Role of trade policies in growth of Indian manufacturing sector

Banga, Rashmi and Das, Abhijit

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Rashmi Banga* and Abhijit Das**

Abstract: ***Indian manufacturing sector witnessed an unprecedented growth in the decade of 2000. Not only did the average annual growth touch 8%, there was a stupendous rise in growth of real exports and real imports of manufactures in this decade. This is also the decade when the average annual growth of real per capita income was the highest (5.6%). In this scenario, the paper examines three issues: firstly, the role played by trade polices and reforms in the growth of the manufacturing sector. Secondly, whether this growth was an export-led growth? And thirdly, what are the successful stories at the industry level. Structural breaks are identified in growth rate of manufacturing sector and growth rates of real exports and real imports using Additive Outliers (AO) and Innovative Outliers (IO) tests. The results show that the reforms of 1991 played a more crucial role than the reforms of 1980s in causing structural break in overall manufacturing growth. Changes in export and import policies which were brought about in 2001 and 2002 led to structural breaks in real exports and real imports of the sector. Time series analysis is undertaken and Vector Error Correction model is estimated using two different specifications to test whether manufacturing growth is an export-led growth or not. Granger causality tests are undertaken to check the causality. The results show that growth of Indian manufacturing sector is not an export-led growth but has been induced by domestic demand and import growth. Motor vehicles and food and food products industries are identified as successful stories with respect to growth in value added and growth in trade while electrical machinery and, chemicals and chemical products with some others are identified as industries which need to be closely monitored as they may have the danger of possible hollowing out.***

Key Words: Indian manufacturing sector; Indian manufacturing growth; reforms of 1991; structural break; IO and AO; VECM for Indian manufacturing; Export Led Growth; Hollowing out
JEL classification: F13, F14, L6, O24, O25,

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* Rashmi Banga, ECIDC, UNCTAD, Geneva, rashmi.banga@unctad.org

**Abhijit Das, Head, Centre for WTO Studies, New Delhi, headwto@iift.ac.in

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1. Introduction

Manufacturing sector in India, as compared to the other sectors, has always been the main focus of liberalisation policies. From import substitution policies of 1950s to export promotion strategies of 1980s and to major tariff liberalisation of 1990s, the sector has experienced a wide variety of policy interventions. However, this sector has also been a sector of major concern for India due to its sticky growth rates, decade after decade, and persistently low contribution to total output and employment in the economy. The sector's average annual growth rate remained around 5.8% in 1950s and 1960s, falling to 5% in 1970s and returning back to 5.8% in 1980s[1]. The sector's contribution to GDP varied from 12% to 14% from 1960s till 1980s and its contribution to total employment was has remained low with negative growth in 1980s (-0.12% per annum).

The reforms of 1990s were accompanied by an improvement in the value added growth rate of manufacturing sector as it touched 6%. Growth of employment increased to 2.9% per annum.[2] This led to a whole stream of literature which estimated and assessed the impact of liberalisation on growth of output and productivity of the sector. But in spite of the reforms, it is argued that protection to the sector remained high. Many products, especially intermediate products and consumer durables continued to enjoy high tariffs. Further, protection to the sector was provided in many other forms as well, which included non tariff barriers, quantitative restrictions (QRs), licensing regime and selective protection which resulted in high magnitude and high variance in protection rates.

But, in the beginning of 2000 a careful dismantling of protection started. This was initiated by the reduction in the tariffs. The weighted average of tariffs declined steadily from 24% in 2001 to 7% in 2009. The weighted average of tariffs were also brought down for the consumer goods from 32% in 1999 to 9.5% in 2009. But more importantly, quantitative restrictions were removed for all items in 2001. During the decade of 2000, through many complementary policies, protection to the

[1] Source: Central Statistical Organisation, National Accounts Statistics

[2] Tendulkar (2000)

manufacturing sector was lowered. Along with this important steps were taken to boost exports of manufacturing sector. These included discontinuing actual user conditions on Open General Licence imports and items were shifted from Restricted to Limited Permissible lists and further from Limited Permissible to Open General License scheme. For the manufacturing sector, the obligation of importing Open General License items via EXIM scrip was also abolished in a phased manner.

Correspondingly, manufacturing sector witnessed the most important breakthrough in its growth rate in the decade of 2000. The decadal average annual growth rate of the sector touched 8%. The sector also witnessed a spurt in its imports as well as exports. Average annual growth rate of manufacturing real exports[3] surged from 5% in 1980s to 9.7% in 1990s and increased further to 12% in 2000s. Average annual growth rate of real imports increased from 5.4% 1980s to 11% in 1990s but then surged to around 16% in 2000s. Though the sector's contribution to total GDP did not increase much (mainly because of a much higher growth of services sector) its contribution to total employment witnessed a rise in the post 2005 period.

The impressive performance of manufacturing sector in the post liberalisation period accompanied by important changes in the trade policies may indicate that that much of the growth of manufacturing sector can be attributed to the liberalisation polices. However, the post liberalisation period, especially the decade of 2000, was also a period of an unprecedented growth of the Indian economy as a whole. This growth was mainly spearheaded by the services sector growth. GDP grew at an average annual growth rate of 7% in 2000s as compared to 5% in the 1990s. More importantly, there was a rise in average annual growth of per capita income. These two factors contributed significantly to domestic demand expansion. Given this scenario, the extent to which libralisation policies may have contributed to the growth process of manufacturing sector becomes an extremely important question to address. It is an important issue not only for India in terms of future policy directions but is also important for other developing countries which have limited policy tools to address their growth concerns and are looking at India's liberalisation and growth experience for some important lessons.

[3] Deflated by Export Unit Value Index

In this context, we attempt to find answers to the following questions:

1. Did liberalisation policies lead to a structural break in the growth of manufacturing sector?
2. Has India's manufacturing growth been an export-led growth or an import-induced growth? What has been the role played by domestic demand?
3. What are the successful and not so successful stories with respect to trade policies and growth within the manufacturing sector?
4. What could be the broad lessons from India's experience of liberalisation with respect to manufacturing sector?

To answer the above questions we use different methodologies. The impact of trade policies on manufacturing sector is assessed by identifying the years of structural break in the growth of manufacturing sector in the period 1950-51 to 2008-09. Identification of years of structural break has been fairly commonly used in the literature to identify which set of liberalisation polices coincide with the shift in the growth trajectory of the sector. We also identify the years of structural break in the growth in real exports and real imports. This is done to further narrow down the subsets of polices within broad set of liberalisation policies that may have been more effective in leading to structural breaks in growth of exports and imports.

Two kinds of structural breaks in the growth rate of manufacturing sector have been identified to examine whether liberalisation policies were effective. These are a *gradual shift* in the mean of the series (Innovational Outliers) and a *sudden change* in the mean of the series (Additive Outliers) using Clemente et al. (1998) tests.

The question whether growth in manufacturing sector has been an export-led growth or an import-induced growth is address by estimating short term and long term relationship between manufacturing growth, export growth and import growth. Causality tests are undertaken to reveal the cause and effect relationships between manufacturing sector growth and growth of exports and imports. A mulitivariate cointegration analysis is carried out by estimating Vector Error Correction Model (VECM) and Granger non-causality tests based on VAR are undertaken for testing causality in the relationships.

A industry level analysis is undertaken based on trade and production data for the organised manufacturing sector to identify industries which may have benefitted from liberalisation policies and those which may not have. Broad conclusions are drawn from the arrived results.

2. Cautious Liberalisation and Change in the Composition of Trade

2.1 Reforms of 1991: Cautious and Selective

liberalisation polices in India are found to be generally in tandem with the industrial policies followed over the years. This may not be the case in many other developing countries. The Industrial Policy of 1948 laid emphasis on heavy protection to Indian industry as it aimed at building a strong heavy capital goods industrial base in the economy. However, faced with low growth rate and lack of capability of the sector to be able to build a strong industrial base, the Industrial Policy of 1956 encouraged foreign capital. It was envisaged that foreign capital would bring better technology and lead to spill over effects on the domestic industry. But the still sticky growth of the sector for the next two decades led to a change in the attitudes and direction of the industrial policy and the Industrial Policy of 1980 encouraged export-oriented industries and import of technology and raw materials.

The deteriorating balance of payments situation and the economic crisis of 1991 led to a drastic change in the orientation of Industrial Policy of 1991, which emphasised along with other reforms, automatic approvals for FDI in many industries, especially in export-oriented industries and encouraged foreign technology agreements. An important step taken in the industrial policy which affected trade was abolition of Phased Manufacturing Programmes, which were imposed on industrial firms and required them to source their parts and components from domestic producers rather than using imported parts and components.

In line with the industrial policy, trade policies followed a broad based liberalisation strategy. Prior to the tariff reforms of the 1990s, the Indian tariff system was complex due to the existence of a large number of exemption notifications applicable to all three types of duties: basic, auxiliary and additional duty. Due to exemptions, the

effective rate of duty varied widely between very similar products. Even for the same product, the rate of customs duty applicable varied according to user, end-use of the product and the country from which it was imported (Goldar, Narayana and Saleem 1992, Goldar 2002). High tariffs rates on a large number of products and tariff peaks along with other non tariff barriers provided high effective rate of protection (ERP) and high import coverage ratio. In the period 1986-90, average ERP for the manufacturing sector as a whole was 125.9% while import coverage ratio was 91.6% (Das 2003).

In 1991 imports were regulated by means of a narrow positive list of freely importable items. Items not in the positive list were either prohibited for imports or could be imported subject to compliance with the requirements of a complex licencing system. The overall approach to import management was selective and geared to curtailment of non-essential and low-priority imports, with particular emphasis to discourage inventory build-up of imported inputs through use of fiscal and monetary modes of regulation. Although multilateral trade rules of GATT in general prohibited QRs on importation or exportation of any product, these rules provided exceptions to this fundamental principle on Balance of Payment grounds. India resorted to the BOP exception and maintained QRs on imports on almost 80% of products, prior to the economic reforms of 1991. This edifice of regulated trade was gradually dismantled through tariff reforms and simplification in import procedures and requirements.

The reforms of 1991 brought some major changes in the existing tariff structure. Average and weighted tariffs declined from 81.9% and 49.5% in 1990 to 57.4% and 27.8% in 1991 (Table 1). The peak duty rate was lowered gradually from > 200% in 1990 to 35% in 1999. A number of other changes were made to simplify the system in terms of fewer rates, lower tariff differential within products and many exemptions which related to end-use were removed. One of the most important steps undertaken in 1992 was to shift the basis of regulating imports from a positive list of freely importable items to a limited negative list approach in 1992. This implied that with the exception of products listed in negative list, all other products could be freely imported.

The EXIM policy of 1992 substantially eliminated licensing and discretionary controls on trade and provided further impetus to exports. Apart from consumer goods, almost all capital goods, raw materials and intermediate goods could be freely imported subject only to payment of customs duty. For consumer goods, a major step taken was to allow their imports under Special Import Licence (SIL) issued to certain categories of exporters, including deemed exporters, trading/export houses, and manufacturers who had acquired ISO 9000 or BIS 14000 certification of quality. The special import licensees were freely transferable.

During 1995-96 the definition of consumer goods was changed to suit the needs of importers, so as to allow them to freely import parts, components and spares of consumer goods as well. These were earlier restricted to the extent that these could be imported without a licence only by actual users. Further, the list of freely importable consumer goods was expanded to include 78 items, which included natural essential oils, instant coffee, refrigerated trucks, cranes and other utility vehicles.

By 1995 more than 3000 tariff lines covering raw materials, intermediates and capital goods were freed of import licensing requirements, supplementary licenses for all importers except small-scale industries were abolished. In 1996, 300 items could be imported under Special Import License. Further, studies estimating the ERP and import coverage ratios show that as compared to the 1980s, ERP declined in the decade of 1990s. It declined from 125.9% in 1986-90 to 80.2% in 1990-95 period and further to 40.4 % in 1996-2000 while import coverage ratio declined from 96.1% in 1986-90 to 37.9% in 1990-95 period and further to 24.8% in 1996-2000 (Das 2003).

2.2 *Dismantling of Protection in 2000s*

Although, the reforms of 1991 brought in some important changes in the tariff regime and simplified many administrative and import controls, but these reforms were not uniform across the board and continued to provide selective protection. Import restrictions on capital goods, raw materials and components were liberalised on a fast track, while import restrictions were maintained for most of the consumer goods. India continued to maintain quantitative restrictions on a large number of consumer goods. Consequently, during this period of liberalisation, the consumer goods sector was

somewhat insulated from competition. In 1996, when the tariff line-wise import policy was first announced, around 40 per cent of the total tariff lines were still under QRs.

Studies that estimated nominal and effective rate of protection during the 1990s (Goladr and Hasheem 1992, Gang and Pandey 1998, Das 2003) find that the effective rate of protection was still high in the 1990s. For the entire period 1980-2000, average effective rate of protection remained as high as 87.4 % for consumer goods and 112% for intermediate goods and 95% for the sector as a whole (Das 2003). Some important export incentives were announced like enhancement of Import Replenishment (REP) license entitlements to 30 per cent across-the-board for all merchandise exporters, which was later raised to 40 per cent for some sectors.

In March 2000, after losing the WTO dispute against the United States on QRs, the EXIM Policy announced removal of QRs on 714 items and the residual 715 items were liberalised by 1st April, 2001. Therefore it was only after a decade of liberalisation reforms that QRs were totally dismantled.

The reduction in average tariffs and Peak tariffs in India, though substantial, also happened in a phased manner i.e., over almost two decades. Table 1 depicts average tariffs and Peak tariffs for different years in the post liberalisation period. Till about 2004, the average tariffs remained above 20%.

