



DOES THE REINHART-ROGOFF HYPOTHESIS APPLY TO THE PHILIPPINES?

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Abstract: Extending Ram (1986, 1989), Goel, Payne and Ram (2008) and other studies, this paper finds that a higher government debt-to-GDP ratio reduces the growth rate of real GDP in the Philippines. In addition, a higher growth rate of employment or a higher investment-to-GDP ratio raises the growth rate of real GDP. Therefore, the debt threshold of 90% proposed by Reinhart-Rogoff does not apply to the Philippines.

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INTRODUCTION

The Philippines' authorities engaged in fiscal and monetary policies to stimulate or stabilize its economy. During and after the Asian financial crisis, the Philippines increased its government borrowing from 1.35% of GDP in 1998 to 2.36% in 1999. The government debt ratio rose from 52.38% of GDP in 1998 to 55.946% of GDP in 1999. The average lending rate dropped from 16.78% in 1998 to 11.78% in 1999 in order to reduce the cost of borrowing by consumers and businesses. To pursue fiscal prudence, in 2019, government borrowing reduced to 1.102% of GDP, and government debt dropped to 39.278% of GDP. These statistics suggest that the Philippines pursued fiscal discipline because the deficit-to-GDP ratio was less than 3% and because the debt ratio was less than 60% based on the EU standards.

In conducting fiscal policy, a major concern is whether more government debt would help or hurt the growth rate of real GDP in the long run. This paper attempts to examine whether government debt affects economic

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growth in the Philippines and determine whether the threshold of the 90% debt ratio proposed by Reinhart-Rogoff (2010a, 2010b) would apply to the Philippines. The paper has several different aspects. An extended production function is employed in studying the impact of government debt on economic growth. Due to lack of the data for capital stock, the ratio of investment spending to gross domestic product is used (Ram, 1986, 1989). A quadratic form for the debt ratio is considered to test if there would be a threshold or turning point.

LITERATURE SURVEY

Several recent studies have examined the relationship between government debt and economic growth. In their seminal works, Reinhart and Rogoff (2010a, 2010b) indicate that the relationship between government debt and the growth rate is relatively weak if the debt ratio is less than 90% whereas a debt ratio larger than 90% results in a decrease in the growth rate. This turning point or threshold for the debt ratio is comparable in emerging and advanced economies. Applying advanced econometric techniques, Minea and Parent (2012) reveal that the threshold for the debt ratio is estimated to be 115%.

Woo and Kumar (2015) show that a 10 percentage-point increase in the debt ratio leads to a 0.2 percentage-point decline in the growth rate of real GDP. Higher debt ratios result in larger negative effects. The negative impact is owing to the decline in labor productivity growth.

Studying the relationship between public debt and economic growth and investment for the Philippines during 1975-2010, Akram (2015) shows that rising external public debt reduces economic growth and investment spending and causes the debt overhang effect but does not show a crowding-out effect. On the other hand, domestic public debt has a positive impact on economic growth but a negative effect on investment spending.

Duran (2017) study the subject for the Philippines during 1986-2015 based on time series techniques. He finds that in the long run, external debt affects growth positively whereas domestic debt influences growth negatively and that in the short run, there is a unidirectional causality from external debt to growth whereas there is no causal relationship between domestic debt and growth.

Examining the subject based on a sample of 8 ASEAN countries including the Philippines during 2006-2015, Wibowo (2017) shows that more public debt has a positive effect on economic growth and that it may take a few years to see the impact realized.

Grennes, Fan and Caner (2019) examine the subject for the U.S. and other OECD countries and include both public and private debt in

measurement. They find that during 1995-2014, the high level of debt reduces the growth rate by 1 percent point compared with a debt level below the threshold. Other OECD countries also show such as negative relationship between high level government debt and economic growth. They also analyze the issues of fiscal rules involving a tradeoff between restraining debt and maintaining flexibility to react to shocks.

de Rugy and Salmon (2020) review previous works and find that most studies show a debt threshold between 75% and 100% of GDP. With the exception of 2 publications, most studies find that a high level of government debt and the growth rate have a negative relationship. In many situations, the negative impact on growth increases as the level of government debt rises. They predict that if rising government debt continues to follow the current trend, real GDP would decline by \$4 to \$5 trillion by year 2049.

