

Print ISSN: 2288-4637 / Online ISSN 2288-4645  
doi:10.13106/jafeb.2018.vol5.no1.5

# Is Currency Appreciation or Depreciation Expansionary in Thailand?

Yu Hsing<sup>1</sup>

Received: January 9, 2018 Revised: February 9, 2018 Accepted: February 20, 2018

## Abstract

Many developing countries have attempted to depreciate their currencies in order to make their products cheaper, stimulate exports, shift aggregate demand to the right, and increase aggregate output. However, currency depreciation tends to increase import prices, raise domestic inflation, reduce capital inflows, and shift aggregate supply to the left. The net impact is unclear. The paper incorporates the monetary policy function in the model, which is determined by the inflation gap, the output gap, the real effective exchange rate, and the world real interest rate. Applying an extended IS-MP-AS model (Romer, 2000), the paper finds that real depreciation raised real GDP during 1997.Q1-2005.Q3 whereas real appreciation increased real GDP during 2005.Q4-2017.Q2. In addition, a higher government debt-to-GDP ratio, a lower U.S. real federal funds rate, a higher real stock price, a lower real oil price or a lower expected inflation rate would help increase real GDP. Hence, real depreciation or real appreciation may increase or reduce aggregate output, depending upon the level of economic development. Although expansionary fiscal policy is effective in stimulating the economy, caution needs to be exercised as there may be a debt threshold beyond which a further increase in the debt-to-GDP ratio would hurt economic growth.

**Keywords:** IS-MP-AS Model, Exchange Rates, Government Deficits, World Interest Rates, Stock Prices, Oil Prices

**JEL Classification Code:** F41, E52, E62

## 1. Introduction

Movements in the exchange rate of the Thai baht and the potential effect on economic activities have continued to receive more attention partly because the 1997 Asian financial crisis originated in Thailand and caused economic disruptions in Thailand and several other Asian countries. During the Asian financial crisis, the Thai baht depreciated as much as 83.21% versus the U.S. dollar from 25.79 in 2007.Q2 to a high of 47.25 in 2007.Q4 as the Thai government gave up the pegged exchange rate regime and allowed the exchange rate of the over-valued baht to be determined by market demand and supply. After the Asian financial crisis, the exchange rate declined to a low of 29.31 in 2013.Q1, and then reached 33.98 in 2017.Q2.

This paper employs an extended IS-MP-AS model (Romer, 2000) to determine whether real depreciation or appreciation of the Thai baht would affect aggregate output in Thailand. In studying the impact of real depreciation or

appreciation on aggregate output, some of the previous articles select the money supply as a proxy for monetary policy (Morley, 1992; Moreno, 1999; Bahmani-Oskooee, 1998; Bahmani-Oskooee, Chomsisengphet, & Kandil, 2002; Kim & Ying, 2007; An, Kim, & Ren, 2014; Kim, An, & Kim, 2015). Romer (2000) suggests that the IS-MP-AS model has the advantage over the IS-LM-AS model partly because a monetary policy rule (Taylor, 1993, 1999; Akyurek, Kutan, & Yilmazkuday, 2011) would work better than the LM function as many central banks including the Bank of Thailand have adopted inflation targeting in determining the policy rate instead of the money supply. The innovation of this paper is the consideration of several new variables such as the real exchange rate, the real stock price, the world real interest rate and the real oil price in the extended IS-MP-AS model in order to explore the impacts of international trade and finance, the financial market, an open economy and supply shocks on aggregate output.

## 2. Theoretical Model

Extending Romer's model (2000), we can express the IS, the monetary policy (MP) and the aggregate supply (AS) functions as:

<sup>1</sup> Joseph H. Miller Endowed Professor in Business. Department of Management & Business Administration, College of Business, Southeastern Louisiana University, United States [Mailing Address: 500 W University Avenue, Hammond, LA 70402, USA] E-mail: yhsing@selu.edu

$$Y = f(Y, G, T, L, S, E) \quad (1)$$

$$R = g(\pi - \pi^*, Y - Y^p, E, R^w) \quad (2)$$

$$\pi = h(\pi^e, Y - Y^p, E, O) \quad (3)$$

$$L = w(R) \quad (4)$$

where  $Y$ ,  $G$ ,  $T$ ,  $L$ ,  $S$ ,  $E$ ,  $R$ ,  $\pi$ ,  $\pi^*$ ,  $Y^p$ ,  $R^w$ ,  $\pi^e$  and  $O$  stand for real GDP in Thailand, government spending, government tax revenue, the real lending rate, the real stock price, the real exchange rate, the real policy rate, the inflation rate, the inflation target, potential real GDP, the world real interest rate, the expected inflation rate, and the real oil price.

