Asian Journal of Economics and Finance. **2019**, 1, 4

ARF INDIA
Academic Open Access Publishing
www.arfjournals.com

Is Real Depreciation Expansionary? The Case of New Zealand

Yu Hsing

Joeph H. Miller Endowed Professor in Business, Professor of Economics,
Department of Management & Business Administration, College of Business,
Southeastern Louisiana University, Hammond, Louisiana 70402, USA, E-mail: yhsing@selu.edu

Received: 15 April 2019; Revised: 12 June 2019; Accepted 20 July 2019; Publication: 10 October 2019

Abstract: Studying the impact of exchange rate movements on aggregate output in New Zealand based on an extended IS-MP-AS model (Romer, 2000), this paper finds that real depreciation raised real GDP during 1990.Q1-2003.Q4 whereas real appreciation increased real GDP during 2004.Q1-2017.Q2. In addition, a lower debt-to-GDP ratio, a lower lagged U.S. real federal funds rate, a higher stock price, a higher real oil price or a lower expected inflation rate would help increase real GDP. Hence, real depreciation or appreciation may increase or reduce real GDP depending upon the phase of economic growth.

Keywords: currency depreciation or appreciation; government debt; world interest rates; oil prices; IS-MP-AS model

JEL codes: F41, E62

1. Introduction

According to the International Monetary Fund (2018), real GDP in New Zealand grew at an annual rate of 3.076% in 2017, which was slightly lower than those in 2015 and 2016. The inflation rate of 1.539% in 2017 was within the inflation target range of 1% to 3% over the medium term. The unemployment rate reached 4.981% in 2017, which was the lowest since 2009. The government borrowing-to-GDP ratio of 0.557% in 2017 was relatively low. Government debt as a percent of GDP declined from a recent high of 31.282% in 2012 to a low of 27.449% in 2017, suggesting that it pursued a relatively conservative fiscal policy. The New Zealand dollar appreciated 40.76% from 2.38New Zealand dollar per U.S. dollar in 2012 to 1.41 in 2017, indicating that New Zealand-made goods became more expensive to foreigners.There was a current account deficit of 2.518% in 2017 mainly because exports were less than imports.

This paper focuses onthe impact of real depreciation or appreciation on aggregate output in New Zealand based on an extended IS-MP-AS model (Romer, 2000). Other related variables will also be considered. Several previous studies (Morley, 1992; Moreno, 1999; Bahmani-Oskooee, 1998; Bahmani-Oskooee, Chomsisengphet and Kandil, 2002; Kim and Ying, 2007; An, Kim and Ren, 2014; Kim, An and Kim, 2015) of the effect of real depreciation or appreciation on aggregate output are based on the traditional IS-LM model and use the money supply as a proxy for monetary policy. Romer (2000)

proposes that the IS-MP-AS model is more appropriate as the monetary policy function (Taylor, 1993, 1999) incorporating inflation targeting is considered. Because New Zealand has adopted inflation targeting since 1990, the extended IS-MP-AS model is expected to better capture monetary policy conducted by the Reserve Bank of New Zealand.

2. Literature survey

Real depreciation tends to increase exports, import costs and domestic inflation and reduce net capital inflows whereas real appreciation tends to reduce exports, imports costs and domestic inflation and increase net capital inflows. Hence, the net impact of real depreciationor appreciation is unclear. Several studies including New Zealand and other related countries in the sample have examined the effect of currency depreciation or devaluation on aggregate output.

Ahmed, Gust, Kamin and Huntley (2002) analyze the impacts of devaluation on output based on a sample of 5 Latin American countries, 4 Asian countries, 4 industrialized countries including New Zealand with floating exchange rates (floaters), and 5 industrialized countries with fixed or non-floating exchange rates (non-floaters). According to their findings, contractionary devaluation is found for developing countries whereas expansionary devaluation is found for both floaters and non-floaters, and exchange rate fluctuations are more destabilizing in developing countries.

Kalyoncu, Artan, Tezekici and Ozturk (2008) investigate the impact of real depreciation on output for 23 OECD countries including New Zealand. Contractionary depreciation is found in six countries whereas expansionary depreciation is found in three countries. Real depreciation does not affect output in New Zealand.

An, Kim and Ren (2014) study the impact of real devaluation on output and current account for 16 countries including the Asian, Latin American and non-G3 developed countries. They find that the contractionary impact of real devaluation could happen in the developing or developed countries. For Latin American countries, the results are consistent: Real devaluation reduces output and improves the current account. Whether the current account may improve after real devaluation would not affect output.

