STRUCTURAL CHANGE IN THE INDIAN ECONOMY

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ABSTRACT

We analyse the evolution of the Indian economy over the past six decades, particularly identifying structural breaks. We find that usually there has been a gradual change in the indicators of the economy .The growth rate of per capita GDP after falling in the decade mid 60s to mid 70s has been accelerating gradually since then. Since 1991 exports have played an important role in this growth. The various crises and the measures taken to tackle them have not disturbed this evolution, except the policy changes ushered from 1991. The structural breaks we identify do not usually coincide with these crises. The structural breaks suggest certain patterns which are investigated using VAR estimations.

Key Words: Indian Economy, Structural Break, VAR Estimation

JEL Classifications: N15, O21, O24

1. Introduction

Indian policy makers embarked on their journey to raise living standards and reduce poverty and inequality soon after independence, and they employed the mechanism of Five Year Plans to bring coherence to their attempts. The process of designing explicit five plans went on for nigh sixty years. But the process of growth and planning did not proceed smoothly. It was interrupted by a number of crises and sometimes these crises led to the suspension of plan implementation for a few years while new policies were adopted to tackle the problems identified by the crisis or caused by the crisis. This paper seeks to analyse whether the different crises were caused by exogenous factors or because of faulty domestic policies. Exogenous factors themselves could be of two kinds one those emanating from the world economy and those emanating in the domestic sphere. We next analyse what the effect of these crises reveal about the interrelationships between different aspects of the Indian economy.

Our analysis proceeds in section 2 by first noting the various crises that have struck the Indian economy over the past six decades and their effects on growth and investment. We find that the effect on GDP is ephemeral while that on investment is longer lasting. We then examine in section 3 the evolution of the Indian economy over the past six decades. We do this plan wise as the plans governed the government's policies. We find that GDP growth gradually accelerates over the plan periods except for a slowdown in the sixties and early seventies. The

gradual growth acceleration is accompanied by increases in investment and savings rates. A significant change over this period is that the share of exports of goods and services (XGS) in GDP declines till the Fourth Plan, 1969-73, and shows rapid growth after the Eighth Plan, 1992-96, reflecting the significant change in India's trade and industrial policies initiated in 1991. While the improved export performance can be ascribed to the policy changes initiated in 1991 the gradual acceleration in growth of GDP cannot be similarly ascribed to any particular policy changes. In section 4 we more formally identify structural breaks in the Indian economy using the Bai-Perron technique. In section 5 we compare the impacts of the manufacturing and services sectors on the Indian economy. The findings suggest certain patterns which are further analysed in section 6 to reveal interrelationships in the Indian economy using VAR estimations. Section 7 concludes the paper.

2.   Crises in the Indian Economy

The Indian economy has experienced a number of crises in the past six decades. There was a balance of payments (BOP) crisis in 1957-58 as the policy makers were implementing the Second Five Year Plan. 1956-1960, that called for much higher rates of investment and that needed much greater imports of capital goods. Another crisis struck in the mid-sixties because of a severe drought that resulted in very poor harvests in 1965-66 and 1966-67. This necessitated large imports of food from the US under the food aid programme and resulted in very high rates of inflation. The drought was followed by cut-off of aid from the US and the World Bank forcing adoption of severe adjustment policies. Subsequently, a BOP crisis was precipitated by the large increases in prices of oil and many commodities in 1973-74. The price increases followed on the heels of the large influx of refugees from the now Bangladesh and the subsequent war that resulted in the independence of Bangladesh. The effects of the oil price rise in 1979 following the revolution in Iran and the subsequent Iran-Iraq war

generated another BOP crisis. The invasion of Kuwait by Iraq and the First Gulf War resulted in a severe BOP crisis as the larger trade deficit because of higher oil prices was aggravated by the fall in remittances as many Indian workers in the Gulf returned home.

Table 1: Crises for the Indian Economy

Date of Crisis	Cause				
	Endogenous	Exogenous	Domestic	External	What
1957-58	✓		✓		Excess Investment
1965 on		✓	✓	✓	Drought and Aid Cut
1973-74		✓		✓	Oil Price Rise
1979-80		✓		✓	Oil Price (Iran-Iraq War)
1990-91	✓	✓	✓	✓	Oil Price (Gulf War)

Though the immediate factor behind the 1991 crisis was the Gulf war with the rise in oil prices and fall in remittances because of return of workers from the Middle East, the domestic situation was fragile both economically, high short term borrowings, and politically, weak governments unable to take decisions.

2.1. Impact of Crises on GDP and Investment

The effect of the crises on gr111owth of GDP was usually short lived. In 1957-58 GDP declined by 1.2 percent, but rebounded in the next year as it grew by 7.6 percent. Similarly the GDP after growing at merely 1.2 percent in 1974-75 grew by 9 percent the following year and after falling by 5.2 percent in 1979-80 grew by 7.2 percent in 1980-81. However, while GDP rebounded rapidly that was not the case with investment.

The drop in the investment ratio after a crisis recovered only after a considerable lag. For instance, after gross fixed capital formation (GFCF) as a percentage of gross domestic product (GDP) reached a peak of 15.9 per cent in 1957-58 it fell after the 1957-58 BOP crisis and did

not recover to the earlier ratio till 1963--64 (RBI 2012). The fall in the GFCF ratio after the 1965-67 crisis was particularly severe - from 20.4 per cent to 16.7 per cent - and it did not recover till 1977-78.

2.2. Response to the Crises

The government responded by a mixture of financing and adjustment. For instance, following the 1957-8 crisis the Indian Government approached the World Bank for financial assistance. The World Bank responded favourably and organised the Aid India Consortium. Under the leadership of the US the Aid India Consortium provided considerable help during the Second and Third Five Year Plans[1]. This aid financed a quarter to a third of public investment in these plans. Following the 1973-74 crisis India borrowed from the trust fund that had been set up at the International Monetary Fund (IMF) to provide BOP financing for countries severely affected by the oil price rise. India also started tapping non-resident Indians. It provided various incentives, including a higher interest rate than they could earn in the country of residence. In the crisis following the oil price rises of 1979 and the Gulf War India borrowed from the IMF. The only crisis when India did not tap external financing was the 1965-67 crisis. This crisis was partly caused by the cut-off of aid and at that time the availability of private financing was very limited.

At the time of the first crisis in 1957-58 there was a vigorous debate about the size of the Plan. Many analysts and policy makers believed that the Plan was too large and beyond the capacity of the economy. As a result of this debate the Plan was divided into two, a core plan and the rest which would be implemented if resources permitted. Subsequent crises also saw similar adjustments on the expenditure side. For instance, the fiscal and monetary policy became so contractionary after the 1973-74 oil price rise that wholesale prices which had risen by

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1.   The US promised to match aid given by the other countries of the Consortium.

