Debt-Growth Nexus in the Philippine Economy: A Cointegration and Causality Analysis

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ABSTRACT

The size of the Philippines' public debt, both internal and external, has been a hotly debated issue for many years now because of not only its long-term implications on fiscal management and economic growth but also its welfare implications on present and future generations of Filipinos. Another related issue, furthering investment levels, is a cause for concern regarding the overall economic performance of the country. Foreign debts, as well as domestic debts, are resorted to by the national government to finance budgetary deficits. Presumably, these debts have helped finance capital-formation activities of the national government through investments in infrastructures, which augment aggregate investments in the economy. However, in the case of the Philippines, as observed on our statistical publications, while foreign debt has accumulated over time, economic growth has remained timid (Philippine Statistical Yearbook, 2009). While economic growth maybe argued as a determinant of a country's ability to borrow, particularly in the eyes of foreign creditors, it may also be argued that the size of foreign indebtedness can also determine the future economic performance of a country based on the presumption that this type of debt generally goes to capital formation. Further, investments are supposed to be one of the major drivers of economic growth as well as a source of tax revenues, which can avert the heightening of government borrowings. However for the Philippines, the Philippine Statistical Yearbook (PSY) 2009 indicates that investments have been just 16% of the real gross domestic product (RGDP). Thus, raising a question of whether investments exert a considerable amount of contribution to the economy as Keynesian economics holds is only but proper.

These are, therefore, empirical issues that can be looked into, and these are what this paper is all about.

Keywords: economic growth, foreign debt, investment, debt-growth nexus.

INTRODUCTION

A country's external debt, although it is an obligation by nature, is by theory, not negative to the economy. It is supposed to help because it can temporarily cover deficits and allow the government to finance the now-needed public goods and services. The debt can then be paid eventually in the future. But, for the highly indebted poor countries (HIPC), this may not be the case. The HIPC class has a general characteristic of having large amounts of foreign debt to finance

their deficit spending. In fact, these countries may sometimes even be dependent on the foreign debt. Many economists at large have debated on the issue of whether such borrowings are helpful to the economy or not. The literature for these kinds of discussions particularly in the Philippines is lagging; thus, this paper strives to help provide empirical answers to the issue of determining the relationship and precedence between economic growth and external indebtedness.

Based on the Philippine Statistical Yearbook for the year 2009 (PSY 2009), our national government's total outstanding indebtedness is five trillion pesos, which is 65% of the gross domestic product (GDP). Regrettably, against these values, the aggregate amount of revenues collected stands only at 14.65% of GDP. Of these five trillion pesos, the foreign debt chunks at 2.4 trillion or 49%. With such big numbers at hand, one may inquire whether these debts may actually be counterproductive in the sense that instead of making the economy boom, such obligations serve as a hindrance. It is in this spirit, the determination of the link between economic output and increase in foreign debt of the national government, especially those belonging to the HIPC like the Philippines, that debt-growth nexus moves. Further, it is also a point to determine the direction of influence of the borrowings: whether the Philippines borrows more because of the increases in its productive capacity and its income that likewise increases its ability to pay, or its GDP rises only as a result of the borrowings, both, or none at all.

Investments are supposed to be one of the major drivers of economic growth as well as a source of tax revenues, which can avert the heightening of government borrowings. However, for the Philippines, PSY (2009) indicates that investments have been just 16% of the real gross domestic product (RGDP). Thus, raising a question of whether investments exert a considerable amount of contribution to the economy as Keynesian economics holds is only but proper.

THEORETICAL FRAMEWORK

The guiding principle of this study is known as Debt – Growth Nexus, which focuses on the link between economic growth and foreign indebtedness. The early versions of this theory postulates that the borrower country will benefit from the transfer of foreign resources such as loans. The works of Higgins (1959), Pearson (1969), Chenery and Strout (1966) provided a foundation for the development of a comprehensive theory of external debt and growth. These early development economists all have a common view that the transfer of foreign resources (through loans, aids and grants) to less developed countries would help to transform their economies, characterized by low or zero growth rates, into economies capable of adequate and sustainable growth. Contributions of highly developed countries to the developing countries are necessary and serve to supplement domestic resource gaps with positive effects on growth.

However, in the verge of the 21st century, the hypothesis of a positive effect of foreign loans extended to the borrowing countries may not hold true especially in the case of the HIPCs. In response to this, the theory was modified so that it may be stated such that "countries belonging to the HIPC class can have a

negative or positive correlation for their external debt and economic growth." Thus, the functional form can be written as:

$$\Delta \text{ RGDP} = f(\text{FD})$$

where "economic growth" is defined as the rate of change (Δ) of the productive capacity of the economy (RGDP) over time whereas FD foreign debt.

