Journal of Economic Cooperation, **28**, 4 (2007), 63-80

AN EMPIRICAL INVESTIGATION FOR THE TWIN DEFICITS HYPOTHESIS IN PAKISTAN

Tahir Mukhtar, Muhammad Zakaria and Mehboob Ahmed*

Pakistan constitutes a valuable case study for investigating the dynamics of persistently high rates of budget and current account deficits. In this paper an attempt has been made to empirically test the twin deficits hypothesis in Pakistan using quarterly time-series data for the period 1975 to 2005. The co-integration results indicate the existence of a long-run relationship between the deficits, while the Granger-causality test shows that bi-directional causality runs between the two variables. This finding casts doubt on the validity of the use of single-equation approach to analyze the twin deficits hypothesis. This implies that a more fruitful inquiry into the relationship between budget and current account deficits should be performed in the context of a simultaneous-equation model.

1. Introduction

Like most developing countries a steady budget deficit in Pakistan is considered to be the primary cause of all major ills of the economy. It has varied between 2.4 to 8.8 percent during the last two and half decades. On the other hand, the current account deficit varied between 0.7 to 7.2 percent during the same period. It remains a controversial issue that variations in fiscal policy can lead to predictable developments in an open economy's performance on current account. An important aspect of this issue concerns what is termed as the twin deficits hypothesis, according to which budget deficits and current account balances are very closely related so that reductions in the former are both necessary and sufficient conditions to obtain improved performance

* The authors are respectively Ph.D Scholars at the Department of Economics, Quaid-i-Azam University, Islamabad and Assistant Professor, Department of Economics, Allama Iqbal Open University, Islamabad.

in the later. The question about causality between the government budget balance and the current account balance is very important to investigate. If it is the case that an unbalanced budget causes predicted changes in current account then fiscal policy should be more prudent.

More elaborate explanations in support of the twin deficits hypothesis draw upon the quantitative perspectives provided in the context of the famous Mundell - Fleming framework of 1960s, Blanchard's (1985) overlapping generations model and ensuing versions put forth by Auerbach and Kotlikoff (1987) and other researchers who have attempted to resolve the question through complex mathematical simulations.

An examination of the representative literature on the underlying association of the twin deficits renders four alternative causal hypotheses as follows: (1) budget deficits cause current account deficits, (2) current account deficits cause budget deficits, (3) there is a bi-directional causality between the two variables, and (4) the two deficits are not casually related. Only hypothesis (1) is consistent with the conventional view that higher budget deficits are the main cause of higher current account deficits, though all four hypotheses are equally plausible on a priori theoretical grounds. For example, hypothesis (2) contends that the falling off of net exports, caused by factors other than the budget deficits, may impose increasing pressures on the government to expand its various spending programs. It is of course widely believed that during 1980s large current account deficits in the United States had harmed domestic manufacturing industries leading to unemployment and losses in foreign market shares. The agricultural sector also faced serious financial crises due to the weak trade performance. These deleterious economic and financial consequences of the current account deficits were understandably viewed with much concern in the United States by the business community, by labor leaders and, perhaps as a result, also by government officials. Government spending programs, therefore, might have been consciously expanded to aid farming sector and several manufacturing industries. Not only had government spending been increased, but government revenues had also declined due to depressed business activities in the export sector, and due to the automatic stabilizing aspect of fiscal policy. Under this scenario, therefore, it would be inappropriate to characterize the observed strong correlation between budget and current account deficits as one in which the former causes the latter in the United States. Of course, should causality be at least in part from current account deficit to budget deficit, as hypothesis (2) contends, then most previous studies in this area would suffer from simultaneous-equation bias rendering them biased and inconsistent.

Although the conventional view implies a significant association between the two variables, so do alternative hypotheses with quite different policy implications. If large budget deficit has not in fact caused high current account deficit, then focusing on measures to reduce budget deficit will not resolve the problem and, moreover, will divert attention from more relevant and urgently needed policy options that address productivity, competitiveness in foreign markets, and export promotion programs.

The persistent existence of budget deficit and current account deficit has been an important issue for policy makers in Pakistan. Moreover, given the emphasis on free trade, decentralization and growth, there is a need to understand the connection of fiscal and current account imbalances in Pakistan economy. For this purpose, the present study employs cointegrating technique, error correction model and causality test to investigate twin deficits phenomenon in Pakistan.

