

Foreign Direct Investment, Export, External Debt and Economic Growth in India- A VECM Approach

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Abstract

The researcher attempted to analyse how FDI, export, external debt contribute to the economic growth of India. The author has developed various econometrics models to assess the relationship of the studied variables. The unit root tests, cointegration model and VECM revealed the short run and long run relationship of the studied variables. The study employed VECM to study the long run, short run and joint effect of the studied variables. The results showed significant effect from FDI, exports and external debt to economic growth. The Wald test result shows the short run relationship in export to economic growth and external debt to economic growth except FDI.

Keywords: Economic growth, export, external debt, VECM, FDI

Introduction

FDI

Growth of the economy is the main thrust of the countries of developing tag, the study on FDI, export, external debt and economic growth has attracted the academicians and the researchers around the world. FDI helps the economy in reducing the imbalance of savings and investments (Vo et al. 2019a) and it also attract the revenue in the form of tax and capital in the form of skilled human resource(Buckley et al.2002).

In this globalization era, the countries are focusing on creating the attractiveness of FDI mainly due to positive effect and fewer commercial, technological and economical barriers. (Demirsel et al-2014).

The other determinant, exports also a significant contributor to the economic growth as studied by Jung and Mrshall-1995 and Kwan and Costomitis-1990. The external debt also play key role in the economic growth as indicated in the studies such as Levine and Renalt-1992, Remamurti (1992).

Export

Exports of tangibles and services are important aspects in economic growth of any country. A debatable issue is whether export drives growth or growth drives export. A number of empirical studies made an attempt to resolve it (Bhagwati 1978, Krueger 1978).

Export led growth provides benefits not only to exporters but also helps in various economic and government policies. Export helps the country to integrate with the world. The Asian country such as India is the best example of export led economic growth showing the export as an engine of economic growth. The export boosts economy with increase in total factor productivity from the economies of scale principle. It also improves skills of the workers, managers and overall productive capacity.

External Debt

The use of external debt in a productive manner enhances economic growth. It is argued (Todaro and Smith-2006) that the developing countries need to borrow the external debt in the initial stages of the economy as these countries generally faces the problem of shortage of domestic capital. The Harrod-Domar growth model highlighted the importance of external debt as it closes the gap between savings and investments. There is a general notation that the economy will be benefited reasonably from the external debt which leads to finance the productive investments. The studies in the literature have shown the inverse relation of external debt and economic growth.

Literature Review

Despite many studies conducted on assessing the FDI, export, and external debt on economic growth, still no common consensus has been established on the same. The main reason of this could be the country, time period, methods of study etc. FDI and economic growth an important factors have attracted the attention of the investors around the world in recent times (Basu et al. 2003; Vo et al. 2019a). The relationship between the above economic indicators have been assessed taking one country or multiple countries into consideration. The study (Edward E. Gharthey-2006) of export and economic growth using US, Japan and Taiwan shows the existence of causal effect in export and economic growth. The study (Shaista Alam -2000) shows the causal effect of external debt on economic growth and found the existence of unidirectional relationship. The positive effect of FDI on economic growth (Shahbaz and Rahman 2010) was found in the study. The FDI-growth study supports the negative effect of FDI on economic growth.

Pradhan (2002) made an analysis of FDI and economic growth in India. The result confirms no positive effect of FDI on economic growth. The results are as per the study of Agrawal (2005) that FDI had very little effect on growth.

Kapusuzoglu (2011) made an attempt to study the relation among the selected indexes of Istanbul Stock Exchange and price of Brent oil in international market and found the

long run relationship in the studied variables.

Several studies in the literature through the light on individual and cross section export and economic growth. i.e. Rivera-Batiz and Romer (1991), Levin and Raut (1997), Crespo-Cuaresma and Wörz (2003).

Tang (2006) studied the relationship of the exports, real GDP and imports. The results of the study indicates no relationship between export and economic growth in China in both short run and long run. Srinivasan and Bhagwati (2001) made a research on the export and economic growth. The authors argument says the manufacturing products are less sensitive in exports in comparison with export of raw material and other goods in the international market.

