Exchange Rate Pass-Through: Is it Important for India?

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Abstract

A large number of empirical studies have examined the exchange rate pass-through (ERPT) into imports and inflation of the importing countries. The existing literature on this issue suggests that the degree of ERPT varies across industries and countries. Moreover, the results indicate that the degree of ERPT has declined over time. This study investigates the exchange rate pass-through for India by examining its imports from the USA. The study uses monthly data over the sample period January 1985 to December 2013. However, the sample is divided into two sub-periods – pre 2000 and post 2000 - to examine the degree of ERPT over time in case of India. The findings of this study suggest that the ERPT is statically significant and has declined over time. The results are consistent with other studies that have examined this issue for other developing and developed countries.

I.   Introduction

A large number of studies have investigated the impact of exchange rate pass-through (ERPT) on imports and inflation of the importing country. If an importing nation's currency depreciates against the exporting nation's currency, import prices, measured by the importing nation's currency, increase. An increase in import prices is expected to increase the rate of inflation of the importing nation. ERPT can be defined in various ways. Ghosh and Rajan (2009) define ERPT as "the percentage change in import prices in the importing nation's currency due to a 1% change in the exchange rate between the importing and exporting nation." Han and Suh (1996) define ERPT as "the percentage change by which import prices, measured by the home currency, rise when the home currency depreciates." Menon (1996) defines ERPT as "the degree to which exchange rate change are reflected in the destination currency prices of traded goods." Goldberg and Knetter (1997) provide a detailed survey of literature on ERPT. Based on the extent to which the changes in exchange rate affect the trade balance and inflation, ERPT can be categorized into 'complete pass-through' and 'incomplete pass-through'. In case of complete pass-through, the change in exchange rate is fully transmitted to trade balance and inflation. However, in case of incomplete pass-through, the transmission is partial. The degree of exchange rate pass-through has significant policy implications in the context of   macroeconomic policy and exchange rate regime. If ERPT is low, the importing nation should not be overly concerned about the inflationary consequences of currency depreciation. Moreover, as pointed out by Ghosh and Rajan (2007), an attempt to improve a trade balance through currency depreciation may not be very effective. India's import from the U.S. has grown steadily and substantially over the last decade. This study will investigate the aggregate import prices of India with respect to bilateral nominal exchange rate with the US dollar and it will examine the transmission of exchange rate changes into import prices in India for the period 1985 to 2013. The degree of ERPT may have significant policy implications for policy makers in India in controlling the inflation rate.

II.   Literature Review

A large number of empirical studies have been conducted to investigate the pass-through of exchange rate to imports, exports and inflation in different countries. The empirical research into ERPT show the following: (a) the exchange rate pass-through has declined over the last decade, (b) the exchange rate pass-through varies across industries and countries. According to Oladipo (2007), the degree of exchange rate pass-through is primarily affected by the fol-

lowing three factors: (1) the relative elasticity of demand for and supply of traded goods, (2) macroeconomic conditions and (3) the microeconomic environment. Ghosh and Rajan (2007) suggest that the degree of ERPT is affected by the nature of goods or industries, the duration of exchange rate changes, direction of exchange rate changes, size of exchange rate change, and a country's macroeconomic fundamentals.   The findings of a study done by Hooper and Mann (1989) showed that the impact of movements in the exchange rate of the US dollar on import prices vary among different industries in different countries. An empirical investigation by Deyak, Sawyer and Sprinkle (1990) found the following: First, the United States 'import responded weakly to the changes in exchange rate. Second, the US export tended to quickly react to the changes in the value of the dollar. Third, the impact of exchange rate pass-through declined over time. Marazzi and Sheets (2007) found that the exchange rate pass-through to U.S. import prices declined substantially from 0.5 to 0.2 over the last decade. They contributed this decline to "competition in global market and structural changes in international production patterns." The authors pointed out several factors which affected exchange rate pass-through in the US, including the reduced share of (commodity-intensive) industrial supplies in U.S. imports and the increased presence of Chinese exports in the U.S. market. Bergin and Feenstra (2009) attributed the decline in pass-through for the United States to the rising share of trade from China and other countries involved in fixing the exchange rate.

Using import data for all products for 2008, Humpage and Shenk (2008) carried out an analysis on the exchange rate pass-through and concluded that the degree of pass-through to all import products in the US as well as other industrial countries declined along with the level of volatility of worldwide inflation. Campa and Goldberg (2009) investigated the degree of ERPT for Turkey. The authors found differential impact in the case of Turkey: incomplete pass-through into import and complete pass-through into export. Chua and Sharma (1998) examined the impact of the exchange rate pass-through on trade flows of some Asian countries such as Korea, the Philippines, Singapore, and Thailand. The empirical findings suggested that the response of imports and exports to changes in exchange rate was larger for countries with high trade restrictions (the Philippines and Thailand) than for countries where trade was freer. Oladipo (2007) found that not only was ERPT incomplete but also the exchange rate pass-through varied among different sectors of the economy in case of Nigeria.