The rest of the paper is organized as follows. Section 2 provides literature review. Analytical framework is presented in section 3. Data description and empirical findings are given in section 4. The final section concludes the study.

2. Literature Review

The question of relationship between budget and current account deficits started to draw researchers' attention in the 1980's. At that time record budget deficit (BDEF) and current account deficit (CAD) emerged in many countries, including the United States. The twin deficits hypothesis asserts that an increase in budget deficit will cause a similar increase in current account deficit. But results of testing this hypothesis turned out different for different countries. Moreover, the results differ even in case of using different econometric techniques and model specifications for the same country data.

Researchers like Abell (1990), Islam (1998), Zietiz and Pemberton (1990), Bachman (1992), Kasa, K. (1994), Vamvoukas (1999), Aqeel and Nishat (2000), Piersanti (2000), Leachman and Francis (2002), Cavallo (2005) and Erceg, Guerrieri, and Gust (2005) supported the conventional view that the twin deficits are closely linked and causality runs from budget deficit to current account deficit. Other investigations of the correspondence between the two deficits include those undertaken by Laney (1984), Miller and Russek (1989), Dewold and Ulan (1990), Enders and Lee (1990), Boucher (1991), Evans (1993), Winner (1993), Kim (1995), Bartlett (1999), Papaioannou, Kei-Mu Yi (2001) and Kaufmann *et al*. (2002) do not detect a stable long-run association between the two deficits using variety of samples. Darrat (1988), Kearney and Monadjemi (1990) and Normandin (1999) have reported evidence supportive of bi-directional causality between the twin deficits. Some studies as Anoruo and Ramchander (1998), Khalid and Teo (1999) and Alkswani (2000) support the reverse causality running from current account to budget deficit. This reverse causation is designated in the terminology of Summers (1988) by current account targeting.

Although the present study does not include all studies of the twin deficits problem, we can see that the topic is interesting and different results for different countries may be got. Therefore, we want to investigate whether the statistical relationship between the government budget deficit and current account deficit in Pakistan is unidirectional, bi-directional or the two variables do not influence each other. To identify the relationship between the two time-series, cointegration and Granger causality tests are employed.

3. Analytical framework

3.1. Theoretical Basis for the Twin Deficits Hypothesis

Economic reasoning for connection between budget deficit and current account balance may be traced from the national income identity,

$$Y = C + I + G + (X - M) \qquad (3.1)$$

where Y, C, I and G stands for national income, private consumption, investment spending and government expenditures respectively; while X and M represents exports and imports of goods and services respectively. We define current account (CA) balance as:

$$CA = (X - M) + F \tag{3.2}$$

where F stands for net income and transfer flows. Thus, in addition to goods and services balance, the current account also includes income received from abroad or paid abroad and unilateral transfers. For simplicity, here we assume that net income form abroad and unilateral transfers are not large items in the current account. Therefore, the term F from the above equation can be excluded.

The current account shows the size and direction of international borrowing. When a country imports more than its exports, it has current account deficit, which is financed by borrowing from abroad. Such borrowing may be done by government (credits from the other governments, the international institutions or from private lenders) or by private sector of the economy. Private firms may borrow by selling equity, land or physical assets. So, a country with current account deficit must be increasing its net foreign debt (or running down its net foreign wealth) by the amount of the deficit. A country with current account deficit is importing present consumption and/or investment (if investment goods are imported) and exporting future consumption and/or investment spending.

According to the national income identity, national saving (S) in an open economy equals:

$$S = Y - C - G + CA \tag{3.3}$$

Alternatively the above equation can be written as:

$$S = I + CA \tag{3.4}$$

where $Y - C - G = I$ and *I*- stands for Investment.