There is no functional sign yet, as the term "nexus" implies that there exists a relationship but as to whether external indebtedness gives rise or causes decline is another theory, such as the debt-overhang hypothesis. While the debt-growth nexus can be advanced to another theory called debt-overhang hypothesis, the former differs in the sense that the negative correlation on "economic growth" in debt-overhang is coursed through investments. As Krugman (1988), Sachs (1988), and Cohen (1993) have put it:

> Debt-overhang phenomenon happens when a large debt burden squeezes investments, because returns are "taxed away" by foreign creditors hence, causes a negative effect on investment. If the debt will exceed the country's repayment ability with some probability in the future, expected debt service is likely to be an increasing function of the country's output level. Thus, some of the returns from investing in the domestic economy are effectively taxed away by existing foreign creditors and investment by domestic and new foreign investors is discouraged. In effect, the debtor country cannot benefit fully from an increase in production. A part of the production goes to creditor countries to pay the debt service.

Borrowing is not bad at all. Economic theory suggests that reasonable levels of borrowing by a developing country are likely to enhance its economic growth. As Rosen (1995) writes:

> If the money borrowed from other countries were used to finance current consumption then the future generation certainly bears a burden because consumption level is reduced by an amount equal to the loan plus the accrued interest that must be sent to the foreign lender. Conversely, if the loan is used to finance capital accumulation, the outcome depends on the project's productivity. If the marginal return on the investment is greater than the marginal cost of the funds obtained abroad, the combination of the debt and capital expenditure actually makes the future generation better off. On the other hand, internal debt creates no burden for the future generation.

Members of the future generations simply owe it to one another. The future generation as a whole is no worse off since its consumption level is the same, as it will (Lerner, 1948). As Musgrave (1979) puts it, "right hand owes to the left."

The topic of debt-growth nexus where the matter of determining the relationship between external debt and economic growth in the literature has pointed out that the adverse effect on growth is due to its displacement of capital. As more and more debt especially those from other nations are accumulated, more

and more capital is displaced in the future, which is in the form of debt servicing (Stiglitz, 2000). Further, the theoretical literature that explains the relationship between large debt and low growth in low-income countries (LIC) lags behind the empirical literature.

Countries at early stages of development have small stocks of capital and are likely to have investment opportunities with rates of return higher than those in advanced economies (Patillo, Poirson, & Ricci, 2002). As long as they use the borrowed funds for productive investments and do not suffer from macroeconomic instability, policies that distort economic incentives, or sizable adverse shocks, growth will increase and allow for timely debt repayments. These predictions hold even in theories based on the more realistic assumption that countries may not be able to borrow freely because of the risk of debt repudiation. Thus, some considerations suggest that at reasonable levels of debt, further borrowing will be expected to have a positive effect on growth.

However, the current debt crisis involves LIC like the Philippines and such expectations cannot be the same. Philippine statistical data suggest that foreign debt accumulation results in negative impact on economic growth. This is attributed to the fact that some of the considerably large foreign debts have been used to finance projects that are "mothballed." The economic benefits for the society, as well as the expected pay-offs to self-finance these projects, have not been realized. Unfortunately, these foreign debts are of legal obligation and must be paid whether they have become productive or not.

The level of national government outstanding external debt in the Philippines has always been a subject of many debates and academic discussions, which, for most of the time hold that the country's indebtedness is beyond its ability to pay back on time. This results in the transfer of debt benefits from the domestic economy to the foreign economy. As Metwally and Tamaschke (1994) claim, such borrowings decrease the domestic country's ability to grow its economy and raise its dependence on foreign debt; hence, it is argued that such types of debt create adverse incentive effects on economic growth in the long run. Moreover, Prebistero (2007) and Easterly (2001) raise the issue of causality between the two variables, stating that the main issue to deal with is the direction of causality since it is neither clear nor necessary that high debt reduces economic growth, and there is a possibility that it could be the other way round.

Over the years, investments have been taught under Keynesian basics to be one of the key sources of fluctuations in the GDP and business cycles. Dornbush et al. (2000) cited that investments over a long period of time determine the size of capital stock and thus help determine long-run growth."

Keynes (1936) introduced the Multiplier Model (of Investment) that states that physical investments or also known as gross capital formation is one of the key ingredients in determining national output by which "a change in investment levels will move the level of output greater than the change" and, such investments can be promoted by the use of government intervention in attaining the set economic goals

as well as during times of economic disarray. This notion is considered by many as indispensable and has been taught in the discipline of economics since then. The functional form of this theory can be written as:

$$\Delta Y = a\,(\Delta I) \qquad : \text{where a is the multiplier}$$

The multiplier model has also effectively put the direction of precedence from the changes in investments toward the determination of a larger level of output. The theory has also emphasized the important role of investments in furthering the levels of economic growth through new knowledge, employment, and tax-revenue generation and promoting efficiency in resources among many others. The formula above has been given all due credit and has been the standard for so many years in the economic discipline. This Keynesian rule, however, has found its counterpart in another model. While this may be true, it is not the case in the Philippines where the amount of gross capital formation or investments is very low, playing only on the latest ten-year average by 17% as a portion in the GDP. Such circumstances have given space for further empirical study regarding the relationship of investment levels and economic growth in the country.