Bahmani-Oskooee andMohammadian (2017) examine whether the impact of real depreciation on output may be nonlinear for 68 countries including New Zealand. For New Zealand, contractionary devaluation is found, and the nonlinear relationship is not confirmed.

A higher government debt-to-GDP ratio may or may not affect real GDP, depending upon whether the negative crowding-out effect would partially or completely cancel out the positive impact of the debt-financed government spending or whether the debt-to-GDP ratio has reached a turning point or threshold. Barro (1974, 1989) suggests that the debt-financed government

spending has a neutral effect in the long run. Cebula (1997, 2014a, 2014b) shows that more government deficits tend to raise the real interest rate and crowd out private spending. Kumar and Woo (2010) reveal that if the initial debt-to-GDP ratio rises 1 percentage point, subsequent average GDP growth will decline 0.2 percentage points. The impact is smaller for advanced countries. Reinhart and Rogoff (2010) estimate the threshold to be 90%, suggesting that if the debt-to-GDP ratio is greater than 90%, it would reduce economic growth and that if the debt-to-GDP ratio is less than 90%, its effect on economic growth is weak. Cecchetti, Mohanty and Zampolii (2011) find the threshold to be 85%. Mencinger, Verbic and Aristovnik (2015) reveal that the turning point is estimated to be 44% - 45% for emerging economies and 90% - 94% for developed countries.

3. The model

Suppose that in the IS function, aggregate expenditure is a function of real income or GDP, the real lending rate, government spending, government tax revenue, the stock price and the real exchange rate, that the real policy rate in the monetary policy function is determined by the inflation gap, the output gap,the real exchange rate and the world real interest rate, that the inflation rate is influenced by the expected inflation rate, the output gap, the real oil price, and the real exchange rate, and that the real lending rate is a function of the real policy rate. We can express an extended IS-MP-AS model (Romer, 2000) as:

$$Y = w(Y, L, G, T, S, E) \tag{1}$$

$$R = x(\pi - \pi^*, Y - Y^p, E, R^w) \tag{2}$$

$$\pi = z\ (\pi^e, Y - Y^p, O, E) \tag{3}$$

$$L = f(R) \tag{4}$$

where

Y = real GDP in New Zealand,

L = the real lending rate,

G = government spending,

T = government tax revenue,

S = the stock price,

E = the real exchange rate (An increase means real depreciation of the New Zealand dollar.),

O = the real oil price,

R = the real policy rate,

π = the inflation rate,

π^* = the inflation target,

Y^p = potential real GDP,

R^w= world real interest rate, and

π^e = the expected inflation rate.

Assume that π^* and Y^p and are constants in the short run. As government debt is a more concerned subjectand is an accumulation of government deficits, we substitute government debt (D) for the government deficit (G – T). Solving for the three endogenous variables, Y, R and π, we find equilibrium real GDP as:

$$\bar{Y} = g(E, D, R^w, S, O, \pi^e) \tag{5}$$

An analysis of the data (Figure 1) indicates that real GDP and the real exchange rate seemed to have a positive relationship during earlier years and a negative relationship during more recent years. Specifically, real depreciation raised real GDP during 1990.Q1-2003.Q4 whereas real appreciation increased real GDP after 2003.Q4. Real GDP also showed seasonal patterns during the sample period. Hence, an interactive slope binary variable (E B), an intercept binary variable (B), and three seasonal binary variables are included in the estimated regression:

$$\begin{gathered}\bar{Y} = h(E, E \times B, B, D, R^w, S, O, \pi^e, S2, S3, S4) \\ \quad + \quad - \quad + \; ? \quad - \quad + \; ? \quad -\end{gathered} \tag{6}$$

where B = 0 during 1990.Q1 – 2003.Q4, B = 1 during 2004.Q1 – 2017.Q2, andS2, S3 and S4 are seasonal binary variables for the second, third and fourth quarters. Figure 2 suggests that real GDP and the government debt-to-GDP

