

Causality between foreign direct investments and exports in India

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Abstract. *This paper attempts to examine the relationship between Foreign Direct Investment and Exports from India during the period from 1990-1991 to 2014-2015. The data has been collected from the various issues of Handbook of Statistics on Indian economy, Reserve Bank of India. It was found that there was no long run co-integrating relationship between FDI inflows and exports from India. Granger causality test was used to find the causal relationship between these variables. The results revealed that there was bi-directional causality between Foreign Direct Investment and exports. This indicates that Foreign Direct Investment might be causing imports which in turn cause exports from India in the post reform period.*

Keywords: foreign direct investment, exports, economic growth, cointegration, causality.

JEL Classification: F21, F10, F43, C32.

1. Introduction

Foreign Direct Investment (FDI) and exports play a crucial role for the sustainable development, especially for emerging economies like India. Obviously, they are also important for the country's growth rate in the short run. FDI in India supplements for the shortage of capital, technology, managerial skills and low market access. It brings in capital and advanced technology that can enhance the technological capabilities of the host country's firms. This would help the country to optimally utilise the scarce resources and maximize its output. The causal relationship between FDI inflows and exports is pivotal for the planning strategies and the overall development process of the country. If FDI boosts export trade of the local firms of the host country, then it will be detrimental to the domestic industry of the home country. On the contrary, if trade and FDI inflows complement each other, then this might lead to enhanced competitiveness of the industries. Thus, the exports and FDI inflows are beneficial and would contribute to the economic growth for the host country.

The relationship between exports and economic growth has been deliberated since the era of the classical economists. They had highlighted the importance of trade and its effect on growth. Export of goods and services from a country generates employment, which can in turn raise the standard of living. It is also a good source of foreign exchange to the country. This can help ease the unfavourable Balance of Payment situations. Trade liberalisation and openness, since the nineties, has made countries like India, realise the importance of exports. In the context of FDI, the latest technology and knowhow can enhance competitiveness. This will lead to a boost in exports and thereby increase the foreign exchange earnings. Ultimately, it will lead to greater capacity utilisation and economic growth. The integration of theories of FDI and trade are still in the preliminary level. Though the importance of FDI or trade as individual variables in economic growth has been widely documented, the possible linkages are relatively understudied. A better understanding of these linkages will help governments to harmonize their FDI and trade policies for prospective growth. From literature, the following linkages between FDI and exports are discussed: (a) Whether FDI substitutes for, or complements Exports (b) Whether FDI causes Exports and (c) Whether Exports causes FDI.

International trade can substitute for the movement of factors of production including FDI, has been highlighted by the Heckscher–Ohlin–Samuelson model. Among countries, exports and imports would mean the indirect exchange of factors of production. If trade barriers are present, International trade and the mobility of factors of production including FDI, are substitutes rather than complements to each other (Liu et al., 2001). The growth of FDI inflows and exports may exhibit causal relationship. But, the direction of causality between FDI and exports may not be apparent. Additional strategies for boosting FDI inflows and export promotion are required for the structural transformation and growth of the economy (Zhang and Felmingham, 2001).

Multi-national companies relocate to other countries, if the business environment is favourable there. After they gain sufficient experience, these foreign firms in the host country may start exporting. Hence, a bi-directional causal relationship between FDI inflows and exports can be found. Thus, the direction of causality between FDI inflows

and exports becomes elusive. This largely depends on the FDI inflows and the export mix in a country. It also varies from country to country. In the case of India, there is this need to find out the direction of the causal links between FDI and exports. The foundation for testing for causality between FDI and exports with recent data becomes more pertinent. Hence, the implication of empirical investigations in assessing FDI–export relationship becomes extremely important. Thereby, the policy makers can make the necessary changes which will favourably encourage more FDI inflows and promote exports.