An alternative concept known as the Accelerator Model of Investment reverses the Multiplier Model and postulates that "investments (I) is proportional to changes in output (Y)" or restating, "rapid output growth stimulates investment" (Samuelson and Nordhaus, 2001) and hence, gives the formula:

$$I_t = {}_2\,(Y_t - Y_{t-1}) \qquad : \quad {}_2 > 0$$

Investment levels in the Philippines have played a minimal role in GDP, having an average contribution of only 17% for the last ten years. Given this, the two propositions ought to be tested in order to determine which holds true in the local setting. Henceforth, evidences regarding these empirical questions and theories as applied in the Philippine setting were what this study aimed at.

DATA AND PROCEDURES

Data and Sources

The study focused on establishing the link as well as the causal relationship between economic growth and foreign debt accumulation along with investments in the Philippines. The annual time series data used covered a 35-year period from 1975 to 2009. The numeric data obtained was transformed in their natural logarithms and then tested using statistical and econometric procedures. The level of significance used in hypothesis testing of different statistical diagnostics and the percentage of the disturbance term was 0.05 or 5%.

The variables selected were real gross domestic product (RGDP), real total foreign debt (RTFD) and real gross capital formation (RGCF); all of which were deflated using the GDP deflator at 1985 constant prices, and expressed in million

pesos. Total outstanding foreign debt was selected over debt servicing as the values of the latter are already paid. The former ought to have more focus as its value is current and larger, thereby, giving more pressure to the debt-managers of the country.

The Model

In answering the debt-growth nexus question, the following regression model has been developed:

$$RGDP = f (RTFD, RGCF)$$

The model is read as: "Real Gross Domestic Product (RGDP) is a function of real total foreign debt (RTFD) and real gross capital formation (RGCF)" where RGDP is the dependent variable while RTFD and RGCF are the regressors. Respecifying the model:

$$RGDP = A (RTFD_1 . RGCF_2)$$

Since this is a nonlinear function, the following double log functional form is formulated to transform it to a linear function. This can be facilitated by transforming the level data into natural logarithm such that:

$$LNRGDP = {}_0 + {}_1 LNRTFD + {}_2 LNRGCF + {}_i$$

Where the accessory parameters are defined as follows:

$_0$ refers to the intercept of the regression line.

$_1$ and $_2$ are the regression coefficients of RTFD and RGCF, respectively. In the context of double log model, they are treated as elasticities.

$_i$ refers to the Disturbance or Error Term which accounts for all other factors or events that may somehow affect the variables but are not included in the model. The chosen level is at 0.05 margin of error.

The question of causality among RTFD, RGCF, and RGDP can be answered and expressed econometrically using the following system of equations:

$$RGDP_t = {}_\cdot RGDP_{t-1} + {}_\cdot RTFD_{t-1} + {}_\cdot RGCF_{t-1} + \mu_t$$

$$RTFD_t = {}_\cdot RGDP_{t-1} + {}_\cdot RTFD_{t-1} + {}_\cdot RGCF_{t-1} + \mu_t$$

$$RGCF_t = {}_\cdot RGDP_{t-1} + {}_\cdot RTFD_{t-1} + {}_\cdot RGCF_{t-1} + \mu_t$$

where the summation signs refer to the cumulative effects of the lagged explanatory variables on current values of the dependent variable.

One of the following conclusions can be drawn from these equations:

1. A unidirectional causality exists from an independent to dependent variable (1st equation) if these two are met:

    a. The coefficient of the lagged values of TFD (or GCF in the second case) is statistically different from zero ($_{\cdot\cdot}$ $_{\cdot} \neq 0$).

b. The sum of lagged values of RGDP is not statistically different from zero ($._{} = 0$).

2. A unidirectional causality exists from the dependent variable to the independent variable (2nd and 3rd equations) if these two occur:
    a. The coefficient of the lagged values of RGDP is statistically different from zero ($._{} \neq 0$).
    b. The sum of lagged values of TFD (or GCF in the second case) is not statistically different from zero ($._{}$ 0).

3. Bilateral causality is present when the sets of RGDP to TFD or to GCF are statistically significantly different from zero in both regressions.

4. Independence happens when the sets of both RGDP to TFD or to GCF are not statistically significantly different from zero in both regressions.

Alternatively, the four (4) conditions above may be applied in the determination of causality between RTFD and RGCF.

STATISTICAL TREATMENT

Prior to the processing of data in Multiple Regression Analysis, the 35-year gathered data from 1975 to 2009 was converted first to their "real" values using the GDP Deflator with 1985 as the base year and then transformed into their natural logarithms. The Augmented Dickey-Fuller Unit Root Test procedure was first applied to verify the existence of unit roots and if the variables are integrated of the same order so as to avoid the phenomenon of spurious regression. After satisfying the unit root criteria, the regression can be performed.

To verify the values and comply with the assumptions of multiple regression as well as ensure that the computed parameters are the best, linear and unbiased estimates are used, namely: t-test for the individual significance of the parameters and F-test for the goodness-of-fit or R^2. Further tests were also conducted which includes Durbin-Watson Statistic for autocorrelation disturbances, Jarque-Bera Test for normality of residuals, White's Heteroskedasticity Test for the constancy of variance, as well as the Ramsey's RESET for specification errors.

