Do FDI Inflows influence Merchandise Exports? Causality Analysis on India over 1991-2016

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Abstract

The deepening waves of globalization since late eighties and the growth in the international integrated production networks (IPN) over the past decade have significantly increased both Foreign Direct Investment (FDI) and merchandise trade flows. India is no exception to this trend, whose share in global FDI inward stock and global merchandise exports have increased from 0.08 percent to 1.13 percent and 0.51 percent to 1.60 percent over 1989-2015 respectively. The current paper attempts to explain the influence of FDI inflows on India's exports through a time series analysis with quarterly data over the period 1990-91 (Q1) to 2015-16 (Q4). The empirical analysis indicates that while exports influence FDI inflows, the reverse is not true in the Indian context. The result underlines the fact that FDI inflows in the country may primarily be targeting the growing domestic sector, rather than utilizing the domestic resources for reaching the world market. It also suggests that there exist further scope for better utilization of the India-centric trade and investment agreements.

Keywords: International Capital Movements, India, exports, causality analysis, endogenous breaks
JEL Classification: F21, F31

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1. Introduction

The deepening waves of globalization since late eighties and the growth in the international integrated production networks (henceforth IPN) over the past decade have significantly increased both Foreign Direct Investment (henceforth FDI) and merchandise trade flows. The value of FDI inward stock has increased from US $ 2081.29 billion in 1990 to US $ 24983.21 billion in 2015 (UNCTAD, 2016). The merchandise exports has increased from US $ 3089 billion to US $ 16548 billion over the same period (WTO, 2011a; Trade Map, undated). While during nineties, only a handful of developing countries emerged as FDI destinations, in subsequent period their number has increased considerably. Over 2005-15, more than 45 percent of the global FDI flows targeted developing countries and transition economies (UNCTAD, 2016).

In the trade literature, the importance of FDI inflows for the exports of a developing country has emerged as an extensively researched question. The enhanced FDI inflows may however influence exports differently across host developing countries, depending on the relative strength of the country-specific factors. Zhang (2005) noted that FDI inflows may encourage exports from the recipient country through better use of the additional capital, transfer of superior technology, upgradation of technical and management skills, access to newer markets etc. However, if the focus of FDI inflows is to target the host market by taking advantage of locally procured cheaper raw materials through transfer of outdated or inappropriate technologies, then export benefits might be limited.

The cross-country investment flows have increased in the recent years owing to a number of reasons. In particular, the stalemate of WTO Doha Round negotiations has compelled many Member countries to seek additional market access through Regional Trade Agreements (henceforth RTAs). The dynamic benefit of the RTAs includes broadening of the size of the bloc market, thus enabling the efficient and most productive firms to grow beyond the national market through exports (Helpman *et al*., 2004). In addition, RTAs motivates the multinational corporations (MNCs) to go for 'tariff-jumping FDI' for accessing the entire trade bloc market (Ito, 2012). Moreover, recent RTAs are generally formed as Comprehensive Economic Cooperation / Partnership Agreements (CECAs / CEPAs), encompassing merchandise and services trade as well as investment collaborations (te Velde and Fahnbulleh, 2003). The recent period has also witnessed signing of a number of Bilateral Investment Treaties (BITs), International Investment Agreements (IIAs) and Double Taxation Avoidance Treaties (DTAAs), all of which facilitates greater cross-country investment flows (UNCTAD, 2011). These enhanced FDI flows play a crucial role in development of IPNs as well as export facilitation (Wang *et al*., 2007).

It has been observed that during 1990-2000, the global merchandise exports increased at an annual average of 7.12 percent, and the same over 2001-15 has accelerated to 8.14 percent. The contribution of the developing countries in this regard deserves special mention. The share of Asia (excluding Australia, Japan, Middle East, New Zealand, Singapore and South Korea) and Latin America in global merchandise export has increased from 15.04 percent to 26.20 percent and 3.06 percent to 3.30 percent respectively over 2001 to 2015. However, the share of Africa has declined from 2.30 percent to 1.70 percent during this period. On the other hand, during 2000 to 2015, the FDI inflow in South, East and Southeast Asia, Latin America and Africa has increased from US $ 958.32 billion to US $ 5181.21.98 billion, US $ 460.98 billion to US $ 1718.59 billion and US $ 153.48 billion to US $ 740.43 billion respectively in that order (UNCTAD, 2016). The growing volume of FDI has significantly contributed in augmenting the export potential of the leading developing countries in these three regions.

Over the last decade, the presence of India in global trade and investment canvas has improved considerably. The country had followed a policy of import-substitution led economic growth model upto 1991. The economic reform undertaken in the subsequent period ensured a transition to the export-led growth model where FDI inflows and exports emerged as two crucial components. Since then a number of reform measures has gradually been undertaken to enhance the inward FDI flows in the country (Palit, 2009). Consequently, India's share in global FDI inward stock has increased from 0.08 percent in 1990 to 1.13 percent in 2015. In a similar manner, to promote exports the country has done away with the entry and size restrictions (Ahluwalia, undated). Reform has been undertaken in the field of trade policy as well (Rajan and Sen, 2002). In addition, India has entered into a number of RTAs with other developing countries. In particular, in the recent period comprehensive agreements with Japan, Singapore and South Korea involving investment provisions has been signed (Chaisse *et al*., 2011). It is observed that the share of India in global merchandise exports has increased from 0.51 percent to 1.60 percent over 1989 to 2015.

