Budget Deficit and Trade Deficit Causality in the Philippines: 1960-2010

*Ronel L. Ellorimo
BS Economics Graduate- USep-School of Applied Economics/ Instructor of University of Southern Mindanao
ronelellorimo@gmail.com

*Dr. Agustina Tan-Cruz
Dean - School of Applied Economics
Agustina Tan-Cruz <a_tancruz@yahoo.com

Keywords: BD, TD, time series, VAR analysis.

CHAPTER 1
INTRODUCTION

Background of the Study

Budget deficit is defined as the difference between what a government spends and what it collects in taxes in a given period. If the government expenditures exceed revenue, the government must borrow to finance the deficit. In contrast, if government revenue exceeds expenditures, this means that government is spending less than it is collecting in taxes and the government is running a surplus. A budget surplus is simply a negative budget deficit (Case and Fair, 2007). On the other hand, trade deficit occurs when a country’s exports of goods and services are less than its imports of goods and services in a given period. The reverse is called a trade surplus. These two deficits are also known as “twin deficits” which appears as “Siamese Twins” that could not be separated (Feldstein, 1992).

A higher budget deficit can be considered as a sign of a potential threat of risky trade deficit and can therefore lead to a huge foreign capital flight as foreign investors usually act in a common movement (Sadullah and Pinar, 2009). Budget deficit show a demand for financing through borrowing from abroad or using excess domestic savings. In the long run it is probable that an increase in budget deficit brings out an increase in domestic real interest rate and an appreciation in the exchange rate, European countries such as Sweden and Germany had this experience.

An increase in domestic savings and a decline in domestic investment mean that budget deficit could be financed by domestic resources in the short run, and foreign savings begin to finance the budget deficit. Further, a decline in the exchange rate causes a deficit in the current account (Hutchison and Pigott, 1984).

Other reasons of budget deficit are unstable public revenue, low degree of economic development, low acceleration of public revenue, deficient government auditing and the regulatory role of government in the economy. Countries which have low degree of economic development, have high level of budget deficit owing to three important reasons which are high spending pressure, deficient tax revenue and low private savings (Sahan and Bektasoglu, 2010).
Figure 1 shows the budget deficit experienced in the Philippines. As shown in the figure, the budget deficit moves downward starting from 1981 to 2010. This is primarily due to the increasing government expenditure which exceeded government revenue. Budget deficit peaked in 2010 by negative 3.5 percent of total value.

By the end of 1983, after the assassination of Benigno Aquino, the country was bankrupt and the economy contracted by 6.5 percent. The government was unable to meet payments of its US$2.3 billion international debt, and worked out a US$27.5 million standby credit arrangement with the International Monetary Fund (IMF). Corruption also within the government remains high and an estimated 10 percent of the GNP was being pocketed. The business community lost confidence and capital begins to leave the country at about US$12 million a day (www.pinas.com).

With the Asian financial crisis in 1997, the Philippines was overwhelmed with an overvalued currency. This resulted in a decline in export competitiveness, which in turn led to a large trade balance. The government’s early response was to defend the peso. The Bangko Sentral ng Pilipinas (BSP) used US$ 2 billion in an unsuccessful attempt to maintain the exchange rate. As this intervention was not effective, a policy of higher interest rates was implemented to cushion the depreciation (Tuano, 2002).

Exports and imports are two components of trade. Trading with other countries is primarily needed because some resources are scarce and are sometimes not present in one country. As shown in Figure 2, trade deficit of the Philippines is moving downward from 1960 to 2010. Trade deficit peaked during the period 1995 to 1997. In 1996, trade liberalization policies helped to push imports up to 22 percent while exports rose only by 18 percent. The result was a widening trade deficit that amounted to negative US$11,342.40 million. There was a slowdown in
export growth resulting to a lower global demand for electronic components. Abrupt drop in the value of Philippine peso and other Asian currencies due to Asian financial crisis in 1997 led to a higher interest rate and slower economic growth (www.bsp.gov.ph).

![Graph showing trade deficit of the Philippines, 1960-2010. Source: National Statistics Office (NSO) and Bangko Sentral ng Pilipinas (BSP)](image147x405to527x652)

From 2000 to 2010, global rice shortage occurred and this led the Philippines to a large importation of rice. The overpriced importation of rice due to the global rice shortage was $714 million or an overprice of $60 per metric ton or $60/MT. The total purchase in tonnage was 11.8 million MT valued at $4.8 billion trading, generating a loss of P182 billion. As of 2010, the National Food Authority (NFA) guaranteed that debt stood at P176.8 billion (newsinfo.inquirer.net).

In 2007, the total imports expanded by 7.5 percent due to higher imports of raw materials, and intermediate goods rose by 8.8 percent backed up by higher purchases of semi-processes and unprocessed raw materials as well as manufactured goods, materials for the manufacture of electrical equipment and iron ore (www.bsp.gov.ph).

Economists believe that trade deficit is associated with positive economic development particularly with higher levels of consumer confidence in investment. In the United States, trade deficit enable people to import capital to finance investment in production capacity. Trade deficit does not hurt employment, but it is a symbol of economic strength that reflects a strong net inflow of foreign investment. A growing trade deficit signal improving conditions while shrinking deficits often occur in time of economic trouble (www.mcculloughsite.com). In contrast, a persistent trade deficit leads to a fewer or a loss of overseas workers. For example, in late 1990s the United States trade deficit reached high record, but unemployment dropped to its lowest rate in three decades (www.infoplease.com).
Trade and budget deficits may lead to economic harm and impair economic growth (McCoskey and Kao, 1999). Large budget deficit in the US contributes two ways to higher real interest rates. First, the increased spending and higher demand for funds in credit markets due to these deficits tend to raise nominal interest rates relative to inflation. Second, the persistence large deficit could lead to a rising government indebtedness and debt interest payments (Atkinson and Chouraqui, 1985).