Note that Equation (2) is an extended Taylor rule (Taylor, 1993, 1999) and that Equation (3) is an extended expectations-augmented aggregate supply function. Assuming that the inflation target and potential real GDP are constants in the short run, we can solve for the three endogenous variables and express equilibrium real GDP as:

$$Y^* = x(E, G - T, R^w, S, O, \pi^e) \quad (5)$$

The Jacobian for the three endogenous variables is given by:

$$|J| = [(1 - f_Y) - f_L w_R g_\pi h_Y - f_L w_R g_Y] > 0 \quad (6)$$

The partial derivative of  $Y^*$  with respect to  $E$  can be written as:

$$\partial Y^* / \partial E = (f_E + f_L w_R g_\pi h_E + f_L w_R g_E) / |J| > \text{or} < 0 \quad (7)$$

Real appreciation is expected to hurt exports, reduce import costs and domestic prices, and increase international capital inflows. Conversely, real depreciation tends to help exports, increase the cost of imports and domestic prices (Yilmazkuday, 2015; Alvarez, Shoja, Uddin, & Yilmazkuday, 2017), and reduce international capital inflows. Hence, the net effect is unclear. Findings of previous studies including Thailand in the sample are inconclusive. Currency depreciation is found to be neutral (Bahmani-Oskooee, 1998; Bahmani-Oskooee et al., 2002), expansionary (Gylfason & Schmid, 1983; An et al., 2014), contractionary (Morley, 1992; Kim et al., 2015), and contractionary in the short run and non-contractionary in the long run (Edwards, 1986; Kamin & Klau, 1998).

The Thai government maintained a relatively prudent fiscal policy. After the global financial crisis, in order to stimulate the economy, the Thai government pursued expansionary fiscal policy. As a result, the government debt-to-GDP ratio rose gradually from a low of 21.43% in 207.Q4

to 32.0% in 2017.Q2. Findings of the impact of government debt or deficit on aggregate output are inconclusive. Barro (1974, 1989) argues that the impact of more government debt/deficit on aggregate output is neutral in the long run. Feldstein (1982), Hoelscher (1986), Cebula (1997), Cebula and Cuellar (2010), Cebula (2014a, 2014b), Cebula, Angjellari-Dajci, and Foley (2014) show that more government deficit/debt raises the interest rate and tends to cause a crowding-out effect. McMillin (1986), Gupta (1989), Darrat (1989, 1990), Findlay (1990), and Ostrosky (1990) maintain that more government debt/deficit does not raise the interest rate. Reinhart and Rogoff (2010) find that if government debt is more than 90% of the GDP, it would reduce economic growth.

### 3. Empirical Results

The data were obtained from IMF's *International Financial Statistics*, the Bank of Thailand, and the Federal Reserve Bank of St. Louis. Real GDP is measured in million baht. The real effective exchange rate is a trade-weighted index, and an increase means real appreciation of the Thai baht. In empirical work, the government deficit is replaced with government debt ( $D$ ) expressed as a percent of GDP because the latter is an accumulation of the former and government debt is a more concerned subject. The world real interest rate is represented by the U.S. federal funds rate minus the U.S. inflation rate. The real stock price is calculated as the nominal equity index adjusted by the consumer price index. The real oil price is measured as the Thai baht per barrel of crude oil adjusted by the consumer price index. The expected inflation rate is estimated as the average inflation rate of the past four quarters. The sample ranges from 1997.Q1 to 2017.Q2 because earlier data for government debt are not available.

