

Haverford College – Economics Department: Thesis

Deficit Conundrums: The Determinants of India's Export Behavior

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Abstract

This paper empirically explores the determinants of Indian exports over the past thirty years. This study builds on previous research conducted on the demand and supply factors influencing India's export behavior and builds an imperfect-substitutes demand-supply simultaneous equation model of export determination. However, this paper is more than just an empirical study of the factors affecting India's exports. It has broader theoretical implications for the Indian economy including measures to bridge India's widening trade deficit. The broad findings of this paper are that the supply of India's exports is price elastic. This suggests that the government should consider pursuing an export-oriented exchange rate policy while striving to maintain low and stable inflation. World demand for Indian exports is also found to play a significant role, suggesting that the government should focus on expanding and deepening ties with fast growing markets to ensure that demand for Indian exports continues to remain buoyant. Finally, the government must focus on diversifying India's export basket away from commodities such as agricultural products, textiles and clothing towards commodities such as chemicals, fuel and mining products. India has a significant share of world exports in the former, but they account for a declining share of aggregate world exports making diversification imperative.

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Section I: Introduction

In the early 1990's India adopted a set of extensive economic reforms in response to a balance of payments crisis. Trade was liberalized and the Indian economy was reintegrated with the world economy. The government abolished quotas and tariffs on trade flows, implemented supply-side reforms to improve India's competitiveness, liberalized capital flows including foreign direct investment, devalued the currency and moved to a floating exchange rate regime. These reform measures helped to stave off an economic crisis and provided a sharp boost to both India's economic growth and merchandise exports (See Figure 1). A comparison of India's annual trade for twenty years before and after liberalization is testimony to this. In absolute terms, India's exports and imports increased only eight fold from \$2.1bn and \$2.4bn in 1971-72 to \$17.8bn and \$19.4bn in 1991-92 respectively. In sharp contrast, India's exports have grown over seventeen-fold from \$17.8bn in 1991-92 to \$304.6bn in 2011-12 and imports have grown over twenty-five-fold from \$19.4bn in 1991-92 to \$489.4bn in 2011-12 (See Figure 2 and Table 1). Growth in imports has tended to outpace growth in exports and India has consistently run a trade deficit since 1977 with imports exceeding exports. A large percentage of India's imports consist of petroleum products as India imports about 80% of its oil requirements¹ (See Figure 3). India has over seventeen percent of the world's population but only 0.8% of the world's known reserves of oil and gas². As a result, India relies heavily on oil imports, which accounted for more than half of India's total trade deficit in 2011-12. Moreover, India's trade deficit has ballooned significantly since 2003-04 rising from \$14.3bn to \$184.8bn in 2011-12. A rapidly-growing economy like India is unlikely to be able to significantly curtail its growing demand for energy

¹ India cuts crude oil imports from Iran, Indian Express, May 16th, 2012

² Can India become a Great Power? The Economist, The Economist Newspaper, 30th March 2013

supplies making it imperative to find other avenues to fund growing imports such as increasing exports in order to prevent a further deterioration in the trade balance. Understanding exactly what factors on the supply and demand side determine India's export behavior is the broad focus of my thesis. However, this paper is not just an empirical study of the various factors that affect India's exports. Its theoretical motivation involves finding the determinants of India's exports and suggesting remedial measures to help bridge India's trade deficit.

An important determinant of a country's exports is its ability to supply diversified goods. Over the past forty years, India's export sector has seen a significant change in its export composition. Data from the Indian Census shows that literacy rates in India have increased significantly since 1971 from just 34.5% to 74% in 2011 greatly improving India's human capital and productive potential. Further, data from the World Bank's World Development Indicators (WDI) also shows that the number of Indians with a vocational education increased from 40 per million in 1970 to 730 per million in 2011. The increasing abundance of highly-skilled people has allowed India to diversify its export basket to include more skill-intensive and technology-intensive exports. Further, it has also facilitated the absorption of imported technology (Roy, 2009). Roy argues that the significant increase in the activity index showing Indian patents with the US Patent and Trademarks Organization during the reforms period is due to improvements in scientific and technological knowledge in India (Roy, 2009). This is visible by the higher growth rates experienced by chemicals, engineering goods, petroleum products and transport equipment sub-sectors (See Figure 7). Therefore, the composition of India's exports has changed from agriculture and low-value added products to skill and technology-intensive manufactures between 1971 and 2011.

Another critical determinant of export growth is the direction and destination of India's exports. Changes in the countries that form India's main export partners have implications for determining India's future export growth potential. Demand for Indian exports is likely to be constrained if India's main export partners are experiencing sluggish growth. OECD countries were the most important destination for India's exports accounting for over three-fifths of total exports prior to the 1990's. However, they now account for just a third of India's exports. On the other hand, the share of developing countries and OPEC has roughly trebled from 15% to 43% for developing countries and from 6% to 20% for OPEC. The United Arab Emirates has replaced the United States as India's single largest export market although the European Union as a whole is still larger. India has also seen its exports to China rise rapidly from a negligible 0.001% in 1987-88 to 6% in 2011-12. (See Figure 8)

On the supply side, aside from a diversification in India's export basket, an exporter's decision to export is influenced by both demand at home as well as the prices he receives at home relative to the prices he gets for his exports. From a theoretical perspective, an increase in domestic demand is likely to divert export supply towards domestic consumption creating a negative link between increases in domestic demand and changes in supply of exports. Further, movements in domestic prices relative to export prices are also likely to influence an exporter's decision to supply goods, while movements in export prices relative to foreign prices of India's export partners are likely to influence demand for Indian exports.

The interplay between prices and the exchange rate suggests that they are a crucial determinant of India's exports as well. Movements in the exchange rate affect both the prices and the competitiveness of exports and imports. Theoretically, a depreciating currency stimulates exports by making goods that are manufactured domestically cheaper abroad while curtailing

imports by raising the domestic prices of goods manufactured abroad providing a quick boost in competitiveness. In the longer term, a rise in the prices of imports also stimulates manufacturers to substitute expensive imports with cheaper goods manufactured domestically, while an appreciating currency has the opposite effect. However, the empirical evidence in favor of such an argument continues to remain weak. There is a lack of consensus among academic economists regarding the impact of fluctuations in the exchange rate on real economic variables like exports, imports and GDP growth. Despite the conflicting results of empirical research, businesses firmly believe that the movements in nominal exchange rates have real effects. In fact, firms often spend time and resources to hedge against exchange rate risk and lobby policy-makers to intervene in the exchange rate market to stabilize currencies, if not peg them to other currencies (Dekle and Ryoo, 2002).

Overall, post-liberalization, India witnessed a visible appreciation in its volume of exports along with a move towards more capital, technology and skill intensive exports. The demand for Indian exports was also diversified away from the OECD countries and towards the Middle East and developing countries in Asia. Other factors such as domestic demand, domestic prices, export prices, foreign prices and the exchange rate are likely to have played key roles. While individual factors can help explain movements in India's exports in the short run, this thesis seeks to conduct a comprehensive study of the demand and supply factors to help explain India's exports in the long run. This thesis hopes to be able to lay out a roadmap for improving India's export performance and help remedy India's deteriorating trade balance.

The remainder of my thesis is structured as follows. Section II gives a brief overview of India's economic history, Section III delves into the existing literature on this topic, and Section IV provides a detailed description of my dataset and explains my model and econometric

methodology. Section V shows the results of my empirical research followed by a brief conclusion.

Section II: Economic History of India

India gained independence from the British in 1947. Post-independence, India, under Nehru's leadership, chose to implement a state-led model of industrialization and development. The Mahalanobis model of economic development was followed which involved establishing a socialistic society with the government controlling the commanding heights of the economy (Ghosh, 2012). Officially, a mixed-economy pattern of development was chosen with the public and private sectors co-existing side by side; in reality, the maze of regulations and bureaucratic hurdles stunted the growth of the private sector. The "entrepreneurial role of the state was evoked to develop the industrial sector" with the objective of achieving a high growth rate, increasing national self-reliance, encouraging small scale industry, reducing regional inequality, and substituting imports with indigenous goods (Ghosh, 2012). However, the flaws of pursuing a state-led model of industrialization were quickly visible as this model failed to deliver the expected reductions in poverty through "trickle-down" growth (Ghosh, 2012). While economic growth was not insignificant, it was not sufficient to meet the aims and objectives of development (Ghosh, 2012). In fact, there is broad consensus that Nehru's decision to turn to "Fabian socialism, [and] central planning" coupled with "an unbelievable quantity of bureaucratic red tape" known as the *license raj* was disastrous for the economy as it strangled the private sector, led to rampant corruption, massive inefficiency, and general stagnation for the economy until liberalization in 1991 (DeLong, 2001).

In 1991, India was forced into accepting far-reaching reforms in response to a balance of payments crisis. The reforms aimed at reorienting the economy from a "statist, centrally directed and highly controlled economy" to a market-based economy. Controls on production were dropped with the aim of increasing efficiency and a policy of import substitution was scrapped

which closed India's economy from the rest of the world. Post liberalization Indian exports witnessed massive growth, as seen below. For analytical purposes, I have broken down the time-path of India's exports into two phases: pre-liberalization and post-liberalization (See Table 2). The pre-liberalization phase extends for twenty years prior to liberalization from 1971 to 1991, while the post-liberalization phase extends from 1991 to 2011. The table also shows ten-year time periods for a more detailed observation of export sub-group growth rates. Total export volume growth picked up sharply from an average of 5.4% pre-liberalization to 11.3% post-liberalization. However, a breakdown of India's exports into sub-groups is far more revealing of India's changing export supply capabilities in addition to faster export growth. Exports of primary products increased from 2.8% to 8.2% characterized by similar growth rates for both its sub-sectors - agriculture and allied groups and ores and minerals. Exports of manufacturing products recorded even higher growth rates of 6.4% and 10.5% in the first and second phases respectively. However, this figure hides internal discrepancies as the export growth of leather manufactures and chemical products declined from 4.3% to 3.2% and 13.4 to 11.9% respectively. Despite the slowdown in the growth rate of chemical exports, chemical exports still witnessed double-digit growth rates in both the phases as mentioned above. Exports of engineering goods picked up appreciably rising from just 6.9% in the first phase to 14.8% in the second phase. Textile exports growth rates remained low in both the phases, although there was a slight uptick in export growth in the second phase to 5.9% from 3.7% in the first-phase. Exports of gems and jewelry also showed double-digit growth rates in both the phases, but the average growth rate declined in the second phase relative to the first. Petroleum exports recorded handsome growth rates in both the phases, recording a compounded annual growth rate (CAGR) of 12.9% in the pre-liberalization phase and 22.8% in the post-liberalization phase. Overall, the

data clearly shows that India's export growth appreciated significantly in the second phase relative to the first. Furthermore, the higher growth rates observed by manufacturing products relative to primary products can be seen in the declining shares of primary products in aggregate exports. The share of primary products in exports has declined by 21 percentage points from 36% in 1971-80 to just 15% in the 2001-11 time period (See Figure 4). On the other hand, manufacturing and petroleum exports saw their share of exports increase by 19 percentage points from 61% in 1971-80 to 80% in 2001-10 (See Figure 4). Large export shares of low-value added goods such as primary goods are generally indicative of a country suffering from a lack of a diversified export and industrial base. The declining share of primary goods shows that as India's economy developed, it was able to build a manufacturing base to allow for the export of higher-value added manufacturing products (See Figure 5 and 6). An improvement in economic growth, infrastructure facilities, literacy and vocational education, increased export-oriented foreign direct investment flows etc. are all likely to improve India's capability to supply manufactured goods while a lack of improvement in these areas are likely to restrict India's exports to primary products like agricultural and agro-based goods and raw mineral and ores.

However, there is controversy and debate surrounding the role played by liberalization in facilitating higher export growth. There are two schools of thought regarding India's economic liberalization programme. While the pro-liberalization school ascribes the increase in exports to supply-side factors which improved India's export competitiveness and were a direct result of economic liberalization, the other school of thought argues that India's sharp increase in exports since the early 1990's has less to do with the reform programme and more to do with "increased global demand with supply factors playing a subordinate role" (Roy, 2009).