The paper focuses on the causal relationship among FDI and exports in India. It tries to investigate whether the level of FDI and exports of India are linked and if so, then in which direction. The remainder of this paper has been classified as follows. The second section presents the theoretical discussions on the effect of FDI on host country exports. Section 3 reviews the existing studies on the causal relationships between FDI and exports. Section 4, describes the data and methodology. Estimation and the results of the study are presented in section 5. Summary and conclusions have been explained in section 6.

2. Theoretical framework

FDI is traditionally considered as an addition to the capital stock of the host economy. The common belief among the policy makers and academicians are that FDI brings productivity gains, technology transfers, introduction of new processes, managerial skills and know-how, employee training, international production networks etc. in the domestic market. The key arguments in favour of FDI promoting economic growth are: (i) Multinational corporations (MNCs) are the principal vehicles for the international transfer of technology and the knowledge know-how. Besides, there is a strong complementary tie between FDI and Human Capital that contributes to economic growth (Borensztein et al., 1998), (ii) The dominance of the MNCs over local firms by means of output per worker leads to enhanced productivity levels, (iii) Emergence of a network expands the scope of interactions between MNCs and domestic firms which will create international economic integration., (iv) Learning of improved management practices. Though both exports and FDI play an important role in India's economic growth, the multichannel causal links have not been fully explored.

All this implied that the relationship between these variables to be country specific. Studies in the Indian context have examined the causality between FDI inflows and exports from India. The results are mixed and there existed a lack of general consensus among the researchers. So, there is the need for an empirical investigation of FDI – export relationship for India. Therefore, the basis for testing the causality between FDI inflows and exports from the country with the latest data becomes very relevant.

One of the major variables which initiate the structural changes in an economy are exports. The export potential in the country attracts FDI. The FDI inflows in turn play a major role in expanding the exports in the host country. This will eventually stimulate the development process in the country. Therefore, if incentives for FDI inflows are provided in the host country, it would enhance the export potential and thereby lead to the rapid economic development of the host country. Again, the role of FDI in export promotion in

developing countries remains controversial and depends crucially on the motive for such inflows. On one hand, if the objective of FDI is to tap the domestic market then it may not contribute significantly to export growth. On the other hand, if the objective is to exploit the export markets by taking advantage of the host country's comparative advantage, then FDI may contribute significantly to export growth in the host country. Thus, whether FDI contributes to export growth or not depends on the nature of the policy regime of the host country. The relationship between exports and FDI can foster rapid economic development in the host country.

3. Review of existing studies

This section reviews existing studies on the causality between FDI inflows and exports. Since the causation is country specific, an understanding on the direction of causation among the two variables will enable policy makers to change the policies in the respective countries. Following are some of the studies showing the causal relation between FDI and exports.

The causal relationship between Foreign Direct Investment and trade in China was analysed. (Liu et al., 2001). It was established that the growth of China's imports led to the growth in FDI flows from the home country. This in turn led to the growth of exports from China to the home country. The relationship between FDI and exports in Pakistan was investigated (Iqbal et al., 2010). From the analysis, it was concluded that there was a long run relationship between these variables. It was also found that there was a bi-directional causality between foreign direct investment and exports. It can be concluded from these studies that FDI and exports enhanced economic growth in the respective economies. It was also suggested that government should ensure a conducive environment for attracting additional FDI inflows.

In the empirical literature, there are several studies that discussed the causality between FDI, export and economic growth. However, only a few prominent studies focused their attention to the linkages between FDI, export and economic growth. Data from 1986 to 2004 were examined among eight rapidly developing East and Southeast Asian economies (Hsiao and Hsiao, 2006). Granger causality between GDP, exports and FDI was detected. Time series data causality and panel data causality tests were compared. The panel data causality revealed superior results than the time series causality data analysis. The relationship between trade, Foreign Direct Investment (FDI) and economic growth in Greece over the period from 1960 to 2002 was investigated (Dritsaki et al., 2004). Cointegration analysis results suggested that there was a long-run equilibrium relationship between these variables. The Granger causality test results inferred that there was a bi-directional causal relationship between exports and economic growth. There was a uni-directional causal relationship between Foreign Direct Investment and economic growth with direction from FDI to GDP and also a uni-directional causal relationship between FDI and exports. The impact of FDI and trade openness on per capita GDP in 23 developed countries (Naveed and Shabbir, 2006) using data from 1971 to 2000 revealed that trade openness positively affected the per capita GDP growth while FDI appeared to

