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Real Exchange Rate Volatility and its Impact on Exports : An Evidence From India

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ABSTRACT

In our study we have empirically derived volatility by calculating the standard deviation of moving average of log of real effective exchange rates (RER). We have further examined the effect of real exchange rate volatility on the exports of the Indian economy from the year 2001 to 2017 respectively and used a modified model developed by Goldstain and kahan. Normalcy test using Shapiro Wilk test has been conducted and to avoid spurious regression analysis the data has been checked for stationarity with the help of Durbin Watson (DW) Test and Augmented Dickey Fuller test. Further the data has been differenced to obtain results of impact of mainly RER, Relative Prices and GDP on Indian exports. The results conclude that volatility is not normally distributed and the DW test value is lower than the effective R square value. The data at level was non stationary and with the help of ADF test we concluded that when differenced by order one < I(1)> they became stationary and significant regression output was achieved. GDP and RER had a significant impact on exports and hence the research continued with the impacting variables to further judge their two-way and three-way causality. The long run association between the data is tested with the help of Johansen's Co-integration test and the results suggested that there is no long run causality between them. Following the result instead of the Vector Error correction model we have applied the Vector Autoregressive model (VAR) to further establish causality in the short run and also evaluate three way causality between Indian exports, Gross Domestic Product and real exchange rate volatility with the help of Granger Casualty test. The variables have causal impact two way and three way (specified variables) when it comes to volatility and exports. The specified time period is from 2001 to 2017 respectively.

Introduction

The unpredictable nature of exchange rates has traditionally received quiet attention in the various researches concerning economic studies. The volatility is commonly observed to have a negative relationship with international trade however theoretical calculations, predictions and empirical results appear to be mixed yet the balance seems to tilt in favor of this insight and perception. The interdependence amongst countries in this epoch of globalized world with reference to international trade of goods, services, capital flows and many more has increased considerably. There is a substantial alteration in the trade composition of the emerging economies of the world with an outstanding shift from exporting commodity to manufacturing product exports. The growth rate of especially developing economies predominately depends on the real exchange rate and this statement definitely owes to a major increase in international trade events. The trade of emerging countries has considered to be pretty moderate especially after comparing with the developed countries. The emerging countries in its sequence of development and growth are very reactive to their trade characters and their structure has made their terms of trade steady yet profound to exchange rate fluctuations specifically their exports. Bretton woods collapsed and was accompanied by the change of exchange rates system from

fixed to floating in 1973 which in turn gave enormous scope for discussion of influence of exchange rates on exports.

There have been a number of discussions on the influence of other macro economic variables like GDP and relative prices on exports and a positive response thus achieved helps in concluding the amplifying of such variables to increase the trade and especially exports. Nevertheless usually the exchange rates have been identified to dishearten the exports howsoever in most of the research discussions. This claim, nevertheless, has generated a mixed pragmatic and empirical support. The initiation of floating exchange rate everywhere around the world has persuaded grander interest in considering the influence of exchange rate changeability on the volume of international trade. However greater degree of volatility of exchange rate movements in latest times has steered policy makers and research scholars to examine, inspect and observe the nature and degree of the impact of such associations on the volume of trade. There are quiet a number of methods to calculate volatility and all have a margin of debate by various economists yet the standard deviation of moving average of logarithm of real exchange rats have been proved to be safe and less debatable calculation. We have used the modified model of Golstain and Kahan (1976) in order to empirically analyze the impact of exchange rate volatility on the export quantities of India. The model specifies some independent variables and we thus see the impact of all in those in the export quantities estimated from the year 2001 to 2017 respectively. The summarized model has an intercept accompanied by log of relative prices of world and Indian exports accompanied further by GDP and Volatility, which is measured as the standard deviation of moving average of log of real effective exchange rates. A new dummy variable is introduced measuring and capturing the high and low peak values of RER which is further accompanied by seasonal dummies D2, D3 and D4.The stationarity of the variables is further tested by the Augmented Dickey Fuller test driven by the result of Durbin Watson which eventually portrayed a non stationary state. Further we have carried tests along to see the impact of volatility on exports only in the short run as the long run results of Johansen's co integration demonstrate a no impact scenario of the same. This compels in calculation of the Vector Autoregressive (VAR) model and not the Vector Error Correction Model (VECM). For the sake of testing the three way impact of identified variables like the export quantities, GDP and RER we have also tested the Granger Casualty and found a three way impact.

