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# TESTING OF TWIN DEFICIT HYPOTHESIS IN A MULTI ECONOMY FRAMEWORK: AN ANALYSIS OF CANADA, BANGLADESH AND GHANA

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The Twin Deficit Hypothesis is an economic proposition that seeks to link a nation's Budget Deficit and Current Account Deficit. There have been numerous studies on this aspect in the past. What this study offers to explore is to look at the hypothesis from a multi economy macro standpoint. Three different economies are taken into account in this study to present a complete case with the hypothesis getting tested from representative countries from their respective economic status. Co-integration testing is carried out along with tests to determine the causality.

**Keywords:** Stationarity, Co-integration, Causality

## INTRODUCTION

### The Term

"Twin Deficit Hypothesis", a term used to imply that there is a link between an economy's current account balance and its fiscal balance, was very commonly used in the United States of America in the 1980s and 1990s when the country experienced deficit in both these counts. This however is not uniformly observed across all the countries across the globe. There are sample examples of countries in which this phenomenon hasn't been witnessed. Twin deficit hypothesis basically refers to the high correlation between a country's Current Account Deficit (CAD) and fiscal or Budget Deficit (BD). One possible way of

explaining this phenomenon is as follows. Fiscal Deficit means expenditure is more than revenue. Now government needs to raise more money, therefore it might increase taxes and interest rates on its lending to boost revenue growth. Exchange rate betters because higher interest rates attract foreign capital. Since exchange rate is better, the government will want to import more. This in turn leads to more CAD. The Keynesian income expenditure approach asserts that an increase in the budget deficit would increase the income level in the domestic economy due to increased domestic absorption. This increase in income level would there by increase imports and hence the gap in the trade balance would also widen.

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## PURPOSE OF STUDY

The aim of the current study is

1. To test the twin deficit hypothesis on three completely different economies. The economies are different w.r.t their economic situation. It is explained in detail in the 'Research Methodology' section.
2. To establish co-integration (if it exists) and also determine the causality on a case to case basis.

## LITERATURE REVIEW

Kim and Roubini, while arguing on Twin Deficit and its implications for the fiscal policy, current account and exchange rate in the US in the *Journal of International Economics* highlighted that twin divergence is quite usual with the US economy. Equating savings to the sum total of current account and investment, the study says that w.r.t to the US the increase in the current account is mainly bolstered by increasing savings and dwindling investments. The study systematically examines the co movement properties of the government budget, CAD and real exchange rates. It concludes by saying that in the short run, the government deficit increased the CAD and decreased the exchange rate.

Kalou and Paleologou, examined the twin deficit hypothesis with reference to the country of Greece in the *Journal of Policy Modelling*. They suggested that the hypothesis is subjected to structural shifts. The country chosen for the purpose of study, i.e., Greece was unique in the sense that it wasn't a very open economy nor was it highly integrated with its partners in the European Union. Stationarity and co-integration testing led to the conclusion that the CAD and BD are linked positively with the direction of causality running from CAD to BD.

Holmes, in his paper on 'Threshold Cointegration and short run dynamics of twin deficit behaviour' published in the journal *Research in Economics* used the method of Threshold Co-integration to explore the relationship between the CAD and BD. The paper argued on the basis of the Mundell Fleming model that expansion of fiscal deficit worsens the CAD. On the basis of quarterly data used for the study, it concludes in line with the previous observations of positive co-integration relationship between the CAD and BD.

Bartolini and Lahiri (October, 2006) in their paper titled 'Twin Deficits, Twenty Years Later' published in the *Current Issues in Economics and Finance* have said that there does appear to be a linkage between the CAD and BD as far as USA is concerned. Its focal point however, is that the relationship is too weak for the reducing budget deficit of the country to wipe out any current account deficit it might have.

Leachman and Francis (2002) in their paper titled 'Twin Deficits: Apparition or Reality?' reported that prior to 1974, co-integration was exhibited between the two variables. Post 1974, the relationship doesn't appear to hold good. The causality flows from the Budget Deficit to the Current Account Deficit.

Normandin (1996) in his paper titled 'Budget Deficit Persistence and twin deficit hypothesis' concluded that the twin deficit hypothesis holds good for USA and Canada. He however, used Blanchard's model to map the responses of the external deficit to changes in the Fiscal Deficit.

Salvatore (2006) in his paper titled 'Twin Deficits in the G7 countries and Global Structural Imbalances' confirmed the hypothesis for each of

the G7 countries. Starting with the theoretical base which holds good for any open market economy, the paper illustrates the twin deficit hypothesis for the G7 economies. Some economies displayed the relationship on lagged variables.

Corsetti and Muller (2008) discovered that the correlation amongst the CAD and BD in the context of the OECD countries was negative. The correlation was negative in lesser degrees in economies which are more open. While saying that the budget and trade balance move in tandem, strongly based on conditional shocks, the overall correlation which is negative is because of the other shocks in a business cycle.

Corsetti *et al.* (2006) tried to link the co movement of the two variables to the degree of openness of the economy. The authors here asserted that the in less open countries, the external shocks to the fiscal deficit is not very high. At the same time, the paper suggests that fiscal prudence would have limited impact on the CAD of USA, the economy being very open.

Mukhtar *et al.* (2007) tested the validity of the twin deficit hypothesis on Pakistan. Using time series data from 1975 to 2005, the authors establish the relationship and furthermore, also discover that bi- directional causality existed between the two variables.