Section III: Literature Review

India's economic liberalization program that did away with the "web of restrictions on trade and investment including FDI" sparked a wave of interest and a vast amount of literature both empirical and theoretical to explain the demand and supply factors that affect India's export behavior (Roy, 2009). In 1991, Virmani conducted an empirical study on the demand and supply factor's affecting India's trade in which he stresses the importance of carefully specifying the demand and supply functions in order to achieve "reliable estimates of the causative factors in export performance", especially if they are to be a guide to policy formation (Virmani, 1991). An aggregate demand and supply function is estimated for India's exports. On the demand side, the quantum of exports demanded is measured as a function of the rupee price of Indian exports converted into dollars by multiplying it by the nominal exchange rate, the dollar prices of exports in the rest of the world, the dollar prices of world home goods and world income. The price of Indian exports is measured using the unit value index, while world GDP is used as a proxy for world income. The price of world exports is estimated using the unit value index (UVI) of world exports and the price of world home goods is measured by a weighted index of the consumer price indices of India's largest trading partners. Virmani prefers the use of unit production costs or unit labor costs to the use of CPI, but is constrained by the lack of available data. On the supply side, Virmani looks at the quantum of exports supplied as a function of the price of exports including export subsidies, the domestic prices at home, domestic income and supply factors such as capacity utilization or rainfall. WPI is used as a substitute for domestic prices while domestic GDP is used as a proxy for domestic income. However, prior to running the regressions, Virmani specifies the importance of testing the inverse supply function (price as a function of quantity) in order to check if the coefficient on the quantum of exports supplied is

significant as it would indicate the need to test their entire model including both the demand and supply equations simultaneously to avoid obtaining biased estimates. However, since the coefficient is found to be insignificant, he estimates his functions directly using OLS. The quantum of exports variable is split into two categories: manufactured goods and primary non-fuel commodities with tests conducted for each variable separately. As demand and supply conditions for these two sub-groups are not the same, Virmani believes that aggregating them together would prevent the export function from being “reasonably robust” (Virmani, 1991). Manufactured goods face constant returns to scale while primary products generally experience decreasing returns to scale. All the estimates are also measured in terms of the growth rates of the variables rather than level forms. The broad conclusions of his research are that the demand for Indian manufactured exports is extremely price elastic with 10% depreciation likely to lead to a 15-19% increase in the dollar value of Indian manufactured exports. Demand for primary goods however does not change significantly. World demand is also found to play a positive role in affecting demand for manufactures and primary exports, while domestic demand negatively affects the prices of India’s manufactured export prices. Rainfall is found to have a negative coefficient on prices, indicating an increase in rainfall over the previous year leads to a decrease in export prices. Measures of export capability such as capacity utilization did not have a significant effect on India’s export prices.

In 2002 and later 2009, Saikat S. Roy did a seminal piece of work on Indian trade by using a simultaneous equation model along the lines of Muscatelli et al’s model (1992) to examine the determinants of India’s exports. Roy argues that the findings of his paper go beyond their empirical results. His research provides a theoretical background for explaining India’s rising exports across various sectors despite changes in trade and exchange rate regimes. Roy

acknowledges that the literature on this topic offers differing views on the determinants of India's export behavior, but he believes that the predominant view on India's exports emphasizes the "importance of supply and other policy related constraints" (Roy, 2009). He contributes most to the literature by examining rival hypotheses for India's exports put forth by the "disputants of the determinants of India's export behavior" and using better and more refined econometric techniques to test their validity. Roy's model consists of a simultaneous equation model along the lines of an "imperfect-substitutes model" with export volume and export prices as the joint dependent variables with all the other variables pre-determined. The export demand function consists of real exports demanded as a function of export prices in domestic currency, foreign prices in dollars multiplied by the rupee-dollar nominal exchange rate and world demand. World demand is calculated as the weighted sum of imports of individual destination countries with the weights being the destination's share in India's total exports in 1985. The export unit value is used as a proxy for price of exports, while the wholesale price index of India in domestic currency is used as a proxy for domestic prices. World prices are a weighted calculation of the consumer price indices of India's eleven largest trading partners weighted according to their share of Indian exports in 1985. The export supply function consists of export prices as a function of real exports supplied, domestic prices and the country's supply capability. Export supply capability is proxied for by data on sectoral value-added for various years and deflated by the wholesale price index of India wherever required. Roy's decision to use the volume of imports of India's export partners as a proxy for world demand marked an improvement over the use of the less accurate real world income as done in previous econometric research. Roy acknowledges that his model is however restricted by the lack of available data on important supply side factors such as technological developments and infrastructure and transaction costs.

Roy runs a two stage least squares regression to obtain his results due to the distinct advantages and popularity of this model in export determination. As all of Roy's variables are integrated of order (1), he uses an error-correction model (ECM) which incorporates the errors of individual equations into the export demand-supply equations. Roy finds that both demand and supply factors are significant in explaining export performance. Although the extent to which supply side or demand side factors influence export behavior depends on the commodity sub-group. Roy finds demand side factors to have more significant coefficients with world demand having a significant impact on India's export growth. Further, even though supply factors affect exports, only certain supply factors are significant in the determination of disaggregated exports which suggests that the diversification of India's export basket has had a limited impact on India's exports growth. Additionally, Roy's results show export prices on the supply side to be relatively insignificant implying that even if price incentives were to offered, it would not necessarily convince domestic producers to export. The lack of a significant coefficient on supply variables does not necessarily negate the possibility that a long-run relationship still exists between export supply capability and exports in India. In fact, Roy argues it would be "simplistic" to attribute "the significant increase in exports after the mid-1980's to trade liberalization per se" (Roy, 2009). Roy opens a new area of research by looking at disaggregates exports, rather than exports as a whole and concludes that while buoyant demand has helped the growth of Indian exports, India's exporters are also increasingly "able to meet the growing demand for sophisticated products that are intensive in skills and technology" (Roy, 2009).

Kishor Sharma (2003) also evaluates India's export behavior, but with a focus on the influence of increasing foreign direct investment in India on export supply capability. Sharma argues that the success of the East and South East Asian countries suggests that FDI is a

“powerful tool of export promotion” as multinational companies, which account for the bulk of the FDI have “well-established contacts” and “up-to-date information about foreign markets” (Sharma, 2003). However, Sharma acknowledges that this theory is not necessarily applicable to India given India’s weaker infrastructure and the differing motives for FDI. He argues that “if the motive behind FDI is to capture domestic market (tariff-jumping type-investment), it may not contribute to [export] growth” (Sharma, 2003). Sharma points out that India only opened up its market to foreign investment in 1991 by lowering tariff and non-tariff barriers. Despite this, India continues to remain far more hostile than many other developing countries. Moreover, India’s factor market including infrastructure is much weaker than most other developing nations with which India competes for exports suggesting that a large amount of the FDI entering the country could be driven by a motive of capturing a greater share of the domestic market rather than investing for export promotion. Sharma looks at the sector-wise breakdown of FDI and finds that until the early 1990’s most of the FDI entering India was concentrated in manufacturing which could be a reflection of India’s import substitution policies. Foreign companies would have chosen to build manufacturing facilities in India to capture a share of the highly protected domestic market. On the other hand, post liberalization; there has been a sharp increase in foreign investment in the tertiary sector such as telecommunication, power generation, consulting services and hotels and tourism. Sharma also creates a simultaneous export demand-supply model to test his regressions with the export demand a function of the real effective exchange rate, world income (which he proxies by world GDP) and lagged export demand. Export supply is a function of the relative price of export prices, measured as the unit price of Indian exports, to domestic prices, measured by the wholesale price index of India. Both are measured in domestic currency. It is also a function of domestic demand, proxied by the

fiscal deficit of the central government, foreign direct investment, infrastructure investment as a percentage of GDP, lagged export supply and a time trend. Sharma finds the coefficient on the REER to be significant with demand for Indian exports increasing when the currency undergoes a real depreciation. He also finds export supply to be positively related to the relative price of exports and negatively related to domestic demand suggesting increases in domestic demand reduces supply of exports. However, Sharma does not find a significant relationship between FDI and export supply, but believes that his model is constrained as he looks at aggregate exports rather than by commodity sub groups. Additionally, the short time-series data prevents considering longer lag effects. This is a key point as FDI often takes time to show results.

The theoretical literature concerning exchange rates and their impact on exports and imports states that as per the elasticity approach, a devaluation in the domestic currency will increase the exports and decrease the imports in the domestic country because devaluation or depreciation reduces the prices of exports and increases the prices of imports. Given this expectation and India's consistent trade deficit, the IMF recommends that developing countries including India depreciate their currencies to correct for the balance of payments problems (Suresh and Reddy, 2010). However, the evidence in favor of such an argument is both mixed and controversial. As seen above, Virmani (1991) finds evidence in favor of depreciation as Indian exports show significant price responsiveness. Brahmabhatt (1996) puts forth similar arguments. He finds that the elasticity of export supply doubled after the government introduced measures to promote exports including exempting export profits from tax, reducing import duties on capital goods and providing export-related loans at low interest rates. However, other authors believe that price responsiveness varies across commodities and also depends on the development strategy being pursued. They argue that import substitution policies reduce price

responsiveness and lead to bias against exports as a result of distortions in relative prices, while liberalization policies increase price responsiveness through competition and cheaper inputs which aims at providing the “right” relative price for exports (Lucas, 1988). In contrast, Ali (1985) finds high price elasticity of export supply indicating that the prices Indian exporters get relative to domestic prices is the primary motivator in deciding whether to export. “Clearly,” Ali (1985) argues “the relative profitability of exports will improve if the world market price of exports, the official foreign exchange rate, or the rate of export subsidy increases, or the price in the domestic market decreases.” In contrast, Lall (1999) provide arguments in favor of the importance of skill formation and technology in determining the changing structure of Indian exports. Therefore, the literature review on determining the factors on Indian exports is rich and diverse with authors coming up with various solutions to help explain India’s export behavior.

In 2010, Suresh and Reddy looked specifically at how movements in the exchange rate affect exports. They used OECD GDP as a proxy for India’s export market and the exchange rate to help explain the exports of India from 1994 to 2008. They conduct Augmented Dickey-Fuller and Phillip Perron tests to test the order of integration. Suresh and Reddy run an OLS regression of the first difference of the log of Indian exports on the first differences of the log of OECD GDP and the log of the exchange rate variable with a time lag. They find OECD GDP to be significant in explaining Indian exports but are unable to conclusively prove that the exchange rate impacted Indian exports despite running four different regressions using four different variables for the exchange rate namely the trade-weighted real effective exchange rate (REERT), export-weighted real effective exchange rate (REERX), trade-weighted nominal effective exchange rate (NEERT) and the export-weighted nominal effective exchange rate (NEERX). Suresh and Reddy (2010) also attribute their lack of significant results for exchange rates to a

“aggregation bias in the estimation” i.e. movements in the exchange rate affect commodity level exports differently but end up neutralizing each other on an aggregate basis. The lack of controls for any other factors indicates flaws in their analysis. Further, the use of OECD GDP as a proxy for India’s export market is problematic as India has increasingly diversified its export market away from OECD countries and towards the Middle East and developing countries.

I also looked at two recent papers whose authors did not conduct any econometric tests, but provide an interesting insight into how India’s exports have been affected during the years preceding and following the global financial crisis of 2009. Ramaswamy (2008) looks at a specific subset of India’s exports by focusing on the policy implications for an appreciating rupee on exports in 2007. The Indian rupee appreciated by 12% between September of 2006 and September 2007. Ramaswamy argues that the appreciation in India’s currency is not driven by trade fundamentals as India had run a record trade deficit. Rather, the rise in the Indian currency could be attributed to massive capital inflows comprising FDI, external commercial borrowings, foreign portfolio investment and remittances. While he does not conduct any empirical work, he argues that despite Indian exports not showing any downward trend from the appreciation, he says that aggregate data hides the fact that several industries have already suffered from a major deceleration in trade growth. Aggregate Indian exports increased sharply on a yearly basis; however, several industries experienced negative growth. Ramaswamy argues that low-value added and price sensitive products with little or no import component in them witnessed a decline in growth. On the other hand, higher-value products, which include an import component, were able to offset the negative impact because they also benefitted from lower import costs. His conclusions align with the research conducted by Virmani (1991) and

Brahmabhatt (1996) and provided evidence on the significant price responsiveness with respect to the demand for Indian exports.

Singh (2009) focuses on another subset of my research by tackling the period of the financial crisis. Singh argues that the outlook for India's currency has "gone through a drastic change" since April 2008. Moreover, he argues that while most currencies have depreciated against the dollar, the Indian rupee has depreciated more than most and the depreciation is not limited to only the dollar but against other major currencies as well including the Euro and the Yen. Singh attributes the depreciation to a flight of funds from the foreign market, a slowdown in capital flows, which reduces the supply of dollars, higher global crude oil prices and the broader recovery of the US dollar against most currencies. He argues that depreciation should boost exports, but does not conduct any empirical evidence to prove his theory. Rather, he focuses on the consequences by breaking down exports at the commodity level and examining the data visually. He argues that merchandize exports such as textiles, leather and handicrafts as well as Indian's export-oriented commodities like cotton, sugar and sesame seed should benefit from higher prices domestically. However, global commodities such as base metals, precious metals, edible oils will be heavily affected as their prices move in tandem with international prices, which have heavily declined. Singh also believes that India's auto exports and IT sector should benefit from a weaker rupee but is unsure if currency hedging would offset some of the gains.

