Chapter 5

Empirical Analysis

Exports instability and its impact on the domestic economies of developing countries has coin tuning interest both in theoretical and empirical literature since works by Coppock (1962) and Mecbean (1966). The present study also attempts to examine the relationship between exports instability and economic growth for India both in the long run and short run. It is interested in knowing not only the equilibrium tendency among a set of five variations but also want to know how the variables react and adjust on the path of equilibrium. The estimation procedure that includes three steps .The first step is to test for stationary of the series with the help of unit root tests because in the presence of non stationary variables, there is a possibility of spurious regression. The second step is to test for co-integration if the variables are non stationary in their levels and stationary in first difference. Once the co-integration has been established among variables, the third step is to formulate Error correction model to examine the long run as well as the short run relationship between exports instability and economic growth of India.

5.1. Results of Unit root Test

To check the stationarity of the data series, the study employs the Augmented Dickey-Fuller and Phillip-Perron tests to identify stationarity of the data. The test statistic for unit root test is exhibited in Table 5.1. The test statistic is computed for two models intercept as well as trend and intercept. Both models are performed on the level as well as the first differencein the series. The table 5.1 for the ADF test indicates that all the variables' are non-stationary in level form whereas the first difference of the series reflects the stationary behavior. Further, EII (Exports instability Index) is stationary in their second difference.The table shows that all the variables are non-stationary in level form whereas the first difference of the series reflects the stationary behavior in the PP test. When the variables were tested in 1^{st} difference and (EII) 2^{nd} differences all the variables are found to be integrated of order zero and hence are stationary in ADF test. So now, the co-integration model can be performed on the given data-series. We also graphed all the variables in their levels and 1^{st} differences. It is seen that the graphs of variables in levels exhibit

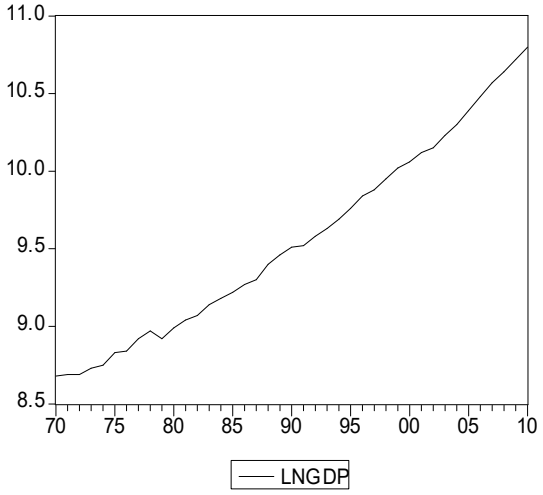
non-constant variances while graphs in 1st differences exhibit constant variances and are indicative of the series being stationary. The two graphs are exhibited in figures 5.1.

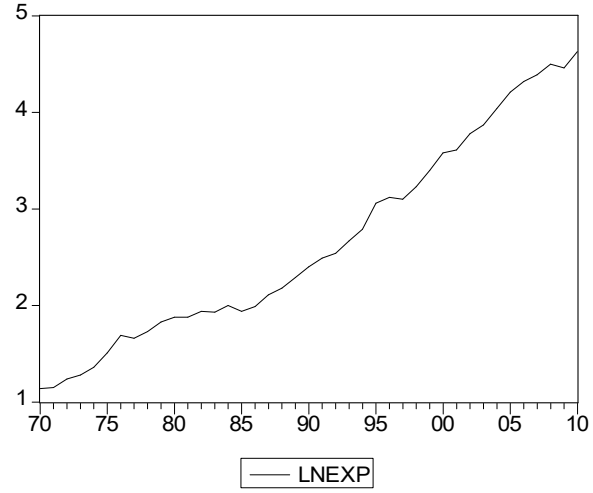
Table: 5.1 Unit Root Test Based on Annual observations

