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Pass through Effect of Exchange Rate and Monetary Policy in Sri Lanka

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ABSTRACT

This study examined the effectiveness of monetary policy in targeting exchange rate shock between different periods in Sri Lanka. After the trade liberalization in 1977, Sri Lanka became a small open economy. Therefore, monetary policy targeting the exchange rate also became an important issue. Sri Lanka introduced floating exchange rate system in 1990. A Vector Error Correction model and impulse response function were estimated to examine the effectiveness of monetary policy in targeting exchange rate shock for whole period from 1977 to 2007 and also separately for the periods from 1977 to 1990 and from 1990 to 2007. The results show that monetary policy is targeting exchange rate much for recent period but not targeting inflation. Inflation rate was high in the recent period. Central bank was purchasing bonds issued by the government to monetize defense spending and to increase the salaries of government employees in this period for political purpose, hence, leading to inflation and monetary policy distortion. Economic growth may be declined in long term if monetary policy is not operating optimally on targeting inflation and exchange rate.

Key words: Monetary policy, pass through effect, exchange rate, inflation, impulse response function

INTRODUCTION

Monetary policy is used to smooth business cycles and increase social welfare since prices are sticky in the short run. In an open economy, foreign shocks may be passed into the domestic economy. So, the task of monetary policy becomes more complicated. Since, the independence in 1948, the main goal of Sri Lankan monetary policy is smoothing inflation. After the trade liberalization in 1977, Sri Lanka became a small open economy. Therefore, monetary policy targeting the exchange rate became an important issue. Sri Lanka introduced floating exchange rate system in 1990. Since, 1977, Sri Lanka is importing more than its export. Its negative trade balance is increasing over the years. This depreciates the Sri Lankan currency. Because government expenditure also is increasing over the years due to defense expenditure and other investments, government budget deficit is increasing. In order to finance government expenditure, the government treasury is using open market operation to borrow money. This increases the money supply and then depreciates Sri Lankan currency. Sri Lankan economy is facing higher inflation due to not only increase in money supply but also high pass through of foreign exchange rate shock into the economy. The optimal degree of intervention is extremely relevant for Sri Lanka

in recent years. The optimal degree of intervention of monetary policy in Sri Lanka can be analyzed by comparing the effectiveness of monetary policy in targeting exchange rate shock between different periods.

Several theoretical papers propose that the optimal degree of intervention depends on the pass-through effect in an economy (Devereux and Engel, 2001). If pass-through is high the exchange rate shock will be reflected in domestic prices. Then, some degree of intervention is desirable in order to reduce the pass-through effect and the domestic volatility. But the pass-through effect appears to be endogenous to the local monetary policy (Devereux and Yetman, 2003). The Sri Lankan economy is facing higher inflation due to not only increased money supply but also high pass through of foreign exchange rate shock into the economy.

According to Purchasing Power Parity (PPP), an exchange rate shock should be passed on to the domestic price level to its full extent but studies on the Pass-Through Effect (PTE) in different countries shows that it is far from complete. Pass-through in developing countries is higher than in developed countries (Mihaljek and Klau, 2002). There are several arguments for incomplete pass through. Obstfeld and Rogoff (2000) said that transportation cost increases prices of imported goods. Then, it reduces their perfect substitutability for the competing domestic goods. The presence of non-traded goods in consumption may be a reason for the low degree of pass through (Betts and Keho, 2001). If imports are intermediate goods that can be produced locally, the local producer may replace the imported input by domestic one in response to exchange rate changes. This substitution will reduce pass-through (Obstfeld and Rogoff, 2001). Hakura and Choudhri (2001) say that pass-through varies systematically with the average inflation rate. They claim that high inflation countries exhibit higher degree of pass-through.

If pass-through is systematically related to the level of inflation that is determined by monetary policy, this might have important implications for appropriate monetary policy in an open economy. Devereux and Yetman (2003) claim that pass-through will be endogenous to the monetary policy regime. Their study on 118 countries confirms that countries with higher inflation tend to have higher pass-through but this relationship is non-linear.

Coricelli *et al.* (2004) show that pass through is larger when there is less exchange rate management. In an open economy, there is an additional trade-off between inflation and exchange rate targeting. An economy may leave exchange rates to float freely and use its monetary policy to target domestic inflation, Then, making the economy more dependent on external shocks or an economy reduce dependency on external shocks by targeting the exchange rate through the interventions in the foreign exchange market. The optimal degree of intervention may increase the social welfare of economy. Optimal degree of intervention is extremely relevant for Sri Lanka in recent years since the economy is facing higher inflation due to not only increase in money supply but also high pass through of foreign exchange rate shock into the economy. Therefore, the objective of the present study was examine the effectiveness of monetary policy in targeting exchange rate shock between different periods in Sri Lanka.

