

## Is real depreciation or more government deficit expansionary? The case of Macedonia

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**Abstract.** *The paper finds that real depreciation of the denar reduces real GDP and that more government deficit spending as a percent of GDP raises real GDP. In addition, a lower world real interest rate, a higher lagged world real income, a lower real oil price or a lower expected inflation would increase real GDP. It suggests that the negative impact of real depreciation such as higher import costs and domestic inflation and less international capital inflows dominates the positive impact of real depreciation such as more exports.*

**Keywords:** currency depreciation; government deficits; world interest rates; world income; oil prices; IS-MP-AS model.

**JEL Classification:** F41, E62.

## 1. Introduction

Macedonia's economy exhibits both progress and concerns. According to the International Monetary Fund (2017), Macedonia showed some encouraging economic statistics as evidenced by an inflation rate of -0.239%, a government-debt-GDP ratio of 38.980%, and a government borrowing-to-GDP ratio of -2.641% in 2016. The annual growth rate of real GDP of 2.406% in 2016 was slightly lower than those in 2014 and 2015. The unemployment rate of 23.55% in 2016 was much higher than most other emerging economies, though it had declined from a high of 37.25% in 2005. The current account continued to show improvements as the deficit declined from a high of 12.802% of GDP in 2008 to 3.076% of GDP in 2016. The government spending as a percent of GDP declined from a high of 38.192% in 2002 to 30.459% in 2016. The government revenue as a percent of GDP also declined from a high of 35.928% in 2003 to 27.818% in 2016. The value of the denar versus the US dollar declined as much as 43.11% from 39.2 denar per US dollar in 2008.Q2 to 56.1 denar per US dollar in 2017.Q2.

This paper attempts to examine whether exchange rate movements or government deficits would affect aggregate output in Macedonia based on an extended IS-MP-AS model (Romer, 2000). Several previous studies employ the traditional IS-LM model to examine the effect of real depreciation on aggregate output and include the money supply in the estimated equation (Bahmani-Oskooee, 1998; Bahmani-Oskooee, Chomsisengphet and Kandil, 2002; Kim and Ying, 2007; Ratha, 2010; An, Kim and Ren, 2014; Kim, An and Kim, 2015). Because the National Bank of the Republic of Macedonia gave up the targeting of the money supply in 1995, the IS-MP-AS model incorporating the monetary policy function may be more appropriate.

## 2. Literature survey

Several recent studies have examined macroeconomic policy, the exchange rate, and its effect on aggregate output and other relevant variables in Macedonia and related countries.

Besimi (2004) reviews exchange rate policy of the National Bank of the Republic of Macedonia. He indicates that a flexible exchange rate regime should be pursued with great caution with relatively narrow bands due to a high degree of currency substitution (euroization), strong exchange rate pass-through and the Balassa-Samuelson effect.

De Grauwe and Schnabl (2008) show that more exchange rate stability reduced inflation and increased economic growth in the South Central Eastern and Central European countries during 1994-2004. Hence, membership in the EMU would increase exchange rate stability, reduce inflation and increase growth.

Jovanovic (2009) estimates the impacts of exchange rate movements on exports and imports for Macedonia. For exports, the negative coefficient of the real effective exchange rate is insignificant whereas the coefficients of foreign demand, metal prices and industrial

production are significant. For imports, the coefficients of the real effective exchange rate, real GDP, private consumption, exports and investment spending are significant. Because devaluation of the denar would not improve the current account much and because the cost of devaluation is relatively high, he does not recommend the devaluation of the denar.

Fetai and Zeqiri (2010) find that the money supply is not an effective instrument in the monetary policy transmission mechanism because the link between the money supply and real GDP is weak. They maintain that a stable exchange rate pegged to the euro would work better for a small open economy like Macedonia because denar depreciation causes manufacturing and retail prices to rise sharply and does not affect real GDP significantly. Hence, exchange rate stability leads to macroeconomic stability.

