Working Paper

Imports from China: Threat or Opportunity
Analysis of Indian Manufacturing Sector

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ABSTRACT:

Manufacture imports from China increased from US$ 42.5 billion in 2010-11 to US $ 74.9 billion in 2017-18 thereby raising concerns about the adverse implication on the domestic manufacture sector. The focus of the paper is to assess the impact of imports from China on the manufacturing performance, in terms of output growth, value added growth, labour and capital productivity, capacity utilisation, Employment and Export intensity. A total of 26 industries corresponding to 18 HS chapters have been selected on the basis of imports from China accounting for over 40% of the total imports of that industry. The analysis was carried out separately for imports defined as Capital goods, Intermediate goods and Consumer Goods. Imports from China seem to have had a favourable impact on industry output / value added driven by increasing labour and capital productivities. The estimates reveal that in terms of value, the impact of imports of intermediate goods on output is 163%, while for capital goods it is 93% and consumer goods is 73%. These results negate the general perception of threat from Chinese imports.

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1. Introduction

India and China are fast growing emerging economies with an average GDP growth of about 6.5%. Following the trade liberalisation reforms in both countries (1970 in China and 1991 in India), the trade orientation has increased. In 2017, the trade to GDP ratio was 38% for China and 41% for India. Structurally, the increasing trade orientation was different for China and India. Both in terms of values and growth rates, world exports of China was higher than world imports, resulting in trade surplus which increased from US$ 8.7 billion in 2010 to US $63 billion in 2017. For India, world imports were higher than world exports resulting in trade deficit which increased from US$ 118 billion in 2010 to US$ 162 billion in 2017. With China emerging as a major global exporter, particularly manufacture exports, China emerged as a major trading partner for India.

With trade expanding between India and China, the share of imports in total trade (with China) increased from 66% in 2000 to 85% in 2017 resulting in a significant increase in trade deficit. In 2017, the trade deficit with China was at US$ 76.4. Efforts to reduce the trade deficit not only explored on increasing exports to China but also focussed on evaluating the impact on domestic industry. Manufacturing imports account for about 65% of the total imports from World of which the share of China increased from 18.1% in 2010-11 to 24.9% in 2017-18. Manufacture imports from China increased from US$ 42.5 billion in 2010-11 to US$ 74.9 billion in 2017-18 thereby raising concerns about the adverse implications on the domestic manufacture sector. The current paper is an effort to analyse the implications of rising imports from China on Indian manufacturing Output, Value added, Productivity, Employment and Exports. The analysis is focussed on the industries where the imports from China account for over 40% of the total imports of the industry.

2. Literature Review

Increased trade raises the competitive pressure in domestic market. This will force domestic import competing producers to increase efficiency in order to maintain their competitive position and lower prices / profit margins (Hung, Salomon and Sowerby, 2004; Jelili, 2004; Weiss, 2002)**.** The lower prices can force lower productive firms to exit and higher productive firms get higher market share (Melitz and Trefler, 2002). As imports create market disciplining effects, especially in term of intra-plant sectoral charges, industry productivity increases (Hay, 2001; Pavcnik, 2002). The "Challenge response" to import competition will force firms to introduce innovative processes and increase input efficiency over time (Fernandez, 2007). This is achieved by investing in R&D, corporate restructuring, learning from foreign competitors through reverse engineering or learning from foreign competitors' production processes (Hung, Salomon and Sowerby, 2004).

According to Melitz (2003), the new profit opportunities from trade will enable productive firms to raise factor demand and increase exports. As exporting firms expand and sectoral share increases, the overall productivity improves. This scale-induced productivity growth will encourage firms to undertake fixed cost investment which leads to higher labour productivity. (Bernand et. al 2003, 2007; Pavcnik 2002). For import competing firms, labour productivity and output falls. (Rodrik, 1992).

Empirical studies on assessing the impact of trade liberalisation on Indian manufacturing have focussed on estimating Total Factor Productivity Growth (TFPG). By comparing the TFPG in pre and post liberalisation periods in India, many studies found that the TFPG in post liberalisation period was higher (Chand and Sen, 2002; Goldar, 2015; Krishna and Mitra, 1998 and Unel 2003). The positive impact of trade liberalisation on domestic productivity was examined in terms of reduction in Effective Rate of Protection (ERP) and Non-Tariff Barriers (NTBs) (Goldar and Kumari, 2003). Chand and Sen, (2002) argued that reduction in price distortions, increasing intra-industry trade in intermediate and capital goods had a strong positive impact on productivity. Topalova and Khandelwal (2011) conclude that productivity among Indian firms increased due to trade reform and attribute these gains to increase access to foreign inputs. Similar results were documented by Goldberg et al (2010); Hasan (2002) and Parameswaran

(2009), where significant productivity growth in firms that import technology inputs, especially capital goods. However,

export-induced productivity growth was not found to be significant (Sharma and Mishra, 2011). Similarly, the effect of productivity growth on employment growth was found to be negative (Banga, 2016).

3. Research Methodology

Evaluating the impact of imports on manufacturing performance requires a concordance between the trade data and industry data. Trade data is classified based on physical characteristics under World Customs Organisation's Harmonised System (HS) while the organised industry data is classified as per economic activities and is published by Central Statistical Organisation under the National Industrial Classification (NIC) which is based on ISIC. This difference in trade and manufacture data gives rise to potential difficulty in linking trade data with manufacture performance data. As such, concordance between manufacturing (NIC at 4 digit) and trade (HS 6 digit) was made. A total of 26 industries corresponding to 18 HS chapters (HS 28, 29, 30, 31, 32, 33,34, 35, 36, 37, 38, 40, 72, 84, 85, 87, 94 and 95) were selected on the basis of imports from China accounting for over 40% of the total imports in that HS Chapter / industry. Together, the selected 26 industries account for 61.4% of the import from China for the years 2007-08 to 2016-17.