Were (2001), and Hameed and Chaudhary (2008) studied debt and economic growth factors and found the negative relationship. Reinhart and Rogoff (2010) studied the relationship of external debt and economic growth with the sample of 20 developed countries. The result of the GDP to debt ratio indicates the negative relationship between debt and growth.

Musebu (2012) analysed external debt and economic growth. The result shows that the external debt hampers the economic growth. The results are consistent with the studies of Cohen (1993), Oteng-Abaye (2003).

The present study focuses on the FDI, export, external debt and economic growth of India.

Model, Methodology, Data

The study made an attempt to examine the significance of FDI, export and external debt in contributing to the growth of Indian economy which is measured through GDP. The model of the research is as follows as per Shahbaz and Rahman (2010),

$$GDP_t = \beta_0 + \beta_1 FDI_t + \beta_2 EXP_t + \beta_3 EXD_t + \epsilon_t$$

Where, β_0 is the intercept. β_1 , β_2 and β_3 are the coefficients. ϵ_t is the error term. Subscripts t denotes year. The variables are translated into log form in order to reduce the heteroskedasticity. The variables are defined as follows in the table 1.

Table-1: Variables Definitions

Factors	Variables	Symbol	Description	Sign
Dependent Variable				
Gross Domestic Product	Real GDP	GDP	Log(GDP)	+
Independent Variables				
Investments	FDI-Inflow	FDI	Log(FDI)	+
Trade	Total Export	Export	Log(Export)	+
Financing	External Debt	EXDT	Log(External debt)	+

The researcher employed suitable methodologies to analyse the effect of study variables i.e. FDI, export, external debt and GDP. These variables passed through the stationary test, Vector Autoregressive model for lag selection, cointegration and VEC for relationship of the studied variables.

The above analyse is carried out for a period from 2000-2019(quarterly data) with totaling 80 observations. The data is gathered from the websites of RBI, World Bank, IMF, UNCTAD etc. The following table no 2 and 3 shows the descriptive statistics and multicollinearity of the selected variables.

Table no 2: Descriptive Statistics

Series: Residuals	
Sample 2000Q1 2019Q4	
Observations 80	
Mean	3.11e-15
Std. Dev	0.058799
Skewness	0.047743
Kurtosis	1.916022
Jarque-Bera	3.947089
Prob	0.138963

Table no 3: Multicollinearity Check

	FDI	Export	External debt
FDI	1		
Export	-0.139776805	1	
External debt	0.056741155	0.183907019	1

The results from the table no 2 shows normal distribution of the residuals by accepting null hypothesis. i.e. normal distribution of residuals as it is acceptable at 5% level. Table no 3 shows the correlation between the FDI-export of -0.13, between FDI-external debt of 0.05 and between export-external debt of 0.18 indicating no multicollinearity problem.

Results and Discussions:

Unit Root Test

The recent methods of stationary such as LLC test, IPS test, ADS test, and PP tests are performed to test the stationary of studied variables. The results are shown in the table no 4a and 4bas follows.