Rationale of the Study

Policy makers are concerned about budget deficits because they may hamper economic growth, the way a large trade deficit will affect long term economic growth. The empirical testing of the relationship between budget deficit and trade deficit is a matter of concern among policy makers and researchers during the past two decades (Fleegler, 2006). A number of studies in different countries have investigated relationship between budget deficit and trade deficit but failed to find a clear causal direction of the two variables. The direction of causality has been a matter of controversy among the researchers and has been an important area of investigation in economics. Studies of Rauf and Khan (2011) for Pakistan; Alfonzo and Rault (2009) for Finland; Chang (2004) for Taiwan; Mohammad (2000); Bahmani and Oskooee (1992, 1995); Resenweing and Tallman (1993); Zietz and Pemberton (1990) found unidirectional evidence from budget deficit to trade deficit.

On the other hand, studies of Feldstien and Horioka (1980) for Hongkong; Marinheiro (2008) for Egypt; and Puah et al. (2006) for Malaysia have found a unidirectional causality running from trade deficit to lead budget deficit. Studies such as of those Lau and Baharumsha (2006) for Singapore; Mukhtar et al. (2007); Tang and Lau (2009) for Cambodia found that causality runs both ways. There are also studies that found no causal relationship of the two variables (see for example Enders and Lee (1990); Miller and Russek (1989); Dewald and Ulan (1990)).

Although there has been increasing interest in investigating the relationship between the two variables in developed and developing countries, the Philippines received only little attention in this area (Pahlavani and Saleh, 2009). On the other hand, Anorou and Ramchander (1998) revealed unidirectional causality coming from trade deficit to budget deficit and not vice versa. Another study also of Baharumshah, Lau and Khalid (2005) concluded a long run relationship between the two variables. The determination of which hypothesis characterizes an economy is more than an intellectual exercise and has implications about solutions to the problem of fiscal and trade deficit of a country. Hence, this study is conducted.

Objectives of the Study

The general objective of the study is to determine the relationship between budget deficit and trade deficit in the Philippines. Specifically, this study has the following objectives:

1. To present the trends of budget deficit and trade deficit in the Philippines from 1960-2010.
2. To provide empirical evidence of the causal relationship between budget deficit and trade deficit from 1960-2010, if any exists.

Significance of the Study
Persistent large deficits cause indebtedness by borrowing internally and externally. The government is concerned and alarmed that the country could very soon no longer afford to subsist on borrowed funds since the payments will eat up the share of the budget (MTDP 2004-2010). Also, this will impose burden on the future generations because of lower capacity for productivity as a result of decreased investment created by national debt. Deficit problems cannot be remedied unless government policies are put into place. The proper interpretation of budget deficit is important because fiscal adjustment is often the centerpiece of stabilization policy. In addition, continual trade deficit will lead domestic producers to be left out due to their lack of competitiveness to imported goods (Anorou and Ramchander, 1998).

The results of the study may add to the existing literature and provide a reference on setting of fiscal and trade policies in the Philippines. This study will particularly be helpful to the Department of Finance, the Department of Budget and Management, the Bureau of Internal Revenue, Department of Trade and Industry and other concerned government agencies, with regards to decision making.

**Scope and Limitation**

This study is focused mainly on examining the direction of the relationship between budget deficit and trade deficit in the Philippines. The researcher will use annual data for budget deficit and trade deficit (balance of trade) from 1960-2010. The budget deficit is the negative difference between government revenues and expenditure (in Philippine peso) while trade deficit is the negative difference between exports and imports (in Philippine peso). Data will be obtained from Bangko Sentral ng Pilipinas (BSP).

**Organization of the Study**

The remainder of the study is organized as follows Chapter 2 cites the overview of the Philippine budget and trade deficits and review of related literature citing studies related to budget deficit and trade deficit causality. Chapter 3 presents the methodology consisting of the theoretical and conceptual frameworks, the data source, the empirical model of the study and the estimation process. Chapter 4 will focus on results and discussion, followed by summary, conclusion and recommendations in Chapter 5.
CHAPTER 2
REVIEW OF RELATED LITERATURE

2.1 Overview of Philippine Budget Deficit

The Philippine economy experienced a major period of political and economic turbulence until the early 1980s (Pahlavani and Saleh, 2009). Under the Marcos regime, the national government fiscal balance from year 1981 to 1985 was 2.8 percent of GDP on the average. However, under the presidency of Corazon Aquino, several coup attempts brought huge foreign debt overhang with the most serious one in 1989 and two major catastrophes: 1990 earthquakes and the explosion of Mt. Pinatubo in 1991. But Aquino was still successful in reducing fiscal imbalance through improved tax effort largely as a result of the tax reform program in 1986. Interest payments of servicing public debt were heavy on average at 6 percent of GDP. Fiscal imbalance was improved from its initial point of 5.1 percent in GDP because of high interest rates, accelerated payments of the foreign debt and the implementation of the SSL or Salary Standardized Law (Diokno, 2008).

From 1994 to 1997, the country under President Ramos, experienced budget surpluses. During Ramos’ regime, there was a real estate boom and huge foreign direct inflows to the Philippines. But the peso depreciated by almost 50 percent due to the sharp devaluation of Thai baht at the onset of Asian financial Crisis in 1997. The national government budget deficit under President Estrada rose from 1.9 percent of the GDP in 1998 to 3.8 percent in 1999 then to 4.0 percent in 2000. This result could be attributed largely to the sharp deterioration in the tax effort and higher interest payments due to the financial crisis. Tax efforts fell from 17 percent in 1997 to 13.7 percent in 2000 owing to the continuing and expanded tax incentives, the narrowing of the VAT base and the lowering of tariff walls. Expenditures rose because of higher foreign interest payments, owing to the large peso depreciation and the payments of accounts payable to
contractors and suppliers, estimated at around P60 billion which Estrada inherited from Ramos administration (Sicat and Abdula, 2010).