Imports can impact industry performance through three broad channels. First, imports provide cheaper access to imported capital and intermediate goods which will enable firms to improve their productivity. Second, liberalised import regime will force firms to improve input efficiency and force the inefficient firms to close down thereby leading to restructuring at the Industry level. And, third, greater access to imported technology / inputs will enable firms to compete effectively in export markets. Evidently, these dimensions get reflected in better industry performance. To capture the trends in industry performance, for the selected 26 industries, data was collected on Output, Gross Value Added (GVA), Gross Fixed Capital, Labour (number and emoluments) Materials consumed, Imports (from China and World) and Exports for the years 2007-08 to 2015-

16. Indices were constructed for performance parameters in real terms using appropriate deflators taking the base year as 2007-08. The performance parameters defined are:

Growth in GVA	$$Q_t^{GVA} = \left(\dfrac{\frac{GVA_t}{P_t}}{\frac{GVA_{base\ year}}{P_{base\ year}}} \right) * 100 \quad where\ P\ is\ price$$
Output	$$Def\_Output_{index} = \dfrac{Def\ Output}{Def\_Output_{Base\ year}} * 100$$
Labour Productivity	$$LP = \left(\dfrac{\frac{Q_{Lt}^{GVA}}{L_t}}{\frac{Q^{GVA}_{baseyear}}{L_{Baseyear}}} \right) * 100 \quad where\ L\ is\ total\ workers$$
Capital productivity	$$KP = \left(\dfrac{\frac{Q_{kt}^{GVA}}{K_t}}{\frac{Q^{GVA}_{baseyear}}{L_{Baseyear}}} \right) * 100 \quad where\ K\ is\ real\ capital$$
Capacity utilisation	$$CU_{jt} = Q_{jt} \Big/ \bar{C}_{jt} * 100 \quad where\ \ \bar{C}_{jt} = \dfrac{K_{jt}}{\left(\frac{K_j}{o_j} \right) min}$$
Import penetration	$$IMP_{jt} = \dfrac{M_{jt}}{Q_{jt} + M_{jt} - X_{jt}} * 100$$
Export intensity	$$\dfrac{X_t}{Q_t} \quad where\ Q_t\ is\ the\ output\ and\ X_t\ is\ exports$$
Capital intensity	$$CI = \dfrac{K_{jt}}{L_{jt}} * 100$$

The association of the above performance indicators with imports was analysed by categorising the imports of each industry into use-based classification, namely, Capital, Intermediate and Consumer goods. Such a categorisation provides insights into the use of imports in different industries of the selected 26 industries. 11 industries have been categorised as those importing Capital goods, 6 industries as those importing Intermediate goods and 9 industries as those importing Consumer goods. The imports of Capital and Intermediate goods is expected to impact positively the industry productivity performance. The import of Consumer goods is expected to replace domestic goods and therefore the output of these industries would fall with increase in

imports from China. Further, for examining the impact of imports on domestic production, augmented production function was

estimated where imports were considered as one of the potential determinants of industry output. The specified model is

$$lnY_{it} = \alpha + \beta_1 lnimc_{it} + \beta_2 lnK_{it} + \beta_3 lnL_{it} + \varphi_i + \varphi_t + \varepsilon_{it} \qquad (1)$$

Where lnY_{it} log of real output of the industry i at time t; $lnimc_{it}$ is log of real imports from China of industry i at time t; lnK_{it} is log of real fixed capital of the industry i at time t; lnL_{it} is log of number of workers in industry i at time t; φ_i is for industry effects φ_t time effects and ε_{it} is error term.

Expected Signs of Explanatory Variables

Variable	Description	Expected Sign
$lnimc_{it}$	Log of imports from China	+/-
lnK_{it}	Log of capital	+
lnL_{it}	Number of workers	+

4. Findings / Results

4.1   Imports from China and Manufacture Performance

The trends in imports from China of the selected industries provide interesting insights. Of the 26 industries, Machine tools (2922) and Chemicals (2411) account for 50% of the imports from China in 2014-16. Another 40% of imports are accounted by 6 industries, namely, office accounting/computing machinery (3000), Iron & Steel (2710), Electronic Valves/components

(3210), Fertilizers (2412), Television and Radio receivers (3230) and Pharmaceuticals (2423). Together, these 8 industries account for over 90% of the imports from China. It is important to

underline here that the share of these 8 industries which was 62% in 2007-09 increased to over 90% by 2014-16. In terms of value, even while these 8 industries account 90% of the imports from China, the remaining 18 industries have also been covered in the analysis of manufacturing performance as the share of imports from China vis-à-vis that of the World is over 40%.

4.1.1   Manufacture Performance Indicators: Capital Goods

Table 1 details the trend in the performance parameters for each industry. Between 2007-08 and 2015-16, real GVA increased for all the industries at varying rates except for 2813(steam generators) where the GVA decreased by 63%. In terms of industry wise share in the total GVA, two industries, namely, Motor Vehicles (3430) and Electric Motors (3110) together accounted for 59% of the total GVA in 2007-08 which increased to 62% by 2015-16. Between these two industries, the share of 3430 in total GVA increased from 27% in 2007-08 to 43% in 2015-16, while the share of 3110 decreased from 32% to 19% (Table 2). Shifts in industry share highlights the shifts in industry specialisation. The imports of capital goods seem to have had a favourable effect, in terms of technical capability, on industry 3430. The share of this industry in real fixed capital investment also increased from 39% in 2007-08 to 54% in 2015-16.

Table 2

GVA and Fixed Capital for Industries Importing Capital Goods

		GVA Deflated (Rs. Lakhs)		Fixed Capital Deflated (Rs. Lakhs)	
nic_04	Description	2007 - 2008	2015 - 2016	2007-2008	2015-2016
2813	steam generators,	2973.63 (7)	1114.49 (1)	1841.45 (4)	1819.91 (2)
2913	bearings, gears, gearing and driving elements	2369.77 (5)	4328.4 (5)	3069.82 (7)	6280.94 (6)
2915	lifting and handling	970.74	2260.26	814.30	2471.71

	equipment	(2)	(3)	(2)	(2)
2922	machine-tools	894.31 (2)	2692.05 (3)	1209.12 (3)	3300.88 (3)
2929	other special purpose machinery	2430.27 (5)	5437.01 (6)	2424.59 (5)	6713.15 (6)
3000	office, accounting and computing machinery	2442.72 (5)	5133.73 (6)	2742.83 (6)	1600.56 (2)
3110	electric motors, generators	14044.1 (32)	16093.9 (19)	7111.88 (16)	12547.27 (12)
3210	electronic valves and tubes and other electronic components	2812.78 (6)	5117.73 (6)	3350.90 (7)	4119.14 (4)
3230	television and radio receivers, sound or video recording	2761.11 (6)	2942.29 (4)	4069.88 (9)	5200.85 (5)
3420	bodies (coach work) for motor vehicles; trailers	514.87 (1)	2623.08 (3)	625.56 (1)	4790.30 (4)
3430	parts and accessories for motor vehicles	12210.51 (27)	36024.26 (43)	17719.10 (39)	57823.63 (54)
	Grand Total	44424.81 (100)	83767.2 (100)	44979.43 (100)	106668.3 (100)