In this background, the current paper attempts to understand the influence of FDI inflows on India's exports over 1990-2016 through a time series analysis. The paper is arranged along the following lines. First, a literature review on the interrelationship between FDI and exports is presented. The FDI inflows and export pattern of India are analyzed next. In the subsequent section, an empirical analysis is conducted to understand the FDI-export long run interrelationship and the causality pattern in the Indian context. Finally, on the basis of the findings, the policy conclusions are drawn.

2. FDI and Exports: Literature Survey

Over the last two decades, the waves of globalization have blurred the thin line between international trade and investment. Exports and outward FDI have theoretically been treated as alternative modes of accessing foreign markets (Horst, 1972). The decision of an MNC to export to a foreign market or to invest depends on several factors, e.g., scale advantages (Brainard, 1997), factor price differences in line with the Factor Proportion Hypothesis (Ethier and Horn, 1990; Helpman, 1984; Markusen, 1984), greater transaction costs (i.e., trade barriers and transportation costs) in line with the Proximity-Concentration Hypothesis (Brainard, 1993; Chaisrisawatsuk, 2007; Krugman, 1983), firm productivity levels (Helpman et al 2004; Melitz, 2003) and for accessing benefits of internalization (Williamson, 1975; Markusen and Venables, 1995). Dunning (1977) noted the advantages associated with creation of own production facilities aboard through FDI by OLI (Ownership-Location-Internalization) advantages framework. In the recent period, the FDI flow from the North to the South seeks to take advantage of the higher growth effect. For instance, over 2000-15, the average GDP growth rate of China, India and the US has been 9.6 percent, 7.2 percent and 1.8 percent respectively, which explains the underlying reason behind FDI inflows to the developing countries.

The FDI inflow in a country can either be vertical or horizontal in nature. However, it has been noted in the literature that a firm may decide to simultaneously send horizontal as well as vertical FDI (Yeaple, 2003). The motivation for horizontal FDI is generally market-seeking in nature, intending to bypass trade costs (Lederman, 2011). Horizontal FDI generally occurs between countries placed on a comparable income and technological plane (Markusen, 1984).) While horizontal FDI is generally a substitute for trade (Markusen (2002; Ito, 2012), the two may also occur simultaneously (Bergstrand and Egger, 2007). In addition to targeting the recipient market, exporting the surplus production to neighbouring countries may also function as a major motivation behind horizontal FDI.

Conversely, vertical FDI implies creation of production facility of an MNC in a country to exploit the local advantages, i.e., raw material, skilled workforce etc. (Gestrin, 2001). Vertical FDI may flow from a technologically advanced country to a developing country (Helpman, 1984). The importance of vertical FDI is on the rise in recent period, given the recent emergence of IPNs. The IPNs facilitate country specialization in narrower product lines, e.g. in the sub-components of the automobile sector in Southeast Asia (WTO-IDE, 2011). There exist a rich literature on the particular nature of agreement between the parent and the network of its subsidiaries in case of vertical FDI, resulting to trade in intermediate inputs for the subsequent stages of processing (Calderón et al., 1996; Gestrin, 2001; Goldberg and Klein, 1998; Rodriguez-Clare, 1996; Svensson, 1996). In addition, vertical FDI may also lead to export of final products from the recipient country.

North-South FDI flows have been witnessed predominantly in the second half of the Twentieth Century, where a country's invest decisions are guided by factor endowment difference (e.g. resources, labour) (Mundell, 1957). As a result, FDI inflows in a typical developing country supplement its capital stock and augment its supply capacity (Kutan and Vukšić, 2007). It has been widely reported in the literature that FDI inflows are accompanied by technologies, core knowledge and management practices, creating positive export spillovers (Athukorala and Menon, 1996; Caves, 1996; De Gregorio, 2003; Greenway et al., 2004; Kneller and Pisu, 2007; Markusen and Venables 1997; Zhang and Song, 2000). However, South-South FDI flows have increased considerably over the last decade with emergence of several MNCs from developing country (Aykut and Goldstein, 2006; Bera and Gupta, 2009; UNCTAD, 2004).

The empirical literature on the FDI-export interrelationship is quite rich. One branch of the literature notes that FDI creates a positive impact on the export performance of recipient countries (Blake and Pain, 1994; Cabral, 1995; Clausing, 2000; Lall, 2000; Lipsey and Weiss, 1981, 1984; Prasanna, 2010; Chaisrisawatsuk and Chaisrisawatsuk, 2007). Martínez-Martín (2010) observed that in short run the effect of FDI is more evident on merchandise exports. In this context, the *flying geese* model of Japanese investment in East and Southeast Asia during seventies and eighties and the recent deepening of the IPNs can explain the FDI-led manufacturing exports (Athukorala and Menon, 1995; Banga 2006; Njong, 2008; Zhang and Song, 2001). The emergence of cross-border multi-plant operations in East Asia during nineties also deserve mention in this regard (Athukorala and Menon 1997).

Positive impact of FDI on exports has been observed in several developed countries (Blomström et al., 1988; Dritsaki et al., 2004; Pfaffermayer, 1994, 1996; Yamawaki, 1991). Among developing countries, the relationship is quite strong for China. Graham (2004) noted that in 1978, China enacted the Law on Chinese-Foreign Joint Ventures with the twin objective of massive technology upgradation as well as export promotion. These reforms paved the road for FDI inflow in China, and the subsequent creation of Special Economic Zones (SEZ) in 1979 led to hassle-free operation for foreign investors in terms of imported raw materials, which in turn created a strong export impetus. Zhang (2005) observed that the export-augmenting effect of FDI in China has been stronger in case of labor-intensive industries. A similar conclusion has been drawn by several other studies as well (Gu et al, 2008; Liu et al., 2001; Zhang and Song, 2001). Sun (2001) has however noted that the effect of FDI differs across regions.