Koczan (2015) reviews fiscal deficit and public debt in six Western Balkan countries including Macedonia after 15 years of economic transition. He indicates that after the global financial crisis, these countries received less capital inflows and experienced lower economic growth. During and after the global financial crisis, the Macedonian government cut spending in 2009 in order to meet revenue shortfalls and froze wages in 2010-2011. Macedonia also partially changed the original universal pension system into the selective contributive system. The second tier currently substitutes part of the first-tier social security pension. The third-tier voluntary private pension plays a minor role.

According to Petrevski, Bogoev and Tevdovski (2016), a higher money market rate causes the inflation rate to decline. A positive fiscal shock results in more output, and fiscal policy is countercyclical, suggesting that more budget deficit will be used to stimulate a sluggish economy. Fiscal and monetary policies are strategic substitutes, suggesting that fiscal tightening will be matched with monetary loosening, and vice versa.

Selimi (2017) investigates the effect of exchange rate changes and other related variables on real GDP for Macedonia. Other variables include M2, degree of openness, CPI, the real interest rate, the current account balance and a dummy variable for the recent global financial crisis. The positive coefficients of the real exchange rate, M2 and the degree of openness are statistically significant. The negative coefficient of the dummy variable is statistically significant. The coefficients of the CPI, the real interest rate and the current account balance are statistically insignificant. The positive significant coefficient of the real exchange rate suggests that real depreciation would increase real GDP.

### 3. The model

Suppose that in the IS function, aggregate spending is determined by real income, government revenue, government spending, the real lending rate, the real exchange rate and the world income, that in the monetary policy function, the key interest rate is influenced by the inflation gap, the output gap, the world real interest rate and the real exchange rate, that in the aggregate supply function, the inflation rate is affected by the expected inflation rate, the output gap, the real exchange rate and the real oil price, and that

the real lending rate is a function of the real key interest rate. We can express an extended IS-MP-AS model as:

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

$$R = g(\pi - \bar{\pi}, Y - \bar{Y}, R^w, E) \quad (2)$$

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

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

where:

Y = real GDP in Macedonia;

G = government spending;

T = government tax revenue;

L = the real lending rate;

E = the real exchange rate (an increase means real depreciation of the denar);

$Y^w$  = world real income;

R = the key interest rate of the central bank;

$\pi$  = the inflation rate;

$\bar{\pi}$  = the inflation target;

$\bar{Y}$  = potential real GDP;

$R^w$  = the world real interest rate;

$\pi^e$  = the expected inflation rate, and

O = the real oil price.

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:

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

An analysis of the sample data indicates that real GDP exhibited seasonal patterns. Therefore, three binary variables, Q2, Q3 and Q4, are added to the estimated equation:

$$Y^* = x(E, G - T, R^w, Y^w, O, \pi^e, Q2, Q3, Q4) \quad (6)$$

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The sign beneath each independent variable represents the impact of a change in the independent variable on equilibrium real GDP.

Real depreciation tends to increase exports, reduce imports, reduce international capital inflows, and increase import costs and domestic inflation (Fetai, 2013; Coricelli et al., 2004). Hence, aggregate demand would shift to the right due to increased net exports and shift to the left due to decreased international capital inflows, and aggregate supply would shift to the left due to rising costs. Previous findings are inconclusive (De Grauwe and Schnabl, 2008; Jovanovic, 2009; Fetai and Zeqiri, 2010; Selimi, 2017).

More government deficit spending tends to shift aggregate demand to the right. On the other hand, government borrowing by selling government bonds tends to push the real interest rate higher, reduce private spending, and shift aggregate demand to the left. Thus,

the net effect is uncertain. Barro (1974, 1989) suggests that the deficit- or 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.

The National Bank of the Republic of Macedonia is expected to respond to a change in the world real interest rate. Hence, an increase in the world real interest rate causes the real lending rate in Macedonia to rise, which reduce private spending and aggregate demand. A higher real oil price or expected inflation rate is likely to shift aggregate supply to the left and reduce real GDP.