From 2001 to 2007, the average national government deficit was 3.1 percent of GDP. It peaked at 5.3 percent in 2002 and tapered off to 0.1 percent in 2007. The poor tax effort and high interest payments were the main reasons for the Arroyo administrations’ poor fiscal position. Taxes as percent of GDP averaged 13.2 percent during the seven-year period – a high departure from 17.0 percent in 1997. With weakening tax effort and rising debt servicing costs, President Arroyo responded by under-spending in public infrastructure and social overhead capital (education and health care). By not spending in physical infrastructure and human capital, Arroyo sacrificed the economy’s long-term growth (Diokno, 2008).

The fiscal deficit rose to 3.9 percent of GDP in 2009 and 3.7 percent of GDP in 2010, limiting space for spending on infrastructure and social services. Investments and job generation remained inadequate and progress has been slow in attaining the Millennium Development Goals on poverty, education, and maternal health. Strengthening of tax revenues to ensure adequate resources for development expenditures and improving the domestic investment climate are keys to improving prospects and attaining long-term development goals (ADB, 2010).

2.2. Related Studies

There has been a lot of studies in the past examining the relationship between budget deficit and trade deficit. However, some researchers failed to find clear causal direction between the two variables. Using quarterly data for the period 1960:Q1 to 1984:Q4, Darrat (1988) concluded that in the case of the United States, there is evidence of ‘budget-to-trade deficit causality, and a stronger evidence of trade-to-budget deficit causality or a bi-directional causality. Vamvoukas (1997) also tested the causal relationship in Greece and found a unidirectional relationship going from fiscal deficit to current account deficit. A similar study by Islam (1998) in Brazil, analyzed the empirical twin deficits from 1973:Q1 to 1991:Q4 using Granger causality test and found out a bi-directional causality between trade deficits and budget deficits.

Anoruo and Ramchander (1998) analyzed trade and budget deficit for five Southeast Asian countries: India, Indonesia, Korea, Malaysia and the Philippines, using Granger causality from 1971-2003. Their empirical findings show that trade deficit causes budget deficit but not vice versa. Bilgili and Bilgili (1998) employed data from 1975 to 1993 of USA, Singapore and Turkey and showed that for each country budget deficit had no causal effect on current account deficit. In addition, Khalid and Guan (1999) tested a combination of developing countries using cointegration. The study tested Egypt, India, Indonesia, Mexico, and Pakistan using data from 1955 to 1993 and found a higher correlation for these developing nations compared to the developed nations (Australia, Canada, England, France, and the United States).

The twin deficits were analyzed by Alkswani (2000) using annual time series data of Saudi Arabia from 1970 to 1999. Cointegration regression and an error correction model (ECM) were employed and it was established that there is a long-run relationship between trade deficits and budget deficits. In addition, Piersanti (2000) analyzed the relationship between the budget and current account deficit for almost all OECD countries excluding Turkey, Switzerland, Portugal, Iceland, Belgium, New Zealand using causality tests. The results showed a strong positive effect of expected future budget deficits on trade deficits for OECD countries. Akbostanci and Tunc (2002) also performed a test for Turkey utilizing data from 1987 to 2001, using cointegration and error correction model (ECM). Results indicated that budget deficit has a considerable impact on current account deficits.

Saleh (2003) used the unrestricted error correction model (UECM) framework to establish whether or not the Lebanese trade and budget deficits were cointegrated. Results found out that there was a weak unidirectional linkage between trade deficit and budget deficit and that the direction of causality is to the budget deficit from trade deficit. Further, the study showed that “twin deficit problem” can be managed effectively if the economic environment is conducive to sustain growth i.e., stable social and political environment and sound supply and demand side policies.
Kouassi, Mougoue and Kymn (2004) performed tests on both developed and developing nations using Granger causality tests and came up with two distinct conclusions. Granger causality tests are conclusive only for a handful of developing nations. Israel has unidirectional causality from budget deficit to current account deficit. Korea’s unidirectional causality runs in other direction, from current account deficit to budget deficit and a “feedback relation” between the deficits for Thailand. All other developing nations that were sampled lacked evidence conclusive enough to determine a causal relationship between the deficits. As for the developed nations that were tested, the evidence for any causal link between the two deficits is less convincing, with the exception of Italy where causality runs unidirectional from current account deficit to budget deficit.

Baharumshah, Lau and Khalid (2005) analyzed the twin deficit hypothesis for Indonesia, Malaysia, Philippines and Thailand using cointegration analysis and variance decomposition technique. They found a long run relationship between the variables in question. In contrast, Onofowora and Owoye (2006) found that evidence of positive relationship between trade and budget deficits in both short and long run for Nigeria. This finding supports the conventional Keynesian twin deficits proposition (an increase in budget deficit leads to an increase in trade deficit) and refutes the Ricardian Equivalence hypothesis (an increase in tax would reduce budget deficit and would not alter external deficit) while Kim and Kim (2006) in their study in Korea concluded that unidirectional causal relation running from the current account deficit to the budget deficit using Toda Yamamoto method.