This paper is majorly divided into seven sections.

Review of Available Literature:

Demers (1991) had demonstrated a competitive firm with risk neutrality in an atmosphere where price uncertainty, consequential from exchange rate risk, leads to more ambiguity about the position or state of demand. With that kind of uncertainty, investing in physical capital is irretrievable, subsequent to decreasing levels of production and trade over time. Also greater degree of volatility and ambiguity of exchange rate movement in recent times has led the policy makers and researchers to examine investigate and explore the nature and extent of the influence of such movement on the volume of trade. Chowdhury (1993) in his literature has mentioned and presented an argument to support the fact that higher exchange rate volatility has indeed a negative impact on the volume of trade. Extensive studies also argue in favor of the impact of fluctuations in the exchange rate to be positive. Grauwe (1992) argue in favor of the positive impact of exchange rate volatility on volume of trade in different economies. Again extensive studies by Arize (1998) , Chit et all (2010) argue in favour of negative impact and Broll and Eckwert (1999) argue in favor of positive impact. Krugman (2003) however expressed that exchange rates are most significant prices in an open

economy because of their sturdy impact on the current account and other macroeconomic variables. Hooper and Kohlagen, 1978 have used alternate measures of volatility which confiscated unexpected changes in the exchange rate, however coherent with the advancements of the time these studies in earlier times have been utilizing basic econometric approximation techniques such as Old least square (OLS). Intraregional trade for key emerging economies like India holds major importance and thus the real effects of fluctuations in bilateral exchange rates amongst the countries that stay geographically close have also amplified (Jadresic et all, 1999). Ethier (1973) says volatility in exchange rates has damaging effects and GDP has positive effects when it comes to trade and exports especially. He further propounded that the influence of inverse correlation reduces with speculative behavior of firm. Agolli (2017) worked on effects of exchange rate volatility in trade variations and found a propounded positive linkage between both self-sufficiently, Clark (1973) developed an similar model of a firm with risk aversion producing inferences almost same as Ethier's model. The Assumption of this risk aversion hypothesis is not a compulsory pre requite criteria to describe a model that holds the antagonistic trade influence hypothesis (McKenzie, 1999). Reddy's work in (1999) have mentioned about other theoretical works have hypothesized that there is a positive association between exchange rate volatility and trade which is in difference to the above models.

Objective of the Study

The primary objective of our research is to estimate the impact of Real Exchange Rate Volatility on volume of Indian exports.

The secondary objective is to examine the impact of other macro economic variables like relative prices and GDP on Indian Exports.

Research Methodology and Modeling

The model underling the experiential analysis is that of Goldstain and Kahan (1976) which has been protracted and modified by us in such a way that it will account for volatility as well as effects of seasonality. The model thus may be put together by the equation 1

$$\text{Log}(X) = \alpha_0 + \alpha_1 \log(P_x/Pw) + \alpha_2 \log(GDP) + \alpha_3 + \alpha_4 (V) + \alpha_5 D2 + \alpha_6 D3 + \alpha_7 D4 + \mu \ldots (1)$$

Correlation matrix is also formulated in order to see the correlation among variables and further multi co linearity is detected in few thus providing with a solid reason to use the log model for the regression equation.

Where X is export quantities, P/P_w the relative prices, which is division of export prices over an index comprised of world export prices, GDP is the Gross Domestic product, V is RER volatility {well-defined as the moving average standard deviation (SD) which is logarithm of real exchange rate}, α_3 is a dummy apprehending high and low peak standards of the real effective exchange rate and as mentioned earlier to be considering seasonal dummies D2, D3, D4 seasonal dummies μ is an error term however.