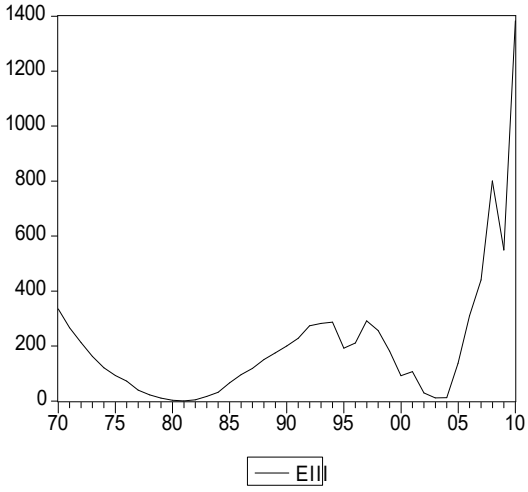
Variables	Model	ADF TEST STATISTIC			PP TESTS STATISTIC	
		LEVEL	IST DIFF.	2ND DIFF.	LEVEL	IST DIFF.
LNGDP	Trend	3.721328	-5.80068*		4.993756	-5.855706*
	Trend &Intercept	-1.107068	-7.99304*		-1.10707	-9.423445*
LNEXP	Trend	1.600041	-5.82957*		1.74629	-5.829571*
	Trend &Intercept	-1.188791	-6.15069*		-1.19085	-6.153606*
EII	Trend	-1.290205	-1.17629	-5.3749*	1.939781	-8.196416*
	Trend &Intercept	-2.482957	-1.71867	-5.358*	1.03859	-9.00257*
LNGFCF	Trend	1.888882	-5.95455*		2.114782	-5.991298*
	Trend &Intercept	-0.940662	-6.76326*		-0.94066	-6.784287*

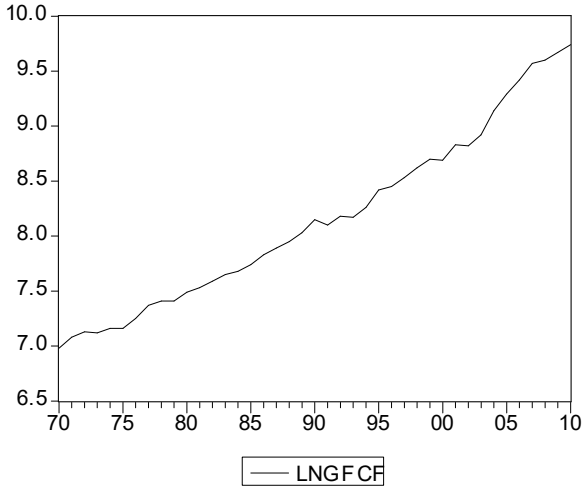
Note: * indicate significant at 1 per cent