Table 1: Average Tariffs and Peak Tariffs for Industrial Products 1990-2008

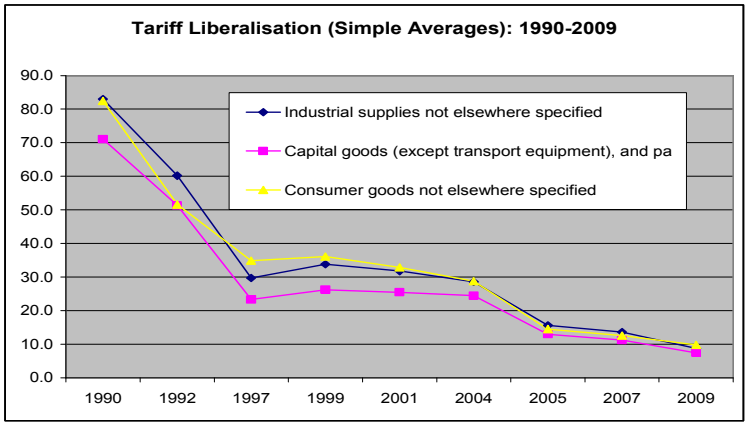
Tariff Year	Simple	Weighted	Peak Tariffs
1990	81.69	49.55	Exceeded
1992	57.45	27.89	150
1997	30.08	19.92	85
1999	33	28.61	35
2001	31.06	24.76	30
2004	27.87	20.95	25
2005	15.38	11.97	15
2007	13.22	8.6	12.5
2008	9.1	5.91	10
2009	9.43	7.21	

Source: World Integrated Solutions and various Economic Survey

In terms of simple averages, the industrial tariffs fell from a very high 82% in 1990 to 33% in 1999 and further to 9% in 2009 for all manufactured products. In terms of weighted average, the tariffs fell from around 50% in 1990 to 29% in 1999 and reached 7% in 2009. Peak tariffs in industrial products were cut down from over 200% in 1990 to about 30% in 2001.

Tariff protection declined much more slowly for consumer goods as compared to raw materials and intermediate products. Tariffs on capital goods were brought down much faster (Figure 1). Though nominal tariff on consumer goods were reduced in line with those on other goods, the effective rate of tariffs on consumer goods may actually have increased for much of the nineties because the remaining import restriction/QRs kept the effective rate of tariff protection on final consumer goods high.

Figure 1 Tariff Liberalisation for Capital goods, Consumer goods and Industrial Supplies



Source: World Integrated Trade Solutions

Cautious liberalisation was followed across industries as well. Industries which were relatively more protected and where weighted tariffs were above 40% in 1990, like food and kindred products, textile mill products and apparel and related products, their weighted tariffs remained above 40% till about 2000. Tariffs were brought down to 10% and below across the board after 2001 (Table 2).

Table 2: Reduction in Tariffs and Number of Domestic Peaks: 1996-2008

Product Name	Simple Average			Weighted Average			Nbr of Domestic Peaks	
	1996	2000	2008	1996	2000	2008	1996	2008
Food and kindred products	54.2	37.7	37.7	41.2	38.9	11.7	132	2003
Tobacco manufactures	52	35.6	35.6	52	38.5	32.3	0	20
Textile mill products	50.1	9.4	9.4	45.7	27.9	9.2	0	0
Apparel and related products	50.7	10	10	51.5	37.6	10	0	0
Lumber and wood products, except furniture	26.7	9.0	9.0	13.7	7.7	5.6	0	0
Furniture and fixtures	46.9	9.9	9.9	46	34.8	10	0	0
Paper and allied products	29.7	9.6	9.6	8.2	16.1	7.3	0	0
Printing, publishing, and allied products	26.4	8.1	8.1	22.5	24.9	8.3	0	0
Chemicals and allied products	39.8	8.3	8.3	35.7	32.5	6.6	0	152
Petroleum refining and related products	20.6	8.1	8.1	12.1	17.3	6.9	0	0

Source: World Integrated Solutions

2.3 Export Promotion Policies

The reforms of 1985 emphasised on export promotion of the manufacturing products. In an attempt to boost exports, several incentives were provided and schemes introduced. These included Cash Compensatory Support, Replenishment import license, duty drawback, duty free licenses and income tax exemption on profits of exports. Export processing zones provided further support to the exporters for sourcing their raw materials and marketing their products. Import of capital goods and parts and accessories was made easier by exempting them from import licensing and lowering their import tariffs.

The reforms of 1991, differed in nature with respect to export promotion schemes. They abolished the Cash Compensatory Support and repalced the Replenishment import license with EXIM scrips which allowed import of a much wider range of intermediate products. This scheme was later abolished and more incentives was provided for exports. Exporters were allowed to keep a certain percentage of their foreign exchange earned. Further, export promotion goods scheme whereby imports were linked to export obligations.

An important step in promotion of exports was taken around the beginning of 2000s. These were changes brought in the policy of reserving production of certain items for the small-scale sector. About 800 items were covered by this policy since the late 1970s, where units producing these items were reserved under the category of small scale, which was defined as units where investment in plant and machinery could not exceed $ 250,000. To boost efficiency and exports, some exportable products were removed from the reserved list in 2001 and 2002. These products included garments, shoes, toys and auto components. Further the investment limit was increased.

2.4 *Composition of Real Exports and Real Imports*

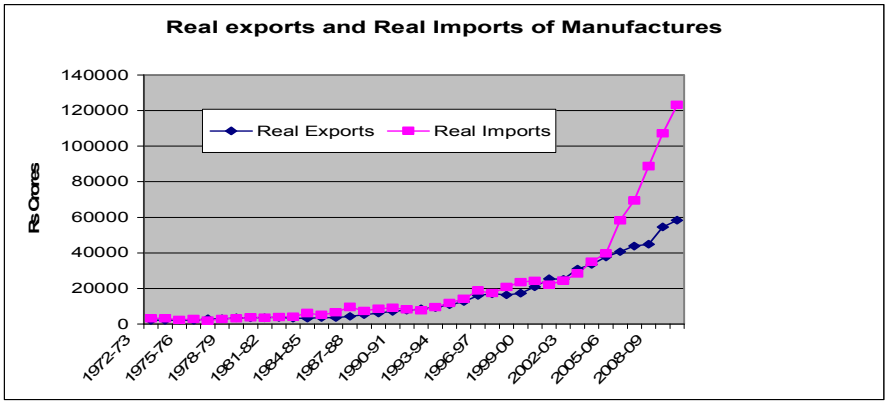
Given the fact that tariff liberalisation was selective and gradual and protection remained relatively high in the decade of 1990s, followed by substantial tariff reduction across the board in the decade of 2000, it would be interesting to see the the way in which exports and imports responded to the liberalisation policies.

Trends in total real imports and real exports[4] of manufactured products in India show that (Figure 2) both real exports and real imports of manufactures grew faster in the decade of 2000. Real exports grew at an average annual growth rate of 10.7% in 1990s and 10.2% in 2000-2009 while real imports grew at an average annual growth rate of 13.3% respectively. Imports of manufactures therefore rose mush faster as compared to exports of manufactures in last decade[5].

[4] Exports are deflated by export unit value index and imports by import unit value index with 1978-79 as base year. Data for exports and imports of manufactured products is drawn from Reserve Bank of India, Handbook of Statistics.

[5] A cross check on the growth was undertaken using ratio of manufacture exports and imports to total merchandise exports and imports from World Development Indicators. This ratio was applied to India's merchandise exports/imports in local currency. The current price series arrived at was deflated be export/import unit value indices. The trend appeared to be the same

Figure 2: Real Exports and Real Imports of Manufactures in India

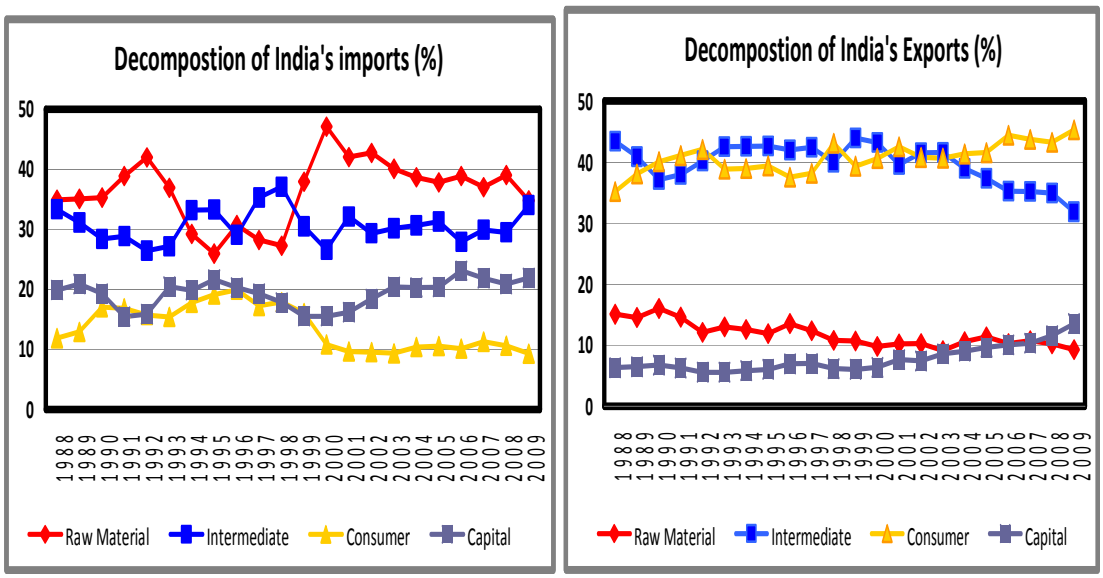


Source: Directorate General of Commercial Intelligence and Statistics (RBI- Handbook of Statistics)

Faster liberalisation of capital goods increased the import share of these products. However, the share of capital goods become almost stagnant (around 20 %) since the year 2003. Imports of intermediate goods (35%) and imports of raw materials (28%) dominated India's imports in the manufacturing sector since 1990 (Figure 3). By 2000, together the share of raw materials and intermediate goods reached 70% while that of consumer goods and capital goods was around 15% each. With the policy changes like removal of QRs and grant of incentives for importing capital goods, by 2009, share of capital goods in total imports increased to 22 % with share of raw materials and intermediates of around 35% each.

In spite of all the efforts put in since independence in terms of import liberalisation and other reforms, capital goods industry in India has not been able to achieve the levels of competitive advantages which would enable higher growth of its exports (Figure 3). Exports from manufacturing sector in 1988 were dominated by intermediate products (43%) and consumer durables (35%) and this continued till 2009 when the share of consumer goods increased to 45% while that of intermediate products declined to 32%. Share of capital goods increased from 6% to 13%.

Figure 3: Imports and Exports of Manufacturing Sector



Source: COMTRADE, World Integrated Trade Solutions

What follows from the above discussion is that the liberalisation polices followed since the 1980s gained speed in 1990s and resulted in higher growth of real exports and real imports of manufactures in 1990s as compared to 1980s. However, the effective dismantling of protection started only since early 2000 which were followed by a much higher growth of imports as compared to exports of manufactures.

Further, sectoral distribution of India's exports and imports reveals some valuable information. In terms of exports, four industries comprised around 80% of total exports in 1970s. These were textile products, food products and beverages, basic metals and leather and leather products. Over time, share of these industries in export basket has declined and other industries have gained shares like petroleum products, chemical and chemical products, non-metallic mineral products, wearing apparels, motor vehicles and electrical machinery and apparatus. India has been able to diversify its export basket with the traditional top four exporting industries losing share from 70% in 1970s to around 20% in 2009 (Table 3).

Emphasis was laid on establishing a sound industrial base in India in the industrial policies and trade policies of 1960s and 70s, accordingly in terms of imports of manufactures, in 1970 the top four industries where imports were high were industries like machinery and equipment, basic metals and chemical and chemical products. With the changing scenario of the Indian manufacturing sector in 1980s, the share of

petroleum products rose significantly from 7% in 1970 to 34% in 2009. Import basket comprising manufactures has also diversified over time. In 2009, import shares are almost same for machinery and equipment and chemicals and chemical products. These rose for electrical machinery and apparatus, non-metallic mineral products, motor vehicles and also food products. This indicates that there was a rise in import competition faced by the Indian manufacturing sector with import liberalisation in the past two decades (Table 4).

Table 3 Sectoral Contribution to Total Manufactures Exports

	1970	1980	1990	2000	2009
TOTAL	**100**	**100**	**100**	**100**	**100**
COKE, PETROLEUM PRODUCTS	1	0.5	3.1	3.7	14.8
NON-METALLIC MINERAL	3.3	9.3	16.8	19	11.4
CHEMICALS AND CHEMICAL	3.9	5.8	9.5	10.9	11.1
BASIC METALS	18.6	8.3	6.2	5.8	10.4
WEARING APPAREL, DRESSING &	2	9.4	15.3	15.3	7.5
TEXTILES PRODUCTS	27.3	19.4	16.2	14.5	6.5
MOTOR VEHICLES, TRAILERS AND	2	3.5	2.3	2.4	6.3
ELECTRICAL MACHINERY AND	1.2	2	1.7	2.3	5.8
MACHINERY AND EQUIPMENT	2	3.7	3.8	3.1	4.5
FOOD PRODUCTS AND	19.8	18.8	9.2	7.5	3.4
FABRICATED METAL PRODUCTS	1.8	3.2	2.1	2.7	1.8
LEATHER & RELATED PRODUCTS	6.4	6	6.1	2.9	1.3
TOBACCO & RELATED PRODUCTS	2.4	2.5	0.9	0.5	0.6
OTHERS	8.3	7.6	6.7	9.4	14.6

Source: World Integrated Trade Solutions, UNCTAD

Table 4: Sectoral Contribution to Total Manufacturing Imports

	1970	1980	1990	2000	2009
TOTAL	**100**	**100**	**100**	**100**	**100**
COKE, PETROLEUM PRODUCTS	7.7	44.6	27.3	39.6	34
MACHINERY AND EQUIPMENT	16.2	7.3	9.6	8.6	9.9
CHEMICALS AND CHEMICAL	12.8	10.8	12.3	9.3	9.9
ELECTRICAL MACHINERY AND	4.3	2.2	4.4	5.1	9.3
BASIC METALS	15.7	10.6	10.6	5.7	8.2
NON-METALLIC MINERAL	2.1	5	9.1	11.2	6.8
MOTOR VEHICLES, TRAILERS AND	3	3.8	3.9	2.2	4.7
FOOD PRODUCTS AND	3.1	7.6	1.1	3.3	2.8
TEXTILES PRODUCTS	8.3	1.8	2.1	2.6	1.3
PAPER AND PAPER PRODUCTS	2.3	1.6	2.1	1.5	0.9
OTHERS	24.5	4.7	17.5	10.9	12.2

Source: World Integrated Trade Solutions, UNCTAD

What we now examine is whether the change in the policy regimes coincides with any structural breaks experienced by the manufacturing sector.