MATERIALS AND METHODS

The degree of pass through is crucial for determination of optimal monetary policy. Several variables influence degree of the pass through effect of exchange rate. Most of them are endogenous variables. A Vector Error Correction model estimates the influence of variables on the pass through effect of exchange rate.

$$\Delta y_t = \propto + \sum_{i=1}^{3} \beta_i \, \Delta y_{t-1} + \gamma \Delta x_t + \delta \varepsilon_{t-1} + u_t \tag{1}$$

where, y_t is a vector of endogenous variables, consumer price index (p), broad money supply (m), nominal exchange rate (s), x_t is a vector of exogenous variables, real GDP (y), oil price (oil). ε_{t-1} is an error term and α, β, γ and δ are coefficient matrices. If co-integration between the endogenous variables exists, this model can be estimated by OLS method. This model was estimated for whole period from 1977 to 2007 and separately for period from 1977 to 1990 and from 1990 to 2007. This model can be used to estimate the influence of lagged exchange rate changes on inflation separately from the influence of other variables by constructing an impulse-response function with the Cholesky ordering m→s→p.

In order to analyze the impact of monetary policy on pass-through and prices, a VEC model similar to the above model was estimated but money supply variable is omitted from the model.

$$\Delta z_t = \propto + \sum_{i=1}^{3} \beta_i \, \Delta y_t + \gamma \Delta x_t + \delta \varepsilon_{t-1} + u_t \tag{2}$$

where, z_t is a vector of endogenous variables, consumer price index (p) , nominal exchange rate (s). A positive shock to the exchange rate should be accompanied by rising interest rates and falling money supply. Then, the inflationary effect of currency depreciation is counteracted by contractionary effect of monetary policy. Thus, omitting money supply from the model, we shall observe lower pass-through which is biased downwards by the money supply effect.

In order to see whether Sri Lankan monetary policy has changed recently, model (2) for whole period from 1977 to 2007 and separately for the period from 1977 to 1990 and from 1990 to 2007 are estimated. This model can be used to estimate the influence of lagged exchange rate changes on inflation separately from the influence of other variables by constructing an impulse-response function with the Cholesky ordering s→p.

Data for Consumer Price Index (CPI), broad money supply (M2), Nominal Exchange Rate (Sri Lankan Rupee/ U.S.Dollar), GDP and oil price from 1977 to 2007 were collected from annual report of Central Bank of Sri Lanka.

RESULTS AND DISCUSSION

The study uses yearly data from 1977 to 2007. The data used include consumer price index, broad money supply, nominal exchange rate, real GDP and the oil price. Most of the macroeconomic variables are non-stationary. Figure 1 shows the most of the variables trend upward but they are irregular. We conducted stationary test for all variables. The results are given in Table 1. Stationary test shows that all variables are difference stationary and I(1) process. Figure 2 shows there is no trend in difference variables. Johansen methodology was used to test whether the variables are co-integrated. The results are given in Table 2.
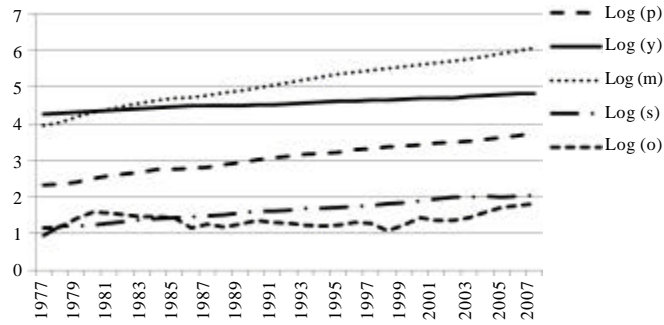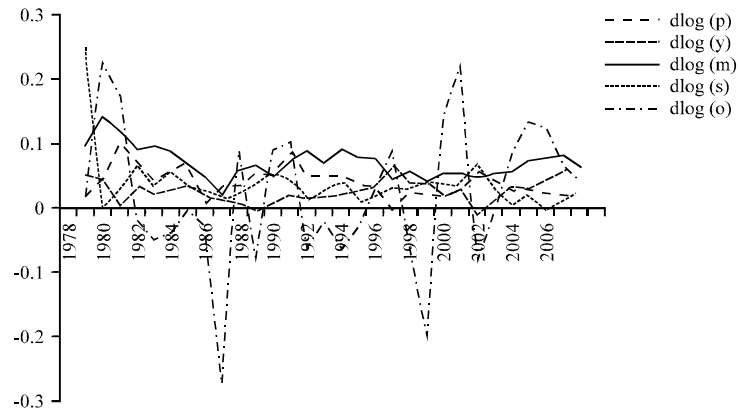
Fig. 1: Variable series

