An Analysis of Impact of Exchange Rate Volatility on the Indian Manufacturing Exports

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Abstract: This paper analyses the impact of real exchange rate volatility of Indian on bilateral exports of India's manufactured commodities. Four major commodities viz Engineering goods, Cotton yarn & fabrics madeups etc., Chemicals & allied products, and Leather & manufactures are selected for the period 1999 to 2013. Five major trading partners of India, i.e., USA, UK, Germany, Italy, and Hong-Kong are chosen for the panel data analysis. Result shows the statistically insignificant impact of exchange rate volatility on the exports of all commodities except for Chemicals and Allied product. Real GDP is found to be positive and significant for all commodities. The real exchange rate has no significance in explaining exports of these commodities. The results support forex market efficiency with regard to exports.

Keywords: Exchanged Rate Risk, Manufactured Commodities, Panel Data, India

JEL Classification Number*:* F31, F14

1. Introduction

After independence, India's foreign trade policy focused mainly on self-sufficient economy and import substituting policy, implies that a minimal role of international trade, as a source of growth. The government has adopted the policy framework of licensing, price controls, and quantitative restrictions to promote public sector organisation. Hence, during the period of licensing policy, 1947-80, GDP grew merely at 3.5 percent per annum better known as the *"Hindu rate of Economic growth"*; term coined by Raj Krishna. Consequently, it was 1980s, when government undertook liberalised investment, expansionary fiscal, and monetary policies; the growth rate surged on an average 5.8 percent per annum. But this rapid expansion was not sustainable and led to large current and fiscal account deficit. A mounting deficit, coupled with high inflation (at 13.5 percent), and the Gulf war led India to a balance of payment crisis in 1991.

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Major policy shift of 1990s, created a conducive environment for export and competed at foreign market platform. Since last two decades, India has witnessed a transformation, from a closed economy to an open market economy. It is clear from the preceding discussion that our export performance and economic performance are closely linked to each other. The share of manufactured exports in India's merchandise exports has increased considerably during post reform period. The share of the manufacturing sector has increased from 50 percent in 1985 to 64 percent in 2009. The share of India in the world manufacturing exports has also increased from 0.6 percent to 1.4 percent between 2000 and 2009. The Indian government has acknowledged, some policy initiative by approving the New Manufacturing Policy (NMP). This policy is targeted at building the capacity of the manufacturing sector, increasing its contribution to the GDP (from 16 percent to 25 percent) as well as improving the international competitiveness of the manufacturing sector. The initial industry reactions to the NMP has been positive and it is expected that a proper execution of the NMP will be beneficial for the Indian economy, as it can generate large-scale employment for nearly a hundred million workers in the next ten years. The implementation of the policy will involve the establishment of a number of National Manufacturing Investment Zones (NMIZ) which will have the features such as, a progressive exit policy, strong physical infrastructure, investment incentives and business-friendly approval mechanisms to support the production in these units.

Engineering goods have continued to be a major component of India's manufactured exports. Its share has gone up from 8,988 million dollars to 64,854. Cotton, textiles and garments are traditional export items and an important industry for India. India's textile industry, in particular, is the second largest textile industry in the world after China. Over time, a number of changes in the domestic and global environment have had a bearing on this industry. The Indian textile industry contributes nearly 14 percent to industrial output and 17 percent to aggregate export earnings; it is third largest producer of cotton (cellulosic, fibre/yarn). Consequently, this industry is visible in global trade market, and contributes from 12 percent of world exports of textile, fibre and yarn, upto 25 percent. Agreement on Textiles and Clothing (ATC) was to provide developing countries more access to markets of developed countries. But countries like China, Korea and India (with a strong textiles production base) remained at a disadvantage, as they had the capacity to produce and export more on the one hand, but they were restricted by the quotas, on the other hand. India's cotton exports experienced a declining share in the UK market (since 1995 onwards) and in recent years, have converged with that of China at close to 8 percent. Similar to its performance in the US market, Indian cotton export share has gradually declined, while that of China's has consistently risen in the same period.

With the opportunities provided by the reforms in the external sector, the market determined exchange rate has volatility, which may be seen as an extra risk factor for international trader. So, following the recent literature, disaggregated data is considered to gain insights on the impact of volatility on manufacturing trade. In the backdrop of the above rationale, this study, therefore, is trying to analyse the effect of real exchange rate volatility(or risk, used interchangeably)of Indian rupee with major currencies such as, US Dollar, UK Pound, Euro, and Hong-Kong dollar on the real exports of Engineering goods, Cotton Yarn, Fabrics, Madeups, etc., Chemicals & allied products, and Leather & Manufactures, for the period 1999 to 2013.In order to investigate the linkage this study employed random effect specification of panel data model.

The rest of the paper is organised in the following fashion, a brief review of the recent literature is given in section 2, methodology and detail about data used are given in section 3, section 4 describes the results and discussion, and finally section 5 concludes the study.