It is worth to look at national saving more closely. We distinguish national saving between saving decisions made by the private sector (S_p) and saving decisions made by the government (S_g). Mathematically, we have,

$$S = S_p + S_g \tag{3.5}$$

S_p is that part of personal disposable income (i.e. income after tax) that is saved rather than consumed. In general we have:

$$S_p = Y_d - C = (Y - T) - C \tag{3.6}$$

where Y_d is personal disposable income, and T is tax collected by the government. Government saving (S_g) is defined as difference between government revenue collected in the form of taxes (T) and expenditures which is done in form of government purchases (G) and government transfers (R). Mathematically, we have

$$S_g = T - (G + R) = T - G - R \tag{3.7}$$

Now equation (3.5) in an identity form can be written as:

$$S = S_p + S_g = (Y - T - C) + (T - G - R) = I + CA \tag{3.8}$$

In order to analyze the effects of government saving decisions in an open economy, the above identity can be written as:

$$S_p = I + CA - S_g = I + CA - (T - G - R) \tag{3.9}$$

or alternatively we can have:

$$CA = S_p - I - (G + R - T) \tag{3.10}$$

where the term in parenthesis is consolidated public sector budget deficit (BDEF), that is, as government saving preceded by a minus sign. The government deficit measures the extent to which the government is borrowing to finance its expenditures. Equation (3.9) states that a country’s private saving can take three forms: investment in domestic capital (I), purchases of wealth from foreigners (CA), and purchases of the domestic government’s newly issued debt (G +R –T).

Looking at the macroeconomic identity (3.10), we can see that two extreme cases are possible. If we assume that difference between private savings and investment is stable over time, the fluctuations in the public sector deficit will be fully translated to current account and the twin deficits hypothesis will hold. The Public sector includes general government (local and central) and non-financial public enterprises (state enterprises like railroads, public utility and other nationalized industries). The second extreme case is known as Ricardian Equivalence Hypothesis, which assumes that change in the budget deficit will be fully offset by change in savings. The explanation is the following: a tax cut does not affect households' lifetime wealth because future taxes will go up to compensate for the current tax decrease. So, current private saving (S_p) rises when taxes fall (or accordingly budget deficit rises): households save the income received from the tax cut in order to pay for the future tax increase. Hence, a budget deficit would not cause a twin deficit.

3.2. Econometric Methodology

3.2.1. Cointegration Test

The concept of cointegration was first introduced by Granger (1981) and elaborated further by Engle and Granger (1987), Phillips and Ouliaris (1990) and Johansen (1991), among others. Engle and Granger cointegration (i.e. long run relationship) test requires that

- Time-series, say Y_t and X_t, are non-stationary in levels but stationary in first differences i.e. $\mathrm{Y}_t \sim I(1)$ and $X_t \sim I(1)$.

- There exists a linear combination between these two series that is stationary at levels i.e. $\upsilon_{it} (= Y_t - \hat{\alpha} - \hat{\beta} X_t) \sim I(0)$.

Thus, the first step for cointegration is to test whether each of the univariate series is stationary or not. If they both are stationary say at first difference i.e. they are $I(1)$, then we may go to the second step to verify the long run relationship between them.

Augmented Dickey Fuller (ADF) test is usually applied to test stationarity. It tests the null hypothesis that a series (Y_t) is non-stationary by calculating a t-statistics for $\beta = 0$ in the following equation:

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \gamma_t + \sum_{k=2}^{n} \delta_k \Delta Y_{t-k} + \varepsilon_t \qquad (3.11)$$

where $\Delta Y_t = Y_t - Y_{t-1}$, $\Delta Y_{t-k} = Y_{t-k} - Y_{t-k-1}$ and $k = 2,3,.....,n$. While α, β, γ and δ are the parameters to be estimated and ε_t is white noise error term.

If the value of the ADF statistic is less than the critical value at the conventional significance level (usually the five per cent significant level) then the series (Y_t) is said to stationary and vice versa. If Y_t is found to be non-stationary then it should be determined whether Y_t is stationary at first differences i.e. $\Delta Y_t (= Y_t - Y_{t-1}) \sim I(0)$ by repeating the above procedure. If the first difference of the series (ΔY_t) is stationary then the series (Y_t) may be concluded as integrated of order one i.e. $Y_t \sim I(1)$. Now we can move to the second step to check cointegration.