The positive interrelationship between FDI and export has been observed in other Asian countries as well. For instance, FDI flows in Turkey has positively affected its exports (Alıcı and Ucal, 2003; Vural and Zortuk, 2011). Johnson (2006) has noted that the export-platform FDI have played a significant role for the East Asian economies. Several studies have observed the presence of a similar relationship in various ASEAN countries (Cuyvers et al., 2006; Gunawardana, 2008; Mithani et al., 2008; Tambunlertchai, 2009). Bhatt (2010) noted that FDI inflow in New Zealand in the previous year positively influences exports of the current year. Athukorala (2002) has reported that in Vietnam FDI inflows increasingly targeted the export-oriented projects since late nineties.

The evidence on positive influence of FDI on export is also been noted in other continents. Analyzing the scenario for 12 Central and Eastern European (CEE) economies, Kutan and Vukšić (2007) has observed that FDI has contributed significantly to their domestic supply capacity, which in turn has enhanced their export volume. Njong (2008) arrived at a similar conclusion on the spillover effect of FDI in Cameroon. Analyzing the scenario in Nigeria, Olayiwola and Okodua (2013) noted that FDI positively influences the non-oil exports from the country. A similar relationship also holds in Latin American countries (Chavez and Dupuy, 2010; WTO, 2011b).

A section of the literature has argued that factors other than FDI (e.g. GDP, resources, human capital) might play a greater role in determination of export flows in long run. As a result, the linkage between FDI and exports can be weak. Considering the interrelationship between the two series in several developing countries spread across Asia (India, Malaysia, Pakistan and Thailand) and Latin America (Chile and Mexico), Miankhel *et al.* (2009) noted that the interrelationship and causality pattern differ in South and East Asia from the one prevailing in Latin America. In particular, in Latin America long run exports rather affect FDI inflows. The analysis acknowledged the role played by external economies of scale, facilitated by clustering of firms (i.e., SEZ). The analysis by Falk and Hake (2008) on EU countries also revealed that exports influence FDI but the reverse is not true. In a different note, Ancharaz (2003) has noted that while FDI may promote export, the same bear limited influences on export competitiveness.

However, the other branch of the literature reports that FDI-export relationship may not necessarily be positive (Jeon, 1992). Svensson (1996) noted that the foreign production of Swedish firms generally bear a negative relationship with home country's exports. The lack of export spillover from MNC operation in Spain and Ireland has also been reported (Barrios et al, 2003;

Ruane and Sutherland, 2004). A weak FDI-export relationship in Kenya has been reported by Fukunishi (2010), which argues that internal constraints (e.g. credit constraint) prohibits local entities from reaching the efficient scale for exporting abroad. The analysis of Türkan (2006) on US data reveals a marginally negative relationship between FDI flows and trade in final products. Weak or no relationship between FDI and exports has been detected in several Latin American countries as well (ANPEC, 2003; ODI, 2003).

The interrelationship between FDI and export in India reveals a mixed picture. A number of empirical studies have noted a positive relationship between the two (Jayachandran and Seilan, 2011; Prasanna, 2010). Some studies also reported causality from export to FDI inflows, but not in the reverse direction (Sultan, 2013). Conversely, some studies has not found a necessarily positive influence of FDI on exports (Singh and Tandon, 2015). It is argued that foreign entry in India has rather been market seeking in nature (Aggarwal, 2002; Joseph and Reddy, undated; Lall and Mohammad, 1983; Sharma, 2000). NCAER (2010) has noted that around 8 per cent of the total investment in SEZs is explained by FDI. However, only around 13 per cent of the total sales of the firms receiving FDI come from export revenue, indicating the general importance of domestic market for these firms. The weaker exports-FDI linkage can also be explained with the country-specific variations. Bera and Gupta (2009) noted that while FDI from developing countries in India generally targets the growth poles, investments from their developed counterparts do not exhibit such motivations. Banga (2006) differentiated between the US and Japanese investment in India and observed varying export intensity, which can be explained by level of technology and networking depth. The investor's adverse perception on suitability of India as a manufacturing hub has been another decisive factor in this regard (Rajan *et al*., 2008). Other firm-specific studies have also observed absence of strong export orientation in foreign manufacturing affiliates (Kuntluru *et al*., 2012; Pradhan *et al*., 2011; Roy and Banerjee, 2007).

3. The Trade and Investment Scenario in India

The current section provides a brief note to FDI and export scenario in India. Table 1 shows the origin of FDI inflows in the country over 2000-16. It is observed that FDI in India mainly come from Asia, Mauritius, Europe and USA. In all, a handful of countries explain more than four-fifth of FDI inflows in the country.

