General Equilibrium Perspective on Twin Deficits Hypothesis: An Empirical Study with US Results

Tuck Cheong Tang

Department of Economics, Faculty of Economics and Administration, University of Malaya, Kuala Lumpur, Malaysia

Published online: 25 Feb 2015.


To link to this article: http://dx.doi.org/10.1080/1226508X.2015.1015041

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the “Content”) contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms &
General Equilibrium Perspective on Twin Deficits Hypothesis: An Empirical Study with US Results

TUCK CHEONG TANG
Department of Economics, Faculty of Economics and Administration, University of Malaya, Kuala Lumpur, Malaysia

ABSTRACT This study proposes an alternative analytical framework for testing the so-called twin deficits hypothesis from the general equilibrium perspective. The income–expenditure equilibrium takes both the behavioural relationships of the saving and investment into consideration. The empirical results of cointegration tests show that the US fiscal balance, current account balance, real income and interest rates (short- and long-run) are co-movement for the observed periods between 1970Q2 and 2011Q4. Also, the causality tests suggest that budget deficit does indirectly Granger-cause current account deficit via short-run interest rate and real income. The real income and interest rates variables determining the behavioural relationships are important in understanding the US twin deficit slogan. In short, the empirical results validate the twin deficits hypothesis in the USA. Some policy implications have been drawn, especially on the implementation of the “fiscal cliff” policy. This study also recommends portfolio balance approach for future twin deficits research.

KEY WORDS: Budget deficit; current account balance; general equilibrium perspective; income–expenditure equilibrium; the USA

JEL CLASSIFICATION: F32

1. Introduction

The historical statistics reported by the OECD Economic Outlook show the US economy is in fiscal deficits or “government dis-savings” over the past decades (in between 1970 and 2011), except for 1973 and 1998–2001. The US current account balances were only posted in surpluses for the years of 1970, 1973–1976, 1980–1981 and 1991, respectively. It has been scholarly labelled that the US trade (current account) deficits are mainly driven by the skyrocketing federal budget deficit (Darrat, 1988, p. 879) – twin deficit slogan. Hence, the unprecedented increase of both the US fiscal budgetary deficit and current accounts imbalances in particular during the
1980s has advocated the theoretical formulation of, and empirical examination on, the so-called twin deficits hypothesis. According to this hypothesis, a larger budget deficit results to an expanded current account deficit by its effect on national saving and consumption (Bartolini & Labiri, 2006, p. 6). Theoretically speaking, such a fiscal deficit will cause a similar increase in current account imbalances.\(^1\) The Keynesian loanable funds theory postulates that budget deficit would cause high interest rates as large of the US budget deficits financed by the sale of bonds (Darrat, 1989, p. 363) causing capital inflows and appreciation of exchange rates; hence widen the current account deficits. According to Bartolini and Labiri (2006, p. 5), that “Each dollar rise in the fiscal deficit is associated on average with a 30 cent decline in the current account” (from regression results of 18 OECD countries). It is “too weak” to support the fiscal policy that cutting down budget deficit in the USA can play a major role in improving the nation’s current account deficits with the rest of the world. Consistently, Corsetti and Muller (2006) based on their empirical results do suggest a fiscal retrenchment in the USA may have a limited impact on its current external deficit. In the 1990s, Sweden and Germany have also fallen into the similar situation where the rise in budget deficits has deteriorated their current accounts positions with real appreciation of their national currencies (Ibrahim & Kumah, 1996, p. 117). Bernheim (1989) analysed the economic [real] effects of budget deficits from the three schools of thought, namely Neoclassical, Keynesian and Ricardian. The study recommends that the Neoclassical paradigm offers the most relevant insights for public policy. It advocates that budget deficits raise total lifetime consumption by shifting taxes to subsequent generations (by assuming full employment of economic resources), the increased consumption necessarily implies a decrease in savings, and raise interest rates to bring capital markets into balance. Thus, the persistent deficits do “crowd out” private capital accumulation (Bernheim, 1989, p. 55). Vamvoukas (1999) empirically examined the validity and rationale of the Keynesian proposition (conventional view) and the Ricardian equivalence hypothesis, and the results suggest that budget deficit has short- and long-run positive and significant causal effects on trade deficit.

Figure 1 presents the correlation relationship between the US current account balance and budget balance for the sample period of 1970Q2–2011Q4. A few of interesting features are visually abstracted from this correlation. A plotted simple linear regression line technically shows a weak positive correlation between budget balance and current account balance. An increase in budget deficit will make the country’s current account deficit worsen. But, this statement is poorly hold for those observations boxed in Figure 1. Some observations are considered as outliers. A negative correlation is available between budget balance and current account balance from the observations pinned on the left quadrant – an improvement in budget deficit may worsen the current account deficit. Interestingly, most of the observations are randomly clustered on the north-east quadrant. Any negative empirical results involved only for two balances (e.g. fiscal and current account) which are subjected to structural misspecification as more information have been digested by the “black hole”, resulting no correlation between the two deficits. From Figure 1, the twin deficits phenomenon is found to be virtually weak in the USA. They are artificially the mirror images of each other. Without taking the general equilibrium approach
into account, empirical relationships between the two deficits accounts are considered to be vulnerable.