Arize and Malindretos (2008) investigated the relationship between trade deficit and budget deficit for ten African countries (Botswana, Burundi, Kenya, Mauritius, Nigeria, Rwanda, Sierra Leone, South Africa, Togo and Tunisia) over the quarterly period 1973:Q2 to 2005:Q4 utilizing the cointegration test procedures and error-correction model. Results showed that budget deficit causes trade deficit in four countries (Botswana, Kenya, Nigeria and South Africa). Similarly, there is evidence of short-run Granger causality running from trade deficit to budget deficit in one country (Rwanda). For Togo, a short-run bidirectional Granger causality was observed while no evidence of short-run causality relationship between trade deficit and budget deficit was found in Tunisia. With respect to long-run Granger causality, there is a strong evidence of bidirectional causality between the two variables in eight cases (Botswana, Kenya, Mauritius, Nigeria, Rwanda, Sierra Leone, Togo and Tunisia). For Burundi and South Africa there was unidirectional granger causality running from trade deficit to budget deficit.

Pahlavani and Saleh (2009) tested the validity of the Keynesian proposition and the Ricardian Equivalence Hypothesis with respect to the direction of causality between budget deficit and current account deficit in the case of the Philippines using the annual data from 1970-2005. The study used the Modified Wald procedure for the causality analysis, also known as Toda Yamamoto method. Both variable used were measured in terms of their ratios to gross domestic product. Bi-directional causality between budget deficit and current account deficit was found in this study.

Zamanzadeh and Mehrara (2011) examined the relationship between government current budget deficit (GCBD) and Non-oil current Account deficit (NOCD) in Iran from 1959 to 2007 based on cointegration analysis and Vector Error Correction Model (VECM). Results of the study confirmed a long-run relationship between the model variables. In other words, there is positive relationship between GCBD and NOCB of Iranian economy. Moreover, Granger causality test showed there is bi-directional relationship between the two variables.
CHAPTER 3
METHODOLOGY

Theoretical Framework

The relationship between budget deficit and trade deficit has attracted a great deal of attention from academics and policy-makers, and an extensive theoretical and empirical literature examining the relationship between trade deficit and budget deficit exists.

One school of thought argues that budget deficit does have a significant impact on current account deficit (also known as the twin deficit hypothesis). For example, studies like Fleming (1962), Mundell (1963), Volcker (1987), Kearney and Monadjemi (1990), and Smyth and Hsing (1995) have argued that government deficits cause trade deficits through different channels. In a Mundell-Fleming framework, it is argued that an increase in the budget deficit would induce upward pressure on interest rates, thus, causing capital inflows. This will lead to an appreciation in the exchange rate, leading to an increase in the trade deficit. On the other hand, the Keynesian absorption theory also suggests that an increase in the budget deficit would induce domestic absorption and thus, import expansion, causing a current account deficit. Thus, Keynes and Mundell strongly support the Twin Deficit hypothesis (Saleh, 2003).

A second school of thought known as the Ricardian Equivalence Hypothesis states that, for a given expenditure path, the substitution of debt for taxes has no effect on aggregate demand nor on interest rates. As a result, a tax increase would reduce the budget deficit but would not alter the external deficit, since altering the means that the government uses to finance its expenditures does not affect private spending or national saving (Marinheiro, 2008). In summary, this school of thought argues that shifts between taxes and budget deficits do not impact the real interest rate, the quantity of investment, or the current account balance. In other words, the Ricardian equivalence hypothesis negates any relationship between the two deficits (Barro, 1989).

Conceptual Framework

(a) Budget Deficit
(Revenue-Expenditure)  ➔  Trade Deficit
(Balance of Trade)
Figure 3 shows the possible mechanisms in the relationship between budget deficit and trade deficit. First, is a one way relationship from budget deficit to trade deficit. This has been supported by studies of Vamvoukas (1997); Saleh (2003); Kouassi, Mougoue and Kymn (2004); Akbostanci and Tunc (2002); Onofowora and Owoye (2006).

Second, is the possibility of a unidirectional causality that runs from trade deficit to the budget deficit. This view has been empirically supported by Summers (1988); Islam (1998); Khalid and Teo (1999); Alkswani (2000); Kouassi, Mougoue and Kymn (2004); Kim and Kim (2006); Piersanti (2000); Arize and Malindretos (2008).

Third, is the bidirectional relationship between the two variables as shown by the studies of Zamanzadeh and Mehrara (2011); Pahlavani and Saleh (2009); Arize and Malindretos (2008); Darrat (1988) and Kouassi, Mougoue and Kymn (2004). There is also a possibility that budget deficit and trade deficit may be independent of each other and that no mechanism actually exists linking the two variables.

Variables

The following variables were used in the study:

1. Budget Deficit – composed of government revenue and government expenditure. The negative difference of the two generates the budget deficit. This will be expressed in billion pesos.

2. Trade Deficit – composed of imports and exports. The difference of the two (export-import) will produce the balance of trade. A negative result indicates trade deficit. This will be expressed in terms of billion pesos.

Data Source
Data on the budget deficit (BD) and trade deficit (TD) from 1960-2010 were obtained from the Central Bank Annual Statistical Report, which in turn came from the National Statistics Office and the Bureau of Treasury.

**Statistical Method**

Descriptive statistics with graphical presentation were used to describe the trends of budget deficit and trade deficit from 1960-2010. Time series analysis was utilized for the cointegration and causality parts.

**Time Series Analysis**

Identifying the nature of the phenomenon by the sequence of observations and forecasting of predicting the future values of the series variables are the two principal goals of time series analysis. Both of these require that the pattern of observed time series data is identified and more or less described formally. It can be interpreted and integrated with other data once the pattern is established, and the results can be used in some investigative phenomena (www.statsoft.com). To investigate relationship between budget deficit and trade deficit, time series estimation will be used.