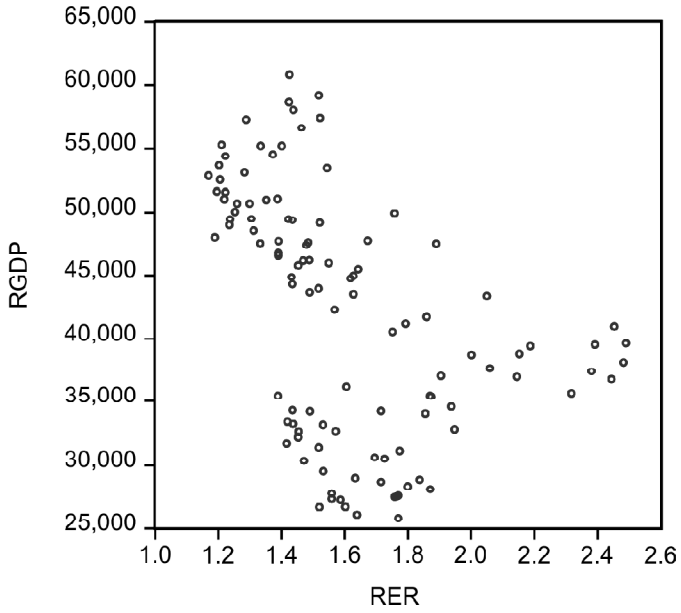

Figure 1: Scatter diagram between real GDP (RGDP) and the real exchange rate (RER)

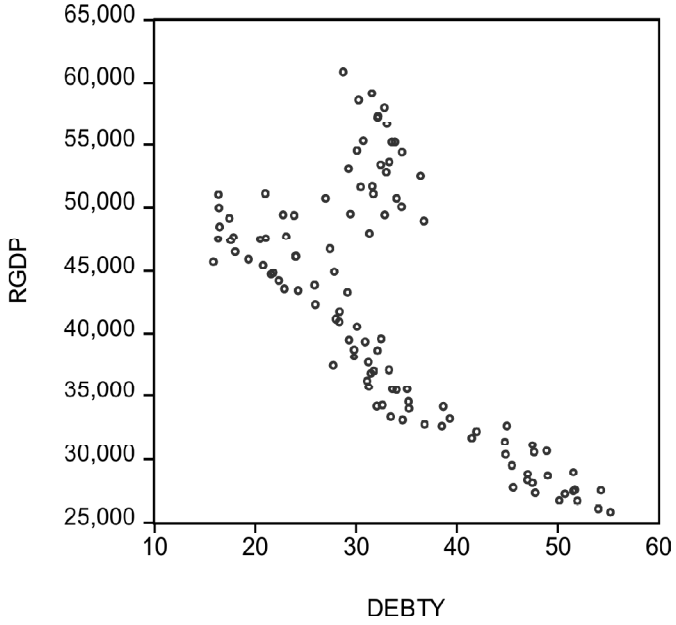

Figure 2: Scatter diagram between real GDP (RGDP) and the debt-to-GDP ratio (DEBTY)

ratio seemed to have a negative relationship during most of the sample period.As New Zealand imports most of its energy needs from abroad, a higher real oil price tends to shift aggregate supply to the left and reduce real GDP. However, if a higher real oil price is caused by a strong economy, aggregate demand may shift to the right.

4. Empirical results

The data were collected from the Reserve Bank of New Zealand and the *International Financial Statistics* published by the International Monetary Fund. Real GDP is measured in million New Zealand dollars. The real exchange rate is measured as units of the New Zealand per U.S. dollar times the relative prices in the U.S. and New Zealand. Thus, an increase in the real exchange rate means real depreciation of the New Zealand dollar, and vice versa. The government debt is expressed as a percent of GDP. The U.S. real federal funds rate is chosen to represent the world real interest rate. It is lagged one period to suggest that there may be a time lag between a change in the U.S. federal funds rate and New Zealand's policy rate. The oil price per barrel measured in the New Zealand dollar is adjusted by the consumer price index. The expected inflation rate is represented by the weighted inflation rate of the past four quarters. The log scale is used except for those variables with negative values before or after the transformation. The sample ranges from 1990.Q1 to 2017.Q2. Complete data for government debt before 1990.Q1 are not available.

According to the DF-GLS unit root test on the regression residual, the value of the test statistic is estimated to be -3.4799, which is greater than the critical value of -3.0220in absolute values at the 5% level. Hence, these time series variables are cointegrated.

