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Understanding the Performance of India's Manufacturing Sector: Evidence from Firm Level Data

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UNDERSTANDING THE PERFORMANCE OF INDIA'S MANUFACTURING SECTOR: EVIDENCE FROM FIRM LEVEL DATA

Radhicka Kapoor[1]

I. INTRODUCTION

India's overall economic performance over the last fifteen years has been outstanding, with the economy growing at an average of over 7% p.a. Growth has been service-led with the services sector accounting for over 60% of GDP growth over the period. Importantly, India's structural transformation has been marked by a shift straight from agriculture to services led growth, leapfrogging manufacturing. The problem with this pattern of growth has been that it has generated relatively fewer opportunities of employment generation. The role of the manufacturing sector, ordinarily considered to be an important engine of growth and job creation for low and middle income countries, has been rather limited. Its share in total GDP and employment has continued to hover around 15% and 12% respectively for the last three decades.

As India's working age population rises rapidly, the issue of job creation in its manufacturing sector has captured the imagination of policy makers like never before. However, simply creating a large number of manufacturing jobs in the in the face of the intensifying demographic pressures is not enough. These jobs need to be 'productive jobs'. Given the enormity of India's jobs challenge, it is important to understand where 'productive jobs' will come from. This requires us to understand where existing jobs are located and whether there are certain sectors or firm types which hold the key to productive job creation. Understanding these questions is essential for the policy debate to rest on strong conceptual foundations. The availability of firm level data from the Annual Survey of Industries over the last fifteen years provides a very rich dataset for examining these issues. These datasets incorporate firm level characteristics and thus enable us to understand what type of firms create "good jobs" and what are the relative contributions of different groups of firms to employment growth.

Before delving into the analysis, it is important to highlight the dualistic structure of India's manufacturing sector. Dualism refers to the prevalence of a formal/organized sector which coexists with a large "unorganized sector". The formal sector is statistically defined by the Factories Act which covers all factories employing 10 or more workers using power, or 20 or more workers without using power. The unorganized sector is divided into two sub-categories-Own Account Manufacturing Enterprises (OAME) and establishments. While the former are household enterprises making use only of family labour, the latter employ at least one wage (hired) worker. The unorganized sector, in particular the household sector, accounts for a disproportionately large share of employment but a very small share of value added in manufacturing (Graph 1). The persistence of dualism over the years has had important welfare implications as the value added per worker in the unorganized sector has been significantly lower than the organized sector (Table 1). Furthermore, firms in the latter

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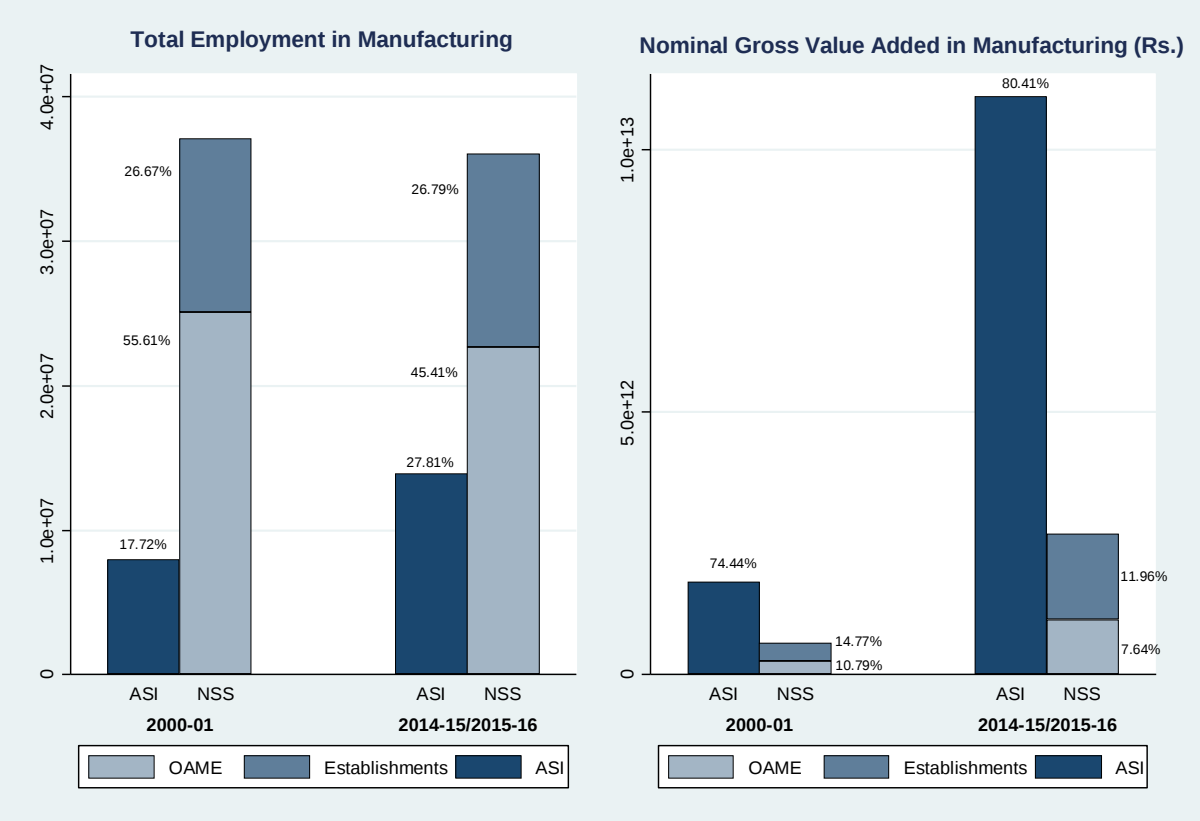
provide better working conditions, security of tenure, non-wage benefits and social security than firms in the unorganized sector. Thus, it is firms in the organised sector which have the necessary characteristics to create productive jobs and this paper focuses it analysis on them.