A. **Testing for Stationarity**

Prior to estimating any relationship of variables in a time series analysis, it is essential to know whether the variables are stationary or not in order to avoid spurious results (War, 2009). Estimation based on non-stationary variable may lead to spurious regression of which it is possible to obtain very high values for $R^2$ but parameter estimates are insignificant.

A stochastic process $Y_t$ is covariance stationary if it satisfies the following requirements:

1. $E[Y_t]$ is independent of $t$.
2. $Var[Y_t]$ is a finite, positive constant, independent of $t$.
3. $Cov[Y_t, Y_s]$ the covariance between any two terms of the series is a function only of the distance between them.

Assumptions (1) and (2) above imply that the means and variances are constant over time while condition (3) above implies that the covariance between observations depends only on how far apart they are, and not on the time of occurrence (Danao, 2002).

**Testing for Unit Roots**

In order to detect if a time series has unit roots, many techniques were developed, but in this study, the Augmented Dickey-Fuller will be used. The specification for ADF is:

$$\Delta Y_t = \beta_1 + \beta_2 + \beta_3 + \delta Y_{t-1} + \alpha \Sigma \Delta Y_{t-1} + \epsilon_t$$

where $\epsilon_t$ is a pure white noise error term. The error term is assumed to be independent and identically distributed. Dickey and Fuller (1981) proposed the ADF test in order to handle the AR in the variables.
In case the test fails to reject the null hypothesis, the series contains unit root and this means that the series is non-stationary. If the series is non-stationary, then we proceed to differencing in order to arrive at a stationary series.

For this study, preliminary tests for unit roots indicated that the series were stationary. Hence, although the author aimed for cointegration, it was decided that the Vector Autoregressive (VAR) analysis be used. Cointegration is possible if there is a linear combination of stationary series obtained by differencing nonstationary series (in level). A brief presentation of VAR follows in the next section.

B. Vector Autoregressive (VAR) Model

The VAR had been used primarily in macroeconomics. Early in its development, it was argued by some authors like Sims (1980) and Litterman (1976, 1986) that VAR would forecast better than any simultaneous equation models. It is an econometric model used to capture the evolution and the interdependencies between multiple time series, generalizing the univariate autoregressive (AR) models. Within VAR, there is no clear-cut classification as to whether the variables are endogenous or exogenous. This indicates that all variables in VAR are treated symmetrically by including for each variable an equation explaining its evolution based on its own lags and the lags of all other variables in the model (www.en.wikipedia.org).

The significant characteristics that the error term must hold in a standard VAR model are as follows:

1. \( E(\varepsilon) = 0 \), which implies that every error term has mean zero
2. \( E(\varepsilon_t, \varepsilon_t') = \Omega \), where \( \Omega \) is the covariance matrix
3. \( E(\varepsilon_t, \varepsilon_{t-n}') = 0 \), no correlation across time.

In this study, the time series representation of a bivariate VAR model for the two variables budget deficit \((BD)\) and trade deficit \((TD)\) is written in the following form:

\[
\begin{pmatrix}
BD_t \\
TD_t
\end{pmatrix} = A_0 + A_{11}BD_{t-1} + A_{12}TD_{t-1} + \ldots + \begin{pmatrix}
BD_{t-p} \\
TD_{t-p}
\end{pmatrix} A_{11}^{(p)} + A_{12}^{(p)} + \begin{pmatrix}
\varepsilon_{1t} \\
\varepsilon_{2t}
\end{pmatrix}
\]
where:

\[ BD_t = \text{budget deficit observed over time period } t; \]
\[ TD_t = \text{trade deficit observed over time period } t; \]
\[ p = \text{lag length} \]
\[ A_{ij} = \text{coefficients of the variables associated to the VAR} \]
\[ A_{0i} = \text{the parameters representing intercept terms} \]
\[ \varepsilon_{1t} \text{ and } \varepsilon_{2t} = \text{white noise or disturbance terms} \]

\[ C. \text{ Lag Length Determination} \]

The selection of appropriate lag length in the VAR model, could be determined using the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC). The main idea of AIC is to select the model that minimizes the negative likelihood penalized by the number of parameters. Alternatively, Schwarz Bayesian Criterion (Schwarz, 1978) is one of the widely used information criteria. Unlike AIC, SBC is derived within a Bayesian framework as an estimate to the Bayes factor for two competing models.

Both AIC and SBC have the main aim of identifying good models even if they differ in their exact definition of a good model. In this case, we will choose the model which has the lowest AIC and SBC value (Enders, 1995). The AIC and SBC equations are given below:

\[ AIC = T \log |\Sigma| + 2N \]
\[ SBC = T \log |\Sigma| + N \log (T) \]

where:

\[ |\Sigma| = \text{the determinants of the variance /covariance matrix of the residuals}; \]
\[ N = \text{total number of parameters estimated in all equation}; \text{ and} \]
\[ T = \text{the number of usable observations}. \]

\[ D. \text{ Granger Causality Tests} \]

In the case of two variables, \( X \) and \( Y \), the Granger Causality approach is different from the common use of the term since it measures precedence and information provided by \( X \) explaining current value of \( Y \). \( Y \) is said to be Granger-caused by \( X \) if \( X \) helps in the prediction of \( Y \), or if the coefficients on the lagged \( X \)'s are statistically significant. Note that two-way causation is frequently the case: \( X \) Granger cause \( Y \) and \( Y \) Granger causes \( X \) (EViews package 5). It is essential to note that the statement "\( X \) Granger causes \( Y \)" does not imply that \( Y \) is the result of \( X \).