be insignificant. There existed uni-directional causality between trade openness and per capita GDP growth. The relationship between real GDP, real export and inward FDI in the least developed countries was investigated (Tekin, 2011). There were multiple causal relations among these variables. Among these countries, the Central African Republic and Liberia had no causality in any direction. The nature of causality between FDI, exports and economic growth in Nigeria over the period from 1981 to 2010 was examined (Nwosa, 2011). It was found that there was no causality between FDI and GDP, as well as between export and GDP. However, there was a positive relationship between FDI, export and economic growth. The relationship between FDI, exports and economic growth in the MENA countries using data was from 1970 to 2008 was analysed (Reza et al., 2011). It was observed that exports promoted growth, in turn growth led to FDI, which brought in the positive impact on exports and GDP.

Some studies made in the Indian context were also reviewed. The industry- specific FDI and output data in post reform India was explored (Chakraborty and Nunnenkamp, 2008). Panel cointegration technique was applied and it was concluded that there was long-run and short-run dynamics of the FDI - growth relationship. Aggregate Granger causality test was also conducted and it was observed that there were feedback effects between FDI and output in both short-run and the long-run. The causal nexus among exports, economic growth and FDI in India from 1992 to 2008 was examined (Durairaj, 2011). The result suggested there was bi-directional relationship between export and economic growth and a uni-directional causal relationship from export to FDI. The relationship between FDI, trade and economic growth in India was also investigated (Dash and Sharma 2011). The results suggested that there was uni-directional causality between FDI and economic growth. The causal relationship of GDP, trade and FDI over the period from 1971 to 2008 in India was inspected (Gharana, 2012). The result supported the export led as well as FDI led growth in the post liberalization period. The relationship between FDI and export in the North- East region of India was examined (Goswami and Saikia, 2012). There was bi- directional causality between FDI and exports. The effect of FDI on economic growth in India was analysed (Ray, 2012). Cointegration and Granger Causality tests were conducted for the period 1990-1991 to 2010-2011. It was reported that there existed uni-directional causality from economic growth to Foreign Direct Investment. The linkages between inward FDI, services trade (both export and import) and economic output of India both at the aggregate and at the sectoral levels (manufacturing and services sectors) were explored (Dash and Parida, 2013). The empirical findings showed presence of bi-directional causal relationship between FDI and economic output. There was also presence of bi-directional causal relationship between services exports and economic output in the aggregate level. Uni-directional causality was found from FDI and services exports to both manufacturing and services output, in the sectoral level.

Thus, it can be observed that the causal relationship between export and FDI is quite complex. This makes it important to explore the causal links between FDI inflows and exports. Even though, the FDI - export relationship was reviewed in detail, there was a lot of ambiguity. This signifies that the relationship between the variables to be country specific. Hence, there is the need for an empirical investigation of the FDI- export relationship for an emerging economy like India.

4. Data and methodology

The two variables used for testing the causality between FDI and exports are taken as Foreign Direct Investment (FDI) and Export (EXP). The data has been collected from the Reserve Bank of India (RBI). The various issues of Handbook of Statistics on Indian economy were used. The values are not adjusted with unit value index for two reasons (1) since aggregate exports are used, what unit value is to be used becomes a debatable issue (2) to account for changes in domestic prices, all values are converted to 2004-05 prices.