Based on a sample of 252 countries during 1960-2009, Swamy (2020) reveal that government debt has a negative effect on economic growth. If the debt ratio rises 10 percentage points, the growth rate of real GDP would decline by 23 basis points. In addition, there relationship is nonlinear. The negative impact is not the same across countries and depends on other macroeconomic factors and the debt regimes.

Examining the subject using a sample of 10 ASEAN countries during 1980-2016, Tran (2020) finds that public debt and economic growth may show different relationships across income groups. For the upper-middle income group such as Malaysia and Thailand and the lower-middle income group such as Vietnam, Laos, Cambodia and Myanmar, both gross public debt and external public debt show an inverted U-shaped relationship with economic growth. These results suggest that there is a threshold, beyond which more public debt would negatively impact economic growth. For the lower-middle income group such as Indonesia and the Philippines, external public debt has a negative effect on economic growth.

THE MODEL

Extending Ram (1986, 1989), Goel, Payne and Ram (2008) and other studies, the growth rate of real GDP in the Philippines can be expressed as:

$$\dot{Y} = f(\dot{E}, \dot{C}, D) \quad (1)$$

where

\dot{Y} = the growth rate of real GDP,

\dot{E} = the growth rate of labor employment,

\dot{C} = the growth rate of capital, and
 D = the government debt-to-GDP ratio.

Due to lack of the data for capital, the growth rate of capital can be substituted by the ratio of investment (I) to gross domestic product (Ram, 1986, 1989).

$$\dot{Y} = g(\dot{E}, I/Y, D) \quad (2)$$

The coefficient of measures the elasticity of real GDP with respect to labor, and the coefficient of I/Y measures the partial derivative of real GDP with respect to capital or the marginal product of capital. The sign of the first two explanatory variables is expected to be positive, and the sign of the debt ratio is unclear. Countries with relatively low government debt may have room to increase debt-financed spending to improve infrastructures without effecting economic growth negatively. If countries with relatively high government debt engage in more debt-financed spending, economic growth may be adversely affected partly due to the crowding-out effect.

There may be an inverted U-shaped relationship between \dot{Y} and the debt ratio. That being the case, the following equation can be considered:

$$\dot{Y} = g(\dot{E}, I/Y, D, D^2) \quad (3)$$

An inverted U-shaped relationship between \dot{Y} and the debt ratio suggests that the sign of D should be positive and the sign of D^2 should be negative.

The critical value of the debt ratio corresponding to the maximum growth rate of real GDP is given by:

$$D^* = \delta_1 / 2\delta_2 \quad (4)$$

where δ_1 is the coefficient of D and δ_2 is the coefficient of D^2 .

EMPIRICAL RESULTS

The data were collected from the IMF's *World Economic Outlook* and *International Financial Statistics*. The growth rate of real GDP is expressed as a percent. Government debt is measured as a percent of gross domestic product. The growth rate of labor employment is expressed as a percent. Investment spending as a percent of GDP (I/Y) is used as the data for capital are not available. The sample ranges from 1993 to 2019. The data for the debt ratio before year 1993 are not available.

An analysis of the data shows that the Asian financial crisis caused the growth rate of real GDP in 1998 to decline sharply. Hence, a dummy variable is generated with a value of 1 in 1998 and 0 otherwise.

