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## General Equilibrium Perception on Twin Deficits Hypothesis: An Empirical Evidence for the U.S.

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### Abstract:

From the general equilibrium perspective, this study proposes the inclusion of private savings and investments in examining twin deficits hypothesis. Using U.S. data, the empirical results support twin deficits hypothesis but the budget deficit's elasticity is decreasing from unity to 0.43.

**Key words:** General Equilibrium; Government Budget Deficits; Current Account Balance; U.S.

**JEL classifications:** *F32; H62*

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## 1. Introduction

A series of papers in a special issue of *Journal of Policy Modeling* (Vol. 28 No.6, pp. 603-712, 2006) dedicates a substantial debate on “*Twin deficits, growth and stability of the US economy*”. Eventually, there is a substantial volume of studies available in the literature describes the theoretical framework and empirical results about the possible linkages (and co-moving) between government budget deficit (BD), and current account deficit (CAD). Concern raise up by Obstfeld and Rogoff (2005) and Mendoza *et al.*, (2007) that unless major policy actions are taken, these imbalances will generate global financial turbulence and the current crisis can be viewed as the outcome of these episodes.

Historically, the so-called ‘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. Several observations have confirmed that the unsustainable budget deficit during these periods has widens current account balances (Darrat, 1988, Bachman, 1992, Leachman and Francis, 2002). By and large, the existing studies on twin deficits phenomenon are mainly focused on the interrelationships and/or co-moving relation in a bi-variate framework between budget deficits and trade balances (or current account balances). Interestingly, Cavallo’s (2005) article entitled “*Understanding the Twin Deficits: New Approaches, New Results*” has highlighted that other things are not always equal, and a number of factors may affect how much budget deficits explain current account deficits.

Using the derivation from general equilibrium perception, this study proposes an alternative framework to test the twin deficits hypothesis in which two additional macroeconomics variables i.e. private savings, and domestic investments are included. This study demonstrates an empirical support of twin deficit hypothesis by using the U.S. data.

Next section discussion the twin deficits hypothesis in terms of general equilibrium perception, and section 3 reports the data, and results. Section 4 concludes the section.

## 2. Theoretical Framework

The conceptual understanding of the twin deficits hypothesis is theoretically built from the commonly documented identify - national income identity:

$$Y = C + I + G + NX \quad (1)$$

where  $Y$  is real GDP,  $C$  is private consumption,  $I$  is investment,  $G$  is government purchases, and  $NX$  is net exports which is the different between exports ( $X$ ) and imports ( $M$ ). And, the  $NX$  is also called  $CAB$  (current account balance). A rewriting of the national income identity, the  $CAB$  relation can be delivered as following:

$$\begin{aligned} NX &= (Y - C - G) - I \\ CAB &= (Y - C - G) - I \end{aligned} \quad (2)$$

Again, the national saving,  $S$  is the national income after subtracting the spending on goods and services by private ( $C$ ) and public ( $G$ ) sectors.

$$CAB = S - I \quad (3)$$

where  $S = S^p + S^g$ .  $S^p$  is private saving which is derived from  $Y - T - C$ , while  $S^g$  is government saving  $T - G$ .  $T$  is tax revenue. If,  $T > G$  indicates budget surplus (BS). But for the case  $T < G$ , the Government budget is in deficits (BD). From the general equilibrium relation (3), the balance budget occurred when  $T = G$ . The twin deficits hypothesis can be expressed in the following relation.

$$CAB = BD + S^p - I \quad (4)$$

Other things being equal, 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 by standard economic theory is  $CAB$  and  $BD$  relation. The second observation is a positive impact of  $BD$  on  $CAB$  (i.e. twin deficits hypothesis), in which other theoretically justified variables (private savings and investments) do play a role in validating this relationship as noted early in Cavallo (2005). Conversely, the twin deficits hypothesis is hold if the estimated coefficient of  $BD$  (equation 4) is statistically difference from zero at conventional levels i.e. 10%, 5%, or 1%.

### 3. Data and Empirical Results

#### *Data*

The U.S. data for current account balance ( $CAB$ ), government budget balance ( $GB$ ), investment ( $I$ ), and private savings ( $S^p$ ) (i.e. subtracting  $S$  with  $GB$ ) are obtained from the

*International Financial Statistics, IFS* (International Monetary Fund, IMF). The variables are measured in real terms (and in \$US billions) by deflating the nominal value with GDP deflator. The sample period covers quarterly observations between 1973Q1 and 2008Q3. Table 1 shows the results of unit root tests (ADF) that all time series are non-stationary in levels at 10% level of significance, except for investment (I). All series are stationary in first differenced form (at least 0.10 levels).

