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Is More Government Debt Conducive to Economic Growth in New Zealand?

Yeni Zelanda'da Daha Fazla Kamu Borcu Ekonomik Büyümeyi Destekler mi?

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ÖZ

Bu çalışma, 1985-2019 dönemi için yıllık veriler ile genişletilmiş bir üretim fonksiyonu tahmin ederek Yeni Zelanda'da kamu borç oranının ve reel gayri safi yurtiçi hasıla büyüme oranının ters U şeklinde bir ilişkiye sahip olduğunu ve Yeni Zelanda'daki borç oranının eşik değerinin veya dönüm noktasının %40.94 olduğunu ortaya koymaktadır. Borç oranı %40.94'ü aşmadığı sürece borç oranının artışının, reel gayri safi yurtiçi hasıla büyüme oranını artıracağını ve borç oranının %40.94'ü aştığı durumda daha yüksek borç oranının reel gayri safi yurtiçi hasıla büyüme oranını azaltacağı gösterilmiştir. Buna ek olarak, daha yüksek bir istihdam büyüme oranı veya yatırım/GSYİH oranı, reel gayri safi yurtiçi hasıla büyüme oranını artırmaktadır. Bu nedenle, Reinhart-Rogoff tarafından önerilen %90 borç eşiği Yeni Zelanda için geçerli değildir.

ABSTRACT

Applying an extended production function and using a sample of annual data over the period of 1985-2019, this paper finds that the government debt ratio and the growth rate of real gross domestic product in New Zealand exhibit an inverted U-shape relationship and that the threshold or turning point of the debt ratio in New Zealand is estimated to be 40.94%. It suggests that a rising debt ratio would raise the growth rate of real gross domestic product as long as the debt ratio is no greater than 40.94% and that a higher debt ratio would reduce the growth rate of real gross domestic product if the debt ratio is greater than 40.94%. In addition, a higher growth rate of employment or investment/GDP ratio raises the growth rate of real gross domestic product. Therefore, the 90% debt threshold proposed by Reinhart-Rogoff is not applicable to New Zealand.

1. Introduction

New Zealand's authorities engaged in fiscal and monetary policies to stimulate or stabilize its economy. During and after the global financial crisis, its government structural balance changed from a surplus of 1.25% of GDP in 2008 to a deficit of 1.43% in 2009 and reached a high deficit of 4.36% in 2010. The government debt ratio rose from 18.98% of GDP in 2008 to 24.32% of GDP in 2009 and then continued to rise to a high of 35.72% in 2012. The Reserve Bank of New Zealand lowered its policy rate from 5.0% in 2008 to 2.5% in 2009. The average lending rate dropped from 8.94% in 2008 to 6.66% in 2009 in order to reduce the cost of borrowing by consumers and businesses. To pursue fiscal prudence, in 2019, government debt dropped to 29.60% of GDP. These statistics suggest that New Zealand 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.

As Herndon, Ash and Pollin (2014), Égert (2015a, 2015b), Bentour (2018), Liu and Lyu (2020) and others have indicated, more studies are needed because individual countries may exhibit varying results or thresholds. This paper attempts to examine whether government debt affects economic growth in New Zealand and determine whether the threshold of the 90% debt ratio proposed by Reinhart-Rogoff (2010a, 2010b) would be applicable to New Zealand. As New Zealand is included in the sample of 20 advanced countries by Reinhart and Rogoff (2010a, 2010b), the study of this subject is even more significant. 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.

2. Literature Survey

Several recent studies have examined the relationship between government debt and economic growth. Using a sample of 24 industrialized countries including New Zealand and 59 developing countries during 1970-2002, Schclarek (2005) shows that for developing countries, total external debt and the growth rate have a negative relationship, suggesting that a lower total external debt would raise the growth rate and that there is lack of support for an inverted U-shape relationship between external debt and economic growth. On the other hand, for industrialized countries, there is no significant relationship between government debt and growth.

Reinhart and Rogoff (2010a, 2010b) show that the relationship between the government debt ratio and the economic growth rate is relatively weak if the debt ratio is less than 90% whereas a debt ratio larger than 90% would cause the growth rate to decline. This 90% debt threshold is applicable to both emerging and advanced economies. Based on the dataset constructed by Reinhart and Rogoff, several other authors present different findings. Minea and Parent (2012) find that the threshold for the debt ratio is estimated to be 115%. Égert (2015a, 2015b) indicates that the nonlinear relationship is not very robust and very sensitive to the specification of the model. If there is a threshold, it is between 20% and 60%. Thresholds vary across countries and over time and may depend on economic conditions. The 90% threshold proposed by Reinhart and Rogoff cannot be confirmed. Herndon, Ash and Pollin (2014) indicate that there is lack of support for the 90% debt threshold proposed by Reinhart and Rogoff. During 1946-2009, among 20 advanced countries with a debt ratio greater than 90%, the growth rate was 2.2% instead of -0.1% as Reinhart and Rogoff presented. The growth rate is not significantly different between countries with the debt ratio

less than 90% and countries with a debt ratio greater than 90%. Countries exhibit varying relationships between public debt and growth during different time periods.

