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Is Currency Depreciation or More Government Debt Expansionary? The Case of Malaysia

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Abstract

Purpose – Many countries rely on currency depreciation or debt-financed government spending to stimulate their economies. Currency depreciation tends to increase net exports and aggregate demand but reduce short-run aggregate supply due to higher import costs. Debt-financed government spending increases aggregate demand, but the crowding-out effect due to a higher real interest rate may reduce private spending and aggregate demand. Therefore, the net impact of currency depreciation or debt-financed government spending on equilibrium real GDP is unclear.
Research design, data, and methodology - This paper examines potential impacts of real depreciation of the ringgit, more government debt as a percent of GDP and other relevant macroeconomic variables on aggregate output in Malaysia.
Results - Applying the AD/AS model, this paper finds that aggregate output in Malaysia is positively associated with real appreciation during 2005.Q3-2010.Q3, real depreciation during 2010.Q4-2016.Q1, the debt-to-GDP ratio and the real stock price, negatively affected by the real lending rate and inflation expectations, and is not influenced by the real oil price.
Conclusions - Real depreciation of the ringgit after 2010. Q3 or sustainable expansionary fiscal policy would be beneficial to the economy.

Keywords: Exchange Rates, Government Debt, Interest Rates, Stock Prices, Oil Prices.

JEL Classifications: E62, F31.

1. Introduction

Malaysia's economic performance in 2015 can be evidenced by a growth rate of 4.97%, an unemployment rate of 3.1%, an inflation rate of 2.08%, a government debt/GDP ratio of 54.49%, a government deficit/GDP ratio of 3.21%, a lending rate of 4.57%, and depreciation of the ringgit by 19.33% versus the U.S. dollar, and other related indicators. Whether real depreciation or a higher debt-to-GDP ratio would be conducive to economic growth may need to be examined further.

This article examines the impacts of real depreciation, government debt as a percent of GDP and other relevant economic variables on aggregate output. This study differs from previous works in several aspects. First, a simultaneous-equation model consisting of aggregate demand and short-run aggregate supply is applied. Second, the real oil price is included in the short-run aggregate supply function in order to consider the impact of a potential supply shock on aggregate output. Third, the dummy variable technique is employed to detect whether the relationship between aggregate output and the real exchange rate may have changed during the sample period.

2. Model

We can express AD and SRAS as:

$$Y^d = f(\pi, G, T, R, S, E) \quad (1)$$

$$Y^s = g(\pi, O, E, \pi^e) \quad (2)$$

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where Yd, G, T, R, S, E, Ys,O,and stand for aggregate demand (AD), the inflation rate, government spending, government tax revenue, the real interest rate, the real stock price, the real exchange rate, short-run aggregate supply (SRAS), the real oil price and the expected inflation rate.

Solving for real GDP and the inflation rate simultaneously, equilibrium real GDP is given by:

$$Y^* = h(E, G-T, R, S, O, \pi^e) \quad (3)$$

To measure the impact of fiscal policy, we replace G – T with government debt as a percent of GDP (D):

$$Y^* = v(E, D, R, S, O, \pi^e) \quad (4)$$

Equilibrium real GDP is expected to be positively associated with the real stock price and negatively influenced by the real interest rate and the expected inflation rate.

Real depreciation would cause domestic manufactured goods and services less expensive, increase exports, and shift aggregate demand to the right. However, real depreciation would increase the cost of imports and domestic inflation and cause the short-run aggregate supply curve to shift to the left. The net effect on aggregate output is unclear.

Using the samples including Malaysia and other related countries, several studies have examined the impact of real depreciation or devaluation on real output. Kim and Ying (2007) and An, Kim and Ren (2014) find that real depreciation is expansionary. Kim, An, and Kim (2015) show that real depreciation tends to be contractionary whereas Nunnenkamp and Schweickert (1990) reject the contractionary devaluation hypothesis. Bahmani-Oskooee (1998) and Bahmani-Oskooee, Chomsisengphet, and Kandil (2002) report that the impact of real depreciation is neutral or that there is no co-integration between real output and real depreciation.

The sign of government debt as a percent of GDP is unclear and depends on the potential positive impact of increased debt-financed government spending on aggregate demand and the possible negative impact of increased debt on private spending and net exports caused by a higher interest rate and a stronger currency. When government debt as a percent of GDP is relatively small, the positive effect tends to dominate the negative effect; and when government debt as a percent of GDP is relatively large, the negative effect tends to overwhelm the positive effect (Lau, Mansor, & Puah, 2010; Mohammadi & Moshrefi, 2012; Aisen & Hauner, 2013). The Ricardian equivalence hypothesis suggests that debt- or deficit-financed government spending has a neutral effect on real output (Barro, 1974, 1989). Studies by McMillin (1986), Gupta (1989), Darrat (1989, 1990), Findlay (1990), Ostrosky (1990) and others indicate that more government deficit/debt would not raise the interest rate. However, Feldstein (1982), Hoelscher (1986), Cebula (1997), Cebula and Cuellar (2010), Cebula (2014a, 2014b), Cebula, Angjellari-Dajci, and Foley (2014) and others show that more government deficit/debt raises real interest rates and tends to crowd out private spending. Reinhart and Rogoff (2010) maintain that economic growth would decline if government debt as a percent of GDP is above 90% and that a higher government debt-to-GDP ratio leads to a higher inflation rate in emerging economies.