In order to test cointegration, we will apply two-step residual based test of Engle and Granger (1987). In the first step we apply OLS to the following regression equation in which all variables are found to be integrated of the same order [e.g. $I(1)$].

$$Y_t = a + bX_t + \upsilon_t \qquad (3.12)$$

The second step involves testing whether the residual term υ_t from the cointegrating regression equation (2) is stationary [i.e. $\upsilon_t \sim I(0)$] using a modified ADF test

$$\Delta \upsilon_t = \vartheta \upsilon_{t-1} + \sum_{k=2}^{n} \theta_k \Delta \upsilon_{t-k} + \mu_t \qquad (3.13)$$

where υ_t, υ_{t-1}, υ_{t-k} and υ_{t-k-1} are, respectively, residuals at time t, $t-1$, $t-k$ and $t-k-1$. While ϑ and θ are parameters to be estimated and u_t is the residual term.

The constant and the time trend are omitted from the ADF test because the residual from the cointegrating regression will have a zero mean and be de-trended. The null hypothesis of $\vartheta = 0$ is tested to check the stationarity of the residual. If the value of *t*- statistic of the ϑ coefficient is less than the critical value then the null hypothesis of non-stationarity is rejected and the residual is found to be stationary at levels. This, in turn, leads to the conclusion that long-run cointegration holds between two time-series.

3.2.2. Error Correction Model (ECM)

If time-series are I (1), then one could run regressions in their first differences. However, by taking first differences, we lose the long-run relationship that is stored in the data. This implies that one needs to use variables in levels as well. Advantage of the Error Correction Model (ECM) is that it incorporates variables both in their levels and first differences. By doing this, ECM captures the short-run disequilibrium situations as well as the long-run equilibrium adjustments between variables. An ECM formulation, which describes the relationship between Y_t and X_t , can be presented as

$$\Delta Y_t = \omega_1 + \omega_2 \Delta X_t - \rho \hat{\upsilon}_{it-1} + \nu_{it} \quad (3.14)$$

In this model, ω_2 is the impact multiplier (the short-run effect) that measures the immediate impact that a change in X_t will have on a change in Y_t. On the other hand, ρ is the feedback effect or the adjustment effect that shows how much of the disequilibrium is being corrected, that is the extent to which any disequilibrium in the previous period effects any adjustment in the Y_t period.

3.2.3. Granger Causality Test

If a pair of series is cointegrated then there must be Granger-causality in at least one direction, which reflects the direction of influence between series. Theoretically, if the current or lagged terms of a time-series variable, say X_t, determine another time-series variable, say Y_t, then there exists a Granger-causality relationship between X_t and Y_t, in which Y_t is Granger caused by X_t. From the above analysis, the model is specified as follows.

$$\Delta Y_t = \theta_{11}\Delta Y_{t-1} + ... + \theta_{1n}\Delta Y_{t-n} + \theta_{21}\Delta X_{t-1} + ... + \theta_{2n}\Delta X_{t-n} - \gamma_1(Y_{t-1} - \alpha X_{t-1} - \delta) + \varepsilon_{1t} \quad (3.15)$$

$$\Delta X_t = \theta_{31}\Delta X_{t-1} + ... + \theta_{3n}\Delta X_{t-n} + \theta_{41}\Delta Y_{t-1} + ... + \theta_{4n}\Delta Y_{t-n} - \gamma_2(Y_{t-1} - \alpha X_{t-1} - \delta) + \varepsilon_{2t} \quad (3.16)$$

The following two assumptions are tested using the above two models to determine the Granger causality relationship between prices.

$\theta_{21} = \cdots = \theta_{2n} = \cdots = \gamma_1 = 0$ (no causality from X_t to Y_t)
$\theta_{41} = \cdots = \theta_{4n} = \cdots = \gamma_2 = 0$ (no causality from Y_t to X_t)

4. Data, Estimation and Interpretation of Results

The study uses quarterly observations for the period 1975 to 2005. The main focus of this paper is on government budget deficit (BDEF) and current account deficit (CAD). The data, seasonally unadjusted and expressed in nominal terms, is obtained from various issues of *International Financial Statistics*, International Financial Corporation and *Economic Survey*, Government of Pakistan. Both the BDEF and CAD are expressed as ratios of the nominal GDP.

Economic time-series data are often found to be non-stationary, containing a unit root. Ordinary Least Squares (OLS) estimates are efficient if variables included in the model are stationary of the same order. Therefore, first we need to check the stationarity of BDEF and CAD. For this purpose we apply Augmented Dickey-Fuller (ADF) test. Table 1 gives the results of ADF tests. Based on the ADF tests, BDEF and CAD appear to be stationary at levels but non-stationary at first difference. Thus, we may conclude that these variables are integrated of order one i.e. $I(1)$.