Fig. 2: Differences on variable series

Table 1: Stationary table

Variable	AR(1)	DF	DFc	DFt	ADF	I
Log(p)	0.987-2 (0.0088)>1	t = 11.59	t = -1.49			I(1)
			F = 2.22			
ε_t			DW = 1.73			
			ARCH = -0.287			
Log(m)	0.979+2 (0.0068)	t = 12.85	t = -3.06	t = -3.9	t = -3.04	I(1)
		F = 165.28	F = 9.37	F = 13.08	F = 10.6	
ε_t	DW =0.79		DW = 0.79	DW = 0.79	DW = 2.04	
					ARCH= -0.49	
Log(s)	0.929+2 (0.0294)	t = 3.82	t = -2.83	t = -8.07	t = -2.62	I(1)
		F = 14.65	F = 8.06	F = 39.39	F = 3.22	
ε_t	DW =1.685				Dh =	
					ARCH= -0.66	
Log(y)	0.989+2 (0.015)>1	t = 8.06	t = -0.7496			I(1)
			F = 0.54			
ε_t			DW =2.03			
			ARCH=0.063			
Log(o)	0.876+2 (0.121)>1	t =0.936	t =-1.01			I(1)
			F= 1.02			
ε_t			DW =1.65			
			ARCH=-0.63			

Table 2: Johansen test

Null hypothesis	Alternative hypothesis		5% critical value	1% critical value
λ_{trace} tests		λ_{trace} value		
r≤0	r > 0	37.18	29.68	35.65
r≤1	r > 1	11.87	15.41	20.04
r≤2	r > 2	3.33	3.76	6.65
λ_{max} tests		λ_{max} value		
r≤0	r = 1	25.30	20.97	25.52
r≤1	r = 2	8.54	14.07	18.63
r≤2	r = 3	3.33	3.76	6.65
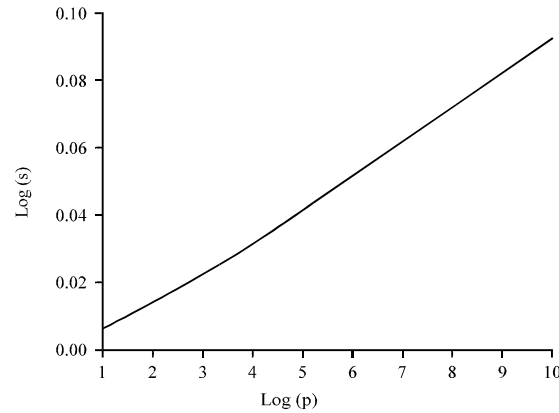
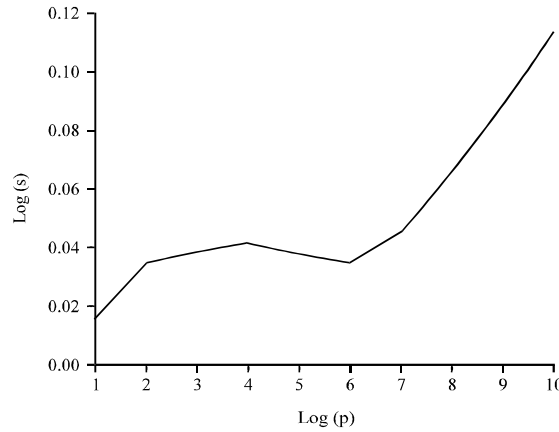Fig. 3: Impulse response for whole period (with money supply)

Fig. 4: Impulse response for whole period (Omitting money supply)

In Johansen methodology, the trace statistic and Max-Eigen statistic shows that there is one co-integrating equation at 5% level. Then, Vector Error Correction model with and without the money supply is estimated for whole period from 1977 to 2007 and separately from 1977 to 1990 and from 1990 to 2007. Impulse response of price to exchange rate shock was obtained from each model to see the pass through effect in each period and to analyze the impact of monetary policy on pass through in each period. Impulse responses in each period are given in the Fig. 3-8.
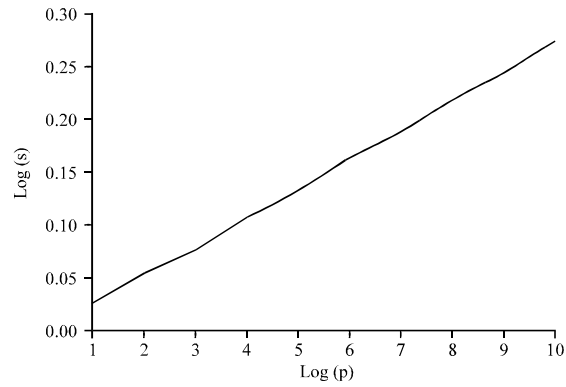
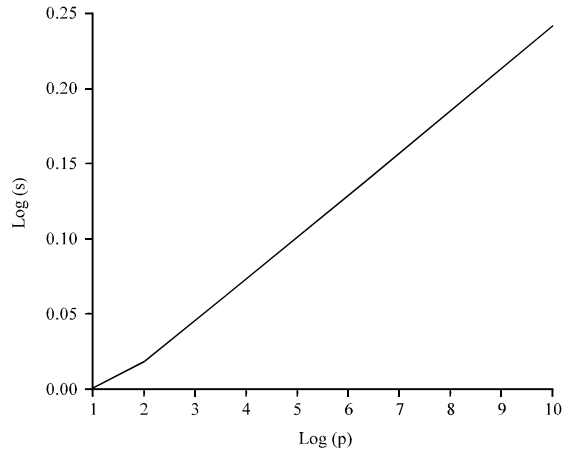Fig. 5: Impulse response from 1977 to 1990 (with money supply)