Table 1: Origin of FDI Inflows to India (2000-2016)

(Percent Share)

Continent / Country	2000-12 (Jan-Dec)	2013 (Jan-Dec)	2014 (Jan-Dec)	2015 (Jan-Dec)	2016 (Jan-Mar)
1. *Asia*	21.32	27.67	36.11	44.81	47.46
A. Singapore	9.95	17.15	24.69	34.17	25.70
B. Japan	7.72	6.36	8.14	4.39	14.44
C. UAE	1.26	1.31	0.97	1.33	5.51
2. *Africa*	38.20	26.55	24.71	23.56	22.17
A. Mauritius	38.02	25.59	24.50	23.37	21.33
3. *Australia and the Pacific*	0.30	0.29	0.24	0.42	0.31
4. *Europe*	26.46	41.53	30.58	19.82	18.24

A. United Kingdom	8.97	17.38	3.76	2.33	3.73
B. Netherlands	4.56	9.68	11.31	7.62	4.70
C. Cyprus	2.71	4.38	4.03	2.87	1.85
D. Germany	3.66	2.16	2.28	1.31	1.02
E. France	1.83	1.97	2.13	1.09	2.20
5. *North and Central America*	6.12	3.52	6.12	10.27	6.77
A. USA	5.83	3.46	5.79	9.99	6.44
6. *South America and the Caribbean*	1.36	0.36	0.57	0.83	3.80

Source: Computed from SIA Newsletter data (April 2016)

Table 2 shows the sectoral distribution of FDI inflows in India over 2000-16. It is observed that primary sector receive only a moderate share of the total FDI inflows in the country. The inflow to manufacturing sector has fluctuated, with automobile, chemical, pharmaceutical and machinery sectors among the prominent recipient sectors. The service sector is the major target of the FDI inflows, with professional services, computer, telecom, trading, media and hospitality sector having particular prominence.

Table 2: Sectoral Distribution of FDI Inflow in India (2000-2011)

(Percent Share)

Sector	**2000-12 (Jan-Dec)**	**2013 (Jan-Dec)**	**2014 (Jan-Dec)**	**2015 (Jan-Dec)**	**2016 (Jan-Mar)**
1. *Primary*	0.84	0.26	2.78	2.05	0.09
A. Mining	0.49	0.12	2.32	1.41	0.01
2. *Manufacturing*	37.22	57.92	38.42	26.74	28.26
A. Miscellaneous Industries	4.19	1.93	1.82	1.48	3.96
B. Automobile Industry	4.12	6.95	7.78	7.33	7.06
C. Metallurgical Industries	3.90	2.07	1.89	1.12	0.96
D. Petroleum & Natural Gas	2.85	0.53	3.51	0.31	0.34
E. Chemicals (other than Fertilizers)	4.58	2.76	2.92	3.64	2.58
F. Electrical Equipments	1.63	0.92	1.65	0.92	1.79
G. Cement and Gypsum Products	1.36	1.23	0.72	0.04	0.07
H. Drugs & Pharmaceuticals	5.30	7.73	4.21	1.59	3.80
I. Industrial Machinery	1.22	2.04	2.38	1.23	2.09
J. Food Processing Industries	0.92	17.45	3.18	1.31	1.14
K. Textiles (including Dyed, Printed)	0.65	0.63	0.59	0.72	0.40
3. *Service*	61.87	41.82	58.80	71.21	71.65
A. Services sector (Financial, Banking, Insurnace, R&D etc.)	19.32	10.52	10.24	16.23	24.96

B. Computer software & hardware	6.03	2.83	5.45	16.84	5.68
C. Telecommunications	6.61	1.37	13.38	3.30	2.39
D. Hospital and Diagnostic Centres	0.82	2.89	1.35	2.10	1.73
E. Construction activities	11.46	5.34	3.53	0.42	0.08
F. Power	4.17	2.61	3.81	1.98	2.06
G. Trading	1.95	3.15	9.96	9.03	10.68
H. Hotel & tourism	3.76	1.72	2.78	2.89	3.67
I. Information & broadcasting (including print media)	1.66	2.57	0.78	1.71	4.04
J. Consultancy services	1.10	0.88	1.74	1.24	1.04

Source: Computed from SIA Newsletter data (April 2016)

Table 3 shows the destination of merchandise exports from India by country. It is observed that share of Indian exports towards developed and developing partners is witnessing an interesting transition. While the share of exports towards WANA and Northeast Asia increased upto 2010-11, it has declined during 2015-16. On the other hand, shares of North America, Africa and South Asia in the export basket have increased in the recent period. The observation indicates that India's trade is intertwined with both developed and developing countries.

Table 3: Destination of Merchandise Exports from India (1999-2000 to 2015-16)

(Percent Share)

Region / Country	**1999-00**	**2003-04**	**2006-07**	**2010-11**	**2015-16**
Total Exports (US $ Billions)	36.82	63.84	126.41	251.14	262.29
1. *West Asia North Africa (WANA)*	12.34	15.95	18.23	22.60	17.64
A. UAE	5.66	8.03	9.51	13.68	11.55
2. *ASEAN*	6.08	9.12	9.97	10.86	9.59
A. Singapore	1.83	3.33	4.79	4.10	2.94
3. *North East Asia*	15.20	14.70	15.36	16.77	11.76
A. China	1.46	4.63	6.58	7.81	3.44
B. Japan	4.58	2.68	2.27	2.07	1.78
C. South Korea	1.29	1.20	1.99	1.65	1.34
4. *South Asia*	3.88	6.73	5.12	5.13	7.10
A. Sri Lanka	1.36	2.07	1.79	1.61	2.02
5. *EU Countries (27)*	26.25	22.74	21.23	18.64	16.95
A. UK	5.53	4.74	4.45	2.84	3.37
B. France	2.44	2.01	1.66	2.02	1.77
C. Germany	4.72	3.99	3.15	2.69	2.70
D. Netherlands	2.41	2.02	2.12	3.09	1.80
6. *Africa*	4.07	4.82	6.65	6.48	9.54
7. *North America*	24.37	19.19	15.80	10.72	17.24
A. US	22.80	18.00	14.92	10.17	15.38

8. *South America*	1.79	1.78	3.37	4.08	2.87
A. Brazil	0.37	0.43	1.15	1.58	1.01

Source: Constructed by the authors from GoI (undated) data

Table 4 shows the composition of merchandise exports from India by sector. It is observed that primary exports hold a small share in Indian exports, with marine products and cereals among the major export items. Among the manufacturing products, mineral fuels, organic chemical and pharmaceutical products, gems and jewelry, iron and steel, machinery and equipment and auto-products are the major exportable from the country. The result underlines the growing sophistication of India's export basket.