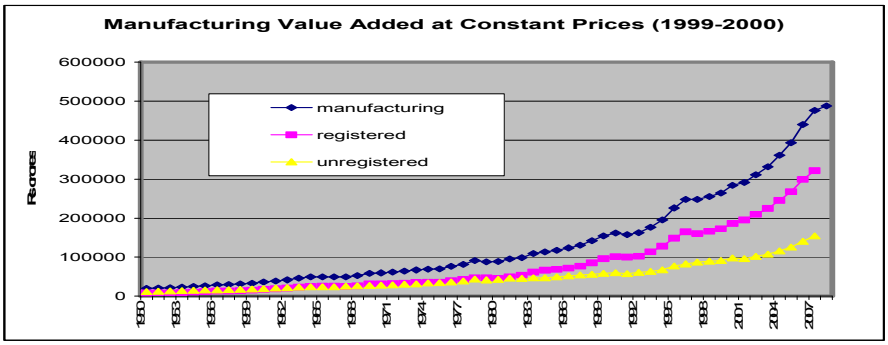
3. Structural Breaks in Manufacturing Growth

Manufacturing sector in India recorded its highest ever decadal growth rate in the decade of 2000. Following the global economic crisis in 2007, growth of this sector dipped but it revived and clocked above 8% in 2009-10 and 2010-11.[6]

To trace the growth path of the manufacturing sector in India, it is important to know that the sector has a dualistic character with a large unregistered/ unorganised sector (employing around 80% of total manufacturing employment and producing around 30% of total manufacturing output) coexisting with registered/organised sector. Output of manufacturing sector therefore depends on the additive outputs of the two sub sectors.

In the past six decades, the share of unorganised sector in total value added by manufacturing sector has declined from 59% in 1950-51 to 32% in 2008-09. In the post 1990 period, the growth in organised manufacturing sector has been higher than the growth in the unorganised sector (Figure 4). Most of the studies confine themselves to examining the growth of the organised sector, mainly because of lack of time series data for the unorganised sector. We examine the growth in total manufacturing sector as well as organised manufacturing sector.

Figure 4: Growth in Manufacturing Real Value Added



Source: Central Statistical Organisation, GDP by Economic Activity at 1999-2000 constant prices

[6] http://indiabudget.nic.in/es2010-11/echap-01.pdf

The average annual growth of real value added in total manufacturing sector increased from 5.6% in 1950s and 1960s to 6.0% in 1980s after declining to 4.2% in the 1970s. The growth dipped again in 1990s but revived to 7.4% in 2000-1 to 2008-09. Average annual growth was highest in the decade of 2000s for both organised as well as the unorganised manufacturing sectors. It increased to 7.8% for the organised manufacturing sector and 6.6% for the unorganised manufacturing sector. In 2000s, both the organised and unorganised sectors experienced their highest average annual growth rates in real value added as compared to the earlier decades (Table 5).

Table 5: Decadal Growth (%) in Value Added in Manufacturing Sector of India at 1999-2000 Constant prices

	Manufacturing Sector	Organised Manufacturing Sector	Unorganised Manufacturing Sector
1950s	5.6	6.3	5.0
1960s	5.7	7.0	3.9
1970s	4.2	4.1	4.3
1980s	6.0	8.0	3.4
1990s	5.4	5.9	4.4
2000-2007	7.4	7.8	6.6

Source: CSO, GDP at constant prices (1999-2000) by economic activity. Note: Growth rates for each year is arrived at by taking natural logs and then difference from the subsequent year. For total Manufacturing Value Added the period is 2000-2008

Rise in average annual growth in the real value added of the organised manufacturing sector in 1980s and then a fall in the decade of 1990s has been an area of much debate and discussions in India. The reforms of 1990s were expected to propel growth in the manufacturing sector but they were accompanied by a fall in the decadal growth rate. Studies using different methodologies and periodization have analysed the impact of these reforms on growth and productivity of the sector. A major area of contention in this literature is whether liberalisation reforms of 1980s led to productivity growth in the manufacturing sector or were 1990s reforms more effective in terms of raising productivity growth and hence overall growth of the sector.

Goldar and Mitra (2002) and Trivedi et al (2011) provide an extensive review of this literature. According to Trivedi (2011) a consensus seems to have emerged from the literature on this issue as most of the studies, using different methodologies and data sources, find that total factor productivity growth (TFPG) decelerated during the

1990s as compared to 1980s. This may have been the major cause for a dip in the overall growth rate of the sector in 1990s.

Studies estimating productivity growth in the decade of 2000s are limited. Virmani and Hashim (2011) estimate total factor productivity growth for the period 1981-82 to 1990-91, 1991-92- 1997-98 and 2002-03 to 2007-08 and find TFPG to decelerate from 0.61% in 1980s to 0.25% in 1990s but increase to 1.41% in 2000s. They term this as the "*J-curve of Productivity Growth*" where productivity growth first declines and then rises with a lag after major liberalisation reforms are undertaken since this requires a structural transformation of the economy.

What becomes clear from this literature is that liberalisation and related reforms played a very important role in the growth of manufacturing sector. However, since these reforms have been spread over two and a half decades (1985 onwards) and differ in nature, magnitude and their within the sector impact, studies using different periods of analysis have arrived at conflicting results with respect to impact of reforms on productivity and overall growth of the sector. In this context, it becomes utmost important to identify the year of structural break in the growth of the manufacturing sector. This will help in identifying which set of liberalisation polices was more effective in generating growth. This may be of interest not only to Indian policymakers but also to other developing countries.

With respect to the overall GDP growth of Indian economy, many studies have identified the year of structural break (e.g., Balakrishnan 2007, Virmani 2006, Ghatak 1997). However with respect to manufacturing sector, very few studies exist which have tested for the structural breaks. Virmani (2005) tests for structural break in growth of value added of manufacturing sector for the period 1965 to 2003 and finds a potential structural break in the year 1981. He concludes that the removal of some of the barriers to growth imposed during 1965-1980 had a greater role to play in the acceleration of manufacturing growth from 1981-82 than simulation of new growth impulses from 1981-82. However, Wallack (2003) does not find any significant structural break in industrial growth for the period 1951-2001. These studies have used some variants of Chow Tests which requires knowing the number of breakpoints and their exact location in the data series. More importantly, Chow test is a multivariate test and can identify structural break only with reference to a regression equation.

To identify the structural breaks, we use tests developed by Clement et al 1998, which identify multiple structural breaks in the series. Two kinds of structural breaks are identified, *"sudden shift"* or instantaneous shock that shifts the mean of the series through AO (Additive Outliers) model and *"gradual shift"* i.e., when the shock persist and dynamically adds to change the mean of the series over the rest of the period through IO (Innovational Outliers)[7] model. One important advantage of these models are that they are able to identify more than one structural break in the series and also able to identify the years of the break. Structural breaks with respect to gradual shifts (IO model) are considered to be more apt for tracking the policy impacts as compared to AO models as these breaks show that whatever change happened during that year adds to the future growth of the series.

We apply these tests to identify structural breakpoints in the growth of real value added in total manufacturing sector and organised manufacturing sector. The period of analysis is 1950-51 to 2008-09 for the total manufacturing sector. One of the limitations of data on value added in total manufacturing sector is that it uses single deflation method in arriving at the value added. Using a double deflation method, we arrive at value added of organised manufacturing sector. The data for the organised sector is drawn from Annual Survey of Industries for the period 1981-82 to 2008-09.

The results of the AO[8] and IO[9] models for total manufacturing sector show that the sudden break points in growth of value addition came in the years 1977 and 1997, ***while the structural break in the growth of real value added of manufacturing sector that added dynamically to the rest of the series and led to a gradual shift of the mean of the series came in 1991*** (Table 6 and Figure 5). The year 1974 is also identified as a break point but is not found to be statistically significant. The two results together provide an important insight. The reforms of 1980s do not appear to have led to any sudden shift or gradual shift in value added growth of total manufacturing sector. However, 1991 reforms appear to have played a very important

[7] See Perron 2006 ; Perron and Volelsang 1992 for the underlying models estimated

[8] which assumes instantaneous changes in intercept

[9] which assumes a gradual change in the intercept and/or slope. The change persists in its effects beyond the initial shock.

role in initiating a shift in the average growth of value added of the manufacturing sector.

The double deflated value added series arrived for the organised manufacturing sector using data for the period 1981-82 to 2008-09 from Annual Survey of Industries[10] (which is used by most of the studies estimating productivity growth) show that there were two structural breaks in the value added growth of organised manufacturing sector. ***Sudden breaks in real value added growth of the organised manufacturing sector are found in the years 1991 and 1998, while gradual shifts in the mean of the series came around 1986 and 2001***. These results support the results arrived by the studies that find 1980s reform as having played an important role in productivity growth of the organised manufacturing sector.

One of the important policy intervention which may have contributed to the gradual shift in the growth series of organised manufacturing sector is industrial de-licensing initiated in 1980s, which gathered momentum in 1990s. Manufacturing sector in India was significantly shackled by the licensing system that specified the limit of output of each plant. Based on the specified output, every plant was allocated a fixed quantity of crucial inputs such as cement, steel, coal, fuel, furnace oil etc. Industrial de-licensing, initiated in 1984-85 removed constraints on output, inputs, location and technology, allowing the manufacturing sector to take advantage of economies of scale. Free entry into de-licensed industries also enhanced domestic competition. Cumulatively, about 23 % of output had been de-licensed by 1990. The process of de-licensing gathered momentum in 1991, when substantially the entire manufacturing sector, with the exception of 16% of output, was de-licensed. Some of the remaining industries were de-licensed in 1993 – 94[11].

Although the structural breaks in the series provide some useful insights to the growth paths and one can relate the identified breaks with the policies adopted during that period, caution needs to be taken with respect to the conclusions drawn. Structural breaks may occur due to combinations of various factors which may be internal as

[10] Data provided by Economic and Political Weekly

[11] Chamarbagwala and Sharma (2008), Industrial De-Licensing, Trade Liberalisation , and Skill Upgradation in India

well as external to the economy. While important policy changes may occur during the period identified as structural break period, it cannot be conclusively said that the structural break occurred due to the change in the policy regime. But it is plausible that the change which occurs and is sustained is because of the change in the policy regime.

Accordingly, the industrial policy of 1980s, which encouraged export-oriented production and import of technology, appears to have had a greater impact on the organised sector as compared to the unorganised sector. The reforms of 1980s therefore did not appear to have led to major changes in total manufacturing growth. This is also validated by the decadal growth rates of organised and unorganised sectors. The decadal growth in the 1980s increased for the organised sector but declined for the unorganised sector. This is probably the reason for lack of any structural break for total manufacturing sector in the 1980s. But the reforms of 1990s which were relatively broader in scope as compared to reforms of 1980s appear to have growth of organised as well as unorganised sector leading to a structural break with a gradual shift in the mean of the growth of the value added series for the total manufacturing sector.

The structural break that led to a gradual shift in value added growth of organised manufacturing sector in the year 2001 is an important result as in the decade of 2000s growth in organised manufacturing sector has been much higher than the unorganised sector and its contribution to GDP has also risen steadily. Decadal average annual growth rate in value added in total manufacturing has also been highest for 2000s.

In the earlier section, the reforms of 1990s and 2000s were discussed. It was concluded that the reforms of 1990s were much more drastic and broader in scope as compared to the reforms of 1980s but they were also cautious and selective in nature. Though a number of changes were introduced in the tariff structure, the effective rate of protection remained relatively high in this decade and high tariff protection continued for the consumer goods. In the decade of 2000s, the dismantling of protection was much more effective as many non tariff barriers were lowered and quantitative restrictions were removed. Structural break that persists in its effect on total manufacturing sector's growth rate is found to have occurred in 1991 while that in organised sector's growth occurred in 1986 and 2001.

Table 6: Break Points using AO and IO Models in Real Manufacturing Value Added

Value Added in	**Breakpoints by AO model**	T-Stat (P-Value)	**Breakpoints by IO model**	T-Stat (P-Value)
Value Added Total Manufacturing Sector	1977	10.99 (0.00)	1974	1.28 (0.20)
	1997	6.52 (0.00)	**1991**	**2.80 (0.007)**
Value Added in Organised Manufacturing Sector using Double Deflation Method (based on ASI data)	1991	6.29 (0.00)	**1986**	**1.98 (0.06)**
	1998	4.74 (0.00)	**2001**	**2.21 (0.03)**

Figure 5: Structural Breaks in Value Added of Total Manufacturing Sector: IO Model

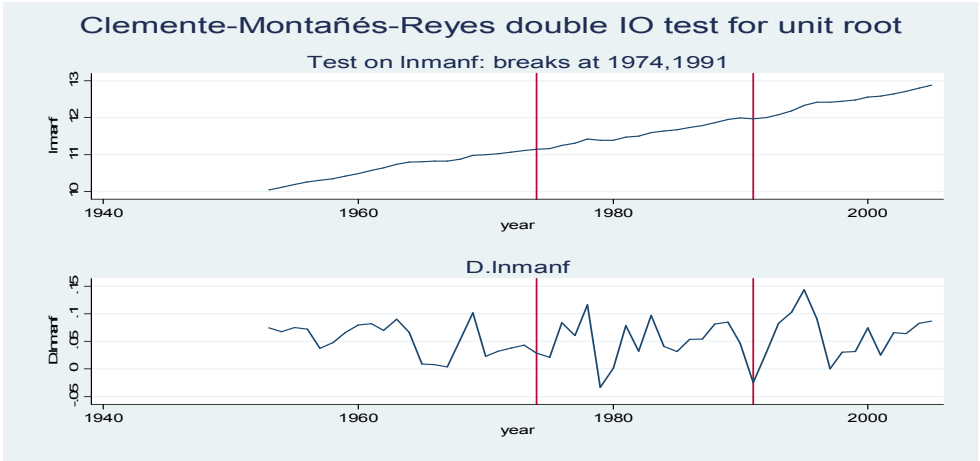
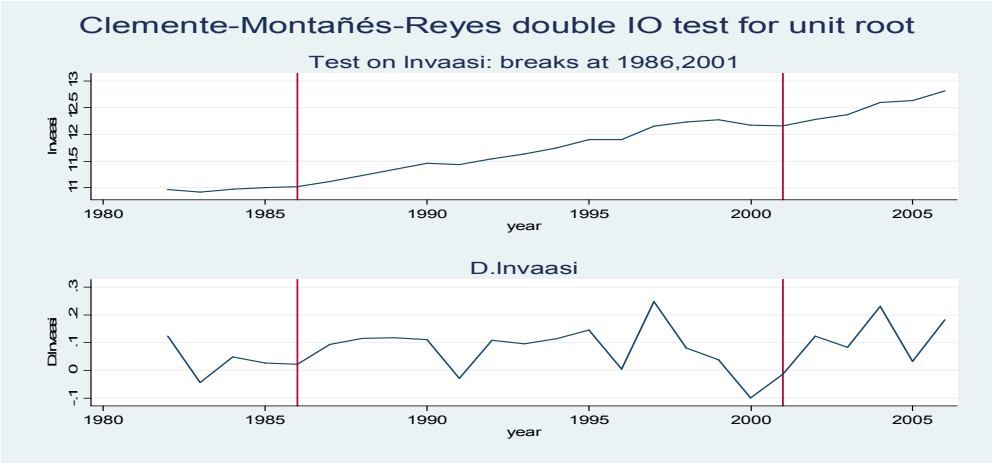


Figure 6: Structural Breaks in Value Added of Organised Manufacturing Sector: IO Model



To come to any plausible linkages between the structural breaks and effectiveness of trade policies in the growth of manufacturing sector, it is important to also assess the effectiveness of these policies with respect to increasing exports and imports. We undertake similar analysis with respect to real exports and real imports of manufactures to identify the years of structural breaks in these series. It would be interesting to see if the years of structural breaks in exports and imports growths coincide with the policy changes with respect to tariff liberalisation and export promotion.