Table 1 reports the estimated regression. The EGARCH process is applied in empirical work in order to correct for potential autoregressive conditional heteroskedasticity. As shown, approximately 90.51% of the change in real GDP can be explained by the independent variables with significant coefficients. Except for the coefficient of the real oil price and the second quarter, other coefficients are significant at the 1% level. Real GDP is positively associated with the real exchange rate during 1990.Q1-2003.Q4, the intercept binary variable, the stock price and the fourth quarter, and is negatively affected by the real exchange rate during 2004.Q1-2017.Q2, the debt-to-GDP ratio, the lagged U.S. real federal funds rate, the expected inflation rate, and the third quarter.

Table 1: Estimated regression of log(real GDP) in New Zealand

Variable	*Coefficient*	*z-Statistic*	*Probability*
C	8.904407	128.6528	0.0000
Log(Real exchange rate)	0.284004	11.03549	0.0000
Log(Real exchange rate)*Binary variable	-0.585479	-9.363280	0.0000
Binary variable	0.392700	11.65364	0.0000
Log(debt-to-GDP ratio)	-0.078660	-5.293538	0.0000
Lagged U.S. real federal funds rate	-0.029007	-13.69401	0.0000
Log(stock price)	0.373206	23.93542	0.0000
Log(Real oil price)	0.011269	0.714377	0.4750
Expected inflation rate	-0.010662	-4.965525	0.0000
S2	-0.015877	-1.620956	0.1050
S3	-0.051765	-5.706277	0.0000
S4	0.042928	6.838323	0.0000
R-squared	0.905098		
Adjusted R-squared	0.894446		
Akaike info criterion	-2.990281		
Schwarz criterion	-2.622034		
Sample period	1990Q1 -2017Q2		
Number of observations	110		
Methodology	EGARCH		

Specifically, a 1% real depreciation would increase real GDP by 0.2840% during 1990.Q1-2003.Q4 whereas a 1% real depreciation would reduce real GDP by 0.3015% during 2004.Q1-2017.Q2. A 1 percent increase in the debt-to-GDP ratio would reduce real GDP by 0.0787%. If the lagged U.S. real federal funds rate rises 1 percentage point, the log of real GDP would decline by 0.0290. When thestock price rises 1%, real GDP would increase by 0.3732%.

In comparison, the finding that real depreciation was expansionary in New Zealand during 1990.Q1-2003.Q4 is consistent with Ahmed, Gust, Kamin and Huntley (2002).The finding that real depreciation was contractionary in New Zealand during 2004.Q1-2017.Q2 is in line with Bahmani-Oskooee and Mohammadian (2017) and An, Kim and Ren (2014).

Several other versions were considered. If the interactive binary variable and the intercept binary variable for the real exchange rate are not included, the coefficient of the real exchange rate is estimated to be 0.0572 and is significant at the 1% level. This result is likely to be misleading as the negative relationship between real GDP and the real exchange rate during 2004.Q1-2017.Q2 is overlooked. If the lagged U.S. real federal funds rate is replaced with the lagged U.S. real prime lending rate, its estimated coefficient of -0.0276 is significant at the 1% level and is very close to the coefficient of the lagged U.S. real federal funds rate. If the expected inflation rate is replaced with the simple average inflation rate of the past four quarters, its negative coefficient is significant at the 1% level. Other results are similar.

5. Summary and Conclusions

This paper has examined the impacts of exchange rate movements and other related variables on aggregate output in New Zealand based on an extended IS-MP-AS model. Major findings indicate that real depreciation of the New Zealand dollar raised real GDP during 1990.Q1-2003.Q4 whereas real appreciation of the New Zealand dollar increased real GDP during 2004.Q1-2017.Q2. In addition, a lower debt-to-GDP ratio, a lower lagged U.S. real federal funds rate, a higher stock price or a lower expected inflation rate would help increase real GDP.

These results have several policy implications. It appears that the relationship between real GDP and the real exchange rate had a structural change during the sample period and that the impact of real depreciation or appreciation on real GDP depends on the level of economic development. Hence, the government may need to review their relationship periodically in order to determine whether the current relationship may be subject to changes. Expansionary fiscal policy measured as a higher debt-to-GDP ratio is ineffective in raising real GDP. It suggests that the negative crowding-out effect cancels out the positive impact of more government debt- financed spending.The Reserve Bank of New Zealand responds to a change in U.S. monetary policy. It is expected that the Federal Reserve Bank would raises its federal funds rate several times this year. Therefore, the Reserve Bank of New Zealand may need to monitor the decision made by the Federal Reserve Bank to determine whether and how much its policy rate may need to change.