To check the normality of the volatility data we have also conducted the Shapiro Wilk test in the quarterly data.

The Durbin Watson (DW) test and the Augmented Dickey fuller (ADF) test has also been conducted to avoid spurious regression analysis and thus found that differencing is required in the data. The equation (2) can be written as follows….

$$\Delta z_t = \rho_0 + \theta z_{t-1} + \rho_1 \Delta z_{t-1} + \rho_2 \Delta z_{t-2} + \rho_3 \Delta z_{t-3} \ldots + \rho_4 \Delta z_{t-p} + a_t \ldots (2)$$

Difference of the dependent variable is Δz_t, ρ_0 is the intercept and θ is the parameter we are estimating for the lag of the dependent variable. $\rho 1$ is a parameter estimating the lag of difference of the dependent variable.

Null Hypothesis: H_0: Data is Stationary and need not be differenced.

Alternative Hypothesis: H_1: Data is not stationary and needs to be differenced.

The DW test results signify the presence of autocorrelation in the result, as the resulted R square value is greater than computed resultant DW test value respectively. The result thus compelled to examine the data with the help of the ADF. Dickey and fuller (1979) deliver a parametric method for the higher order correlation by presumptuous that the series follows an AR (p) process. ADF is the adapted r improved version of Dickey Fuller (DF) test, which embraces extra lagged terms of the dependent variables in order to eradicate autocorrelation.

If the sequence under analysis of study is enclosed in single unit root, and combined of the same order suggests there exists a likely co-movement between the series. A linear amalgamation of them is stationary, implying the presence of a long-run relationship between these variables. Hence, we can test for co integration, which is the presence of at least one long-run linear stationary association between these price indexes, using the method of Johansen (1991, 1995). However Johansen (1995) displayed that the test procedure is impartial if the rank tests are deciphered as a sequence.

After the outcomes show no long run co integration we have applied the Vector Autoregressive (VAR) instead of using the VECM (Vector Auto Correction methodology) to further establish the causality. VAR models Vector Autoregressive Models which are used for multivariate time series. It is a stochastic process model used to apprehend the linear interdependencies amidst multiple time series. The construction is that each variable is a linear function of past lags of themselves and past lags of the other variables. All variables in a VAR arrive the structure of the model in the same way where each variable has an equation describing its evolution constructed on its own lagged values the lagged measures of the other model variables, and a random error term.

$$Y_{t,1} = \delta_1 + \Phi_{11} X_{t-1,1} + \Phi_{12} X_{t-2,2} + \Phi_{13} X_{t-3,3} .. + \Phi_{1p} X_{t-p,p} + \omega_1 \ldots (3)$$

In our case the equation will be

$$Y_{t,1} = \delta_1 + \Phi_{11} X_{t-1,1} + \Phi_{12} X_{t-2,2} + \omega_1 \ldots (4)$$

Granger causality test to establish a two and three way causality between GDP, RER volatility and Indian exports volume. Granger causality is a statistical perception of causality that is constructed on prediction. Bestowing to Granger causality, if X_1 "Granger-causes" (or "G-causes") a X_2, then past values of X_1 should contain information that helps to foretell X_2 exceeding and beyond the evidence confined in past values of X_2 alone. Its mathematical formulation is established on linear regression demonstrating of stochastic processes (Granger 1969).

$$X = \alpha_1 + \beta_1 G + \beta_2 V + \mu_1 \ldots . (5)$$

$$G = \Phi_1 + \lambda_1 X + \lambda_2 V + \mu_2 \ldots . (6)$$

$$V = \theta_1 + \delta_1 G + \delta_2 X + \mu_3 \ldots . (7)$$

Where X is the Indian exports, G is GDP and V is RER volatility.