Generally speaking, there are four “popularized” hypotheses on the causation between fiscal deficit and trade (current) account balance: (1) budget deficits cause trade deficits (hence, the well-examined Keynesian twin deficits hypothesis); (2) trade deficits cause budget deficits (current account targeting hypothesis); (3) budget deficits and current account deficits are causally independent (Barro-Ricardo Equivalence Theorem); and (4) both accounts deficits are mutually causal. The theoretical view of the first hypothesis has been briefly explained in previous paragraph. The second causal relationship is from current account deficit to budget deficit that reflects the deterioration in current account leads to slower pace of economic growth and hence increases the budget deficits as advocated by the Keynesian view on the expansion fiscal policy (i.e. increases the government spending). This hypothesis is often labelled by economists “long-run current account targeting”. The third hypothesis is so-called Ricardian equivalence hypothesis testing for no relationship between the budget deficit and current account deficit. The essential of Ricardian view is that fiscal deficits merely postpone taxes (Bernheim, 1989, p. 63). Given an assumption of an increase of taxes in future, the future disposable income is expected to drop and it offsets the consumption that increases private savings to smooth out the expected decrease in income; hence fiscal imbalances have no real effects. This hypothesis is also theoretically supported by the another view that budget and current account deficits are themselves influenced by their own factors, and the apparent association between the two variables is rather elusive (Darrat, 1988, pp. 880–881). The last hypothesis describes a bidirectional causality between the current account and budget deficits or to say that they are mutually dependent (e.g. Darrat, 1988; Abell, 1990). Indeed, this phenomenon is hypothesized from both the first and the second hypotheses.

Figure 1. Scatter Plot of Current Account Balance (lnCAD) and Budget Balance (lnBD).

Source: OECD Economic Outlook.
This study is motivated by various strands of literature that focus on twin deficits hypothesis. With the introduction of some so-called advanced and new econometric approaches, many empirical studies have re-examined the relationship between budget balance and current (trade) account balance – the twin deficits hypothesis. Among the well-employed testing methodology are the vector autoregressions (VARs) approach-based cointegration tests, Granger causality tests, impulse response functions and variance decompositions analysis. However, their empirical findings are inclusive since their empirical settings are based on an ad hoc specification without a proper theoretical derivation that may artificially compute a positive finding validating the twin deficits hypothesis. According to Brooks and Fausten (1998, p. 152), “… the nature of an external imbalance can be understood correctly only from a general equilibrium perspective”. This study takes this concern into account and fills the gap by applying the income–expenditure equilibrium (demand side) from the general equilibrium perspective.

Bringing together the insights generated from these strands of literature, this study offers:

1. An alternative testing framework (structural equation) to re-examine the twin deficits hypothesis that derived from the general equilibrium perspective that is to utilize the income–expenditure approach. It does consider the role of goods and services market clearing condition that involves the behavioural determinations of private saving and domestic investment variables;

2. An appropriate testing methodology that considers both cointegration and coefficients tests as suggested by the income–expenditure equilibrium including causality method; and

3. Extra empirical evidence of twin deficits hypothesis for a well-studied nation, the USA, and enrich the existing literature. The empirical results show a positive finding of the twin deficits model derived from the income–expenditure equilibrium.

Next section is about the literature review for a few of selected empirical studies. Section 3 sets up a simple theoretical framework for understanding the twin deficits phenomenon that derived from the income–expenditure equilibrium (i.e. goods and services market), in general equilibrium perspective. Section 4 describes the data and presents the empirical results obtained. Section 5 concludes the study and suggestions for future research.

2. Literature Review – Selected Studies

From the literature search, most of the existing studies have directly examined the twin deficits hypothesis in a bivariate framework either the budget deficit does cause current account deficit or not. Some studies include other variables that are in a multivariate setting in order to avoid the bias of using two variables. Among them, Darrat (1988) considered the US quarterly data 1960–1984, and the empirical results of multivariate Granger causality test show that the budget deficit does Granger-cause current account deficit. A causality from current account to budget balance is hold. Another included endogenous variables are monetary base, real output, inflation, labour cost, exchange rate, short-term interest rate, long-term interest rates
and foreign real income. The current account balance is also explained by other
variables such as exchange rate, monetary base, short-term interest rates, long-term
interest rates, inflation and foreign real income. Using the same research methodology,
Abell (1990)’s study supports the twin deficits hypothesis, but their relationship
is through the transmission mechanisms of interest rates and exchange rates. The
sample period is between 1979 and 1985. Other variables included in the multivariate
framework are money supply (M1), interest rates (Moody’s AAA rated bonds), real
exchange rate, real disposable personal income and consumer price index. Ibrahim
and Kumah (1996) find that budget deficit does increase the interest rate differential
and do worsen the current account balance for the cases of Germany, Japan, Sweden
(2006) examined the fiscal and current account balances in OECD countries covering
the observations between 1990 and 2005. They find most of the changes in fiscal and
current account balances accord with the predictions of the twin deficit hypothesis.4
However, it is an interesting finding from them that improving US fiscal accounts
from 1992 to 2000 were associated with a worsening US current account. Vamvoukas
(1999)’s study employed a set of econometric tests (cointegration analysis, error-
correction modelling and Granger trivariate causality), and twin deficits hypothesis is
hold in Greece. Lau et al. (2010) also documented that causality runs from budget
deficit to current account deficit for Malaysia, the Philippines (pre-crisis) and
Thailand, which fits well with the Keynesian view