Graph 1: Distribution of Employment and Nominal GVA by enterprise type[2]



Source: ASI and NSS Enterprise Survey, unit data (2000-01, 2014-15 and 2015-16)

Table 1: GVA per worker in Organised and Unorganised Manufacturing Sector (Rs)

Year	OAME	Establishments	NSS (Total)	ASI
2000-01	10154	28980.928	16233	226462.9
2014-15/2015-16	46088	122344	74379	825730.2

Source: ASI and NSS Enterprise Survey, unit data (2000-01, 2014-15 and 2015-16)

The main findings of the paper are as follows. Despite an acceleration of growth in gross value added (GVA) during the period under study, the manufacturing sector has faltered in creating productive jobs for its rapidly rising workforce. This decoupling of growth in GVA and employment is a cause of concern. Whilst this disconnect can partially be explained by the rising capital intensity of production, it can also be attributed to the fact that India has

2 The most recent year for which we have ASI data is 2014-15. For the unorganized manufacturing sector, we have data from NSS's Unincorporated Non-Agricultural Enterprise Survey, 73rd round. This corresponds to the year 2015-16.

been unable to exploit its labour advantage to grow labour intensive industries. The proliferation of small firms, in particular small old firms, which have failed to expand as they age has contributed significantly to the sluggish contribution of the manufacturing sector to employment. Young firms (defined as those which have been in operation for less than five years) are found to witness faster employment growth than old firms. These results point to the urgency of reducing incentives for small firms which discourage them from growing and instead nurturing the growth of young firms. Further, when we exploit the heterogeneity in firms' input usage pattern to understand what factors have constrained the growth of the manufacturing employment, we find that firms which are more dependent on external finance and infrastructure witness significantly slower employment growth than their respective control groups. This suggests that without adequate infrastructure development and financial depth, firms are going to be unable to realize their potential and increase employment. We also find that large firms which have a higher imported input intensity observe faster employment growth than their respective control group. Our results point to the importance of addressing the inverted duty structure so that small and medium sized firms can also take advantage of improved access to imported inputs.

II. DATA

This study is based on a nationally representative survey of formal manufacturing firms in India, namely the Annual Survey of Industries (ASI). The survey gathers information on "registered" or formal sector firms that are covered by Sections 2m(i) and 2m(ii) of the 1948 Factories Act i.e. those firms that use electricity and hire more than ten workers, and those that do not use electricity but nevertheless employ twenty or more workers. ASI divides it survey frame into two categories, the census and sample sectors. The census sector covers larger plants, while the rest are categorized under the sample sector and are surveyed based on predetermined sampling design.

The ASI data provides detailed information on output, value added, fixed capital, investment, raw materials, fuel, total persons engaged and wages and salaries to all employees of the firm. The variable 'total persons engaged' includes all kinds of workers- production workers, employees holding supervisory or managerial positions, and working proprietors. The ASI database further subdivides production workers into two categories: those hired directly and workers employed through contractors. It also contains details about the type of ownership and type of organization. In addition to these key variables of interest provided in the dataset, we compute average monthly wage per worker by dividing the total wage bill of the firm accruing to production workers by number of workers. Capital intensity of production is calculated at the industry level by dividing the ratio of fixed capital to total workers.

To understand whether certain firm types witnessed faster employment growth compared to others, we classify firms on the basis of characteristics such as their size, age, imported input intensity, infrastructure and external finance dependence. Firms are categorised into different size bins using the total employment measure. Age of the enterprise is calculated using the variable 'year of initial production'. Thereafter they are classified into young, middle aged and old categories. Following Ghose (2016) and Gupta, Hasan and Kumar (2008), we create

estimates of imported input intensity, fuel intensity and external finance dependence of the firm in the following manner. Imported input intensity is constructed by dividing the cost of imported inputs by the gross value of output. Fuel intensity is computed by dividing costs of energy input by gross value of output[3].We use the fuel intensity measure as a proxy for the infrastructure input intensity of the firms (Ghose, 2016 and Hasan at al, 2011). External finance dependence of the firm is defined as a ratio of outstanding loans to invested capital. The raw data consist of about 661, 528 observations over the fifteen year period. In this study, we only use observations corresponding to open plants and plants with positive values of output, plant and machinery and total persons engaged. Table 2 reports the total number of firms in the dataset used in our study (sample and population estimates).

Table 2: Number of firms in ASI dataset

Year	Population	Sample
2000-01	130906	33551
2001-02	118133	34170
2002-03	114620	33596
2003-04	113082	44541
2004-05	118822	37984
2005-06	131209	44314
2006-07	140921	45299
2007-08	155486	42215
2008-09	149862	39029
2009-10	150821	42663
2010-11	121938	35070
2011-12	122458	35504
2012-13	123915	38361
2013-14	124234	38868
2014-15	126761	41068

Source: ASI unit data (several years)

There are three different industrial classifications used in the ASI dataset over the time period, 2000-01 and 2014-15. For the surveys between 1998-99 and 2003-04 the industrial classification used was NIC-1998, for the period between 2004-05 and 2007-08 it was NIC-2004 and for 2008-09 onwards, it was NIC-2008. In this study, we undertake a concordance exercise across the three different classifications to harmonize the dataset as per the NIC-2004 classification. Further, the data collected from the ASI is at current prices and any analytical work requires deflating these variables. The wholesale price index (WPI) series is the obvious candidate for this exercise. However, we cannot use it directly as it is constructed with a view to capturing price movements based on nature of commodities and final demand, while ASI follows the NIC classification of industries,. Therefore, we construct a WPI for each of the industries in the analysis by approximating commodities based on the nature of economic activities and map NIC activities to WPI commodities[4].

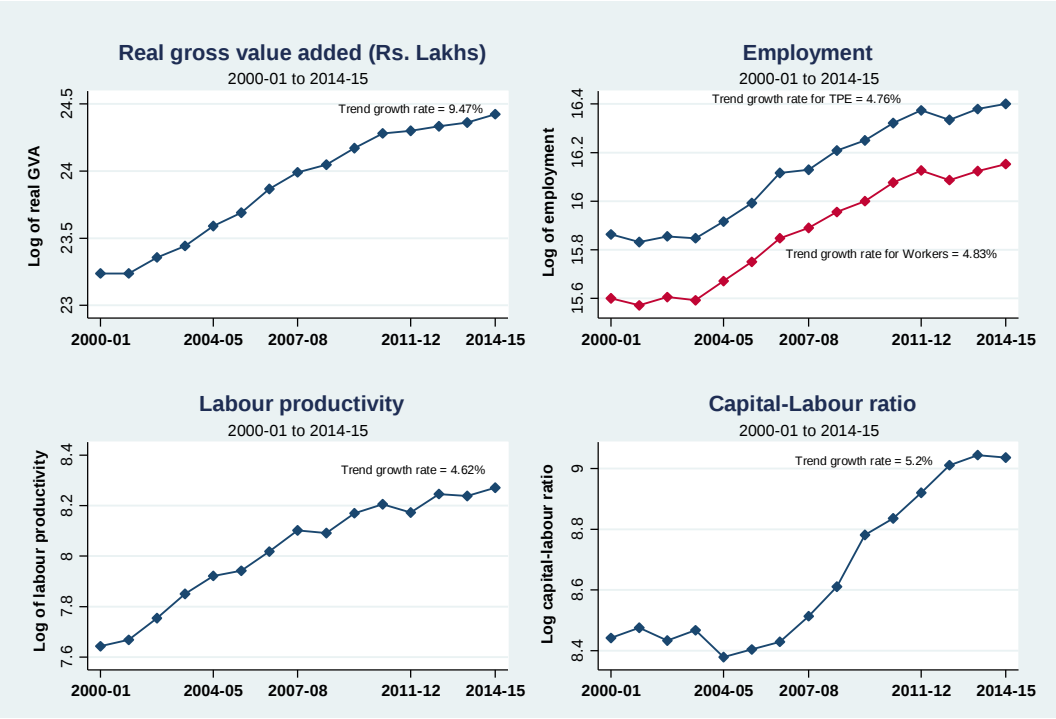
3 It is calculated as a ratio of expenditure on energy inputs, storage and transportation to current value of gross output.