At an international level, there is still a lack of consensus on whether exchange rates have an impact on real economic variables like exports and imports. Deckle and Ryoo (2002) look at the impact of the exchange rate on export volumes of firms in Japan from 1982 to 1997 in comparison to most literature which focuses on aggregate export data. They find that there is a significant impact of exchange rates on export volumes with the impact differing for different

industries, which they believe can be attributed to financing constraints, other non-linearities and the increasing ability of exporters to hedge against exchange rate risk. However, the lack of comprehensive data in addition to the large number of ways in which firms can hedge make controlling that variable difficult.

Lall (1999) conducts an empirical study to evaluate India's export performance relative to other Asian countries. Lall (1999) argues that while India's import substitution policy has created a lot of inefficiencies and "widespread technical lags," it has also allowed India to foster a "large and diverse industrial sector." Nonetheless, the export sector suffered massively due to "policy-induced constraints" including "inadequate access to new technologies and capital goods, restricted inward investment, controls on the growth of large private domestic firms in favor of public enterprises, government direction of investments, a rent-seeking bureaucratic and business culture, and inadequate infrastructure" (Lall, 1999). Moreover, while liberalization improved India's export growth relative to its past performance, India's liberalization was still "anemic", "intermittent" and "patchy" compared to its peers in East and South East Asia (Lall, 1999). As Lall had conducted his research immediately after the Asian Financial Crisis of 1997, his research set out to find if the weakness in Indian exports could be explained by a temporary slowdown in the larger export market or if India specifically had exhausted the benefits of its liberalization program and that low export growth was here to stay. In order to do that, Lall compares the export structure of India with other newly industrialized countries. Theoretical literature based on the Heckscher-Ohlin theory postulated that export structures do not matter. A country exports those products in which it has a comparative advantage. In the case of a developing country, exports are specialized in goods that use a large amount of labor. As countries grow and wages rise, they move towards specializing in more capital intensive goods

and their export structure changes correspondingly to reflect the new factor endowments. However, this theory has been disproven due to its unrealistic assumptions such as complete technological diffusion across countries and perfect symmetric information. Instead, Lall argues that a country's export structure is significant and can be measured by looking at the technological component of a country's exports. Further, different export structures have different growth prospects and different implications for domestic capabilities. For example, India has a relatively advanced industrial base compared to its peers in South Asia with approximately 14% of exports consisting of medium or high technology exports. However, compared to other developing countries like China, South Korea or Mexico, India's high technology exports are "only one-fifth of that in China, one-tenth of that in Korea and Taiwan, a mere 7% of that in Malaysia or Singapore" (Lall, 1999).

Another factor that affects the growth prospects of India's exports is their "market positioning" which shows how well-placed they are in terms of product level competitiveness and the dynamism of their export markets. Lall says that an ideal situation for India would have a high percentage of exports under the category of "rising stars" while a minimal level under "lost opportunity" (Lall, 1999). Rising stars indicate growing market share in dynamic products while lost opportunities consist of losing market share in dynamic opportunities. Unfortunately for India, only 20% of manufactured exports fall under the category of rising exports while over two-thirds of exports fall into the lost opportunity category. The remaining exports come under the category of retreat which indicates that there might be a desirable movement away from stagnant products towards dynamic products. India also lags behind its peers on measures that would improve India's competitiveness such as human capital, technological activity and foreign direct investment. India has the worst performance on measures of human capital bar Pakistan.

Research and development investment as a percentage of GDP languishes at 1% while Korea and Japan investment around 3% of GDP in research and development. In conclusion, Lall argues that while India has a diversified industrial base, it has been unable to take advantage of it because most of its exports are still limited to undesirable low-technology products. More importantly, given India's stark weaknesses in almost every measure of export competitiveness and sustainability, Lall argues that India's export growth prospects do not look very promising.

Section IV: Dataset, Methodology and Estimation

I have collected annual data for 1980 to 2011 from various sources including the Reserve Bank of India's (RBI) "Handbook of Statistics on Indian Economy 2011-2012; the International Financial Statistics (IFS) database and World Economic Outlook database from the IMF. The RBI's handbook consists of data released by India's central bank and includes information on national income, savings and employment, output and prices, money and banking, financial markets, public finances, trade and balance payments, currency and coinage, and socio-economic indicators. The handbook includes annual, quarterly and monthly data and the central bank releases this information publicly and it is available online on the RBI's website. The IFS website stores data for a variety of indicators for all the world's economies while the World Economic Outlook database contains the latest data on important economic indicators for the world's economies. Table 4 shows my sample data.

To determine the factors that affect India's exports, I build a two-stage least squares (2SLS) imperfect-substitutes demand-supply simultaneous equation model of export determination. Before I conduct my simultaneous equation regressions, however, I run ordinary least square regressions in order to obtain a rough estimation of my results. I cannot run OLS regressions for my final results as they would suffer from endogeneity bias. In order to receive consistent estimates from my OLS regressions, it is vital that my regressors are not correlated with the error term. However, this is not the case with my model, necessitating the use of an instrumental variable. My simultaneous equations model is specified as below:

$$1) \text{Ln (Exports Demanded)}_i = \beta_1 + \beta_2 \text{Ln (Price of Exports)}_i + \beta_3 \text{Ln (Foreign Prices)}_i + \beta_4 \text{Ln (World Demand)}_i$$

$$2) \text{Ln (Exports Supplied)}_i = \alpha_1 + \alpha_2 \text{Ln (Price of Exports)}_i + \alpha_3 \text{Ln (Domestic Prices)}_i + \beta_4 \text{Ln (Real GDP growth)}_i + \alpha_5 \text{Ln (Domestic Demand)}_i$$

where exports demanded and supplied are the real exports demanded and supplied calculated as the annual dollar value of Indian exports deflated by the dollar unit value index to get the volume of exports. The annual export unit value index (UVI) or the wholesale price index (WPI) can be used as a proxy for the price of exports. Virmani (1991) argues that the export unit value index (UVI) is a better estimate of India's export prices than the wholesale price index of India despite the flaws of the UVI. The UVI is limited by the fact that even if the prices of all of India's exports do not change, the value of the index still changes. Further, as the UVI does not have fixed weights, if the price of an export increases causing export volumes to decrease, the weight of that particular good in the index decreases resulting in a biased estimate of our coefficient towards zero. Nonetheless, it is still a better measure of India's export prices because the WPI index is even more limited by its use of domestic weights rather than trade weights in its calculation. Further, it is often based on listed prices rather than the prices at which trades actually take place and it also includes the prices of non-tradeables. Virmani argues that this is particularly relevant for India as there are a large number of commodities whose imports are restricted or banned and need to be treated as non-tradeable goods. I choose to use the export UVI in dollars as a proxy for export prices. This data is obtained from the IFS website. Foreign prices are calculated from the consumer price indices of India's twelve largest trading partners. The price indices are recalibrated from their national currency to US dollar prices and then weighted according to their share of India's exports in that particular year. CPI data is obtained from the IFS website. World demand is calculated from the import volumes of India's twelve largest trading partners also weighted according to their shares of Indian exports. This data is

obtained from the IFS website. Domestic prices are calculated using the wholesale price index of India. This data is obtained from the RBI's *Handbook of Statistics on the Indian Economy*. Virmani (1991) also argues in favor of usage of WPI because its calculation includes the widespread prevalence of import controls making it an extremely reliable proxy for domestic prices. India's consumer price index is far more recent and generally unreliable to calculate domestic prices in India. For instrumentation purposes, I also recalculate the WPI index from national currency to US dollars. As annual data for the WPI is released by financial year (April to March) rather than the calendar year (January to December), there is scope for my data to be slightly biased. Real GDP growth is used as a proxy for India's export supply capability. As India's GDP has grown, so has its capability to supply more diversified exports. India's export composition has changed over the past thirty years from a greater dependence on primary goods to largely depending on skill and technology intensive exports. However, my decision to use real GDP growth as a proxy for supply capability is different from prior research. For example, Roy (2009) uses data on sectoral value added from the National Accounts Statistics, Government of India; Sharma (2003) uses infrastructure as a proxy and Virmani uses rainfall and capacity utilization. Domestic demand is proxied by using output gap. Output gap is measured as:

$$\text{Output gap} = (\text{real GDP} - \text{trend GDP})/\text{trend GDP}$$

Trend GDP is calculated using the Hodrick-Prescott filter³ (See Figure 9 and 10). All my variables are calculated in index form and rebased where required to make 2005 as the base year. The exchange rate is an important factor as well because movements in the exchange rate affect the Rupee prices that manufacturers receive for their exports. However, as I have chosen to

1. ³ Reserve Bank of India Occasional Papers: Estimation of Potential Output in India, Vol. 30, No. 2, Monsoon 2009

measure all my variables in the same currency, there is no need to introduce an exchange rate variable. A dummy variable for liberalization was considered but discarded. Higher real GDP growth post-liberalization should capture the effects of liberalization, removing the need for a dummy. A dummy for China's entry into the WTO was also considered, but discarded due to the presence of insignificant results.

As mentioned above, a 2SLS model is conducted due to the presence of an endogeneity bias. The price and quantity of exports demanded and supplied are jointly dependent on each other, with all the other variables pre-determined. In order to ensure that the error term is not correlated with the price variable, an instrumental variable is required that is correlated with the dependent variable only through the price variable and is uncorrelated with the error term. The advantage of a simultaneous equation model is that the instrument for the price variable can be found in the exogenous variable of the other simultaneous equation. Therefore, for my demand side equation, I instrument the price of exports with domestic prices to obtain unbiased results. For my supply side equation, I instrument the price of exports with foreign prices to obtain unbiased results for my price of exports. While the general recommendation is to instrument the price variable with all the exogenous variables in the other equation in order to remove the possibility of obtaining conflicting estimates with different exogenous variables and to obtain more accurate results (smaller variances) in a large sample. However, as I lack a large sample size, the minimum number of instruments required is used⁴. The use of a single instrument in both the demand and supply equations also ensures that my equations are 'just-identified', fulfilling the order condition.

⁴ http://personal.rhul.ac.uk/uhte/006/ec2203/Lecture%20Handout_Endogeneity.pdf

In addition to running econometric tests, I also look at India's export performance at the commodity level. As data is not available on the price of Indian exports by commodity, I am restricted to carrying out my analysis using visual aids rather than econometric tests. My data spans from 1990-2011 and is taken from the World Trade Organization's (WTO) website. I collect data on aggregate and commodity-level exports for India and the World. The aim of my research is twofold. Firstly, I look at how the composition of global exports is changing, which provides insight into which commodity segments are growing quickly and accounting for a greater share of world export. I then look at India's share of world exports in each commodity segment to see whether India is gaining a greater share of that commodity segment over time. Piecing together these two strands of research will then allow me to analyze whether India is capturing a greater market share in those segments of world trade that are growing rapidly or not. Combining these pieces of research are crucial as India may be capturing a greater share of the market for a particular commodity, but if that commodity itself accounts for a decreasing share of global exports, then it indicates a lack of trade diversification on India's behalf.

Section V: Results

Table 5 and 6 show the results for the demand and supply equations estimated using ordinary least squares regressions. We find that the variable ‘price of exports’ to have a significant positive correlation on the volume of exports supplied. Our estimation suggests that a 1% increase in the dollar price of exports increases the volume of exports supplied by 3.76%. The results are significant at the 1% significance level. The results for the other variables are not significant, although the ‘domestic price’ variable just misses the 10% significance level. Real GDP growth is completely insignificant raising questions about the impact of liberalization in improving India’s export competitiveness and supply capability. However, as my decision to use real GDP growth is different from previous research, the coefficient and significance level of this parameter need to be interpreted with caution. Whether real GDP growth is a good proxy for India’s changing supply capability is a question that requires more debate and research before making authoritative claims. However, until we are able to collect data on alternative variables such as technological developments, infrastructure and transaction costs that would serve as better proxies for India’s changing supply capability, we are likely to be restricted to using the level and first difference forms of real GDP for estimating India’s changing supply capability. Domestic demand is also found to have an insignificant impact suggesting that greater demand in the domestic market does not influence a manufacturer’s decision to export his goods or sell them in the domestic market.