Other group of studies such as Lau et al. (2010) find that the causality pattern is in
an opposite direction that is from current account deficit to budget deficit for the case
of Indonesia and South Korea. Also, other studies by Kearney and Monadjemi
(1990), Argimon and Roldán (1994) and Alkswani (2000) support this reversed
causation. For example, Alkswani (2000) studied the twin deficits hypothesis by
using Saudi Arabia’s data from 1970 to 1999, and the empirical result suggests that
trade deficit does Granger-cause budget deficit. However, some studies support the
view that both deficits are mutually dependent. Darrat (1988)’s study finds that both
accounts deficits are mutually causal concluding the current account and budget
deficits are mutually dependent. Ibrahim and Kumah (1996) finds a bilateral
causality between trade deficits and budget deficits for Brazil from 1973 through
1991. Also, Lau et al. (2010) re-examined the twin deficits hypothesis for the Asian
crisis-affected countries. Their results suggest a bidirectional causality exists for the
Philippines in the post-crisis era. It is crucial to highlight that such hypothesis is
vulnerable and their finding was artificially determined from the Granger’s view of
causation. Impressionistically, it is to say that the interpretation of two patterns
(bi-direction causality) occurred simultaneously at the same time, is difficult. For
example, given a fixed sample period, once a causal relation is empirical identified from
X to Y (or Y to X), a feedback (reversed) causal relation is impossible. Economically, it
reinforces the intuition that temporally based causality relationships may not reveal the
true structural relationship that exists between the budget balance and the current
account balance. The past studies fail to put an attention on this concern. Hence, the
present study focuses on the first hypothesis – the twin deficits hypothesis.

Some studies also examine the co-moving or cointegration between budget deficit
and fiscal deficit with application of the appropriate testing methods. For example,
Miller and Russek (1989) suggest no cointegration (i.e. long-run equilibrium
relationship) between both the fiscal and current account deficits. This negative finding can be explained by a low power of the employed statistical tests stemming from the shortness of the sample period under study. This “common factor”, however, can be handled with care by either employing a longer sample period or using more appropriate of testing methods with relevant critical values, see Narayan (2005). Other reason explaining the weak validation of twin deficits hypothesis is the bias of using bivariate framework which ignores the potential influences of other variables, either by a trivariate or multivariate framework. Daly and Siddiki (2009) find an empirical evidence of a long-run relationship between budget deficits, real interest rate and current account deficit in 13 out of 23 countries. Other study filling this gap is by Ibrahim and Kumah (1996).

Nevertheless, the twin deficits hypothesis remains controversy for continuing research among economists through the current decade. Chihi and Normandin (2013) confirm that the current account and budget deficits of developing countries are positive co-movement. The annual observations cover the post-1960 era, and the empirical tests are statistically significant for many cases (of 24 countries). In general, they find that the domestic resources net of public absorptions is an important factor to explain the positive cointegration between the two deficits. Trachanas and Katrakilidis (2013)’s study provide an empirical support of the twin deficits hypothesis for the five-sampled European economies (Portugal, Ireland, Italy, Greece and Spain) from the period of 1975–2009. Their empirical results take into account the presence of structural breaks and asymmetries, and the budget deficit improvement has greater impact on the external deficit rather than the opposite. More recently, Xie and Chen (2014) considers a sample of 11 Organization for Economic Co-operation and Development (OECD) countries, i.e. Belgium, Finland, France, Greece, Iceland, Ireland, Norway, Spain, Sweden, Switzerland and the UK for the annual period 1980–2010. The panel Granger causality results (with bootstrap critical values) suggest a bidirectional causality between the current account deficit and budget deficit for the 11 OECD countries.

Akanbi (2014) empirically studied the linkages between fiscal balance and the current account in Nigeria over the sample period 1970–2012. The study separated the effects of oil and took into consideration of the contemporaneous effects of exchange rate fluctuations, GDP growth and money supply. The cointegration results (Johansen multivariate tests) confirm a positive long-run relationship between government budget balance and the current account balance. Also, the twin deficits hypothesis is supported by the non-oil segment. In addition, Tosun et al. (2014)’s study considers some selected Central and Eastern European economies, namely Bulgaria, Latvia, Lithuania, Poland, Romania, Serbia and Slovenia. But, their results of cointegration (i.e. bounds testing approach) and Granger non-causality tests reject the twin deficits hypothesis, except for Bulgaria. Elhendawy (2014) provides an empirical support of the twin deficit hypothesis for the cause of Egypt. Gabrisch (2014) investigated the increasing deficits in the trade and current accounts of three post-transition countries, namely Czech Republic, Hungary and Poland. The empirical results of cointegration and other techniques reject the twin deficits hypothesis. The study found that the specific transition factors – net capital flows and import intensity of exports – do affect the countries’ external deficit. Other studies are Islam (1998), and Bluedorn and Leigh (2011). From the literature survey,
most the studies fallen into this category, the model is intended to represent an ad hoc-reduced form rather than a behavioural structure that derived systematically from the relevant theoretical theory, in particular, from the general equilibrium perspective.

3. Theoretical Framework

This study extends the theoretical framework employed in Corsetti and Muller (2006)’s study by further considering the behavioural relations from the income–expenditure equilibrium (i.e. from the demand side) in general equilibrium perspective. Accordingly, a simple accounting suggests that shocks to the government budget move the current account in the same direction. According to them (Corsetti & Muller, 2006, p. 614), a general equilibrium model illustrates an equation that:

\[
\text{Current account deficit} = 0.5[(\text{Investment} - \text{Investment}_{\text{ROW}}) - (\text{Private Saving} - \text{Private Saving}_{\text{ROW}}) + (\text{Budget Deficit} - \text{Budget Deficit}_{\text{ROW}})].
\]

Applying income–expenditure approach, Tang and Lau (2011) examined the US twin deficits hypothesis with inclusion of two new variables, namely planned private saving (\(S_{p}^{t}\)) and planned domestic investment (\(I_{t}\)), that is \(\text{CAB}_{t} = BD_{t} + S_{p}^{t} - I_{t}\), a relationship which characterizes an open economy. However, the behavioural contents of \(S_{p}^{t}(.)\) and \(I_{t}(.)\) have been ignored by their analysis. This study fills this gap. Other things being equal, a precise focus on this relation yields two expected observations. The first is the existence of 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 relations 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 saving and investment) do play a crucial role in validating this relationship as noted early by Cavallo (2005).