Source: Derived from CSO, Annual survey of Industries (Volume 1), Various issues

Note: Figures in brackets are share in the total

The correspondence between fixed capital and GVA is brought out by labour and capital productivity trends. Increase in fixed capital will lead to higher labour productivity which in turn can result in higher growth in GVA. During the reference period, real fixed capital increased for all industries except for 2813 and 3000. The factors associated with lower fixed capital is different for these industries. In the case of 2813, lower investment corresponds to lower GVA and thereby lower labour and capital productivity. However, for industry 3000, lower capital investment corresponds to high growth in GVA, labour and capital productivity. Two important dimensions emerge from this trend. One, number of workers in this industry decreased by 35%

during the reference period. As such, there is a significant growth in Labour productivity. Two, with a decrease in capital and labour, how did the GVA increase by over 100%. In this regard, it may be noted that the number of firms in this industry decreased from 174 to 125. This would imply that with liberalisation, inefficient firms have exited the industry. With this restructuring, the overall efficiency of the industry has increased which is reflected in the growth of GVA, labour and capital productivity. The average GVA per factory increased from 14 to 41 during the reference period (Table 3).

Table 3

Efficiency Parameter at Factory Level: For Industries Importing Capital Goods

		No of Factories		GVA per factory (Rs. Lakhs)		Fixed capital per factory (Rs. Lakhs)		Number of Workers per factory	
Nic_04	Description	2007-2008	2015-2016	2007-2008	2015-2016	2007-2008	2015-2016	2007-2008	2015-2016
2813	steam generators	463	370	6	3	4	5	94	52
2913	bearings, gears and driving elements	540	685	4	6	6	9	60	61
2915	lifting and handling equipment	399	526	2	4	2	5	37	47
2922	machine-tools	825	1173	1	2	1	3	26	28
2929	other special purpose machinery	1389	1860	2	3	2	4	46	33
3000	Office/accounting computing machinery	174	125	14	41	16	13	103	93
3110+3120	electric motors, generators and transformers	2341	3035	6	5	3	4	61	46
3210	electronic valves and electronic	621	1034	5	5	5	4	83	57

	components								
3230	television and radio receivers	207	218	13	13	20	24	91	60
3420	bodies (coach work) for motor vehicles;	334	699	2	4	2	7	73	64
3430	parts / accessories for motor vehicles	2834	5006	4	7	6	12	92	108
		10127	14731	60	95	67	88	764	649

Source: CSO, Annual Survey of Industries (Volume 1), Various Issues

For other industries, higher fixed capital corresponds to higher GVA. While there is significant growth in labour productivity across industries, capital productivity decreased for most of the industries. This would imply that higher capital investment did not result in commensurate growth in output. The correspondence between fixed capital, GVA, labour and capital productivity is not determined by the same factors in these industries. For industries, 2929, 3110 and 3230 number of workers decreased even when the number of factories has increased. As such number of workers per factory decreased while the fixed capital per factory increased resulting in almost doubling of capital intensity in these industries (Table 1). Thus, capital is substituting labour in these industries. For industries 2913, 2915, 2922, 3210, 3420 and 3430 both fixed capital and number of workers increased significantly primarily due to increase in factories. For 2913, 2915, 2922 and 3430, workers per factory and fixed capital per factory also increased implying that capital is complementing labour because of which there is a more than proportionate growth in output. However, in case of 3210 and 3420, increase in factories did not correspond to increase in the number of workers. As such, workers per factory decreased resulting in growth in labour productivity. Interestingly, for industry 3420, the capital per factory increased significantly which also resulted in increase in capital intensity. Thus, while capital intensity for all industries has increased, employment growth is observed in few industries.

Another important dimension is the direct correspondence between growth in demand and growth in GVA. Domestic demand (apparent consumption) and exports together have driven the growth in GVA. The highest growth in demand is in industry 2922 at 32% annually and the corresponding GVA increased by 300%. Similar is the case with other industries. For all

industries export intensity also increased, except for 3420 and 3430. Thus, it would seem that with rising capital and labour

productivities, export competitiveness has increased. In the case of 3420 and 3430, the significant increase in GVA / output is primarily to meet the growing domestic demand.

With the growth in demand (both domestic and exports), capacity utilization (CU) is expected to rise. However, CU has decreased highlighting significant increase in capacity for all these industries (Table 1). This would imply that the scope for improving operational efficiency exists for these industries.

In the light of the above trends, the association between rising imports from China and industry performance needs to be seen. In this regard, two important trends gain significance. One, rising share of imports from China is positively associated with better manufacturing performance. And two, high import penetration evident in most industries point to higher use of imports relative to domestic goods. This may be due to non-availability of requisite capital or substitution of domestic goods with imports. This is evident for 2922, 3000, 3230, 3210 and 2929. For other industries, import penetration is low implying that imports are complementing domestic goods.