4 Capital is deflated using the WPI created for NIC 29.

III. OVERALL TRENDS

We begin our analysis by looking at overall trends in the various indicators of industrial performance and employment in the manufacturing sector. The different panels of graph 2 summarize some of the empirical regularities that we observe.GVA has been rising steadily over the last fifteen years witnessing a trend growth rate of 9.5% per annum. The growth of employment and workers has been relatively lower in contrast at 4.5% p.a. The differential trends in employment and real GVA are reflected in the growth of labour productivity which witnessed a trend growth rate of 4.6% p.a. Graph 2 also indicates that the capital intensity of production across the manufacturing sector has been rising over time. The increase has been particularly steep since 2004-05. The higher capital intensity of production is one of the reasons for the disconnect observed between employment and GVA growth as it has meant that fewer additional workers have been added to the manufacturing sector.

Graph 2: Performance of Indian Manufacturing

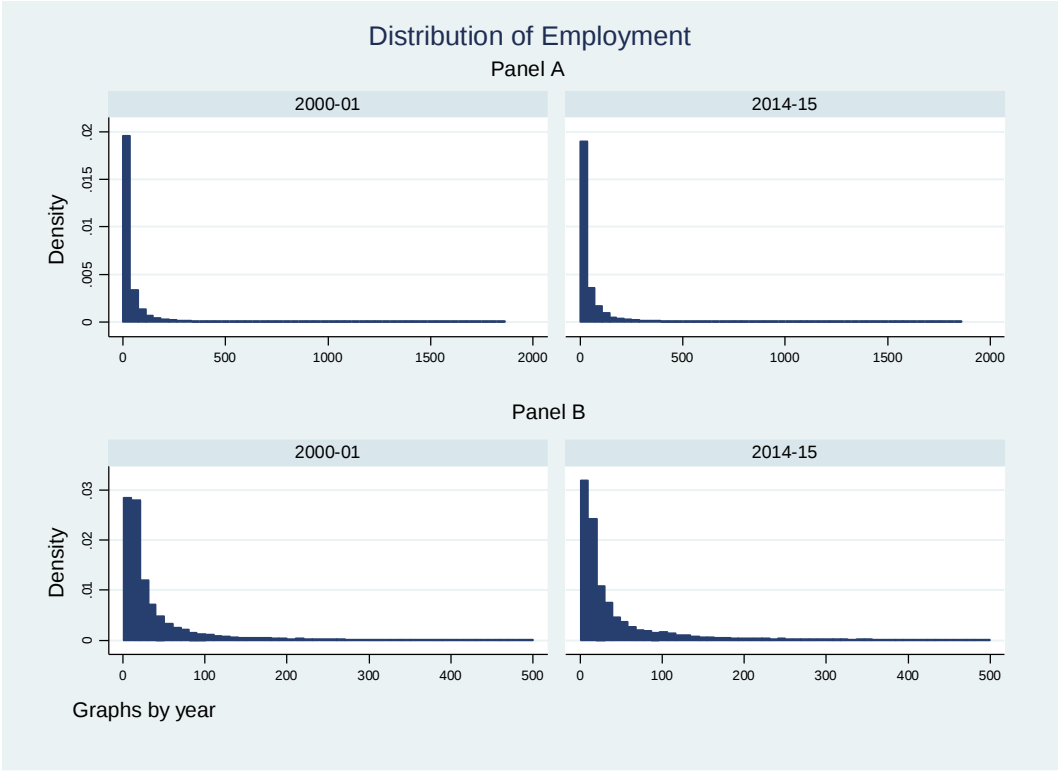


Source: ASI published statistics (several years)

Graph 3 and 4 present the distribution of employment and GVA respectively using plant level data for the years 2000-01 and 2014-15. For both variables, we find that most of the values are in fact quite small and there are a large number of zero values. Given that these small values dominate the distribution, and there are very few large values, it is difficult to analyse this data. Therefore, we cut off the largest values and reconstruct the histogram in the lower panel (Panel B). Both in the case of GVA and employment, we find the distribution to be skewed right. This suggests that the distribution is dominated by establishments having low employment and GVA. When we compare the distributions over time, we find that in case of

total employment, the distribution has not altered much over time, and the manufacturing landscape is dominated by small establishments. In the case of GVA, we find that the distribution of GVA in 2000-01 is relatively more right skewed compared to 2014-15. This suggests that unlike the employment variable, there has been a more substantial right shift in the GVA distribution. This reinforces the disconnect between employment and GVA growth in the organized manufacturing sector.

Graph 3: Distribution of Employment

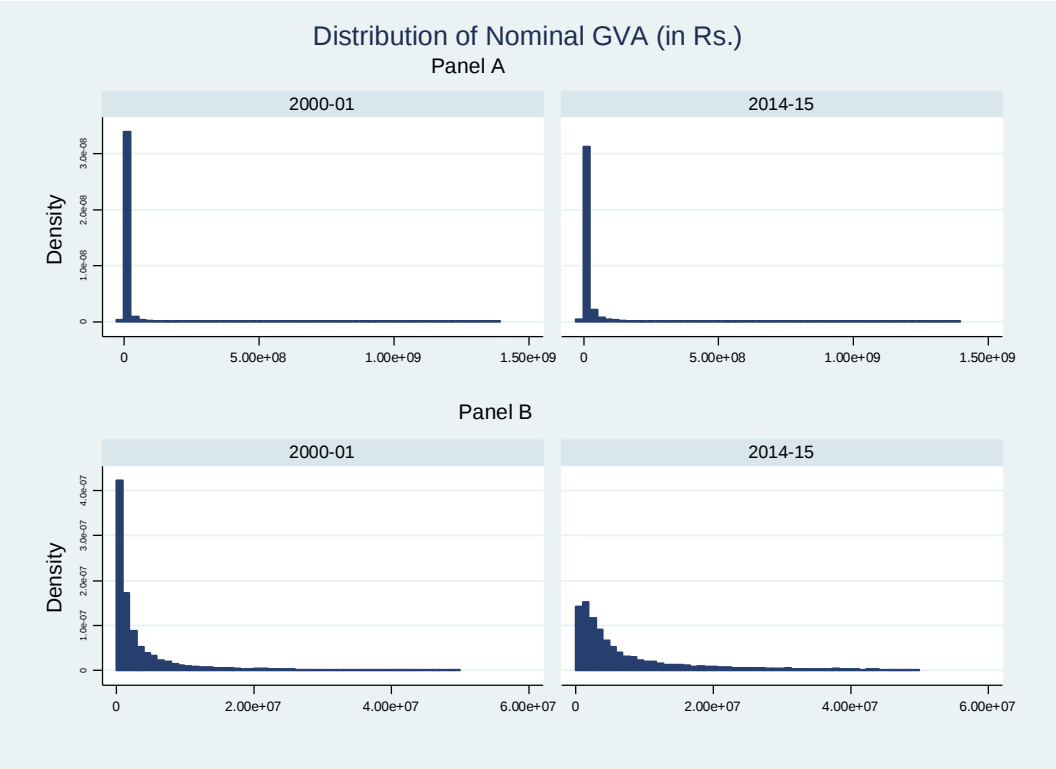


Source: ASI unit data (2000-01 and 2014-15)