The stationarity of the data series is verified by using the Augmented Dickey-Fuller (ADF) test. The unit root property of the data series is important for the causality analysis. Variables that are non-stationary can be made stationary by differencing. The number of differencing (d) required to make the series stationary identifies the order of integration $I(d)$. The unit root test results reveal that the null hypothesis of unit root for the selected variables viz. FDI and exports in the case of India. The logarithmic form of both variables are taken. Then, the stationarity of regression residuals are used for estimating the existence of co-integrating relationships between FDI and Exports. Engle-Granger test for cointegration can be used. If the residuals of the data series are stationary it means cointegration relationship exists between the variables. If it is non-stationary then the cointegration technique cannot be applied. Standard Granger Causality test can be used to examine possible causal relationships among the variables. Firstly, unrestricted equation with n lags is estimated by using OLS.

$$E_t = \alpha_0 + \sum \alpha_i F_{t-i} + \sum \beta_j E_{t-j} + \varepsilon_t \quad (1)$$

$$F_t = \omega + \sum \gamma_i E_{t-i} + \sum \theta_j F_{t-j} + \varepsilon_t \quad (2)$$

Equation (1) assumes that current exports are related to past values of exports as well as of FDI and equation (2) assumes a similar behaviour for FDI. Here, F stands for FDI and E stands for exports.

The elementary steps for running the Granger Causality test are:

1. State the null hypothesis and alternate hypothesis. For example, $y(t)$ does not Granger-cause $x(t)$.
2. Choose the lags. This mostly depends on how much data is available. One way to choose lags i and j is to run a model order test (i.e. use a model order selection method). The idea is to pick several values and run the Granger test numerous times to see if the results are the same for different lag levels. The results should not be sensitive to lags.
3. Find the f-value. Two equations can be used to find if $\beta_j = 0$ for all lags j :

$$y(t) = \sum_{i=1}^{\infty} \alpha_i y(t-i) + c_1 + v_1(t) \quad (3)$$

$$y(t) = \sum_{i=1}^{\infty} \alpha_i y(t-i) + \sum_{j=1}^{\infty} \beta_j x(t-j) + c_2 + v_2(t) \quad (4)$$

The two equations for Granger Causality: Restricted (3) and unrestricted (4). Similarly, these equations test to see if $y(t)$ Granger-causes $x(t)$:

$$x(t) = \sum_{i=1}^{\infty} \alpha_i x(t-i) + c_1 + u_1(t) \quad (5)$$

$$x(t) = \sum_{i=1}^{\infty} \alpha_i x(t-i) + \sum_{j=1}^{\infty} \beta_j y(t-j) + c_2 + u_2(t) \quad (6)$$

4. Calculate the f-statistic using the following equation:

$$5. F = \frac{(ESS_R - ESS_{UR})/q}{ESS_{UR}/(n-k)} \quad (7)$$

It follows the F distribution with m and (n-k) degrees of freedom. If the computed value of F is greater than the specified critical value then the null hypothesis is rejected.

5. Estimation and results

The first step is to know if the variables are stationary or non-stationary to avoid the spurious regression in the time series analysis. Therefore, the Augmented Dickey- Fuller (ADF) test (Dickey and Fuller, 1979) was used. The ADF unit root test for the log of FDI (LFDI) and the log of export (LEXPORT) with both intercept and trend were conducted. The results are presented in Table 1 which follows:

Table 1. Results of ADF test

Variable	Augmented Dickey-Fuller test results			
	ADF without trend		ADF with trend	
	Level	1 st Difference	Level	1 st Difference
LFDI	-0.095896 (-2.2311)	-0.654220 (-3.1950)**	-0.408946 (-2.2289)	-0.738871 (-3.4234)**
LEXPORT	-0.014505 (-0.7544)	-1.001011 (-4.3641)*	-0.318350 (-1.6417)	-1.004522 (-4.3265)*

Note: FDI and Exports represent FDI (% of GDP), and Exports respectively.

* Represents significance at 1% level. ** Represents significance at 5% level.

The results show that LFDI and LEXPORT were integrated of order one i.e. I (1). In other words, the results show that LFDI and LEXPORT are stationary at first order difference.