On the demand side, the price of exports is found to have a significant negative correlation with the volume of exports demanded. A 1% increase in the dollar price of India exports decreases the demand for Indian exports by 0.26%. World Demand is also found to have a significant positive impact indicating that a 1% increase in world demand results in a 1.88%

increase in the volume of exports demanded. My foreign price variable is found to be insignificant indicating that changes in consumer prices in India's largest export partner countries do not have a significant impact on demand for Indian exports. As mentioned above, the coefficients and standard errors of my independent variables are likely to suffer from endogeneity bias as price and quantity of exports are jointly dependent on each other. Therefore, 2SLS regressions are run with the results shown in Table 7 and 8. The exogenous variables are significant at the 1% level indicating that they are suitable instruments in both the cases.

In the supply side equation, the coefficients on export price and domestic price are found to be significant at the 1% level. A 1% increase in the price of exports increases the volume of exports supplied by 5.05%, indicating strong price elasticity, while a 1% increase in domestic prices decreases the volume of exports supplied by 3.12%. The results indicate that as the price of exports increase, manufacturers are incentivized to export their goods. Increases in domestic prices, on the other hand, reduce the incentive for manufacturers to export their goods in favor of selling their goods in the domestic demand. Real GDP growth and domestic demand continue to be insignificant. On the demand side, only the world demand variable is significant indicating that a 1% increase in world demand increases the volume of Indian exports demanded by 1.69%. Both my 'price of exports' and 'foreign price' variable are insignificant indicating that demand for Indian exports is not price sensitive. Therefore, while changes in the price of Indian exports influence the decision of manufacturers to supply goods, they do not influence the demand for Indian exports. In comparison to the results of my 2SLS regressions, the OLS results show that the coefficients on my variables were biased downwards towards zero in the case of the supply equation and biased upwards in the case of the demand equation.

Figures 11 to 17 and Tables 9 to 11 show the results of my research on India's exports relative to the world at the commodity level. Figure 11 shows that Indian exports increasingly account for a greater portion of aggregate world exports with India's share rising from half a percent (0.52%) in 1990 to 1.66% in 2011. Therefore, as India integrates its economy with the world economy, India's share of world exports has seen a commensurate increase. Table 10 and Figure 12 show the composition of world exports. Agricultural products and manufactures have seen their share of world exports decrease from 12.6% to 9.7% and from 72.6% to 67% respectively. Fuel and mining products have seen their share of world exports increase from 14.8% to 23.3%. A more detailed breakdown shown in Figure 13 reveals that the sub-groups of food and fuel have mirrored the performance of the groups to which they belong to, indicating that the other products in that category have seen their share of world exports remain stable. Except for chemicals, and office and telecom equipment sub-groups, all the other manufactures sub-groups have seen their share of world exports fall (Table 10). Additionally, while office and telecom equipment accounts for a greater share of world exports than it did in 1990, it has also been a downward trend since its share of world exports peaked in 2000 (Figure 14). Overall, over the past two decades, fuel exports have been the clear winners as far as world exports are concerned.

Figure 15 and Table 11 shows that India's share of world exports in the three main groupings – agricultural products, fuels and mining products and manufactures – have all increased. Figure 16 and 17 show a more detailed breakdown of India's export share. India's share of world exports have increased in every segment and commodity albeit by differing amounts (Table 11). For example, India has seen its share of fuel exports and iron and steel exports increase by eighteen fold and twelve-fold from 0.1% and 0.2% in 1990 to 1.8% and 2.5%

in 2011. On the other hand, even though India had 2.1% share in the world clothing exports in 1990, India has seen its share of clothing exports increase very gradually to 3.5% in 2011. In fact, Figure 17 shows that India's exports of clothing stagnated as a percentage of world clothing exports after 2000, which could potentially be attributed to China's entry into the WTO in December, 2001.

Overall, given that fuel exports increasingly account for a greater share of world exports, India's sharp improvement in fuel exports bode well for aggregate Indian exports. Further, chemical exports also account for a larger share of total world exports and India has seen its share of world chemical exports quadruple from 0.4% to 1.6% from 1990-2011. India has also experienced rapid growth in automotive exports with its share rising from 0.1% to 0.7%. However, automotive exports account for a declining share of world exports. Similarly, India's exports of textiles improved from 2.1% to 5.1%, but textile exports saw their share of world exports nearly halved from 3.2% to 1.7% over the same time period (See Table 9). Therefore, India's exports relative to world exports at the commodity level represent a mixed picture.

Section VI: Conclusion

The primary aim of this paper is to analyze the factors that determine India's export behavior. India's widening trade deficit has provided a major theoretical motivation to understanding India's export behavior. I have used an imperfect-substitutes simultaneous equation econometric model to understand India's export performance and suggest remedial measures to bridge the trade deficit.

The results favor the school of thought that is more skeptical of the benefits of liberalization. Buoyant world demand has played a clear role in helping to sustain the growth in Indian exports while liberalization and the resultant changes in India's supply capability seem to have had an insignificant impact on the supply of Indian exports. However, the use of real GDP growth as a proxy for India's changing supply capability is debatable. Graphical representations of India's exports clearly show a sharp change in India's supply capability after 1991 despite the lack of significant results in my econometric results. Real GDP growth is a crude substitute for changing supply capability and may be responsible for the lack of significant results. More importantly, more research needs to be conducted in this particular field including finding variables that may be more appropriate substitutes before jumping to broad conclusions.

The importance of world demand indicates that Indian exports are heavily dependent on rapid growth in the economies that form India's major trading partners. While India's ability to influence the growth policies of partner countries is limited, the Indian government should prioritize establishing closer trade ties with fast growing countries, especially in the Middle East and developing Asia.

The price of exports is found to be significant on the supply side indicating that the supply of Indian exports is price elastic. Therefore, the government should consider providing

price incentives to Indian exporters to get them to supply more goods. Further, given the negative relation between domestic prices and export volumes, it is imperative that the government keeps a lid on domestic prices and inflation. High prices at home dissuade manufacturers from seeking markets abroad for their goods hurting India's export growth.

Future research should focus on increasing the number of years for which data is available as a major constraint faced in instrumenting my variables was the lack of a large data set. Further, there are several variables from technological changes, to infrastructure improvements and hedging that could potentially affect a manufacturer's decision to export goods, but are not included in previous research due to the lack of available data. Collecting data on these variables is important as they could help to piece together India's export trajectory in the long-run.

Results at the commodity level show that Indian exports (as a share of world exports) are doing extremely well in key areas like fuel and chemical exports. However, there are also important sectors such as textiles, clothing and agricultural products that are not doing well at the global level but account for a sizeable share of India's exports. As a result, key Indian exports are getting concentrated in slow-growth areas and India needs to focus on diversifying away from these sectors to higher growth areas such as fuel and chemical exports. It is imperative that India do so as sectors in which India accounts for a large share of world exports (clothing and textiles) have either seen their shares stagnate (clothing) due to competition from other countries or account for a decreasing share of overall global exports (textiles).

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Appendix

Table 1: India's Annual Trade from 1970-71 to 2010-11 in 5 year increments (\$ Millions)

Year/ Millions (\$)	Exports	Imports	Trade Balance
1970/71	2,031	2,162	-131
1975/76	4,649	6,064	-1,415
1980/81	8,485	15,867	-7,382
1985/86	8,905	16,067	-7,162
1990/91	18,145	24,073	-5,927
1995/96	31,795	36,675	-4,880
2000/01	44,560	50,537	-5,976
2005/06	103,091	149,166	-46,075
2010/11	251,136	369,769	-118,633

Table 2: Period-wise Growth Rates of India's exports

Sector/Time Period	10 year CAGR				20 year CAGR	
	1971-81	1981-91	1991-01	2001-11	1971-91	1991-11
Aggregate Exports	5.3%	4.6%	11.3%	10.9%	5.4%	11.3%
I. Primary Products	3.5%	1.2%	7.3%	8.5%	2.8%	8.2%
--Agriculture and Allied Products	4.3%	0.4%	8.1%	7.3%	2.8%	7.9%
--Ores and Minerals	0.2%	4.6%	3.8%	12.9%	2.9%	9.1%
II. Manufactured Goods	6.0%	6.3%	11.8%	9.0%	6.4%	10.5%
-- Leather and Manufactures	4.6%	3.9%	6.0%	0.1%	4.3%	3.2%
-- Chemicals and Related Products	10.3%	12.0%	13.9%	8.9%	13.4%	11.9%
-- Engineering Goods	7.9%	5.0%	13.5%	15.2%	6.9%	14.8%
-- Textile and Textile Products	3.6%	4.5%	10.9%	1.6%	3.7%	5.9%
-- Gems and Jewelry	16.3%	10.0%	12.2%	10.5%	14.1%	11.6%
Others	11.8%	1.2%	18.2%	17.3%	6.7%	17.7%
III. Petroleum Products	-0.4%	4.6%	18.1%	25.4%	12.9%	22.8%

Notes: The Growth rates for each of the phases are compounded annual growth rates.

Table 3: Period-wise Growth Rates of Select Commodities

Commodity	10 year CAGR				20 year CAGR	
	1971-81	1981-91	1991-01	2001-11	1971-91	1991-11
Tea	0.9%	0.2%	-0.7%	0.0%	-0.2%	-0.4%
Coffee	14.6%	-4.2%	8.5%	3.5%	2.4%	5.6%
Mica and Iron Ore	0.7%	0.6%	-3.2%	18.2%	1.2%	8.2%
Petroleum Products	-0.4%	4.6%	18.1%	25.4%	12.9%	22.8%
Basic Chemicals, Pharmaceuticals and Cosmetics	11.2%	8.7%	11.9%	9.9%	12.2%	11.2%
Iron and Steel and Manufacture of Metals	4.6%	3.3%	17.0%	10.3%	4.4%	13.7%
Transport Equipment	9.3%	2.5%	8.9%	22.7%	5.9%	16.1%
Gems and Jewelry	16.3%	10.0%	12.2%	10.5%	14.1%	11.6%
Readymade Garments	19.6%	8.7%	11.5%	1.3%	14.5%	6.0%

Notes: The Growth rates for each of the phases are compounded annual growth rates.

Table 4: Sample Data containing all my variables

Year	Exports Volume	Real GDP	World Demand	Domestic Prices (\$)	Price of Exports	Foreign Prices (\$)	Real GDP Growth (%)
1980	116.3	24.0	24.7	105.5	73.8	49.6	6.6
1981	119.2	25.6	24.8	104.6	69.6	50.4	6.5
1982	129.1	26.5	25.3	100.5	72.5	51.1	3.8
1983	126.6	28.5	26.2	101.2	72.2	50.5	7.4
1984	128.7	29.6	28.9	96.1	73.4	50.1	3.7
1985	121.0	31.2	29.1	92.2	75.5	51.3	5.5
1986	125.4	32.7	31.1	95.7	74.9	56.1	4.9
1987	148.0	34.3	33.0	100.7	76.3	61.3	4.8
1988	143.6	37.2	35.5	100.8	92.1	60.9	8.5
1989	168.2	39.4	38.2	92.9	94.3	62.1	5.9
1990	194.2	41.6	40.5	94.9	92.5	71.3	5.6
1991	197.2	42.1	41.2	83.3	89.9	73.2	1.3
1992	218.1	44.3	42.7	80.2	90.0	79.2	5.1
1993	251.1	46.9	44.1	71.7	85.9	73.8	5.9
1994	287.0	50.3	48.4	80.9	87.2	78.8	7.3
1995	371.2	54.0	52.1	84.5	82.5	83.6	7.3
1996	420.6	58.3	54.4	80.9	78.7	87.1	8.0
1997	390.3	60.8	59.1	82.4	89.7	87.8	4.3
1998	408.1	64.8	62.6	76.8	81.9	89.1	6.7
1999	460.1	69.0	66.8	76.0	77.5	90.0	6.4
2000	552.3	72.0	74.3	78.1	76.7	89.5	4.4
2001	599.1	76.0	74.1	77.0	72.4	90.0	5.5
2002	714.6	79.0	77.1	77.3	70.5	91.4	4.0
2003	739.6	85.4	81.3	85.1	79.7	93.1	8.1
2004	858.6	91.3	91.7	93.1	89.3	94.0	7.0
2005	996.2	100.0	100.0	100.0	100.0	100.0	9.5
2006	1157.1	109.6	108.6	103.8	105.3	100.4	9.6
2007	1237.4	119.8	120.5	119.0	121.2	103.3	9.3
2008	1445.2	127.8	132.3	122.2	134.6	105.4	6.7
2009	1349.3	138.8	119.7	114.0	122.2	96.6	8.6
2010	1537.9	151.8	132.0	132.3	147.2	95.5	9.3
2011	1747.9	161.2	139.2	141.1	173.3	105.9	6.2

Notes: The Base Year = 2005 for all independent variables.

