical observations. First, there are possible for at least one cointegrating relation or long run equilibrium among the variables CAB, S^P, BD, and I. More precisely, one of the long run relation identified is between CAB and BD. Thus, these two variables are cointegrated as demonstrated by this relation. The second observation is a positive relationship between CAB and BD in which BD does play a role in determining the CAB as predicted by the early mentioned twin deficits hypothesis.

2.2 Empirical Literature

Previous literature has mainly centered the discussions on the twin deficits issue based on two major theoretical models. However, these are not the only possible outcomes between the two deficits. In fact, there are four testable hypotheses arise from the twin deficits phenomena. The first testable hypothesis is based on the Keynesian (or conventional) proposition. Accordingly, an increase in budget deficits induces upward pressure on interest rates that in turn trigger capital inflows and appreciation of the exchange rate. Ultimately, the appreciation of the domestic currency will lead to an increase in the current account deficits, if any. A group of studies such as Hutchison and Pigott (1984), Zietz and Pemberton (1990), Bachman (1992), Vamvoukas (1999), Piersanti (2000) and Leachman and Francis (2002) found supports that a worsening budget deficits stimulates an increase in external accounts deficits. However, in recent Baharumshah and Lau (2007) have found a uni-directional causal pattern from budget deficit to external deficit in Thailand (i.e. the budget deficit does positively influence the current account deficit), while Acaravci and Ozturk (2008) and Hakro (2009) have confirmed a similar finding for Turkey, and Pakistan, respectively.

The second hypothesis refers to the Ricardian Equivalence hypothesis (hereafter REH) which is taken from the seminal work of Barro (1974). According to this view, an intertemporal

shift between taxes and budget deficits does not matter for the real interest rate, the quantity of investment or the current account balance. In other words, the absence of any Granger causality between the two deficits would be in accordance with the REH. The empirical evidence in Enders and Lee (1990), Evans and Hasan (1994), and Kaufmann *et al.* (2002) have concluded that there is no link between the two deficits and hence is supportive of REH.

The third view is about a unidirectional causality that runs from current account deficits (CAD) to budget deficits (BD). Empirical studies by Islam (1998), Anoruo and Ramchander (1998), Khalid and Teo (1999), Kim and Kim (2006) support this proposition. Using the data from Egypt, Marinheiro's (2008) study has rejected the twin deficits hypothesis in support of the reverse causality from CAD to BD. According to them, this will occur if the government of a country utilizes their budget (fiscal) stances to target the current account balance. This pattern of external adjustment might be especially relevant for developing countries (Khalid and Teo, 1999).

The final pattern is a bi-directional (or two-way) causality between BD and CAD. While BD may cause CAD, the existence of significant feedback may cause causality between the two variables to run in both directions (see, Darrat, 1988; Normandin, 1999; Hatemi and Shukur, 2002; Kouassi *et al*., 2004; Lau and Baharumshah, 2004). Lau and Baharumshah (2006) who analyze nine Asian countries in the panel setting, Jayaraman and Choong (2007) for data in Fiji while Arize and Malindretos (2008) for most of the African countries found that both BD and CAD depends on each other.

3. Data and Empirical Results

3.1 Data

The Cambodian macroeconomics variables of Current account balances (CAB), and government budget position (surplus or deficit) (GB) are considered in this study. The data are obtained from the *International Financial Statistics*, *IFS* (International Monetary Fund, IMF), and the variables are measured in real terms (and in $US billions) by deflating the nominal value with CPI (Consumer Price Index). Due to limited data available from *IFS*, the time series observations cover quarterly data between 1996Q1 and 2006Q2 yielding 42 observations.

3.2 Empirical Results

Since the testing procedures of unit root tests, cointegration tests, causality tests, and so on are widely applied by many empirical studies in these areas – testing the sustainability of CAB and GB, and the causality in CAB and GB (twin deficits hypothesis), the methodology of these approaches are not detailed in this study.

Table 2 reports the results of a set of unit root tests (i.e. ADF. DFGLS, and KPSS), and correlation tests as well. The estimated correlation coefficient (the bottom of Table 1) is 0.826 suggesting a strong correlation between budget deficits (GB), and external deficit (CAB) The AIC suggests 3 quarters lag, and the results of unit root tests (ADF and DFGLS) and stationary tests (KPSS), consistently confirm the real government budget deficit (GB), and real current account deficit (CAB) are non-stationary in levels, or integrated with order one ~ $I(1)$.