Table no 4a: Stationary Test at Level

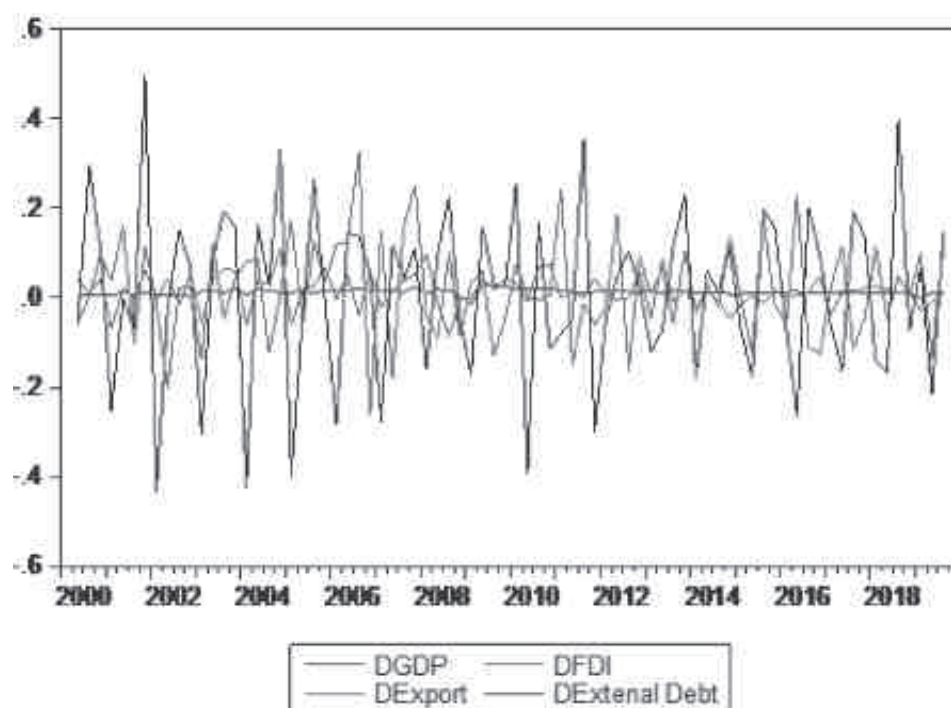
Group Unit Root Test:				
Series: GDP, FDI, Export, External Debt				
Sample: 2000Q1 2019Q4				
Methods	Statistics	Prob	Cross sec	Obs
LLC	-0.66954	0.2516	4	312
IPS	1.68927	0.9544	4	312
ADF-Fisher	2.67582	0.9530	4	312
PP-Fisher	20.6294	0.0082	4	316

Table no 4b: Stationary Test at First Difference

Group Unit Root Test:				
Series: GDP, FDI, Export, External Debt				
Sample: 2000Q1 2019Q4				
Methods	Statistic	Prob	Cross sec	Obs
LLC	-19.0567	0.0000	4	310
IPS	-23.9279	0.0000	4	310
ADF-Fisher	87.7047	0.0000	4	310
PP-Fisher	87.8582	0.0000	4	312

The above result shows the non stationarity of the variables at level except for the test PP-Fisher Chi-Square shows the

stationarity at level. The variables are stationary at first difference indicated by the significance at 5% level.

Figure 1: Stationary of Study Variables at First Difference**Cointegration Test**

The cointegration test is used to examine cointegration of the variables. The said cointegrated test takes into account

the statistics named λ trace and λ max statistics, where the model is:

$$\lambda_{trace(r)} = -T \sum_{i=r+1} \log (1 - \lambda_i)$$

$$\lambda_{trace(r, r+1)} = T \log (1 - \lambda_{r+1})$$

Where,

r = number of individual series

T = number of usable observations

λ = Eigen values

H_0 : No cointegration equation

H_1 : H_0 is not true

H_0 shows the null hypothesis indicates the cointegrating vectors which is/are less than or equals r and H_1 indicates greater than r . The results are computed by the comparison of t-statistics to critical values. H_0 can be rejected if the t-statistics are significant at 5% and vice versa

Table no 5: Cointegration Test

Null Hypothesis	Trace test	Max eigen value test
Null*	51.95891	39.77123
Atmost 1	12.18768	7.489329
Atmost 2	4.698353	3.620729
Atmost 3	1.077624	1.077624

*denotes significant at 5% level

The next step after confirming the stationarity of the variables at first order 1(I) perform the cointegration test to examine the cointegrating variables in the study. The cointegration test is performed on the level data as suggested by the literature.

The first hypothesis at (None *) is rejected since the value of trace test and max eigen value test are significant at 5% level. The cointegration test confirms that the study has cointegrating variables. The results are shown in the above table no 6 indicates at least 1 cointegration is found at 5% level. Sometime the shocks in the short run which may converge with long run. Hence, long and short run estimation is needed. The results of the cointegration test confirms the cointegration in the variables which are

examined using the appropriate VECM model.

Vector Error Correction Model (VECM)

The next part of the analysis is to perform a restricted VAR i.e. VECM. The cointegration term is called as error correction model as it gradually corrects the deviation from long run equilibrium. The cointegrated vectors show the long run effect and causality can be examined using error correction term. VECM is performed to analyse relationship in the variables.