Table 4: Sectoral Distribution of Merchandise Exports from India (1999-2000 to 2015-16)

(Percent Share)

Product Category	**1999-00**	**2003-04**	**2006-07**	**2010-11**	**2015-16**
Total Exports (US $ Billions)	36.82	63.84	126.41	251.14	262.29
1. *Primary Products*	15.61	11.92	9.13	8.69	11.43
A. Marine Products	3.16	1.94	1.24	0.89	1.71
B. Coffee, Tea and Spices	2.67	1.12	0.94	0.83	1.13
C. Cereals	1.97	2.37	1.34	1.26	2.39
D. Residues and waste from the food industries; prepared animal foder.	1.06	1.16	0.99	0.98	0.31
2. *Manufacturing Products*	84.39	88.08	90.87	91.31	88.57
A. Mineral fuels and related processed products	0.25	5.85	14.92	16.92	11.91
B. Inorganic chemicals etc.	0.43	0.66	0.64	1.23	0.46
C. Organic chemicals	3.72	4.42	4.54	3.64	4.39
D. Pharmaceutical products	2.32	2.54	2.52	2.61	4.92
E. Plastic and articles thereof	1.15	2.09	2.17	1.57	1.99
F. Garments	15.41	12.32	8.87	5.67	6.48
G. Gems and Jewelry	20.60	16.86	12.73	15.95	15.08
H. Iron and steel and articles thereof	4.47	6.46	7.12	6.81	4.44
I. Copper and articles thereof	0.23	0.89	2.40	3.23	0.94
J. Machinery and mechanical appliances; parts thereof	2.70	3.93	4.03	3.57	5.05
K. Electrical machinery and equipment and parts thereof	2.35	2.97	3.25	4.32	3.05
L. Automobile products	1.89	2.73	2.98	4.50	5.47

Source: Constructed by the authors from GoI (undated) data

Table 5 shows the composition of merchandise exports from India by stage of processing over 1996 to 2015. It is observed that over the period India has been able to reduce the share of raw material and intermediate products exports, while the importance of consumer and capital goods are on the rise. This signifies a steady rise in value-added exports from the country, indicating technology adoption effects.

Table 5: Stage of Processing in Indian Merchandise Export (1996-2015)

(Percent Share)

Product Category	1996	2000	2004	2007	2010	2015
Raw materials	13.50	9.79	10.60	10.74	9.88	8.27
Intermediate goods	41.88	43.13	38.93	35.14	35.64	32.74
Consumer goods	37.64	40.65	41.40	43.77	42.61	45.22
Capital goods	6.97	6.43	9.07	10.35	11.87	13.77

Source: Computed by authors from World Bank (undated) data

In the Indian context, applying Granger causality test based on Vector Error Correction method (VECM) over 1980-2010, Sultan (2013) noted that exports cause FDI inflows, but the reverse is not true. However, not many studies have attempted to identify the structural break points with respect to FDI-export interface in India. Moreover, several existing studies have followed Granger Causality method for analyzing FDI-export causal relationship, but the current study reports the robust causality results obtained from Toda-Yamamoto (1995) procedure. Therefore the current analysis intends to complement the existing literature in the following manner. First, it explores causal relationship between FDI-export in the Indian context, in particular by considering the possible presence of multiple structural breaks. Second, it analyses the direction of causality between the two data series (in both directions), which is instrumental for bringing out the present FDI-export interlinkage and future policy implications.