Table 1. Augmented Dickey-Fuller (ADF) Test on the Levels and on the First Difference of the Variables (1975Q1 – 2005Q4)

Variables	Level	First Difference	Mackinnon Critical Values for Rejection of Hypothesis of a Unit Root			Decision	Order of Integration
			1 %	5 %	10 %		
Budget Deficit (BDEF)	-0.8135	-13.1953	-2.5824	-1.9425	-1.6171	Nonstationary at level but stationary at first difference	*I* (1)
Current Account Deficit (CAD)	-0.1360	-7.9625	-2.5824	-1.9425	-1.6171	Nonstationary at level but stationary at first difference	*I* (1)

Now we test cointegration between BDEF and CAD in Pakistan. This would help us to identify, if there exists, an equilibrium relationship between these two variables. Results of regression equation (3.12) and ADF test for the residual, υ_t, are presented in Tables 2 and 3 respectively. We can see that the residual is stationary at level that is it is integrated of order zero. This validates our proposition that BDEF and CAD are indeed cointegrated that is a long-run relationship between them holds.

Table 2. Empirical Findings of the Model (1975Q1-2005Q2)

Dependent Variable: Current Account Deficit (CAD)	
Constant	-2.5133
	(-1.5864)
Budget Deficit (BDEF)	0.8164
	(10.6123)*
AR (1)	0.5196
	(6.6313)*
R^2	0.7052
Adjusted R^2	0.6917
DW	2.0993
F-Stat	138.9012
Prob (F-Stat)	0.0000
Number of Obs.	123

Note: Values in parentheses show t-statistics. The statistics significant at 5 % level of significance are indicated by *.

Table 3. Augmented Dickey-Fuller Test for the Residuals

Estimated Residuals	Level	Mackinnon Critical Values for Rejection of Hypothesis of a Unit Root 1 %	5 %	10 %	Decision	Order of Integration
υ_t	-11.9684	-2.5825	-1.9426	-1.6171	Stationary at level	$I\,(0)$

In order to check stability of long-run relationship between BDEF and CAD, we estimate Error-Correction Model. The results are presented in Table 4. The short run effect of BDEF on CAD is insignificant, while the long run adjustment impact of BDEF on CAD is significant. The adjustment parameter (ρ) appears with negative value indicating the long-run convergence. The ECM estimation reveals that 72% of the disequilibrium in CAD produced by BDEF would be adjusted in every quarter. Thus, there is a stable long-run relationship between BDEF and CAD.

Table 4. Empirical Findings of Error Correction Model

Dependent Variable: D(CAD)	
Constant	-0.0746
	(-0.3119)
D(BDEF)	-0.0932
	(-0.2569)
ρ	-0.7276
	(-9.1936)*
R^2	0.4703
Adjusted R^2	0.4682
DW	2.0807
F-Stat	29.2520
Prob(F-Stat)	0.0000
Number of Obs.	122

Note: Values in parentheses show t-statistics. The statistics significant at 5 % level of significance are indicated by *.

To check the causal relationship between the variables we have applied Granger-causality test using lag length up to four periods. The following four hypotheses are tested.

1. BDEF Granger causes CAD
2. CAD Granger causes BDEF
3. Causality runs in both directions
4. BDEF and CAD are independent

The results are filed in Table 5. The results show that the hypothesis that BDEF does not Granger cause CAD is rejected. This, of course, accords with the conventional hypothesis (1). But, one should immediately note that in the same table the null hypothesis that CAD does not Granger-cause BDEF is also rejected. It validates the reverse hypothesis (2). These results, taken together, support hypothesis (3) and suggest that while budget deficit has caused current account deficit, strong significant feedback does exist which in effect makes causality between the two variables rather bi-directional. Consequently, the high association between budget and current account deficits observed in last two and half decades in Pakistan appears to be at least partly the outcome of the government's preoccupation with the size of the current account deficit. This finding additionally implies that any investigation of the impact of budget deficit on current account deficit should be performed within a simultaneous-equation model. Consequently, one may argue that previous studies in this area that a priori assume budget deficit to be exogenous could be biased and inconsistent.