In equilibrium, all of the markets must clear. In the goods and services market, this means that planned expenditure (\(E\)) equals planned output (\(Y\)) per period:

\[E_{t} = Y_{t}\]

Given that \(E_{t} = C_{t} + I_{t} + G_{t} + X_{t} - M_{t}\), and \(Y_{t} = C_{t} + S_{p}^{t} + T_{t}\), the income–expenditure equilibrium condition can be rewritten as Equation (2):

\[I_{t} + G_{t} + X_{t} = S_{p}^{t} + T_{t} + M_{t}\]

where \(C\) is domestic consumption of goods and services; \(I\) is domestic investment, \(G\) is domestic government expenditure, \(X\) is exports of goods and services, \(M\) is imports of goods and services; \(S_{p}\) is private sector saving; and \(T\) represents total tax revenue accruing to the domestic government.

The public saving (\(S_{p}^{t}\)) is \(T_{t} - G_{t}\) and that the sum of public and private saving represents national saving (\(S_{n}^{t}\)) it follows that the trade balance is equal to planned net national saving (\(S_{n}^{t} - I_{t}\)):

\[X_{t} - M_{t} = S_{n}^{t} - I_{t}\]

This condition implies that for goods market equilibrium, the net imports (\(M_{t} - X_{t}\)
must provide the resources to cover the excess of investment spending \((I)\) that is not provided from domestic sources, such as national saving \((S^n)\). Alternatively, any domestic spending or exports that cannot be provided for from domestic resources requires the importation of the requisite resources from abroad (see Feldstein and Horioka, 1980).

Equation (3) can be arranged in terms of a relation between various balances that have received prominent attention in open economy macroeconomics discussion. These balances provide potentially useful insights into possible adjustment processes that may affect net exports \((X_t - M_t)\) or current account balance.\(^7\)

\[
(X_t - M_t) = (S^p_t - I_t) + (T_t - G_t) 
\]  

(4)

The trade position \((X_t - M_t)\) is equivalent to the sum of net private saving \((S^p_t - I_t)\) and the government’s budget surplus \((T_t - G_t)\). This formulation draws an attention to the potential relationship between the fiscal policy and trade balances. Rewriting the terms \(-(X_t - M_t)\) for current account deficit \((CAD_t)\) and \(-(T_t - G_t)\) captures budget deficit \((BD_t)\):

\[
CAD_t = (S^p_t - I_t) + BD_t 
\]  

(5)

A budget deficit \((BD_t)\) may be offset by an increase in private saving or fall in either domestic investment \((I_t)\) or exports \((X_t)\). The latter adjustment response does cause the trade balance to fall as emphasized by the twin deficit hypothesis. The twin deficit hypothesis maintains that the external balance is dominated by the government budget that trade deficits reflect predominantly budget deficits and conversely. This would not be the case in a Ricardian world where government spending is a perfect substitute for private spending and taxes are lump sum. A budget deficit (public dis-saving) elicits a corresponding flow of net private saving without affecting the trade balance. However, if savers (households) are not Ricardian and the substitutability between private and public spending is less than perfect, a budget deficit is associated with insufficient private saving. This must be reflected in a negative trade balance as a result of the net imports that are required to realize the excess government expenditure. This logic applies ipso facto to explain adjustment to changes in the budget.

The response of domestic investment and the trade balance to budget deficits depends on the degree of capital mobility and the exchange rate regime. Given fixed exchange rates and a high degree of capital mobility, the domestic interest rate responds to a fiscal stimulus. The tightening of domestic credit conditions is moderated as foreign funds flow in, maintaining a higher level of domestic investment and a negative trade balance. Capital inflows put upward pressure on the real exchange rate, either through a nominal exchange rate appreciation or a rising domestic price level. An appreciation of the real exchange rate, as a result of a budget deficit, further contributes to an unfavourable trade balance (Miller & Russek, 1989, pp. 97–98).

Given \(BD_t\), the requirements for equilibrium in the goods market suggest that current account balance \((CAD_t)\) can be explained by two behavioural variables, namely the private saving \((S^p)\) and domestic investment \((I)\). Identifying the open functional forms of the behavioural variables as in Equation (5), and noting the direction of functional variation below the independent variables, Equation (6) can be written as:
Conventionally, economic theory illustrates that the private saving \((S^p_t)\) is positively explained by the households’ disposable income \((y_t)\) and interest rate \((r_t)\), while the interest rate variable has negative effect on domestic investment \((I_t)\). Given \(\frac{\partial CAD_t}{\partial t} = \frac{\partial BD_t}{\partial t} > 0\), it is to say that the \(\frac{\partial CAD_t}{\partial y_t} = \frac{\partial S^p_t}{\partial y_t} > 0\) and \(\frac{\partial CAD_t}{\partial r_t} = \frac{\partial S^p_t}{\partial r_t} = -\frac{\partial I_t}{\partial r_t} > 0\). Both \(y\) and \(r\) variables are expected to have a positive impact on a country’s current account balance by either households’ saving behaviour or investors’ decision to invest. In other words, the dynamic evolution of the net imports that a country spends abroad and the amount that it takes domestically (net private saving) should be balanced, that is, there should be at least one long-run relationship (cointegration) between the CAD, \(y\), \(r\) and BD, and both \(y\) and \(r\) should be positive.