The cointegration method used is the Johansen-Juselius Approach as this is the one applicable for multivariate series. After verifying if the model is cointegrated, the next procedure conducted was the determination of the optimal lag length, which was aided by the use of both the Akaike and Schwarz Information Criterion. After all of the previously mentioned processes are satisfied, the Granger Causality was applied.

The thorough procedures of the above tests are fully described in Gujarati (2004) and Danao (2002). A statistical computer program under the trade name Eviews created by Quantitative Micro Software was used to facilitate the computation of the data.

RESULTS AND DISCUSSION

The 35-year annual series data from 1975 to 2009, on RGDP, RTFD and RGCF are shown in Table 1 as follows:

Year	RGDP	RTFD	RGCF	Year	RGDP	RTFD	RGCF
1970	343,162	53,456	67,236	1990	720,690	265,109	172,951
1971	361,791	49,316	71,102	1991	716,522	244,528	143,047
1972	381,497	56,624	73,684	1992	718,941	251,843	154,252
1973	415,529	50,322	82,415	1993	734,156	292,124	166,397
1974	430,314	50,224	99,568	1994	766,368	252,105	180,797
1975	454,260	70,489	123,546	1995	802,224	252,933	187,131
1976	494,265	95,919	146,854	1996	849,121	228,146	210,440
1977	521,954	102,919	148,282	1997	893,151	319,002	235,052
1978	548,950	129,927	160,283	1998	888,000	313,477	196,794
1979	579,909	137,632	167,265	1999	918,160	356,387	192,894
1980	609,768	161,837	161,071	2000	972,960	454,807	239,054
1981	630,642	205,851	165,633	2001	990,042	438,889	221,621
1982	653,467	231,200	179,577	2002	1,034,093	499,568	212,081
1983	665,717	334,135	191,070	2003	1,085,071	587,541	218,414
1984	616,962	316,496	120,398	2004	1,154,296	618,739	234,066
1985	571,883	276,302	82,047	2005	1,211,452	503,382	213,470
1986	591,423	291,787	90,301	2006	1,276,873	464,632	224,105
1987	616,923	295,125	108,085	2007	1,368,640	397,430	249,122
1988	658,581	253,395	123,960	2008	1,429,226	438,815	261,405
1989	699,448	234,857	149,310	2009	1,431,979	459,557	230,906

Sources: National Economic Development Authority (NEDA), Philippine Statistical Yearbook (PSY) Link Series - National Accounts of the Philippines (1940 – 1999; A publication of the National Statistical Coordination Board (NSCB), Statistical Data Analysis Division - Research Service (SDAD – RS)- Bureau of the Treasury (BoT).

Looking at the values procured from various government offices, it can be easily said that there is an increasing behavior exhibited by each of the three variables selected. While there are times of fluctuations, that could be highly attributed to the political and economic conditions during those times. However, such numbers may be deceiving, as it does not show the year-on-year fluctuation of values. To address this, a graphical presentation of the level data and growth rates are provided in the next page.