Within a system of the two equations (such in this study), the model becomes:

\[ BD_t = C_1 + \sum A_{1i} BD_{t-1} + \sum A_{12} TD_{t-1} + \varepsilon_{1t} \]

\[ BD_t = \text{budget deficit observed over time period } t; \]
\[ TD_t = \text{trade deficit observed over time period } t; \]
\[ p = \text{lag length} \]
\[ A_{ij} = \text{coefficients of the variables associated to the VAR} \]
\[ A_{0i} = \text{the parameters representing intercept terms} \]
\[ \varepsilon_{1t} \text{ and } \varepsilon_{2t} = \text{white noise or disturbance terms} \]
\[ TD_t = C_2 + \sum_{i=1}^{k} A_{2i} TD_{t-1} + \sum_{i=1}^{k} A_{1i} BD_{t-1} + \epsilon_{2t} \]

Testing for Granger causality between \( BD \) and \( TD \) consists of checking the significance of \( A_{12} \) and \( A_{22} \) coefficients. If the value of \( A_{12} \) is statistically significant but those of the \( A_{22} \) is not, then TD Granger causes BD. On the contrary, if the value of \( A_{22} \) is statistically significant then there exists bi-directional causality between BD and TD (Enders, 1995).

**Empirical Application**

SHAZAM version 9.0 and EViews package version 5.0 will be used for all computations needed in the study. Microsoft Excel 2010 will be used for the descriptive part, including graphical presentation to describe the trends of budget deficit and trade deficit from 1960 to 2010.

**CHAPTER 4**

**RESULTS AND DISCUSSION**

This chapter presents the trends of the Philippine budget deficit and trade deficit from 1960 to 2010. Descriptive statistics with graphical presentations are used to describe the trends. Included also are discussion of the results of the stationary tests, lag length determination, Vector Autoregressive (VAR) estimation and the Granger Causality tests.

**Trends of Philippine Budget Deficit and Trade Deficit**

Trends of the budget deficit (\( BD \)) and trade deficit (\( TD \)) in the Philippines for 51 years are plotted in Figures 4 and 5. Figure 4 shows the trend of the budget deficit in the Philippines from 1960 to 2010, and it shows a stable fiscal trend that stagnated beginning in the 1980’s as the...
country was rocked by its most severe political and economic turmoil under martial law during the reign of former President Ferdinand Marcos. Insurgencies persisted in some areas in Mindanao, Palawan and the Sulu archipelago, as a result of the August assassination of the opposition leader Benigno Aquino. Foreign investments slowed down and dwindled and these worsened the economic problems. The Philippines also experienced severe economic recession from 1984 to 1985. Expansionary policy was formulated in an effort to cope with the mounting external debt, but had been unsuccessful. The deficit continued to soar further until Corazon Aquino’s succession in 1986. The government’s inability to collect tax due to a weak system and some major catastrophes like severe earthquakes, Mt. Pinatubo’s explosion, and weak-long nonstop rains by the late 1980’s up to early 1990’s added enormously to the burden of the government (newsinfo.inquirer.net).

![Figure 4. Budget deficit of the Philippines, 1960-2010.](image)

Source: National Statistics Office (NSO) and Bangko Sentral ng Pilipinas (BSP)

A modest sign of recovery in 1994, aided significantly by rapid economic growth, has been recognized by the satisfactory gain of the first quarter budget surplus. As a result, state borrowings from concessional lender and from international creditor declined, as well as reducing the state exposure to external environment. But the slight recovery in the previous year started to be wiped out by the start of the 1997 Asian financial crisis that devalued the Philippine currency leading to higher interest payments and sharp deterioration of tax effort. Furthermore, according to the Department of Labor and Employment (DOLE), more than 155,000 workers were affected by job cuts, while a total of 3,072 companies reported closure, retrenchment and have adopted work reduction programs due to this crisis. Thus, employment was also affected. The Philippines got the second largest fiscal deficit among the ASEAN countries after Malaysia during the period 2000 to 2001, primarily due to the persistent growth of deficits from 4.1 percent and 5.3 percent respectively. There was an extreme drop of budget deficit from 2001 to 2007, which was primarily due to the poor tax effort and high interest payments under the Arroyo Administration’s poor fiscal position (www.bsp.com).

The year 2010 was marked by the peaked budget deficit amounting to negative PhP314,458,000,000. One of the main reasons was the occurrence of Bagyong Ondoy (Typhoon Ketsana), considered to be one of the worst disasters in modern history that brought out heaviest rains in more than 60 years. It has scored a number of fatalities and generated losses in property and crops in millions of pesos (www.pinas.com).
The behavior of trade deficit in the Philippines is presented in Figure 5, and the graph shows smooth trend from 1960 to 1979. Though the Philippines enjoyed the boom in prices in the world markets in 1973, the gains in exports was offset by the increase in import bill, attributed mainly by the rise in oil prices which was reflected by the decline from 1973 to 1976. In 1977, the country experienced a slight recovery due to the remarkable gains in agriculture and mining industries, but devastating rains accompanying typhoon started hitting the country again in 1978, together with the rising prices of petroleum which contributed to the set back on the subsequent years (www.bsp.gov.ph).

![Graph of trade deficit of the Philippines, 1960-2010](Image)

*Source: National Statistics Office (NSO) and Bangko Sentral ng Pilipinas (BSP)*

Under the Marcos administration in the 1980’s the country experienced political turmoil and economic crisis that led to slowing economy. The slowdown of economic activities caused largely by high price of oil. The Philippine exports such as sugar and coconut oil experienced a price decline in the world market. The government was forced to borrow more money from the International Monetary Fund (IMF) to help keep the economy going. The foreign debt of the Philippines reached US$26 billion. A big portion of the annual earnings of the country was allocated to the payment on annual interest on loans. After the Aquino assassination, the tourism industry suffered a great decline. The wave of anti-Marcos demonstrations in the country that followed drove the tourists away. In addition, the political troubles hindered the entry of foreign investments. Foreign banks also stopped granting loans to the Philippine government (www.oocities.org).