Figure 1 shows the government debt-to-GDP ratio during the sample period. The debt ratio declined from a high of 76.08% in 1993 to a low of 52.38% in 1998, rose to 74.057% in 2004, and then continued the declining trend to a low of 39.278% in 2019. Even during the global financial crisis in 2008-2009, the debt ratio did not rise. Figure 2 shows a scatter diagram



Figure 1: The Debt-to-GDP Ratio over Time

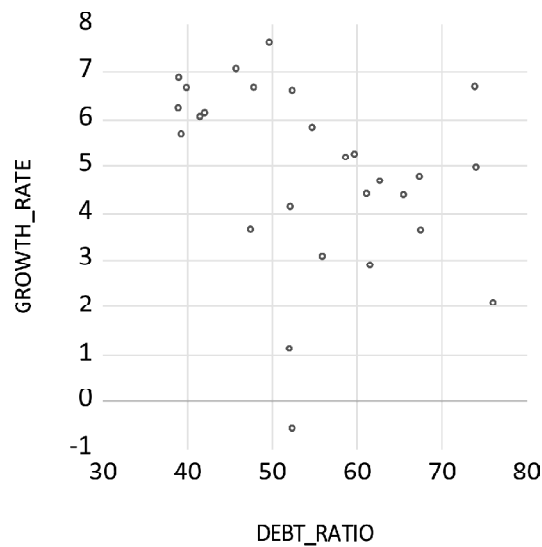


Figure 2: Scatter Diagram between the Growth Rate of Real GDP and the Debt-to-GDP Ratio

between the growth rate of real GDP and the government debt-to-GDP ratio. They seemed to exhibit a negative relationship during 1993-2019.

Table 1 presents empirical results for equation (2). The GARCH process is applied in empirical estimation in order to correct for potential autoregressive conditional heteroscedasticity. As shown, approximately 40.27% of the change in the growth rate of real GDP can be explained by the five right-hand side explanatory variables. All the coefficients are significant at the 1% or 10% level. The negative significant coefficient of the debt ratio suggests that the debt ratio has a negative impact on the growth rate.

A one percentage point increase in the debt ratio would lead to a decrease in the growth rate by 0.1014 percentage points. When labor employment rises one percentage point, real GDP would increase by 0.0676 percentage points. A one percentage-point increase in the investment/GDP ratio would raise the growth rate by 0.0825 percentage points.

When equation (3) is estimated, an inverted-U curve is not confirmed. This result seems to be consistent with the graph in Figure 2, which exhibits a negative relationship between the debt ratio and the growth rate. The coefficients of the growth rate of labor and the investment/GDP ratio are insignificant at the 10% level. The results are not reported here and will be available upon request.

Table 1
Estimated Growth rate of Real GDP in the Philippines

<i>Variable</i>	<i>Coefficient</i>	<i>Probability</i>
Constant	5.5070	0.0000
Employment growth rate	0.0676	0.0662
Investment/GDP ratio	0.0825	0.0063
Debt ratio	-0.1014	0.0000
Dummy variable	-6.2701	0.0000
R-squared	0.4027	
Akaike info criterion	3.9325	
Schwarz criterion	4.3215	
Sample period	1193-2019	
Methodology	GARCH	

Notes: The dummy variable is equal to 1 if the year is 1998 and zero otherwise.

In comparison, the finding in this paper is consistent with the results reported by Kumar and Woo (2015), Swamy (2020), and Tran (2020), who indicate that the debt ratio and the growth rate have a negative relationship. The lack of a threshold for the Philippines is in contrast with the thresholds

found by Reinhart and Rogoff (2010a, 2010b) and Minea and Parent (2012). The negative relationship is opposite to the positive relationship reported by Wibowo (2017).

SUMMARY AND CONCLUSIONS

This paper has examined the relationship between government debt and economic growth for the Philippines based on an extended production function during 1993-2019. A threshold or turning point of the debt ratio for the Philippines is not confirmed. In addition, a higher employment growth rate and a higher investment/GDP ratio contribute to economic growth. The declining trend of the debt ratio in the Philippines since 2004 suggests that fiscal policy has worked in the right direction and that the Reinhart-Rogoff hypothesis does not apply to the Philippines.

There are some policy implications. Individual countries may exhibit unique economic conditions and different relationships between the debt ratio and economic growth. The Philippines has maintained fiscal prudence during the global financial crisis and kept the debt ratio below 40% since 2016. The current debt ratio of 39.278% in 2019 implies that the Philippines' government debt is sustainable. More education and training for workers would raise labor productivity and growth. The government may provide incentives to encourage businesses to invest more in high tech equipment to increase productivity and growth.

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