The results of AO and IO models show that with respect to the growth of real exports instantaneous breaks came in the years 1996 and 2001 (Table 7 and Figure 7) while ***the gradual additive shifts in export growth occurred in 2001***. The industrial policy of export promotion of 1980s does not seem to have played an important role in terms of causing a structural break in export growth but policies followed from 2000 onwards appear to have played a role. Though export promotion has been an objective of trade policy for a long time and incentives have been introduced for export promotion, it is difficult to say that the policy regime changed drastically in the decade of 2000. The role of external demand may have been more important in this decade leading to structural break in the export growth of manufactures. Some of the

important policies which may have contributed were removal of items (garments, shoes, toys and auto components etc) from the small scale reserved list in 2001.

With respect to imports of manufactures, sudden shifts appear in the years 1974 and 2002 while gradual shifts appear post 1975 and 2003 (Table 7 and Figure 8). ***The additive structural break which led to the gradual shift in real imports came in 2003***. Tariff liberalisation gathered speed after 2001 when across the board tariffs in the manufactures, especially consumer durables were brought down to 10%. This period also coincides with the policy of removal of quantitative restrictions (2001 &2002) on consumer durables and a spurt in imports of capital goods and machinery.

Table 7 Structural Breaks in Real Exports and Real Imports

	Breakpoints by AO model	T-Stat (P-Value)	**Breakpoints by IO model**	T-Stat (P-Value)
Real exports	1996	2.96 (0.01)	1974	1.59 (0.12)
	2001	4.96 (0.00)	**2001**	**3.25 (0.00)**
Real Imports	1974	1.82 (0.07)	1975	2.05 (0.04)
	2002	8.12 (0.00)	**2003**	**4.65 (0.00)**

Figure 7: Structural Breaks in Real Exports of Total Manufacturing Sector: IO Model

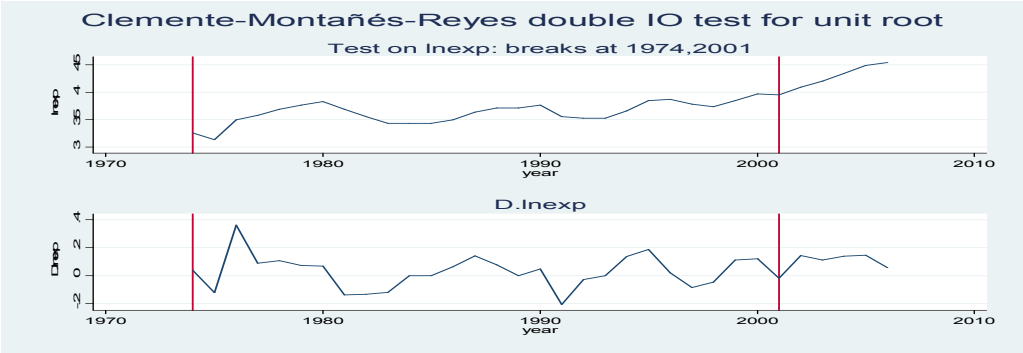
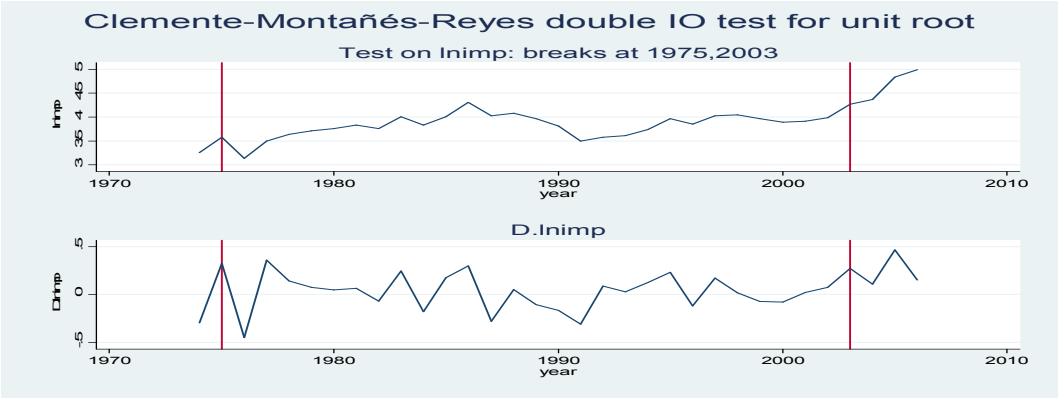


Figure 8: Structural Breaks in Real Imports of Total Manufactures: IO Model



The above results indicate that the value added growth in the total manufacturing sector underwent a structural break in the year1991 which changed the growth trajectory of the sector; the value added growth in the organised sector experienced a similar structural break in 2001. The year 2001 is also found to be an important break point for the growth of real exports while 2003 is an important break point in the growth of real imports. Together these results indicate that though the policies with respect to liberalisation started with the Industrial Policy of 1980, it was only after two decades, i.e., around the beginning of 2000 that more effective trade policies were followed which produced the desired results with respect to exports and imports. Import competition as well as export growth increased in post 2001 period which may have ignited higher value added growth in the organised manufacturing sector.

4. Is Manufacturing Growth an Export-Led Growth or an Import-Induced Growth?

Exports and imports both play an important role in the growth of any sector. However, the relative importance of the two for growth of the economy is an important issue, especially at times of increased volatility in the world economy. Further, knowledge of the direction of causality of the relationship between export/import growth and growth of the sector is necessary for future policy directions.

Export-led Growth (ELG) literature is extensive and is based primarily on the Keynes theory where in a particular economy demand drives the economic system to which supply adjusts as opposed to Say's law wherein supply creates its own demand. It is argued that developing countries lack the demand which is required for growth in the long run. If these countries are producing below their productive capacities (given the surplus labour) then the growth of the economy will be determined by growth of external demand (Thirlwal 1994). To bring about a structural change in the growth trajectory of the developing countries, one of the driving forces suggested is therefore increase in external demand or exports.

The proponents of *Trade as an Engine of Growth* found empirical support in the 1980s through the successful experiences of some countries like Hong Kong, China, Japan, and Republic of Korea, which were able to increase their growth through ELG strategies, and not so successful experiences, mostly in Latin America, where import substituting polices did not yield the desired growth rates (Balassa 1980, Sach And Warner 1995). ELG was proposed to generate higher capacity utilisation, higher economies of scale, improve productivity and lead to better allocation of resources based on comparative advantage. A stream of empirical literature supported this ELG hypothesis (see Blecker 2000 for a comprehensive survey of the literature).

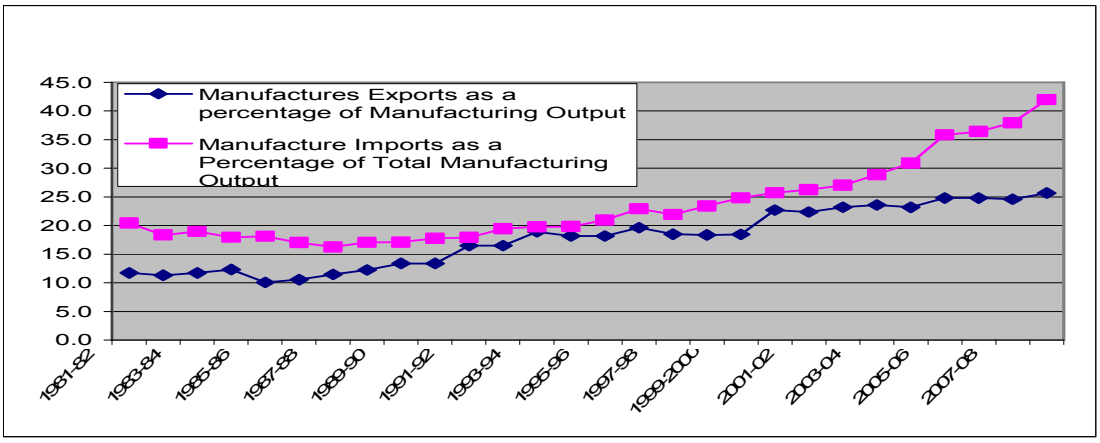
The East Asian economic crisis of 1997 and Global economic crisis of post 2007 have shaken the belief on ELG strategies and has brought the role played by domestic demand in the forefront. It is argued that the domestic demand based growth models can reduce dependency on other markets which may become volatile given the current economic scenario and it may provide cushion against the increasing competition given by Chinese exports in the third country market (Felipe 2003). One of the major criticisms against the ELG strategies is that they lead to creation of excess capacity in

manufacturing sector (Kaplinsky 1993, Ertuk, 1999). This excess capacity undermines the financial soundness of investments, as was the case for East Asian economies during the financial crisis. Some of the studies have further questioned the causality of this approach. According to Rodriguez and Rodrik (2000) successful export performance can be a result of successful development rather than the cause.

Along with ELG strategies, import liberalisation has also been proposed as a key to economic growth. Endogenous growth models have emphasized the static as well as dynamic gains arising from imports. (Romer 1987, 1990). Imports of intermediate products can enable creation of new domestic varieties and further boost productivity (Markusen 1989, Grossman and Helpman 1991, Kasahara and Rodrigue 2008). It is argued that imports of consumer durables can lead to increase in domestic competition leading to improved productivity (Melitz and Ottaviano 2007, Helpman and Krugman 1985, Bernard, Redding and Schott 2006), while imports of improved technologies and capital goods can further foster higher efficiency and productivity gains. However, with higher imports there is also a danger of crowding out of domestic investments if the domestic industry is unable to compete. This may lead to reduced output and adversely affect productivity growth.

In the case of India, in the post 1990 period, exports and imports of manufactures have both grown steadily, with imports growing at a much faster rate than exports (Figure 9). At current prices, the ratio of exports to manufacturing output increased from 10% in 1980-81 to around 25% in 2008-09 (Figure 9). At real prices, the ratio was around 16% in 2008-09.

Figure 9: Manufactures Exports and Imports as a Percentage of Organised Manufacturing Output at Current Prices



Source: Figures for manufacturing output is taken from Annual Survey of Industries and exports and imports form Reserve Bank of India. All figures are in crores in current prices.

In the post 1990 period, along with the surge in exports and imports, manufacturing sector also experienced a much higher average annual growth rate (Table 8). Although these trends suggest that trade may have led to this growth in the manufacturing sector, but it is important to note that along with trade, domestic economy also experienced its highest ever per annum growth in this decade. A rise in growth of real per capita income from 3.2% in 1980s to 3.6% in 1990s and further to 5.6% in 2000s highlights the growth in domestic demand and corresponding purchasing power.

Table 8: Average Annual Growth Rate in Real Exports, Real Imports, Real Value Added in Manufacturing and Per Capita Income

	Growth in Real Exports	Growth in Real Imports	Growth in Real Value Added in Organised Manufacturing Sector	Growth in Real Per Capita Income
1970s	7.5	1.9	4.1	1.4
1980s	7.0	4.2	8.0	3.2
1990s	10.7	13.3	5.9	3.6
2000-2009	10.2	21.0	7.8	5.4

Note: Growth rates for each year is arrived at by taking natural logs and then difference from the subsequent year. For Manufacturing Value Added the period is 2000-2008 Source: Source: Directorate General of Commercial Intelligence and Statistics (RBI- Handbook of Statistics)

Given this economic setting, the evident question which draws attention is the direction of causality in the relationship between growth in exports and imports with growth in manufacturing sector and the role played by rising domestic demand.

With respect to the manufacturing sector in India, impact of liberalisation on growth has been explained in terms of estimating productivity growth in the pre and post liberalisation periods. Different methodologies have been used to arrive at productivity estimates. But very few studies have attempted to estimate the long term and short term relationship and causality of export/import growth and growth in the manufacturing sector. We use the cointegration analysis for identifying the long term and short term relationships and causality between export/import growths with growth in the manufacturing sector. Such an approach has been extensively used in the literature for testing the growth linkages between overall GDP growth and export growth to test ELG.

Studies using this approach for testing ELG hypothesis for the aggregate economy have arrived at mixed results. Numerous empirical studies (e.g., Thorton 1996, Ekanayake 1999, Panas and Vamvoukas 2002) find strong support for the ELG hypothesis. However, there exist an equally large number of studies that are unable to support the ELG hypothesis for the economy as a whole (e.g., Ahmad and Kwan 1991, Rehman and Mustafa 1997, Love and Chandra 2005). Jung and Marshall (1985), for instance, based on the standard Granger causality tests, analyzed the relationship between export growth and economic growth using time-series data for 37 developing countries and found evidence for the export-led growth hypothesis in only four countries. Literature has generated more debate than consensus on this issue. In contrast to the export-led growth hypothesis, neoclassical trade theories typically stress that the causality runs from home-factor endowments and productivity to the supply of exports (e.g. Findlay, 1984).