The Data

The data has been collected from various secondary sources like the ITC (International Trade Centre), UNCTAD (United Nations Conference on Trade and Development) , IFS (International Financial Statistics) and RBI (Reserve Bank of India) data center. The yearly and quarterly data of the variables have been drawn from the sources from 2001 to 2017 respectively. The data is analyzed using appropriate statistical tools with the help of MS Excel, XLSTAT and STATA.

Data Analysis, Results and Findings

Principles of Hypothesis Testing involve the null hypothesis, which is initially presumed to be true. Further evidence is congregated, to see if it is consistent with the hypothesis, and verified using a decision rule. If the evidence is coherent with the hypothesis, the null hypothesis endures to be well thought out 'true'. If not, the null is rejected in support of the alternative hypothesis.

The Normalcy Test

The normalcy test conducted for RER volatility with the help of Shapiro Wilk test and Anderson Darling Test had the following results.

Table 1: SW Test

Shapiro-Wilk test (volatility):	
W	0.934
p-value (Two-tailed)	0.002
alpha	0.05

Source: calculated form the collected data

H_{011}: The variable from which the sample was extracted follows a Normal distribution.

H_{111}: The variable from which the sample was extracted does not follow a Normal distribution.

Hence we reject the null hypothesis H_{011}, and accept the alternative hypothesis H_{111}.

DW and ADF

The Durbin Watson test value (0.58) was found to be lesser than the r square value, which eventually gave us a reason to perform the ADF test, and the test results are as follows.

Table 2:ADF Unit Root Results

Variables	ADF
Exports	I(1)
Relative prices	I(1)
Gross Domestic Product	I(1)
Volatility RERI	I(1)

Source: calculated form the collected data

Tests are conducted using the five percent level of significance, Exports are the unit values of Indian export volumes, GDP signifies the real gross domestic product, V stands for volatility of RER and P_x/P_w is the relative prices of Indian exports to the world export prices *The tests are executed to a maximum of two lags using the Akaike info criterion .

The null hypothesis H_{021} of the Augmented Dickey Fuller tests is that the series is stationary.

The alternative H_{121} is that the series is non-stationary of order n.

The results of the tests show that relative prices, GDP, exports and RER volatility are non-stationary. The results of the test are as follows. Hence in such a case we reject the H_{021} and accept the H_{121} to conclude that the data is non-stationary and hence needs to be differenced.

Correlation and Multi-Co-linearity

Table 3:Correlation and Multicolinearity

Correlation matrix:								
Variables	X	RP (Px/Pw)	GDP	"V"	Dummy(Low& High)	D2	D3	D4
X	**1.000**	0.641	0.891	0.452	0.082	0.003	0.003	-0.009
RP (Px/Pw)	0.641	**1.000**	0.792	0.055	0.068	0.012	0.009	-0.033
GDP	0.891	0.792	**1.000**	0.336	0.088	0.012	0.012	-0.036
"V"	0.452	0.055	0.336	**1.000**	0.014	-0.022	0.003	-0.094
Dummy(Low& High)	0.082	0.068	0.088	0.014	**1.000**	-0.008	0.129	0.025
D2	0.003	0.012	0.012	-0.022	-0.008	**1.000**	-0.340	-0.327
D3	0.003	0.009	0.012	0.003	0.129	-0.340	**1.000**	-0.327
D4	-0.009	-0.033	-0.036	-0.094	0.025	-0.327	-0.327	**1.000**
Multicolinearity statistics:								
Statistic	X	RP (Px/Pw)	GDP	"V"	Dummy(Low& High)	D2	D3	D4
.	0.823	0.684	0.878	0.318	0.037	0.341	0.353	0.348
Tolerance	0.177	0.316	0.122	0.682	0.963	0.659	0.647	0.652
VIF	5.660	3.160	8.180	1.466	1.038	1.518	1.546	1.535

Source: calculated form the collected data

Few strong positive correlations have been identified between variables like GDP and exports, GDP and relative prices, volatility and exports have been established. However to detect multi co-linearity we find the Tolerance level and also the Variance Inflation Factor (VIF). The standard guidelines of levels that is .2 for

tolerance and 5 for VIF is taken into consideration and thus we see that variables like exports and GDP may have the slightest bit of multi co-linearity. Hence it would be the best to use a log model to express the impact causal equation to establish a relationship between the said dependent variable and independent variables.