When Erap succeeded Cory Aquino, foreign investments slowed down due to the bad impact of EDSA 2. The Philippines was greatly affected with an overvalued currency in 1997 due to the Asian financial crisis. This resulted to a decline in export competitiveness as well as a slowdown in export growth resulting to a slackening global demand for electronic components.
that led to a large trade balance, reaching to negative PhP327,923,000,000. Weaker prices for Philippine exports, higher production costs and a slowdown in the economies of the country’s major trading partners like US and Japan, restrained export growth to only more than 4 percent. Increasing petroleum prices and heavy importation of capital goods including power generating equipment helped push imports up almost 17 percent, resulting to a 50 percent jump in the trade deficit to more than US$4 billion (www.mongabay.com). But, in 1999, the economy recovered through trade surplus due to a boom in real estate and huge foreign direct inflows to the country. In addition, the Philippine trade deficit soared more than 200 percent in 2009, together with higher oil and steel costs. Moreover, drastic decline occurred after, due to the global rice shortage in the country, which led to a large importation of rice from 2000 to 2010 (newsinfo.inquirer.net).

Stationarity Tests

Appendices B and C present the correlograms of the autocorrelation functions (ACF) and sample partial autocorrelation functions (PACF) for budget deficit and trade deficit. A correlogram is a commonly used tool for checking randomness in a data set. It helps to indicate whether the series is stationary or not. It can be inferred from the figures that all the series are stationary in level since the plots gradually die out. It is difficult, however, to distinguish the stationarity of the series by merely looking at the correlogram. In order to test formally the stationarity of the series, the Augmented Dickey Fuller (ADF) test was applied, the results of which are shown in Table 1.

Random walk is a special case of the unit root process. It does not include an intercept or a drift term. Random walk with a drift has an intercept or drift term, and mixed process includes linear time trend and a drift term (Enders, 1995). Results point out that budget deficit (BD) and trade deficit (TD) are significant under the mixed process, rejecting the null hypothesis that these variables contain unit root. Hence, both series are stationary, confirming with earlier findings using the correlograms.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Random Walk</th>
<th>Random Walk w/ Drift</th>
<th>Mixed Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD</td>
<td>-1.0617</td>
<td>-1.6294</td>
<td>-3.4320*</td>
</tr>
<tr>
<td>TD</td>
<td>-1.6103</td>
<td>-2.2792</td>
<td>-3.6932*</td>
</tr>
</tbody>
</table>

*Significant at 10% level

Lag Length Determination

Model building in VAR depends on the selection of the appropriate lag length, which could be specified using the Akaike Information Criterion (AIC) and SBC or Schwartz Bayesian Criterion. As in the univariate case, we select the model which has the lowest information criterion value. The appropriate lag length is necessary to determine the correct set of variables to be included in VAR model. In addition, choosing inappropriate lag length (p) reduces the precision of estimated coefficients in the VAR (p) model (Enders, 1995).

In selecting the appropriate lag length specification, we chose the model which has the lowest AIC, SC and Likelihood Ratio (LR). Table 2 shows the result of the lag length determination for the VAR model. It can be seen that basing on AIC, SC and LR, the lowest value is at lag 2. The lag length, VAR (2) was then chosen to be the lag order for the BD-TD model. This means, the expected effect of a variable to another is felt two years after.
Vector Autoregressive (VAR) Analysis

After determining the stationarity properties of the series and the appropriate lag length, we proceeded with the Vector Autoregression (VAR) analysis. The VAR is commonly used for forecasting systems of interrelated time series. Also, this is employed to analyze the dynamic impact of random disturbances on the system of variables. The VAR approach sidesteps the need for structural modeling by treating every endogenous variable in the system as a function of the lagged values of all of the endogenous variables in the system (www.EViews.com).

In this study, the relationship between \( BD \) and \( TD \) has been estimated. The VAR model (\( BD \) and \( TD \)) have lag equal to 2. Table 3 shows the VAR (2) estimation outputs showing the estimates and their corresponding standard errors.

For the VAR (2) model, the results showed that the value of the 2 - year prior \( BD \) directly affects the present value of the country’s \( TD \). This result gave support to the study conducted by Kearney and Monadjemi (1990) which states that government deficits cause trade deficits through various channels. This can also be explained through the Mundell–Fleming framework, which states that an increase in budget deficit would encourage interest rates to increase, thus causing capital inflows in the country. As a result, exchange rate will be appreciated leading to an increase in trade deficit. However, according to Keynes in his absorption theory, an increase in budget deficit would induce domestic consumption and thus, import will expand, causing a current account deficit. On the other hand, the current trade deficit is affected by past trade deficit and by past budget deficit values. Results of the study also revealed that the variation of the economic variables, budget deficit and trade deficit, under the VAR (2) model can be explained by around 77 percent to 75 percent respectively.

Table 3. Estimates of the unrestricted VAR (2) model.

<table>
<thead>
<tr>
<th></th>
<th>Budget Deficit (BD)</th>
<th>Trade Deficit (TD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( BD(-1) )</td>
<td>1.314870* (0.13787)</td>
<td>-0.179591* (0.21805)</td>
</tr>
<tr>
<td>( TD(-1) )</td>
<td>0.142943* (0.08253)</td>
<td>1.001092* (0.13053)</td>
</tr>
<tr>
<td>( BD(-2) )</td>
<td>-0.551560* (0.16966)</td>
<td>0.705498* (0.26833)</td>
</tr>
<tr>
<td>( TD(-2) )</td>
<td>-0.064308* (0.16966)</td>
<td>-0.379827*</td>
</tr>
</tbody>
</table>

Table 2. Lag length determination for the VAR (2) model.