ELG for India has been tested using time series analysis for the aggregate economy by some studies. Dhawan and Biswal (1999) investigate the ELG hypothesis using a vector autoregressive (VAR) model by considering the relationship between real GDP, real exports and terms of trade during 1961-1993.They employ a multivariate framework using Johansen's cointegration procedure and find a long-run equilibrium relationship between these three variables and the causal relationship from growth in

GDP and terms of trade to the growth in exports. In the short term they find the causality running from export growth to overall GDP growth. Similar results are found by Sinha (1996) which explores the relationship between openness and GDP growth and finds a two way relationship.

Studies that find support for ELG using cointegration and causality tests for India include Mallick (1996), Ghatak and Price (1997), Nidugala (2001), Krishan et al (2008), Kemal et al. (2002) and Pradhan (2010). Studies that do not find support for ELG for India include Asafu-Adjaye et al. (1999), Anwer and Sampath (2001) and Chandra (2002). Marjit and Raychaudhari (1997) find that GDP growth Granger causes export growth and not the other way around. Sharma and Panagiotidis (2004) also fail to find support for ELG hypothesis for India

For Indian *manufacturing* sector, very limited studies exist, which test for ELG hypothesis by testing for causality. Given the growing importance of services sector in terms of contribution to GDP growth and export growth, analysis at the aggregate economy level may not apply to the manufacturing sector, which may be applicable in many industrialised countries with prominent industrial sectors. The structural breaks in growths of exports, imports and value added in the manufacturing sector in early 2000 makes this sector an important case to test for ELG hypothesis and the role played by imports.

Studies using time series analysis for testing causality either use bivariate approach (e.g., Jung and Marshall 1985, Chow 1987, Ahmad and Kwan 1987) or neoclassical growth accounting technique of production function, which specifies a production function of labor, capital and export levels regressed on real gross domestic product (for example, Michalopoulos and Jay, 1973, Feder, 1982, Balassa, 1985, Rana, 1988 and Ram 1987). We undertake the multivariate cointegration analysis for the organised manufacturing sector using two specifications. *Firstly*, we build a five-variable VAR model using the augmented production function approach, which has been widely used in this literature (Balassa (1978), Feder (1983), Kavoussi (1984), Ram (1985, 1987), Oschos (1989), Sengupta (1991), Khan and Saquib (1993), Greenway and Sapsford (1994), Shan and Sun 1998., Hachicha (2003), Herzer et al (2007), Lorde (2011).

In the augmented production function approach, which goes beyond the traditional neo classical theory of production, real output is taken as a function of labour, capital stock, real exports and real imports[12]. The inclusion of exports as an additional input provides an alternative procedure to capture total factor productivity (TFP) growth where following Herzer et al. (2006), it is assumed that total factor productivity can be rewritten as a function of exports (Xt), imports (Mt) and other exogenous factors (Ct) uncorrelated with Xt and Mt.

Some studies have argued that it is necessary to separate the economic influence of exports on output from the influence incorporated into the growth accounting relationship (Heller and Porter, 1978; Islam, 1998; Herzer et al., 2006, Ghatak and Price, 1997). We address this issue by testing both aggregate output and aggregate output net of exports. Output net of exports provides a different interpretation as it would represent output produced for the domestic market. Relationship of exports to 'output net of exports' provides insights into the extent of domestic linkages and spillovers from the exportable sector to the rest of the manufacturing sector (Blecker, 2006). The analysis is undertaken for organised manufacturing sector for the period 1981-82 to 2008-09.

Secondly, for testing the ELG hypothesis, growth in organised manufacturing GDP is taken as a function of growth of domestic demand and growth of external demand. This framework for explaining manufacturing growth was first used by Lawrence (1984). Subsequently, this was used by many studies (e.g., Berg and Schmidth 1994, Lee and Cole 1994). Growth in domestic demand is captured by growth in per capita GDP and real imports; while growth in external demand is captured through growth in real exports. The analysis is undertaken for the organised manufacturing sector for period 1970-71 to 2009-10.

[12]Inclusion of imports also helps in avoiding spurious causality result, see Riezman and Summers (1996).

For testing these specifications data on output, employment and capital stock is taken from Annual Survey of Industries for the period 1981-82 to 2008-09[13]. The EPWRF (2007) database has been used which has been extended for remaining years with data collected directly from the CSO, ensuring the two series matched. Wholesale Price index deflators for manufactures are used to arrive at the constant price series (1993-94 prices). The capital stock has been represented by the net fixed capital (at constant price) using perpetual inventory method and implicit price deflators are used to deflate the series[14]. Exports and imports of manufactures have been estimated using data provided by Reserve Bank of India (Handbook of Statistics). Export unit value index (1978-79 as base) and import unit value index have been used to arrive at real exports and real import series. Total persons engaged are used as employment in the organised manufacturing sector. The per capita remuneration in each industry was derived from the ASI data and applied to this series.Manufacturing GDP and per capita GDP at constant prices of 1999-2000 are taken from Central Statistical Organisation.

To determine the relationship between output growth and growth of exports and imports, we perform Johansen and Juselius (1990) Multivariate Cointegration test, which involves three steps. First, determine the order of integration for each of the variables under observation. Second, estimate cointegrating regression. Finally, if the time series are cointegrated, then construct the error-correction model (ECM).

To determine whether the series are stationary or not Augmented Dickey-Fuller test and Phillips-Perron test are used. Johansen and Juselius Cointegration Test procedures are used to determine the number of cointegration vectors by estimating trace statistics. Trace statistic investigates the null hypothesis of r cointegrating relations against the alternative of n cointegrating relations, where n is number of variables in the system for r = 0, 1, 2…n-1. This indicates *long term relationship*. Once the number

[13] Data for a longer comparable time series is not available from ASI. Many studies have estimated Granger causality and cointegration analysis based on around 30 years of annual data (e.g. Sharma and Panagiotidis, 2005 reinvestigated economic growth sources in India for the periods 1971 to 2000; Asafu-Adjaye et al. (1999) tests ELG for the period 1960-1994; Ghatak and Price (1997) tests the ELG hypothesis for India during 1960-1992. An alternative specification is also tried with a longer time series.

[14] The series built by Virmani and Hashim (2011) has been used.

of cointegrating relations is determined along with the suitable number of lags, Vector Error Correction model (VECM) is estimated to determine the *short term relationships*. Granger causality based on VAR is estimated to determine the *causality* in the series.

The VECM estimated takes the following form:

$$\Delta LNY_t = c_0 + \sum_{i=1}^{n} [\alpha_i \Delta LK_{t-1} + \beta_i \Delta LL_{t-1} + \delta_i \Delta LM_{t-1} + \gamma_i \Delta LX_{t-1} + \varpi_i \Delta LNY_{t-1}] + \varphi_i ECT_t + u_t$$

$$\Delta LX_t = c_0 + \sum_{i=1}^{n} [\alpha_i \Delta LK_{t-1} + \beta_i \Delta LL_{t-1} + \delta_i \Delta LM_{t-1} + \gamma_i \Delta LX_{t-1} + \varpi_i \Delta LNY_{t-1}] + \phi_i ECT_t + e_t$$

where Δ is the difference operator, LN are natural logs, Y is manufacturing real output, K is net fixed capital stock in manufacturing sector, M is real imports of manufactures, X is real exports of manufactures, L is employment in organised manufacturing sector, and the *ECT* is the error correction term which represents the lagged error from the cointegration equation. Since we have relatively small number of observations to test this hypothesis, we use K/L ratio i.e., capital intensity of labour in place of capital stock and labour.

The results with respect to stationarity are reported in the Appendix. The results of stationarity tests show that all series, Real Output, Real Output net of Exports, Real Imports and Real capital-labour ratio are found to be non-stationary in levels and stationary at first difference, which means that they are integrated at an of order of 1, so they are I (1) series. They therefore have a stochastic trend. In addition, the first difference of all the series rejects the unit root hypothesis implying that they become stationary at the first difference.

We first test whether the series are co-integrated and a linear relationship exists between real output, capital intensity of labour, real exports and real imports in the long run using augmented production function. Imports consist of manufactures including, industrial supplies, capital goods, consumer durables and others. We apply the Johansen and Juselius Cointegration Test which is a multivariate unit root test that estimates the cointegrating rank. Appropriate lag length is derived by using Akaike

Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBIC), which comes out as 1.

Vector Error Correction models (VECM) mix levels and first differences to estimate the short run and long run simultaneously. The long run is estimated when the data is in levels while the short run is estimated using first differenced data. Using one lag we arrive at the results of Johansen tests for cointegration using output and output net of exports. The results of the test show that there exist two co-integrating vectors, i.e., null hypothesis of no con-integration can be rejected at the 5% significance level for both the equations using real output and real output net of exports. The screen shots of the results are reported in the Appendix. The results shows that there exists long term relationship between the variables.

The coefficients of error correction term are found to be negative and significant for the both the equations with real output and real output net of exports as the dependent variable (Table 9 and 10). This indicates that any short term fluctuations between the dependent and independent variables will lead to a stable long term relationship.

Table 9: Screen Shot of results of Error Correction term between real output, real K/L, real exports and real imports.

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_LNOUTPUT	3	.074982	0.6019	33.25932	0.0000
D_LNKL	3	.031016	0.8543	128.9971	0.0000
D_LNIMP	3	.098829	0.6548	41.73097	0.0000
D_LNEXP	3	.081951	0.5937	32.14795	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_LNOUTPUT						
_ce1						
L1.	-.3181751	.1796729	-1.77	0.077	-.6703275	.0339773
_ce2						
L1.	.161301	.1024582	1.57	0.115	-.0395134	.3621154
_cons	.0547796	.0311754	1.76	0.079	-.0063231	.1158823

Table 10. Screen Shot of results of Error Correction term between real output net of exports real K/L, real exports and real imports.

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_LNOUTNETEXP	4	.051165	0.8681	138.2499	0.0000
D_LNKL	4	.033884	0.8337	105.2556	0.0000
D_LNEXP	4	.071815	0.7016	49.36544	0.0000
D_LNIMP	4	.091222	0.7187	53.6486	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_LNOUTNET~P						
_ce1						
L1.	-.6207849	.2060637	-3.01	0.003	-1.024662	-.2169075
_ce2						
L1.	-.3190671	.180532	-1.77	0.077	-.6729032	.0347691
_trend	-.0011889	.0019248	-0.62	0.537	-.0049615	.0025837
_cons	.1765382	.0345268	5.11	0.000	.108867	.2442094

Table 11 reports the cointergating equations with respect to output and output net of exports. The results show that in the long run in both the cases exports do not have significant coefficient implying that exports in the long term may not have a significant impact on output, while imports are found to have a significant impact on output. Capital labour ratio is also found to have a significant impact in both cases.

Table 11: Results of Cointegrating Equations

	LN K/L	LN EXP	LNIMP	Constant
_ce1 Real LN Output				
coefficient	**0.42*** **	**0.19**	**0.35*** **	**2.75**
Std Err	**0.086**	**0.12**	**0.10**	
z	**5.33**	**1.63**	**3.33**	
P	**0.00**	**0.13**	**0.001**	
_ce1 Real LN Output Net of Exports				
coefficient	**0.53*** **	**0.21**	**0.43** **	**1.13**
Std Err	**0.15**	**0.20**	**0.17**	
z	**3.59**	**1.03**	**2.52**	
P	**0.00**	**0.30**	**0.01**	
Diagnostic tests are reported in the Appendix				

To test the causality of relationships we undertake Granger non-causality tests reporting Wald statistics based on the estimates of VAR model. A variable X Granger-causes Y if Y can be better predicted using the histories of both X and Y than it can by using the history of Y alone.

Results of the Granger non-causality reported in Table 12, which show that the hypothesis that 'exports do not Granger cause output' is accepted as test statistics is not found to be significant, while the hypothesis that 'output does not cause exports' is rejected. ***This implies that the relationship between output growth and export growth runs from 'output growth → export growth' and not the other way around.*** Higher growth in manufacturing output leads to higher exports. It is also found that higher growth of domestic output or 'output net of exports' also Granger causes higher exports (Table 13). This can be the case if more and more firms explore international markets with growth of their output. The growing diversity of export basket may be the result of this output growth. Similar results were arrived at by Sharma and Panagiotidis (2005) for aggregate Indian economy for the period 1971 to 2001.

Short term causality between imports and growth in output is found to be one way, ***higher imports Granger cause higher output*** but higher output does not necessarily Granger cause higher imports. This is an interesting result as it also indicates that output for domestic market may not be too dependent on imports in the short term. More interesting is the results relating to causality between exports and imports. Results for 'output net of exports' show that there exists, ***two way relationships between exports and imports***. Higher exports lead to higher imports and higher imports also lead to higher exports in the short term.

The result that exports does not affect growth of manufacturing 'output net of exports' but is affected by imports can be interpreted as lack of domestic linkages of exportables with domestic output (Blecker 2006). Higher exports can lead to higher total manufacturing output if the import content of exports is low. A negative impact of exports on domestic output is found by some studies, e,g., in case of Mexico Moreno-Brid *et al.* (2005) found that around 70 percent of Mexico's exports of manufactures are produced through assembly processes involving imported inputs that enter the country under preferential tax schemes, which allows tax-free entry of imported inputs and raw materials for export purposes. This has led to reduction in local content in Mexico's manufactured exports and weak linkages of exports with domestic suppliers. Blecker (2006) also find a similar result for Mexico and concludes that the more Mexico integrates into the global value chains the less it integrates with the domestic economy.

Table 12: Screen Shot of results of Granger non-Causality test between real output, real exports and real imports.

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. vargranger

  Granger causality Wald tests
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Equation	Excluded	chi2	df	Prob > chi2
LNOUTPUT	LNKL	27.784	2	0.000
LNOUTPUT	LNEXP	.1936	1	0.660
LNOUTPUT	LNIMP	26.411	2	0.000
LNOUTPUT	ALL	47.492	5	0.000
LNKL	LNOUTPUT	1.448	2	0.485
LNKL	LNEXP	2.4293	1	0.119
LNKL	LNIMP	5.09	2	0.078
LNKL	ALL	7.1937	5	0.207
LNEXP	LNOUTPUT	1.6e+12	2	0.000
LNEXP	LNKL	4.0867	2	0.130
LNEXP	LNIMP	.00346	2	0.998
LNEXP	ALL	3.5e+12	6	0.000
LNIMP	LNOUTPUT	1.495	2	0.474
LNIMP	LNKL	15.114	2	0.001
LNIMP	LNEXP	2.1192	1	0.145
LNIMP	ALL	24.197	5	0.000

Table 13: Screen Shot of results of Granger non-Causality test between real output net of exports, real exports and real imports.