Impact model and Regression

The model used henceforth to estimate the impact of some variables on the Indian exports includes selection of major macro economic variables and also special dummy variable α_3 in order to estimate the fluctuations of the fluctuations (volatility) by identifying the low and peak values deviated from the average. This kind of phenomenon is established equation brought up by Golstain and Kahan, which also brings in the impact of the seasonal dummy's in order to test the same. The equation also includes an intercept and a stochastic error term.

Table 4 portrays the empirical result of equation 1

$$\mathbf{Log\ (X)= \alpha_0+ \alpha_1 log(PX/Pw) + \alpha_2\ log(GDP)+ \alpha_3 + \alpha_4(V) + \alpha_5 D2+ \alpha_6 D3 + \alpha_7 D4\ + \mu}$$

Null Hypothesis $H_{031:}$ There is no impact of relative prices on Indian Exports.

Null Hypothesis $H_{032:}$ There is no impact of GDP on Indian Exports.

Null Hypothesis $H_{033:}$ There is no impact of RER Volatility on Indian Exports.

Null Hypothesis $H_{034:}$ There is no impact of Volatility fluctuations (peak and low values, α_3) on Indian Exports.

Null Hypothesis $H_{035:}$ There is no impact of seasonal dummies on Indian Exports.

Table 4: Regression Results

REGRESSION					
R Square	0.818276064				
Adjusted R Square	0.797074938				
Standard Error	0.042906282				
Observations	68				
	Coefficients	*Standard Error*	*P-value*		
Intercept	-0.151265647	0.346829959	0.664302064		
Log of RP (Px/Pw)	-0.049817812	0.060095477	0.41040277		
Log(GDP)	0.358554099	0.04125563	0.04666		
"V"	3.320816715	1.929230209	0.007696387		
Dummy(Low& High)	-0.5888429	0.010637634	0.038766		
D2	0.003858285	0.014829822	0.795622881		
D3	0.003214817	0.014965913	0.83064446		
D4	0.007048155	0.015043062	0.641102028		
ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	0.497371306	0.071053044	38.59587772	6.3819E-20
Residual	60	0.110456942	0.001840949		
Total	67	0.607828247			

Source: Calculated from the collected data

The results clearly demonstrate the results, which further help us to take a decision for the framed hypothesis.

We accept H_{031} as their exists no impact of relative price changes on the exports (p value 0.41 greater than 0.05) however the coefficient is -.049 respectively. We reject H_{032} as their exists a positive impact of GDP on the exports (p value 0.046 lower than 0.05) and the value of α_2 .035 which eventually explains a change by .35 units of the explanatory variable explained by a 1 unit change in the independent. We again reject the third null hypothesis H_{033} as their exists a positive impact of Volatility on the exports (p value 0.0076 lower than 0.05) and the coefficient is 3.32 respectively explains a 3.3 unit change in exploratory initiated by a 1 unit change in the explained variable. We reject H_{034} as their exists a negative impact of fluctuations in RER volatility explained by a dummy for low and peak values for the same (p value 0.038 lower than 0.05) and the value for the coefficient is -0.58 that explains the negative impact of .58 units on the explanatory variable influenced by a 1 unit movement in the explained. We however accept the null hypothesis number 5 H_{035} and conclude that there is no significant impact of the seasonal dummy variables on the dependent variable all p values greater than 0.05.The value of R square is almost 80 percent which explains a very significant impact of the independent variables on the dependent nevertheless some odd cases. Thus we can sum up the conclusion and extend our further tests with the variables which impact the exports in our study which are mainly the GDP and the RER volatility.

Johansen's Co integration

However the impact on short run is thus estimated and established further opening up the scope to estimate the long run equilibrium relationship between the series using the Johansen-Juselious multivariate procedure for all the cases.