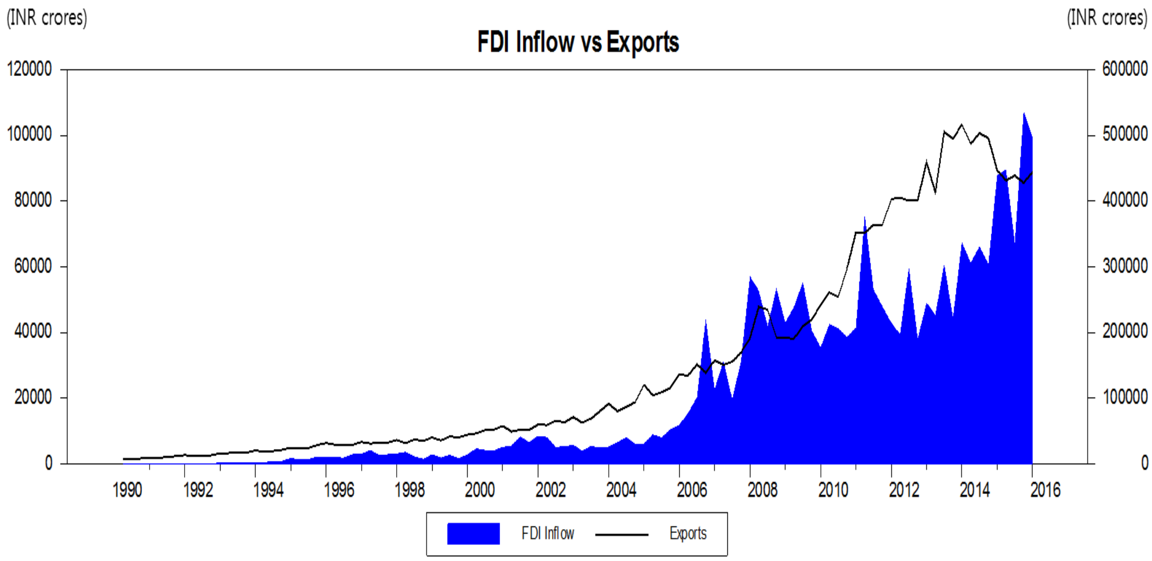
Empirical Analysis

Data

Quarterly data over the period 1990-91:Q1 to 2015-16:Q4[4] are used to examine the causal relationship between exports (X) and foreign direct investment (FDI) inflows for the Indian economy. The data has been compiled from Handbook of Statistics on Indian Economy (2015-16), published by Reserve Bank of India (RBI, 2016). All the variables are calculated in home currency price (INR Crores). The FDI and exports scenario for India over the sample period is shown with the help of Figure 1. While exports revel a rising trend from late nineties, growth in FDI series is witnessed over the last decade.

[4] The financial year for the Indian economy ranges from April (of the current calendar year) to March (of the next calendar year).

Figure 1: Exports and FDI for Indian Economy (Values in INR Crores)



Source: Constructed by the authors from RBI (2016) data

Unit Root Test

Traditionally, the stationary properties of variables are examined by using Augmented Dickey Fuller (1979) and Phillips Perron (1988) unit root test. However, as suggested by Perron (1989), the standard unit root tests are biased towards the non-rejection of null hypothesis in the presence of structural breaks. A graphical representation of data on India's export and FDI exhibited in Figure 1, suggests multiple regime shifts, centred on broadly two periods: first, post 2001-crisis in US and subsequent recovery around 2003 onwards, and secondly, global recession that had its origin in the US during the third quarter of 2008 and the subsequent Eurozone crisis 2010 onwards. Given the strong likelihood that both the series under consideration are subject to multiple structural breaks, the standard unit root tests for stationarity are likely to yield misleading conclusions.

Unit root test against a single-break stationary alternative was proposed by Zivot and Andrews (1992). It was extended to a two-break stationary alternative by Lumsdaine and Papell (1997) and up to five-break stationary alternative, with an a priori unknown number of breaks, by Kapetianos (2005). However, as pointed out by Bec and Bassil (2009), these tests maintain the linearity assumption under the unit root null hypothesis. As observed by Nunes and Kuan (1997) and Antilay (2005), if a break exists under the null of unit root, standard unit root tests exhibit *size distortions* that tend to over-reject the null hypothesis of unit root. To overcome this problem, Lee and Strazicich (2003, 2004) applied the Lagrange Multiplier (LM) test statistics to develop an alternative unit root test in the presence of endogenous structural breaks (at most two). The LM unit root test allows for breaks both under the null and the alternative hypothesis, such that the rejection of unit root null based on this test provides strong evidence of stationarity.

The following data generating process (DGP) is considered for the analysis:

$$y_t = \delta' Z_t + e_t, \qquad e_t = \beta e_{t-1} + \varepsilon_t \tag{1}$$

where Z_t is a vector of exogenous variables, δ' is a vector of parameters and ε_t is a white noise process, such that ε_t ~NIID (0, σ2). Let us consider the framework that allows for two structural breaks following Lee and Strazicich (2003). The *crash* model that considers two shifts in levels only is described by $Z_t = [1, t, D_{1t}\ D_{2t}]'$, and the *break* model that allows for two changes in both level and trend is described as $Z_t = [1, t, D_{1t}\ DT_{1t}\ D_{2t}\ DT_{2t}]'$, where D_{jt} *and* DT_{jt} *for* $j = 1, 2$ are the appropriate dummies defined as,

$$D_{jt} = 1,\ \text{if } t \geq T_{Bj} + 1;$$
$$= 0,\ \text{otherwise}$$

and,

$$DT_{tj} = t - T_{Bj},\ \text{if } t \geq T_{Bj} + 1;$$
$$= 0,\ \text{otherwise}$$

where T_{Bj} denotes the j[th] break date.

The main advantage of Lee and Strazicich (2003) approach to unit root test is that it allows for breaks under the null (β = 1) and the alternative (β < 1) in the DGP given in (1). Following Nag and Mukherjee (2012), this method use the following regression to obtain the LM unit root test statistics:

$$\Delta y_t = \delta' \Delta Z_t + \phi \tilde{S}_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta \tilde{S}_{t-j} + u_t \tag{2}$$

where $\tilde{S}_t = y_t - \tilde{\Psi}_t - Z_t \tilde{\delta}$, $t = 2, ..., T$; $\tilde{\delta}$ denotes the regression coefficients of Δy_t *on* ΔZ_t and $\tilde{\Psi}_t = y_1 - Z_1 \tilde{\delta}$, y_1 and Z_1 being the first observations of y_t and Z_t respectively. To take care of like autocorrelation in error terms, the lagged terms $\Delta \tilde{S}_{t-j}$ are included in the equation. The null hypothesis of unit root (ϕ = 0) is tested by the LM t-statistic. The lag length *k* is selected by employing the general to specific (GTS) approach in all of the a priori unknown break unit root tests and counterchecked using different lag selection criteria, like AIC, BIC etc. The critical values are tabulated in Lee and Strazicich (2003) for the two-break case.