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. vargranger

  Granger causality Wald tests
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Equation	Excluded	chi2	df	Prob > chi2
LNOUTNETEXP	LNKL	9.2261	3	0.026
LNOUTNETEXP	LNEXP	3.8601	3	0.277
LNOUTNETEXP	LNIMP	9.2552	3	0.026
LNOUTNETEXP	ALL	24.545	9	0.004
LNKL	LNOUTNETEXP	5.8655	3	0.118
LNKL	LNEXP	6.4046	3	0.094
LNKL	LNIMP	3.5911	3	0.309
LNKL	ALL	18.971	9	0.025
LNEXP	LNOUTNETEXP	8.0566	3	0.045
LNEXP	LNKL	26.963	3	0.000
LNEXP	LNIMP	10.215	3	0.017
LNEXP	ALL	104.21	9	0.000
LNIMP	LNOUTNETEXP	5.0355	3	0.169
LNIMP	LNKL	11.178	3	0.011
LNIMP	LNEXP	9.4448	3	0.024
LNIMP	ALL	34.155	9	0.000

Lack of evidence of growth of manufacturing exports affecting growth of manufacturing 'output net of exports' in the long term in case of India implies that growth in Indian manufacturing in the decade of 2000s has not really been an export-led growth and may not be led by export growth in the future. This result is corroborated by the results arrived by other studies for India which have estimated long term relationship between export growth and total GDP growth by estimating VECM. Asafu-Adjaye et al. (1999) consider three variables: exports, real output and imports for the period 1960-1994. They do not find any evidence of the existence of a causal relationship between these variables in case of India and no support for the ELG hypothesis. Using similar methodology for the period 1961-92, Dhawan and Biswal (1999) also find no long term relationship. Chandra (2002) fails to find any support for long-run relationship between real exports and real GDP. Ghatak and Price (1997) use GDP net of exports' as regressor, along with exports and imports as additional variables to test the ELG hypothesis for India during 1960-1992, Their results indicate that real export growth was Granger-caused by non-export real GDP growth over the period 1960-1992. Their cointegration tests confirm the long-run nature of this relationship.

Imports of manufactures, on the other hand, are found to have a long term impact on growth of manufacturing output net of exports. Imports of manufactures comprise of imports of industrial supplies, capital goods, consumer durables and other manufactures. Tariff liberalisation has been faster in the case of capital goods and industrial intermediate goods or industrial supplies in case of India. In the decade of 2000s, tariffs fell drastically even for consumer durables. Higher imports of technology via capital goods and better quality inputs is found to impact productivity and efficiency growth and lead to a positive impact on manufacturing output growth. Imports of consumer durables increases domestic competition and may further add to improvements in productivity and efficiency leading to higher output growth in manufacturing sector. Similar relationship with respect to imports and output and productivity growth in India is found by other studies like Rodrik (1995), Goldberg et al (2009), and Topalova and Khandelwal (2010).

To confirm this result a different specification has also been attempted for the manufacturing sector using a longer time series (1970-2009). Total manufacturing

GDP is taken as a function of domestic demand and external demand. Growth in domestic demand is captured by growth in per capita income and real imports while growth in external demand is captured by growth in exports.

Growth in Registered Manufacturing GDP = f (Growth in Domestic Demand for manufactures and Growth in External Demand for manufactures)

The results of VECM are reported in the Appendix. The results do not differ qualitatively from the above results. The Granger causality results (Table 14) show that Domestic demand in terms of growth of per capita income has a significant impact on the growth of total manufacturing sector while growth in exports does not lead to growth in manufacturing sector in the long term. Short term results arrived by VECM model indicate that imports with a lag is found to impact manufacturing output in period t and higher per capita income with two lags impacts manufacturing output. Exports even with 2 lags are not found to have any significant impact (Appendix).

Table 14: Screen Shot of results of Granger non-Causality test between real output net of exports and real exports and real imports.

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. vargranger

  Granger causality Wald tests
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Equation	Excluded	chi2	df	Prob > chi2
lnorgmanf	lnexp	.76114	3	0.859
lnorgmanf	lnimp	7.7765	3	0.051
lnorgmanf	lnpcy	12.358	3	0.006
lnorgmanf	ALL	29.624	9	0.001
lnexp	lnorgmanf	9.267	3	0.026
lnexp	lnimp	20.176	3	0.000
lnexp	lnpcy	15.539	3	0.001
lnexp	ALL	54.656	9	0.000
lnimp	lnorgmanf	5.1957	3	0.158
lnimp	lnexp	1.481	3	0.687
lnimp	lnpcy	6.6131	3	0.085
lnimp	ALL	19.261	9	0.023
lnpcy	lnorgmanf	19.4	3	0.000
lnpcy	lnexp	.72346	3	0.868
lnpcy	lnimp	5.2989	3	0.151
lnpcy	ALL	37.92	9	0.000

With the slowdown of the global economy in post economic crisis of 2007 one of the major concerns with respect to Indian economy has been the impact of slowdown in external demand on the growth of the manufacturing sector. *The results suggest that the jump in the growth of manufacturing sector in the last decade can be explained more by growth in domestic demand and imports rather than growth in exports.* The results also show that export sector in India is dependent on imports.

One of the plausible reasons why exports may not be playing a leading role in the growth of Indian manufacturing sector is that even with rising growth of exports, the total share of exports in manufacturing output is still small at around 25% in current prices and not more than 16 % in real terms, showing that major part of the output still caters to the domestic market. Higher growth of imports adds to the manufacturing growth in many different ways, i.e., through increase in productivity and efficiency due to imported technology and better quality of imported inputs and through providing competition in the domestic market which encourages domestic firms to improve their quality, pricing and efficiency of delivery for preserving their market share from imported products.

5. Success Stories within Manufacturing Sector

The results with respect to structural breaks and cointergation analysis indicate that growth of exports did not play a major role in growth of manufacturing sector. However, imports played an important role in boosting growth of manufacturing output as well as growth of exports. Examining industrial growth rates provide a more disaggregated picture with respect to industries and may help in identifying the success stories with respect to industries within manufacturing sector which experienced higher growth in the decade of 2000. The issue to examine is that whether these were also the industries where exports and/or imports played a comparatively greater role incentivized by trade policy.

The average annual growth of value addition at the sector level shows that more than 10% average annual growth in the period 2000-01 to 2007-08 occurred, apart from petroleum products sector, in motor vehicles, trailers and semi-trailers; fabricated metal products; wood and wood products; furniture and other manuf; leather and

leather products; office, accounting and computing machinery; electrical machinery; other transport equipment; food products and beverages; and medical precision and optical instruments (Table 15).

Out of the these industries, top five industries with respect to change in average annual growth in value addition in 2000s over the decade of 1990s were wood and wood products, petroleum products, medical precision and optical instruments, publishing, printing and related activities, office accounting and computing machinery and paper and paper products (Table 15).

However, these industries are not the industries which figure in the list of top five industries with highest contribution to manufacturing exports, apart from petroleum products. 85% of manufacturing exports take place from 13 broad industries and four out of the top five industries which reported higher change in the growth of value addition do not appear in the list of the industries with relatively higher contribution to manufactures exports (Table 3). Domestic demand seems to have played a much more important role in their growth as compared to external demand. Similar results are also found by Kumari (2010), where contribution of domestic demand in output growth is found to be higher as compared to growth of external demand in the post liberalisation period.

Interestingly the top four industries where contribution of exports to total exports has increased the most i.e., nonmetallic mineral products, chemical and chemical products and basic metals (Table 4), the average annual growth in value addition in all the four industries has declined in the period 2000-01 to 2008-09 as compared to the 1990s, while their contribution to total imports has increased in 2009 as compared to 2000.

Table 15: Sectoral Average Annual Growth in Real Value Added in Organised Manufacturing Sector

	AVG1980s	AVG1990s	AVG2000s
COKE, PETROLEUM PRODUCTS AND NUCLEAR FUEL	-0.1	0.6	19.4
MOTOR VEHICLES, TRAILERS AND SEMI-TRAILERS	6.9	14.8	16.5
FABRICATED METAL PRODUCTS	1.9	13.4	15.5
WOOD AND WOOD PRODUCTS	7.5	-13.5	14.8
FURNITURE & OTHER MANUFACTURING N.E.C.	4.1	29.7	13.0
LEATHER & RELATED PRODUCTS	5.1	9.5	13.0
OFFICE, ACCOUNTING AND COMPUTING MACHINERY	4.8	5.8	12.8
ELECTRICAL MACHINERY AND APPARATUS, N.E.C	9.7	15.8	12.3
OTHER TRANSPORT EQUIPMENTS	6.6	10.2	11.9
FOOD PRODUCTS AND BEVERAGES	18.6	8.6	11.1
MEDICAL, PRECISION AND OPTICAL INSTRUMENTS	11.6	0.7	10.5
PAPER AND PAPER PRODUCTS	3.1	4.3	9.8
PUBLISHING, PRINTING AND RELATED ACTIVITIES	-1.9	0.7	9.3
WEARING APPAREL, DRESSING & DYEING OF FUR	14.3	15.5	9.0
TEXTILES PRODUCTS	4.9	12.8	8.0
MACHINERY AND EQUIPMENT N.E.C.	5.7	14.0	7.1
NON-METALLIC MINERAL PRODUCTS	8.6	9.5	7.1
CHEMICALS AND CHEMICAL PRODUCTS	11.1	10.1	3.8
BASIC METALS	0.5	17.5	3.3
RADIO, TELEVISION AND COMMUNICATION EQUIPMENTS	28.1	14.8	1.8
TOBACCO & RELATED PRODUCTS	1.7	7.7	-1.4
RUBBER AND PLASTIC PRODUCTS	8.0	8.5	-2.0
OTHERS	5.5	10.1	8.5
TOTAL MANUFACTURING	6.5	11.5	8.7

Note: Average annual growth rates of value added are calculated from Annual Survey of Industries. Double Deflation method is used. 2000s is 2000-01 to -2008-09

Table 16 reports decadal average annual growth rates in value added of broad industrial categories along with contribution of these industries to total exports and imports of manufacturing sector. Simple average tariffs over the decades are also reported.

The Table shows that the sectors with double digit average annual growth rates of value added in 1990s were motor vehicles, electrical machinery, fabricated metal products and petroleum products. These industries continued to grow at double digit rate in the period 2000-01 to 2008-09. Out of these those industries which experienced increase in their value added growth as compared to 1990s and also experienced higher export and import growth can be categorised as *Success stories*. There are two such industries, Motor Vehicles, Trailers and Semi-Trailers; and Electrical machinery and apparatus. Tariffs in these industries were lowered but they

continued to remain high for motor vehicles. Food products and beverages experienced a rise in its growth of value added and exports but fall in its imports. This could be because of the rise in tariffs for this industry. Given the importance of this industry with respect to its backward linkages with the agriculture sector, higher growth in this industry with lower import growth qualifies this industry as a success story.

Rising imports in a sector along with rising exports but falling value added growth in that sector indicates that rise in exports over time is fuelled by rise in imports rather output growth in the manufacturing sector. This also indicates that the nature of import in these industries may be more of the intermediate goods as compared to capital goods which increase productivity and efficiency. The growing import content in exports has become an issue of concern in many developing countries.

Industries which have witnessed a fall in their value added growth but rise in their export growth and import growth in 2000s as compared to 1990s are potential cases of increased import intensity of exports. These are Chemicals and Chemical Products and Basic Metals. The double digit value added growth in the decade of 1990s was followed by less than 5% growth in their value added. These are the industries which need to be closely monitored for a possible '*hollowing out'* wherein the externalities of export growth spill to the external sector and the domestic economy is unable to reap the economies which arise due to higher exports. There has been a drastic fall in tariffs of these industries during the decade of 2000 as compared to 1990.

There are some industries which have witnessed a fall in their value added growth along with a fall in their export growth as well as import Growth and these can be categorized as *not so successful stories*. These are Wearing Apparel, Dressing & Dyeing of Fur; Textiles Products; and Non-Metallic Mineral Products. The case of textiles and wearing apparels is a bit surprising. This sector enjoys a number of export incentives and has enjoyed high protection but in spite of this export growth has slowed down in 2000s. An important factor for this could be the intense competitive pressure on prices on account of exports from China, Bangladesh, Mexico etc. Another cause could be high protection and lower import growth of this sector.

Table 16 Average Annual Growth in Value Added, Contribution to Exports and Imports and Tariffs

	Average Annual Growth Rates of Real ValueAdded		Contribution to Total Manufacturing Imports		Contribution to Total Manufacturing Exports		Simple Average Tariffs		
	1990s	2000s	**1990**	**2009**	**1990**	**2009**	1996	2000	2008
High Growth Industries									
COKE, PETROLEUM PRODUCTS AND NUCLEAR FUEL	0.6	19.4	3.1	14.8	27.3	34	20.6	8.1	6.73
MOTOR VEHICLES, TRAILERS AND SEMI-TRAILERS	**14.8**	**16.5**	**2.3**	**6.3**	**3.9**	**4.7**	**39.4**	**48.3**	**20.91**
ELECTRICAL MACHINERY AND APPARATUS, N.E.C	**15.8**	**12.3**	**1.7**	**5.8**	**4.4**	**9.3**	**30.9**	**27.2**	**6.9**
FABRICATED METAL PRODUCTS	13.4	15.5	2.1	1.8			25	30.4	9.92
FOOD PRODUCTS AND BEVERAGES	**8.6**	**11.1**	**9.2**	**3.4**	**1.1**	**2.8**	54.2	37.7	41.19
Growth Declines									
NON-METALLIC MINERAL PRODUCTS	9.5	7.1	16.8	11.4	9.1	6.8			9.08
CHEMICALS AND CHEMICAL PRODUCTS	**10.1**	**3.8**	**9.5**	**11.1**	**12.3**	**9.9**	**39.8**	**8.3**	**8.3**
BASIC METALS	**17.5**	**3.3**	**6.2**	**10.4**	**10.6**	**8.2**	**25.3**	**30.8**	**5.17**
WEARING APPAREL, DRESSING & DYEING OF FUR	15.5	9	15.3	7.5			50.7	10	10
TEXTILES PRODUCTS	12.8	8	16.2	6.5	2.1	1.3	50.1	9.4	9.8

Apart from domestic market growth, growth in imports has been found to lead to growth in the sector. This sector has been over-protected in terms of its imports of intermediate goods as well as final goods.