25.2 percent in 1974-75 fell by 1.1 percent in 1975-76. The reduction in domestic absorption also resulted in the country running current account surpluses for a few years in the mid-seventies. As we saw above investments declined following a crisis and recovered only after a time lag. Also in subsequent crisis a somewhat greater emphasis was given to raising the rate of savings, as we shall see below.

3.   Progress of the Indian Economy

We first look at the evolution of the Indian economy to identify major interruptions to the growth process. Since the intended overall macro and development policy changes were made in the plans we analyse the performance plan wise.

The growth rate of the economy plummeted to a relatively low level for almost a decade from the mid sixties to the mid seventies as the economy struggled to cope with the cutback in aid during 1966-68[2]. The savings rate had to be raised before investment and growth could recover. In the short run the higher rate of savings had a deflationary effect on the economy.[3]   Furthermore, as noted below lack of demand for capital goods created by the aid cutback created substantial excess capacity. Since this was a period when the world economy was growing rapidly as were also other developing countries, India missed the opportunity to take advantage of favourable international conditions[4].

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2.   The slowdown in the economy was similar to that experienced by many Latin American countries in the eighties as they struggled to cope with their debt crisis.

3.   There was considerable analysis at that time about the demand constraint to investment and growth (Chakravarty, 1979).

4.   The period till 1973 is called the "Golden Age of Capitalism" (Marglin and Schor, 1990). The growth rates of the different regions are analysed in Agarwal (2008).

Table 2: Growth Rate of GDP and Major Sectors in India

	GDP	Agricul- ture	Manufact- uring	Services
First Plan (1951-55)	3.9	3.2	5.8	5.2
Second Plan (1956-60)	4.1	3.3	6.3	4.9
Third Plan (1961-65)	3.5	-0.3	6.6	5.4
Annual Plans (1966-68)	3.7	4.4	2.2	4.3
Fourth Plan (1969-73)	3.2	2.8	4.9	3.2
Fifth Plan (74-78)	5.0	3.6	6.5	5.4
Sixth Plan (80-84)	5.5	6.3	5.2	5.5
Seventh Plan (85-89)	5.7	3.1	6.3	7.2
Eighth Plan (92-96)	6.5	4.9	9.5	6.8
Ninth Plan (97-01)	5.7	2.5	3.6	8.0
Tenth Plan (02-06)	7.6	2.5	9.0	9.2
Eleventh Plan (07-11)	8.0	3.8	7.7	9.9
2012-13	4.5	1.7	1.1	6.8

Source: Reserve Bank of India (2012).

Since the mid seventies there has been a steady acceleration of the growth rate, except for a slight deceleration during the Ninth Plan, which is difficult to prima facie ascribe to any policy measures (Table 2). The effects of poor harvests in the mid sixties can be seen in the negative average rate of growth of value added in agriculture during the Third Plan.

The effect of the subsequent cutback in aid can be seen in the sharp drop in the growth of the manufacturing sector during the periods of the annual plans and the Fourth Plan. The cutback in aid, the investment needs accompanying the green revolution in agriculture and priority accorded petroleum exploration and refining following the oil price rises in 1973-74 forced a changed allocation of the government's investments and a smaller allocation for manufacturing (Lele and Agarwal, 1991). The poor performance of the manufacturing sector was

because the Government's industrialisation strategy stressed investment in heavy industries in the public sector. The output of these basic industries would be used for further investment in heavy industries in the public sector. Such a strategy was growth maximizing and a higher rate of growth would lead to a greater reduction of poverty in the long run (Mahalanobis 1953 and 1955; Bhagwati and Chakravarty, 1969; Chakravarty, 1969). A large part of this public sector investment was financed by aid and the aid cut-off had very serious consequences. Without the aid investment fell. So there was no demand for the output of the public sector units that had been set up resulting in considerable excess capacity and very high capital output ratios. Also, as noted above, other sectors claimed a larger share of the government's investment budget.

It has been contended that the rapid growth of the economy since the nineties has been based on services growth rather than growth of manufacturing.[5] This is not borne out by the data. The average growth rate for services during the period 1980-1996 is 6.4 percent, not statistically different from the 6.3 percent growth rate for manufacturing during that period. Again the average growth rates for the two sectors are not statistically significantly different for the period 2002-10. The significant difference is during the Ninth Plan (Table 2). The large reduction in tariff rates for imports of manufactures could have resulted in a shrinking of the sector as happened in many Latin American countries where the share of manufactures in GDP has fallen considerably since the debt crisis (Agarwal and Chakravarty, 2016).

The behaviour of investment mirrors that of the growth rate of the economy. The investment to GDP ratio was stable during the Third to Fourth Plan periods and then there was a sharp increase from the Fifth Plan to the Sixth Plan with further increases in the Tenth and Eleventh

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5.   For a discussion of this aspect of Indian growth see Kotwal, Ramaswami and Wadhwa (2011).

Plans. The increase in the investment ratio is usually preceded by increases in the share of gross domestic savings in GDP so that the financing of the higher investment would not depend on foreign aid. We see a very sharp increase in the savings rate after the cut-off in aid in the mid sixties to the Fifth Plan. The increase in the savings ratio predates the increase in the investment ratio. Again the savings ratio starts to increase in the Ninth Plan before the investment ratio shot up in the Tenth Plan.

Table 3: Economic Performance Some Indicators (% of GDP)

Plans	Gross Fixed Capital Formation	Gross Domestic Savings	Current Account Balance	Exports of Goods and Services
First Plan (1951-55)	9.5	9.8	0.2	
Second Plan (1956-60)	13.0	11.0	-2.8	
Third Plan (1961-65)	14.3	12.7	-1.8	3.9
Annual Plans (1966-68)	14.3	12.7	-0.2	4.0
Fourth Plan (1969-73)	14.3	14.9	-0.7	3.8
Fifth Plan (74-78)	16.3	18.6	0.5	5.9
Sixth Plan (80-84)	20.5	17.6	-1.5	6.6
Seventh Plan (85-89)	21.4	19.6	-2.2	6.0
Eighth Plan (92-96)	22.4	22.5	-1.2	8.8
Ninth Plan (97-01)	24.3	24.3	-0.6	11.2
Tenth Plan (02-06)	28.1	31.0	0.2	17.9
Eleventh Plan (07-11)	33.7	33.5	-2.6	22.6
2012-13	33.2	30.1	-4.7	24.4

We now discuss the state of India's external sector by examining both export performance and the balance between exports and imports. It has been contended that India's growth has been driven by domestic demand and not exports unlike China's growth.

The importance of exports both of goods and non factor services (NFS) declined through the first three plans.[6] They then stabilized before experiencing a sharp increase in the Fifth Plan.[7] Exports of goods, NFS and transfers, mainly remittances started growing very rapidly from the Eighth Plan onwards, namely since the liberalization process started. A number of policies were changed following the BOP crisis of 1991 all of which contributed to this rapid expansion of exports. The rupee was devalued and later was made market determined so it tended to devalue. Imports were liberalized.