Table 6 presents the unit root test results in the absence of structural breaks. Applying standard Augmented Dickey Fuller (1979) and Phillips Perron (1988) unit root tests, the results suggest that both FDI and Exports are non-stationary but integrated of order 1.

Table 6: Unit Root Tests without Structural Break)

Variables	ADF[1]		PP[2]	
	Level	**First Difference**	**Level**	**First Difference**
X	-1.46	-12.72*	-1.58	-12.48*
FDI	-0.66	-10.96*	-3.27	-20.49*

Note: 1. Augmented Dickey-Fuller test. 2. Philips-Perron test. 3. Asterisk (*) denotes statistically significant at 1% level. 4. Results reported are those with drift and trend. 5. First difference of both series are reported staionary.

However, as explained earlier, plot of the two series (X and FDI) in Figure 1 strongly suggests that both the series under consideration may be subject to more than one structural breaks, which makes the above findings based on standard unit root tests for stationarity misleading. Table 7 presents the LM unit root test results for the two break case (Lee and Strazicich, 2003). The results suggest that the null hypothesis of a unit root can be rejected for FDI in levels, but not for exports. In other words, the FDI series is stationary in the presence of two endogenous structural break at 1% level of significance, while the X series is integrated of order 1. This is in sharp contrast to the unit root results without structural breaks reported in Table 6, where both the series are integrated of order 1.

Table 7: Unit Root Tests with Two Structural Breaks (at Level)

Series	**Model**	**Break Points**	**Optimal Lags**	**T-Statistic**	**Critical Values at 1%**	**Critical Values at 5%**	**Result**
X	Break (Intercept & Trend)	2003-04:Q3 2010-11:Q3	0	-4.67	(-6.16 to -6.45)	(-5.59 to -5.74)	Do not reject null hypothesis of unit root, i.e., I(1)
FDI	Break (Intercept & Trend)	2006-07:Q2 2012-13:Q4	0	-10.12*	(-6.16 to -6.45)	(-5.59 to -5.74)	Reject null hypothesis of unit root, i.e., I(0)

Note: 1. Method applied is Lee and Strazicich's (2003) 2. Asterisk (*) denotes statistically significant at 1% level. 3. Results reported are those for Break Model (Intercept & Trend). 4. The first difference of X is reported stationary.

A careful observation reveals that the estimated breakpoints can be roughly clustered around two periods: mid of the last decade, which can be attributed to the boom phase in the global economy and the early period of the present decade, which marks the post-recession period that had its origin in the United States during the third quarter of 2008 and the subsequent Eurozone crisis 2010 onwards.

Contegration Test

The tests for cointegration between two time series can be tested using a vector autoregressive model (VAR) based approach. Let us consider a VAR of order *p*:

$$y_t = A_1 y_{t-1} + ...+ A_p y_{t-p} + Bx_t + \varepsilon_t \quad (3)$$

where y_t is a k-vector of (nonstationary) I(1) variables, x_t is a d-vector of deterministic variables, and ε_t is a vector of innovations. Rewriting this VAR as

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma \Delta y_{t-1} + Bx_t + \varepsilon_t \qquad (4)$$

where:

$$\Pi = \sum_{i=1}^{p} A_i - I, \qquad \Gamma_i = -\sum_{j=i+1}^{p} A_j$$

The test for cointegration between y's is calculated by looking at the rank of Π matrix via its eigen values. As discussed in Brooks (2002), under the Johansen (1988) approach there are two tests. The first is the *trace test* which is a joint test where the null is that the number of cointegrating vectors is less than or equal to r against an unspecified alternative that they are greater than r. The test statistic is formulated as:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{k} \ln(1-\hat{\lambda}_i) \qquad (5)$$

where r is the number of cointegrating vectors under the null hypothesis and $\hat{\lambda}_i$ is the estimated value for the i-th ordered eigen value from the Π matrix. The second is the *maximum eigen value test* for cointegration which conducts separate tests on each eigen value, and has as its null that the number of cointegrating vectors is r against an alternative of $r+1$. The test statistic is formulated as:

$$\lambda_{\max}(r | r+1) = -T \ln(1-\hat{\lambda}_{r+1}) \qquad (6)$$

The critical values for the two statistics were provided by Johansen and Jesulius (1990).

Johansen-Jesulius cointegration test is generally applied in a model where all variables in the system are I(1). However, as noted by Hjalmarsson and Österholm (2007), if one variable is I(0) instead of I(1), the same will be reflected 'through a cointegrating vector whose space is spanned by the only stationary variable in the model' (Hjalmarsson and Österholm, 2007, pp 5). Since in the present model, exports is I(1) and FDI is I(0), one can still apply the Johansen-Jesulius cointegration test, which is analysed in Table 8. Both trace and maximum eigen value tests reject the null of zero cointegrating vectors and one can conclude that there exists a cointegrating relationship with one cointegrating vector.

Table 8: Results from Johansen-Jesulius Cointegration Test

Null Hypothesis	Trace Test	Maximum Eigen Value Test
$r=0$	27.23* (0.005)	21.59* (0.006)
$r=1$	5.64 (0.22)	5.64 (0.22)

Note: 1. Method applied is intercept (no trend) in cointegrating equation. 2. The figures in the parenthesis are the *p-values*. 3. * denotes rejection of the hypothesis of no cointegration at 0.05 level.