Table 5.Causality Patterns

Lagged Years	Null Hypothesis	Decision
1	No causality from BDEF to CAD	Rejected
	No causality from CAD to BDEF	Rejected
2	No causality from BDEF to CAD	Rejected
	No causality from CAD to BDEF	Rejected
3	No causality from BDEF to CAD	Rejected
	No causality from CAD to BDEF	Rejected
4	No causality from BDEF to CAD	Rejected
	No causality from CAD to BDEF	Rejected

5. Conclusions

Pakistan constitutes a valuable case study for investigating the dynamics of persistently high rates of budget deficit and current account deficit. The aim of this paper is to examine empirically the conventional argument that the budget deficit significantly affect current account deficit in Pakistan. Generally, empirical support for this proposition in an economy has been primarily based either on direct observation of the data or on some correlation-based analyses. Such an approach is clearly inadequate to identify the nature of the causal linkage between budget and current account deficits. Indeed, analyses of this type cannot discriminate between four alternative but equally plausible hypotheses, each with different policy implications. These are that budget deficits cause current account deficits (the conventional view), that current account deficits cause budget deficits, that there is a bi-directional causality between the two variables and finally that both variables (although highly correlated) are causally independent. The causality approach, therefore, provides a useful means of discriminating among these alternative hypotheses.

The present study uses quarterly data for Pakistan for the period 1975 to 2005 on budget deficit and current account deficit and is based on cointegration analysis, ECM strategy and Granger causality tests. The empirical results only partially support the conventional view that budget deficit has positive and significant long run causal effect on current account deficit in Pakistan. We do find evidence of budget deficit-to-current account deficit causality, but also find, perhaps an equally stronger, evidence of current account deficit-to-budget deficit causality. Such bi-directional causality link is consistent with the third alternative hypothesis and is of course suggestive of a simultaneous determination of these two key variables. If true, this finding casts serious doubt on the validity of the use of single-equation approach to empirically test the twin deficits hypothesis. Indeed, this implies that a more fruitful inquiry into the relationship between budget and current account deficits should be performed in the context of a simultaneous-equation model.

References

Abell, J. D. (1990), "Twin Deficits During the 1980s: An Empirical Investigation", *Journal of Macroeconomics*, 12: 81-96.

Alkswani, M. A. (2000), *The Twin Deficits Phenomenon in Petroleum Economy: Evidence from Saudi Arabi*a, Presented at the Seventh Annual Conference, Economic Research Forum (ERF), 26-29 October, Amman, Jordan.

Anoruo, E. and S. Ramchander (1998), "Current Account and Fiscal Deficits: Evidence from Five Developing Economies of Asia", *Journal of Asian Economics*, 9(3): 487-99.

Aqeel, A and M.Nishat (2000), "The Twin Deficits Phenomenon: Evidence from Pakistan", *The Pakistan Development Review*, 39(4): 535-50.

Auerbach, A. and L. J. Kotlikoff (1987), *Dynamic Fiscal Policy*, Cambridge University Press.
Bachman, D. D. (1992), "Why is the US Current Account Deficit So Large: Evidence from Vector Autoregressions", *Southern Economic Journal*, 59: 232-40.

Barlett, B. (1999), *Current Account Deficit Unrelated to Budget Surplus*, National Center for Policy Analysis, (Draft available at *http://www.ncpa.org. /barlett.html*).

Blanchard, J. O. (1985), "Debt, Deficits, and Finite Horizons", *Journal of Political Economy*, 93(2): 223-47.

Boucher, J.L. (1991), "The U.S. Current Account: A Long and Short Run Empirical Perspective", *Southern Economic Journal*, 58(1): 93-111

Cavallo, M. (2005), *Government Consumption Expenditures and the Current Account*, FRBSF Working Paper 2005-03. http://www.frbsf.org/publications/economics/papers/2005/wp05-03bk.pdf.

Darrat, A. F. (1988), “Have Large Budget Deficits Caused Rising Trade Deficits?”, *Southern Economic Journal*, 54(4): 879-87.

Dewold, W. G. and M. Ulan (1990), “The Twin Deficit Illusion”, *Cato journal*, 10: 689-707.