Table 4: India's Export Performance (% of GDP)
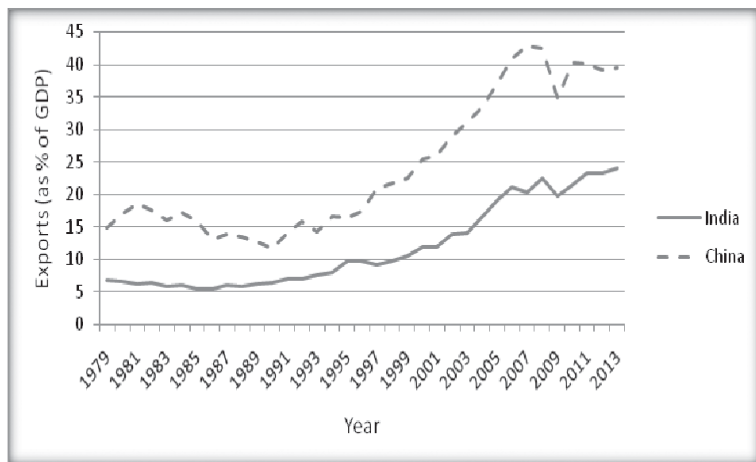
Plans	Goods	Non-Factor Services	Income	Transfers
First Plan (1951-55)	5.5	1.0	0.2	0.6
Second Plan (1956-60)	4.1	0.9	0.1	0.6
Third Plan (1961-65)	3.2	0.7	0.0	0.6
Annual Plans (1966-68)	3.3	0.7	0.1	0.5
Fourth Plan (1969-73)	3.2	0.5	0.1	0.9
Fifth Plan (74-78)	4.9	0.9	0.2	1.1
Sixth Plan (80-84)	4.5	1.5	0.3	1.5
Seventh Plan (85-89)	4.6	1.3	0.2	1.1
Eighth Plan (92-96)	8.1	1.9	0.2	2.4
Ninth Plan (97-01)	8.6	3.1	0.5	2.8
Tenth Plan (02-06)	11.8	5.8	0.7	3.3
Eleventh Plan (07-11)	14.7	7.6	0.9	3.7

6. Indian exports at the time of independence consisted mainly of agricultural products such as tea, jute and cotton in all of which India had a large market share. Improved export performance had to wait for development of the manufacturing sector (Government of India, 1952). Actually the export target for the Third Plan had been achieved by the third year. The droughts of 1965-67 and the subsequent aid cutback required an entirely different strategy.

7. This increase reflected the analysis of the effects of a permanent increase in the price of imported oil and the subsequent terms of trade loss (Persson and Svensson, 1985).

This helped exports in two ways. One, if fewer import competing goods are produced following the trade liberalization then resources would be freed to move to export production and the devaluation of the exchange rate would provide an incentive for such a shift.[8] Two, better quality imports could be acquired to improve the competitiveness of exports. The import content of Indian exports increased following the liberalization. The elimination of industrial licensing also allowed entry of more firms and some of them would export.[9] So removal of entry restrictions resulted in a large increase in exports.

We now examine whether China's growth was more export driven and India's growth more dependent on domestic demand.

Figure 1: Exports (% of GDP), 1979-2013

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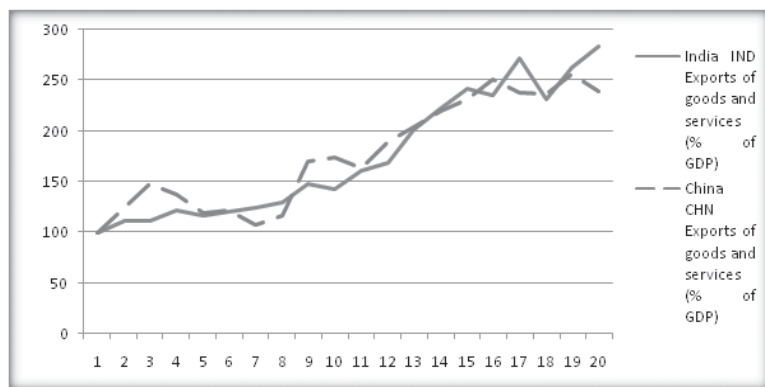
8   This analysis reflects the absorption approach to the balance of payments (Johnson, 1962).

9   For the effect of entry on exports see Agarwal and Barua (2004). They show that if a monopolist in the domestic market is a perfect competitor in the export market and exports say 5 percent of his output, then entry of a second firm leads to a fourteen fold increase in exports. While the extent of the increase depends on the elasticity of domestic demand because that determines the extent of price decline after entry and so the incentive to export, the increase is quite robust to variations in the parameters.

The share of exports of goods and services (XGS) is much higher in China than in India (Figure 1). However the behaviour of the share shows a very striking similarity. This is borne out if we if we compare the evolution since the respective reforms. So we form an index number of the share with the value of 100 for China's share in 1979, the beginning of China's reform, and for India's share in 1992, the beginning of India's reform. So the year 10 represents 10 years after the reform and so corresponds to 1989 for China and 2001 for India.

The increase in share of exports of goods and services was 239 percent for China, but 283 percent for India and this is not merely because of the spurt in the last three or four years. The shares track well throughout the 20 year period since the respective reforms (Figure 2).[10] There is no evidence that India has depended more on domestic demand for growth while China has depended more on exports for growth.

Figure 2: Index of Share of Goods and Services in GDP since the Reforms

(Index =100 for China's share in 1979 and for India's share in 1992)

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10.   There is considerable similarity between the Chinese and Indian performances when seen from the perspective of change since their respective reforms (Agarwal and Whalley, 2015a)

Exports can provide a fillip to the economy because of the backward linkages, though of course in strict national accounting terms it is net exports which contribute to GDP. But export performance has another effect on economic growth. Export performance influences the current account deficit and its sustainability. A large current account deficit can usually not be sustained and it is usually corrected by a period of slower growth. So we now examine the state of India's current account over the years.

The current account has usually been negative except in the Fifth Plan when for a few years in the mid-seventies it was positive and again for some years during the Ninth Plan (Table 4). The 1991 reforms led to an improvement in the current account balance as the deficit fell from 2.5 percent of GDP in the 7th Plan to 1.3 percent in the 8th Plan and only 0.1 percent in the 9th Plan, before ballooning again in the 11th Plan.