Table 4

Capital Goods: Import Penetration in Industries Importing Capital Goods

nic_04	Description	Share (imc/im) [1] (in Rs. Billion)		Import Penetration	
		2007 - 2008	2015 - 2016	2007 - 2008	2015 - 2016
2813	steam generators	88	54	11.43	7.51
2913	bearings, gearsand driving elements	12	32	42.78	46.69
2915	lifting and handling equipment	30	43	49.05	41.47
2922	machine-tools	44	61	81.87	95.77
2929	other special purpose machinery	19	31	45.97	56.96

3000	Office/ accounting and computing machinery	39	57	64.64	69.53
3110+ 3120	electric motors, generators and transformers	32	41	20.42	41.59
3210	electronic valves and electronic components	22	69	45.44	57.94
3230	television and radio receivers	47	59	30.29	63.43
3420	bodies (coach work) for motor vehicles	45	22	5.65	6.37
3430	Parts/ accessories for motor vehicles	7	16	13.39	13.29

[1] IMC are imports from China; IM are imports from World

4.1.2 Manufacturing Performance Indicators: Intermediate goods

From the selected industries, 6 industries have been identified where imports from China are used as intermediate goods. Broadly, raw materials and semi-finished goods are covered under intermediate goods. The dependence of these industries on imports varies from 8% to 95% in 2015-16 (Table 2.5). Chemicals (2411), Fertilizers (2412) and other Chemicals (2429) have relatively high share of imports in materials consumed. For these industries, the share of imports from China increased during the reference period. In the case of Pharmaceuticals (2423) and Iron and Steel (2710), imports account for less than 15% of the materials consumed. However, the share of imports from China increased significantly. The emergence of China as a major sourcing country for these industries is on account of three factors: cost competitiveness, non-availability of critical imports or requisite quality domestically and non-availability of domestic suppliers of requisite volumes[3].

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[3]Based on the discussions with Indian importers sourcing from China. This is further substantiated by the growth of Chemical, Pharmaceuticals and Steel industries in China. In Chemicals, China's share in world productionincreased from 14.6% in 2010 to 22.8% in 2016. In the case of Pharmaceuticals China's share increased from 7.7% in 2010 to 13.2%in 2016. In the case of basic metals (Steel), China's share increased from 30.2% in 2010 to 39.8% in 2016. (UNIDO, International Yearbook of Industrial Statistics, 2018, PP 66-68)

Table 5
Intermediate goods: Imports from World and China

	Description	Raw Material (RM)		Imports (World)[1]		Domestic RM[1]		Imports (China)[2]	
		2007 – 2008	2015-2016	2007 – 2008	2015-2016	2007 - 2008	2015-2016	2007 - 2008	2015-2016
2411	Chemical	23879.76 (100)	48834.78 (100)	21951.29 (92)	46608.71 (95)	1928.47 (8)	2226.069 (5)	4595.57 (21)	13720.88 (29)
2412	fertilizers and nitrogen compounds	26553.94 (100)	44704.50 (100)	9423.64 (35)	22378.88 (50)	17130.30 (65)	22325.63 (50)	2158.25 (23)	9097.69 (41)
2423	pharmaceuticals, medicinal chemicals	31088.22 (100)	77288.05 (100)	4421.79 (14)	8934.226 (12)	26666.43 (86)	68353.82 (88)	1905.18 (43)	3951.41 (44)
2429	other chemical product n.e.c.	11580.48 (100)	23652.03 (100)	4530.74 (39)	9051.252 (38)	7049.74 (61)	14600.78 (62)	446.88 (10)	1142.67 (13)
271+2731	Basic Iron & Steel	144237.83 (100)	234880.80 (100)	19898.69 (14)	31715.32 (14)	124339.14 (86)	203165.5 (86)	4636.92 (23)	9520.25 (30)
2811	structural metal products	16675.48 (100)	15431.28 (100)	1561.11 (9)	1158.126 (8)	15114.37 (91)	14273.15 (92)	911.92 (58)	316.59 (27)
	Grand Total	254015.7 (100)	444791.4 (100)	61787.26 (24)	119846.5 (27)	192228.45 (76)	324944.9 (73)	14654.72 (24)	37749.49 (31)

Notes: [1]. Figures in brackets are the share in total Raw material

[2]. Fugures in brackets are the share of imports from China in world imports

With these factors driving the imports of intermediate goods, the impact on the performance of these industries will largely be through two important channels: one, growth in Gross Value Added (GVA) and two, growth in Exports. Table 6 details the trend in the industry performance indicators. During the reference period, GVA increased for all the industries except for 2710 (Iron and Steel). The highest increase in GVA is for 2423 (pharmaceuticals) followed by 2429 (other chemicals) and 2411 (chemicals). The high growth in GVA in these industries is also reflected in high growth in labour and capital productivities particularly for 2412, 2423 and 2429. This correspondence between GVA and labour and capital productivities underlines the increasing efficiency of labour and capital which is driving the growth in GVA. In the case of 2710 (Iron and Steel), GVA reduced during the reference period with a corresponding decrease in capital and labour productivities. However, during this period, the real output increased by over 55%. These opposite trends highlight the rising share of inputs possibly due to higher prices of domestic inputs[4]. The decline in GVA is explained by the decrease in capital and labour productivities.

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[4] High price of domestic inputs could be a fall out of 20% safeguard duty on steel imports. This is in addition to overall tariff which has been increased from 7.5% in 2012-13 to 12.5% in 2016-17.

The trend in labour and capital productivity underlines the structural changes taking place at the industry level. For all the six industries, capital intensity increased significantly during the reference period (Table 6). With rising capital intensity, the implication for employment differs between the industries. Number of workers increased for all the industries with the increase in number of factories. However, as detailed in Table 7, the number of workers per factory decreased for 2411 (Chemicals), 2412 (Fertilizers), 2429 (other Chemicals), 2710 (Steel) and 2811(metal products). In these industries the fixed capital per factory increased thereby suggesting a possible substitution of labour with capital. It is only in the case of 2423 (Pharmaceuticals) that the fixed capital per factory increased along with workers per factory thereby suggesting a complementarity between capital and labour.

Table 7

Efficiency Parameter at Factory Level : Intermediate Goods

	Description	No of Factories		GVA per factory		Fixed capital per factory		Number of Workers per factory	
		2007-2008	2015-2016	2007-2008	2015-2016	2007-2008	2015-2016	2007-2008	2015-2016
2411	Chemical	2149	3272	4	5	9	20	37	40
2412	fertilizers and nitrogen compounds	448	772	17	18	41	35	86	70
2423	pharmaceuticals, medicinal chemicals and botanical products	3377	5036	7	12	9	15	64	79
2429	other chemical product n.e.c.	2235	3361	2	3	3	4	57	34
271+2731	Basic Iron & Steel	6249	9392	10	4	20	38	88	67
2811	structural metal products	1520	3131	3	2	4	5	57	41

With the rise in production efficiency at the industry level, exports would also grow. The export intensity for 2411 (Chemicals) is high at 0.71 implying that 70% of the output is exported. Similarly, in the case of 2423 (Pharmaceuticals), export intensity increased from 0.27 to 0.39 during the reference period (Table 6). In the remaining industries, i.e, 2412 (Fertilisers), 2429 (other Chemicals), 2710 (Iron & Steel) and 2811 (Structural Metal Products), the export intensity is low. As GVA has increased for these industries (except 2710 (Iron & Steel), it would imply that the increase in output is primarily aimed at meeting the domestic demand. The industry wise annual growth of domestic demand apparent consumption ranges between 6% to 15% which is largely met through domestic production for these industries. With the exception of 2411 (Chemicals), the import penetration ratio ranges between 5% to 30% implying that over 70% of the production is directed towards meeting the domestic demand (Table 8).