Insert Table 2 about here

As expressed by equation (4), there is a possible long run relationship between BD and CAB. The empirical results of the Johansen's multivariate cointegration tests in Table 3 support this theoretical view at 5% level of significance. Panel B, Table 3 provides the results of the exclusion restriction on CAB and GB where the null of restricting the coefficients of CAB and GD to zero can be easily rejected at the 5% significance level. The results indicate that the variables share a long run co-movement that is bounded by their long run equilibrium relationship. The estimated cointegrating equation by OLS estimator, $CAB_t = 3.617GB_t$ shows that CAB is a positively related to GB. Therefore, a continuing improvement in government budget position (GB) does help in reducing the Cambodia's external deficits.

Insert Table 3 about here

Clearly, the correlation coefficient, 0.826 between CAB and GB does not tell much about the direction of causation. Table 4 reports the results of Granger causality analysis that are based on the estimations of error correction models. The coefficients of the $\sum\Delta GB$ are statistically difference from zero with absolutely large chi-squared statistic at 5% level, indicating the causality pattern is running from GB to CAB in the short run – supporting twin deficits hypothesis. Meanwhile, the sum of the coefficients of $\sum\Delta CA$ is also statistically difference from zero at 5 % level. A bi-directional causality between GB and CAB can be concluded, in the short run. More precisely, the error correction term of the equation CAB (second column of Table 4) is statistically different from zero, and it further supports cointegration between GB and CAB with the speed of adjustment of 14% per quarter or about 1.8 years to return equilibrium level. Again, it supports causality from GB to CAB in the long run.

Insert Table 4 about here

The plots of impulse response function presented in Figure 1 (the first and second figures) show that the GB and CA are going back to the equilibrium from 15^{th} quarter after an initial shock. Meanwhile, the persistence profile analysis examines the effect of system-wide shocks (i.e. both GB and CAB equations) on the cointegrating (or long run) relation (i.e. CAB - 3.617GB). Clearly show that the current account relation has a strong tendency to converge to their respective equilibria, the speed of convergence of the CAB equation to its equilibrium is noticeably fast i.e. after 8^{th} quarter. These effects are also demonstrated in Table 5, which reports the analysis of the generalized variance decomposition for the twin deficits hypothesis for Cambodia, which further supports the finding of bi-directional causality between GB and CAB. The innovations in GB explain 50% of CAB, while the 14% GB is explained by the innovations in CAB for the time span of 48 quarters. And, the shocks in GB and CAB contribute more in explaining the forecast error variance in their own, supporting the earlier causality linkages.

Insert Figure 1 about here

Insert Table 5 about here

4. Concluding Remarks

This study examines the twin deficits hypothesis that depicting the causal relationship between government budget deficit and current account balance) for a transition economy in South East Asia, Cambodia.

The sample covers quarterly data between 1996Q1 and 2006Q2, and the empirical results show a cointegration between these two macroeconomics variables as suggested by theory. More interestingly, there are bi-directional causality between government budget deficit and external deficit in Cambodia. This finding is also found in existing literature such as Anoruo and Ramchander (1998), Kouassi *et al.* (2004), Lau and Baharumshah (2004; 2006), Jayaraman and Choong (2007), and Arize and Malindretos (2008) for developing countries in Asia and African, and Normandin (1999) and Hatemi and Shukur (2002) for developed country like U.S. Impressively, this observation implies that the two-causality of between government budget deficits and external imbalances is applicable to different stages of economics level such as developed country, developing country and the transition country.

An implication of this finding is that one simply cannot rely on cutting down the budget deficits by rising up the national savings in an attempt to reduce the current account deficits in Cambodia. IMF has canceled a budgetary support loan in 1997, and the Cambodian government has implemented a 10% value-added tax in 1999.[3] A bi-directional causality implies that government budget is not a fully controlled policy variable (i.e. exogenous variable). However, higher government spending is needed for fiscal policy that helps combat slowing growth, and in order to keep budget deficits small (or under control), a careful prioritization (on pro-poor social outlays, low level of government salaries, and capital spending such as high-quality infrastructure projects) is required.[4]

[3] http://www.csua.berkeley.edu/~sophal/manila.pdf, Accessed on September 1, 2009.

[4] http://www.cdc-crdb.gov.kh/cdc/second_cdcf/session2/imf_john_nelmes_eco_dev_en.htm Accessed on September 1, 2009.

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Table 1 Cambodia's Budget position, net exports, and current account balance (as % GDP) 2002-2006

Year	Government Budget Balance as % GDP	Net Exports as % GDP	Current Account Balacne as % GDP
2002	-3	-8	-3
2003	-4	-10	-5
2004	-2	-7	-3
2005	0	-9	-6
2006	-2	-7	-5

Source: World Development Indicator, World Bank *(*www.worldbank.org/data). The negative sign indicates 'deficit'.