Table 5: The Current Account Balance and its Components (% of GDP)

Plans	Current Account	Goods	NFS	Income	Transfers
First Plan (1951-55)	-0.3	-1.4	0.4	0.0	0.6
Second Plan (1956-60)	-2.2	-2.8	0.4	-0.2	0.5
Third Plan (1961-65)	-2.1	-2.5	0.3	-0.5	0.6
Annual Plans (1966-68)	-1.4	-1.3	0.2	-0.6	0.4
Fourth Plan (1969-73)	-0.4	-1.0	0.1	-0.5	1.0
Fifth Plan (74-78)	0.3	-1.5	0.4	-0.2	1.5
Sixth Plan (80-84)	-1.8	-3.7	0.6	-0.2	1.5
Seventh Plan (85-89)	-2.5	-3.2	0.3	-0.9	1.1
Eighth Plan (92-96)	-1.3	-3.4	0.2	-1.1	3.0
Ninth Plan (97-01)	-0.1	-3.1	0.7	-0.9	3.2
Tenth Plan (02-06)	-0.4	-6.2	2.9	-0.8	3.7
Eleventh Plan (07-11)	-3.9	-10.7	3.8	-1.0	4.0

Within the current account the balance on goods and on income has been negative. However, that on non-factor services (NFS) and on transfers has been positive. A second feature is that the imbalances have been generally growing especially since the Fourth Plan. The reforms initiated in 1991 temporarily halted the trend of increasing deficits in merchandise trade. However, the reforms did not reduce the deficit on merchandise trade to any significant extent as it jumped again almost to 4 percent in the 11th Plan. But there was a surge in exports of NFS and of incoming remittances.

4.   Structural Breaks

The above analysis has pointed to significant structural changes in the Indian economy over the past six decades.[11] We now examine more formally whether there were structural breaks in the Indian economy during this period by using Bai and Perron (1998, 2003) method for estimating multiple structural breaks in linear models. We used two sets of data to test for structural breaks. We used data from the World Bank from 1960 to 2013 to test for breaks not only in the series for India but also the series for low income countries, the group to which India belonged for most of this period and also for the entire world. This was done to isolate factors emanating from the world economy that may account for the structural breaks in the Indian economy. We also used data from the Reserve Bank of India from 1951-52 to 2012-13. This longer time series allowed us to see whether there was a structural break in the mid-sixties. Since the data from the World Bank was only from 1960 it would not identify a break in the mid-sixties.

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11.   An earlier analysis had concentrated on the behaviour of 12 significant economic indicators and had found improvement in these indicators in the 1990s as compared to the 1980s and in the 2000s as compared to the 1990s (Agarwal, Mitra and Whalley, 2015).

From the World Bank data we find no breaks in the growth rate for per capita GDP in India (Table 6).[12] For the world there is only one break in 1972 whereas the low income countries (LIC) experienced two breaks in 1993 and 2002.

In general while there are breaks in growth rates for the world and for low income countries (LIC) there are none for India. The technique compares growth rates before a possible break with the growth rate after the possible break. Only if the two growth rates are significantly different does the technique denote the point as a break point. While the growth rate has fluctuated considerably in India there is no point at which there is a sharp break in the later growth rate compared to the earlier growth rate. But that does not mean that there is no point of time at which there is a sharp interruption in the rate of growth. But what the lack of a structural break implies is that any interruptions in the growth process are temporary. The existence of breaks in the rate of growth of per capita GDP for the world and LICs implies that the rate of growth varied for a substantial period of time.

Table 6: Breaks in Grow1th Rates

	India	Low Income Countries	World
GDP per capita	None	1993, 2002	1972
Agriculture	None	2003	None
Manufacturing	None	1986, 1991	No Data
Services	2003	1985, 1989	No Data

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12.   However, several authors have identified structural break in India's GDP growth rate during mid 1970's or early 1980s [see Agarwal, Mitra and Whalley (2015) for a detailed discussion]. Using the Bai and Perron (1998, 2003) method we do find multiple structural breaks in India's GDP or GDP per capita series, however, as already discussed, we find no statistically significant structural break in the GDP growth rate for India over the period 1951-2013.

For the world there is a break in 1972. During this period there were increasing global imbalances and rising inflation that culminated in the collapse of the fixed exchange rate regime in 1971. This break in the growth rate of the world per capita GDP is not reflected in either the growth rate in developing countries whether low income or middle income or in India. There are two breaks in the growth rate of per capita GDP in LICs. These occur in 1993 when the growth rate increased from an average of -0.7 percent in the period 1975 to 1993 to an average of 1.2 percent in the period 1994 to 2002 and in 2002 when the average growth rate of per capita GDP increased further to 3.6 for the period 2003 to 2013.

We analyse temporary interruptions in the growth process by seeking breaks in the series. We take the log of the series as shifts in slopes then represent changes in the growth rate. We find three break points of the economy, namely the performance of the economy can be divided into 4 periods (Table 7). In the first period from 1950-51 to 1977-78 the growth rate averaged 3.7 percent. Then there are increases in the growth rate first to 4 percent during the period of the 6th Plan and later to almost 6 percent from the middle of the 7th Plan to the beginning of the 10th Plan and subsequently it further accelerated.[13] Again the picture is one of almost steady acceleration in the growth rate.

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13   The deceleration in 2012-13 and 2013-14 is too short a period for it to qualify as a separate period.

Table 7: Breaks in the Indian Economy (taking natural log series)

Variables	Break Years	Average growth rates
GDP at Factor Cost	1977-78 1986-87 2003-04	3.74 (1950-51 - 1977-78) 4.03 (1978-79 - 1986-87) 5.86 (1987-88 - 2003-04) 7.55 (2004-05 - 2013-14)
GDPPC at Factor cost	1963-64 1977-78 1988-89 2003-04	1.79 (1950-51 - 1963-64) 1.38 (1964-65 - 1977-78) 2.30 (1978-79 - 1988-89) 3.73 (1989-90 - 2003-04) 6.05 (2003-04 - 2012-13)
Manufacturing	1964-65 1978-79 1989-90 1999-2000	6.63 (1950-51 - 1964-65) 4.62 (1965-66 - 1978-79) 4.95 (1979-80 - 1989-90) 5.84 (1990-91 - 1999-2000) 7.53 (2000-01 - 2012-13)
Services	1960-61 1971-72 1984-85 1994-95	3.65 (1950-51 - 1960-61) 5.22 (1961-62 - 1971-72) 4.37 (1972-73 - 1984-85) 5.41 (1985-86 - 1994-95) 6.97 (1995-96 - 2012-13)
Agriculture	1986-87 2000-01	2.52 (1950-51 - 1986-87) 3.40 (1987-88 - 2000-01) 3.31 (2001-02 - 2012-13)

The breaks in manufacturing growth coincide partly with the breaks in the GDP growth rate. For instance, the growth of manufacturing accelerates in 1978-79 to almost 5 percent and in 1989-90 to 5.8 percent and these breaks roughly correspond to the accelerations in the growth rate of GDP in 1977-78 and 1986-87. We get an additional break for per capita GDP because of variations in the rate of growth of population.