The scatter diagram in Figure 1 seems to suggest that real depreciation raised real GDP up to 2005.Q3, but real appreciation increased real GDP after 2005.Q3. The scatter diagram in Figure 2 seems to indicate that real GDP and the government debt as a percent of GDP had a positive relationship. An analysis of real GDP data shows that real GDP had seasonal patterns. To test whether the slope of the real effective exchange rate and the intercept might have changed during 2005.Q4-2017.Q2, a binary variable  $B$  with a value of zero during 1997.Q1-2005.Q3 and 1 during 2005.Q4-2017.Q2 is generated. Hence, an interactive binary variable, an intercept binary variable and three seasonal dummy variables are included in the estimated regression:

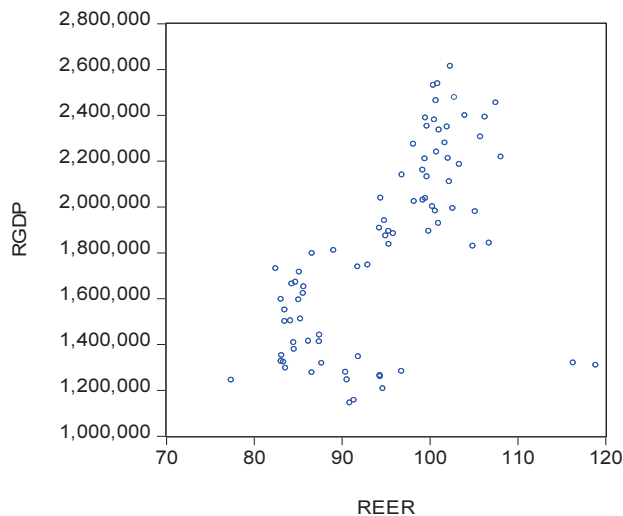
$$Y^* = z(E, E \times B, B, D - T, R^w, S, O, \pi^e, Q2, Q3, Q4) \quad (8)$$

The partial derivative of  $Y^*$  with respect to  $E$  can be expressed as  $\partial Y^*/\partial E = \lambda_1 + \lambda_2 B$  where  $\lambda_1$  and  $\lambda_2$  are the estimated coefficients for  $E$  and,  $E \times B$  respectively. Thus,  $\partial Y^*/\partial E = \lambda_1$  during 1997.Q1-2005.Q3 when the binary variable has a value of zero, and  $\partial Y^*/\partial E = \lambda_1 + \lambda_2$  during 2005.Q4-2017.Q2 when the binary variable has a value of 1.

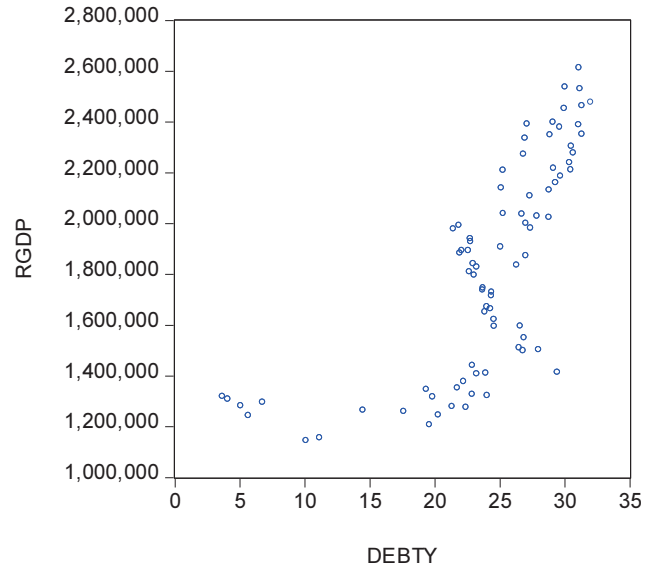
According to the ADF test, all the variables have unit roots in level and are stationary in first difference. The ADF test on regression residuals show that the test statistic of -5.7445 is greater than the critical value of -4.0769 in absolute values at the 1% level. Hence, these variables are cointegrated and have a long-term stable relationship.

Table 1 reports empirical results. The GARCH process is employed in order to correct for potential autoregressive conditional heteroskedasticity. Except for the variables with zero or negative values, other variables are measured on a log scale. As shown, approximately 96.53% of the variation in real GDP can be explained by the right-hand side variables. The coefficients of all the exogenous variables are significant at the 1% or 10% level. The mean absolute percent error of 3.32% suggests that the forecast error is relatively small.