5.1 Graphs for Macroeconomic Variables (Levels)

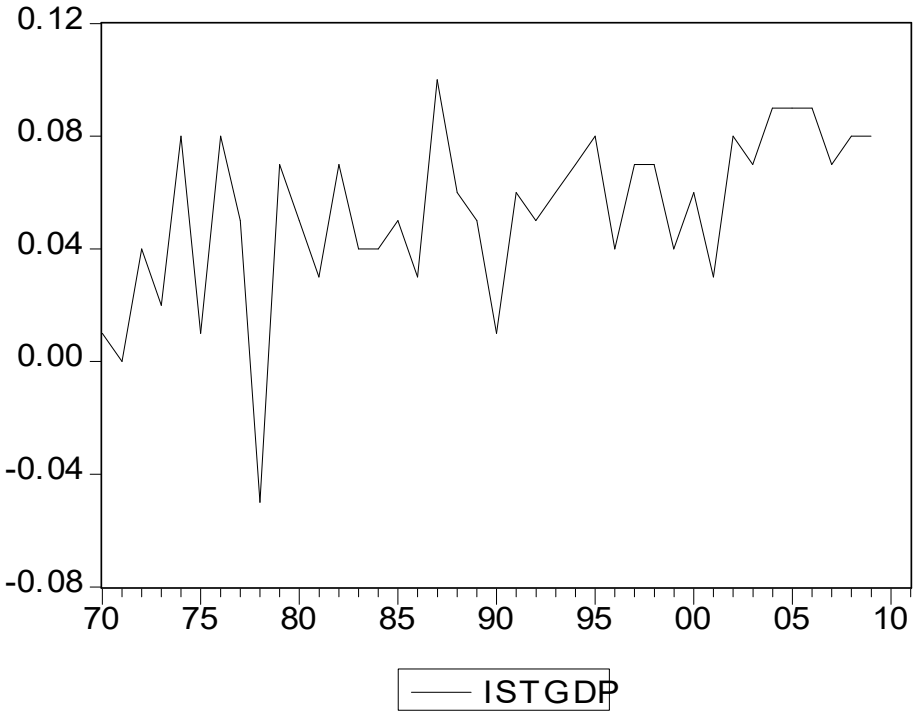


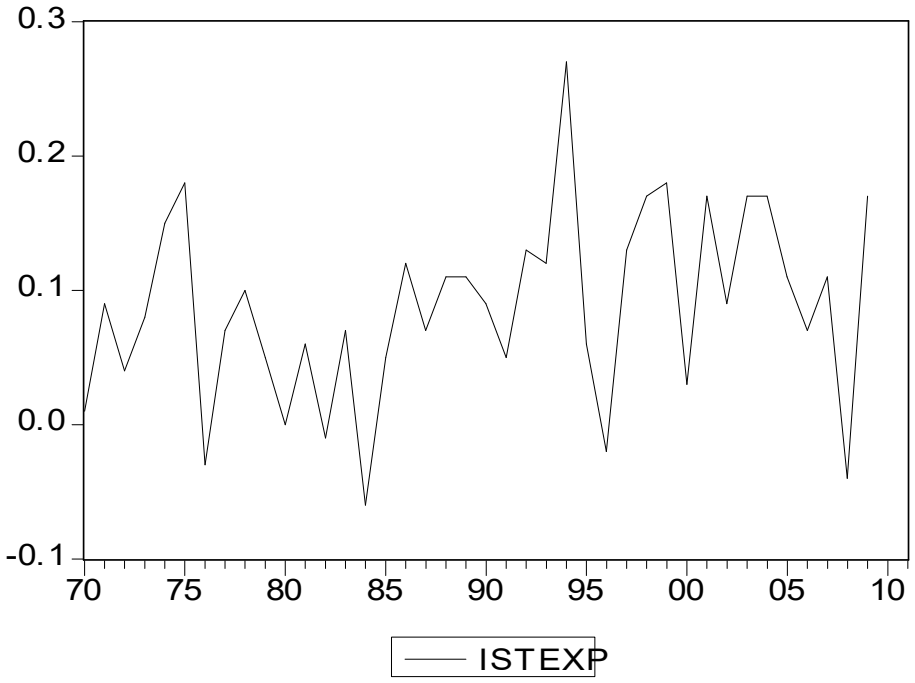






Graphs for Macroeconomic Variables (1st Difference)