2. Literature Review

Exchange rate volatility seems to be a major outcome of flexible exchange rate regime. The theoretical explanation of the relationship between exchange rate volatility and international trade is provided by Hooper and Kohlhagen (1978), who argued that higher the exchange rate volatility tends to enhance the cost for the risk-averse traders through taking extra risk of exchange rate, and creates unpredictable condition in the movement of exchange rates, which is supposed to reduce trade. Partially, it is also due to non-accessibility of the forward market to all trader to hedge foreign exchange risk at very low cost, especially for developing countries. On the other side, there may be more trade under the uncertain situation to maximise current profit due to expected fall in future profit, and this positive effect of exchange rate volatility is documented by De Grauwe (1988).There are lots of empirical studies on the relationship between exchange rate and export performance on the Indian economy. Studies like Mookerjee (1997), Baluswar, Thomson and Upadhaya (1996), and Sarkar (1994) could not find any long-run relationship between exchange rate and exports for pre reform period of Indian economy. Presty (2008) and Eckaus (2008) shows that exchange rate has a significant impact on export performance for the post reform period in India. Dholakia and Saradhi (2000) also show that export quantity is sensitive to exchange rate but there is no impact of exchange rate volatility on the export, in case of India. Singh (2004) could not find the presence of j-curve effect and impact of exchange rate volatility on the trade balance of India for the period of 1975:Q2 to 1996:Q3. Bahmani-Oskooee and Mitra (2008) has studied the effect of the exchange rate risk on the commodities traded between India and USA at the disaggregate level, and found that 40% of the commodities have been affected by exchange rate risk. Some of the

studies found a positive effect of exchange rate risk at disaggregate like, KG and Sreejesh (2011) found a positive effect of real exchange rate volatility of Indian Rupee with Euro on the exports of India to Euro Area.

Most of the studies employ aggregate data which may have biased results due to the aggregation bias, therefore by using disaggregated export data on commodities may provide useful insights, so as to which commodities are affected by exchange rate risk.

3. Database and Research Methodology

Most of the studies have been done with aggregate data and explored cross-section variation. However, a panel framework reveals several advantages over cross-section analysis. On the one hand, panel data allows to capture the relationships between the relevant variables over a longer period and to identify the role of the overall business cycle phenomenon. On the other hand, through a panel approach, one can able to remove the time invariant country-specific effects. Using the panel data of major manufacturing bilateral exports to different countries, we estimate standard real export demand function for India's bilateral exports to i^{th} country as follows:

$$lnX_{jit} = \beta_0 + \beta_1 lnGDP_{it} + \beta_2 lnRE_{it} + \beta_3 lnV_{it} + \beta_4 break + \varepsilon_{jit} \quad (1)$$

Where, X_{jit} is the real export volume of the jth commodity to the i^{th} country at the time period *t*, GDP_{it} is the real GDP of the i^{th} country at time *t*, RE_{it} is the real exchange rate of Indian rupee with i^{th} country's currency at period *t*, and V_{it} is the real exchange rate volatility for time *t;* measured as standard deviation of the 12 month real exchange rate. A break dummy variable is created to capture financial crisis of 2008, which causes a sharp fall in exports, in case of India. It takes value 1 before 2008 and 0 otherwise. ε_{jit} is the disturbance term and assumed to follow white noise process.

We have estimated the above model with pooled OLS, Fixed effect, and Random effect technique of estimating panel data model. Fixed effect model has the advantage of controlling individual specific effect of cross section variable, while random effect model provides abetter estimate when the unobservable individual effect is uncorrelated with the dependent variable. We have used Hausam specification to select the better model, which tests the null hypothesis of non-existence of correlation between unobservable individual effects and the export volume.

Data on bilateral exports of Engineering goods, Cotton yarn & fabrics, Chemicals & allied products, Leather & Manufactures, and bilateral exchange rate are sourced from the RBI *"data bank on Indian economy"*. Also, unit value index of export is used for deflating nominal exports. The real exchange rate is calculated by multiplying nominal exchange

rate with the ratio of the consumer price index of India with the respective trading partner's consumer price to get the real exchange rate. All the data is in log form and yearly observation, starting from 1999 to 2013.The period 1999 is, because euro was introduced as the official currency of Germany and Italy, hence for these countries exchange rate of Indian rupee with the euro is used. The exchange rate is defined, as domestic currency per unit of foreign currency. Following Bahmani-Oskooee and Wang (2007), we have used the standard deviation of the monthly real exchange rate in a year to capture real exchange rate volatility. To deal with nonsperical natural of residual, panel corrected standard errors (PCSE) which corrects for contemporaneous correlation between the subjects, heteroscedasticity and autocorrelation of type AR(1), is used, as suggested by Beck and Katz (1995).