## MATERIALS AND METHODS

### Sample Size

The countries selected for the study are as follows:

1. Canada
2. Bangladesh
3. Ghana

The rationale was basically to select three countries from three different continents, and if possible, from different levels of economic prowess. Canada represents a developed economy, Bangladesh an emerging market and Ghana represents an underdeveloped nation. The selection of these three countries serve both the purposes. The selection was intended to be such that countries from all tranches of economic development get a proper representation in this study. Although there were other countries as well which might have fitted the requirements as stated, the reason for the these three countries getting selected is because of the availability of time series data for the longest period of time in the World Economic Outlook database.

### Data Collection

The data was primarily collected from the World Economic Outlook database. CAD and BD figures for these three countries from 1980 till 2015 is taken for the purpose of analysis.

Stationarity Testing using Augmented Dickey Fuller test (ADF test) is initially carried out on the raw data of the CAD and BDs of the aforementioned countries. Once stationarity is established, co-integration testing is carried out using the JMP software. This is followed up by the Granger Causality test done in MS Excel. All in all, the methodology follows a simple pattern of initially establishing stationarity, then checking for co-integration if any and finally exploring the causality amongst the variables.

### Establishing Stationarity

The establishment of stationarity of the two variables, viz., CAD and BD is a necessity as co-integration is possible only if the data series by themselves are stationary. A data series is said to be stationary when joint probability of a series



does not change over time. In simple terms, it basically implies the absence of randomness and presence of pattern in a series. The next data point in a series needs to have some degree of dependency on the previous data point to make it stationary. The statistical properties such as mean and variance for a stationary series tend to remain constant over time. Also, a non-stationary or random data series can be converted into stationary series using mathematical transformations.

**ADF Test**

ADF test is the tool used in this study to check for stationarity. In the analysis of the data inputs, the natural logarithm of the absolute values of CAD and BD were taken to reduce the variance in the data series. In this test, Unit Root is used as the indicator to determine the stationarity of a series. If presence of a unit root is established, it implies the series is not stationary.

**Co-integration Testing**

The two stationary data series for each country, i.e., CAD and BD need to be tested for co-integration, i.e., we need to determine if there is a pattern of the variables moving together or in a parallel manner. Co-integration is said to exist between two or more variables if they share a common stochastic drift. By drift, it basically implies the average change in the values of the two variables. Co-integration testing was done on the JMP software. It has an add-in that goes by the name 'SAS ETS'. The data inputs are put in their stationary form and the output throws the result.

**Establishing Causality**

Causality is nothing but the establishment of cause and effect. Herein the attempt is to establish a one way causality that Budget Deficit

causes Current Account Deficit. This is seen as being consistent with the Keynesian explanation.

**RESULTS AND DISCUSSION**

**Results of Stationarity Testing**

The hypothesis for this testing stationarity was as follows:

*H<sub>0</sub>: Data Series has a unit root*

*H<sub>1</sub>: Data Series does not have a unit root.*

Accepting *H1* means that the data series is stationary.

The results of the stationarity testing are summarised countrywise in the Table 1.

The meaning of the terms are explained below:

**Stationary:** The data series exhibits stationarity in its original form.

Table 1: Results of Stationarity Testing		
	CAD	BD
Canada	Second Difference Stationary	First Difference Stationary
Bangladesh	First Difference Stationary	First Difference Stationary
Ghana	First Difference Stationary	Stationary

**First Difference Stationary:** The data series exhibits stationarity when the first differences are considered.

**Second Difference Stationary:** The data series exhibits stationarity when the second differences are considered.

The data thus fulfils the requirement for the study.

**Results of co-integration Testing**

The results of the co-integration test are tabulated below.

The broad conclusion that can be drawn from the above results is that Current Account Deficit and Budget Deficit for all the three countries are

	Cointegrated (Yes/No)
Canada	Yes
Bangladesh	Yes
Ghana	Yes

co-integrated. Thus the Twin Hypothesis stands validated for these countries. As a corollary to this, we conducted the Granger Causality testing.

**Results of Granger’s Causality**

If a variable X1 (BD) “Granger-causes” (or “G-causes”) a variable X2 (CAD), then past values of X1 should contain information that helps predict X2 above and beyond the information contained in past values of X2 alone. This basically implies that the prediction for the future values of a time series which can be done by using the past values of its own time series, should be augmented by the inclusion of past data of another time series.

Auto-regression was initially carried out using the lagged values of CAD. Thereafter unrestricted regression was carried out in which lagged values of CAD as well as lagged values of BD were also taken into account. The *F* values which is then calculated taking into account both these results are then tested against the benchmark numbers provided by the *F* table.

For each country, the *F* number was greater than the benchmark, thereby denoting that granger causality exists in all the three cases.

Country	F Value	Benchmark F Value
Ghana	3.91	2.95
Bangladesh	3.34	2.95
Canada	3.4	2.95

Thus BD ‘granger causes’ CAD. Budget Deficit was the cause for Current Account Deficit in these three countries.

**CONCLUSION**

In conclusion, we can safely say that for the countries examined, the variables BD and CAD are co-integrated. Also, BD ‘Granger causes’ CAD. In the papers reviewed for this study, we noticed that the results were mainly based on developed economies and a few times on emerging markets. The present study juxtaposes the three types of economies together to get a comprehensive macro outlook at the hypothesis. We had seen that co-integration held good for all the countries in the reviewed papers in the literature review. There is one subtle difference that emerges however. In the case of Greece we saw that the causality was from CAD to BD. If we compare Greece with Bangladesh (both considered as emerging market), we have an opposing view in this study, i.e., Bangladesh direction of causality went from BD to CAD.

The study was carried out in a multi country framework to account for as many interpretations as possible. What we see is that the twin hypothesis was validated for all the three types of economies considered. While it will be premature to generalise these results for all

countries, it does indicate that the theory tends to hold good irrespective of the economic status of a nation.

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