Table 3 reports total employment across industries (at the NIC-2 digit level) for the initial and final years of the study (2000-01 and 2014-15). The industry which accounted for the largest increase in employment over this time period was the manufacture of chemical and chemical products. It created close to a million jobs during this fifteen year period. This was followed by the motor vehicles, trailers and semi-trailers industry, which created roughly 600,000 jobs during this period. Manufacturing of other non-metallic mineral products and textiles created a little over half a million jobs each. It is worth noting that amongst the above mentioned four industries, which accounted for roughly half of the total jobs created over this 15 year period, only one industry i.e. textiles industry is typically classified as labour intensive. As a key labour intensive industry, the manufacture of wearing apparel had enormous potential to create a large number of productive jobs. However, only 380,000 jobs have been added over the time period under study. The performance of the food products and beverages industry, traditionally a labour intensive industry has also fallen short of expectations. It has created

less than 50,000 jobs over a fifteen year period and its share in total employment in the organized manufacturing sector has fallen steeply from 17.2% to 10.4%.

Graph 4: Distribution of Nominal GVA



Source: ASI unit data (2000-01 and 2014-15)

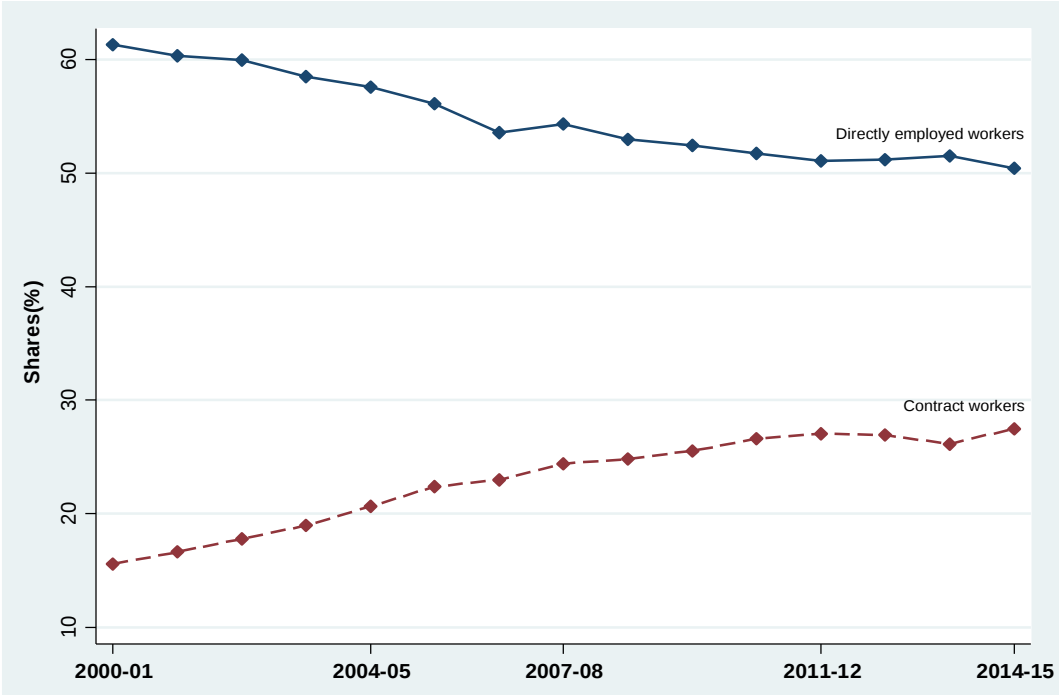
The trends in table 3 reflect the rising importance of capital intensive industries vis-à-vis labour intensive industries. In 2014-15, the contribution of the chemical and chemical product industry to total employment is comparable to that of the textile industry (13%). During the last fifteen years, the growth of employment in the chemical and chemical product industry has outstripped the growth of employment in the textile industry. Consequently, the share of the latter in total employment has fallen from 16% to 13%, while that of the former has increased concomitantly from 10% to 13%. Similarly, the growth of employment in the motor vehicle industry has been spectacular and its share in total employment today has surpassed that of the wearing apparel industry (5.43%). This has happened despite the fact that the capital intensity of production in both the chemical and chemical products industry motor vehicles industry has been over ten times the capital intensity in the wearing apparel industry for the time period under study.

The rising share of employment in capital intensive industries is a consequence of the faster growth of output and GVA in these industries (Kapoor, 2016). On the other hand, labour intensive industries which typically have a higher employment elasticity of output observed significantly slower growth of GVA and output than capital intensive industries and therefore generated fewer jobs. This is a cause of great concern as despite India's true comparative

advantage lying in labor-intensive activities, India's manufacturing sector has specialized in relatively capital and skill intensive activities (Kocchar et al, 2005).

Another issue which merits attention is the change in the employment structure of the manufacturing workforce. The last decade has been marked by a steep rise in the use of contract workers in place of directly employed workers (Graph 5). The share of contract workers in total employment increased sharply from 15.58% in 2000-01 to 27.51% in 2014-15, while the share of directly employed workers fell from 61.26% to 50.41% in the same period. Total employment in the organized manufacturing sector increased from 7.75 million in 2000-01 to 13.26 million in 2014-15, with 44.26% of this increase being explained by the growing use of contract workers. In fact the phenomenon of contractualisation has been witnessed across all industries. Table 3 reports the shares of contract workers across various industries in 2000-01 and 2014-15. What is striking is that capital intensive industries appear to be more reliant on contract workers as compared to labour intensive industries[5]. For instance in the chemical and chemical products industry, 37.3% of employment growth came from hiring of contract workers. In the motor vehicle industry, the corresponding figure stood at 46.6%. In the manufacture of other non metallic mineral products, contract workers accounted for almost 70% of employment growth over this period. Surprisingly, in the textile and wearing apparel industry though, the corresponding figures were lower at 20.2 % and 15.2% respectively.

Graph 5: Distribution of Employment by Worker Type



Source: ASI published statistics(several years)

5Kapoor & Krishnapriya (2017) argue that firms in capital intensive industries are more reliant on contract workers (compared to labour intensive industries), as this enables they help the management suppress the bargaining power of regular workers and drive up their profits.

