Economic Growth and External Debt Servicing of the Philippines: 1981-2005

by

Janice Abilene S. Patenio and Agustina Tan-Cruz

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ABSTRACT

This study focuses on the relationship between Economic Growth and external debt service payments of the Philippines considering other explanatory variables such as capital stock, labor force, and human capital, wherein quarterly data for the period 1981 to 2005 were used. Moreover, it investigates the relationship between debt servicing and economic growth with the use of the vector autoregressive (VAR) representation, wherein the VAR (4) model was used. At first, it was planned to proceed with cointegration since the literature claims that this is the preferred approach (rather than VAR) especially for long-run estimation. However, tests of existence of unit roots revealed that the variables were stationary.

Results of the study using the VAR (4) model show that economic growth is not very much affected by external debt servicing. Further, it was revealed that debt servicing in the Philippines is not that high for debt overhang to occur.

Keywords: external debt servicing, VAR, economic growth, debt overhang

I. Introduction

A major problem facing nations today, particularly the developing ones such as the Philippines, is the size of their external debt. According to the World Bank, total external debt may be defined as debt owed to non-residents repayable in terms of foreign currency, goods or services. When debt gets so large, countries have trouble even paying interest on the loans. As a result, some developing nations talk about defaulting, or not repaying borrowed money, and when countries approach default, borrowers and lenders often try to revise the repayment schedule. Some lenders have found creative ways to resolve the debt crisis. For instance, the Philippines was unable to repay a major loan to the Bank of America, which in turn accepted an offer of 40% stock ownership in the Bank of the Philippines instead of the repayment (Clayton, 1995).

The Philippines had turned to International Monetary Fund (IMF) previously in 1962 and 1970 when it had run into balance of payments difficulties. It did so again in late 1982. An agreement was reached in February 1983 for an emergency loan, followed by other loans from World Bank and transnational commercial banks. Negotiations began again almost immediately.
after the moratorium declaration between Philippine monetary officials and the IMF. The situation became complicated when it came to light that the Philippines had understated its debt by some US$ 7 billion to US$ 8 billion, overstated its foreign exchange reserves by approximately US$ 1 billion, and contravened its February 1983 agreement with the IMF by allowing a rapid increase in the money supply. A new standby arrangement was finally reached with the IMF in December 1984, more than a year after the declaration of the moratorium (Library of Congress Country Studies).

The Philippines spends a third of its national budget every year for debt servicing. Outstanding external debt as of December 2005 was $54,186 million and about $53,304 million as of March 2006 (Bangko Sentral ng Pilipinas).

Economic theory suggests that reasonable levels of borrowing by a developing country are likely to enhance its economic growth. 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. 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 should 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 would be expected to have a positive effect on growth. Others stress that large accumulated debt stocks may be a hindrance to growth. Both these elements together imply that debt is likely to have nonlinear effects on growth (Pattillo, et al., 2002).

**Significance/Objectives of the Study**

Most studies are focused on the relationship between external debt and investment. Few have investigated the relationship between external debt and growth. In the case of the Philippines, there is little empirical work available on this subject. The study advances empirical understanding of the external debt problems, side by side with economic growth in the Philippines.
The study examines the relationship between the external debt service payments and economic growth in the Philippines. More specifically, it investigates whether external debt servicing along with other variables such as capital stock, labor force, and human capital have any significant impacts on the rate of economic growth in the Philippines using vector autoregressive representation.

The study is limited to a 25-year quarterly data of the Philippines, specifically from 1981 to 2005. It focuses on the relationship between economic growth and external debt servicing. GNP represents or serves as a dummy to economic growth, which is defined to be a function of capital stock, labor force, human capital and debt service.

II. Methodology

2.1 Theoretical Framework (most are taken from Karagol, 2002)

The relationship between external debt and economic growth as discussed by Karagol (2002) is not very simple. This subject usually attracts the interest of highly developing countries due to the reduction in economic growth via investment, namely debt overhang. Debt overhang theory is based on the premise that if 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 investor is discouraged. Debt servicing, including interest payments and repayments, may also be a real linkage from an indebted country. It takes large benefit from the domestic economy to transfer to the foreign economy. Therefore, the country foregoes some spectacular multiplier-accelerator effects. According to Metwally and Tamaschke (1994) as cited by Karagol, this decreases the domestic country’s ability to grow its economy and raises its dependence on foreign debt. It is argued that a debt overhang creates adverse incentive effects on the economic growth in the long run.