#### 4. Empirical results

The data were obtained from IMF's International Financial Statistics and the National Bank of the Republic of Macedonia. Real GDP is measured in million denar. The real exchange rate is measured as the units of the denar per euro times the relative prices in the euro area and Macedonia. Hence, an increase means real depreciation of the denar, and vice versa. The choice of the real denar/euro exchange rate is because it has a higher correlation coefficient than the real denar/USD exchange rate or the real effective exchange rate. The government deficit is expressed as a percent of GDP. The world real interest rate is represented by the lending rate in the euro area minus the inflation rate in the euro area. World real income is represented by the real GDP in Germany. A lagged real GDP in Germany is used due to an information lag. A simple lagged inflation rate is chosen to represent the expected inflation rate (Romer, 2000). Except for the world real interest rate and the expected inflation rate with negative values before or after log transformation, other variables are measured on the log scale. The sample runs from 2005.Q1 to 2017.Q2 and has a total of 50 observations. The data for the government deficit before 2005.Q1 are not available.

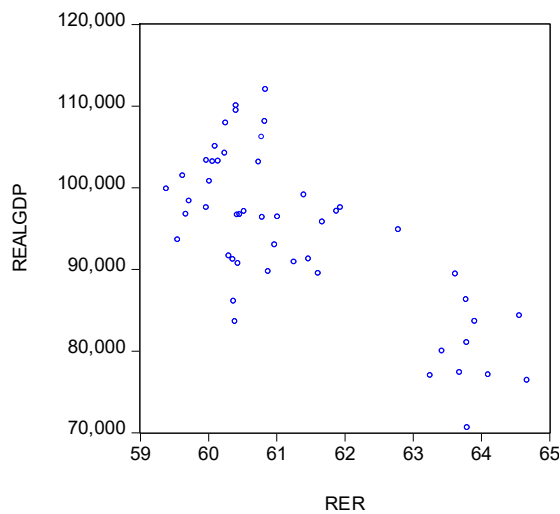
To test whether these time series variables have a long-term stable relationship, the ADF test on the regression residual is performed. The value of the test statistic is estimated to be -4.999, which is greater than the critical value of -4.000 in absolute values at the 1% level. Therefore, these variables are cointegrated.

Figure 1 shows the scatter diagram between real GDP and the real exchange rate. They seemed to have a negative relationship, suggesting that real depreciation reduced real GDP whereas real appreciation raised real GDP. Figure 2 shows that relationship between real GDP and the deficit-to-GDP ratio. They appeared to have a positive relationship.

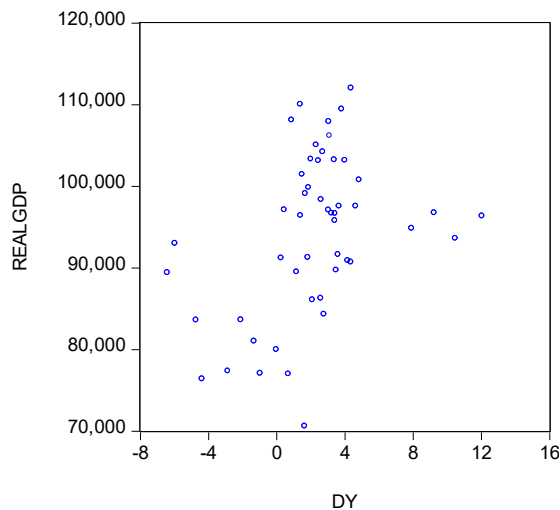
Table 1 reports empirical results. Approximately 92.86% of the change in real GDP can be explained by the nine independent variables. All the coefficients are significant at the 1% level. Real GDP is positively associated with the deficit-to-GDP ratio and the lagged real GDP in Germany and three seasonal binary variables and negatively influenced by the real exchange rate, the real lending rate in the euro area, the real oil price and the expected

inflation rate. Real GDP is very sensitive to a change in the real exchange rate as a 1% real depreciation of the denar versus the euro would reduce real GDP by 1.6979%. The negative significant coefficient of the real exchange rate suggests that the negative effect of real depreciation such as higher import costs, higher domestic inflation and less international capital inflows would dominate the positive effect such as more exports and less imports. The lagged real GDP in Germany also has a powerful impact. A 1% rise in Germany's lagged real GDP would lead to a 1.0061% increase in real GDP.