These results have a strong connotation for the Indian manufacturing sector in the post 2008 global crisis period. The results explain the puzzle with respect to the growth of the manufacturing sector and its exports in spite of slowdown in the external demand. The growth is fuelled by the growing domestic demand for the manufactures as the per capita incomes rise. Higher domestic demand is plausibly creating growth in output

and value added in industries which are not necessarily export-oriented. This growth in the domestic market-oriented industries is also probably creating more demand for imports, especially for the capital goods and industrial intermediate goods. Demand for imported consumer durables is also rising with growth in incomes. Rising domestic competition and better imported technology and intermediate products are further fuelling the growth in the domestic-market oriented industries. But in this growth propelling growth process the export-oriented industries are being left out. This may be leading to the rising import content in their exports. This may have further adverse effects on their growth as their domestic linkages lower with rising import content and they are further isolated from the domestic growth.

6. Conclusions and Broad Lessons from Indian Experience

In the wake of global economic crisis, the issue of trade liberalsation and growth has become much more debatable. Conventional theories of export-led growth are now being challenged and growing import liberalsation is being viewed with concern. In this scenario, some of the developing economies have crossed the threshold and become emerging economies. This has led to considerable interest in their success stories. India's growth since the last decade has also attracted a lot of attention and attempts are being made to derive useful lessons from its growth experience for other developing countries.

Much of the growth in India's GDP has been contributed by growth in services sector. However, India's manufacturing sector has also experienced its highest ever average annual decadal growth in the decade of 2000, growing at an average annual growth rate of 8%. This was accompanied by its highest ever decadal growth in exports as well as imports (average annual growth rates of 11% and 27%). The role played by trade policy in the growth of the manufacturing sector is an issue of great importance, not only for India but also for other developing countries which have limited tools of development at their disposal. In this context, this paper investigates the extent to which trade acted as a driver of growth in the manufacturing sector. In particular, using different methodologies we examine whether growth in Indian manufacturing was an export-led growth or an import-induced growth. We also attempt to assess the

role played by India's trade liberalisation policies in the growth process of the manufacturing sector.

India's trade liberalisation policy has changed face several times since 1980s. The decade of 1980s was more dominated by export promoting policies while the decades of 1990 and 2000 saw more emphasis on import liberalization. Accordingly, the average annual growth of exports in 1980s was much higher than that of imports in 1980s, but in 1990s and 2000s, the average annual growth of imports surpassed that of exports. In the decade of 2000 real imports grew at an average annual growth of 27% as compared to 10% of real exports.

However, India's import liberalisation differed considerably in its extent and spread from other developing countries. The import liberalisation policy followed by India can be described as *cautious and sequential*. Import duties on capital goods were lowered in mid 1980s, followed by lowering of import duties on raw materials and intermediate products in the 1990s and eventually import duties were lowered for consumer goods in 2001. However, standard deviation of tariffs within the industry increased in many industries in 2009 as compared to 1990 reflecting that strategic protection which is still being followed in some industries. Some of these industries are motor vehicles and food product and beverages.

The paper follows different methodologies and specifications to test the inter linkages between growth in exports, imports and manufacturing output. To assess the importance of trade reforms in the growth process of the manufacturing sector, two kinds of structural breaks are identified in the growth series of total manufacturing value added and output of organised sector. These are *'gradual*' structural break that adds dynamically to future growth and *'instant'* breaks which shift the growth trajectory. Gradual shifts are more important in identifying the effectiveness of policy changes as they add dynamically into the system.

The results of the AO and IO models show that for the total manufacturing sector ,the structural break that adds dynamically to the rest of the growth process came **in *1991*** while the sudden break points in growth came in the year 1997. The reforms of 1980s which were more export- oriented did not lead to any sudden shifts or gradual shifts in value added growth of total manufacturing sector. But for the registered

manufacturing sector, the results using double deflated value added series for the organised manufacturing (which is used by most of the studies estimating productivity growth) show that the sudden breaks are found in the years 1991 and 1998, while gradual shifts in the mean of the series came around ***1986 and 2001***.

This indicates that it's plausible that reforms of 2000, which were more effective dismantling of protection to the sector, led to a gradual shift in the growth of organised manufacturing sector while the reforms of 1990s which were much broader in scope led to a gradual shift in the growth trajectory of the total manufacturing sector. The industrial policy of 1980s, which encouraged export-oriented production and import of technology, appears to have had a greater impact on the organised sector than the unorganised sector.

Significant structural breaks in export and import growths are found in the years 2001 and 2002. Tariff liberalisation gathered speed after 2001 when across the board tariffs in the manufactures, especially consumer durables were brought down to 10%. This period also coincides with the policy of removal of quantitative restrictions on consumer durables and a spurt in imports of capital goods and machinery. Seen with the drastic changes in import liberalisation policies in this period it can be said with some level of confidence that these policies were effective. But the industrial policy of export promotion of 1980s does not seem to have played an important role in terms of causing a structural break in export growth but policies like removal of items like garments, shoes, toys and auto components etc from the small scale reserved list in 2001 may have played some role.

The structural breaks in manufacturing growth and growth of exports and imports coincide around early 2000s indicating some causal relationship between trade and growth of manufacturing sector. To estimate the long term and short term relationships between growth of manufacturing output and growth of exports and imports we undertake multivariate cointegration analysis for the organised manufacturing sector using two specifications. Firstly, we build a five-variable VAR model using the augmented production function approach. VECM is estimated with growth of 'total manufacturing output' and 'manufacturing output net of exports' as used as dependent variables for deeper insights. The other variables are real exports, real imports, real capital stock and labour. Secondly, based on growth accounting framework, output

growth is taken as a function of growth in domestic demand, (captured by growth in per capita income and growth in imports) and growth in external demand captured by growth in exports.

The results based on both the specifications are found to be qualitatively similar. They reveal that ***Growth of Indian manufacturing sector is not an Export-led Growth but is an Import-Induced Growth***. Growth in exports does not seem to have contributed to growth in total manufacturing output in the long term and the causality runs from Growth in output → Growth in Exports. Short term results with respect to causality also show that in the short term export growth does not seem to cause growth in output. Interestingly, causality from export growth to growth in output net of exports is also not found. This can be interpreted as exports having lower linkages with the domestic sector as it does not affect the growth of output produced for domestic economy. Import growth on the other hand, according to the estimated results, have Granger caused output growth as well as export growth. This is indicative of exports growth being driven by imports rather than domestic production. This can be an area of concern for the economy as the potential advantages of a robust export growth spills to the external sector rather than being used internally by the domestic industry.

The analysis at the aggregate level is substantiated by sectoral analysis. Interestingly, industries which have experienced increase in their contribution to total exports of manufacturing sector in 2000s as compared to 1990s are also the industries which have witnessed a slow down in the average annual growth rates in the decade of 2000s as compared to 1990s. While, the top five industries where growth has improved in the decade of 2000s as compared to 1990s, e.g., wood and wood products, medical precision and optical instruments, publishing, printing and related activities, office accounting and computing machinery and paper and paper products are not the industries where which are export oriented.

The *success stories* at the sector level include those industries which have experienced higher value added growth in the last decade as compared to 1990s and have also experienced higher export and import growth in this period. There are two such industries, Motor Vehicles, Trailers and Semi-Trailers; and Food and Food Products. But, there are some *not so successful stories* which have witnessed a fall in their value

added growth along with a fall in their export growth as well as import growth. These are Wearing Apparel, Dressing & Dyeing of Fur; Textiles Products; and Non-Metallic Mineral Products. The case of textiles and wearing apparels is a bit surprising. This sector enjoys a number of export incentives but in spite of this export growth has slowed down in 2000s along with its value added growth. One apparent cause could be slowdown in external demand but that could have been overcome by the domestic market as in the case of other consumer exportables. Another cause could be high protection and lower import growth to this sector.

Some of the more worrisome cases are the industries which have experienced a fall in their value added growth in 2000s as compared to 1990s but a rise in their export growth as well as import growth. These industries are: Electrical Machinery and Apparatus, N.E.C; Chemicals and Chemical Products; Basic Metals; and Machinery And Equipment nec. These industries need to be closely monitored for a possible '*hollowing out'* wherein the externalities of export growth spill to the external sector and the domestic sector is unable to reap the economies which arise due to higher exports.

Some of the export promotion policies are linked to imports of intermediate products, wherein exemption from duties and other benefits are provided to exporters need to be reexamined. On one hand imported inputs may increase competitiveness of the sector but on the other hand these imports may also lead to potential hollowing out of the sector when value added growth starts declining with rising imports and exports. At the aggregate level it is seen that imports of raw materials and intermediate goods increased much faster as compared to capital goods and consumer goods in this decade. Tariffs with respect to inputs of exportable products therefore need to be closely monitored with the view to avoid potential hollowing out.

One of the major issues facing policy makers of developing countries across the world is the extent to which a sector should be protected. On one hand protectionism may raise inefficiencies and slow down the productivity and value added growth of the sector but on the other hand it may give the space for the sector to grow by catering to domestic demand which may eventually lead the sector to export. The Indian experience on this issue is mixed. There are some industries which were heavily protected till 2000. These were mainly industries producing exports like textile and

textile products; wearing apparels; and chemical and chemical products with weighted average tariffs of 28%, 38% and 32% respectively in 2000. All the three industries experienced an above 10% average annual growth rate in the 1990s but a below 10% average annual growth rate in the 2000s. Their growth in exports also declined. Chemicals and chemical products was able to sustain its export growth through higher import growth.

On the other hand, industries like wood and wood products, paper and related products and petroleum products had comparatively low tariffs, weighted average tariffs in 1996 were 14%, 8% and 12% respectively. There was a further fall in their tariffs in 2000. Though these industries did not enjoy high protection they were able to improve their average annual growth rates in 2000s as compared to 1990s. Petroleum products were also able to increase their contribution to total exports and become the highest contributor to exports of manufacturing sector.

In case of India, cautious and caliberated import liberalisation has worked for some of the sectors and these sectors when liberalised were able to compete both domestically as well as in the external markets. But in general traditional export oriented sectors which enjoyed high protection when liberalised were not able to compete very successfully in the domestic market and also lost their share in the external markets. One of the ways to sustain their shares in external markets was to increase import content of their exports. This is now one of the major challenges facing the Indian trade policymakers.

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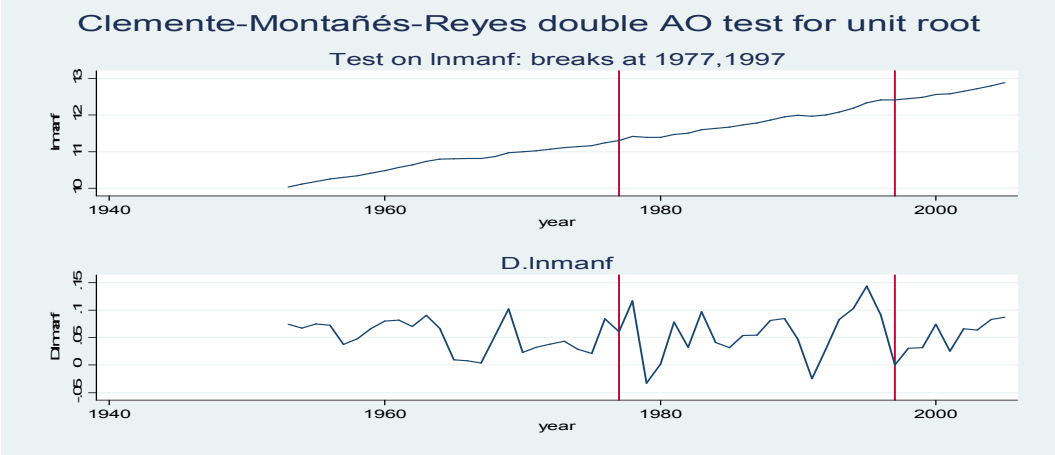
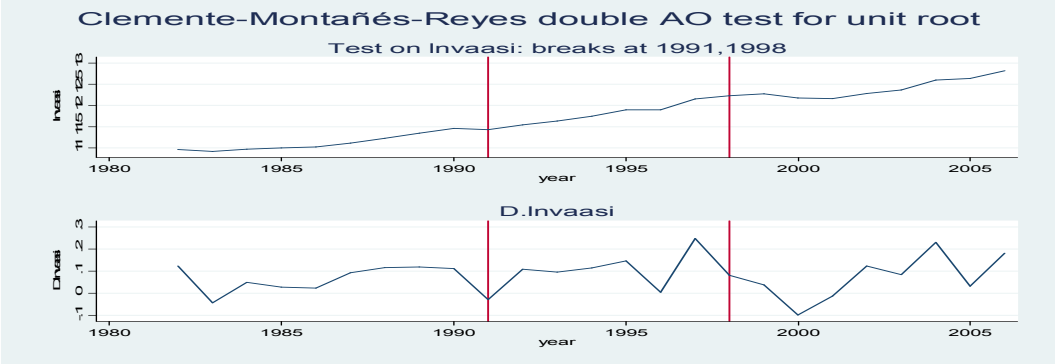
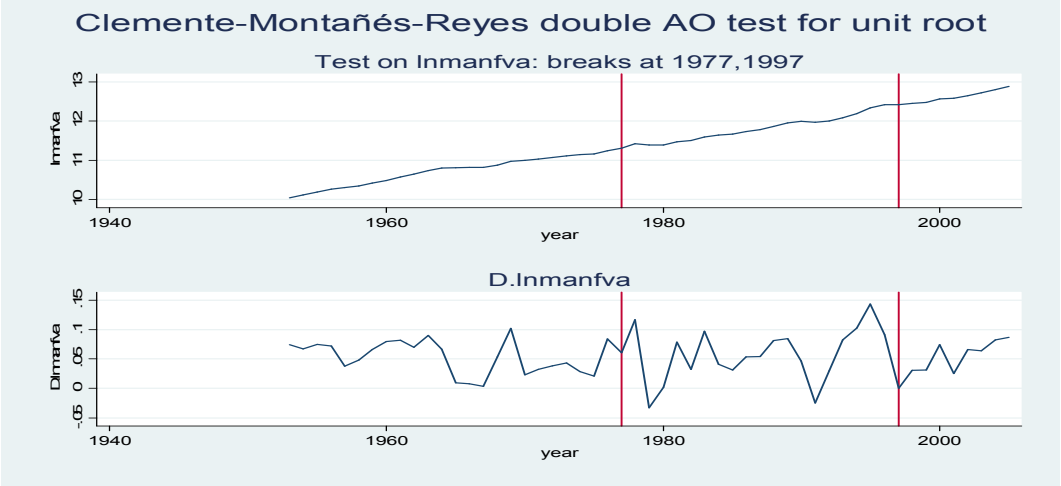
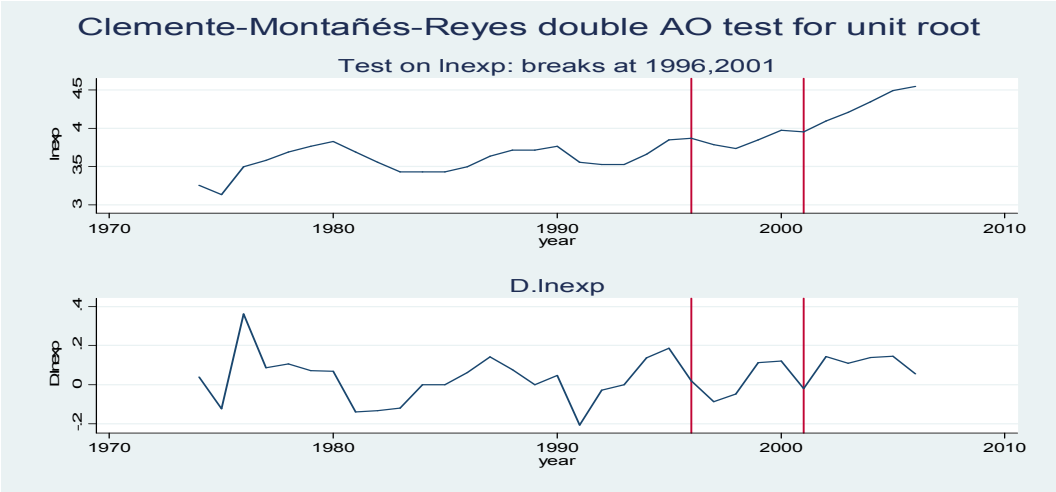
APPENDIX