The structural relation (6) offers an alternative framework for testing the so-called twin deficit slogan. A reduced form of Equation (6) can be written as bellow:

\[
\ln CAD_t = \beta_1 \ln y_t + \beta_2 r_t + \beta_3 \ln BD_t + e_t
\]

where \(e\) is residual. Cointegration test (Engle & Granger, 1987) is applied to a set of variables, namely \(\ln CAD\), \(\ln y\), \(r\) and \(\ln BD\). Once a cointegrating relation (at least one) is found among the non-stationary variables the parameters of the right-hand side variables in Equation (7) can be estimated by ordinary least squares (OLS) estimator. Hence, a cointegrating relation exits among \(\ln CAD\), \(\ln y\), \(r\) and \(\ln BD\) is only a necessary condition but insufficient for holding the twin deficits hypothesis (e.g. \(\ln BD\) causes \(\ln CAD\)). It needs to satisfy at least the statistically significance of real GDP (\(\ln y\)) and/or interest rate (\(r\)) the determinants of net private saving behaviour \((S^p - I)\) from the income–expenditure equilibrium (i.e. Equation 5).

By the same token, the actualized budget deficits can be converted into a zero-one dummy (Dummy_BD) that considers value of one for the periods with budget deficits, a value of zero otherwise for the budget balance variable (lnBD).

\[
\ln CAD_t = \beta_1 \ln y_t + \beta_2 r_t + \beta_3 \text{Dummy}_{BD} + e_t
\]

4. Data and Empirical Results

This section briefly describes the data and variables used in the analysis, and then it reports the results of cointegration tests and regression estimations, as well as Granger causality tests and impulse response functions. The analytical framework (e.g. structural equation 6) suggests four macroeconomic variables, namely current account balance (lnCAD), budget balance (lnBD), real GDP (lny) and real interest rates (i.e. short- and long-term rs and rl). All of the variables are measured in real terms — the nominal data were deflated by GDP deflator, except for real interest rates which is the difference between nominal interest rates and inflation rate (percentage per annum of GDP deflator). The US data are obtained from the OECD Economic Outlook over the sample period 1970Q2–2011Q4.
Table 1 reports the KPSS stationarity test results that the null hypothesis of stationary has been rejected for all cases (at least) at 10% level of significance, suggesting that the variables are non-stationary in levels. The next step is to examine the cointegratedness property among current account balance, budget balance, real GDP and real interest rates.

The empirical results of Johansen’s multivariate cointegration tests are presented in Table 2. The low p values of the trace statistics (last column in first panel) suggest the rejection of the null hypothesis of at most one cointegrating equation. Two cointegrating equations exist among current account balance, budget balance, real GDP and real long-run interest rate at 10% significance level. By considering the short-run interest rate (rs), the trace test indicates one cointegrating equation lnCAD – β1lny – β2rs – β3lnBD, at 10% significance level. Overall, there is an empirical support of the existence of a cointegrating relation among the variables which partially validates the twin deficits hypothesis in the US as postulated by the structural equation (6) that derived from the income–expenditure equilibrium approach.

Table 3 reports the OLS estimates of the data-driven regressions (7) and (8) with a consideration of interchangeable both the long (rl)- and the short-term (rs) interest rates with estimated OLS regressions (1)–(4). The empirical results (of their significance) are varying from specification to specification – only the data-driven

<table>
<thead>
<tr>
<th>Table 1. KPSS stationarity tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>lnCADt</td>
</tr>
<tr>
<td>lnBDt</td>
</tr>
<tr>
<td>lnyt</td>
</tr>
<tr>
<td>rl_t</td>
</tr>
<tr>
<td>rs_t</td>
</tr>
</tbody>
</table>

Kwiatkowski et al. (1992).

Note: The KPSS equations include constant and trend.
* , ** and *** denote significance level at 10%, 5% and 1%, respectively.

<table>
<thead>
<tr>
<th>Table 2. Unrestricted cointegration rank test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesized no. of CE(s)</td>
</tr>
<tr>
<td>lnCAD, ln y, lnBD, rl</td>
</tr>
<tr>
<td>None*</td>
</tr>
<tr>
<td>At most 1*</td>
</tr>
<tr>
<td>At most 2</td>
</tr>
<tr>
<td>At most 3</td>
</tr>
<tr>
<td>lnCAD, ln y, lnBD, rs</td>
</tr>
<tr>
<td>None*</td>
</tr>
<tr>
<td>At most 1</td>
</tr>
<tr>
<td>At most 2</td>
</tr>
<tr>
<td>At most 3</td>
</tr>
</tbody>
</table>