The VECM is conducted on the level data using the software (Eviews-9) because the software automatically takes the first differences for estimating the variables.

$$\text{VECM Model: } \Delta \ln gdp_t = \alpha_0 + \sum_{i=1}^k \alpha_1 \Delta \ln gdp_{t-i} + \sum_{i=1}^k \alpha_2 \Delta \ln fdi_{t-1} + \sum_{i=1}^k \alpha_3 \Delta \ln export_{t-1} + \sum_{i=1}^k \alpha_4 \Delta \ln edebt_{t-1} + ECT_{t-1} + e_t$$

This model shows the error correction term where the first term is differenced log of GDP, followed by differenced FDI, differenced export and differenced external debt, ECT

is error correction term signifies the long run effect and e_t is error term.

Model-I

VECM equation is given below:

$$\begin{aligned} \text{Equation: } D(\text{GDP}) = & (1) * (\text{GDP}(-1) - 0.256521462296 * \text{FDI}(-1) - 0.485601555982 \\ & * \text{EXPORT}(-1) - 0.193488004837 * \text{EXDT}(-1) - 8.72629403816) + C(2) \\ & * D(\text{GDP}(-1)) + C(3) \\ & * D(\text{GDP}(-2)) + C(4) \\ & * D(\text{FDI}(-1)) + C(5) \\ & * D(\text{FDI}(-2)) + C(6) \\ & * D(\text{EXPORT}(-1)) + C(7) \\ & * D(\text{EXPORT}(-2)) + C(8) \\ & * D(\text{EXDT}(-1)) + C(9) \\ & * D(\text{EXDT}(-2)) + C(10) \end{aligned}$$

Table no 6: Results of VECM

Estimation Method: Least Squares Sample: 1 80				
	Coefficients	Std. Error	t-Statistic	Prob.
Coefficient(1)	-0.058364	0.017535	-3.328441	0.0019
Coefficient(2)	-0.382215	0.264660	-1.444174	0.1565
Coefficient(3)	0.394344	0.219472	1.796789	0.0799
Coefficient(4)	0.006184	0.007164	0.863178	0.3932
Coefficient(5)	0.006876	0.006784	1.013467	0.3169
Coefficient(6)	0.138161	0.025328	5.454966	0.0000
Coefficient(7)	0.074545	0.035819	2.081148	0.0439
Coefficient(8)	-0.011308	0.007030	-1.608521	0.1156
Coefficient(9)	4.22E-05	0.006093	0.006921	0.9945
Coefficient(10)	0.011835	0.003752	3.154435	0.0030
Coefficient(11)	-0.611049	0.488168	-1.251718	0.2179
Coefficient(12)	-10.89131	7.368063	-1.478179	0.1472
Coefficient(13)	-6.763966	6.110038	-1.107025	0.2749
Coefficient(14)	-0.335421	0.199452	-1.681714	0.1004
Coefficient(15)	-0.361679	0.188870	-1.914967	0.0627
Coefficient(16)	1.605761	0.705113	2.277309	0.0282
Coefficient(17)	0.019734	0.997197	0.019790	0.9843
Coefficient(18)	-0.468685	0.195710	-2.394800	0.0214
Coefficient(19)	0.173352	0.169617	1.022020	0.3129
Coefficient(20)	0.330283	0.104453	3.162028	0.0030
Coefficient(21)	0.165420	0.209277	0.790434	0.4339
Coefficient(22)	-0.697762	3.158681	-0.220903	0.8263
Coefficient(23)	2.988934	2.619367	1.141090	0.2606
Coefficient(24)	0.065468	0.085505	0.765666	0.4484
Coefficient(25)	0.058915	0.080968	0.727631	0.4711
Coefficient(26)	0.351614	0.302281	1.163200	0.2516
Coefficient(27)	0.190995	0.427498	0.446774	0.6574
Coefficient(28)	0.041105	0.083901	0.489924	0.6269
Coefficient(29)	0.020225	0.072715	0.278137	0.7823
Coefficient(30)	-0.005831	0.044779	-0.130218	0.8970
Coefficient(31)	1.593986	0.424734	3.752904	0.0006
Coefficient(32)	-5.432794	6.410633	-0.847466	0.4018
Coefficient(33)	4.540444	5.316080	0.854096	0.3981
Coefficient(34)	0.418314	0.173535	2.410552	0.0206
Coefficient(35)	0.347790	0.164327	2.116447	0.0406
Coefficient(36)	-1.065744	0.613489	-1.737187	0.0900
Coefficient(37)	1.417691	0.867618	1.634003	0.1101
Coefficient(38)	-0.838529	0.170279	-4.924455	0.0000
Coefficient(39)	-0.141127	0.147577	-0.956297	0.3447
Coefficient(40)	0.191670	0.090880	2.109045	0.0412
R ²	0.875501			
Adj R ²	0.763451			
S.E. of reg	0.002882			