**Table 1 Results of Augmented Unit Root tests (*p*-values)**

	Data in levels Constant and trend	Data in first difference Constant
<i>LnCAB</i>	0.9961 (11)	0.0722 (13)
<i>LnGB</i>	0.7227 (7)	0.0019 (6)
<i>LnI</i>	0.0911 (12)	0.0004 (12)
<i>LnS<sup>P</sup></i>	0.1725 (12)	0.0114 (11)

Note: The number in (.) denotes the lag length suggested by AIC from a maximum of 13 lags.

#### *Empirical Results*

On the other hand, the results of Johansen's multivariate cointegration tests suggest at least one cointegrating vector among the four variables (i.e. 12 lags) which is consistent with theoretical intuition of two cointegrating relations as suggested by theories, namely twin deficits hypothesis (CAB and GB), and capital mobility hypothesis (S and I).

**Table 2 Johansen's multivariate cointegration tests**

Data Trend: Test Type	None No Intercept No Trend
<u>Lags interval: 1 to 4</u>	
Trace	1
Max-Eig	1
<u>Lags interval: 1 to 5</u>	
Trace	1
Max-Eig	1
<u>Lags interval: 1 to 12</u>	
Trace	2
Max-Eig	2

Notes; \*Critical values based on MacKinnon-Haug-Michelis (1999). VAR Lag Order Selection Criteria – Schwarz information criterion and Hannan-Quinn information criterion suggest 4, and 5 lags, respectively. Sequential modified LR test, Final prediction error, and Akaike information criterion 12 lags (maximum lag order)

The twin deficits hypothesis is typically tested by a simple linear regression equation i.e.  $LnCAB_t = b_1 LnBD_t + e_t$ . The OLS (ordinary least squared) estimation is presented as equation (6). The estimated elasticity is found to be close to unity, 0.978.

$$\begin{aligned} \text{Ln}\hat{CAB}_t &= 0.978\text{Ln}BD_t \\ (t\text{-ratios}) & (90.350) \end{aligned} \quad (5)$$

Implicitly, the residuals series of this specification does capture the omitted variables suggested by equilibrium relation (4), namely savings ( $S^P$ ), investment (I) (or capital mobility). Thus, the estimated residuals series of equation (5) does not reflect cointegration property between current account balance, and government budget position, but savings-investment relation. Following equation (4), an OLS regression model can be estimated i.e.  $CAB_t = b_1\text{Ln}BD_t + b_2\text{Ln}S^P_t - b_3\text{Ln}I_t + e_t$  where  $b_i$  are the estimated parameters, and  $e_t$  is residuals. Firstly, the coefficients of private saving ( $S^P$ ) and investment (I) are restricted as suggested by theory i.e.  $b_2 = 1$ , and  $b_3 = -1$ . The OLS estimator yields:-

$$\begin{aligned} \text{Ln}\hat{CAB}_t &= 1.000\text{Ln}BD_t + \text{Ln}S^P_t - \text{Ln}I_t \\ (t\text{-ratios}) & (102.705) \end{aligned} \quad (6)$$

The elasticity of BD is close to equation (5). Consistently, the restrictions imposed on private savings and investments reflect residuals series in equation (5). Equation (7) reports the estimates of parameters of equation (4) without any restrictions.

$$\begin{aligned} \text{Ln}\hat{CAB}_t &= 0.431\text{Ln}BD_t + 5.164\text{Ln}S^P_t - 4.707\text{Ln}I_t \\ (t\text{-ratios}) & (6.293) \quad (15.949) \quad (-15.204) \end{aligned} \quad (7)$$

All of the estimated parameters are statistically difference from zero with reasonable large  $t$ -ratios. Interestingly, the estimated coefficients for private saving ( $S^P$ ) and investment (I) both are not numerically equal to -1, and 1, respectively as theory suggests. The Wald test statistic ( $F$ -statistic) of testing the sum of coefficients of  $S^P$ , and I equals zero (i.e.  $H_0: b_2+b_3 = 0$ ) is 87.602 ( $p$ -value is 0.000) rejecting the null hypothesis, and the elasticity of budget deficit on current account balance is found to be inelastic, 0.431 which is half of the values estimated as equations (6) and (7), but it is statistically different from zero ( $t$ -ratio is 6.293) supporting twin deficits hypothesis for U.S. Undoubtedly, this observation further supports the theoretical view of omitting two important variables viz. private saving, and investment in testing twin deficits hypothesis (see Cavallo, 2005).

#### 4. Conclusion

This study proposes an alternative testing framework to the twin deficits hypothesis from the general equilibrium perspective, in which both private savings and investments are included. Empirical illustration of using U.S. data shows supportive evidence of the twin deficits model derived from general equilibrium perspective. The budget deficit elasticity decreases (almost half) when the general equilibrium approach applied. It supports the argument made by Cavallo (2005). And, this study suggests an alternative framework for twin deficits hypothesis for further research

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