Note: Trend assumption is no deterministic trend with lags interval (in first differences) of 1 to 4.
* Rejection of the hypothesis at the 0.1 level.
Prob. is MacKinnon et al. (1999)’s p values.
regressions (1) and (3) report statistically significant budget balance (\( \ln BD \)). A 1% increase in budget deficit raises the current account deficit by about 0.9 percentage point supporting the twin deficits hypothesis as from the approach used by Bartolini and Labiri (2006). From the estimated regression (1), long-run interest rate (\( r_l \)) is positively related to the US current account balance, but real GDP (\( \ln y \)) has no explanatory power. Once, the short-run interest rate (\( r_s \)) is taken into account, its impact disappears, but the real GDP turns into a meaningful interpretation that a 1% increases in real income, 0.098% increases in the US current account balance, as explained by the saving channel. The dummy variables for budget deficit (Dummy_BD) are statistically insignificance (based on regressions (2) and (4)) from 10% level. By controlling the budget deficits,14 both real GDP (\( y \)) and short-run interest rate (\( r_s \)) are statistically significance and in positive sign (regressions (2) and (4)) supporting the theoretical view of twin deficits hypothesis from the income–expenditure approach via the behavioural variables of saving and investment. With the combined positive results from both cointegration tests and estimated OLS regressions, the twin deficits hypothesis, i.e. budget deficit causes current account deficit in the USA, is empirically supported from the general equilibrium perspective. This positive finding is consistent with previous studies by Darrat (1988) and others.

Our empirical results provide an interesting policy implication concerning the current popular shorthand term – “fiscal cliff” that the US Government announced at the end of 2012 on a simultaneous increase in tax rates and decrease of government spending through sequestration that would have occurred January 2013 through a series of previously enacted laws, in the purpose of reducing the country’s budget deficits. Increase in tax rates (temporally or permanently) will reduce the households’ disposable income that results a decrease in private saving depending on the marginal rate of saving. Based on the structural equation (6), it may worsen the US current account balance, while the cut of government spending directly improves the budget account balance; hence the net effect of “fiscal cliff” policy on the country’s twin deficit hypothesis is theoretically ambiguous. The data-driven regressions (1) and (3) suggest that the country’s current account balance is directly responsive to budget balance with high elasticity values of 0.85 and 0.89, but the effect of real income is either insignificance or small, hence cutting government spending can improve the country’s current account deficit. However, based on the data-driven regressions (2) and (4) with a given budget deficit (Dummy_BD), the US

### Table 3. Estimated cointegrating relation – OLS

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \ln y )</td>
<td>0.060 (0.265)</td>
<td>0.837*** (0.000)</td>
<td>0.098* (0.084)</td>
<td>0.825*** (0.000)</td>
</tr>
<tr>
<td>( r_l )</td>
<td>3.699*** (0.008)</td>
<td>2.773 (0.191)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( r_s )</td>
<td></td>
<td>2.111 (0.139)</td>
<td>8.464*** (0.000)</td>
<td></td>
</tr>
<tr>
<td>( \ln BD )</td>
<td>0.886*** (0.000)</td>
<td>0.847*** (0.000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dummy_BD</td>
<td>0.070 (0.648)</td>
<td></td>
<td>0.148 (0.307)</td>
<td></td>
</tr>
</tbody>
</table>

*Note: The dependent variable is lnCAD. The value reported in (.) is p value from the t-statistic. * and *** denote significance level at 10% and 1%, respectively. Constant term is not included as suggested by Equation (6).
current account balance is more responsive to real income with an estimated elasticity of about 0.8, and it tells that an increase in tax rates that will reduce the households’ disposable income worsens the current account deficit (i.e. decreases the current account balance).

However, according to Granger (1988), “the cause occurs before the effect’. This approach is widely applied by empiricists in order to validate the four possible causation patterns between budget deficit and current account deficit. For simplicity reason, Granger non-causality test is carried out by employing the testing method proposed by Toda and Yamamoto (1995). Table 4 reports the empirical results. There is a reasonable support of Granger causality from the current account deficit to budget deficit, but not vice versa. It confirms one of the four “popularized” hypotheses – current account targeting hypothesis that “trade deficits cause budget deficits” (i.e. hypothesis 2 in Section 1). On the other hand, current account deficit is also Granger-caused by real GDP which is justified by the standard aggregate import demand function that imports are positively determined by home income (real GDP). Also, home income is found to cause budget deficit as predicated by the Wagner’s law.

Unfortunately, these results have no say on the twin deficits phenomenon that an expected causality pattern is from budget deficit to current account deficit as informed by Equation (7). A study by Tang (2014) included the “third” deficit – capital and financial account balance, and he found that the US budget, current account, and capital and financial account deficits are cointegrated. His study is consistent with the current finding that the pattern of causation is from current account deficit to budget deficit (i.e. rejecting twin deficits hypothesis).

Is the proposed theoretical framework of twin deficits phenomenon with the US data voided? The answer is no. Toda and Yamamoto (1995) causality tests have been continued to take the other endogenous variables into account, namely, ln\(y\), \(r_s\) and \(r_l\), into a VAR system. Interestingly, the empirical results show that the theoretical framework explains the experience of the USA. Figure 2 shows the causality pattern of twin deficits – from budget deficit to short-run interest rate, to real income and to current account deficit. These observations provide a necessary and sufficient condition in order to support the proposed theoretical framework that the budget deficit do indirectly cause current account deficit through saving (\(r_s\) and ln\(y\)) and investment (\(r_s\)) channels supporting the so-called Keynesian hypothesis.