Table 3: Total persons engaged in manufacturing industries (NIC 2 digit)

NIC Code (2004-05)	Industry	Total Persons Engaged			Share of Contract Workers	
		2000-01	2014-15	Trend Growth Rate (2000-01 to 2014-15)	2000-01	2014-15
15	Food Products and Beverages	1332588	1380318	0.02	15.71	24.60
16	Tobacco Products	483185	438519	-1.03	59.60	69.63
17	Textiles	1288648	1811866	3.17	7.79	11.39
18	Wearing Apparel	330969	720303.4	6.39	4.94	10.48
19	Leather and Leather Products	138225	321582.6	6.96	15.61	17.16
20	Wood and Products of Wood	49627	85753	4.39	7.08	18.31
21	Paper and Paper Products	179706	140437.7	-2.17	17.06	23.06
22	Printing and Reproduction of Recorded Media	117903	197174	4.52	3.59	13.83
23	Coke, Refined Petroleum Products and Nuclear Fuel	67879	122731	4.42	13.33	41.68
24	Chemical and Chemical Products	799363	1716931	7.26	13.68	26.65
25	Rubber and Plastic Products	252307	597032	7.07	9.87	25.69
26	Other Non-metallic Mineral Products	443870	996506	6.23	25.87	49.49
27	Basic Metals	563730	1004446	5.75	17.59	36.68
28	Fabricated Metal Products, except machinery and equipment	294731	443935.8	4.39	20.57	34.89
29	Machinery and Equipment n.e.c.	426729	944658.8	7.67	7.01	21.69
30	Office, Accounting and Computing Machinery	19343	36382.21	6.98	28.07	31.89
31	Electrical Machinery and Apparatus n.e.c.	231546	465382.5	6.68	8.69	29.27

32	Radio, Television and Communication Equipment and Apparatus	111962	138186.6	3.40	6.07	27.86
33	Medical, Precision and Optical Instruments, Watches and Clocks	64825	104274	4.37	3.51	18.99
34	Motor Vehicles, Trailers and Semi-trailers	257924	892955	10.17	8.36	35.55
35	Other Transport Equipment	183672	300965	4.44	9.38	38.16
36	Furniture	114316	404695.3	10.23	11.53	17.39

Source: ASI published statistics (several years)

The increasing contractualisation of the workforce reflects significant informalization of the workforce. These are the workers who are hired by an intermediary or contractor on short term contracts, are unprotected and can be fired easily. Importantly, wages paid to contractual workers are relatively low as compared to those paid to regular workers (Kapoor & Krishnapriya, 2017). Several reasons have been attributed to this increasing informalization. First, the use of contract workers provides a means of getting around stringent labour regulations, particularly IDA, as contract workers do not come under the purview of labour laws that are applicable to directly employed workers in labour markets. Second, increased import competition has led to informalization of industrial labour since the lower wages of informal workers and the savings made on the expenditure of worker benefits helps in reducing costs and thus improving competitiveness (Goldar & Aggarwal, 2012). Finally, firms have an additional reason for hiring contract workers. The presence of contract workers in the firm's workforce helps the firm's management suppress the bargaining power of regular workers and exert downward pressure on their wages. Thus, firms use contract workers to their strategic advantage against unionised regular workers (Kapoor & Krishnapriya, 2017).

IV. FIRM CHARACTERISTICS MATTER

The dismissal performance of the manufacturing sector has largely been attributed to distortions in labor markets, capital markets, land markets, product markets and poor infrastructure. Much has been said about each of these aspects in the existing literature. In this study, we are more concerned with analysing underlying micro trends using firm level data from the organised sector. This enables us to identify what type of firms create productive jobs, where jobs have been concentrated and why, on an aggregate, the employment performance of the manufacturing sector has been sluggish. In this section, we classify firms on the basis of different characteristics and examine whether employment growth was high or low in certain firm types. We examine firms on the basis of five criteria- size, age, external finance dependence, infrastructure reliance and import input intensity. Our discussion begins with an analysis of firm size.

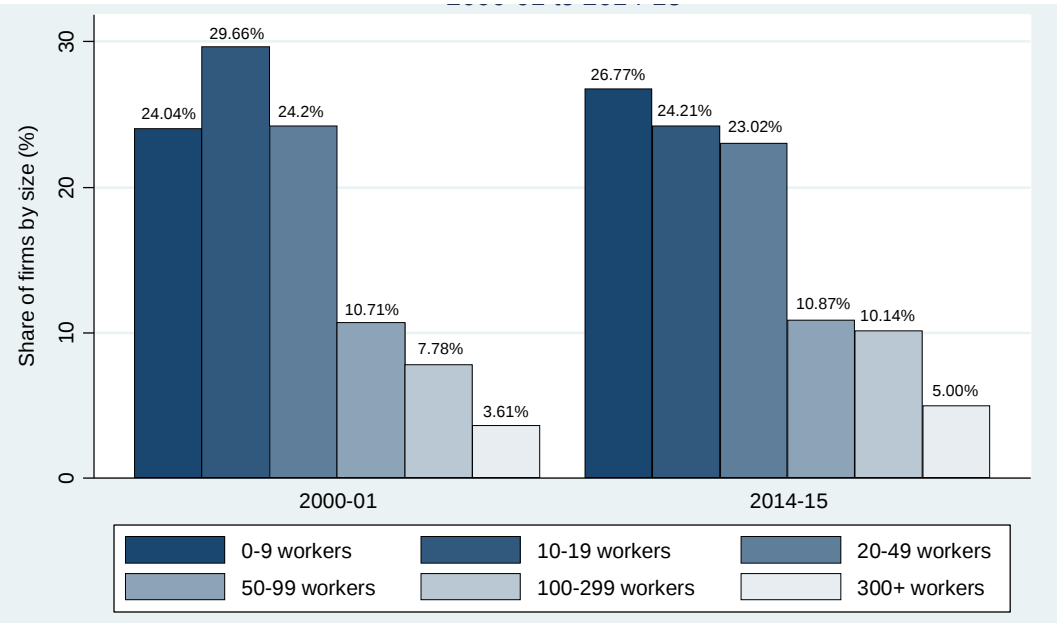
Small firms are not drivers of employment growth

A critical aspect of the debate on job creation in the manufacturing sector is about the role of firm size. Historically, India has supported small and medium enterprises (SMEs) as it believed that these enterprises would use labour-intensive methods of production, thereby generating faster employment. The Small Scale Reservation Policy (1967), which reserved production of some goods for small-scale units[6], was the cornerstone of India's manufacturing policy for about 60 years. However, between 1997 and 2007, 600 out of more than a 1,000 items were de-reserved as it was argued that small firms making reserved products resisted growing or upgrading their technology as they would have to stop making those products if their investments grew beyond the permissible limits for small-scale industry.