Real GDP is positively associated with the real effective exchange rate during 2005.Q4-2017.Q2, the government debt-to-GDP ratio and the real stock price and negatively affected by the real effective exchange rate during 1997.Q1-2005.Q3, the U.S. real federal funds rate, the real oil price and the expected inflation rate. These results suggest that real depreciation of the baht raised real



**Figure 1.** Scatter diagram between real GDP (RGDP) and the real effective exchange rate (REER)



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

GDP during 1997.Q1-2005.Q3 but real appreciation of the baht increased real GDP during 2005.Q4-2017.Q2. Specifically, a 1% real depreciation of the baht raised real GDP by 0.2171% during 1997.Q1-2005.Q3, but a 1% real appreciation of the baht increased real GDP by 0.2756% during 2005.Q4-2017.Q2. The significant coefficient of government debt as a percent of GDP implies that the positive effect of debt-financed government spending outweighed the negative crowding-out effect on private spending.

In comparison, the finding of a positive impact of real depreciation on real GDP during 1997.Q1-2005.Q3 is consistent with Gylfason and Schmid (1983) and An et al. (2014). On the other hand, the finding of a negative impact of real depreciation on real GDP during 2005.Q4-2017.Q2 is consistent with Morley (1992) and Kim et al. (2015) and is in accordance with Edwards (1986) and Kamin and Klau (1998) in the short run.

Two other versions are estimated. If the U.S. real federal funds rate is replaced with the U.S. real prime lending rate, its negative coefficient of -0.0119 is significant at the 1% level. Other results are similar. If the expected inflation rate is represented by the simple lagged inflation rate, its coefficient of -0.0059 is significant at the 1% level. Other results are comparable.

**Table 1.** Estimated regression of log(real GDP) in Thailand

Variable	Coefficient	z-Statistic	Probability
Intercept	14.50394	86779.08	0.0000
Log(real effective exchange rate)	-0.217069	-49.88051	0.0000
Log(real effective exchange rate)*binary variable	0.492716	107.3166	0.0000
Binary variable	-1.986055	-88.06242	0.0000
Log(government debt as a percent of GDP)	0.073280	25.55192	0.0000
U.S. real federal funds rate	-0.012084	-10.14997	0.0000
Log(real stock price)	0.212692	60.36492	0.0000
Log(real oil price)	-0.051726	-36.53525	0.0000
Expected inflation rate	-0.010566	-14.80673	0.0000
Second quarter	-0.047929	-10.31797	0.0000
Third quarter	-0.052885	-12.37593	0.0000
Fourth quarter	0.008690	1.712780	0.0868
R-squared	0.965272		
Adjusted R-squared	0.959814		
Akaike information criterion	-3.831138		
Schwarz criterion	-3.420235		
Mean absolute percent error	3.316728		
Sample period	1997.Q1- 2017.Q2		
Number of observations	82		

Notes: The binary variable has a value of 0 during 1997.Q1-2005.Q3 and 1 during 2005.Q4-2017.Q2. MAPE is the means absolute percent error.

## 4. Summary and Conclusions

This paper has examined whether real depreciation/appreciation would affect real GDP in Thailand. Other related variables are considered as well. An extended IS-MP-AS model is presented. Real depreciation helped real GDP during 1997.Q1-2005.Q3 whereas real appreciation increased real GDP during 2005.Q4-2017.Q2. In addition, a higher government debt-to-GDP ratio, a lower real federal funds rate, a higher real stock price, a lower real oil price or a lower expected inflation rate would be conducive to economic growth.

There may be some policy implications. Real depreciation or appreciation may help or hurt real GDP depending upon the time period under consideration. Therefore, it is essential to assess their relationship periodically to determine whether real depreciation or appreciation would be beneficial to aggregate output. When the government considers increasing debt-financed spending, fiscal prudence would be needed as its impact may be reduced partially or completely by the crowding-out effect. In conducting monetary policy, the Bank of Thailand would need to monitor and consider U.S. monetary policy in order to link the domestic real interest rate to the world real interest rate.