Table 8

Intermediate Goods: Import Penetration

nic_04	Description	Share (imc/im) (in Rs. Billion)		Import Penetration	
		2007 – 2008	2015 - 2016	2007 - 2008	2015 - 2016
2411	Chemical	21.70	28.56	75.71	77.52
2412	fertilizers and nitrogen compounds	9.91	37.19	28.95	29.77
2423	pharmaceuticals, medicinal chemicals	41.39	43.71	12.86	14.25
2429	other chemical product n.e.c.	10.59	13.50	30.48	30.76
2710	Basic Iron & Steel	20.82	29.82	10.21	10.35
2811	structural metal products	46.63	30.28	8.59	4.57

IMC are imports from China. IMt are imports from world.

Growth in demand (i.e. domestic and exports) leads to industry expansion. The number of factories in these industries increased significantly during the reference period (Table 7). As such, there seems to be an expansion in the industry capacity because of which the capacity utilisation is low particularly for 2411 (Chemicals), 2710 (Iron & Steel) and 2811 (Structural metal

products). Low capacity utilisation underlines the scope of increasing operational efficiency. For 2412 (Fertilisers),

2423 (Pharmaceuticals) and 2429 (other Chemicals products), the capacity utilisation is relatively high thereby underlining higher operational efficiency in these industries.

4.1.3   Manufacturing Performance Indicators: Consumer goods

Of the selected industries, 9 industries have been categorised as those importing consumer goods. Conceptually, the increase in the imports of consumer goods will displace domestic output. This inverse relationship between imports and domestic production is not evident in these industries for two reasons. One, the imports of all the industries in this category has both consumer goods and intermediate goods. The industry has been categorised under consumer goods if the share of imports of consumer goods is over 65% in 2015-16. This would mean that most of these industries in this category have imports of intermediates goods accounting for about 30% of the total imports of the industry. As such, the manufacturing performance is associated with both the imports of consumer and intermediate goods. And two, to reduce the import dependence and promote domestic manufacturing of consumer goods, policy initiatives like increase in tariff rates, tightened standards and Make in India, were introduced. The fall out of these policy initiatives has been a decrease in the imports of final goods but an increase in the imports of parts and components. This is particularly true for mobile phones. Under the Make in India programme, a number of foreign companies (Chinese and South Korean) set up production facilities in India. As such, the imports of mobile phones from China which was US$6.3 billion in 2014 decreased to US$3.3 billion in 2017. However, the imports of parts of mobile phones & telecom equipment from China increased from US$1.3 billion in 2014 to US$9.4 billion in 2017. In other words, imports of final consumer goods has given way to imports of intermediate goods. The combined effect of these trends on manufacturing performance of consumer goods will not result in an inverse relationship between imports and domestic production, thereby highlighting the complex challenge of promoting domestic manufacturing to reduce import dependence.

Table 9 details the industry-wise trend in manufacturing performance parameters. During the reference period, GVA more than doubled for all the industries except for 3694 (games and toys) where GVA declined by 27%. This would mean that imports of consumer goods have displaced

domestic production for 3694 (Toys & Games) while they have facilitated growth in output and GVA for other industries. Factors associated with these differing trends need a closer look. For the

eight industries (2422, 2424, 2511, 2899, 2930, 3150, 3230 and 3610) there is a strong correspondence between growth in GVA and growth in labour productivity. Higher labour efficiency has contributed to growth in GVA. Between these industries, the capital productivity/efficiency is relatively lower than labour productivity. With higher output per unit of capital invested, the use of capital relative to labour has increased thereby resulting in high capital intensity. This is particularly the case with industries 2424, 2930 and 3220 (Table 9). The implications of high capital intensity on employment varies between industries even when the number of workers and number of factories have increased for most industries in this category. For industries 2424, 2511 and 3150, workers per factory have increased along with fixed capital per factory implying that the engagement of labour has increased along with higher capital (Table 10). For other industries (2422, 2899, 3930, 3220 and 3610), workers per factory have reduced while fixed capital per factory has increased thereby suggesting a possible substitution of labour with capital (Table 10)

Table 10

Efficiency Parameter at Factory Level: For Industries Importing Consumer Goods

nic_04	Description	No of Factories		GVA per factory (Rs. Lakhs)		Fixed capital per factory		Number of Workers per factory	
		2007-08	2015-16	2007-08	2015-16	2007-08	2015-16	2007-08	2015-16
2422	paints, varnishes	697	1428	3	5	2	6	29	26
2424	soap and detergents	1387	1909	4	10	3	5	49	53
2511	rubber tyres and tubes; retreading	615	604	6	15	8	31	87	151
2899	other fabricated metal products	3434	6974	1	1	1	2	38	27
2930	domestic	685	1039	2	6	3	8	40	38

	appliances, n.e.c							
3150	electric lamps and lighting equipment	387	595	2	3	3	4	66	71
3220	television and radio transmitters	232	249	13	33	17	16	127	115
3610	Furniture	751	1532	1	1	1	2	37	26
3694	games and toys	188	151	1	1	1	2	55	46

Source: CSO, Annual Survey of Industries (Volume 1), Various Issues

The above restructuring in the industries is in response to increased competition from imports. As the export intensity for these industries being low (except for 2899 and 3610), the growth in domestic demand is driving the industries expansion. The average annual growth of the domestic demand is over 15% in these industries. Such high growth in domestic demand has resulted in capacity expansion in these industries because of which the Capacity Utilization (CU) at industry level has decreased for most industries (Table 9). It is only in the case of 2424, 3150 and 3220, the CU has increased primarily due to lower relative growth in fixed capital investment[5]. Following the capacity expansion, over 85% of the domestic demand is met through domestic production as the import penetration rates is below 15% for industries 2422, 2424, 2930 and 2511 (Table 11). Import penetration is high (between 50% to 70%) for 3220 and 3610 implying that less than 50% of the demand is met through domestic production. It is for these industries that the share of imports from China account for 60% to 80% of the total imports (Table 11).