Table 5: Export Supply Determinants – OLS Results

Variables	
Volume of Exports Supplied	Coefficient
Independent	
Price of Exports	3.759*** (0.790)
Domestic Prices	-1.842 (1.070)
Domestic Demand	-0.033 (0.090)
Supply Capability	0.625 (0.560)
Constant	-6.213* (3.230)

Table 6: Export Demand Determinants – OLS Results

Variables	
Volume of Exports Demanded	Coefficient
Independent	
Price of Exports	-0.260** (0.138)
Foreign Prices	-0.424 (0.255)
World Demand	1.886*** (0.138)
Constant	-0.960 (0.950)

Notes: All variables are in their natural log form. Price of exports is proxied by the export unit value index. Domestic prices and foreign prices are proxied by the wholesale price index of India and the weighted consumer price index of India's twelve largest trading partners respectively. Domestic demand is proxied by output gap and supply capability by real GDP growth respectively. World Demand is the weighted volume of imports of India's twelve largest export partners. The standard errors for the coefficient of each variable are listed in brackets while *, **, *** indicates that the variable is significant at the 10%, 5% and 1% level respectively.

**Table 7: Export Demand Determinants – Two Stage Least Squares Regression
First-Stage Regressions**

Variables	
Price of Exports	Coefficient
Independent	
Foreign Prices	0.828** (0.348)
World Demand	-0.159 (0.169)
Domestic Prices (IV)	1.035*** (.180)
Constant	-3.167* (1.565)

Instrumental 2SLS Regressions

Variables	
Volume of Exports Supplied	Coefficient
Independent	
Price of Exports	0.053 (0.191)
Foreign Prices	-0.190 (0.277)
World Demand	1.691*** (0.162)
Constant	-2.596*** (1.180)

Notes: All variables are in their natural log form. Price of exports is proxied by the export unit value index. Domestic prices and foreign prices are proxied by the wholesale price index of India and the weighted consumer price index of India’s twelve largest trading partners respectively. Domestic demand is proxied by output gap and supply capability by real GDP growth respectively. The standard errors for the coefficient of each variable are listed in brackets while *, **, *** indicates that the variable is significant at the 10%, 5% and 1% level respectively.

The Price of exports is instrumented by domestic prices to obtain unbiased results.

**Table 8: Export Supply Determinants – Two Stage Least Squares Regression
First-Stage Regressions**

Variables	
Price of Exports	Coefficient
Independent	
Domestic Prices	0.97051*** (0.13028)
Supply Capability	-0.0665 (0.1035)
Domestic Demand	0.00627 (0.01621)
Foreign Prices (IV)	0.61741*** (0.09833)
Constant	-2.4538*** (0.67051)

Instrumental 2SLS Regressions

Variables	
Volume of Exports Supplied	Coefficient
Independent	
Price of Exports	5.05563*** (0.82768)
Domestic Price	-3.1215*** (1.06111)
Supply Capability	0.42682 (0.52184)
Domestic Demand	-0.0457 (0.08455)
Constant	-5.8625** (2.98777)

Notes: All variables are in their natural log form. Price of exports is proxied by the export unit value index. Domestic prices and foreign prices are proxied by the wholesale price index of India and the weighted consumer price index of India’s twelve largest trading partners respectively. Domestic demand is proxied by output gap and supply capability by real GDP growth respectively. World Demand is the weighted volume of imports of India’s twelve largest export partners. The standard errors for the coefficient of each variable are listed in brackets while *, **, *** indicates that the variable is significant at the 10%, 5% and 1% level respectively.

The Price of exports is instrumented by foreign prices to obtain unbiased results.

Table 9: Indian and World Export Growth by Commodity, 1990-2011

Commodity Sub Group	CAGR	
	World Export Growth	India Export Growth
Aggregate Exports	8.3%	14.4%
Agricultural Products	6.8%	11.5%
Food	7.2%	11.4%
Fuels and mining products	10.5%	20.1%
Fuels	10.9%	25.0%
Manufactures	7.8%	13.8%
Iron and steel	7.9%	21.0%
Chemicals	9.5%	16.2%
Machinery and transport equipment	7.7%	18.1%
Office and telecom equipment	8.6%	18.4%
Automotive products	6.9%	20.2%
Textiles	5.0%	9.6%
Clothing	6.6%	8.6%

Table 10: Composition of World Exports by Commodity

Commodity Sub Group	Share in 1990	Share in 2011
Agricultural Products	12.6%	9.7%
Food	9.6%	7.9%
Fuels and mining products	14.8%	23.3%
Fuels	11.0%	18.5%
Manufactures	72.6%	67.0%
Iron and steel	3.2%	3.1%
Chemicals	9.0%	11.6%
Machinery and transport equipment	36.8%	33.5%
Office and telecom equipment	9.1%	9.8%
Automotive products	9.7%	7.5%
Textiles	3.2%	1.7%
Clothing	3.3%	2.4%

Table 11: India's Share of World Exports by Commodity (%)

Commodity Sub Group	Share in 1990	Share in 2011
Aggregate Exports	0.5%	1.7%
Agricultural Products	0.8%	2.1%
Food	0.9%	2.0%
Fuels and mining products	0.3%	1.8%
Fuels	0.1%	1.8%
Manufactures	0.5%	1.6%
Iron and steel	0.2%	2.5%
Chemicals	0.4%	1.6%
Machinery and transport equipment	0.1%	0.8%
Office and telecom equipment	0.1%	0.4%
Automotive products	0.1%	0.7%
Textiles	2.1%	5.1%
Clothing	2.3%	3.5%