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0.0
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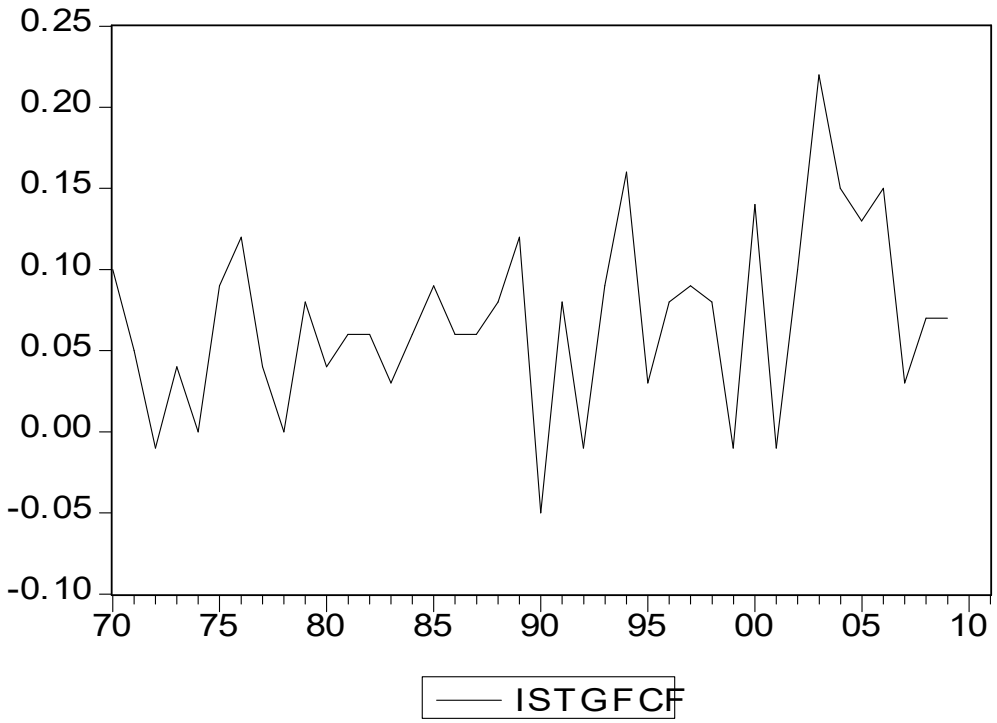
70
75
80
85
90
95
00
05
10
ISTEXP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-0.10
70
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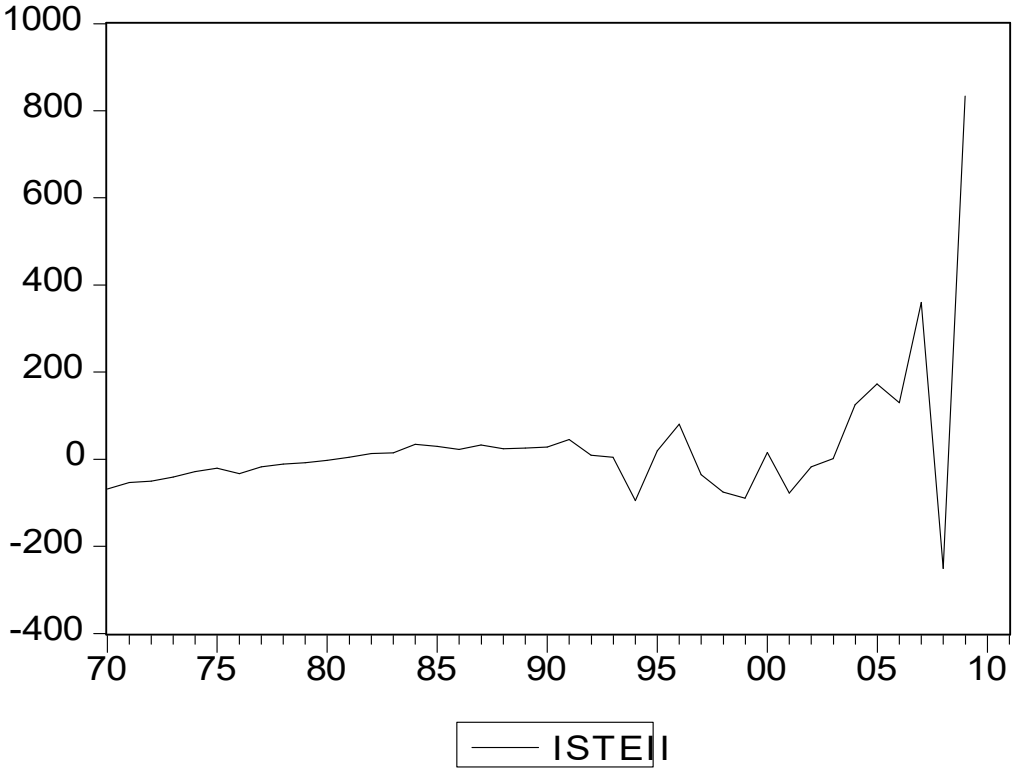
10
ISTGFCF



5.2Results of Cointegration Test

The stationary behavior of the series fulfills the criteria of estimating the co-integration model. In the cointegration, study utilized the Johnson cointegrationmethodology. This technique is stronger in case of more than two variables. The test results have been presented in tables 5.2 shows that the hull hypothesis of no. co-integrating vector is rejected as value of trace statistic (84.17) is greater than the critical value (79.34) at 5 percent level of significance. However, the null hypothesis of less than or equal to 1 co-integrating vector against the alternative hypothesis of greater than one co-integrating vector cannot be rejected at 5 percent level of significance as the λ_{trace}statistic value (54.39) is less than the critical value (55.24).Besides this, the table shows at none probability is less than 5 percent (0.0206) which indicates we can reject the null hypothesis. At most one the probability value is more than 5 percent so we accept null hypothesis. This shows that at least one co-integration relationship exists between variables.

Table 5.2 Johanson co-integration test

Null hypothesis	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
r=0	0.5432	84.1701	79.3414	0.0206
r≤1	0.4295	54.3991*	55.2458	0.0593
r≤2	0.3467	33.0717	35.0109	0.0796
r≤3	0.2783	16.8940	18.3977	0.0801
r≤4	0.1117	2.5002	3.8415	0.0739

* denotes rejection of the hypothesis at the 0.05 level

Having established the co integration among the variables, short run and long run behavior of these variables are investigated. To serve the purpose, vector error correction model is employed.