4. Results and Discussion

Equation (1) is estimated by pooled OLS, fixed effect, and random effect and results are presented in Table 1 to 4. Random effect model is selected by applying Hausman test for all commodities, therefore, results of random effect specification are discussed. We have also estimated the same model with two way error component model (mixed or random effect) by which we got almost the same result. So, results from the only cross section effect model are reported, and Hausman test is also insignificant in two way error component model, supporting random effect to be an appropriate model. The main focus of the paper is to check the impact of real exchange rate volatility on manufactured commodities. Chemicals & Allied products are found to be positively affected by real exchange rate volatility but the magnitude is very low. There is no significant impact of real exchange rate volatility on the other three commodities (such as, Cotton yarn, fabrics made ups, etc., Engineering goods, and Leather & manufactures).The theory behind this result is that foreign exchange market is efficient enough to provide effective way to hedge against risk arises from exchange rate volatility. It also depends upon how far manufacturing unit benefited from the foreign exchange market instrument, as wide range of instruments is available for hedging purpose and how far their expectations are true regarding future fluctuation in exchange rate because hedging depends upon future expectation.

Table 1: Dependent Variable - Chemicals and Allied product

Variables	Pooled OLS	Fixed effect	Random effect
Constant	13.24***	55.64***	-12.208*
GDP	0.659***	-1.73***	0.628***
Exchange rate	-0.001	-0.025***	-0.007***
Exchange rate volatility	0.091*	0.085	0.098***
Break dummy	0.154***	-0.221*	-0.105*
Adjusted R-squared	0.490	0.869	0.267
F-statistic	67.83***	62.15***	7.73***
Hausman test	-	-	0.000

Table 2: Dependent Variable - Cotton Yarn and fabric

Variables	Pooled OLS	Fixed effect	Random effect
Constant	-8.422***	42.68***	-8.422***
GDP	0.463***	-1.36***	0.463***
Exchange rate	0.00	-0.003	0.00
Exchange rate volatility	-0.086*	-0.041	-0.086*
Break dummy	0.433***	0.27***	0.43***
Adjusted R-squared	0.621	0.857	0.621
F-statistic	56.62***	31.31***	31.31 ***
Hausman test	-	-	0.000

Table 3: Dependent Variable - Engineering Goods

Variables	Pooled OLS	Fixed effect	Random effect
Constant	-7.843***	-27.56	-7.843***
GDP	0.511***	1.209	0.511***
Exchange rate	0.002	-0.001*	0.002
Exchange rate volatility	0.032	0.044	0.032
Break dummy	-0.581***	-0.462***	-0.581***
Adjusted R-squared	0.782	0.818	0.782
F-statistic	67.57***	42.57***	67.50***
Hausman test	-	-	0.000

Table 4: Dependent Variable - Leather and Manufactured

Variables	Pooled OLS	Fixed effect	Random effect
Constant	2.188***	-23.51***	2.18***
GDP	0.111***	1.019***	0.11***
Exchange rate	-0.012	-0.032	-0.012
Exchange rate volatility	0.001	0.002	0.001
Break dummy	-0.027	0.064	-0.027
Adjusted R-squared	0.269	0.575	0.269
F-statistic	10.06***	15.30***	10.06***
Hausman test			0.000

Note: ***, ** and * denote statistical significance at 1, 5, and 10% levels of significance respectively. The Hausman test has $\chi 2$ distribution and tests the null hypothesis that unobservable individual effects are not correlated with the explanatory variables. The F-statistics tests the null hypothesis of insignificance as a whole of the estimated parameters, against the significance of overall estimated parameters.

Real GDP has shown the positive and significant impact on exports of all four commodities, which drives the international trade, from early years of capitalism and growth of income in the developed and emerging market economies, as a major factor to enhance the export performance of India; but this is not the case for all commodities. The movement in the real exchange rate is unable to explaining the export performance of major manufactured goods, which are studied here. This result supports the findings of previous analysis which shows the non-presence of *J-curve hypothesis* in the case of Indian economy. This may be due to that Indian exports have less bargaining power in the international market.

5. Conclusion

This paper analyses the effect of real exchange rate volatility of Indian rupee vis-à-vis major currencies such as US Dollar, UK Pound, Euro and Hong-Kong dollar on the real exports of Engineering goods, Cotton yarn, fabrics & madeups etc., Chemicals & allied products and Leather and manufactures for the period 1999 to 2013. Using five countries, USA, UK, Germany, Italy and Hong-Kong panel, it is shown that exchange rate volatility does not created barrier to international trade of major manufactured commodities exported from India. There have been lots of works, which have shown that financial development leads to an efficient way to allocate and minimise risk. Indian foreign exchange market may develop to such extent that provides trader to hedge against foreign exchange risk effectively. The result is in line with other studies based on aggregate data analysis such as, Singh (2004). This study is less prone to what is called *"aggregation*

bias". GDP still remains major factor deriving growth in merchandise trade, specially manufactured goods.

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