H_{041}: There is no co integration among variables

H_{141}: There is co integration among variables

Table 5:Multivariate co-integration test Results Trace Tests

Maximum rank	Parms	LL	eigenvalue	Trace statistic	Critical Value
0	12	103.92398	.	26.6718**	29.68
1	17	111.80029	0.73091	10.9192	15.41
2	20	116.74492	0.56137	1.0299	3.76
3	21	117.25987	0.08225		

Maximum rank	Parms	LL	eigenvalue	Max statistic	Critical value
0	12	103.92398	.	15.7526	20.97
1	17	111.80029	0.73091	9.8893	14.07
2	20	116.74492	0.56137	1.0299	3.76
3	21	117.25987	0.08225		

Source: Calculated from the collected data

*Note: ** shows significance at 5% level of significance and zero co integration*

The trace and max statistic values are all less than the critical values suggesting the acceptance of the null hypothesis that there usually does not exist long run association of the variables like exports GDP and RER. Hence we accept the null hypothesis $H_{041.}$

6.6 The VAR Model

The variables are not co integrated hence we can run the unrestricted Vector Auto regression (VAR) test.

Equation 4 for two-lagged VAR model is expressed as follows,

$$Y_{t,1} = \delta_1 + \Phi_{11} X_{t-1,1} + \Phi_{12} X_{t-2,2} + \omega_1$$

Table 6:Vector Autoregressive Model

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
X |						
X |						
L1.	.70596	.2113303	3.34	0.001	.2917602	1.12016
L2.	1.510121	.54547	2.77	0.006	.4410189	2.579222
GDP|						
L1.	1.18205	.3292748	3.59	0.000	.5366831	1.827417
L2.	-1.732217	.4715065	-3.67	0.000	-2.656352	-.8080809
V |						
L1.	1.464114	.324595	4.51	0.001	.592009	1.020237
L2.	-1.857376	.279042	-5.69	0.002	-2.324215	-.6094639
_cons	.6621393	.3191516	2.07	0.038	.0366136	1.287665
GDP|						
X |						
L1.	-.4280131	.2031046	-2.11	0.035	-.8260908	-.0299354
L2.	1.056074	.5242384	2.01	0.044	.028586	2.083563
GDP|						
L1.	1.155079	.3164582	3.65	0.000	.5348318	1.775325
L2.	-.5592584	.4531537	-1.23	0.217	-1.447423	.3289066
V|						
L1.	1.000565	2.234114	0.45	0.654*	-3.378217	5.379347
L2.	-2.639157	2.190333	-1.20	0.228	-6.932131	1.653817
_cons	1.145023	.3067291	3.73	0.000	.5438447	1.7462
V |						
X |						
L1.	-.0368746	.0261722	-1.41	0.159	-.0881712	.014422
L2.	-.122488	.0675538	-1.81	0.070	-.2548909	.009915
GDP|						
L1.	-.0241764	.0407791	-0.59	0.553*	-.1041019	.0557491
L2.	.0988264	.0583938	1.69	0.091	-.0156233	.213276
V|						
L1.	-.289752	.2878897	-1.01	0.314	-.8540053	.2745014
L2.	.3502116	.2822481	1.24	0.215	-.2029845	.9034076
_cons	-.1002987	.0395254	-2.54	0.011	-.177767	-.0228304

Source: Calculated from the collected data
*Note * shows insignificance at 5 % level of significance*

Most of the values are significant and by discussing all three cases one by one we can conclude on the significant short run impact of all the variables namely exports, GDP and RER on each other individually taking in consideration their lagged values. In case 1 when exports are dependent all the lagged values of GDP and RER are significant as their probability is less than 5 percent respectively. Coming to the second case, case 2 holds GDP the dependent variable and all the values of two lags of both volatility and exports holds significant except the first lag (Lag1) of volatility as the independent variable because of the probability value greater than 5 percent. Case 3 holds volatility as the dependent variable and all the independent variables have probability less than 5 percent hence holds significant except the first lag of GDP (Lag1) which is greater than 5 percent hence holds insignificant.