Table no 7: Wald Test

Variables	Chi-squ	Prob.
D(FDI)	0.605314	0.7389
D(EXPORT)	11.13907	0.0038
D(EXDT)	5.565677	0.0619

The results of the above table no 6 show the estimates of VECM and effect on GDP. The table no 6 shows coefficients from 1 to 40. The Coefficient(1) shows the long run relationship from FDI, export and external debt to GDP as the Coefficient(1) value is negative (-0.1044) and acceptable at 5% level. The negative value of Coefficient (1) and significant result shows the long run relationship. The findings are inconsistent with (Aitken and Harrison 1994; Alfaro et al. 2004; Konings 2001; Lyrroudi et al. 2004;)

The table no 7 indicates the results of short run relationship of the selected variables. For the short run relation, Wald test results show between GDP-FDI, the chi square value is 0.605314 (0.7389) not significance at 5% level. It indicates no short run relationship between GDP-FDI. These results are consistent with the previous studies (Chandana Chakraborty & Parantap Basu -2010, Tang, T.C- 2006).

The results of the wald test shows significant short run relationship between GDP-Export, where the chi square value is 11.13907 (0.0038) significance at 5% level. Lastly, there is a significant short run relationship between GDP-external debt, where the chi-square value is 5.565677 (0.0619) significant at 10% level.

Diagnostic Check for the Model

The model that is used in the research is employed for the diagnostic checks to find out the correctness of the model specification. Firstly the normality of the residuals has been checked and found the residuals of the model show the data is normally distributed. The H0 of 'residuals are normally distributed' is accepted as the results are not significant at 5% level. (0.250873>0.05) as per the table no 2. It is confirmed the normal distribution of residuals.

Table no 8: Autocorrelation Results

Obs*R-squared	5.699461
Prob	0.0579

The table no 8 result shows the observed R-squared value is 5.699 and significant at 5%. i.e 0.0579. The H0 of 'no autocorrelation' is not rejected. It shows the data is free from the serial autocorrelation.

Conclusions

The study attempted to analyse how FDI, export and external debt add value to the economic growth of India in both the short and long run. The econometric models such as VAR, Johansen Cointegration, VECM and Wald test are employed for the analysis. The findings of this study significantly contribute to the literature. The study employed the quarterly data during the period 2000-2019 which is collected from the RBI database.

The analysis is concluded as follows. Firstly, FDI inflows have shown positive effect on the GDP in the long run, but

no significant effect in the short run. Secondly, exports also have shown significant effect on the GDP in the long run and also contributes significantly in the short run. Finally, external debt has also shown significant effect on economic growth in long run and short run.

From the above results, it can be inferred that the FDI, exports and external debt are key factors in determining the economic growth of India. It is suggested that the government should design the optimal policies on FDI, export and external debt to create healthy economic environment in the country. This will boosts the confidence of the investors and attract the new investors to India. The liberalised BOT policies, flexible human capital will tends to have positive effect of FDI on economic growth (Zhang-2001). There are many factors determines the economic growth of India apart from FDI, export and external debt.

Further researcher can look into other factors to understand the effect on the economic growth.

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