5.3 Results of Vector Error correction model

The existence of at least one co-integrating vector among the variables implies that a Vector Error correction modelcan be estimated to investigate the short-run as well as long run relationship. The estimates of coefficients of error correction terms along with their standard errors and z-statistics have been shown in table 5.3.This table shows that LNEXP (real exports) and EII (exports instability index) are statistically significant at 1 per cent. The coefficient value of these variables is 1.109 and 0.0013 per cent respectively. It implies that one percent increase in real exports and exports instability leads to 1.109 and 0.0013 percent increase in GDP in case of India Thus the results of Error correction shows there is a positive long run relationship between exports instability and economic growth in case of India. Similarly, LNEXP (real exports) have a positive long run effect with economic growth in India. The table also contains the estimates of the coefficient of error correction terms. EII and real exports values are 1.109 and 0.0013 respectively, which mean the speeds of error correction are 1.1 and 0.01 percent annually and confirm a long run relationship. Besides this Gross fixed capital formation is showing negative association with economic growth. The negative association between GFCF

and GDP is not following the economic theories rather it is move opposite direction and shows inconsistency in the economic theories.

Table 5.3 Long term estimates of coefficients of Vector error correction model

VARIABLE	Coefficient	Standard error	Z statistic	Probability
LNGDP	1			
LNEXP	1.109	0.29217	3.796	0.0017
EII	0.0013	0.00033	3.926	0.02516
LNGFCF	-3.52	0.618	-5.703	0.0064
DV	-0.542	0.140	-3.875	0.00390
CONSTANT	14.262			
TREND	0.0977			

The result for short run adjustment is presented in the table 5.4.The past error correction term is negatively sign (-0.009) while considering GDP as the dependent variable. This table highlighted that the coefficient value of the error correction term is statistically insignificant. Thus the decision of the short run error correction model explores that there is no significant short run causality between variables.

5.4 Short Term Estimates of Vector Error Correction Model

Regressor	**D(LNGDP)**	**D(LNEXP)**	**D(LNGFCF)**	**D(EIII)**	**D(DV)**
CointEq1	-0.009672583 [-0.18479]	-0.21870525 [-1.59842]	0.01877107 [0.15370]	-504.824013* [-3.24096]	0.49222 [1.23480]
D(LNGDP(-1))	-0.501883902* [-2.43187]	1.135834293* [2.10544]	0.15092192 [0.31342]	429.5880778 [0.69949]	-1.3989 [-0.89004]
D(LNGDP(-2))	-0.269072615 [-1.38651]	0.320610418 [0.63201]	0.19178948 [0.42356]	1113.212118*** [1.92764]	-0.5141 [-0.34787]

D(LNEXP(-1))	0.136708862*** [1.70677]	2.23E-01 [1.06423]	0.13479653 [0.72127]	-147.5148441 [-0.61888]	-0.2575 [-0.42221]
D(LNEXP(-2))	0.121848437*** [1.64090]	-0.236421988 [-1.21798]	0.11174822 [0.64497]	707.0026616* [3.19944]	0.15955 [0.28213]
D(LNGFCF(-1))	0.074906566 [0.46500]	-0.368284506 [-0.87459]	-0.15663534 [-0.41673]	-778.9340004 [-1.62489]	1.90765 [1.55496]
D(LNGFCF(-2))	-0.076325134 [-0.56521]	-0.882776853* [-2.50085]	-0.29888767 [-0.94862]	-248.1438346 [-0.61751]	1.02474 [0.99644]
D(EIII(-1))	6.80288E-05 [1.21050]	-0.000133593 [-0.90938]	7.3961E-05 [0.56405]	-0.7230422* [-4.32344]	-0.0002 [-0.38335]
D(EIII(-2))	0.000162048* [2.38169]	-0.000177828 [-0.99984]	-4.5786E-05 [-0.28841]	1.240292963* [6.12573]	0.00033 [0.63296]
D(DV(-1))	-0.01433468 [-0.44115]	-0.007783018 [-0.09163]	0.01000237 [0.13193]	-125.7323481 [-1.30028]	0.14893 [0.60184]
D(DV(-2))	-0.027605533 [-0.87340]	-0.072172354 [-0.87353]	-0.10542298 [-1.42952]	-68.11885364 [-0.72423]	0.12767 [0.53041]
Constant	0.048972017* [3.82485]	0.037183239 [1.11097]	0.02466447 [0.82561]	-50.65044851 [-1.32936]	0.00683 [0.07008]
Trend	0.001085193*** [1.76381]	0.003141907** [1.95357]	0.00177897 [1.23923]	0.785799894 [0.42919]	-0.0038 [-0.81095]

Notes: (1) *, ** AND *** indicates 1 percent 5 percent And 10 level of significant. (2) “Z” value is presented in parenthesis