It is interesting to note that the break in the GDP series occurs before that in manufacturing suggesting that manufacturing responded to the higher growth of GDP which would in turn imply that the manufacturing sector faced a demand constraint; overall exports were a small part of GDP and similarly, exports of manufactures of manufacturing

output. But later the manufacturing sector's growth accelerated in 1999-2000 before that of GDP and we note that exports of goods accelerated in 1996-67 suggesting that the last growth acceleration in value added in manufactures was export driven. We explore the relation between the manufacturing sector and GDP further in section 5.

The breaks in the growth rate of services are usually independent of that in GDP except the acceleration in services growth rate in1984-85 pre-dates that in GDP in 1986-87. However, there is a break in the growth rate of value added for services in 2003.

What is surprising are the breaks in the growth rate of agriculture. There are only two - acceleration after 1986-87, which is well after the onset of the green revolution, and a marginal decline after 2000-01. This behaviour of the agricultural growth rate we believe is because the value-added in agriculture fluctuates very extensively with growth rates varying from -12.77 to 15.63. Consequently, the application of the technique of structural breaks to the agricultural series may be problematic.

We now consider the performance of the external sector, trying to see to what extent it can explain the performance of GDP. As evident from Table 8, a number of variables show structural breaks in the late 1990s or in the early 2000s. In particular, it is worth noting that the merchandise trade deficit went up to 8.5% of the GDP in the last decade from 3.2% of GDP during 1977-2002.

Now, one point is worth mentioning at this stage. The relationship between India's exports and India's exchange rate with the US is non-unique. As elaborated in Agarwal and Essid (2015), an expansionary monetary policy of the US may both increase (real effect) and decrease (monetary effect) India's exports to the US. An expansionary monetary policy in the US increases US import demand and hence, exports of partner country will increase. This is the real effect. On the other hand,

Table 8: Breaks in Indian Exports and Balances

Variables	Break Dates	Average Values
Export of goods (% of GDP)	1964-65 1973-74 1985-86 1996-97	4.51 (till 1964-65) 3.21 4.66 6.52 12.30 (till 2013-14)
CAB (% of GDP)	1965-66 1977-78 1988-89 1998-99	-1.53 (till 1965-66) -0.36 -1.85 -1.43 -1.54 (till 2012-13)
Merchandise Trade Balance (% of GDP)	1976-77 2001-02	-1.74 (till 1976-77) -3.21 -8.48 (till 2013-14)
Imports (% of GDP)	1972-73 1984-85 1996-97	5.61 (till 1972-73) 6.16 7.38 16.79 (till 2013-14)
Non-oil Imports (% of GDP)*	1992-93 2002-03	4.53 (till 1992-93) 7.34 13.88 (till 2013-14)
Exchange Rate (Re/US$)	1978-79 1989-90 2002-03	7.03 (till 1978-79) 10.51 32.68 46.27 (till 2013-14)

*   For non-oil imports, the data period is 1970-71 to 2013-14. For the rest, data period is 1950-51 to 2013-14.

an expansionary monetary policy of the US will raise US interest rates. This will lead to a depreciation of the US dollar. Hence, the currency of the partner country will appreciate and in turn will lower the exports of the partner country. This is the monetary effect. The total effect, hence, will depend on the relative strengths of the real and monetary effects.

5. Impact of Manufacturing and Services Sectors on the Indian Economy

In this section we compare the effects of the manufacturing and services sectors on the economy by examining the sectors' backward and forward linkages. We used national input-output tables for India from the World Input Output Database (2013) to aggregate the sectors into five sectors - primary, manufacturing, utilities, construction and services. We did these for the years 1995 and 2011. The input-output tables for India are given below.

Table 9: Input-Output Table (India)

1995					
	Primary	Manu-facturing	Utilities	Constru-ction	Services
Primary	0.117	0.116	0.072	0.030	0.105
Manufacturing	0.0501	0.328	0.085	0.317	0.017
Utilities	0.007	0.039	0.241	0.015	0.000
Construction	0.005	0.002	0.019	0.005	0.000
Services	0.054	0.181	0.169	0.144	0.015
2011					
	Primary	Manu-facturing	Utilities	Constru-ction	Services
Primary	0.080	0.085	0.056	0.017	0.014
Manufacturing	0.088	0.261	0.388	0.391	0.079
Utilities	0.010	0.026	0.030	0.015	0.006
Construction	0.012	0.013	0.090	0.045	0.022
Services	0.014	0.223	0.196	0.056	0.114

Now, we invert these matrices to analyze the contribution of each of these sectors on the final demand of all the sectors.

Table 10: The Inverse of the Input Output Table [(I - A)⁻¹], 1995

	Primary	Manu-facturing	Utilities	Constru-ction	Services
Primary	1.156	0.244	0.169	0.134	0.127
Manufacturing	0.093	1.527	0.200	0.498	0.036
Utilities	0.016	0.081	1.330	0.047	0.003
Construction	0.006	0.006	0.027	1.008	0.001
Services	0.084	0.309	0.278	0.254	1.030

The above table shows that the primary sector supplies 0.244 units for the production of one unit of final demand for manufactures and supplies 0.127 units for the production of one unit of final demand for services. So per unit the manufacturing sector provided a larger market for primary goods than did the services sector. This is true for the other sectors also except for the services sector that provides 1.03 units for production of one unit of final demand for the services sector but only 0.309 for one unit of the manufacturing sector.

We can also examine what each sector provides to the other sectors for their production. The manufacturing sector provides 0.093 for the agriculture sector whereas the services sector provides 0.084. Again we find that the manufacturing sector usually provides more inputs for production in the other sectors than does the services sector. So, by and large, the manufacturing sector has larger backward and forward linkages.

Table 11: The Inverse of the Input Output Table [(I - A)⁻¹], 2011

	Primary	Manu-facturing	Utlilities	Constru-ction	Services
Primary	1.104	0.143	0.135	0.082	0.033
Manufacturing	0.157	1.452	0.678	0.617	0.152
Utilities	0.016	0.043	1.055	0.035	0.012
Construction	0.019	0.034	0.120	1.065	0.031
Services	0.062	0.379	0.414	0.232	1.172

The above table shows that the manufacturing sector continues to have stronger backward and forward linkages in 2011.

We know that exports of both goods including manufactures and non factor services have increased considerably, that of services increasing faster. We use the input output table to calculate the contribution of the exports to output. In 1995 service exports were 2.0[14] percent of GDP and this contributed 2.4 percent of GDP as greater amounts of goods of the other sectors were produced to get the output of services. Exports of manufactures were 8.8 percent of GDP and this resulted in a contribution to GDP of 19.2 percent. For 2011 exports of services were 7.6 percent of GDP and this contributed 10.6 percent of GDP; exports of manufactures were 16.45 percent of GDP and this contribute 33.7 percent of GDP. Despite exports of services increasing faster than exports of manufactures, the latter continued to contribute more to GDP because of stronger linkages.