References

Ahmed, S., Gust, C., Kamin, S., & Huntley, J. (2002). Are depreciations as contractionary as devaluations? A comparison of selected emerging and industrial economies.

An, L., Kim, G., Ren, X. (2014). Is devaluation expansionary or contractionary: Evidence based on vector autoregression with sign restrictions, *Journal of Asian Economics*, Vol. 34, pp. 27-41.

Bahmani-Oskooee, M. (1998). Are Devaluations Contractionary in LDCs? *Journal of Economic Development*, Vol. 23, pp. 131-144.

Bahmani-Oskooee, M., Chomsisengphet, S., Kandil, M. (2002). Are devaluations contractionary in Asia? *Journal of Post Keynesian Economics*, Vol. 25, pp. 69-81.

Bahmani-Oskooee, M., & Mohammadian, A. (2017). On the Relation between Domestic Output and Exchange Rate in 68 Countries: An Asymmetry Analysis.

Barro, R. J. (1974). Are government bonds net wealth? *Journal of Political Economy*, Vol. 82, pp. 1095-1117.

Barro, R. J. (1989). The Ricardian approach to budget deficits, *Journal of Economic Perspectives* Vol. 3, pp. 37-54.

Cebula, R. J. (1997). An empirical note on the impact of the federal budget deficit on ex ante real long term interest rates, 1973-1995, *Southern Economic Journal*, Vol. 63, pp. 1094-1099.

Cebula, R. J. (2014a). Impact of federal government budget deficits on the longer-term real interest rate in the US: Evidence using annual and quarterly data, 1960-2013, *Applied Economics Quarterly*, Vol. 60, pp. 23-40.

Cebula, R. J. (2014b). An empirical investigation into the impact of US federal government budget deficits on the real interest rate yield on intermediate-term treasury issues, 1972–2012. *Applied Economics*, Vol. 46, pp: 3483-3493.

Cecchetti, S. G., Mohanty, M. S., Zampolli, F. (2011). The real effects of debt, BIS Working Papers No. 352. Basel: Bank for International Settlements.

International Monetary Fund (2018). World economic outlook database, *http://www.imf.org/en/Publications/WEO/Issues/2018/06/05/world-economic-outlook-october-2017.*

Kalyoncu, H., Artan, S., Tezekici, S., & Ozturk, I. (2008). Currency devaluation and output growth: an empirical evidence from OECD countries. *International Research Journal of Finance and Economics,* 14(2), 232-238.

Kamin, S. B., Klau, M. (1998). Some multi-country evidence on the effects of real exchange rates on output, FRB International Finance Discussion Paper 611.

Kim, G., An, L., Kim, Y. (2015). Exchange rate, capital flow and output: Developed versus developing economies, *Atlantic Economic Journal*, Vol. 43, pp. 195-207.

Kim, Y., Ying,Y. H. (2007), An empirical assessment of currency devaluation in East Asian countries, *Journal of International Money and Finance*, Vol. 26, pp. 265-283.

Kumar, M. S., Woo, J. (2010). Public debt and growth, IMF Working Paper 10/174. Washington, D.C.: IMF.

Mencinger, J., Verbic, M., Aristovnik, A. (2015). Revisiting the role of public debt in economic growth: The case of OECD countries, MPRA Paper No. 67704.

Moreno, R. (1999), Depreciation and recessions in East Asia,*Economic Review-Federal Reserve Bank of San Francisco*, Vol.3, pp. 27-40.

Morley, S. A. (1992). On the effect of devaluation during stabilization programs in LDCs, *Review of Economics and Statistics*, Vol. 74, pp. 21-27.

Reinhart, C. M., Rogoff, K. S. (2010). Debt and growth revisited. MPRA Paper 24376. University Library of Munic.

Rodrik, D. (2008). The real exchange rate and economic growth,*Brookings Papers on Economic Activity*Vol. 2, pp. 365-412.

Romer, D. (2000). Keynesian macroeconomics without LM curve,*Journal of Economic Perspectives*, Vol. 14, pp. 149-169.

Taylor, J. B. (1993). Discretion versus policy rules in practice,*Carnegie Rochester Conference Series on Public Policy*, Vol. 39, pp. 195-214.

Taylor, J. B. (1999). A historical analysis of monetary policy rules, In *Monetary policy rules* (pp. 319-348). University of Chicago Press.