6 These were originally defined as firms with up to Rs 500,000 in fixed assets and fewer than 50 employees.

Despite significant de-reservation, small firms continue to dominate the manufacturing landscape. Graph 6 presents the distribution of firms by size for the years 2000-01 and 2014-15. We divide firms into six bins- (0-9; 10-19; 20-49; 50-99; 100-299 and 300+ workers). In 2014-15, small firms (i.e. those hiring less than 50 workers) account for over 50% of total firms in manufacturing sector. The large firms i.e. those hiring more than 100 workers account for a small share of the distribution. The share of mid-sized firms (50-99 workers) is also not significant. Thus, there is no 'missing middle' in the sense of a bimodal distribution. Importantly, the firm size distribution has not altered over the last fifteen years. Graph 6 also shows the firm size distribution in 2000-01. From this it is evident that the proliferation of small firms is a phenomenon which has persisted over time.

Graph 6: Distribution of firms by firm size



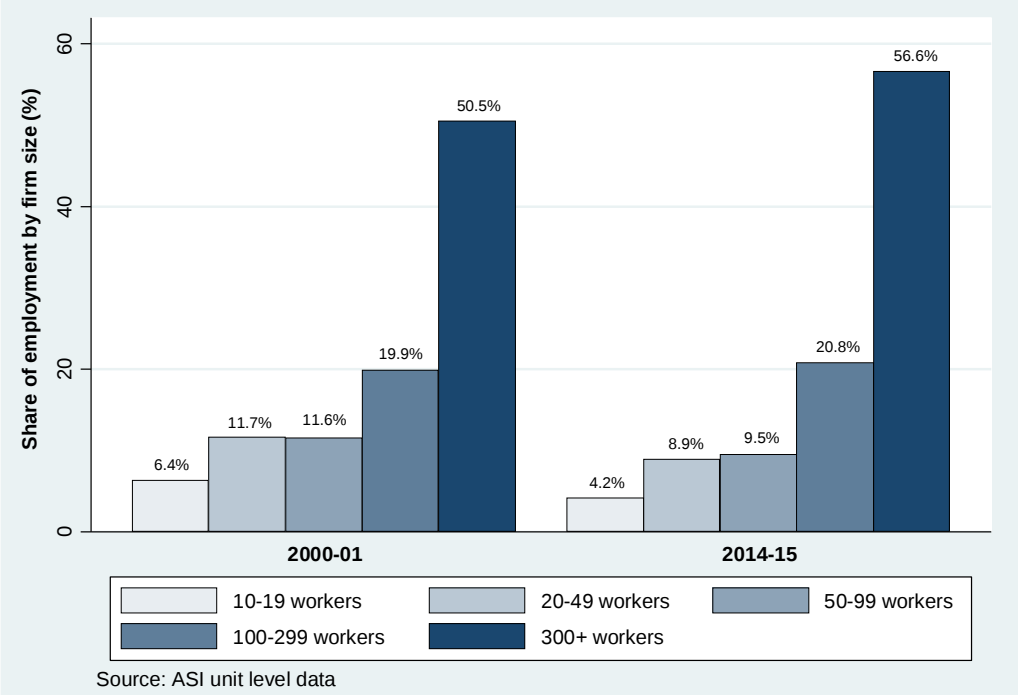
Source: ASI unit data (2000-01 and 2014-15)

Table 4 and graph 7 report the total employment and distribution of employment across firms of different size. We find that the share of small enterprises in total manufacturing employment has been significantly smaller than that of large enterprises in the last decade. What is more, the share of small enterprises in total employment has fallen over this period, while that of large firms has risen. We also find that the trend growth rate of employment in small firms is significantly lower than that in larger firms (Table 5). Importantly, net changes in employment and growth rates tend to hide a considerable amount of job creation and destruction. Although conventional wisdom on firm dynamics says that most job creation comes from small enterprises, recent literature has shown that job destruction is equally important in their case and this perhaps explains why these enterprises hardly grow over time (Li and Rama 2012). Thus, the general claim that SMEs are the main creators of jobs in net terms is questionable. We also examine the distribution of wages of production workers across firms of different sizes in Table 6.[7] Unsurprisingly, we find that smaller firms are

7 We do this exercise only for production workers. Supervisory and managerial staff are excluded from this analysis.

paying significantly lower wages than larger firms. In fact average wages are monotically increasing across the size bins.

Graph 7: Distribution of employment by firm size



Source: ASI unit data (2000-01 and 2014-15)

Table 4: Total Employment by Size Bins

	Total Employment	
Size Bin	2000-01	2014-15
0-9 workers	166144	232958
10-19 workers	482513	542681
20-49 workers	880792	1161725
50-99 workers	876349	1239422
100-299 workers	1504077	2696423
300+ workers	3814239	7349732

The preponderance of small firms in the manufacturing landscape coupled with their significantly lower contribution to employment suggests that small firms are not expanding and creating jobs. The dominance of small firms over the entire time period under study is reflective of the fact that these establishments are unable to expand (i.e. the transition from a small to a medium to a large enterprise seems difficult) and/or choose to remain small due to inbuilt incentive to remain undersized. Thus, understanding what holds back Indian enterprises of different size groups from expanding is critical insofar as the goal of generating better paying jobs is concerned.

Table 5: Trend growth rate of employment by size bins (2000-01 to 2014-15, % per annum)

10-19 workers	20-49 workers	50-99 workers	100-299 workers	300+ workers
1.22	2.69	3.49	4.92	5.68

Source: ASI unit data (several years)

Table 6: Average Annual Worker Wages (in Rs)

Size Bin	2000-01	2014-15
10-19 workers	25105.04	86423
20-49 workers	27122.61	95029.56
50-99 workers	28952.32	101577.1
100-299 workers	35589.92	111724
300+ workers	61022.92	152626.7

Source: ASI unit data (2000-01 and 2014-15)

Younger firms witness higher employment growth

Several recent studies have reported that the age of the firm is more important than the size of the firm in understanding net job creation. Using US data, Haltwinger et al. 2010 find that smaller firms are associated with higher employment growth primarily because of their youth, and once they control for age in their analysis, the higher employment growth of smaller enterprises disappears. Martin et al. (2014) find that in the case of India too, young establishments grow more quickly than old establishments, large establishments grow more quickly than small establishments, and employment growth has been highest for younger, larger enterprises. They also document that larger, younger establishments have higher labour productivity than smaller, older establishments. The importance of firm age is further reiterated in the World Bank's Enterprise Survey (2014), a firm level survey of a representative sample of an economy's private sector. The study notes that a firm's ability to navigate the business environment and the obstacles it faces depends on its experience and longevity.

We begin our analysis by examining the total employment and distribution of employment by age bins (Table 7 and 8).We find old firms (i.e. those greater than 10 years) have accounted for roughly 70% of total employment over the time period under study. The young firms (less than 5 years) explain the smallest share of total employment (about 10%). The substantially larger share of employment in the old age bin appears to give the impression that these firms

are the drivers of employment growth. However, we need to be cautious before drawing such inferences. The reason for this is as follows.