In the next section we try to analyze the inter-relationships between the performance of India's manufacturing sector and India's external sector and, hence, in turn, try to identify the dynamics of India's growth. We do the analyses using VAR estimations.

6. Vector Autoregression (VAR) Estimations

As discussed in the last section, the relationship between India's exports and India's exchange rate with the US is non-unique and a more formal analysis is warranted to have a better understanding of this relationship. We do with the help of VAR estimation using three variables - export, CAB and exchange rate. We used data on India's exports, CAB (as a percent of GDP) and INR exchange rate (vis-à-vis US$) for the period 1962-63 to 2012-13. However, while testing for stationarity, we

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14   The source of data on exports of manufacturing and non-factor services as a percentage of GDP is Reserve Bank of India.

applied (natural) log transformation of each of the three series. In doing so, we further modified the CAB series by adding 10 to all the values on an ad hoc basis, that is, we just performed a shift of origin for the CAB series in order to make this transformed series free of negative values and ready for log transformation. Phillips-Perron test (see Phillips and Perron, 1988) for testing for unit roots exhibited that each of the three series are integrated of order one I(1), and hence, are stationary after first difference. The results of unit root test are given in Table 12.[15]

Table 12: Summary of Unit Root Tests

Series	t-values at Level	t-values at First Difference
lnexp	-1.259891 (0.8863)	-7.615512 (0.0000)
lnexrt	-1.572066 (0.7900)	-4.747715 (0.0019)
lnmodcab	-3.233962 (0.0896)	-8.208772 (0.0000)

* Probability values are given in parentheses

Before testing for cointegration, we tested for the optimal lag structure of the system. Table 13 summarizes the VAR lag order selection results. As evident from the results, the optimal lag structure turns out be 3 from maximum number of criteria.

Using the optimal lag structure thus obtained, we test for cointegration using Johansen cointegration test (see Johansen, 1991). The results, given in Table 14, indicate that there exists one cointegrating equation using the Maximum Eigen-value criterion for unrestricted VAR.

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15 As in section 4 we have already identified multiple structural breaks in almost all the variables, we incorporated the structural breaks while testing for unit roots for all the variables using Perron (1997) technique. We found that all the variables have unit roots.

Table 13: VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-61.54419	NA	0.003129	2.746561	2.864656	2.791001
1	142.9427	374.1675	7.64e-07	-5.572029	-5.099651*	-5.394270
2	155.4935	21.36317	6.61e-07	-5.723130	-4.896468	-5.412051*
3	167.3015	18.59131*	5.94e-07*	-5.842619*	-4.661673	-5.398221
4	172.9976	8.241120	7.01e-07	-5.702026	-4.166797	-5.124309

Table 14: Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.369415	22.13315	21.13162	0.0361
At most 1	0.230777	12.59400	14.26460	0.0903
At most 2 *	0.086529	4.344178	3.841466	0.0371

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
  * denotes rejection of the hypothesis at the 0.05 level
  **MacKinnon-Haug-Michelis (1999) p-values

Given the original series are non-stationary, we perform Vector Error Correction estimation to establish the significance of the relationship between these three variables as captured by the cointegrating equation. Finally, we run Granger causality test (see Granger, 1969) to understand the dynamics of the system.

As evident from the results, changes in exchange rate and exports significantly influence CAB. The other causalities, were however, statistically insignificant.

Before proceeding further, we return our focus to one more interesting observation made in the last section. As evident from Table 7, the structural breaks in India's GDP and manufacturing output do not reveal any unique pattern. To have a better understanding of this causality between GDP and manufacturing output, we estimated a VAR model using data for 1950-51 to 2012-13. We find that there exists one

Table 15: Vector Error Correction Estimation Results

Cointegrating Eq:	CointEq1		
LNEXP(-1)	1.000000		
LNEXRT(-1)	-0.519837		
	(0.28239)		
	[-1.84083]		
LNMODCAB(-1)	6.712904		
	(1.47127)		
	[4.56267]		
C	-24.54734		
Error Correction:	D(LNEXP)	D(LNEXRT)	D(LNMODCAB)
CointEq1	0.033208	-0.022445	-0.069297
	(0.01457)	(0.01150)	(0.02122)
	[2.27946]	[-1.95226]	[-3.26547]

Table 16: VEC Granger Causality Tests Results

Dependent variable: D (LNMODCAB)			
Excluded	Chi-sq	df	Prob.
D(LNEXP)	10.14594	2	0.0063
D(LNEXRT)	3.233140	2	0.1986
All	14.55783	4	0.0057

cointegrating equation implying a long-run positive relationship between GDP and manufacturing output growth rates. The rationale is pretty straight forward - manufacturing is a component of GDP itself and hence, there will exist a positive relation between the two. Interestingly, Granger causality test results reveal that there does not exist any statistically significant causality among the two growth rates[16] .

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16. The estimation results, as given in Tables A5 and A6 the appendix, show that though there exists a long-run positive relation between *lngdp* and *lnman*, there is no significant short run causality either way. In other words, both GDP and Manufacturing growth rates move in the same direction (as Manufacturing is just a part of GDP) but there is no significant causal relation among them.

Even though we do not find any causal relationship between the performance of India's manufacturing sector and overall GDP, we know that the percent of value manufacturing exports to manufacturing value added has increased from 16.4% in the 6th Plan (1980-84) to almost 60% in the period 2007-10 (Agarwal and Whalley, 2015b). The manufacturing sector's growth accelerated in 1999-2000 before that of GDP and we note that exports of goods accelerated in 1996-67 suggesting that the last growth acceleration in value added in manufactures was export driven. To delve deeper into the matter, we resort to VAR estimation to analyze the relation between growth of the Indian manufacturing sector with India's exports and imports. In doing so, we can identify whether it is the growth in the manufacturing that led to the growth in exports or the other way round. In fact, it might be the growth in exports which might finance growth in the import of intermediate goods needed for the manufacturing sector.

First we consider three variables - exports, imports and manufacturing (all as percentage of GDP) data for India for the period 1950-51 to 2012-13 to construct a VAR model. To achieve stationarity[17] in all the series, we performed a (natural) log transformation of these three series and found that all of them are integrated of order one, that is, they are stationary after first differencing. Next we tested for the optimal lag structure of the VAR[18] and found the optimal lag structure to be one. Using the optimal lag structure we test for cointegration using Johansen cointegration test. However, the results, as given in Table A3 in the appendix, show that there exists no cointegrating equation, that is, there is no long-run equilibrium relation between the three growth rates in this sample. Therefore, we performed an unrestricted VAR to find out the short-run relations among these variables. Table 17 gives the results of the VAR estimation results.

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17.   See table A1 in the appendix for the results of the Augmented Dickey-Fuller test for unit roots (see Fuller, 1976 and Dickey and Fuller, 1979).