Other channels through which the need to service a large amount of external obligations can affect economic performance include the crowding out effect. Due to high real interest rates,
terms of trade of over borrowed country worsens and shut-off from foreign credit markets. It is expected that investments would have declined because of the decrease in available resources for financing investment and macroeconomic conditions. Moreover, because of the expected higher taxes and deteriorated domestic policies that will affect real returns on investment since the debtor country has to pay their debt obligations, this has led to a decreasing growth rates on investment. In addition, foreign borrowing affects future growth through the effect on interest payment obligations. This causes a higher stock of outstanding debt. This means that external borrowing increases future debt service obligations because the foreign exchange constraint tightened in the future (Kamin et al., 1989). In the crowding out effect, a reduction in the debt service should lead to an increase in investment for any given level of future indebtedness. If a greater portion of foreign resources are used to service external debt, very little is available for investment and growth.

In summary, in the debt overhang hypothesis, external debt causes a negative effect on investment. The debtor country can not benefit fully from an increase in production. A part of the production goes to creditor countries to pay the debt service and this point is a consideration for investment and production decisions.

2.2 Conceptual Framework

This study takes off from the framework employed by Wijeweera, et al. (2005) and by Cunningham (1993) wherein debt servicing was classified as a primary factor of production. It used the following standard production function model to investigate the relationship between economic growth and external debt,

\[ Y = f (K, LF, DS) \]  

where \( Y, K, LF \) and \( DS \) represent GNP, capital stock, the labor force and debt servicing respectively.

Karagol (2002) extended the Cunningham model to incorporate Romer’s (1996) conceptualization of human capital. It consists of the abilities, skills, and knowledge of particular workers. Therefore, like traditional economic goods, human capital is rival and excludable, and adding human capital to the model raises the output effects of changes in the resources devoted to capital accumulation. With an additional human capital \( H \) variable, the new production function takes the following form:
This study makes use of this extended model.

\[ Y = f(K, LF, DS, H) \] \hspace{1cm} (2)

Figure 1. Relationship between Economic Growth and Production Variables.

2.3 Estimation

For this study, it was originally planned to use cointegration analysis, which in turn requires basic principles of the autoregressive (AR), moving average (MA), and autoregressive integrated moving average (ARIMA) models. However, preliminary tests showed that the variables are stationary. Hence the decision to proceed with the vector autoregressive (VAR) model.

2.3.1 Test for Presence of Unit Roots

The standard practice in the time series literature obliges a check for unit roots in each series before estimating any equation. According to Granger and Newbold (1974) as cited by Wijeweera et al. (2005), if there is a unit root then that particular series is considered to be non-stationary. Moreover, estimation based on non-stationary variables may lead to spurious results, which will produce high R² and t-statistics, but without any coherent economic meaning or has insignificant results. In accordance with standard practice, this study will check whether or not the variables are stationary. The Augmented Dickey-Fuller (ADF) test for checking unit roots was employed in this study.
In Enders (1995), Dickey and Fuller (1979) considered three different regression equations that can be used to test for the presence of a unit root:

\[ y_t = y_{t-1} + e_t \]  \quad \text{Random Walk}

\[ y_t = a_0 + y_{t-1} + \epsilon_t \]  \quad \text{Random Walk w/ Drift}

\[ y_t = a_0 + y_{t-1} + \alpha t + \epsilon_t \]  \quad \text{Mixed Process}

Although the literature is rich with the application of cointegration with studies related to economic growth, plenty of studies in the past failed in the unit root tests. Hence, the alternative was to use the vector autoregressive (VAR) model. It was feared that for this study, the unit root tests would fail. This fear was confirmed after doing preliminary tests for existence of unit roots.

### 2.3.2 The Vector Autoregressive Process

The vector autoregressive (VAR) model of Sims (1980) is one of the most successful, flexible, and easy to use model for the analysis of multivariate time series. A VAR is an \( n \)-equation, \( n \)-variable linear model in which each variable is in turn explained by its own lagged values, plus current and past values of the remaining \( n - 1 \) variables. VAR is simply an autoregressive model with at least two variable time series having \( p \) as the number of lags used in the model. Thus, it is a multivariate AR model in which \( n \) variables are specified as linear functions of \( p \) of their own lags, \( p \) lags of the other \( n - 1 \) variables. The lag length (\( p \)) for the model may be determined using model selection criteria such as the Akaike Information Criterion (ADF) and the Schwartz Bayesian Criterion (SC). Algebraically, a \( p \)-order vector autoregressive model, written VAR (\( p \)) is given by

\[ y_t = \nu + A_1y_{t-1} + \cdots + A_p y_{t-p} + u_t \quad (6) \]

where:

- \( y_t = (y_{1t}, \ldots, y_{Kt})' \) is a \( n \times 1 \) random vector of observation of the variables,
- \( A_1 \) through \( A_p \) are \( n \times n \) matrices of parameters,
- \( \nu \) is a \( n \times 1 \) vector of parameters, and
- \( u_t \) is the error term/ assumed to be white noise; that is,
  \[ E(u_t) = 0, \]
  \[ E(u_tu_t') = \Sigma, \] and
  \[ E(u_tu_s') = 0 \text{ for } t \neq s \]
It has been argued that it is better to pursue macroeconomic modeling within a VAR framework than within a simultaneous equations framework. The proponents of VAR modeling argue that simultaneous equations modeling places too many dubious \textit{a priori} restrictions on structural parameters and that VARs provide a flexible framework free from the constraints of our questionable inadequate macroeconomic theory (Statistica Electronic Textbook, 1984-2003).

\subsection*{2.3.3 Variance Decomposition}

Since unrestricted VAR are over parameterized, they are not particularly useful for short-term forecasts. However, understanding the properties of the forecast errors is exceedingly helpful in uncovering interrelationships among the variables in the system. The forecast error variance decomposition tells us the proportion of the movements in a sequence due to its “own” shocks versus shocks due to the other variable (Enders, 1995).

\subsection*{2.3.4 The Granger-causality test}

One of the main uses of VAR models is forecasting. The structure of the VAR model provides information about a variable’s or a group of variables’ forecasting ability for other variables. The intuitive notion of a variable’s forecasting ability is due to Granger (1969). If a variable, or group of variables, $y_1$ is found to be helpful for predicting another variable, or group of variables, $y_2$, then $y_1$ is said to Granger-cause $y_2$; otherwise it is said to fail to Granger-cause $y_2$. In this case, we would like to know whether the identified production variables can help forecast economic growth of the Philippines. In order to address this concern, the Granger-causality test is applied. The test involves F-tests to examine whether lagged information on a variable $x$ provides any statistically significant information about a variable $y$ in the presence of lagged $y$. A test of causality is a test whether the lags of one variable enter into the equation for another variable. In a five-variable case, such as in this study, in which $A_{ij}(L)$ represents the coefficients of lagged values of variable $j$ on variable $i$, variable $j$ does not Granger cause variable $i$ if all coefficients of the polynomial $A_{ij}(L)$ can be set equal to zero. Clearly, the notion of Granger causality does not imply true causality but only implies forecasting ability. In this study, this is done with the use of the \textit{Eviews package 3.0}. 
2.4 Data and Data Sources

Economic growth is generally a factor in an increase in the income of a country. In this study, it was measured through the rate of increase in real Gross National Product or GNP. Following Cunningham (1993) and Karagol (2002), GNP is determined by four factors of production; labor, human capital, capital and external debt service. Fixed capital formation was used to control for the capital stock, and employed labor force data to control for labor force. Annual education expenditure of the Philippine government was used as a proxy to human capital, while external debt service payments included interest payments and repayments to foreign creditors.

The study requires a time series data. This study used data for the period 1981 to 2005. Data on GNP, fixed capital formation, labor force, education expenditure and external debt service were taken from the Philippine Statistical Yearbook of the National Statistical Coordination Board (NSCB), the Bangko Sentral ng Pilipinas (BSP), and the Department of Budget and Management (DBM). Other relevant data were taken from the National Statistics Office (NSO) and other websites such as the Philippine Institute for Development Studies (PIDS).

III. Results and Discussion

3.1 Lag Length Determination

Selection of p, the order of the VAR, is a further concern. Choosing p unnecessarily large will reduce the forecast precision of the corresponding estimated VAR (p) model. It was decided to use test criteria such as the Akaike Information Criterion (AIC) and the Schwartz Bayesian Criterion (SBC). Table 1 shows the AIC, SBC and LR with respect to the different lag order. The decision rule is to choose the lag order with the minimum value of the criteria. The SBC at lag 4 was chosen and so 4 becomes the acceptable lag length of the model.
Table 1. Lag Length Determination