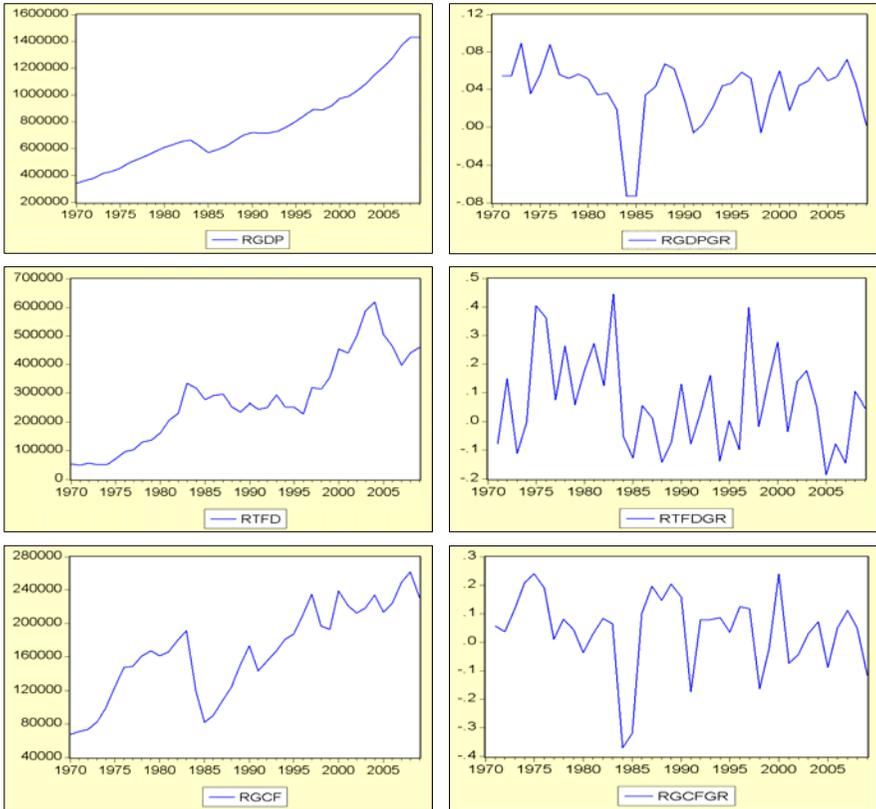| Level Data	Growth Rates

**Figure 1 Graphical Illustration of the Level Data of RGDP, RTFD, and RGCF
and Their Growth Rates**

       Fig. 1 shows that there were large visible year-on-year fluctuations in the RGDP across the time series. In the years 1973 to 1980, economic growth played at 6% to 7% on the average. While there were fluctuations in the economy during the period, the increase in the following years tended to balance the effect in general. The average growth rate could be attributed to the fact that since the country was under martial law at that time, most of the economic and social reforms initiated by the president were easily put into place. The economy's thrust was also changed from agricultural to the introduction of industrialization foundations to increase the productivity of the land. Hence, it could be expected that there were more imports of new machineries and related technologies from other countries in relation to industrialization projects. Moreover, these projects are financed by foreign debts. Such projects included the construction of railroads, Light Rail Transit (LRT), construction of alternative sources of energy like hydroelectric and geothermal power plants, importation of advanced machines that boosted the garment industry, and "mechanization" of some agricultural processes among others. The biggest example among these projects was the Bataan Nuclear Power Plant (BNPP), a 620-

megawatt nuclear facility of the Pressurized Water Reactor (PWR) type located at Napot Point in Morong, Bataan. In 1976, the government signed a contract with Westinghouse Electric Corp. to construct the said project with a completed cost of construction and additional safety upgrades in the amount of 1.95 billion U.S. dollars. These projects were entered into by the government at that time on the notion that these debts are self-liquidating as the proceeds from the projects are the ones that will be used to pay the debt, in addition to the benefits that will be garnered by the general public.

However, in the 1980s, the economic growth slumped continuously and eventually hit its lowest during the turbulent years of 1984 and 1985. Capital flight was also severe. Afterward, however, it gradually recovered starting 1986. Despite the large deficits, low tax efforts, and high debt servicing, the Aquino administration responded by approving the 1986 tax reform, which showcased the approval of some 30 measures including the introduction of VAT in the Philippines (Diokno, 2008). Results of these efforts showed that the economy's performance proved to be recovering. However, this was short-lived as the later part of 1989 toward 1990 was hard for the administration because of the turn of political events, which resulted in speculative behavior, and capital flight was again on high, which adversely affected the economy.

During his presidency, Ramos faced the challenge of addressing the power-sector problem and increases in outstanding foreign debt were seen. His administration also adopted an aggressive policy on privatization of some government assets like Petron and Bonifacio Property (Diokno, 2008) on the notion that these public assets and corporations would be better handled by the private sector. On the latter years to 1996, some of the matured medium-term loans were paid. However, in the latter part of 1997, the Asian Financial Crisis began to hit the neighboring countries. The Philippines was of no exception. The country was hit in mid-1998 alongside the national elections. Inflation was high while the balance of trade deficit reached 250 billion pesos. The same challenges were experienced by the new government under Pres. Joseph Estrada, also known as the Erap Administration. Amid the criticisms of his leadership ability, he and his economic managers were able to make the adjustments to counter and shorten the effects of the Asian Financial Crisis in the Philippines. Consequently, the need to borrow more from western countries increased, resulting in the sudden upsurge by 40% in 1997.

In 1998 to 2000, the foreign debts under the short tenure of Pres. Estrada in office also increased because these funds were used to mitigate the effects of the Asian Financial Crisis in the late 1997, which persisted to 1998. Moreover, a considerable amount was used to finance national defense expenditure, since it was during this period when the Chief Executive commanded the Armed Forces to topple down the Moro Islamic Liberation Front (MILF) rebels who were causing terror over a large area in Mindanao. Nonetheless, the gross domestic product crawled slowly but steadily upward. The country also experienced a balance of trade surplus after 10 years. Conversely, because of his alleged vices, jueteng payola, midnight cabinet, and the corruption allegations against him that eventually lead to his impeachment proceedings, the economy began to slow down again.

After the oath-of-office of the then Vice President Gloria Macapagal Arroyo to the Presidency in January 2001 until 2009, she laid down extensive infrastructure and archipelagic-linkage programs, such as the "Roll On, Roll Off Nautical Highway", construction of new airports and national roads, extension of expressways, and overhaul of the Philippine National Railroad system, among others. Despite these efforts, however, growth tended to be very fluctuating under her prolonged nine-year tenure that was characterized by uncertainties and various scandals, which affected the country's economic performance. Inflation rates were consistently high; the country's balance of trade deficit reached the highest from 1970, which was 256 billion pesos in 2003. This scenario was repeated in 2005 when the deficit hit 226 billion pesos. Subsequently, the government declared a fiscal deficit because the country had suffered a 178-billion-peso deficit on the average from 2001 to 2005. A new tax law (the Expanded Value Added Tax, EVAT) was implemented as an answer to the problem, yet the deficit was augmented to 12 billion pesos in 2007. This deficit surged to 298 billion pesos in 2009, but at that same time, the economy's gross domestic product just grew by 200 billion pesos.