Based on a sample of 82 countries including New Zealand during 1980-2009, Kourtellos, Stengos and Tan (2013) reveal that the relationship between public debt and growth depends on the degree of democracy. The negative relationship is found in low-democracy countries. The level of public debt does not affect economic growth in high-democracy countries. There is little support for a nonlinear relationship between public debt and economic growth.

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.

Examining the subject based on a sample of 8 ASEAN countries 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.

Using a sample of 48 countries including New Zealand during 1960-2015, Intartaglia, Antoniades and Bhattacharyya (2018) reveal that public debt seems to hurt economic growth in the developing and developed countries with varying degrees, that private debt and growth have a negative relationship in developed countries, that household debt promotes economic growth in developing economies, and that non-financial corporate debt impairs economic growth in developed economies.

Bentour (2018) studies the subject for 20 advanced countries including New Zealand during 1880-2010 based on a regression kink model. Debt thresholds are unstable and sensitive to country size, government spending and government effectiveness. He rejects the hypothesis that there is a common threshold fitting all the countries.

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 percentage 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.

Liu and Lyu (2020) examined the subject based on a sample of 102 countries during 1980-2016. They find that public debt and growth have a nonlinear relationship in the developed, developing and emerging countries. Debt thresholds for individual countries vary by the degree of openness, the crisis, gross saving and the current account balance.

3. The Model

Extending previous studies (Ram, 1986, 1989; Goel, Payne and Ram, 2008), we can express the growth rate of real GDP in New Zealand as:

$$\dot{Y} = f(\dot{E}, \dot{K}, D) \qquad (1)$$

where

$\dot{Y}$ = the growth rate of real GDP,
$\dot{E}$ = the growth rate of labor employment,
$\dot{K}$ = 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 spending to gross domestic product (IY) (Ram, 1986, 1989).

$$\dot{Y} = g(\dot{E}, IY, D) \qquad (2)$$

The coefficient of $\dot{E}$ measures the elasticity of real GDP with respect to labor, and the coefficient of IY 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 in specific form can be expressed as:

$$\dot{Y} = \beta_0 + \beta_1 \dot{E} + \beta_2 IY + \beta_3 D + \beta_4 D^2 + \varepsilon \qquad (3)$$

Where D^2 is the debt ratio squared and ε is the error term. An inverted U-shaped relationship between $\dot{Y}$ and the debt ratio suggests that the sign of β_3 should be positive and the sign of β_4 should be negative.

The critical value (threshold or turning point) of the debt ratio corresponding to the maximum growth rate of real GDP is given by:

$$D^* = \beta_3 / 2\beta_4 \qquad (4)$$

4. Empirical Results

The data were collected from the IMF's World Economic Outlook and International Financial Statistics, which are published by the International Monetary Fund. The growth rate of real GDP and labor employment are expressed as a percent. Government debt is measured as a percent of gross domestic product. IY is represented by investment spending as a percent of GDP. The sample ranges from 1985 to 2019. The data for the debt ratio before year 1985 are not available.

Figure 1 presents growth rates over time. The growth rate was negative in 1991 mainly due to restrictive monetary policy and declining consumer confidence caused by rising oil prices. Economic growth was negative in 2008 due to the global financial crisis. Figure 2 shows the government debt-to-GDP ratio during the sample period. The debt ratio declined from a high of 68.58% in 1986 to a low of 16.30% in 2007, rose to 35.73%% in 2012, and then continued a declining trend to a low of 29.60% in 2019. Figure 3 shows a scatter diagram between the growth rate of real GDP and the government debt-to-GDP ratio. They seemed to exhibit a nonlinear relationship and a negative relationship when the debt ratio is greater than 40%. Empirical work is needed to verify whether they have a nonlinear or inverted relationship.

Table 1 presents the estimated regression based on equation (3). The GARCH process is employed order to address potential autoregressive conditional heteroscedasticity. Approximately 48.76% of the change in the growth rate of real GDP can be explained by the four right-hand side variables. All the coefficients are significant at the 1% level. The negative significant coefficient of the debt ratio squared suggests that the debt ratio and the growth rate have a nonlinear relationship. Using equation (4), the critical value (threshold or turning point) of the debt ratio corresponding to the maximum growth rate is estimated to be 40.94%. A higher debt ratio up to 40.94% would raise the growth rate whereas a higher debt ratio beyond 40.94% would dampen economic growth.