<table>
<thead>
<tr>
<th>Lag Order</th>
<th>AIC</th>
<th>SBC</th>
<th>LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>91.18298</td>
<td>91.96938</td>
<td>-4483.557</td>
</tr>
<tr>
<td>2</td>
<td>90.825</td>
<td>92.27575</td>
<td>-4395.425</td>
</tr>
<tr>
<td>3</td>
<td>90.81655</td>
<td>92.94002</td>
<td>-4324.602</td>
</tr>
<tr>
<td>4</td>
<td>89.11347</td>
<td>91.91823</td>
<td>-4172.447</td>
</tr>
<tr>
<td>5</td>
<td>88.99742</td>
<td>92.4922</td>
<td>-4097.378</td>
</tr>
<tr>
<td>6</td>
<td>89.19674</td>
<td>93.39047</td>
<td>-4037.247</td>
</tr>
<tr>
<td>7</td>
<td>89.36179</td>
<td>94.26359</td>
<td>-3975.323</td>
</tr>
<tr>
<td>8</td>
<td>89.10048</td>
<td>94.71968</td>
<td>-3893.622</td>
</tr>
<tr>
<td>9</td>
<td>88.77273</td>
<td>95.11886</td>
<td>-3809.159</td>
</tr>
<tr>
<td>10</td>
<td>88.56172</td>
<td>95.64451</td>
<td>-3730.277</td>
</tr>
</tbody>
</table>

3.2 VAR Analysis

In VAR analysis, there is no division between endogenous and exogenous variables. It is also assumed that no instantaneous feedback exists among the variables and so the system is not simultaneous. Thus, a VAR is a system of equations where current values of each variable depend on past values of itself and past values of the other variables.

In matrix notation these concepts, in application to the variables of the study, become

\[
\begin{pmatrix}
Y_1 \\
K_t \\
LF_t \\
HC_t \\
DS_t \\
\end{pmatrix} = \begin{pmatrix}
V_1 \\
V_2 \\
V_3 \\
V_4 \\
V_5 \\
\end{pmatrix} + \begin{pmatrix}
A_{11}^{(1)} & A_{12}^{(1)} & A_{13}^{(1)} & A_{14}^{(1)} & A_{15}^{(1)} \\
A_{21}^{(1)} & A_{22}^{(1)} & A_{23}^{(1)} & A_{24}^{(1)} & A_{25}^{(1)} \\
A_{31}^{(1)} & A_{32}^{(1)} & A_{33}^{(1)} & A_{34}^{(1)} & A_{35}^{(1)} \\
A_{41}^{(1)} & A_{42}^{(1)} & A_{43}^{(1)} & A_{44}^{(1)} & A_{45}^{(1)} \\
A_{51}^{(1)} & A_{52}^{(1)} & A_{53}^{(1)} & A_{54}^{(1)} & A_{55}^{(1)} \\
\end{pmatrix} \begin{pmatrix}
Y_t \\
K_t \\
LF_t \\
HC_t \\
DS_t \\
\end{pmatrix}
+ \begin{pmatrix}
A_{11}^{(4)} & A_{12}^{(4)} & A_{13}^{(4)} & A_{14}^{(4)} & A_{15}^{(4)} \\
A_{21}^{(4)} & A_{22}^{(4)} & A_{23}^{(4)} & A_{24}^{(4)} & A_{25}^{(4)} \\
A_{31}^{(4)} & A_{32}^{(4)} & A_{33}^{(4)} & A_{34}^{(4)} & A_{35}^{(4)} \\
A_{41}^{(4)} & A_{42}^{(4)} & A_{43}^{(4)} & A_{44}^{(4)} & A_{45}^{(4)} \\
A_{51}^{(4)} & A_{52}^{(4)} & A_{53}^{(4)} & A_{54}^{(4)} & A_{55}^{(4)} \\
\end{pmatrix} \begin{pmatrix}
Y_t-4 \\
K_t-4 \\
LF_t-4 \\
HC_t-4 \\
DS_t-4 \\
\end{pmatrix}
+ \begin{pmatrix}
\mu_11 \\
\mu_11 \\
\mu_11 \\
\mu_11 \\
\mu_11 \\
\end{pmatrix}
\]
This model is known as a 5-dimentional VAR(4) because the vectors and matrices have 5 rows, which represent the five variables, having lag four periods.