For oil importing countries, a higher real oil price would cause short-run aggregate supply to shift to the left, resulting in less aggregate output. Nonetheless, a higher real oil price due to strong aggregate demand is likely to produce a short-run positive effect and a long-run negative effect (Hamilton, 1996; Kilian, 2008a, 2008b).

3. Empirical Results

Data sources came from Bank Negara Malaysia, IMF's International Financial Statistics, and the St. Louis Federal Reserve Bank. Real GDP in Malaysia is measured in million ringgits. The real exchange rate (REXC) is chosen because the correlation coefficient between real GDP and the real exchange rate is much greater than other measures of the exchange rate. The real exchange rate is equal to the units of the ringgit per U.S. dollar times the CPI in the U.S. and divided by the CPI in Malaysia. A higher real exchange rate suggests that the ringgit faces real depreciation, and vice versa. Government debt measured as a percent of GDP is used to represent fiscal policy. The real lending rate measured as the difference between the nominal lending rate and the expected inflation rate is chosen to represent the real interest rate. The real stock price is represented by the nominal equity price index divided by the CPI to adjust for inflation. To avoid potential multicollinearity problems, lagged real stock price is used. The real oil price is equal to the nominal oil price per barrel divided by the CPI and measured in the ringgit. We estimate the expected inflation rate as the mean inflation rate of the last four lagged periods. Except for negative or zero values, other variables are measured on a log scale. The sample ranges from 2005.Q3 to 2016.Q1. During 1998.Q4 - 2005.Q3, Malaysia pegged the ringgit to the U.S. dollar, the ringgit changed little, and the true relationship between aggregate output and the exchange rate may not be detected during this period.

<Figure 1> reveals that real GDP and the real exchange rate seemed to have changed from a negative to a positive relationship during 2010.Q4 - 2016.Q1. Hence, a dummy variable B with a value of one during 2010.Q4 - 2016.Q1 and zero otherwise is created. An interactive dummy variable and an intercept dummy variable are included in the estimated regression:

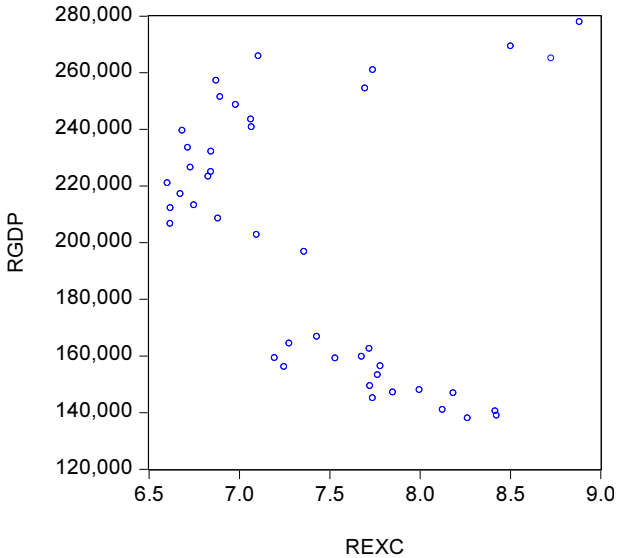
$$Y^* = w(E, E\times B, B, D, R, S, O, \pi^e) \quad (5)$$
$$- \quad + \quad - \quad + \quad ? \quad + \quad ? \quad -$$

Taking partial derivative of Y^* with respect to E, we have:

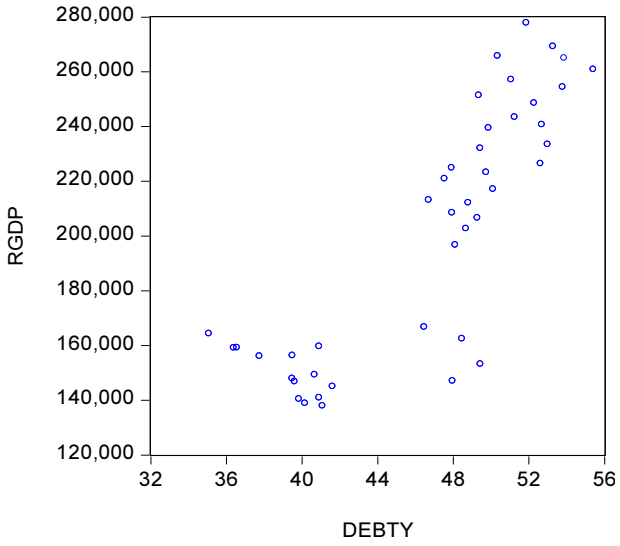
$$\frac{\partial Y^*}{\partial E} = \lambda_1 + \lambda_2 \times B \quad (6)$$