Table 11

Consumer Goods: Import Penetration

		Share (imc/im) (in Rs. Billion)		Import Penetration	
nic_04		2007 - 2008	2015 - 2016	2007 - 2008	2015 - 2016
2422	paints, varnishes	9	8	10.66	9.27
2424	soap and detergents, cleaning	6	11	5.27	5.94

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[5]During the reference period the share of 2424 in the total fixed capital for this category decreased from 17% to 14% for 3150, the share decreased from 5% to 4% and for 3220 the share decreased from 17% to 6%.

2511	rubber tyres and tubes	62	49	6.1	7.3
2899	other fabricated metal products	19	25	20.4	23.34
2930	domestic appliances, n.e.c	55	68	13.31	12.03
3150	electric lamps and lighting equipment	57	80	20.84	28.56
3220	television and radio transmitters	52	66	75.52	68.00
3610	Furniture	44	59	34.5	48.03
3694	games and toys	83	73	25.16	16.83

IMC are imports from China. IM$_t$ are imports from world.

For the eight industries, where the growth in GVA is significant, 3 industries (3150, 3220 and 3610) have high import penetration ratios with high share of imports from China. The cost advantage for China is primarily because of significant scale economies as China emerged as a major global producer for these industries[6]. Even with the growth in output/GVA in these industries, imports from China have supplemented domestic production to meet the growing demand. It would, therefore, seem that imports from China have not displaced domestic production. Considering that average tariffs have been increased[7] and anti-dumping duties imposed on 29 products covered under these industries (i.e. HS chapters 85 and 94), the feasibility of expanding domestic production would depend on promoting large scale production facilities with considerable scale economies (cost advantage).

The above analysis has covered the industries where the GVA has increased during the reference period. Against this, for industry 3694, the GVA decreased by about 30% in 2015-16 compared to 2007-08. The decline in GVA is associated with a decline in capital productivity (Table 9). As the number of workers decreased, labour productivity increased by 8%. However, with no growth in domestic demand, the number of factories decreased in this industry which also resulted in the

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[6] China is major producer of these goods. The share in World value added (at 2010 prices) for electrical equipment (3150) increased from 16.5% to 25.4% between 2010 and 2016. For Computer Electronics (3220), China's share increased from 17.9% to 28.0%. For Furniture (3610) China's share increased from 7.4% to 11.4% (UNIDO, Industrial Statistical 2018 PP 68-72).

[7] Between 2012 and 2015, the average tariffs for 3150 increased from 9% to 12.5%, for 3610, tariff increased from 7.5% to 12.5% and for 3220, and tariff decreased from 15% to 12.5%.

decrease in number of workers per factory (Table 10). The contraction in the industry (both in terms

of output and number of factories) underline the possibility of imports displacing domestic production. Even with the tariff increasing from 7.5% in 2012 to 12.5% in 2015 and 2 anti-dumping duty imposed on products under this industry (HS Chapter 95), the imports from China accounted for 73% of the industry imports in 2015-16. Such high share of imports from China underlines the possibility of displacing domestic production which could be specific to a segment.

4.2 Assessment of Impact of Imports from China: Econometric analysis

Table 12 presents results of Equation (1) i.e. the impact of Chinese imports, capital and labour on gross output of all 26 industries as well as Capital goods (11), Consumer goods (9), and Intermediary goods (6) industries in log form.

The results of OLS and FE/RE regression indicates that both inputs of production capital and labour have positive impact on the output and statistically highly significant for all categories of industries. The results of the estimates can be considered as credible as both the inputs of production show positive marginal product. The production function is considered to be well behaved, if each input of production has positive marginal product. In other words, any increase in inputs should lead to increase in output.

For all Industries, coefficient of imports from China is positive and statistically significant in the pooled OLS, however FE model indicates that it is positive but numerically low and statistically significant at only 10% level of significance. The FE model estimated is controlled for industry and year. As a result, we can say that imports from China does not have negative impact on Indian Industry. The impact of imports from China on output in value terms have been derived by multiplying the elasticity values with actual imports and output values. From this is evident that on an average if imports increase by Rs. 100, output increases by Rs. 40.

Probably the combined impact all industries is not getting reflected due to varying nature of the industries involved in the study. For this reason, estimates have been made separately for capital, Intermediate and consumer goods.

For Capital goods industries, we can conclusively say that imports from China have positive impact on 11 Indian Capital goods Industries under study. The imports are not hampering the industry but complementing the Capital goods industry sector. In terms of value, if imports increase by Rs.100 then the output increases by Rs. 90 and vice versa. It is also important to note that the Capital goods that are imported, may be helping the user industries by improving their productivity and lowering cost of products/services and other benefits which the current estimates do not cover.

For consumer goods industries, the coefficient of imports from China is negative but very low elasticity and statistically not significant in the pooled OLS regression model. However, FE model indicates coefficient is positive and statistically significant. This is a surprising result as we expect a negative impact of Chinese imports on Indian Manufactured output as this group of industries include items like games and toys, domestic appliances, lamps and lighting, furniture etc. However, as was explained earlier (see section 4.1.3). This category combines both consumer and intermediate goods. Further, Chinese companies have set up manufacturing facilities wherein parts and accessories have been imported from China and assembled in India. For this reason along with output imports are also rising. Assessing the impact of imports in value terms, it is evident that an increase in imports by Rs. 100, output increases by Rs. 73.

 For Intermediary industries, the coefficient of imports from China is positive and statistically significant in both the models pooled OLS regression model and FE model. Redundancy of Fixed Effects indicate that period effects are redundant, therefore in the accepted model presented in Table 12 column 8 is with only cross-section or Industry effects. As we have used level data the coefficients are not elasticities therefore we have derived elasticities of the models presented the same in column 9 and 10 of Table 12.