Table 2 Unit Root, Lag Selection and Correlation Coefficient Tests

Panel A: Unit Root Tests

	Test Statistics					
	t_μ	t_τ	τ_μ	τ_τ	η_μ	η_τ
			A: Level			
CAB	-1.841 (3)	-1.873 (3)	-1.517 (3)	-1.762 (3)	1.265 (3)*	1.256 (3)*
GB	-1.547 (3)	-2.257 (3)	-1.410 (3)	-2.285 (3)	0.524 (3)*	0.359 (3)*
			B: First Differences			
ΔCAB	-11.274 (2)*	-11.153 (2)*	-7.396 (1)*	-7.531 (1)*	0.111 (2)	0.063 (2)
ΔGB	-4.103 (3)*	-4.038 (3)*	-3.734 (3)*	-3.989 (3)*	0.009 (3)	0.001 (3)

Panel B: Lag Selection Based on Multivariate AIC

Lag	AIC
1	149.944
2	151.544
3	163.620**
4	162.234
5	161.133
6	158.292
7	155.441
8	153.829
9	153.617
10	154.113
11	153.471
12	149.947

Panel C: Correlation Coefficients Analysis 0.826

Notes: The t, τ, and η statistics are for ADF, DFGLS and KPSS respectively. The subscript μ in the model allows a drift term while τ allows for a drift and deterministic trend. Refer to the main text for the notations. Asterisks (*) indicate statistically significant at 5% level. Figures in parentheses are the lag lengths. The asymptotic and finite sample critical values for ADF are obtained from MacKinnon (1996) while the KPSS test critical values are obtained from Kwiatkowski *et al*. (1992, Table 1, pp. 166). The DFGLS for the drift term (μ) follows the MacKinnon (1996) critical values while the asymptotic distributions for the drift and deterministic trend (τ) are obtained from Elliott *et al*. (1996, Table 1, pp 825). Both the ADF and DFGLS test examine the null hypothesis of a unit root against the stationary alternative. KPSS tests the null hypothesis that the series is stationary against the alternative hypothesis of a unit root. Δ denotes first difference operator (**) indicates the optimal lag selected for the VAR estimation.

Table 3 Cointegration Test and Hypothesis Testing

Panel A: Johansen Multivariate Test							
Null	Alternative	k=3 r=1					
		λmax			Trace		
		Unadjusted	Adjusted	95% C.V.	Unadjusted	Adjusted	95% C.V.
r = 0	r = 1	18.722*	16.109*	14.880	26.719*	22.990*	17.860
r<= 1	r = 2	7.997	6.881	8.070	7.997	6.881	8.070
Panel B: Test of Exclusion Restrictions Based on Johansen Procedure							
Variables		Chi-squared-statistics (*p*-value)					
CAD		10.679 (0.001)*					
GB		17.883 (0.000)*					
Panel C: Normalizing the Cointegrating Vectors (OLS)							
CAB -3.617GB							
(*t*-ratio, 4.988)							

Notes: Asterisks (*) denote statistically significant at 5% level. The *k* is the lag length and *r* is the cointegrating vector(s). Chosen r: number of cointegrating vectors that are significant under both tests. The unadjusted and the adjusted statistics are the standard Johansen statistics and the statistics adjusted for small sample correction factor according to Reinsel and Ahn (1992) methodology. The test statistic of the exclusion test is given by T [ln (1-λ*) - ln (1-λ)], where T is the number of observations. It has χ^2 distribution with r (k-s) degree of freedom. Here r denotes the number of cointegrating vectors, k is the dimension of the restricted cointegrating space and s is the number of variables in the system.

Table 4 Granger Causality Results

Dependent Variables	ΔCAB	ΔGB
∑ΔCAB		4.015 (0.045)*
∑ΔGB	17.253 (0.000)*	
Error correction term	*-0.140*	*-0.010*
	-4.153 (0.000)*	-1.384 (0.176)

Notes: The χ^2-statistic tests the joint significance of the lagged values of the independent variables, and the *t*-statistic tests the significance of the error correction term(s). The '*italic'* figures are the estimated coefficients of error correction terms. Δ is the first different operator. Figures in parentheses are the *p*-values. Asterisk (*) indicates statistically significant at 5% level.