Figure 1: India's Volume of Exports, 1970 to 2011

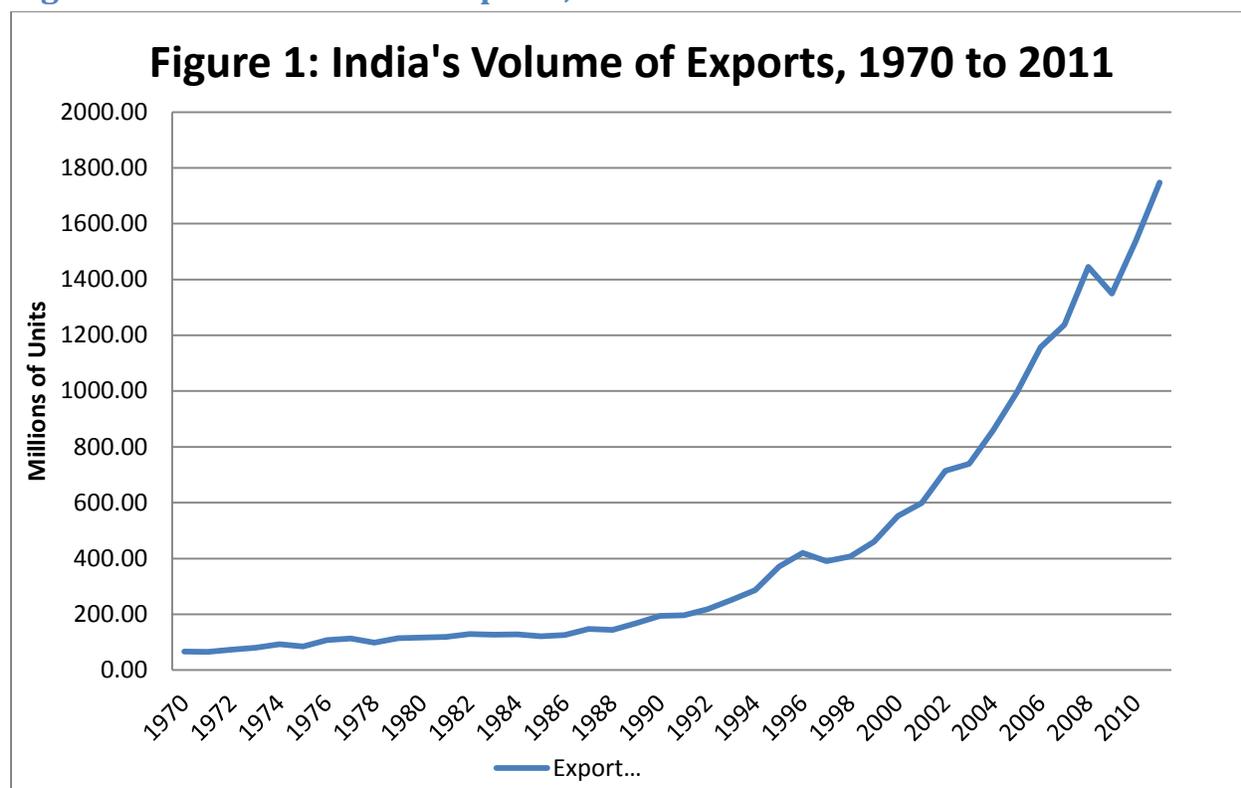


Figure 2: India's Aggregate Trade Behavior, 1970-71 to 2010-11

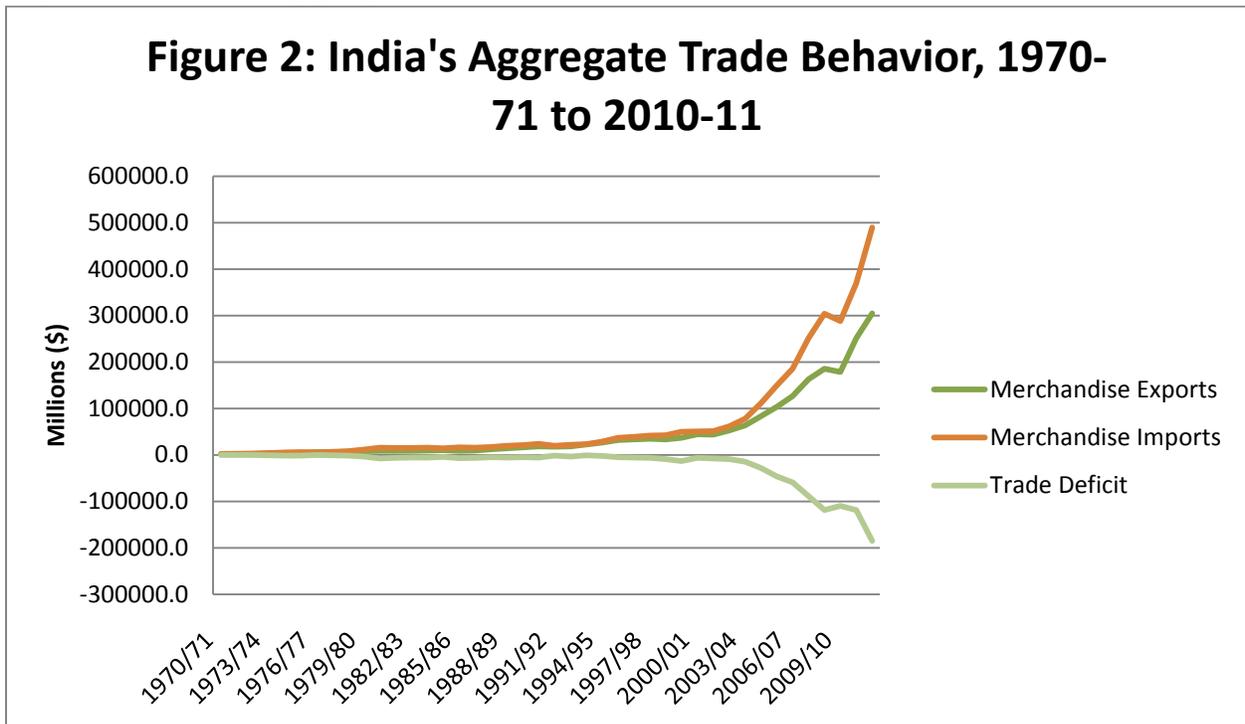


Figure 3: India's Imports - Oil and Aggregate Imports from 1970-71 to 2010-11

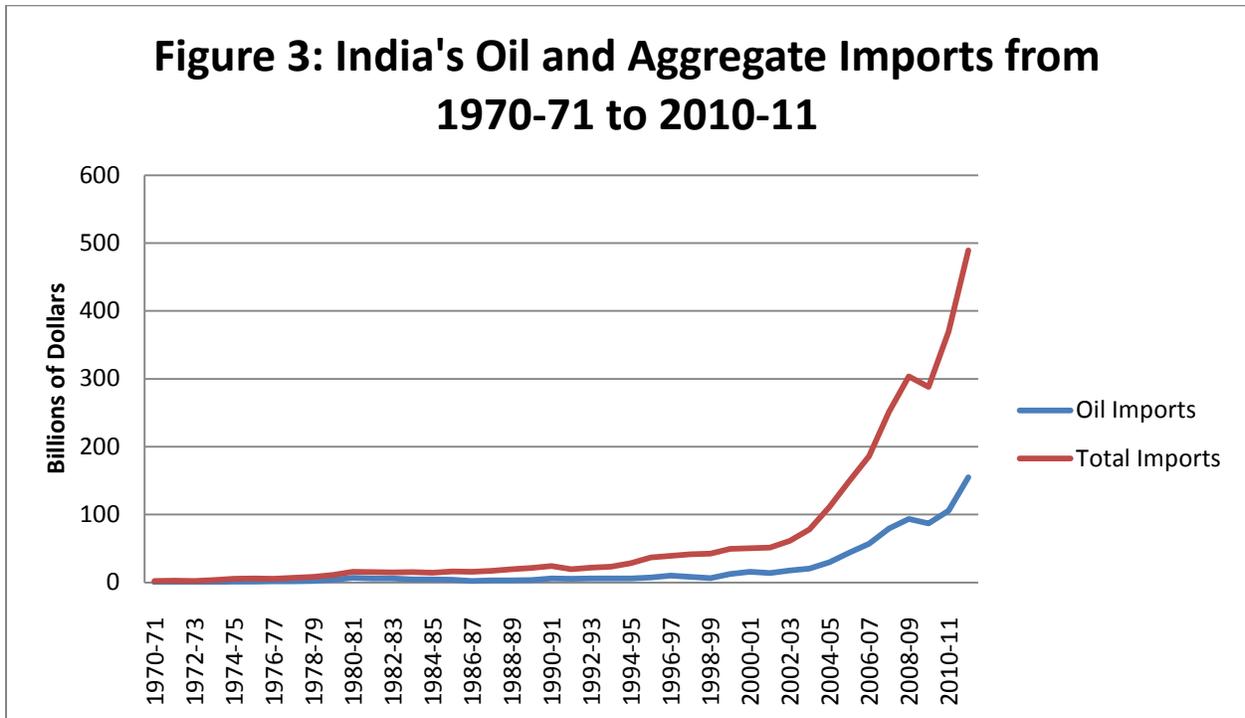


Figure 4: Sector-wise Breakdown of India's Exports

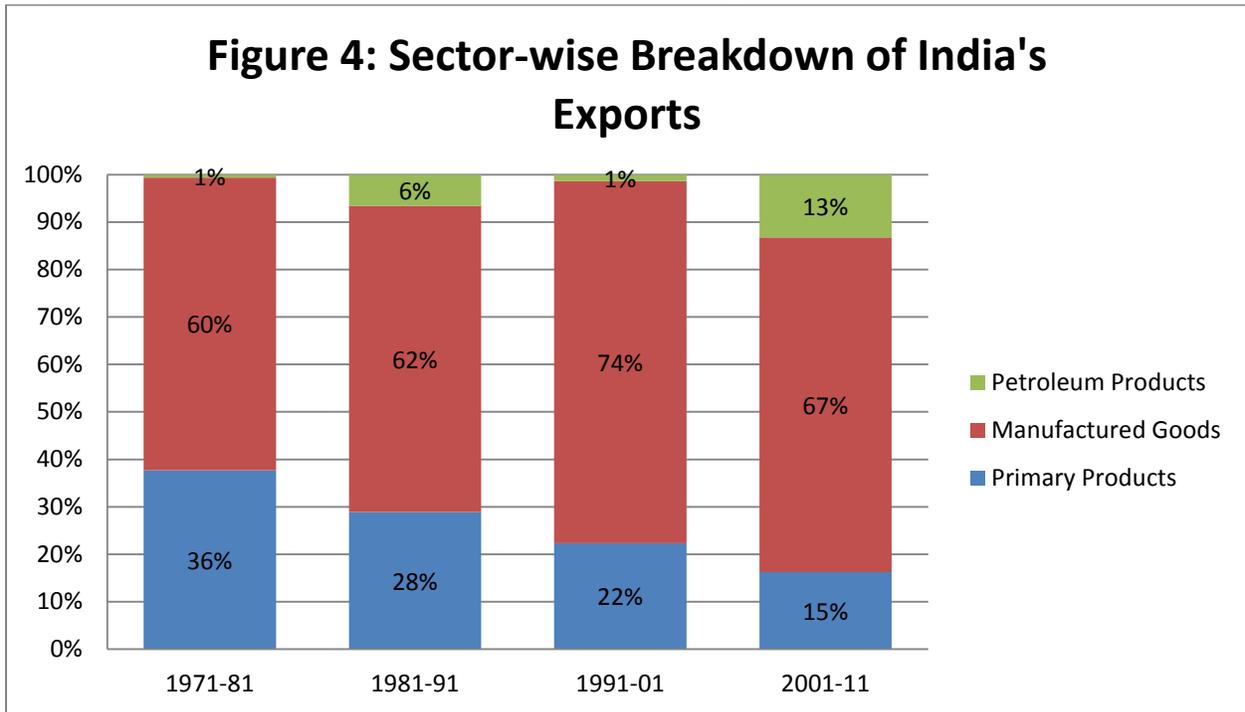


Figure 5: Detailed Breakdown of Primary Exports (% of Total)

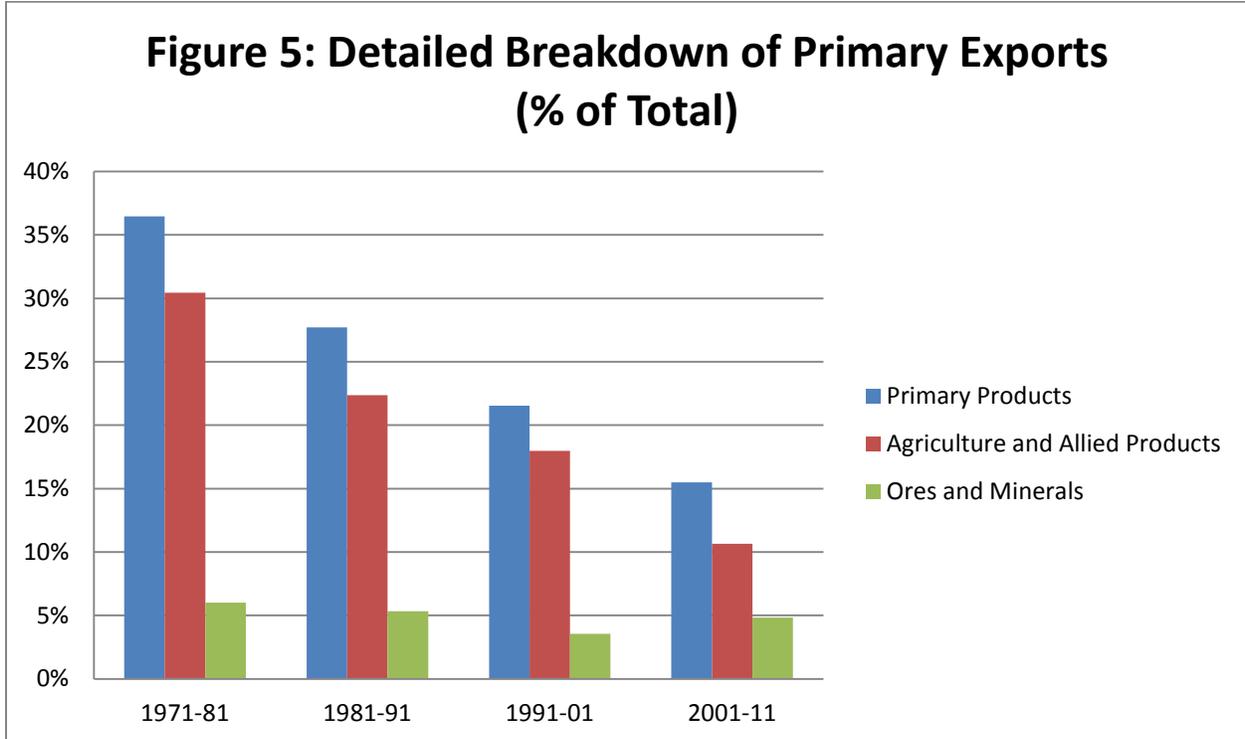


Figure 6: Detailed Breakdown of Manufacturing Exports (% of Total)

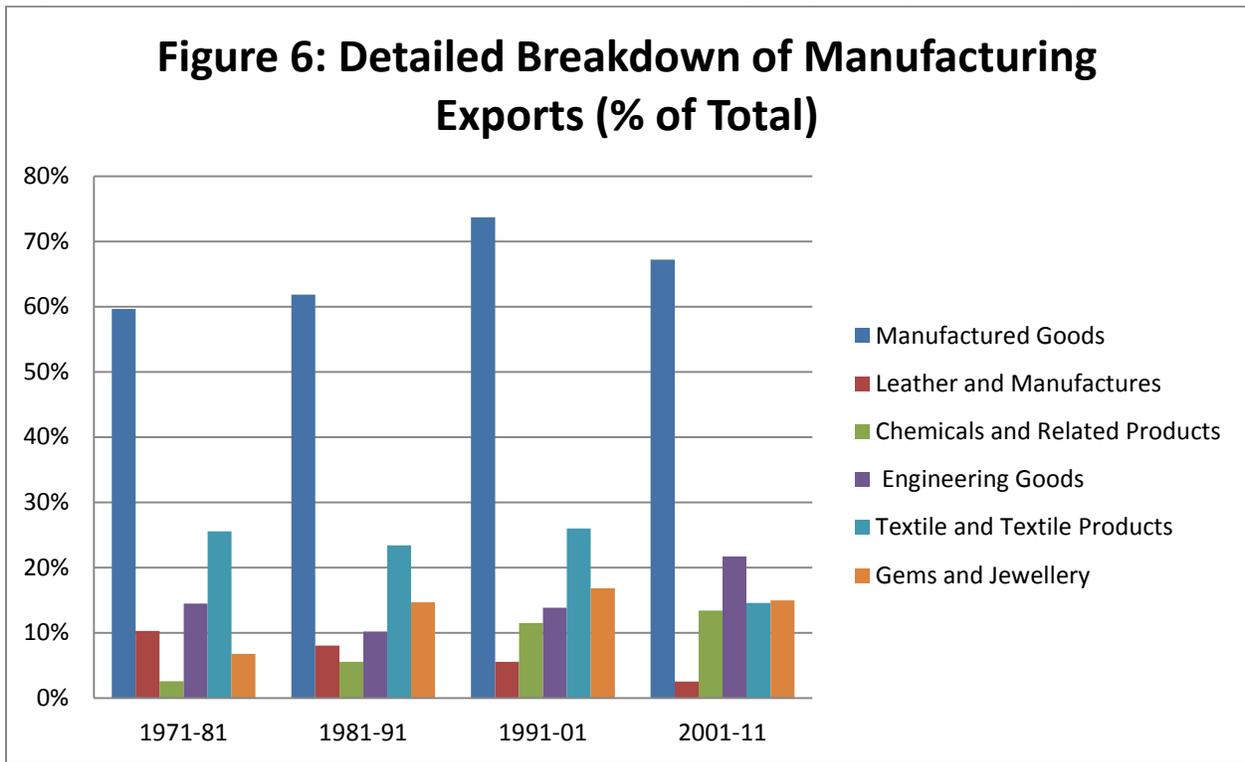


Figure 7: India's Exports by Commodity (% of Total)