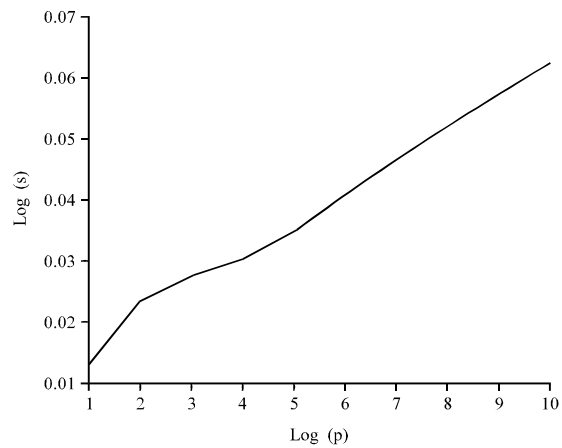Fig. 6: Impulse response from 1977 to 1990 (Omitting money supply)

Fig. 7: Impulse response from 1990 to 2007(with money supply)

Impulse response Fig. 3-8 (with money supply) show that, in the period before 1990, a shock to the exchange rate caused a 5% change in consumer price index in one year but caused only a
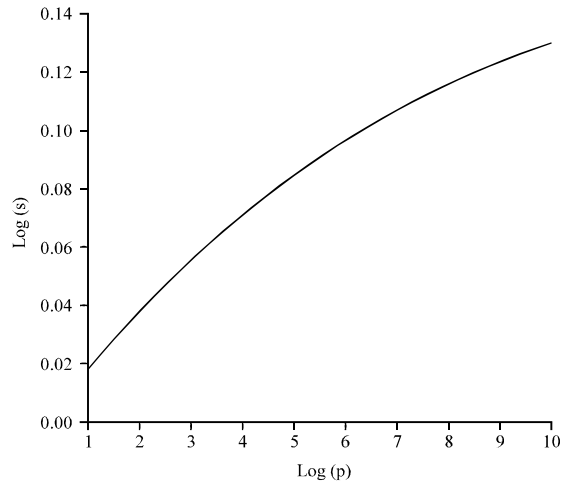
Fig. 8: Impulse response from 1990 to 2007 (Omitting money supply)

2% change in consumer price index in one year after 1990. The reason for this reduction in pass through effect after 1990 might be an increase in the substitute goods produced locally for imported goods. Pass through effect in whole period is much higher than the last period from 1990 to 2007. This is mainly due to the higher pass through before 1990. But, when we omit money supply in the model that means we did not control money supply in our model. A positive shock to the exchange rate should be accompanied by rising interest rates and falling money supply. Then, the inflationary effect of currency depreciation is counteracted by contractionary effect of monetary policy.

During the period from 1977 to 1990, the impulse response function with money supply is slightly above the impulse response function without money supply in the same period. But, during the period from 1990 to 2007, the impulse response function with money supply is significantly lower than impulse response function without money supply in the same period. This indicates that pass through effect of exchange rate from 1977 to 1990 was higher than that of exchange rate from 1990 to 2007. Then, monetary policy was targeting exchange rate shock much in recent period when compare to the period from 1977 to 1990. But inflation rate was high in the recent period. It means that monetary policy was not targeting inflation much when compare to the period before 1990. This was due to expansionary monetary policy. Central bank was purchasing bonds issued by the government to monetize defense spending and to increase the salaries of government employees in this period for political purpose, hence, leading to inflation and monetary policy distortion in Sri Lanka. Sri Lankan monetary policy was not operating at optimal intervention on targeting inflation and exchange rate.

CONCLUSION

The pass through effect of exchange rate shock after 1990 was lower than the pass through effect from the period from 1977 to 1990. Monetary policy was targeting the exchange rate much after 1990 but not targeting inflation much. Inflation rate was high in the recent period. Central bank was purchasing bonds issued by the government to monetize defense spending and to increase the salaries of government employees in this period for political purpose, hence, leading to inflation and monetary policy distortion. Economic growth may be declined in long term if monetary policy is not operating optimally on targeting inflation and exchange rate.

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