Table 7: Distribution of Employment and Firms by Age Groups

	Employment		Firms	
Age Bin	2000-01	2014-15	2000-01	2014-15
Less than 5 years	10.5	9.3	15.2	13.2
5 to 9 years	17.1	19.5	22.5	21.9
10 years and above	72.3	71.15	62.2	64.7

Source: ASI unit data (2000-01 and 2014-15)

Table 8: Total Employment by Age Groups

	Employment	
Age Bin	2000-01	2014-15
Less than 5 years	798982	1229153
5 to 9 years	1292178	2568368
10 years and above	5481512	9369578

When we look at the distribution of firms across different age bins, we find that the old firms account for a disproportionately large share of total firms and dominate the manufacturing landscape in India (Table 7). We also examine the distribution of firms with respect to both age and size. In Table 9, we examine distributions of firms by size for each of the age bins. Here, we find that amongst the young firms, the distribution is dominated by small firms. This is unsurprising, as firms would typically start off small. However, when we look at the distribution of old firms, here too, we find the distribution to be dominated by small firms. Firms which have less than 20 workers account for over half of the distribution of old firms. The persistence of small old firms in the data is indeed problematic and reinforces the fact that firms are not expanding and growing as they age. This phenomenon could well be a result of two things-first, firms are too constrained to grow, and second, they find it difficult to exit. The lack of adequate regulatory apparatus to deal with failed businesses in India is a major problem. While India has made much headway in removing barriers to entry of firms into the economy over the past two decades, impediments to easy exit of loss making entities continue to exist. In principle, productive and innovative firms should expand and grow, forcing out the unproductive ones. So surviving firms should typically be much larger than new ones. However, this does not appear to be the case. Using the ASI dataset we find that on average, an old plant in India was a mere 1.7 times larger than a new one for the time period under study. The low average employment in old firms is indicative of the fact that firms have not expanded as they age, and that there are constraints to firm growth and exit.

Table 9: Distribution of firms by age and size

2000-01			
size_bin	less than 5 years	5 to 9 years	10+ years
0-9 workers	18.04	20.08	27.09
10-19 workers	33.76	32.32	27.76
20-49 workers	27.77	25.65	22.76
50-99 workers	11.52	11.52	10.19
100-299 workers	7.02	8.02	7.79
300+ workers	1.88	2.41	4.41
2014-15			
size_bin	less than 5 years	5 to 9 years	10+ years
0-9 workers	25.83	24.09	27.92
10-19 workers	26.27	23.48	24.05
20-49 workers	23.61	24.11	22.53
50-99 workers	11.35	12.66	10.15
100-299 workers	10.13	10.83	9.84
300+ workers	2.81	4.82	5.51

Source: ASI unit data (2000-01 and 2014-15)

Using the ASI dataset we find that on average, an old plant in India was only 1.7 times larger than a new one (Table 8). The low average employment in old firms is indicative of the fact that firms have not expanded as they age, and that there are constraints to firm growth and exit.

Next, we examine the distribution of employment across firms of different age and size bins (Table 10).It is worth noting that small old firms account for roughly 1% of total employment in both the reference years, but these firms account for close to 27% of total firms in the manufacturing landscape. This reinforces the fact that the organized manufacturing sector is proliferated by small firms which have failed to expand and make a significant contribution to employment generation as they age. On the other hand, the large old firms which accounted for 4-5% of firm distribution in Table 9, account for over 40% of the employment distribution in Table 10. This large share is unsurprising as by construction this size bin includes firms hiring 300 or more workers. While these statistics suggest that a few large firms are accounting for a disproportionately large share of employment, they do not tell us whether older firms grow faster or slower than younger firms. To address this issue, we need to undertake a detailed firm level empirical analysis. This is precisely what we attempt in Table 11.

Table 10 :**Distribution of employment by age and size of firm**

2000-01			
size bin	less than 5 years	5 to 9 years	10+ years
0-9 workers	0.26	0.43	1.50
10-19 workers	1.11	1.58	3.65
20-49 workers	2.06	2.75	6.73
50-99 workers	1.89	2.82	6.76
100-299 workers	2.66	4.50	12.37
300+ workers	2.58	5.00	41.37
2014-15			
size bin	less than 5 years	5 to 9 years	10+ years
0-9 workers	0.24	0.35	1.18
10-19 workers	0.60	0.89	2.63
20-49 workers	1.26	2.02	5.54
50-99 workers	1.36	2.41	5.64
100-299 workers	2.73	4.74	12.90
300+ workers	3.15	9.11	43.28

In column 1 of Table , we regress the log of firm's employment on a time trend, the log of firm age and an interaction term between the two. We control for firm fixed effects to account for time invariant firm specific unobservables. Here, we find the coefficient on the interaction term between old age and time is negative and statistically significant, suggesting that growth of employment in old firms has been lower than in young firms over the last decade. In column 2, we control for the other time varying firm factors such import input intensity, fuel intensity and external finance dependence. We also introduce a capital intensity dummy in our specification. This captures whether the firm is in a capital or labour intensive industry. Here too, we find the interaction term between time trend and age to be negative and statistically significant. Further, in columns 3, 4 and 5, we divide the firms in our sample into three size bins: small (0-49 workers), medium (50-99 workers) and large (100 or more workers).We find that the coefficient on the above-mentioned interaction terms is negative and significant across all three groups. The result that employment growth is slower in younger firms is robust across all size bins.

Table 11: Firm Level Performance of Old, Middle Aged and Young Firms

	(1) ln(tpe)	(2) ln(tpe)	(3) ln(tpe)	(4) ln(tpe)	(5) ln(tpe)
time	0.031***	0.090***	0.027***	0.009*	0.084***
	(0.002)	(0.004)	(0.007)	(0.005)	(0.004)
ln(Age of firm in years)	0.132***	0.224***	0.086***	0.039***	0.211***
	(0.004)	(0.011)	(0.019)	(0.014)	(0.012)
ln (Age of firm)*time	-0.013***	-0.020***	-0.009***	-0.002	-0.018***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
ln(External financial dependence		-0.007***	-0.015***	-0.004	-0.003
		(0.002)	(0.005)	(0.003)	(0.002)
ln(Fuel intensity)		-0.050***	-0.062***	0.002	-0.041***
		(0.007)	(0.013)	(0.006)	(0.007)
(Dummy=Capital intensive industry)		0.060***	0.030	0.012	0.065***
		(0.020)	(0.032)	(0.028)	(0.022)
ln(Import intensity)		0.014***	0.006	-0.001	0.014***
		(0.003)	(0.005)	(0.004)	(0.003)
_cons	3.453***	4.132***	2.649***	4.121***	4.864***
	(0.011)	(0.047)	(0.082)	(0.057)	(0.052)
N	593790	69318	11815	8430	49073

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Pattern of input use matters

In this section, we relate the pattern of employment growth in the manufacturing sector to firm level heterogeneity in the pattern of input use. We exploit differences in firm level fuel intensity and dependence on external finance to understand whether firms more reliant on infrastructure and external finance dependence witness faster or slower employment growth compared to their respective control group. This allows us to identify the extent to which these factors have constrained the growth of employment in organized manufacturing. While Gupta, Hasan & Kumar (2008) and Ghose (2016) have conducted a similar analysis at the industry level, we do so at the firm level.