Regression Results

The results of the regression performed on the cointegrating equation are as follows:

Table 2

Cointegrating Equation Regression Result

| Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.65958	18.82017	0.885198	0.3831
LNRTFD	-0.023370	0.019598	-1.192440	0.2424
LNRGCF	0.181751	0.021732	8.363405	0.0000
AR(1)	1.564860	0.147262	10.62634	0.0000
AR(2)	-0.567652	0.149912	-3.786581	0.0007
R-squared	0.997748	Mean dependent var		13.57318
Adjusted R-squared	0.997447	S.D. dependent var		0.315661
S.E. of regression	0.015948	Akaike info criterion		-5.307397
Sum squared resid	0.007630	Schwarz criterion		-5.085205
Log likelihood	97.87945	F-statistic		3322.515
Durbin-Watson stat	2.020199	Prob(F-statistic)		0.000000
Inverted AR Roots	.99	.57		

The results in Table 2 showed that the computed t-value for RTFD is lower than the critical value of 2.0301 (df = 35, 0.025) and a probability higher than the level of significance of 0.05; hence, the beta coefficient is statistically insignificant or not different from the hypothesized value that the coefficient is equal to zero. This, however, does not mean that the associated variable is unimportant. Strictly, it

means that the probability of committing a Type 1 error (rejecting a true null hypothesis) is quite high. Notwithstanding, the t-test alone does not imply the destruction of the model as a whole nor does it mean that the variable is less important. On the other hand, RGCF shows values above the t-critical level. This means that the computed coefficients for each independent variable are statistically significant in explaining the RGDP.

The coefficient of multiple determination as signified by the adjusted R^2 has returned a value of 0.997, which means that 99.7% of the variations in real gross domestic product can be explained by the independent variables, real total foreign debt, and real gross capital formation. Further, the F-statistic is also way above the F-critical value of 5.34 (0.05, 3-1, 35-3), which suggests that the parameter estimates of the independent variables altogether or the model in itself is statistically significant in explaining the values of RGDP. Moreover, the probability that the model will fall below the F-critical value is 0.00%.

The test for first-order until the second-order serial correlation signified by Durbin-Watson statistic of 2.0202 showed that after correcting for autocorrelation disturbances AR(1) and AR(2), the model is held clean from positive, negative, or indeterminate autocorrelation (0.05, 2, 35 = 1.584du < 2.0202 < 2.416 4-du).

The figure below verifies the prior results of the tests discussed before. The Sample Regression Function (Fitted) is closely tracking the Population Regression Function (Actual) data hence, verifying the value of R^2.
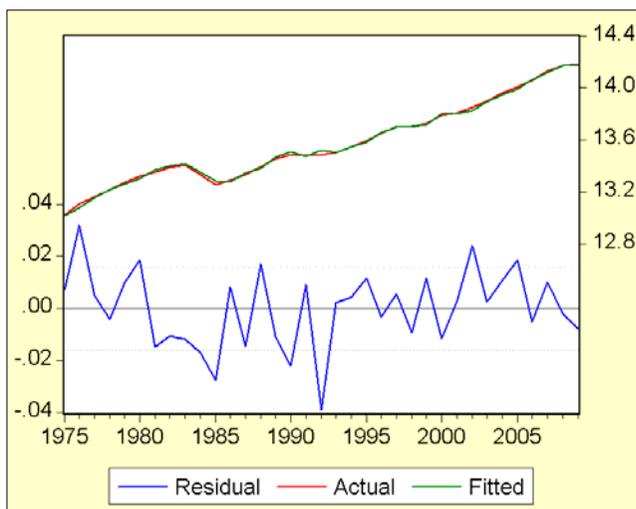
The residual graph as provided, along with the actual and fitted lines, also suggests that the mean value of all the residuals would play closely at zero level or "normal." Formally, the Jarque-Bera Normality Test has been used to verify the normality of residuals such as that of the data being regressed:

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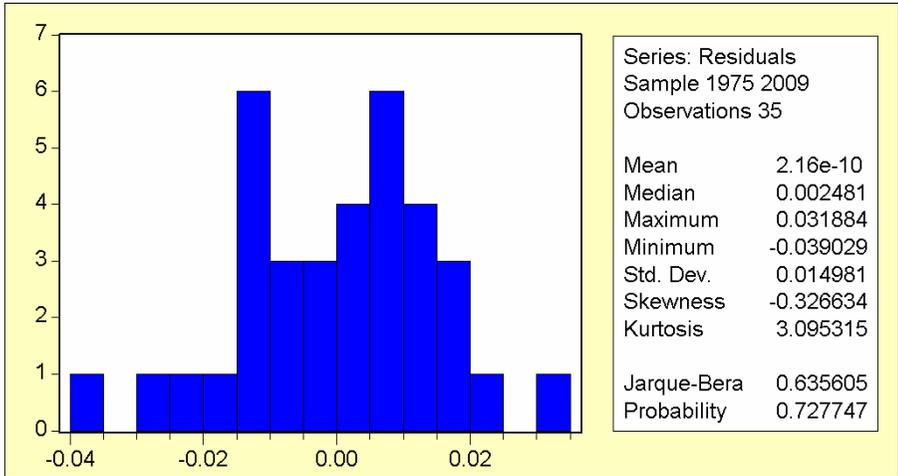|	Series: Residuals Sample 1975 2009 Observations 35	
	Mean	2.16e-10
	Median	0.002481
	Maximum	0.031884
	Minimum	-0.039029
	Std. Dev.	0.014981
	Skewness	-0.326634
	Kurtosis	3.095315
	Jarque-Bera	0.635605
	Probability	0.727747

Figure 3 Normality of the Residuals

The JB statistic returned a value of 0.6356, which is close to zero, and the probability that the residuals are not different from zero is 72.8%. Hence, with these results, the residuals of the model can be said as "normally distributed".

The next process is to determine whether the variances of the regression coefficients are constant overtime. To this end, the study has employed White's Heteroskedasticity test (cross terms) and the results are as follows:

Table 3

White's Heteroskedasticity Result

White Heteroskedasticity Test:			
F-statistic	0.650351	Probability	0.663504
Obs*R-squared	3.528845	Probability	0.619028

Table 3 indicates that the p-value or the probability of having constant variance is 61.9%. This is greater than the level of significance at 5%; hence, it can be said that there exists constant variance and the null hypothesis of no heteroskedasticity is held.

The test for the specification error in the regression done also plays a major part in validating the model, hence, the value of the estimated coefficients. To this end, the Ramsey Regression Specification Error Test (Ramsey RESET) is tapped. The test validates the presence of any of the following: inclusion of an irrelevant variable, omission of a relevant variable, measurement error on the data used, usage

of incorrect functional form, and presence of very high multicollinearity in the model. The test result of the data is as follows:

Table 4
Ramsey's RESET Result

Ramsey RESET Test:			
F-statistic	2.676738	Probability	0.086345
Log likelihood ratio	6.123511	Probability	0.046805

The test result shows that the F-statistic is below the F-critical value of 5.34 (0.05, 3-1, 35-3), and the probability of accepting the null hypothesis of no specification error is 0.0863, which is way above the rejection probability of 0.05. Hence, the model can be said as correctly specified.

After all of the statistical diagnostics and the assumptions of the classical multiple linear regression model, along with the forecasting criteria have been satisfied, it can now be said that the computed coefficients are the best linear and unbiased estimators and can now be interpreted with all due reliability.

Considering the data transformation to natural logarithms, the computed regression coefficients b1 and b2 are actually the elasticity of the deflated values for total foreign debt and gross capital formation, respectively.

Regression Coefficient for RTFD $_1$. The computed value is -0.0234, which implies that taking the gross capital formation constant, 1% change in the level of the total foreign debt will lead to a decrease in the productive capacity of the economy 0.0234%. The result actually validates what the related literature say regarding debt-growth nexus: that the effect of increasing external indebtedness of a country, especially those belonging to the highly indebted poor countries category, is generally negative. In the case of the Philippines, the country has accumulated chunks of foreign debt. However, the projects that were built from these borrowings have not given back the benefits as expected of them because of various reasons and, consequently, have become counter-productive. An example of these projects includes the 1.92-billion U.S.D. Bataan Nuclear Power Plant (BNPP) project that was completed, with its additional safety upgrades, in 1985. However, this was "mothballed" as a result of the political turmoil during the time of President Marcos. Not a single kilowatt hour was produced for the country, but the duty of paying the principal and interest obligations for such a project remains. In the same token, projects under the Arroyo Administration seem to be not-so-productive because of wrong priorities "like big airport construction projects in provinces where the population is small and whose tourism potential is not great compared to other areas that need airports or where airports require expansion" (Diokno, 2008) . Ironically, such debts, which are intended for the general benefit, produce adverse effects, but they still must be paid no matter what happens because, these are legal obligations, not just simple borrowings from an acquaintance with no interest and time maturity.

Regression Coefficient for RGCF $_2$. The elasticity value of 0.1818 for real gross capital formations holds that a percent change in the said variable taking total foreign debt constant will promote the real gross domestic product by 0.1818%. Using the Philippine data from 1975 to 2009, the result was just barely in consonance with Keynesian economics, which holds that investment plays as one of the key components of the gross domestic product. However, it can be observed that for the Philippines, although investment has a positive relationship with RGDP, it still has a very minimum effect. This is due to the fact that the country has not exhausted its investment capabilities even until the present time. The construction of the Philippine economy goes more for personal consumption expenditures, which for the year 2009 alone represent 80% of the gross domestic product while gross capital formation stands only at 16%. The country has vast available resources to be tapped for the economy to zoom upward; however, there is a lack of sufficient capital coupled with the small number of properly educated members of the populace resulting in high rates of poverty and unemployment, in addition to other economic woes that discourage potential local or foreign investors. The result only proves that there is much more to do in empowering investments in the country, and such should be one of the priorities of the next administration after the nine-year rule of the incumbent president and the subsequent national elections.