### Table 4. Granger non-causality tests

<table>
<thead>
<tr>
<th>Excluded variable</th>
<th>lnCAD</th>
<th>lnBD</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnBD</td>
<td>2.616 (0.624)</td>
<td>2.689 (0.611)</td>
</tr>
<tr>
<td>lnCAD</td>
<td>38.772*** (0.000)</td>
<td>39.775*** (0.000)</td>
</tr>
<tr>
<td>ln(y)</td>
<td>8.326* (0.080)</td>
<td>8.132 (0.087)*</td>
</tr>
<tr>
<td>(r_s)</td>
<td>5.577 (0.233)</td>
<td>1.660 (0.798)</td>
</tr>
<tr>
<td>(r_l)</td>
<td>5.417 (0.247)</td>
<td>1.152 (0.886)</td>
</tr>
</tbody>
</table>

Note: The degree of freedom is four. The testing hypothesis is the null of no causality. The value reported in (.) is p value from the chi-square statistic.
* and *** denote significance level at 10% and 1%, respectively.
Another window to look at the twin deficits hypothesis is their responses to a shock of the endogenous variables such as real income, interest rates, as well as their own shock – impulse response analysis. Figure 3 illustrates the graphical presentation of impulse response functions. Panel A shows a one standard deviation shock to budget deficit remedying current account deficit, especially after reaching zero at

![Diagram](https://via.placeholder.com/150)

**Figure 2.** Granger Non-Causality.

*Note:* The reported value is chi-square statistic, while the value in (.) is $p$ value. The null hypothesis is no causality.

Another window to look at the twin deficits hypothesis is their responses to a shock of the endogenous variables such as real income, interest rates, as well as their own shock – impulse response analysis. Figure 3 illustrates the graphical presentation of impulse response functions. Panel A shows a one standard deviation shock to budget deficit remedying current account deficit, especially after reaching zero at

![Graph](https://via.placeholder.com/150)

**Figure 3.** Impulse Response Functions. Panel A: Response of Current Account Balance (lnCAB). Panel B: Response of Budget Balance (lnBB).

*Note:* The lnCAB is log of current account balance; lnBB is log of budget balance, lnRGDP is log of real GDP; RST and RLT are short- and long-runs interest rates.
fourth quarter – its impact is small but positive. Current account deficit improves after third quarter the initial short-run interest shock, and it is stronger (positive) the impact than of a budget deficit shock. Current account deficit responses to its own shock is the largest and positive, but deteriorating after a temporary improvement between second and third quarters. A one standard deviation shock to real GDP has negative impact on current account deficit in which current account deficit worsens for the first five quarters before improving through the remaining horizon. Similar observations are presented by the long-run interest rate (i.e. right-hand side diagram of Panel A). Panel B presents the responses of budget deficit to Cholesky one standard deviation innovations. Its own shock has large and positive impact on budget deficit. It initially reduces budget deficit in the first quarter but worsens then. Budget deficit responses positively (improves) to a real GDP shock, but decreasing slightly after quarter seven. An initial current account deficit shock worsens budget deficit until quarter three, and its position improves throughout the remaining quarters. The budget deficit responses positively to short-run (and long-run) interest rates shock but worsening the deficit position after the third quarter. Their impact is smaller for long-run interest rate than of short-run interest rate. The other observations are consistent with the long-run interest rate variables.

5. Summary and Conclusion

This study re-examines the twin deficit slogan for the US economy by testing the structural relationship between budget deficit and trade (current) account imbalance. The empirical model is a derivation from the demand side of the general equilibrium perspective, i.e. income–expenditure equilibrium, which contents two behavioural relationships, namely private saving and domestic investment. This study utilizes the available quarterly time-series data from 1970 to 2011. The empirical results show that budget balance, current account balance, real income and interest rate are co-movement. Meanwhile, the determinants of behavioural variables, namely real income and real interest rates, have positive impact on (to improve) the US current account deficit. On the other hand, the causality tests show a direction of causation is sequentially from the budget deficit to short-run interest rate, real income and lastly current account balance. This study supports the twin deficits hypothesis in the USA. It is to note that, the proposed framework in this study does not aim to replace the existing ad hoc bivariate or multivariate framework, but to introduce an alternative in order to validate the well-hypothesized twin deficits issue.

Nevertheless, there are two boundaries that this study needs to acknowledge, perhaps for future research. The first concern lies on the income–expenditure equilibrium, which captures only the real sector or the goods and services market. If the budget deficits accumulated by a country are financed by the financial instruments such as the issuance of bonds. Hence, the role of financial market is totally ignored. One of the potential and necessary extensions of this study for future research is to explore the role of financial sector in examining the twin deficits hypothesis in a “monetized” economy. This deficiency can be addressed by looking at the portfolio balance approach from the general equilibrium perspective. It includes both the bond and money markets.
The second boundary is about the single case study of the US economy. The USA has historically posted deficits for both of her internal and external accounts; therefore, a positive finding of empirical tests on the twin deficits hypotheses is a prior. A robust conclusion is expected to be obtained by involving other sample countries in which they are not twin deficits in nature from the official reported statistics. Japan and China are among the countries named in the list. For example, Japan’s budget deficit has been substantially expanded since in 1990s, while her trade account is in surplus from 1980s, except for, its deficits posted since 2011. Meanwhile, a surge of China’s current account surplus was posted after 2004, but the country has a record of prolong fiscal imbalances since in the late of 1980s (with exception of 2007) with USD193.2 billion in 2013 marking a 50% increases from previous year. Also, a bigger group of countries is recommended than of single country study such is feasible for cross countries-wise research. Richer findings are expected in between the developed and developing nations by applying either individual data or panel data approach and so on. In this context, it calls for future study.