**Figure 1.** Scatter diagram between real GDP and the real exchange rate



**Figure 2.** Scatter diagram between real GDP (REALGDP) and the government deficit-to-GDP ratio (DY)



Several other versions are considered. If the real exchange rate is measured as units of the denar per US dollar times the relative prices in the US and Macedonia, its coefficient is estimated to be -0.2427, indicating that a 1% real depreciation of the denar versus the US

dollar would reduce real GDP by 0.2427%. Hence, real GDP is less sensitive to the real exchange rate measured in the US dollar. When the real exchange rate is replaced with the real effective exchange rate, its coefficient is estimated to be 0.8931 and is significant at the 1% level, suggesting that a 1% real appreciation of the denar would raise real GDP by 0.8931%. The result is consistent with the finding reported in Table 1. The value of R-squared is estimated to be 0.8738. The mean absolute percent error is 2.7102%. Other results are similar. In comparison, the use of the real effective exchange rate yields a smaller explanatory power and a larger forecast error.

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

Variable	Coefficient	z-Statistic	Probability
C	5.268041	154.0578	0.0000
Log(Real exchange rate)	-1.697889	-164.7404	0.0000
Deficit as a percent of GDP	0.002820	3.981556	0.0001
Real lending rate in the euro area	-0.009669	-5.529432	0.0000
Log(Lagged real GDP in Germany)	1.006062	928.8510	0.0000
Log(Real oil price)	-0.041701	-226.2874	0.0000
Expected inflation rate	-0.007476	-8.927631	0.0000
Q2	0.068682	13.20427	0.0000
Q3	0.085779	12.02793	0.0000
Q4	0.092001	15.64089	0.0000
R-squared	0.928564		
Adjusted R-squared	0.912491		
Akaike info criterion	-4.162385		
Schwarz criterion	-3.665259		
Sample period	2005.Q1-2017.Q2		
Observations	50		
MAPE	2.087616%		
Methodology	EGARCH		

## 5. Conclusions

This paper has examined the effects of exchange rate movements, more government deficits and other relevant variables on real GDP in Macedonia. Real depreciation reduces real GDP, and more government deficit as a percent of GDP raises real GDP. In addition, a lower real lending rate in the euro area, a higher lagged real GDP in Germany, a lower real oil price or a lower expected inflation rate would help increase real GDP.

There are several policy implications. The conventional approach of real depreciation of a currency in order to stimulate exports and raise aggregate output may not apply to Macedonia because real depreciation produces both positive and negative effects including more exports, higher import costs, higher domestic inflation, and less international capital inflows. The net impact is country specific. In the case of Macedonia, real depreciation is contractionary whereas real appreciation is expansionary. This finding is in line with monetary policy of the National Bank of the Republic of Macedonia that the benefit of exchange rate stability outweighs the costs of denar depreciation such as high inflation and international capital outflows.

Expansionary fiscal policy in the form of more deficit spending as a percent of GDP appears to be expansionary. However, there may be threshold or turning point beyond which further increase in government deficits as a percent of GDP may reduce real GDP. Hence, fiscal discipline may be needed.

The National Bank of the Republic of Macedonia responds to a change in the real interest rate in the euro area. Fortunately, the ECB has reduced its policy interest rate since November 2011. Thus, the National Bank of the Republic of Macedonia would not have too much pressure to raise its domestic real interest rate and hurt private spending. As the impact of the lagged real GDP in Germany is relatively large, it may be more desirable for Macedonia to expedite the process of becoming an EU member so that its trade with Germany and other EU countries would increase due to decreases in tariffs and other regulations. As the crude oil price is on the rise, its negative impacts on aggregate supply and real GDP need to be monitored.

There are areas for future research. Many countries are concerned about the impacts of exchange rate movements and expansionary fiscal policy on aggregate output. The model may be applied to other countries in the South East European region and beyond in order to see if similar results would be obtained.

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