## References

- Akyurek, C., Kutun, A. M., & Yilmazkuday, H. (2011). Can inflation targeting regimes be effective in developing countries? The Turkish experience. *Journal of Asian Economics* 22(5), 343-355.
- Alvarez, R., Shoja, A., Uddin, S. A. H., & Yilmazkuday, H. (2017). Daily exchange rate pass-through into micro prices. Retrieved February 5, 2018, from <https://ssrn.com/abstract=2911679>.
- An, L., Kim, G., & Ren, X. (2014). Is devaluation expansionary or contractionary: Evidence based on vector autoregression with sign restrictions. *Journal of Asian Economics*, 34, 27-41.
- Bahmani-Oskooee, M. (1998). Are devaluations contractionary in LDCs? *Journal of Economic Development*, 23(1), 131-145.
- Bahmani-Oskooee, M., Chomsisengphet, S., & Kandil, M. (2002). Are devaluations contractionary in Asia? *Journal of Post Keynesian Economics*, 25(1), 69-82.
- Barro, R. J. (1974). Are government bonds net wealth? *Journal of Political Economy*, 82(6), 1095-1117.
- Barro, R. J. (1989). The Ricardian approach to budget deficits. *Journal of Economic Perspectives*, 3(2), 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*, 63(4), 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*, 60(1), 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*, 46(28), 3483-3493.
- Cebula, R. J., Angjellari-Dajci, F., & Foley, M. (2014). An exploratory empirical inquiry into the impact of federal budget deficits on the ex post real interest rate yield on ten year treasury notes over the last half century. *Journal of Economics and Finance*, 38(4), 712-720.
- Darrat, A. F. (1989). Fiscal deficits and long-term interest rates: Further evidence from annual data. *Southern Economic Journal*, 56(2), 363-374.
- Darrat, A. F. (1990). Structural federal deficits and interest rates: Some causality and co-integration tests. *Southern Economic Journal*, 56(3), 752-759.
- Edwards, S. (1986). Devaluation and aggregate economic activity: An empirical analysis of the contractionary devaluation issue. UCLA Department of Economics, No. 412.
- Feldstein, M. (1982). Government deficits and aggregate demand. *Journal of Monetary Economics*, 9(1), 1-20.
- Findlay, D. W. (1990). Budget deficits, expected inflation and short-term real interest rates: Evidence for the US. *International Economic Journal*, 4(3), 41-53.
- Gupta, K. L. (1989). Budget deficits and interest rates in the US. *Public Choice*, 60(1), 87-92.
- Gylfason, T., & Schmid, M. (1983). Does devaluation cause stagflation? *Canadian Journal of Economics*, 16(4), 641-654.
- Hoelscher, G. (1986). New evidence on deficits and interest rates. *Journal of Money, Credit, and Banking*, 18(1), 1-17.
- Kamin, S. B., & Klau, M. (1998). Some multi-country evidence on the effects of real exchange rates on output. *FRB International Finance Discussion Paper*, No. 611. Retrieved from [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=96613](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=96613)
- Kim, G., An, L., & Kim, Y. (2015). Exchange rate, capital flow and output: developed versus developing economies. *Atlantic Economic Journal*, 43(2), 195-207.
- Kim, Y., & Ying, Y. H. (2007). An empirical assessment of currency devaluation in East Asian countries. *Journal of International Money and Finance*, 26(2), 265-283.
- McMillin, W. D. (1986). Federal deficits and short-term interest rates. *Journal of Macroeconomics*, 8(4), 403-422.
- Moreno, R. (1999). Depreciation and recessions in East Asia. *Economic Review-Federal Reserve Bank of San Francisco*, 99(3), 27-40.
- Morley, S. A. (1992). On the effect of devaluation during stabilization programs in LDCs. *The Review of Economics and Statistics*, 74(1), 21-27.
- Ostrosky, A. L. (1990). Federal government budget deficits and interest rates: Comment. *Southern Economic Journal*, 56, 802-803.
- Reinhart, C., & Rogoff, K. (2010). Debt and growth revisited. MPRA Paper 24376. University Library of Munic. Retrieved from <https://mpra.ub.uni-muenchen.de/24376/>
- Romer, D. H. (2000). Keynesian macroeconomics without LM curve. *Journal of Economic Perspectives*, 14(2), 149-169.
- Taylor, J. B. (1993). Discretion versus policy rules in practice. *Carnegie Rochester Conference Series on Public Policy*, 39, 195-214.
- Taylor, J. B. (1999). A historical analysis of monetary policy rules. In J. B. Taylor (Eds), *Monetary Policy Rules* (pp. 319-347), Chicago, Illinois: University of Chicago Press.
- Yilmazkuday, H. (2015). Pass-through of trade costs to US import prices. *Review of World Economics*, 151(4), 609-633.