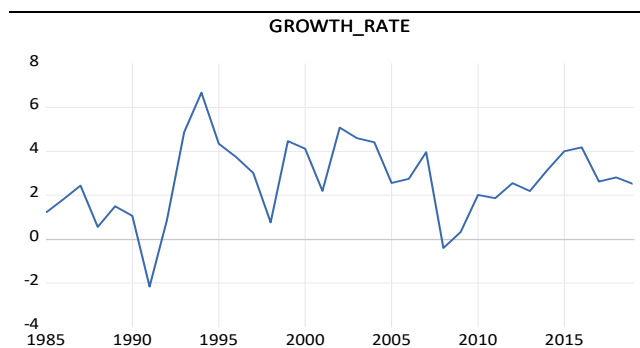**Figure 1.** The Growth Rate of Real GDP in New Zealand

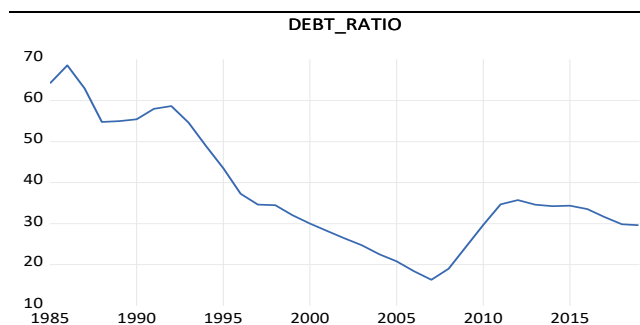**Figure 2.** The Debt-to-GDP Ratio in New Zealand over Time

Figure 3. Scatter Diagram between the Growth Rate of Real GDP and the Debt-to-GDP Ratio in New Zealand
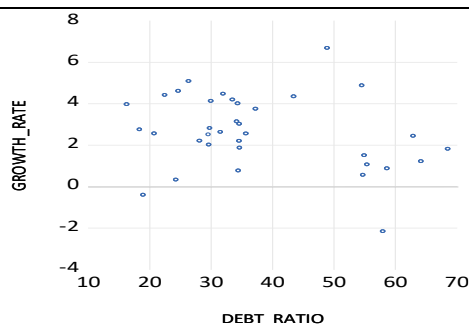

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Table 1. Dependent Variable: Growth rate of Real GDP in New Zealand

Variable	(A)	(B)
Constant	-70.642	-31.360
	(0.0000)	(0.0000)
Employment growth rate	0.3469	0.5613
	(0.0000)	(0.0000)
Investment/GDP ratio	0.2482	0.1970
	(0.0000)	(0.0000)
Debt ratio	0.2157	0.0152
	(0.0000)	(0.0000)
Debt ratio squared	-0.0026	
	(0.000)	
R-squared	0.4876	0.4200
Akaike info criterion	34.697	32.743
Schwarz criterion	38.696	35.853
Sample period	1985-2019	1985-2019
Methodology	GARCH	GARCH

Notes: The number in the parenthesis is the probability

All the coefficients are significant at the 1% level. The negative significant coefficient of the debt ratio squared suggests that the debt ratio and the growth rate have a nonlinear relationship. Using equation (4), the critical value (threshold or turning point) of the debt ratio corresponding to the maximum growth rate is estimated to be 40.94%. A higher debt ratio up to 40.94% would raise the growth rate whereas a higher debt ratio beyond 40.94% would dampen economic growth.

When labor employment rises one percentage point, real GDP would increase by 0.3469 percentage points. A one percentage-point increase in the investment/GDP ratio would raise the growth rate by 0.2482 percentage points.

When equation (2) without the quadratic term is estimated, 42.00% of the change in the growth rate can be explained by the three explanatory variables. All the coefficients are significant at the 1% level. The positive coefficient of the debt ratio suggests that a higher debt ratio would raise the growth rate. This result is due to the omitted variable of the quadratic term. A 1 percentage point rise in the growth rate of employment would raise the growth rate by 0.5613 percentage points, and a 1 percentage point increase in the investment/GDP ratio would increase the growth rate by 0.1970 percentage points.

In comparison, the finding in this paper is contrast with the results reported by Kumar and Woo (2015), Intartaglia, Antoniades and Bhattacharyya (2018), Swamy (2020), and Tran (2020), who indicate that the debt ratio and the growth rate have a negative relationship. The evidence of a threshold in New Zealand is consistent with the thresholds found by Reinhart and Rogoff (2010a, 2010b) and Minea and Parent (2012), Égert (2015a, 2015b), Grennes, Fan and Caner (2019), and Liu and Lyu (2020). However, the threshold for New Zealand is much smaller than the ones found by Reinhart and Rogoff (2010a, 2010b), Minea and Parent (2012), and Grennes, Fan and Caner (2019). The nonlinear quadratic relationship is opposite to the positive relationship reported by Wibowo (2017) and no or little relationship found by Schclarek (2005), Kourtellos, Stengos and Tan (2013), and Herndon, Ash and Pollin (2014).

5. Conclusions

This paper has examined the relationship between government debt and economic growth for New Zealand based on an extended production function during 1985-2019. A threshold or turning point of the debt ratio for New Zealand has been 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 New Zealand since 2013 suggests that fiscal policy has worked in the right direction and that the 90% debt threshold suggested by Reinhart-Rogoff does not apply to New Zealand.

There are some policy implications. Individual countries may exhibit unique economic conditions and different relationships between the debt ratio and economic growth. New Zealand has maintained fiscal prudence after the global financial crisis and kept the debt ratio below 40% since 1996. The current debt ratio of 29.60% in 2019 compared with the estimated debt threshold of 40.94% implies that New Zealand's government debt is sustainable. Improving workers' skills and knowledge through more education and training would increase economic growth. The government may offer businesses incentives to encourage more investment expenditures to promote economic growth.

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