Accordingly we can conclude that imports do impact the output positively by about 5.7%. Which means if imports increase by 100% then Indian output will increase by 5.7% and vice versa. This may appear small but if convert them in value terms imports from China increase by 100 then the output of these Intermediate products of India will increase by 163 and vice versa. It is pertinent to mention that the average share of raw materials in the output of these industries is 56%.

Therefore, firms in these intermediary goods industries must be trying to get the necessary inputs from international markets.

The estimates reveal that for all industries the impact of imports is positive. If we look at the magnitude in terms of elasticity consumer goods have higher elasticity (0.138%) capital goods have higher coefficient at (0.109%), and finally Intermediary goods at (0.079%). But, if we take impact of import in value terms then Intermediates have higher influence than the other two industries increase in 1 unit will increase output by 1.63 units, the same for Capital goods is 1 unit import will lead to 0.9 units increase in output and in consumer goods, 1 unit imports lead to 0.73 units increase in production. We need to understand that it is combined effect of several industries in the sectors some of the industries are adversely affected while other industries are positively affected. However we could not use slope dummy to find impact of imports on each industry due to lack of degrees of freedom.

While interpreting the results we need to appreciate the fact that we are taking imports of goods which are falling into the category of the industry but not necessarily used by the industry. For example, import of laptop is a capital good, which may improve the production/productivity of the importing industry, and the importing industry is not necessarily capital goods industry. It may be imported by Capital goods industry to use in its own production facility or to add some value add and sell it. Therefore, it is perfectly possible that a Capital goods industry's domestic output may suffer due to capital goods imports of that category if user industries are importing the goods. However, in case of intermediate inputs there is higher likelihood of importing intermediate products, value add and sell them to user industries. Chemical and Pharma industries are an example of these, however, we cannot rule out the possibility of textile industry importing some chemicals. Therefore, it is possible Intermediate goods sector is able to have higher influence on the output than the rest of the sectors. Consumer goods we expected negative impact, descriptive analysis confirmed that it is indeed true for some industries like toys but on an overall assessment due to small value addition undertaken by Chinese companies especially in consumer electronics the imports are having positive impact on domestic production. Another reason for lower positive response of capital goods over the intermediate goods could be due to over invoicing of Import of capital goods in some industries (either to get launder the money or

get higher credit for depreciation and higher prices in regulated industries, like power purchase agreement)[8].

Table 12

Regression Results

	All Industries (26)		Capital Goods (11)		Consumer Goods (9)		Intermediary Goods (6)			
	OLS	FE	OLS	RE	OLS	FE	OLS	RE	OLS	RE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Elasticity	Elasticity
LNIMC	0.062 (0.015)*	0.033 (0.020)***	0.125 (0.026)*	0.109 (0.028)*	-0.004 -0.022	0.138 (0.057)**	2.25 (0.68)*	1.626 (0.624)*	0.079	0.057
LNCAP	0.68 (0.036)*	0.089 (0.042)**	0.576 (0.077)*	0.267 (0.066)*	0.845 (0.060)*	0.076 (0.089)	0.68 (0.061)*	0.538 (0.046)*	0.385	0.305
LNWORKERS	0.189 (0.045)*	0.697 (0.059)*	0.282 (0.080)*	0.634 (0.108)*	0.182 (0.071)**	0.672 (0.090)*	0.26 (0.03)*	0.296 (0.031)*	0.534	0.613
C	1.541 (0.283)*	1.26 (0.517)*	1.052 (0.494)*	-0.052 -0.88	0.698 (0.435)	0.737 (0.738)	269.83 (4264)	2580 (8708)	0.001	0.013
Observations	312	312	132	132	108	108	72	72		
R-squared	0.91	0.98	0.83	0.73	0.94	0.98	0.97	0.94		
Industry		Yes		Yes		Yes		Yes		

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[8]https://thewire.in/business/dri-to-pursue-cases-of-alleged-over-invoicing-by-big-corporate-groups

effect										
Period effect		Yes		Yes		Yes				

Note:

1. Selection of Fixed Effect or Random Effects model is based on Husman test.

2. The statistical tests conducted on redundancy of industry and period effect indicate that the model chosen is appropriate

3. * significant at 1%; ** significant at 5%; *** significant at 10%

4. In case of Intermediary goods the regression (OLS, RE) results are based on level data not on log form.

4.3 Conclusion

The analysis presented in this paper has highlighted the manufacturing performance of the industries that have imported from China. During 2007-08 and 2015-16, growth in imports from China is associated with growth in GVA / Output. Of the selected 26 industries, GVA declined for only 3 industries (2813, 2710 and 3694). Thus, it would seem that imports from China, i.e. Capital, Intermediate and Consumer goods have had a favourable impact on industry output driven by increase in labour and capital productivities, thereby underlining higher industry efficiency.

The fall out of higher capital and labour productivities has lead to increase in capital intensity across industries. The structural shift towards capital is primarily due to rigid labour laws in India. While for some industries, higher capital intensity has resulted in capital substituting labour for others capital and labour together have contributed to output growth. Of the selected 26 industries, employment reduced for 17 industries. Thus, it would seem that output growth leading to employment generation is in the following industries: Auto ancillaries (2913, 3430), Machine tools (2922, 2929), Chemicals (2411), Pharmaceuticals (2423), Soaps and Detergents (2424), Rubber tyres (2511) and Electric lamps (3150). For these industries, imports from China have facilitated output growth thereby leading to higher employment.

Following the competition from imports from China, there is evidence of industry restructuring, i.e. exit of inefficient firms and increased market share of efficient firms. As such, firms were able to meet the sharp increase in domestic demand expansion and also have increased exports

thereby underlining the rising export competitiveness of industries and their products. This is particularly true for Chemicals, Pharmaceuticals, Machine-tools, Metal products and Furniture.

Industry expansion has led to capacity expansion. Therefore, the decline in capacity utilisation underlines the scope for further increasing production / operation efficiency.

While the above trends highlight the association of imports from China with manufacturing performance indicators, the causal relationship is brought out by the econometric analysis. The estimates have revealed that for all industries taken together, the impact of imports from China is positive. In terms of value, the impact of imports of intermediate goods on output 163%, while for capital goods it is 93% and consumer goods is 73%. Thus, imports of intermediate and capital goods have a greater effect on output of the manufacturing sector.