We considered the variables; Y, K, LF, HC, DS, with lag p equal to 4. **Eviews package 3.0** was used to determine the VAR estimates. The relationships of these variables are written in equation forms as

\[
Y_t = -6788.342 + 0.084588Y_{t-1} + \ldots + 1.049645Y_{t-4} + 0.489173K_{t-1} + \ldots - 0.869862K_{t-4} + 0.635808LF_{t-1} + \ldots - 0.2892LF_{t-4} - 0.378437HC_{t-1} + \ldots - 1.917263HC_{t-4} - 0.381209DS_{t-1} + \ldots + 0.106852DS_{t-4} + \mu_t
\]

\[
K_t = 1807.344 + 0.046905Y_{t-1} + \ldots + 0.053681Y_{t-4} + 0.563912K_{t-1} + \ldots - 0.002034K_{t-4} - 0.10165LF_{t-1} + \ldots - 1.597967LF_{t-4} - 0.930643HC_{t-1} + \ldots - 1.505407HC_{t-4} - 0.089579DS_{t-1} + \ldots + 0.091581DS_{t-4} + \mu_t
\]

\[
LF_t = 234.8986 + 0.006708Y_{t-1} + \ldots - 0.002412Y_{t-4} - 0.02937K_{t-1} + \ldots - 0.016147K_{t-4} + 0.76278LF_{t-1} + \ldots - 0.025837LF_{t-4} + 0.071615HC_{t-1} + \ldots - 0.061022HC_{t-4} + 0.011304DS_{t-1} + \ldots - 0.031735DS_{t-4} + \mu_t
\]

\[
HC_t = -2635.061 + 0.029543Y_{t-1} + \ldots - 0.006334Y_{t-4} + 0.0128793K_{t-1} + \ldots + 0.034192K_{t-4} + 0.036878LF_{t-1} + \ldots - 0.0296LF_{t-4} + 0.845488HC_{t-1} + \ldots + 0.201961HC_{t-4} + 0.004472DS_{t-1} + \ldots - 0.028068DS_{t-4} + \mu_t
\]

\[
DS_t = 7851.374 + 0.061534Y_{t-1} + \ldots - 0.031374Y_{t-4} - 0.002371K_{t-1} + \ldots + 0.159428K_{t-4} + 0.783366LF_{t-1} + \ldots - 0.485638LF_{t-4} + 0.20214HC_{t-1} + \ldots + 0.647691HC_{t-4} + 0.800902DS_{t-1} + \ldots + 0.108493DS_{t-4} + \mu_t
\]

These estimates can then be used to tell the effect of each variable to another and the effect of the past values of one variable to another. A classical regression interpretation can be applied. For instance, GNP series as represented by \(Y_t\), can be affected by the past year’s external debt service payments (\(DS_{t-4}\); since data is quarterly) wherein a one percent increase of past year’s debt service decreases GNP by 10.7% considering other variables constant. Likewise, external debt service increase by 3.14% per one percent increase of past year’s GNP (\(Y_{t-4}\)). This result is somehow inconsistent with the economic theory discussed wherein debt
servicing is argued to have a negative effect to economic growth, but this result however is only a one year lag effect.

Table 2. Summary statistics of the model VAR(4)

<table>
<thead>
<tr>
<th></th>
<th>GNP</th>
<th>K</th>
<th>LF</th>
<th>HC</th>
<th>DS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adj. R-squared</td>
<td>0.99091</td>
<td>0.876185</td>
<td>0.990446</td>
<td>0.996331</td>
<td>0.994066</td>
</tr>
<tr>
<td>S.E. equation</td>
<td>5437.07</td>
<td>3985.757</td>
<td>453.5686</td>
<td>677.984</td>
<td>2603.281</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-950.0644</td>
<td>-920.2551</td>
<td>-711.6149</td>
<td>-750.2047</td>
<td>-879.3635</td>
</tr>
<tr>
<td>AIC</td>
<td>20.23051</td>
<td>19.60948</td>
<td>15.26281</td>
<td>16.06676</td>
<td>18.75757</td>
</tr>
<tr>
<td>SBC</td>
<td>20.79146</td>
<td>20.17043</td>
<td>15.82376</td>
<td>16.62772</td>
<td>19.31852</td>
</tr>
</tbody>
</table>