18.   See table A2 for the results of VAR lag order selection.

Table 17: VAR Estimation Results Summary

	DEXP	DIMP	DMAN
DEXP(-1)	-0.045614	-0.047413	-0.114349
	(0.155714)	(0.18642)	(0.05674)
	[-0.29288]	[-0.25433]	[-2.01539]*
DIMP(-1)	0.048164	-0.003699	-0.063578
	(0.12424)	(0.14872)	(0.04526)
	[0.38766]	[-0.02487]	[-1.40467]
DMAN(-1)	-0.105117	0.392407	0.180624
	(0.34755)	(0.41601)	(0.12661)
	[-0.30245]	[0.94326]	[1.42658]
C	0.015131	0.018139	0.006353
	(0.01393)	(0.01668)	(0.00508)
	[1.08606]	[1.08772]	[1.25166]

As evident from the above Table, it is only the last period's growth in exports which has a significant impact on the present period's growth rate in manufacturing. To complete the analysis we test for pair-wise Granger causality. The results are given in Table 18 below.

Table 18: Pair-wise Granger Causality Test Results

Null Hypothesis:	F-Statistic	Prob.
DIMP does not Granger Cause DEXP	0.11994	0.7304
DEXP does not Granger Cause DIMP	0.01579	0.9004
DMAN does not Granger Cause DEXP	0.06014	0.8071
DEXP does not Granger Cause DMAN	9.32847	0.0034*
DMAN does not Granger Cause DIMP	0.85461	0.3591
DIMP does not Granger Cause DMAN	7.02541	0.0103*

The Granger causality results not only reinforce the results of the unrestricted VAR model, but also show that growth rate of imports has significant impact on growth rate of manufacturing. These results imply that it is the growth of exports which influence growth of manufacturing via growth in imports rather than the growth in manufacturing influencing growth of exports.

However, till now we have used total import data for the Indian economy. Hence, we repeat the above exercise using non-oil imports instead of total imports. Now, such a decision is not an arbitrary one. If we look into the trends of exports, imports and non-oil imports for India (though we have data only from 1970-71 for non-oil imports), it becomes evident that the exports and non-oil imports series almost coincide with each other and they grow almost smoothly during the period 1970-71 to 2012-13. On the other hand, oil imports show an increase till 1980-81 followed by a sharp fall till 1986-87 after which it increased gradually till 2004-05 and after 2004-05 there is again a sharp increase [19].

Now, the Johansen test for cointegration reveals that there exists one cointegrating equation when we consider the non-oil imports (natural log transformed).

Table 19: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.344017	30.94459	29.79707	0.0367
At most 1	0.219514	13.65819	15.49471	0.0928
At most 2	0.081752	3.496814	3.841466	0.0615

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
*   denotes rejection of the hypothesis at the 0.05 level
** MacKinnon-Haug-Michelis (1999) p-values

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19   See Figure 3 in the appendix.

Given, there is one cointegrating equation; we opted for a vector error correction model this time to have a closer look into the exact relationship between these three variables in the long-run equilibrium.

Table 20: VEC Granger Causality Tests Results

Dependent variable: D(LNNOIMP)			
Excluded	Chi-sq	df	Prob.
D(LNEXP)	0.561869	1	0.4535
D(LNMAN)	0.807996	1	0.3687
All	1.017143	2	0.6014
Dependent variable: D(LNEXP)			
Excluded	Chi-sq	df	Prob.
D(LNNOIMP)	1.582940	1	0.2083
D(LNMAN)	0.360388	1	0.5483
All	2.169366	2	0.3380
Dependent variable: D(LNMAN)			
Excluded	Chi-sq	df	Prob.
D(LNNOIMP)	5.337462	1	0.0209
D(LNEXP)	2.475464	1	0.1156
All	7.556824	2	0.0229

This time, the results (as given in Table A4 in the appendix) clearly exhibit significant influence of last period's growth rate of imports on present period's growth rate of manufacturing. Further, VEC Granger causality tests (Table 20) reveal that growth rates of exports and non-oil imports have significant impacts on growth rate of manufacturing while the reverse does not hold.

Hence, the results from the analyses done in this section clearly reveal that the growth in the manufacturing does not have a statistically significant impact on the growth rate of exports. On the contrary, growth of exports financing growth of imports, in particular, non-oil imports

has a significant impact on growth of manufacturing. There is lag of one period in such causality - that is, last period's export and non-oil import influence present period's manufacturing.

7. Conclusion

Since the 1970s there has been a continuous growth of India's GDP. However, a priori, it is not easy to identify any structural break in the GDP series. On the other hand, there seems to be an increase in exports and investment as evident from Tables 2 and 7. Manufacturing sector experienced a sharp fall after aid was cut off in the mid 1960s following a reversal in the pattern in the late 1980s and a continuous increase after that.

In this paper we performed structural break analyses of several macroeconomic variables for the Indian economy to have a clear picture about the evolution of the economy from various dimensions. Interestingly, though GDP and GDP per capita series exhibit multiple structural breaks, we do not find any statistically significant structural break in India's GDP growth rate. Hence, unlike many analysts[20] who claim that the policy changes began in 1991 had resulted in a significant acceleration of the growth rate, we find that no such significant acceleration has occurred.

Our analysis casts doubt on two perceptions about India's growth. First, India's growth is domestic demand led as compared to the export-led growth story of China. We show that India's export performance is very similar to that of China's. Hence, one cannot claim that China's growth is export-led and that India's growth is domestic demand-led.

Second, India's development is service sector led rather than manufacturing sector led. We found no significant difference between the growth rates of the value added in manufacturing and services.

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20.   Kotwal, Ramaswami and Wadhwa (2011).

Furthermore, we found that the backward and forward linkages are stronger for the manufacturing sector vis-à-vis the services sector. Hence, we do not find evidence in support of this perception that India's growth can be largely attributed to the growth of the services sector.

While analyzing the components of GDP we found multiple breaks in the Manufacturing and Services sectors. However, Agriculture exhibited only a couple of structural breaks. So far the external sector is concerned, almost all the indicators like exports, imports, non-oil imports, CAB and exchange rate (vis-à-vis US dollar) exhibit multiple structural breaks.

Interestingly, the structural breaks in all the major series of the Indian economy exhibit a similar pattern - there is one break in almost every decade from the 1960s to the 1990s. To have further insight to the long run dynamics of these variables we performed multiple VAR estimation models. In the external sector, we found that changes in exports and exchange rates have a significant impact on the changes in current account balance. Reverse causalities were not statistically significant.

While analyzing the long and short run relations among the external sectors and manufacturing growth we found that the growth in the manufacturing does not have a statistically significant impact on the growth rate of exports. On the contrary, growth of exports and imports (particularly, non-oil imports) of the previous period have a significant impact on the current period growth of manufacturing.