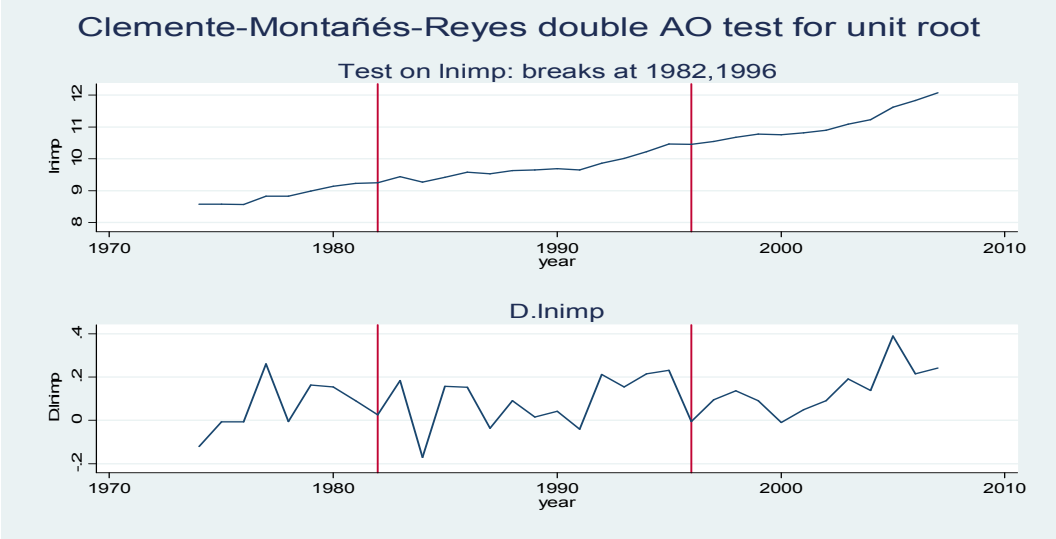
1. Results of AO Models








Clemente-Montañés-Reyes double AO test for unit root
Test on lnexp: breaks at 1996,2001
lnexp
3
3.5
4
4.5
1970
1980
1990
2000
2010
year
D.lnexp
Dlnexp
-2
0
.2
.4
1970
1980
1990
2000
2010
year


Clemente-Montañés-Reyes double AO test for unit root
Test on lnimp: breaks at 1982,1996
lnimp
8
9
10
11
12
1970
1980
1990
2000
2010
year
D.lnimp
Dlnimp
-2
0
.2
.4
1970
1980
1990
2000
2010
year

Unit Root Tests for the Series

Dickey Fuller Test for Stationarity

Variable Name:	ADF	Test Statistic
Log Output	Trend (1)	0.911
	Difference	-2.795**
Log Output Net exports	Trend (1)	1.316
	Difference	-2.598**
Log Exports	Trend (1)	1.302
	Difference	-2.951**
Log Imports	Trend (1)	2.013
	Difference	-2.939**
Log Capital intensity of labour	Trend (1)	-1.262
	Difference	-3.475**
1970-2009		
Log Manufacturing GDP	Trend (2)	2.973
	Difference	-5.844***
Log Per Capita Income	Trend (2)	2.989
	Difference	-5.659***
Log Exports	Trend (2)	0.296
	Difference	-3.07**
Log Imports	Trend (2)	1.406
	Difference	-2.939**

Note: ***denotes significant at 1% (For ADF it denotes the test statistic being greater than the critical value at 1%) , ** denotes significant at 5% and * denotes significant at 10%. Figures in brackets are the optimum lag lengths determined by AIC and BIC for ADF and Ng-Perron modified AIC (MAIC) for DF-GLS

Vector autoregression

Sample: 1975 - 2007		No. of obs	= 33
Log likelihood = 221.1962		AIC	= -10.25431
FPE = 4.95e-10		HQIC	= -9.460875
Det(Sigma_ml) = 1.77e-11		SBIC	= -7.896181

Equation	Parms	RMSE	R-sq	chi2	P>chi2
lnorgmanf	13	.037945	0.9979	15535.01	0.0000
lnexp	13	.086217	0.9605	802.1246	0.0000
lnimp	13	.191497	0.8763	233.8767	0.0000
lnpcy	13	.024048	0.9958	7751.646	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnorgmanf						
lnorgmanf						
L1.	1.430775	.1440042	9.94	0.000	1.148532	1.713018
L2.	-.9205866	.2464472	-3.74	0.000	-1.403614	-.437559
L3.	.5033859	.1731766	2.91	0.004	.163966	.8428058
lnexp						
L1.	.0059222	.071671	0.08	0.934	-.1345504	.1463948
L2.	-.0416421	.0945497	-0.44	0.660	-.2269561	.1436719
L3.	.0033159	.0664947	0.05	0.960	-.1270112	.133643
lnimp						
L1.	.0729552	.0318793	2.29	0.022	.0104728	.1354375
L2.	-.0951495	.0439293	-2.17	0.030	-.1812493	-.0090497
L3.	.0554772	.0395116	1.40	0.160	-.021964	.1329185
lnpcy						
L1.	-.039513	.2681535	-0.15	0.883	-.5650843	.4860582
L2.	-.6249691	.2879477	-2.17	0.030	-1.189336	-.060602
L3.	.6870145	.2018831	3.40	0.001	.2913308	1.082698
_cons	-.2853823	.7728163	-0.37	0.712	-1.800074	1.22931
lnexp						
lnorgmanf						
L1.	.0660343	.3272005	0.20	0.840	-.5752669	.7073356
L2.	-.526137	.5599675	-0.94	0.347	-1.623653	.5713791
L3.	.0832144	.393485	0.21	0.833	-.688002	.8544308
lnexp						
L1.	.62755	.162848	3.85	0.000	.3083737	.9467263
L2.	.09873	.2148321	0.46	0.646	-.3223332	.5197931
L3.	-.3835164	.1510865	-2.54	0.011	-.6796405	-.0873922
lnimp						
L1.	.2657851	.072435	3.67	0.000	.1238151	.407755
L2.	.0215722	.0998143	0.22	0.829	-.1740603	.2172047
L3.	-.2512621	.0897766	-2.80	0.005	-.427221	-.0753031
lnpcy						
L1.	1.138725	.6092878	1.87	0.062	-.0554573	2.332907
L2.	-.0270482	.6542634	-0.04	0.967	-1.309381	1.255284
L3.	.3092878	.4587108	0.67	0.500	-.5897689	1.208344
_cons	-6.604949	1.755962	-3.76	0.000	-10.04657	-3.163326
lnimp						
lnorgmanf						
L1.	-.4568906	.726746	-0.63	0.530	-1.881287	.9675053
L2.	1.541986	1.243745	1.24	0.215	-.8957104	3.979682
L3.	-1.732075	.8739706	-1.98	0.047	-3.445026	-.0191241
lnexp						
L1.	.3664293	.3617022	1.01	0.311	-.342494	1.075353
L2.	-.5007365	.4771641	-1.05	0.294	-1.435961	.4344879
L3.	.3498576	.3355787	1.04	0.297	-.3078645	1.00758
lnimp						
L1.	.6631053	.1608855	4.12	0.000	.3477755	.9784352
L2.	.3342572	.2216979	1.51	0.132	-.1002627	.7687771
L3.	-.1630296	.1994031	-0.82	0.414	-.5538525	.2277933
lnpcy						
L1.	.1577893	1.353291	0.12	0.907	-2.494612	2.810191
L2.	.4668755	1.453186	0.32	0.748	-2.381317	3.315068
L3.	1.064077	1.018844	1.04	0.296	-.9328204	3.060974
_cons	-8.451752	3.900173	-2.17	0.030	-16.09595	-.8075531
lnpcy						
lnorgmanf						
L1.	.0370861	.0912649	0.41	0.684	-.1417898	.2159621
L2.	.3113381	.1561898	1.99	0.046	.0052118	.6174645
L3.	-.3165199	.1097534	-2.88	0.004	-.5316326	-.1014071
lnexp						
L1.	-.0038588	.0454226	-0.08	0.932	-.0928855	.085168
L2.	-.0235525	.0599224	-0.39	0.694	-.1409982	.0938931
L3.	.0302463	.042142	0.72	0.473	-.0523506	.1128432
lnimp						
L1.	-.0219636	.020204	-1.09	0.277	-.0615628	.0176356
L2.	.0633961	.0278409	2.28	0.023	.008829	.1179632
L3.	-.0398834	.0250411	-1.59	0.111	-.0889631	.0091962
lnpcy						
L1.	.5588651	.1699465	3.29	0.001	.225776	.8919542
L2.	.2877005	.1824914	1.58	0.115	-.0699761	.6453771
L3.	.1372806	.1279466	1.07	0.283	-.1134902	.3880513
_cons	-.2068777	.4897845	-0.42	0.673	-1.166838	.7530823

.

Diagnostic tests for VECM

Autocorrelation (LM Test)

VECM with Total Output

```
. veclmar
```

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	15.6559	16	0.47722
2	15.3013	16	0.50269

H0: no autocorrelation at lag order

Tests for Normally Distributed Disturbances

```
. vecnorm, jbera skewness kurtosis
```

Jarque-Bera test

Equation	chi2	df	Prob > chi2
D_LNOUTPUT	0.867	2	0.64831
D_LNEXP	0.050	2	0.97518
D_LNIMP	1.730	2	0.42107
D_LNKL	1.320	2	0.51673
ALL	3.967	8	0.86005

Skewness test

Equation	Skewness	chi2	df	Prob > chi2
D_LNOUTPUT	-.37443	0.561	1	0.45394
D_LNEXP	-.10362	0.043	1	0.83582
D_LNIMP	.61389	1.507	1	0.21953
D_LNKL	-.0096	0.000	1	0.98469
ALL		2.112	4	0.71525

Kurtosis test

Equation	Kurtosis	chi2	df	Prob > chi2
D_LNOUTPUT	2.4468	0.306	1	0.58016
D_LNEXP	2.9144	0.007	1	0.93182
D_LNIMP	2.5284	0.222	1	0.63718
D_LNKL	1.851	1.320	1	0.25057
ALL		1.856	4	0.76225

.

Eigenvalue stability condition

Eigenvalue	Modulus
1	1
1	1
.9611252	.961125
.303606	.303606

The VECM specification imposes 2 unit moduli.

.

VECM with Output net of exports

. veclmar

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	17.0925	16	0.37964
2	18.8168	16	0.27828

H0: no autocorrelation at lag order

. vecnorm, jbera skewness kurtosis

Jarque-Bera test

Equation	chi2	df	Prob > chi2
D_LNOUTNETEXP	1.580	2	0.45380
D_LNEXP	1.036	2	0.59571
D_LNIMP	1.226	2	0.54174
D_LNKL	0.890	2	0.64086
ALL	4.732	8	0.78580

Skewness test

Equation	Skewness	chi2	df	Prob > chi2
D_LNOUTNETEXP	.61436	1.510	1	0.21918
D_LNEXP	-.4134	0.684	1	0.40835
D_LNIMP	.51402	1.057	1	0.30393
D_LNKL	-.20265	0.164	1	0.68525
ALL		3.414	4	0.49100

Kurtosis test

Equation	Kurtosis	chi2	df	Prob > chi2
D_LNOUTNETEXP	2.7346	0.070	1	0.79070
D_LNEXP	2.4064	0.352	1	0.55276
D_LNIMP	2.5888	0.169	1	0.68096
D_LNKL	2.1482	0.726	1	0.39430
ALL		1.318	4	0.85840

.

Eigenvalue stability condition

Eigenvalue	Modulus
1	1
1	1
.9637741	.963774
.306373	.306373

The VECM specification imposes 2 unit moduli.