3.4 Variance Decomposition and Causality

Table 3. Variance Decomposition

<table>
<thead>
<tr>
<th>Percent of forecast error variance in</th>
<th>y_t</th>
<th>k_t</th>
<th>l_f</th>
<th>h_c_t</th>
<th>d_s_t</th>
</tr>
</thead>
<tbody>
<tr>
<td>y_t</td>
<td>80.36</td>
<td>9.94</td>
<td>1.03</td>
<td>5.19</td>
<td>3.49</td>
</tr>
<tr>
<td>k_t</td>
<td>39.53</td>
<td>51.17</td>
<td>1.97</td>
<td>4.09</td>
<td>3.24</td>
</tr>
<tr>
<td>l_f_t</td>
<td>1.32</td>
<td>1.95</td>
<td>94.09</td>
<td>1.44</td>
<td>1.2</td>
</tr>
<tr>
<td>h_c_t</td>
<td>3.29</td>
<td>0.67</td>
<td>1.27</td>
<td>94.66</td>
<td>0.12</td>
</tr>
<tr>
<td>d_s_t</td>
<td>1.78</td>
<td>0.13</td>
<td>0.6</td>
<td>22.28</td>
<td>75.21</td>
</tr>
</tbody>
</table>

Table 3 indicates that capital stock explains 9.94% of the forecast error of GNP, labor force explains 1.03% of the forecast error of GNP, human capital explains 5.19% of the forecast error of GNP, and external debt service explains 3.49% of the forecast error of GNP. Thus capital stock has the highest explanatory percentage of economic growth’s forecast error, and labor has the least. This means that with the events (shocks) causing a change in any of the variable, the respective percentage change results will be the effect also on the events that can cause changes in economic growth. Therefore movements of capital, which is very unpredictable as shown in the graph, will likely to have the most effect on economic growth, and labor force will have the least effect.
Table 4. Results of the Granger-causality test.

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Obs.</th>
<th>F-statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital stock does not Granger-cause GNP</td>
<td>16.2591</td>
<td><strong>5.60E-10</strong></td>
<td></td>
</tr>
<tr>
<td>GNP does not Granger-cause capital stock</td>
<td>6.38266</td>
<td><strong>0.00015</strong></td>
<td></td>
</tr>
<tr>
<td>Labor force does not Granger-cause GNP</td>
<td>2.35997</td>
<td>0.05953</td>
<td></td>
</tr>
<tr>
<td>GNP does not Granger-cause labor force</td>
<td>2.48342</td>
<td>*0.04948</td>
<td></td>
</tr>
<tr>
<td>Human capital does not Granger-cause GNP</td>
<td>1.2843</td>
<td>0.28241</td>
<td></td>
</tr>
<tr>
<td>GNP does not Granger-cause human capital</td>
<td>11.5223</td>
<td><strong>1.50E-07</strong></td>
<td></td>
</tr>
<tr>
<td>Debt servicing does not Granger-cause GNP</td>
<td>1.44585</td>
<td>0.22577</td>
<td></td>
</tr>
<tr>
<td>GNP does not Granger-cause Debt servicing</td>
<td>7.64212</td>
<td>2.50E-05</td>
<td></td>
</tr>
</tbody>
</table>

The relationship of each of the variables to GNP was tested. The results showed that only capital stock granger-cause GNP, which means that this variable can help forecast economic growth. The rest of the variables are insignificant at 0.01 and 0.05 significance level, thus, can not help forecast economic growth. GNP on the other hand can help forecast all of the variables since causality results are significant. More importantly, to further emphasize the relationship of debt servicing on economic growth, tests results indicate that the effects of debt servicing on economic growth are not significant at conventional levels, whereas the effects of economic growth on debt servicing are greatly significant. Causality in this case is unidirectional.

IV. Summary and Conclusion

This paper aims to investigate the relationship between economic growth and external debt servicing. Considering debt service as a primary factor of production, the model: \( Y = F (K, LF, HC, DS) \) was used.

Results of the VAR (4) model show that economic growth is not very much affected by external debt servicing. Instead, it was found that capital stock has a strong relationship with economic growth. In debt overhang theory, it was mentioned that debt servicing will decrease economic growth because investors will be discouraged to invest. Capital variable in this study represents investments and since it was proven that capital has a great effect on growth, high external debt is supposed to have an alarming effect in the country. However, external debt servicing did not show a large effect on economic growth. This is probably because external
debt servicing in the Philippines is not high enough for debt overhang to occur. Therefore, debt servicing is not yet a threat in economic growth and thus, the Philippines should not fear of experiencing debt overhang in the near future.

This study however has a very limited scope. Further studies, either support studies or comparative, are suggested.

Suggested areas for further research are the following:
1.) The use of longer time series and therefore more observations for the study to explain further the effects of the variables considered on economic growth.
2.) Other models to explain economic growth can also be explored such as the Dynamic Simultaneous Equation Model.
3.) The use of other proxy or dummies for the identified variables is also worth trying.
4.) A shock variable can be introduced in the model to represent unanticipated disturbances. This might give a more realistic model.
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