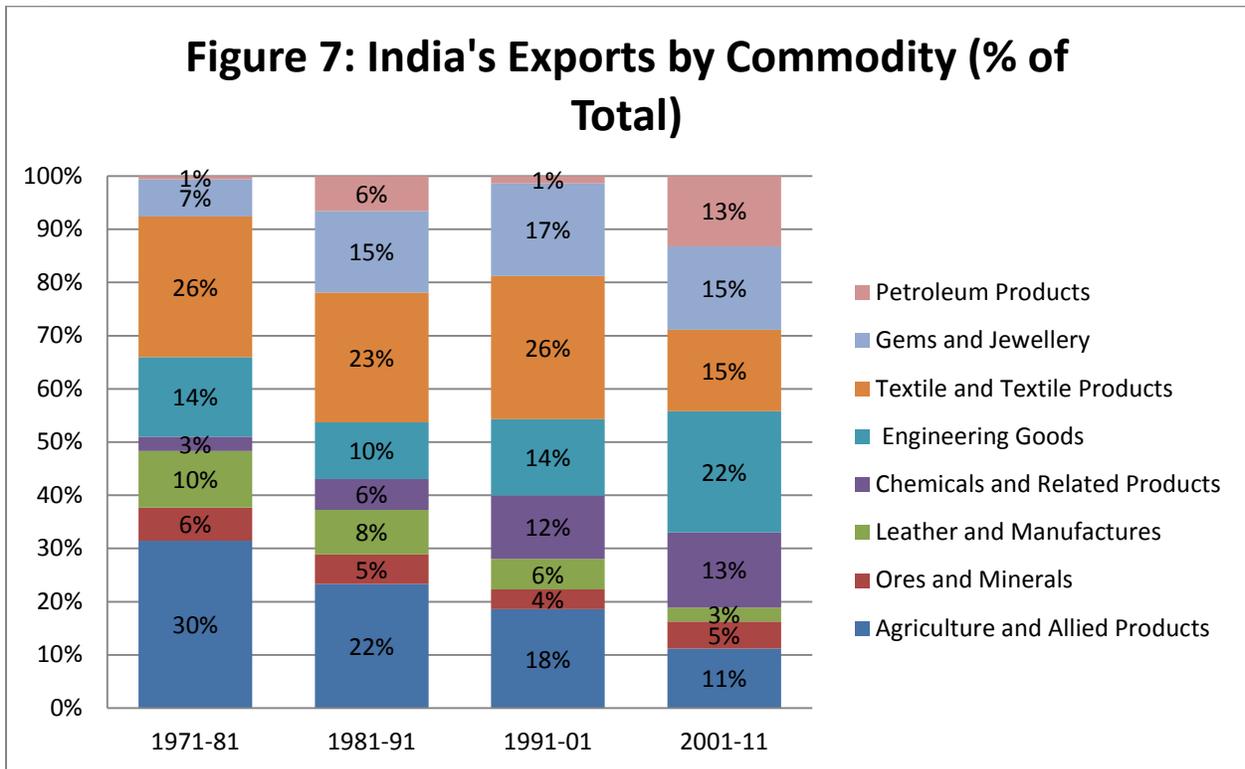


Figure 8: Direction of India's Merchandise Exports

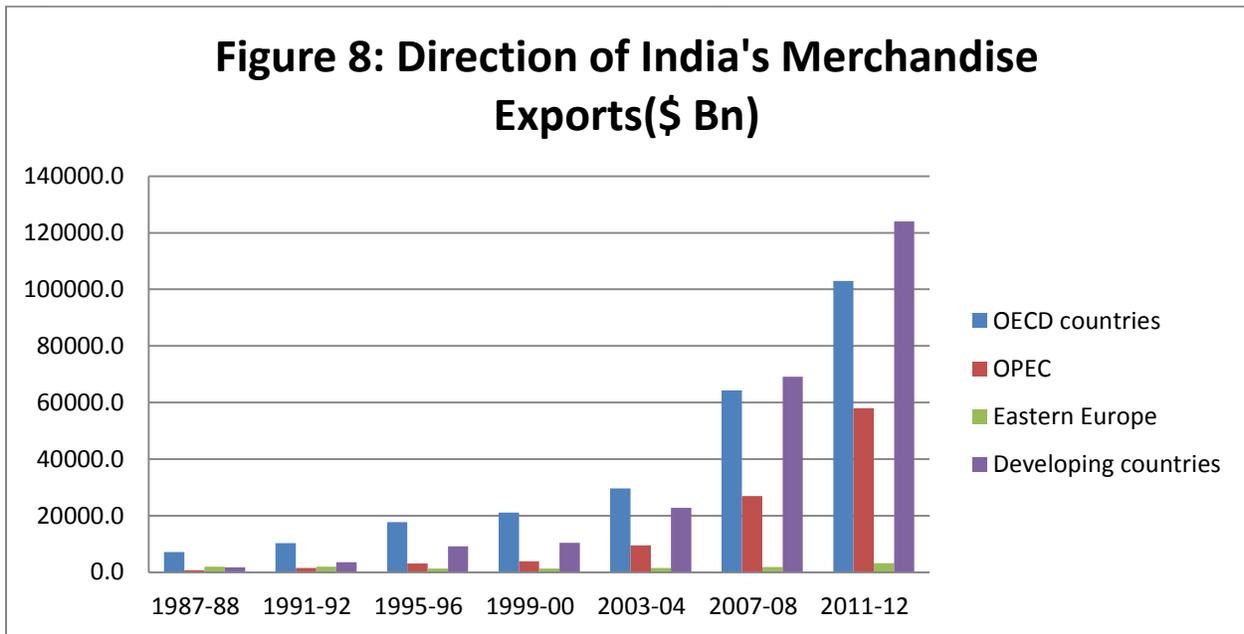


Figure 9: Output Difference - Real GDP minus Trend growth rate

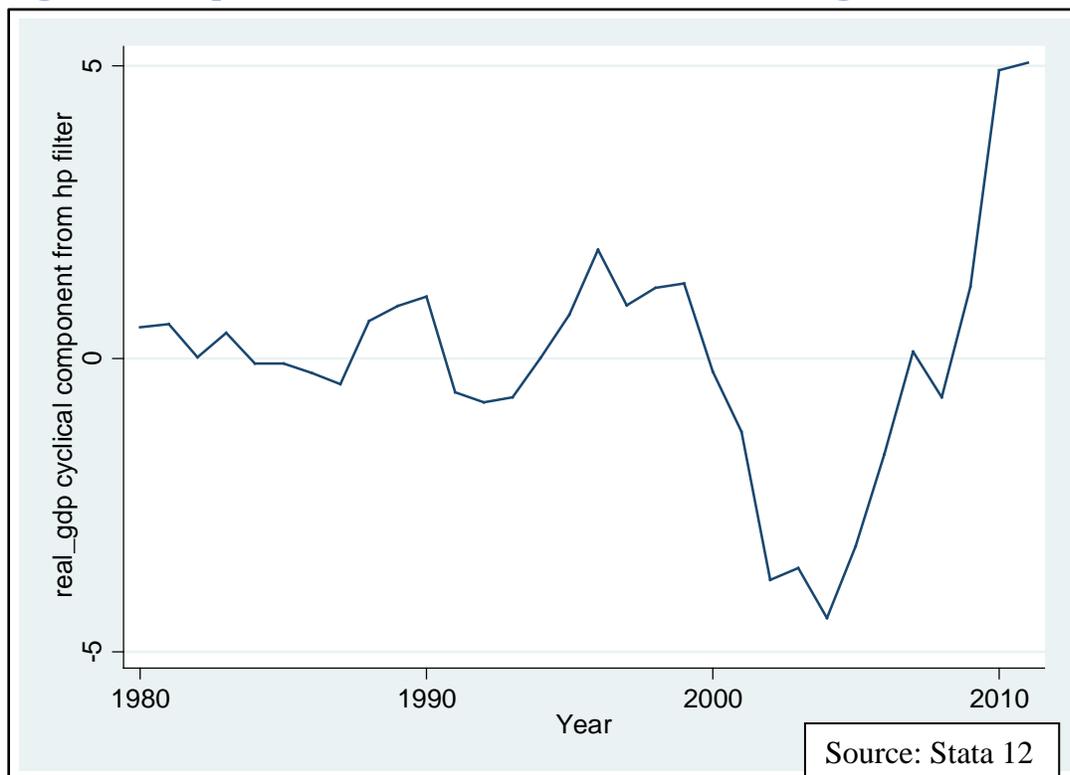


Figure 10: Output Gap - $[(\text{Real GDP} - \text{Trend})/\text{Trend}] * 100$

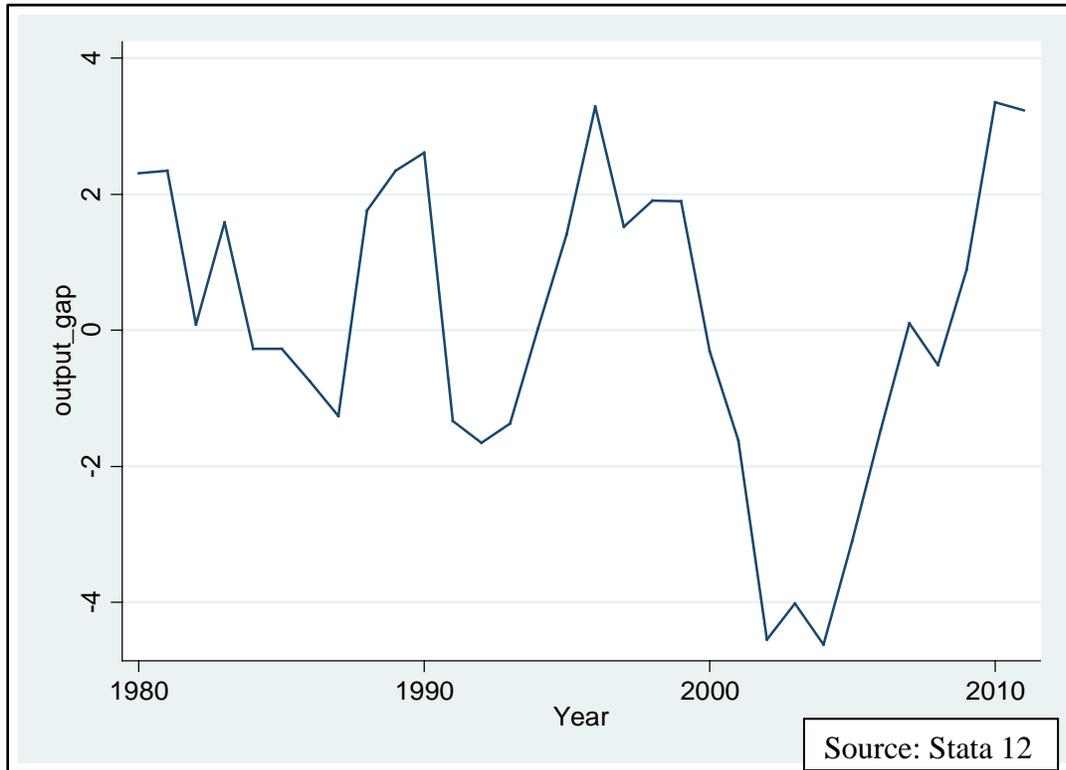


Figure 11: India's Exports as a % of World Exports, 1990-2011



Figure 12: World Exports (%) by Category

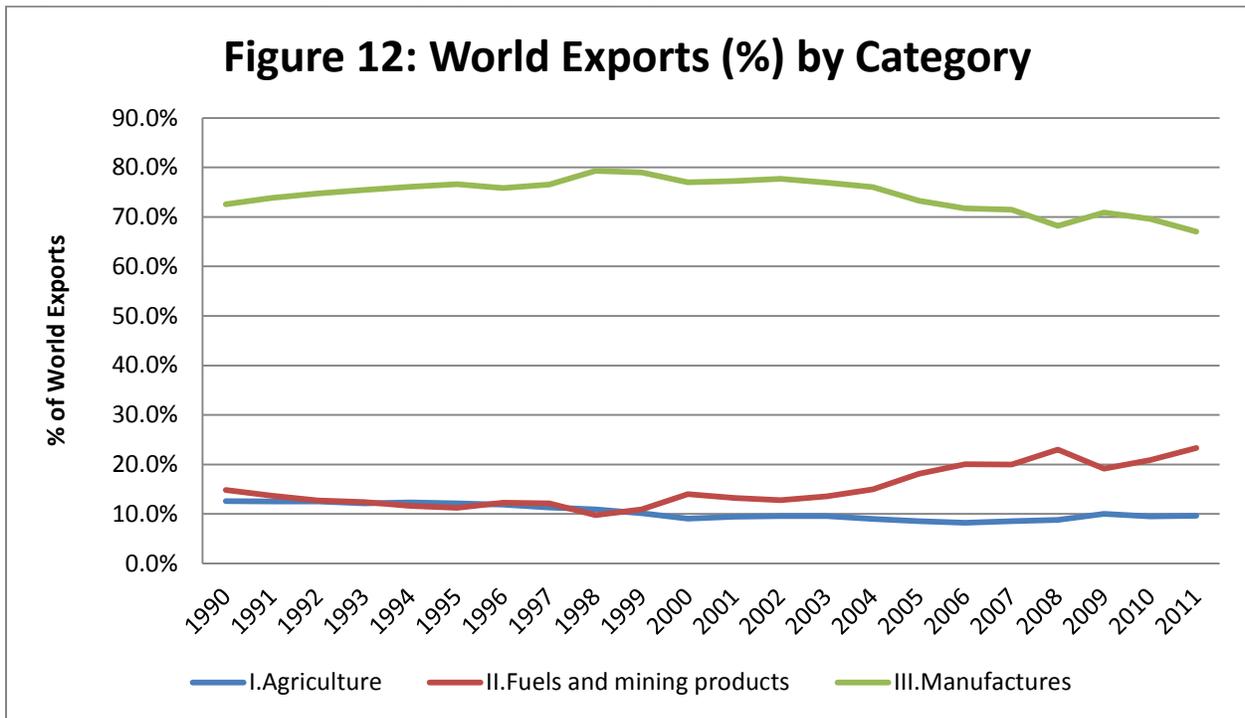


Figure 13: Composition of World Exports (%) for Agriculture, Fuels and Mining Products