Economists as well as policy makers are interested in the relation between ERPT and inflation. Several studies have investigated the impact of ERPT on the inflation rate of importing countries. The impact varies from country to country. Moreover, researchers have found that the degree of exchange rate pass-through varies between developing countries and developed countries. Empirical findings suggest that the nominal and real exchange rates have a significant impact on the rate of inflation for Asian countries. However, this relationship seems to be opposite in the Non-Asia regions (Achsami, Fauzi and Abdullah, 2010). Slavov (2008), using data for 101 countries over the period 1976-2006, found that exchange rate pass-through declined in countries participating in a common currency arrangement. In particular, there was a substantial reduction in pass-through in the member countries of the European Monetary Union after the countries started using Euro as the common currency. Ghosh and Rajan (2007) found that exchange rate pass-through is higher for Asia's developing countries such as Thailand and Indonesia, but quite lower for developed economies such as Japan. Reyes (2007) found that the nominal exchange rate pass-through into inflation declined for emerging economies such as Brazil, Chile and Mexico. The author attributed this to the adoption of inflation targeting in these countries resulting from the direct and indirect interventions of the central bank in the foreign exchange market. Nogueira and

Ledesma (2011) argued that the exchange rate pass-through not only influenced current inflation, but also inflation expectations. The authors found that the exchange rate pass-through increased in periods of macroeconomic distress and recommended a stable macroeconomic environment in reducing exchange rate pass-through and correcting trade imbalances. The purpose of this study is to examine the transmission of exchange rate changes into import prices in India and its impact on inflation. The degree of ERPT may have significant policy implications for policy makers in India in controlling the inflation rate.

III.   Statistical Models, Estimating Equations and Results

The monthly data on consumer price index, India's import from the USA, and the exchange rate are collected from Federal Reserve Economic Data (http://stlouisfed.org/fred2) over the period January 1985 to December 2013. The data indicates that India's import from the US has grown from \$141.7 million in January 1985 to \$1559.49 million in December 2013. However, over the same period, the exchange rate has declined from 12.62 rupees per US dollar to 62.05 rupees per US dollar. The consumer price index in India has grown from 14.69 (base year June, 2010=100) to 135.86 over the same period. To examine the degree of ERPT over time, the sample period is divided into sub-periods: Period 1 spans from January 1985 to December 1999 and Period 2 covers January 2000 to December 2013. The import is expressed in Indian rupees and the exchange rate is defined in terms of Indian rupees per unit of the US dollar. To investigate the relationship among import, exchange rate, and inflation, the following three models will be estimated for each of the sub-periods as shown below:

$$limport = \alpha_1 + \beta_1 \, ler \qquad (1)$$
$$lcpi = \alpha_2 + \beta_2 \, ler \qquad (2)$$
$$lcpi = \alpha_3 + \beta_3 \, limport \qquad (3)$$

where:

limport = natural log of import,

lcpi = natural log of consumer price index, and

ler = natural log of exchange rate.

The empirical findings for period 1 (January 1985 to December 1999) are in Table 1 below.

Table 1

Model	α	β	R^2	F
1	3.5163 (26.1972)*	1.5675 (37.1471)*	0.8857	1379.91
2	0.6141 (15.6238)*	0.8670 (70.1646)*	0.9651	4923.08
3	-0.9170 (-8.8376)*	0.5042 (41.2327)*	0.9052	1700.13

*t-statistics are shown in parenthesis

All the estimated models are found to be statistically significant. Model 1 suggests that when the exchange rate increases by 1%, the import is estimated to increase by 1.57%. The impact of exchange rate on import is highly significant. Moreover, the R^2 indicates that 89% of the import is explained by the exchange rate. Model 2 shows that the elasticity is equal to 0.867. It indicates that a 1% increase in the exchange rate causes the CPI to increase by 0.8675%. In addition, R^2 is robust and the elasticity is statistically significant. Model 3 reports the estimated relationship between the CPI and the import. The impact of import prices on domestic price level is found to be highly significant. Moreover, it suggests that a 1% increase in import causes the CPI to increase by 0.5042%. In addition, approximately 91% of the CPI can be explained by the import prices in the case of India.

Table 2 reports the empirical findings for period 2 (January 2000 to December 2013) as shown below:

Table 2

Model	α	β	R^2	F
1	-0.3555 (-0.1617)*	2.8393 (4.9703)*	0.1295	24.70
2	-2.1812 (-2.8620)*	1.6979 (8.5761)*	0.3070	73.55
3	0.4904 (4.5239)*	0.3654 (35.7179)*	0.8849	1275.77

*t-statistics are shown in parenthesis

Similar to period 1, all the estimated models are found to be statistically significant. Model 1 suggests that when the exchange rate increases by 1%, the import is estimated to increase by 2.84%. The impact of exchange rate on import is highly significant. Moreover, the R^2 indicates that only 13% of the import is explained by the exchange rate. Compared to period 1, there has been a substantial decline in the explanatory power of the model. Model 2 shows that the elasticity is equal to 1.6979 and it is statistically significant. It indicates that a 1% increase in the exchange rate causes the CPI to increase by 1.6979%. Moreover, the impact of exchange rate on CPI is higher in period 2 compared to period 1. However, based on the R^2, it can be inferred that there are other factors which influence the CPI more than exchange rates after January 2000. Model 3 reports the estimated relationship between the CPI and the imports. The findings suggest that a 1% increase in imports causes the CPI to increase by 0.3654%. Similar to period 1, the impact of import prices on domestic price level is found to be highly significant. However, compared to period 1, the impact has been reduced from 0.5042% to 0.3654% for a 1% increase in import prices.

IV. Conclusion

This study investigates the import prices of India with respect to bilateral nominal exchange rate with the US dollar and examines the transmission of exchange rate changes into import prices and inflation in India for the period 1985 to 2013. The sample period is divided into two sub-periods: before 2000 and after 2000. The import prices on domestic inflation rate are found to be statistically significant for both periods. Moreover, it is found that the degree of ERPT is incomplete. The findings are consistent with other studies. In addition, the exchange rate pass-through has declined over time in the case of India. This finding is also consistent with other studies that have investigated the degree of ERPT for other developing and developed countries. The policy makers in India should focus on formulating appropriate macroeconomic policies to strengthen the Indian rupee to reduce the impact of exchange rate pass-through in controlling the inflation rate.

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