<table>
<thead>
<tr>
<th>Lag Order</th>
<th>AIC</th>
<th>SC</th>
<th>LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>106.8527</td>
<td>106.9299</td>
<td>NA</td>
</tr>
<tr>
<td>1</td>
<td>104.6303</td>
<td>104.8620</td>
<td>109.7394</td>
</tr>
<tr>
<td>2</td>
<td>104.2285*</td>
<td>104.6146*</td>
<td>24.86584*</td>
</tr>
</tbody>
</table>

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
AIC: Akaike information criterion
SC: Schwarz information criterion
It is important to note that annual observations of the variable were used. Thus, from the estimates of these economic variables, the model can be used to explain the effect of the immediate past 2 year values of one variable to another. That is, the expected effect of a variable to another is felt after 2 years.

Granger Causality Test

Table 4 presents the results of the Granger causality test of the VAR (2) model. The results indicate the direction of causal relationship between $BT$ and $TD$ at 10 percent significance level.

Table 4. Granger causality test result.

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Obs</th>
<th>F-Statistics</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD does not Granger cause BD</td>
<td>49</td>
<td>1.95630$^{ns}$</td>
<td>0.15348</td>
</tr>
<tr>
<td>BD does not Granger cause TD</td>
<td>49</td>
<td>5.68002$^{*}$</td>
<td>0.00639</td>
</tr>
</tbody>
</table>

Tests results in Table 4 shows that the null hypothesis that budget deficit ($BD$) does not Granger cause trade deficit ($TD$) should be rejected but the null hypothesis that trade deficit ($TD$) does not Granger-cause budget deficit ($BD$) is rejected at the 10 percent level of significance. This means that past values of budget deficit can help in the prediction of trade deficit in the Philippines. However, past values of trade deficit cannot predict the budget deficit. The empirical results give further support to the Keynesian view and Mundell-Fleming framework that there is a strong link between budget deficits and trade deficits in the Philippines. But prior studies by Pahlavani and Saleh (2009) in Philippines, Kouassi, Mougoue and Kymn (2004) for Thailand, Lau and Baharumsha (2006) for Singapore; Mukhtar et al. (2007); Tang and Lau (2009) for Cambodia, all revealed a strong bidirectional relationship between budget deficit and trade deficit.
CHAPTER 5
SUMMARY AND CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH

Summary and Conclusions
This paper investigated the causal relationship between budget deficit and trade deficit in the Philippines. The study made use of annual observations of the variables from 1960 to 2010. Standard time series procedures were conducted first in order to examine the relationship of the subjects. The trends of the time series were inspected and subjected to stationarity test using correlograms and ADF test. Using Eviews package version 5, the unrestricted Vector Autoregressive (VAR) was used to check the linkage between the variables and estimate the parameters of the VAR equation. Finally, the direction and magnitude of the relationship between budget deficit and trade deficit was tested using Granger causality test. The question of whether budget deficit stimulates trade deficit or vice versa, was analyzed.

Findings of the study indicated that budget deficit Granger-causes trade deficit but trade deficit does not Granger-cause budget deficit in the Philippines. The empirical result of causality between the two variables may lead to economic harm and impair economic growth since mounting deficits will charge burden to future generation (McCoskey and Kao, 1999). Improving the terms of trade, coordination of monetary and fiscal policies, a sustained effort to enhance private policy, formulating measures focusing on efficiency improvement as well as the exchange rate are the other important factors which will complement the budget policy (Pahlavani and Saleh, 2009). A unidirectional causality of the two variables could be found in the results of the studies conducted by Rauf and Khan (2011) for Pakistan; Alfonzo and Rault (2009) for Finland; Chang (2004) for Taiwan; Mohammad (2000); Bahmani and Oskooee (1992, 1995); Resenweing and Tallman (1993); Zietz and Pemberton (1990); Vamvoukas (1997); Saleh (2003); Kouassi, Mougoue and Kymn (2004); Akbostanci and Tunc (2002); Onofowora and Owoye (2006).

Recommendations
In the Philippines, the budget deficit gives a positive relationship to the country’s trade deficit but not vice versa. Meaning, an increase in budget deficit would also increase trade deficit; but an increase in trade deficit will not increase budget deficit. Since causality between the two, would hamper economic growth of the country, policymakers should formulate and provide strategies on how to reduce these deficits. Hence, the following recommendations are made:

1. Government must control deficit and put it into balance by strengthening tax mechanisms as a tool to pin down the nation's financial stability.
2. Government should give focus on finding means on how to increase the national savings in order to reduce the fiscal deficit.
3. The government must secure its political stability to encourage foreign companies to invest in the country.

Areas for Further Research
The following areas are suggested for further study:

1. The analysis in this study was based only on a bivariate model. It can be extended to multivariate models where aside from budget deficit and trade deficit, other variables
such as exchange rate, private savings, inflation, money supply and political stability can be included.

2. The use of other econometric models such as Dynamic Ordinary Least Square (DOLS) and Autoregressive Distribution Lag (ARDL) may be also explored to explain the linkages between budget and trade deficit.

3. Apply longer data set on a quarterly and monthly basis, which might give better relationship between trade and budget deficits.

BIBLIOGRAPHY


Other Online References:
www.abs-cbnnews.com
www.adb.com
www.bsp.gov.ph
www.en.wikipedia.org