As optimal lag length is considered as the necessary condition for the VAR model, the optimal lag length criteria is estimated which is presented in Table 2 that follows:

Table 2. Lag length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	0.002661	NA	0.004231	0.210246	0.309661	0.227071
1	48.87378	82.30926*	3.78e-05*	-4.513030	-4.214786*	-4.462555
2	51.56642	3.968094	4.42e-05	-4.375412	-3.878339	-4.291288
3	54.21214	3.341964	5.35e-05	-4.232857	-3.536954	-4.115083
4	59.74503	5.824090	4.99e-05	-4.394213	-3.499482	-4.242789
5	62.57159	2.380265	6.65e-05	-4.270694	-3.177133	-4.085620
6	72.44869	6.238169	4.75e-05	-4.889336*	-3.596946	-4.670612*

* indicates lag order selected by the criterion.

LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

The results show that the maximum criterion like LR, FPE and SC select the first lag as the optimal lag. On the other hand, the AIC and the HQ criterions select the sixth lag as the optimal lag. However, as lag one is selected as the maximum lag by the maximum lag selection criterion, lag one is used for the estimation of the VAR model.

A model was constructed to check the stationarity of regression residuals, where ADF t-statistics for residual was found to be insignificant and the results are reported in Table 3.

Table 3. Results for stationarity of residuals for estimating cointegrating relationships between FDI and exports

Model	Constant	Coefficient	D.W	Adjusted R2	ADF t-Statistics for Residual	Decision about presence of Cointegration
Model : EXP on FDI	7.266 (41.26)*	0.475 (17.65)*	0.97	0.90	-3.403	No

* denotes significance at the level 1%.

The results in Table 3 shows the absence of co-integrating relationship between the FDI inflows and exports from India. This implies that there is no long run cointegrating relationship between FDI inflows and exports from India. Therefore, the absence of cointegrating relationship between the variables leads us to apply the standard Granger causality test to test the causal relationship between the variables. The short run causal relationship between the variables can be performed without including the error correction term. The results of the Granger causality test are presented in the Table 4 that follows.

Table 4. Granger causality test for exploring the relationships between FDI and exports in India

Null Hypothesis:	Obs	F-Statistic	Prob.
LEXPORT does not Granger Cause LFDI	24	3.49131	0.0757
LFDI does not Granger Cause LEXPORT		2.01357	0.0894

The empirical findings based on the Granger model are shown in Table 4. The results of Granger causality test for India show that the null hypothesis of 'FDI does not cause exports' as well as null hypothesis for 'exports do not cause FDI' have been rejected at 1% level. It indicates the presence of bi-directional causality between FDI and exports. This means, exports cause FDI and FDI causes exports, as both the null hypotheses are rejected. This could be due to the fact that FDI could cause imports which in turn cause exports and exports further causes FDI. It can also be the case that FDI also causes exports which might in turn lead to more imports.

The table points out that the null hypothesis of LEXPORT does not Granger cause LFDI is rejected at 10 % level of significance. Again, the null hypothesis of LFDI does not Granger cause LEXPORT is also rejected. However, this does not rule out the possibility that exports could Granger cause FDI and FDI could Granger cause exports in the medium run. In other words, there exists the possibility that rising exports could attract more FDI inflows in India and rising FDI inflows could cause exports in the medium run.

6. Summary and conclusions

The objective of the paper was to check the causality between FDI and exports from India since 1991. For meeting this objective, cointegration technique was used to examine the causal relation between FDI inflows and exports from India. The results for India showed that there was no long-run relationship between these variables. It can be inferred that in the long run, Foreign Direct Investment does not lead to larger levels of exports in India.

In order to test the existence to short-run causal relationship between these two variables, Granger causality tests were used. The results indicated that there existed bi-directional causality between FDI and exports which indicate that FDI might be causing imports (importing technologies) which in turn causes exports. Exports in turn, further caused more FDI inflows. Moreover, it can also be noted that FDI also causes exports which in turn might lead to more imports.

From a policy perspective, the results of bi-directional causal relationship between the variables suggest that for expanding exports, India could focus more on technology imports and its transfer. This will also promote industrial up-gradation through procurement of advanced machinery and equipments. Further, this will have important implications for the formulation of long term growth path for the economy.

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