Acknowledgements
I would like to acknowledge two anonymous reviewers for their comments and suggestions. I also extend my gratitude to Evan Lau from the Faculty of Economics and Business, Universiti Malaysia Sarawak for the comments made on the crude draft of this study. However, all errors and omissions rest with me.

Notes
1. However, Miller and Russek (1989)'s study finds that a $1 change in the fiscal deficit eventually leads to roughly a $1 change in the trade deficit.
2. Assumed an economy is relatively open that will probably have domestic developments dictated by the foreign balance to a certain extent. Hence, the budget balance of a country will be affected due to the large inflows or through debt accumulations – a country will run into budget deficits (Reisen, 1998).
3. For example, Japan’s current account surplus is stable during the 1990s, despite the country’s sharply declining fiscal condition as the changes in private saving can offset changes in fiscal policy, leaving a country’s current account balance largely unaffected (Bartolini & Labiri, 2006, p. 2).
4. They investigated the effect of fiscal consolidation on the current account. They examined contemporaneous policy documents, including Budget Speeches, Budgets, and IMF and OECD reports, to identify changes in fiscal policy motivated primarily by the desire to reduce the budget deficit, and not by a response to the short-term economic outlook or the current account. The results based on this measure of fiscal policy changes suggest that a 1% of GDP fiscal consolidation raises the current account balance-to-GDP ratio by about 0.6 percentage point, supporting the twin deficits hypothesis. This effect is substantially larger than that obtained using standard measures of the fiscal policy stance, such as the change in the cyclically adjusted primary balance.
5. For simplicity, Baharumshah et al. (2009) have assumed \( S = I \) or \( S - I = 0 \) for their reduced form twin deficits equation, \( \text{CAD} = b_1 + b_2BD + b_3\text{INV} \) (where INV is investment). Conversely, the twin deficits hypothesis is hold if the estimated coefficient of BD is statistically difference from zero at conventional levels, i.e. 10%, 5% or 1%.
6. Also, Baharumshah et al. (2009)'s study documents that investment has a noticeable impact on current account deficit from the causality results of five ASEAN countries.
7. The current account balance is usually referred to as the trade balance (net exports) that is, the balance between the value of exports and imports for a given period. However, the current account balance includes net services and net transfers – these particular sub-accounts is usually minimized and not
considered due to the fact they normally represent a small fraction of the total (Ventosa-santaulària et al., 2013, p. 1319).

8. It is partially hold as Bartolini and Labiri (2006, p. 6)'s study that twin deficits hypothesis that a larger fiscal deficit leads to an expanded current account deficit by its effect on national saving and consumption.

9. In this context, three cointegrating relations are potentially highlighted by economic theories. The first is from the income–expenditure equilibrium about the current account determination, \( CAD = f(y, r, BD) \). The second relation is from the Keynesian theory on the interest rate determination, \( r = f(BD) \), and lastly, \( BD = f(y) \) from the Wagner’s law. In view of the objective of the present study, this is interesting to work on the first cointegrating relation than of others which is offered by income–expenditure equilibrium.

10. Darrat (1989) finds that budget deficits have not caused significant changes in the long-term interest rate, but a reverse causality. Again, the empirical results from Darrat (1990) show that structural federal deficits and the corporate bond rate are not cointegrated. The present study does not examine the causal relationship between budget deficit and interest rates, but to illustrate the role of interest rates on current account balance from the both saving and investment relations.

11. The long-term interest rate is the long-term government bond yields (10-year), while the short-term interest rate is the 3-month or 90-day rate and yield (certificates of deposit).

12. We also computed the similar analysis for Equation (8) and find no cointegration between \( \ln CAD, \ln y \) and \( r_l \) (or \( r_s \)). The dummy variable Dummy_BD is exogenously considered in the VAR system. The null hypothesis of none cointegrating relation is not rejected at 10% level of significance (trace test) with a \( p \) value of 0.80 (0.89) for \( r_l \) (as interest rate).

13. We consider only the trace test since “… it [the trace test] shows more robustness to both skewness and excess kurtosis in innovations that the maximal eigenvalue test” (Cheung & Lai, 1993, p. 326).

14. The dummy variable is statistically insignificant but it does not interpret no twin deficits. As illustrated by the income–expenditure approach (Section 3), either income (\( y \)) or interest rate (\( r \)) play a crucial role in validating the twin deficits hypothesis.

15. Their method allows non-causality test without pretesting cointegration either the underlying variables are cointegrated or non-cointegrated of an arbitrary order. Table 1 shows all of the underlying variables are non-stationary in levels, i.e. \( I(1) \). The details of this testing method are available from Toda and Yamamoto (1995). Methodologically speaking, their method is straight-forward by involving two steps. The first step is to identify the true lag length of \( k \) and the maximum order of integration \( (d_{\text{max}}) \) of the variables in the VAR system. An augmented VAR\((k + d_{\text{max}})\) is then estimated (by OLS estimator). The second step is about the computation of the Wald statistics for the restrictions on the parameters of the VAR\((k)\) model. It is to reject the null hypothesis of “\( x \) does not Granger-cause \( y \)”. The VAR system includes the endogenous variables of \( \ln CAD, \ln BD, \ln y \) and \( r_l \) (and \( r_s \)). Given the quarterly data, \( k = 4 \) and \( d_{\text{max}} = 1 \) are specified for the augmented VAR.

16. The full computed results are not reported here, but they are available from the author upon request.

17. The impulse response functions are computed by Eviews statistical software with a VAR(4) due to the general rule of thumb that quarterly data are employed for the variables in Equation (7).

References