where λ_1 and λ_2 are the coefficients for E and ExB respectively. It suggests that the impact of a change in E on Y^* equals λ_1 during 2005.Q3 - 2010.Q3 and $\lambda_1 + \lambda_2$ during 2010.Q4 - 2016.Q1 and that $\lambda_1 < \lambda_2$ in absolute values. <Figure 2> shows that real GDP and the debt-to-GDP ratio seemed to have a positive relationship.

The estimated regression and relevant statistics are presented in <Table 1>. The exogenous variables with significant coefficients can explain approximately 96.81% of the change in real GDP. The mean absolute percent error is estimated to be 3.3287%, suggesting that the forecast error is relatively small. Except for the coefficient of the real oil price, other coefficients are significant at the 1% level. Real GDP is positively influenced by the real exchange rate during 2010.Q4 – 2016.Q1, government debt as a percent of GDP, lagged real stock price and negatively impacted by the real exchange rate during 2005.Q3 – 2010.Q3, the real lending rate and inflation expectations. Specifically, a 1% real appreciation of the ringgit would increase real GDP by 0.8053% during 2005.Q3 – 2010.Q3 whereas a 1% real depreciation of the ringgit would increase real GDP by 0.5011% during 2010.Q4 – 2016.Q1. When government debt as a percent of GDP rises 1%, real GDP would increase 0.6850%. A 1% increase in lagged real stock price would raise real GDP 0.2858%.



<Figure 1> Scatter diagram between real GDP (RGDP) and the real exchange rate (REXC)



<Figure 2> Scatter diagram between real GDP (RGDP) and government debt as a percent of GDP (DEBTY)

Several different versions are considered. When the real exchange rate is replaced by the real effective exchange rate, its coefficient is negative and highly significant. However, the mean absolute percent error is 8.1477%, which is much higher than that reported in <Table 1>. If government debt as a percent of GDP is replaced by the government deficit-to-GDP ratio, its coefficient is positive but insignificant. The mean absolute percent error is estimated to be 4.3133%, which is higher than the value when the debt-to-GDP ratio is used. If the real government bond yield replaces the real lending rate, the negative coefficient is significant at the 10% level. However, the negative coefficient of the expected inflation rate is insignificant at the 10% level.

<Table 1> Estimated Regression of Log (real GDP) for Malaysia

Variable	Coefficient	z-Statistic
C	9.823880	5314.788
LOG(real exchange rate)	-0.805277	-32.27200
LOG(real exchange rate) *dummy variable	1.306435	16.01138
Dummy variable	-2.456821	-15.63450
LOG(Government debt as a percent of GDP)	0.684985	41.31105
Real lending rate	-0.014661	-9.662692
LOG(lagged real stock price)	0.285772	12.24469
LOG(real oil price)	0.009286	0.505770
Expected inflation rate	-0.014799	-7.386995
R-squared	0.968069	
Adjusted R-squared	0.960556	
Akaike information criterion	-3.375019	
Schwarz criterion	-2.883521	
MAPE	3.3287%	
Methodology	EGARCH	
Sample period	2005.Q3 – 2016.Q1	
Number of observations	43	

4. Summary and Conclusions

This article has studied the effects of the real exchange rate, government debt as a percent of GDP and other relevant variables on aggregate output in Malaysia. A simultaneous-equation model consisting of aggregate demand and short-run aggregate supply is employed to derive a reduced-form equation. It finds that real appreciation during 2005.Q3 – 2010.Q3, real depreciation during 2010.Q4 – 2016.Q1, a higher government debt-to-GDP ratio, a higher real stock market index, a lower real interest rate, or a lower expected inflation rate would raise aggregate output. A higher real oil price does not affect aggregate output.

Therefore, whether real depreciation or real appreciation would raise aggregate output depends on the time periods. During the early stage up to 2010.Q3, real appreciation increases aggregate output whereas during the later stage beginning in 2010.Q4, real depreciation raises aggregate output. Recent real depreciation seems to suggest that the real exchange rate is moving toward the right direction in raising aggregate output. Although the government debt-to-GDP ratio has a positive effect on aggregate output, fiscal prudence may need to be exercised in order to keep government debt as a percent of GDP at a sustainable level. Monetary policy aimed at a lower inflation expectations or real interest rate would be beneficial to economic growth.

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