Enders, W. and B. S. Lee (1990), “Current Account and Budget Deficits; Twin or Distant Cousins?”, *The Review of Economics and Statistics*, 72: 373-81.

Engle, R. F. and C. W. J. Granger (1987), “Cointegration and Error Correction Representation, Estimation and Testing”, *Econometrica,* 55: 251-76.

Erceg, C. J., L. Guerrieri and C. Gust (2005), *Expansionary Fiscal Shocks and the Trade Deficit,* International Finance Discussion Paper No. 2005(825), Federal Reserve Board.

Evans, P. (1988), *Do Budget Deficits Affect the Current Account*?, Unpublished Paper, Ohio State University.

Fleming, M. (1962), “Domestic Financial Policies Under Fixed and Under Floating Exchange Rates”,*IMF Staff Papers*,9:369-79.

Granger, C. W. J. (1981), “Some Properties of Time Series Data and Their Use in Econometric Model Specification”, *Journal of Econometrics*, 16: 121-30.

Islam, M. (1998), “Brazil’s Twin Deficits: An Empirical Examination”, *Atlantic Economic Journal*, 26(2): 121-29.

Johansen, S. (1991), “Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models”, *Econometrica*, 59: 1551-80.

Kasa, K. (1994), “Finite Horizons and the Twin Deficits.” *Economic Review*, Federal Reserve Bank of Boston, 3: 19-28.

Kaufmann, S., Scharler, J. and Winckler, G. (2002), "The Austrian Current Account Deficit: Driven by Twin Deficits or by Intertemporal Expenditure Allocation?", *Empirical Economics* 27: 529-42.

Kearney, C. and M. Monadjemi (1990), "Fiscal Policy and Current Account Performance: International Evidence on the Twin Deficits", *Journal of Macroeconomics*, 12(2): 197-219.

Khalid, A. M. and W. G. Teo (1999) "Causality Tests of Budget and Current Account Deficits: Cross-Country Comparisons', Empirical Economics 24: 389-402.

Kim, K. H. (1995), "On the Long Run Determinants of the US Trade Balance: A Comment", *Journal of Post Keynesian Economics*, 17: 447-55.

Laney, L. (1984), "The Strong Dollar, the Current Account and Federal Deficits: Cause and Effect", *Federal Reserve Bank of Dallas Economic Review*, 1: 1-14.

Leachman, L. L. and B. Francis (2002), "Twin Deficits: Apparition or Reality?", *Applied Economics*, 34: 1121-32.
Miller, S. M., and F. S. Russek (1989), "Are the Twin Deficits Really Related?", *Comentary Policy Issues*, 7: 91-115.

Mundell,R.(1963), "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates", *Canadian Journal of Economics and Political Science*,29:475-85.

Normandin, M. (1994), *Budget Deficit Persistence and the Twin Deficits Hypothesis,* Working Paper No. 1994(31), Center for Research on Economic Fluctuations and Employment, Universite du Quebec, Montrel.

Papaioannou, S. and K. Yi (2001), "The Effects of a Booming Economy on the U.S. Trade Deficit", Current Issues in Economics and Finance, Federal Reserve Bank of New York, 7(2).

Phillips, P. C. B. and S. Ouliaris (1990), “Asymptotic Properties of Residual Based Tests for Cointegration”, *Econometrica*, 58: 165-93.

Piersanti, G. (2000), “Current Account Dynamics and Expected Future Budget Deficits: Some International Evidence”, *Journal of International Money and Finance* 19:255-171.

Summers, L. (1988), “Tax Policy and International Competitiveness”, in J. A. Frenkel (ed.), *International Aspects of Fiscal Policies (NBER Conference Report)*, (Chicago: University of Chicago Press), 349-75.

Vamvoukas, G. (1999), “The Twin Deficits Phenomenon: Evidence from Greece”, *Applied Economics,* 31: 1093-1100.

Winner, L. E. (1993), “The Relationship of the Current Account Balance and the Budget Balance”, *American Economist*, 37(2): 78-84.

Zietiz, J. and D. K. Pemberton (1990), “The US Budget and Trade Deficits: A Simultaneous Equation Model”, *Southern Economic Journal*, 57: 23-34.