Table 5 Generalized Variance decomposition for Cambodia

Percentage of variations in	Horizon	due to innovation in:	
	(Quarters)	ΔCAB	ΔGB
Quarters Relative Variance in: ΔCAB			
	1	*80.474*	19.525
	4	*77.135*	22.864
	8	*71.643*	23.356
	24	*59.690*	40.309
	48	*49.161*	50.839
Quarters Relative Variance in: ΔGB			
	1	0.911	*99.089*
	4	10.365	*89.635*
	8	11.746	*88.254*
	24	13.239	*86.761*
	48	13.751	*86.249*

Note: The column in *italic* represents their own shock.

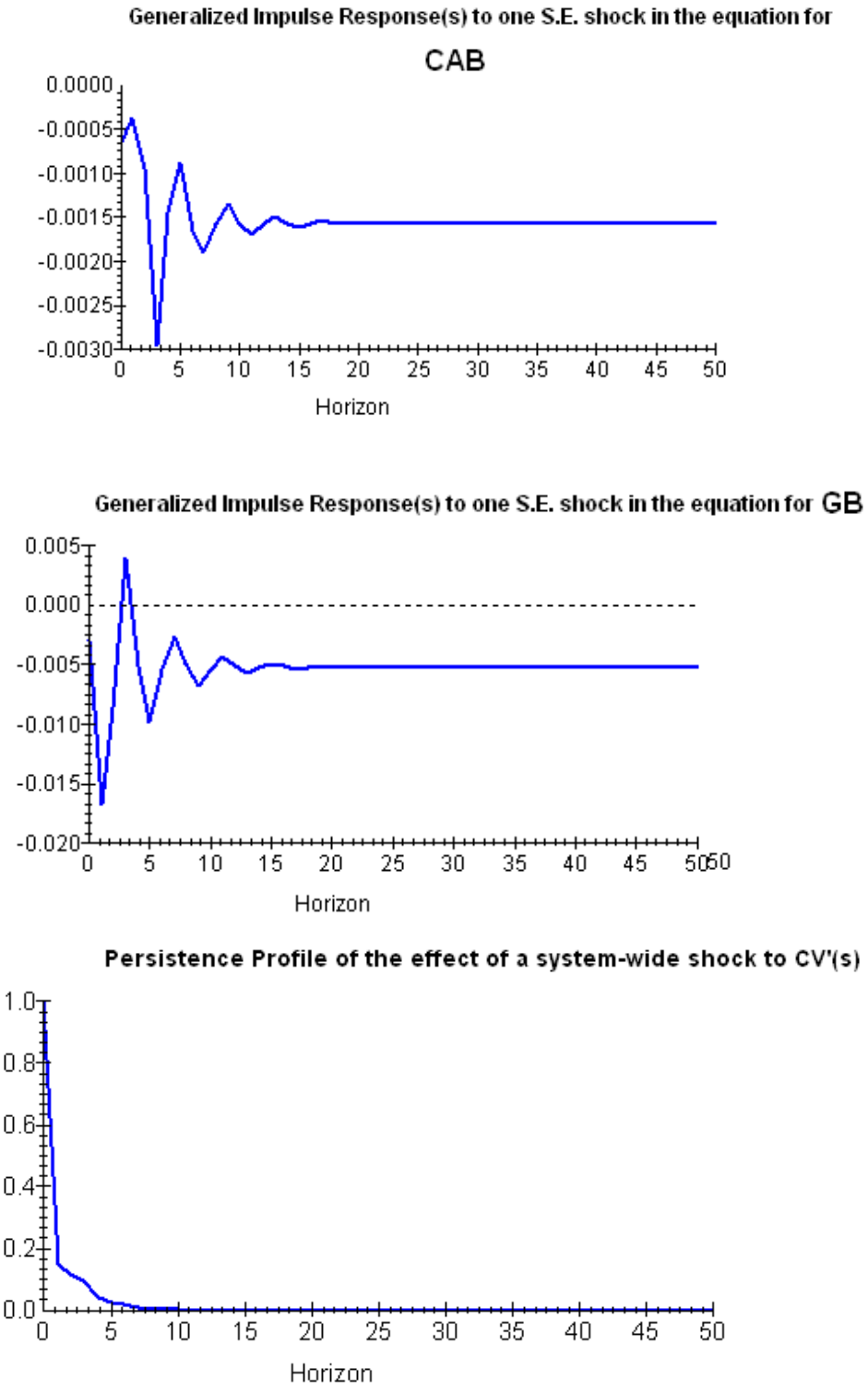

Figure 1 Generalized Impulse responses and Persistence Profile Analysis