These results negate the general perception of threat from Chinese imports. However, this conclusion needs to be substantiated with firm level performance analysis which is beyond the purview of this paper. Another imported gap in the analysis is the exclusion of unorganised sector. The data pertains only to the organised sector and therefore some of the performance indicators could have been overestimated, particularly with regard to labour productivity and employment   generation.

Table 1
Performance Parameters for Industries classified as Capital Goods industry as per their end use

nic_04	Description	Gross Value Added		Labour Productivity		Capital Productivity		Capacity Utilisation (%)		Capital Intensity		Export Intensity	
		2007 - 2008	2015 - 2016	2007 – 2008	2015 - 2016	2007 – 2008	2015 - 2016	2007 - 2008	2015 - 2016	2007 - 2008	2015 - 2016	2007 - 2008	2015 - 2016
2813	steam generators,	2973.6 (100)	1114.5 (37.5)	100	84.6	100	37.9	81.22	49.92	0.04	0.09	0.06	0.21
2913	bearings, gears,	2369.8 (100)	4328.4 (182.7)	100	142.8	100	89.3	94.40	86.57	0.09	0.15	0.23	0.35
2915	lifting and handling	970.7 (100)	2260.3 (232.8)	100	138.4	100	76.7	70.10	52.21	0.06	0.10	0.12	0.22
2922	machine-tools	894.3 (100)	2692.1 (301.0)	100	197.4	100	110.3	82.85	88.16	0.06	0.10	0.41	0.63
2929	other special purpose machinery	2430.3 (100)	5437.0 (223.7)	100	228.0	100	80.8	100.00	53.41	0.04	0.11	0.17	0.25
3000	office, accounting and computing	2442.7 (100)	5133.7 (210.2)	100	321.5	100	360.2	29.55	100.00	0.15	0.14	0.16	0.18
3110	electric motors, generators	9098.4 (100)	16094.0 (114.6)	100	115.7	100	64.9	99.10	69.24	0.05	0.09	0.15	0.28
3210	electronic valves and tubes	2812.8 (100)	5117.7 (182.0)	100	159.9	100	148.0	41.30	68.59	0.07	0.07	0.20	0.15
3230	television and radio receivers	2761.1 (100)	2942.3 (106.6)	100	154.9	100	83.4	65.99	41.95	0.22	0.40	0.06	0.18
3420	bodies (coach work) for motor vehicles; trailers	514.9 (100)	2623.1 (509.5)	100	275.9	100	66.5	100.00	55.30	0.03	0.11	0.03	0.03
3430	parts and accessories for motor vehicles	12210.5 (100)	36024.3 (295.0)	100	141.4	100	90.4	93.52	82.14	0.07	0.11	0.13	0.14

Source: Derived from CSO, Annual survey of Industries (Volume 1), various issues

Table 6
Performance Parameters for Industries classified as Intermediate Goods industry as per their end use

nic_04	Description	Gross Value Added		Labour Productivity		Capital Productivity		Capacity Utilisation		Capital Intensity		Export Intensity	
		2007 - 2008	2015 – 2016	2007 - 2008	2015 – 2016	2007 – 2008	2015 - 2016	2007 - 2008	2015 - 2016	2007 - 2008	2015 - 2016	2007 - 2008	2015 - 2016
2411	Chemical	8066.6 (100)	15666.0 (194.2)	100	117.5	100	59.5	83.31	53.94	0.25	0.50	0.72	0.71
2412	fertilizers and nitrogen compounds	7642.6 (100)	13724.4 (179.6)	100	127.8	100	120.6	63.37	77.79	0.48	0.50	0.00	0.01
2423	pharmaceuticals, medicinal	22194.2 (100)	60843.0 (274.1)	100	148.6	100	107.3	92.21	95.69	0.14	0.19	0.27	0.39
2429	other chemical product n.e.c.	3886.0 (100)	9969.4 (256.6)	100	280.8	100	127.0	70.67	78.60	0.06	0.12	0.18	0.19
2710	Basic Iron & Steel	61134.5 (100)	40859.2 (66.8)	100	57.8	100	23.3	100.00	54.33	0.23	0.56	0.11	0.08
2811	structural metal products	4035.6 (100)	6119.5 (151.6)	100	102.9	100	61.5	100.00	43.37	0.07	0.11	0.08	0.12

Table 9

Performance Parameters for Industries classified as Consumer Goods industry as per their end use

nic_04	Description	Gross Value Added		Labour Productivity		Capital Productivity		Capacity Utilisation		Capital Intensity		Export Intensity	
		2007 - 2008	2015 - 2016	2007 - 2008	2015 - 2016	2007 - 2008	2015 - 2016	2007 – 2008	2015 - 2016	2007 - 2008	2015 - 2016	2007 - 2008	2015 - 2016
2422	paints, varnishes and similar coatings	2285.0 (100)	6653.9 (291.2)	100	158.4	100	55.7	100.00	51.69	0.08	0.24	0.06	0.05
2424	soap and detergents, cleaning	5538.2 (100)	19536.6 (352.8)	100	238.0	100	141.8	85.85	94.11	0.06	0.10	0.07	0.08
2511	rubber tyres and tubes;	3818.4 (100)	9357.8 (245.1)	100	143.1	100	65.0	89.41	48.81	0.09	0.21	0.16	0.18
2899	other fabricated metal products n.e.c.	3226.0 (100)	5571.1 (172.7)	100	122.4	100	46.5	100.00	44.86	0.03	0.08	0.33	0.33
2930	domestic appliances, n.e.c	1557.1 (100)	6239.8 (400.7)	100	274.5	100	108.9	44.01	42.52	0.08	0.21	0.10	0.07
3150	electric lamps and lighting equipment	841.1 (100)	2063.7 (245.4)	100	150.3	100	98.0	82.60	100.00	0.04	0.06	0.07	0.10
3220	television and radio transmitters	3000.6 (100)	8256.9 (275.2)	100	283.4	100	266.1	24.94	100.00	0.13	0.14	0.11	0.11
3610	Furniture	814.0 (100)	2135.7 (262.4)	100	183.0	100	91.3	100.00	57.06	0.03	0.07	0.34	0.38
3694	games and toys	262.3 (100)	191.8 (73.1)	100	108.3	100	50.8	100.00	55.96	0.02	0.04	0.06	0.07

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