Granger causality to establish whether two variables together can cause one dependent variable

Table 7:Granger causality Wald tests

Equation	Excluded	chi2	Prob > chi2
Exports(X)	GDP	13.802	0.001
Exports(X)	v	4.8946	0.087
Exports(X)	ALL	14.459	0.006
GDP	Exports(X)	6.8724	0.032
GDP	v	1.6124	0.447
GDP	ALL	7.281	0.122
v	Exports(X)	6.8703	0.032
v	GDP	8.6672	0.013
v	ALL	13.005	0.011

Source: Calculated from the collected data

Testing the hypothesis based on equation 5, 6 and 7

Equation 5, Hypothesis 5:

$X = \alpha_1 + \beta_1 G + \beta_2 V + \mu_1$

H_{051}: GDP and RER "V" together cannot cause Exports

H_{151}: GDP and RER "V" together can cause Exports

Equation 6, Hypothesis 6:

$G = \Phi_1 + \lambda_1 X + \lambda_2 V + \mu_2$

H_{052}: Exports and Volatility together cannot cause GDP

H_{152}: Exports and Volatility together can cause GDP

Equation 7, Hypothesis 7:

$V = \theta_1 + \delta_1 G + \delta_2 X + \mu_3$

H_{053}: GDP and Exports together cannot cause Volatility

H_{153}: Exports and Volatility together can cause GDP

Where X is the Indian exports, G is GDP and V is RER volatility.

We reject all the three hypothesis H_{051}, H_{052} and H_{053} and accept the alternative H_{151},

$H_{152}$and H_{153} and finally conclude that both GDP and RER V can together cause exports, both Exports and RER V can together cause GDP and both GDP and exports can together cause RER V.

Conclusion

Finally we conclude by saying that selected macro economic variable have an impact on the Indian exports respectively. However we would like to discuss the results one by one. The RER data is not normally distributed. The primary objective has been fulfilled with the help of various statistical tests and the results helped us concluding with the fact that not only the RER V values but also the dummy low and peak values of RER have a significant impact on the Indian exports the first one having positive and the second one having negative impact respectively. In the secondary objective we wished to establish an impact of other variables like relative prices and GDP on the Indian exports and we see that though relative prices do not have a significant impact on our dependent variable the Gross Domestic Product has a significant impact however. This was the result we intended to find but yet we wished to use the modified Goldstain and kahan model and see the impact of the seasonal dummies as well. The seasonal dummies nevertheless have no impact on our dependent variable. Further we conducted an individual causal test to establish a two-way relationship between identified impacting variables that is GDP, Exports and RER V. To achieve the results we had to go through various tests. Testing the stationarity of the data was a prerequisite and data was found to be non-stationary and was differenced to achieve stationary results. Further co-integration results expressed the lack of co-integration between the variables thus giving us the scope to apply the Vector Autoregressive model. The results of VAR model helped us to conclude that the lags of the independent variables which were periodically all three (GDP, X and V) could cause the dependent variables which were again three (GDP, X and V) respectively. Nevertheless we applied the Granger causality Test and conclude with the help of the same that two independent variables together could cause the dependent variable which was again all three (GDP, V and X) respectively.

Suggestions

The volatility data was not normal and hence tests were required before running a Old least square regression analysis. The presence of multi co-linearity in the data had a prerequisite to apply log in the model and thus a very good reason to take up the Goldstain and Kahan model. The fluctuations in the RER has a negative impact on the Indian exports and thus moderation in the same will boost exports and the Reserve bank of India should constantly monitor it and try to moderate whenever it crosses a particular level. However the stationarity tests had resulted in appearances of integration of the same order and hence co-integration analysis could be applied for the same but no long run connection between the variables could be established. GDP has a definite impact on the exports of the country and also a two-way relationship is established providing us with a definable reason to suggest that improving the gross domestic product will in turn improve the exports as well.

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