One of the major locus points of the study is to determine the direction of causality between the real gross domestic product and real total foreign debt. However, the said test is known to be sensitive to the number of lags used. To determine the optimal lag length, the Akaike Information Criterion and Schwarz Information Criterion are employed and the results of the various regression runs using varying lag models are as follows:

Table 5
Optimal Lag Length

Number of Lags	Information Criterion	
(LNRTFD and LNRGCF)	Akaike	Schwarz
1	-4.1625837	-3.9403911
2	**-4.0613184**	**-3.8391258**
3	-3.9736876	-3.7514950
4	-3.9412326	-3.7167678
5	-3.9931705	-3.7664269

The software, Eviews, returns the message "Estimated AR process is non-stationary" starting from LAG 5 onwards. Since the AIC and SIC returned the lowest value at 2 lags, as well as that Granger Causality Test on EViews starts on Lag 2 by default, It can be concluded that 2 is the optimal lag length. After the process of cointegration and determining the optimal lag length, the Granger

Causality Result is safely conducted to determine the direction of causality between the variables used in the study. The result is as follows:

Table 6
Granger Causality Result

Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
LNRTFD does not Granger Cause LNRGDP	38	1.98253	0.15379
LNRGDP does not Granger Cause LNRTFD		1.62380	0.21251
LNRGCF does not Granger Cause LNRGDP	38	3.06013	0.06037
LNRGDP does not Granger Cause LNRGCF		3.50892	0.04152
LNRGCF does not Granger Cause LNRTFD	38	3.13766	0.05656
LNRTFD does not Granger Cause LNRGCF		3.86075	0.03115

The following conclusions can be drawn from the results of estimation above:

For RGDP and RTFD, both the probabilities of their pairwise causality test were way above the 5% level of significance where the null hypothesis can be rejected. Based on these, each "does not granger cause" the other; thus, it can be concluded that there exists independence between the two variables.

Using the Philippine data from 1975 to 2009, RGCF barely "does not granger cause" RGDP, which is quite inconsistent with Keynesian expectations for reasons that investment levels in the country are very low, and that the country has not exhausted its investment potentials yet. This conclusion is also in coherence with the explanation on the low parameter estimates of the said variable in the previous discussions in this study.

Moreover, the probabilities also show that the RGCF-to-RGDP relationship is reversed such that it is actually RGDP that granger causes RGCF. This, however, is not wrong for it validates the Accelerator Model of Investment, which holds that "investments is proportional to changes in output," thus, making RGDP as the determinant value for RGCF.

The result also returned that the direction of causality from RGCF to RTFD is rejected, thus, it can be said that the lagged valued of RGCF does not precede the changes in RTFD. On the contrary, the direction of influence from the past values of RTFD toward RGCF is held.

CONCLUSIONS

The result from this study had established that the link between real total outstanding foreign debt of the national government and gross domestic product is negative. The Philippine data adhere to prior findings in the related literature that for low income earning and/or highly indebted poor countries, the effect of increasing external indebtedness in economic growth is negative if not minimally positive. Moreover, empirical evidence validates that the prior values of foreign debt do not necessarily influence the productive capacity of the economy, thus, proving that more external borrowings do not really help the Philippine economy in eliminating its fiscal woes. The expected pay-offs and benefits for the general welfare of the economy have not materialized from the projects that were financed from these foreign debts. Moreover, the expected benefits are covered by debt servicing and, hence, are more of a burden to the future generations. Neither the fluctuations in the economy do precede why would the national government borrow more or borrow less.

Further, the following are held:

The Accelerator Model of Investment is also held in the Philippines from 1975 to 2009; thus, it is the level of real gross domestic product that precedes the level of investments in the country. This conclusion is not startling, especially in the case of countries like the Philippines. RGDP has been one of the leading indicators of economic performance and, hence, a presumptive yardstick of industry climate for both domestic and foreign investors before doing business in the country.

A unilateral causation is also observed from total foreign debt to gross capital formation. Generally, foreign debts are used to finance public investment projects like roads and so on. These public investments complement private investments in such a way that the former induces the latter. For example, a locality with well-maintained road networks connecting areas from manufacturing to distribution and target markets would attract private investors to do business in that place, hence, promoting economic welfare in terms of local productivity and employment.

The following suggestions can also be considered for further research:

Longer time series by using quarterly data may be done.
The paper is general by nature. A more specific measure for economic performance is through investments and this could be done by exploring the debt-overhang hypothesis using the GCF = f(TFD) model and some variations.

The inclusion of other fiscal and monetary variables like total domestic debt, monetary aggregates, and dummy variable for political and economic shocks is also suggested.

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