Causality Test

Traditionally Granger (1969) causality is employed to test for the causal relationship between two variables. This test states that, if past values of a variable y significantly contribute to forecast the future value of another variable x then y is said to Granger cause x . Conversely, if past values of x statistically improve the prediction of y, then we can conclude that x Granger causes y. The test is based on the following regressions:

$$y_t = \beta_0 + \sum_{k=1}^{M} \beta_k y_{t-k} + \sum_{l=1}^{N} \alpha_l x_{t-l} + u_t \quad (7)$$

$$x_t = \gamma_0 + \sum_{k=1}^{M} \delta_k y_{t-k} + \sum_{l=1}^{N} \gamma_l x_{t-l} + v_t \quad (8)$$

where y_t and x_t are the two variables, u_t and v_t are mutually uncorrelated error terms, t denotes the time period and *'k'* and *'l'* are the number of lags. The null hypothesis is $\alpha_l = 0$ for all l's and $\delta_k = 0$ for all k's versus the alternative hypothesis that $\alpha_l \neq 0$ and $\delta_k \neq 0$ for at least some l's and k's. If the coefficient α_l's are statistically significant but δ_k's are not, then x causes y. In the reverse case, y causes x. But if both α_l and δ_k are significant, then causality runs both ways (Bhattacharya & Mukherjee, 2008, 2016). The direction of causality depends critically on the number of the lagged terms included. The present study considers the optimal lag length criteria to be 4 (Table 9).

Table 9: Results for Optimal Lag Length Selection Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-2320.820	NA	3.56e+18	48.39209	48.44551	48.41368
1	-2090.054	447.1103	3.16e+16	43.66778	43.82805	43.73257
2	-2079.962	19.13129	2.78e+16	43.54088	43.80800	43.64886
3	-2070.802	16.98419	2.50e+16	43.43338	43.80735	43.58454
4	-2061.061	17.65607*	2.22e+16	43.31377	43.79459*	43.50812*
5	-2056.067	8.843352	2.18e+16	43.29306	43.88073	43.53061
6	-2050.723	9.240703	2.12e+16	43.26506	43.95958	43.54580
7	-2045.646	8.567475	2.08e+16*	43.24263	44.04399	43.56655
8	-2041.646	6.583489	2.08e+16	43.24262*	44.15083	43.60974

Note: 1. Asterisk (*) denotes the optimal lag length selected by the criterion. 2. The criterion are Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ).

It has been noted that the traditional Granger (1969) causality test for inferring leads and lags among integrated variables will end up in spurious regression results, and the *F*-test is not valid unless the variables in levels are integrated of same order. Toda and Yamamoto (1995) proposed a simple procedure requiring the estimation of an 'augmented' VAR, even when individual series are not integrated of same order, which guarantees the asymptotic distribution of the MWald statistic. The testing procedure is similar to Granger causality, but augmented with extra lags depending on the maximum order of integration of the series under consideration (Bhattacharya & Mukherjee, 2008, 2016). It is essentially a two-step procedure. *First*, we need to test for stationarity of the series and also need to find the maximum order of integration (d_{max}), which is found in the present study to be 1. *Secondly*, once the stationarity is checked and the order of integration is determined, an autoregressive model (VAR) in levels is constructed with a total of ($k+d_{max}$) lags, where k is the optimal number of lagged terms, which in the present study is 4. Thus in the present study the total number of lags considered is 5. The Wald statistic will be asymptotically distributed as a Chi Square, with degrees of freedom equal to the number of "zero restrictions", irrespective of whether x_{1t} and x_{2t} are I (0), I (1) or of any arbitrary order.

The Toda-Yamamoto causality result is presented in Table 10. The first null hypothesis, '*Exports does not Granger cause FDI*', is rejected at 1% significance level. In other words, the analysis suggests exports lead FDI and not vice-versa.

Table 10: Results for Toda-Yamamoto Approach to Granger Causality Test

Dependent Variable	Null Hypothesis	MWald statistics	p-values
FDI	Exports does not Granger cause FDI	22.02952*	0.0002
Exports	FDI does not Granger cause Exports	6.289182	0.1786

Note: 1. Asterisk (*) denotes statistically significant at 1% level.

Policy Considerations

In the recent period, the deepening of the IPNs across Asian economies has been facilitated by the FDI inflows as well as the evolving RTAs. Two defining features of the recent RTAs include strong trade facilitation agreement and investment cooperation agreement. The freer investment regime, supported by lower tariff barriers resulting from the RTAs and trade facilitation measures, contributes significantly in creation of specialization in narrower product lines, leading to IPNs and cross-border exports.

The results obtained in the Indian context in this background are interesting, though not completely counterintuitive. The observation that FDI inflows are not contributing to exports, while the reverse relationship is true, underlines the fact that FDI inflows in the country may primarily be targeting the growing domestic sector, rather than utilizing the domestic resources for reaching the world market. Of late exports are rising from the growing segments of the economy, for example, automobile and other manufacturing sectors. Moreover, almost two-third of the FDI inflows in the country are coming towards the service sector, where the domestic segment offer a huge growth opportunity. As a result, the export implications of the FDI inflows are found to be limited. The results suggest that there exist further scope for better utilization of the India-centric trade and investment agreements, which may strengthen the investment-trade link. Also, once the 'Make-in-India' and the other recent initiative undertaken in the country mature, the FDI-export linkage is likely to grow deeper.

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