Our analysis provides an alternative narrative for India's development process. A correct appraisal is important for appropriate policy design. Further analyses of exact sectoral and dynamic interlinkages are required to improve our understanding of the operation of the Indian economy.

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APPENDIX

Table A1: Summary of Unit Root Tests

Series	t-values at First Difference*
lnexp	-8.865972 (0.0000)
lnimp	-8.576165 (0.0000)
lnman	-7.547305 (0.0000)

* Probability values are given in parentheses

Table A2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	38.88952	NA	5.82e-05	-1.237570	-1.130995	-1.196057
1	220.8142	338.7562*	1.50e-07*	-7.200488*	-6.774190*	-7.034437*
2	226.4820	9.967525	1.69e-07	-7.085585	-6.339563	-6.794994
3	231.8369	8.863327	1.93e-07	-6.959893	-5.894147	-6.544763
4	236.8810	7.827093	2.23e-07	-6.823484	-5.438013	-6.283815
5	242.1003	7.558913	2.60e-07	-6.693113	-4.987919	-6.028905

* indicates lag order selected by the criterion

Table A3: Test for Cointegration

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.226952	27.74282	29.79707	0.0847
At most 1	0.173799	12.04058	15.49471	0.1550
At most 2	0.006448	0.394629	3.841466	0.5299
Trace test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.226952	15.70224	21.13162	0.2427
At most 1	0.173799	11.64595	14.26460	0.1247
At most 2	0.006448	0.394629	3.841466	0.5299
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table A4: Results of VEC Estimates

Cointegrating Eq:	CointEq1		
LNNOIMP(-1)	1.000000		
LNEXP(-1)	-0.732755		
	(0.17168)		
	[-4.26806]		
LNMAN(-1)	6.667456		
	(1.78057)		
	1[3.74455]		
C	-18.78447		
Error Correction:	D(LNNOIMP)	D(LNEXP)	D(LNMAN)
CointEq1	-0.079501	-0.086788	-0.055877
	(0.04360)	(0.03960)	(0.01505)
	[-1.82360]	[-2.19184]*	[-3.71280]*
D(LNNOIMP(-1))	-0.102506	0.184389	0.128691
	(0.16136)	(0.14656)	(0.05570)
	[-0.63527]	[1.25815]	[2.31029]*
D(LNEXP(-1))	-0.140160	-0.211625	-0.101560
	(0.18698)	(0.16983)	(0.06455)
	[-0.74958]	[-1.24609]	[-1.57336]

D(LNMAN(-1))	0.391674	0.237583	0.113697
	(0.43573)	(0.39576)	(0.15042)
	[0.89889]	[0.60032]	[0.75586]
C	0.051060	0.041379	-0.001784
	(0.01762)	(0.01600)	(0.00608)
	[2.89772]	[2.58550]	[-0.29329]
R-squared	0.103022	0.149013	0.331760
Adj. R-squared	0.003357	0.054459	0.257511
Sum sq. resids	0.313078	0.258270	0.037310
S.E. equation	0.093256	0.084700	0.032193
F-statistic	1.033687	1.575952	4.468216
Log likelihood	41.75844	45.70361	85.36566
Akaike AIC	-1.793095	-1.985542	-3.920276
Schwarz SC	-1.584122	-1.776570	-3.711304
Mean dependent	0.041572	0.040764	-0.000381
S.D. dependent	0.093413	0.087105	0.037361
Determinant resid covariance (dof adj.)		6.26E-08	
Determinant resid covariance		4.24E-08	
Log likelihood		173.4783	
Akaike information criterion		-7.584306	
Schwarz criterion		-6.832006	

* Statistically significant at 5% level of significance

**Table A5: VEC Estimation Results (GDP and
Manufacturing Growth Rates)**
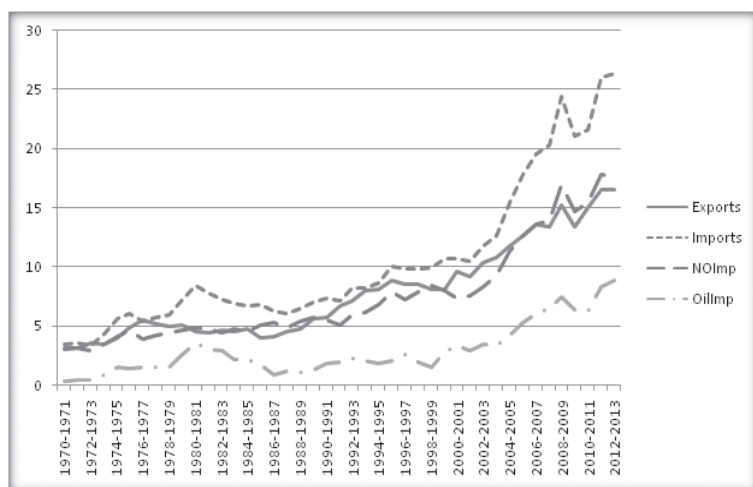
Cointegrating Eq:	CointEq1	
LNGDP(-1)	1.000000	
LNMAN(-1)	-1.004999	
	(0.00921)	
	[-109.063]	
C	-1.870911	
Error Correction:	D(LNGDP)	D(LNMAN)
CointEq1	-0.280878	-0.122863
	(0.05162)	(0.06427)
	[-5.44075]	[-1.91175]
D(LNGDP(-1))	0.119223	0.187798
	(0.14314)	(0.17820)
	[0.83290]	[1.05387]
D(LNMAN(-1))	-0.2241999	-0.076101
	(0.13898)	(0.17301)
	[-1.61894]	[-0.43985]
C	0.124172	0.103331
	(0.01586)	(0.01974)
	[7.83092]	[5.23463]
R-squared	0.411763	0.137222
Adj. R-squared	0.380803	0.091813
Sum sq. resids	0.090331	0.139991
S.E. equation	0.039809	0.049558
F-statistic	13.29992	3.021885
Log likelihood	112.1568	98.79472
Akaike AIC	-3.546125	-3.108024
Schwarz SC	-3.407707	-2.969606
Mean dependent	0.111259	0.115231
S.D. dependent	0.050590	0.052003

Determinant resid covariance (dof adj.)	2.33E-06
Determinant resid covariance	2.04E-06
Log likelihood	226.5760
Akaike information criterion	-7.100851
Schwarz criterion	-6.754806

Table A6: Granger Causality Results (GDP and Manufacturing Growth Rates)

Dependent variable: D(LNGDP)			
Excluded	Chi-sq	df	Prob.
D(LNMAN)	2.620971	1	0.1055
Dependent variable: D(LNMAN)			
Excluded	Chi-sq	df	Prob.
D(LNGDP)	1.110650	1	0.2919

Figure 3: Trends of Indian sExports, Imports and Non-oil Imports

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