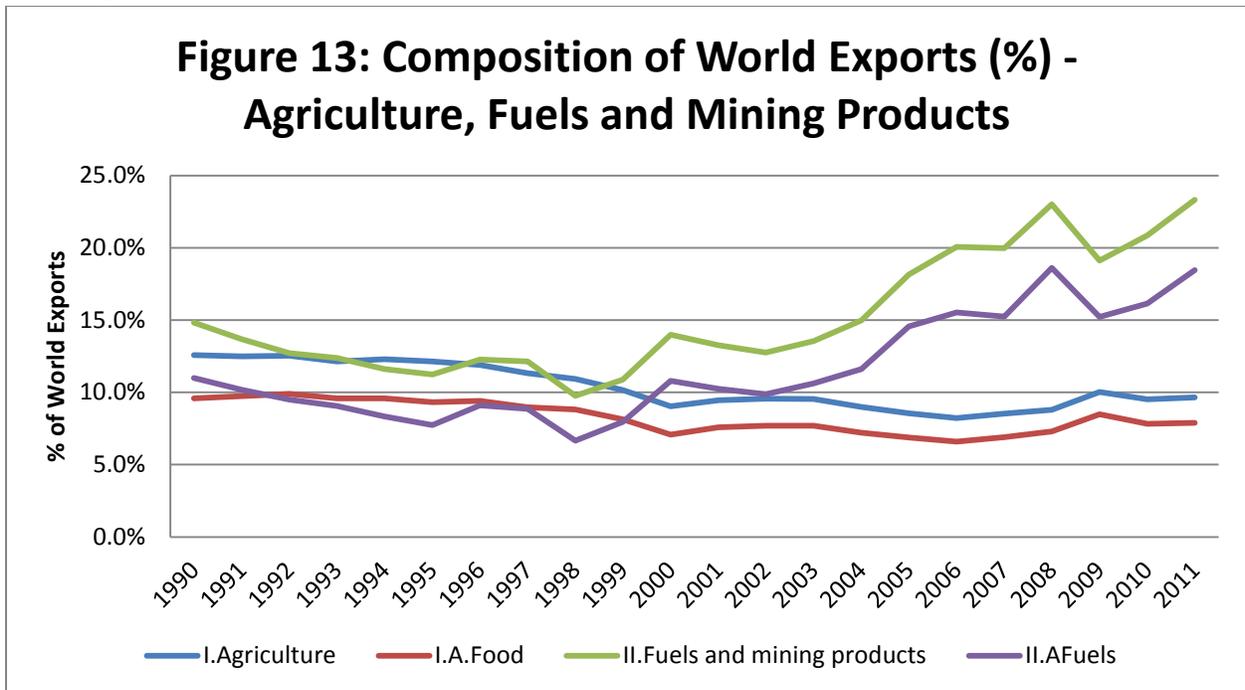


Figure 14: Composition of World Exports (%) for Manufactures

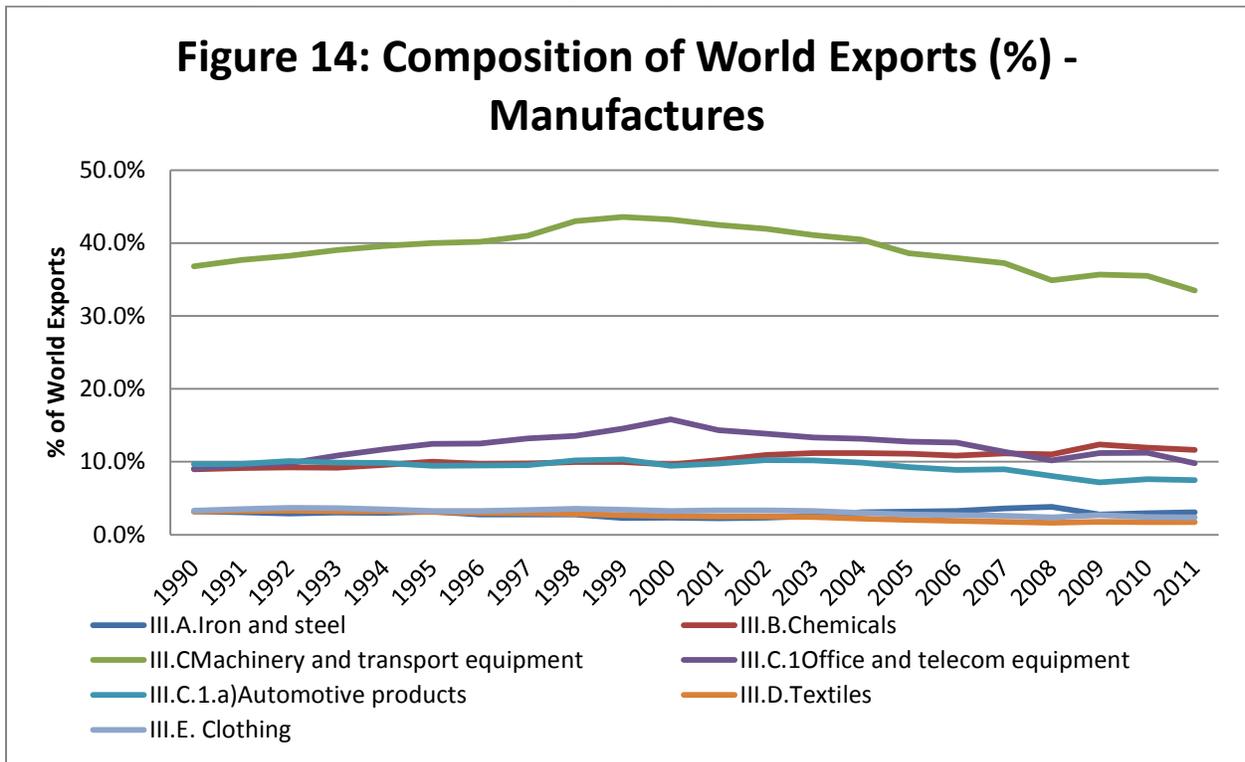


Figure 15: India's Share of World Exports by Export Category

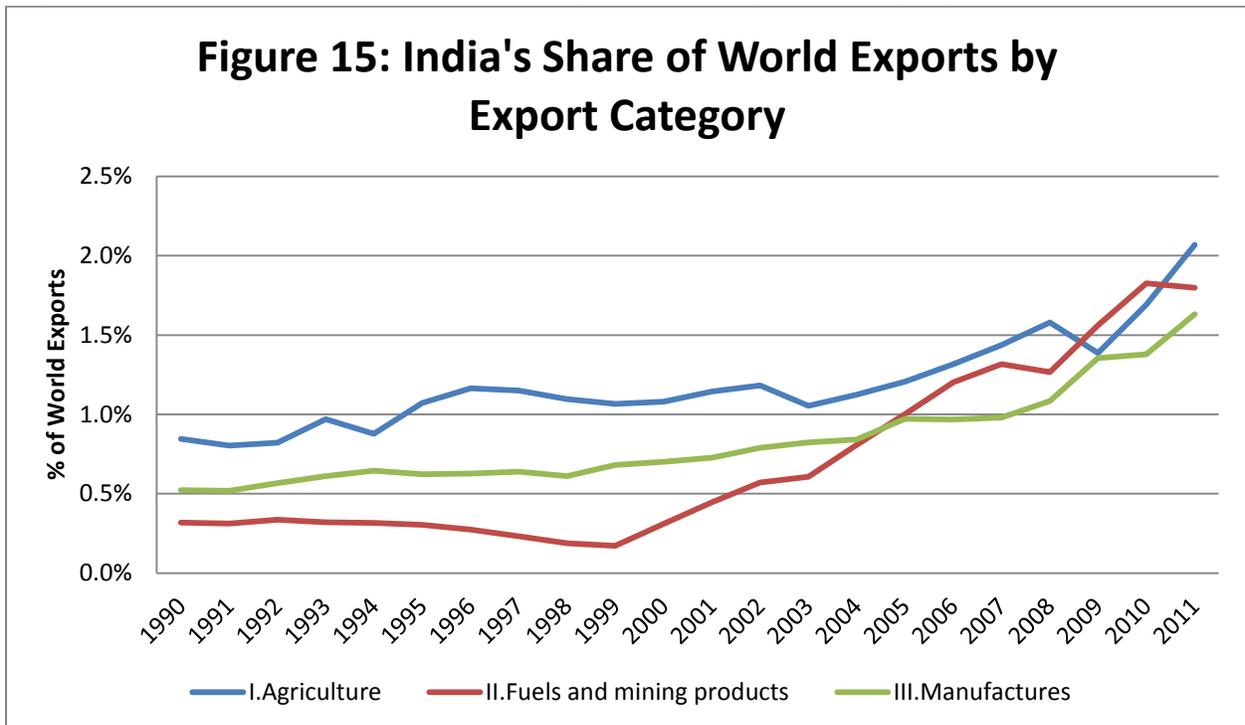


Figure 16: India's Share of World Exports (%) of Agricultural Products, Fuels and Mining Products

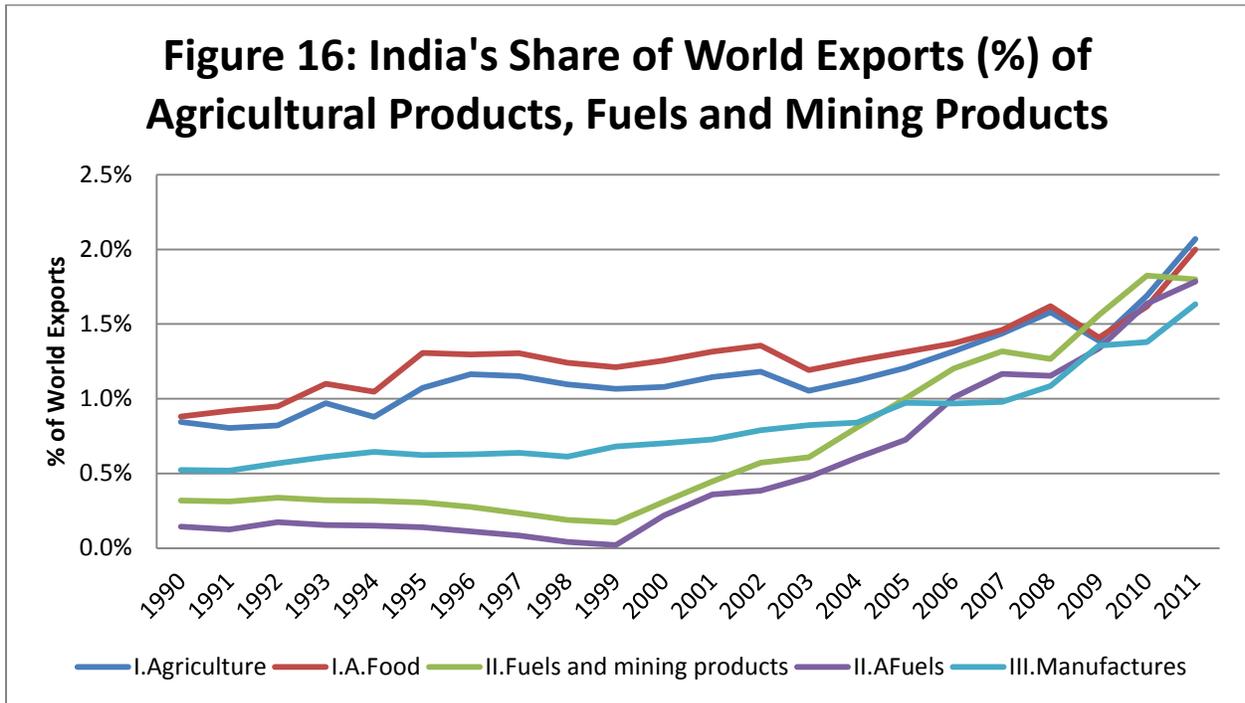


Figure 17: India's Share of World Exports (%) of Manufactures