Table 12 reports the differential performance of fuel and non-fuel intensive firms. In column 1, we find the coefficient on the interaction term between the log of the firm's fuel intensity and time trend to be negative and statistically significant. This suggests that industries with higher levels of fuel intensity (i.e. greater dependence on infrastructure) witnessed slower employment growth than their respective control group. Firm fixed effects are included in this specification to control for firm specific time invariant unobservables[8]. In columns 2, we also control for firm level time variant characteristics such as firm age, size, import intensity of input usage and dependence on external finance[9]. This exercise is necessary to ensure that the results are not driven by characteristics other than fuel intensity. The coefficient on the interaction term retains its sign and significance. Further, we introduce a capital intensity dummy to control for whether the firm is in a capital or labour intensive industry. These results highlight the importance of improving infrastructure to accelerate the growth of employment.

Next, we examine the heterogeneity in the performance of firms on the basis of their external finance dependence. These results are reported in Table 12 (Column 3 and 4). We find the coefficient on the interaction terms between the log of the firm's external finance dependence and time trend to be negative and statistically significant. This suggests that industries which are more reliant on the financial sector for meeting their credit needs witness slower employment growth compared to their control group. This result is robust to the inclusion of various time variant firm characteristics such as firm age, size, import intensity of input usage and fuel intensity (Column 4). It suggests that improved access to finance would have important payoffs for accelerating the performance of the manufacturing sector. The results in table 10 are unsurprising. The World Bank Enterprise Survey (2014) has also identified access to electricity and finance amongst the top five business environment obstacles for firms in India. Of the 9, 281 firms surveyed, 15.5% chose electricity as the biggest obstacle while 11.7% of the firms identified access to finance as the biggest constraint.

8 Since we already have this effect, we do not include industry or state fixed effects in our specification.

9 Table X in the Appendix reports correlations among these various characteristics.

Table 12: Firm level performance of fuel intensive and external finance dependent firms

	(1) ln(tpe)	(2) ln(tpe)	(3) ln(tpe)	(4) ln(tpe)
time	-0.008*** (0.001)	0.010*** (0.003)	0.000 (0.001)	-0.004*** (0.001)
ln(Fuel intensity)	-0.050*** (0.003)	-0.001 (0.010)		-0.073*** (0.003)
ln(Fuel intensity)*time	-0.004*** (0.000)	-0.006*** (0.001)		
ln(External finance dependence)		-0.008*** (0.002)	0.010*** (0.003)	0.012*** (0.003)
ln(External finance dependence)*time			-0.004*** (0.000)	-0.004*** (0.000)
ln(Age of firm in years)		0.122*** (0.009)		0.075*** (0.003)
(Dummy=Capital intensive industry)		0.059*** (0.020)		0.023** (0.010)
ln(Import intensity)		0.013*** (0.003)		
ln(External finance dependence)*time			-0.004*** (0.000)	-0.004*** (0.000)
constant	3.645*** (0.011)	4.631*** (0.049)	3.830*** (0.005)	3.449*** (0.019)
N	625492	69318	461623	402029

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Finally, we classify firms on the basis of imported input intensity. It has often been argued that India's inverted duty structure (where import duties on raw materials are higher than those on final products) has constrained the growth of manufacturing industries. This

suggests that firms which are more reliant on imported inputs are likely to witness slower growth than those which are not. Yet, empirical evidence suggests otherwise. Ghose (2016) finds that industries with higher average imported intensity grew faster than those with lower average imported input intensity. Goldar (2015) has argued that higher imported input intensity tends to be associated with higher productivity growth. Topalava and Khandelwal (2011) have found that improved access to imported intermediate inputs contributed significantly to productivity advances in Indian manufacturing firms. In our empirical analysis, we attempt to examine whether firms with higher imported input intensity observed lower or higher employment growth compared to their respective control group (table 13). We find that the coefficient on the interaction term between the firm's input intensity and time trend is positive and statistically significant (column 1). This indicates that firms with higher import intensity witnessed faster employment growth than those with lower import intensity. However, this result is not robust to the inclusion of firm specific time variant controls (column 2). After controlling for the age of the firm, we do not find firms more reliant on imports to grow faster than those with lower import intensity. Next, we breakdown the sample into small, medium and large sized firms separately. Here, we find that it is only in the large firm sample (column 5) that the interaction term is positive and significant implying that firms with higher imported input intensity observed faster employment growth[10]. For small and medium sized firms, the interaction term is insignificant (Column 3 and 4). This suggests that payoffs to import liberalization were perhaps greater for large sized firms and all firm types did not benefit equally. It may well be the case that for small and medium sized firms, the adverse impact of the imported duty structure did not allow them to exploit the productivity enhancing effects of imported intermediate inputs. While, analyzing the impact of import liberalization of firms of different sizes is beyond the scope of this paper, our results highlight the importance of controlling for firm characteristics.

10 This result should not be interpreted to suggest that the inverted duty structure does not have an adverse impact on manufacturing performance. As noted by Ghose (2016) it may well be the case that domestic industries producing the inputs are inefficient and therefore imported inputs turn out to be cheaper despite the duties. The other possibility is that taxes on domestically produced inputs are higher than import duties on imported inputs.

Table 13: Firm level performance of import input intensive firms

	(1) ln(tpe)	(2) ln(tpe)	(3) ln(tpe)	(4) ln(tpe)	(5) ln(tpe)
time	0.042*** (0.002)	0.030*** (0.002)	-0.001 (0.004)	0.006** (0.002)	0.032*** (0.002)
ln(Import intensity)	-0.004 (0.005)	0.009* (0.005)	0.017 (0.011)	-0.008 (0.007)	0.001 (0.006)
ln(Import intensity)*time	0.002*** (0.000)	0.000 (0.001)	-0.001 (0.001)	0.001 (0.001)	0.001** (0.001)
(Dummy=Capital intensive industry)		0.065*** (0.020)	0.034 (0.032)	0.012 (0.028)	0.070*** (0.023)
ln(External finance dependence)		-0.007*** (0.002)	-0.015*** (0.005)	-0.004 (0.003)	-0.004* (0.002)
ln(Fuel intensity)		-0.050*** (0.007)	-0.063*** (0.013)	0.002 (0.006)	-0.040*** (0.007)
ln(Age of firm in years)		0.126*** (0.009)	0.045*** (0.015)	0.031*** (0.010)	0.117*** (0.010)
constant	4.961*** (0.015)	4.442*** (0.043)	2.797*** (0.074)	4.133*** (0.052)	5.140*** (0.048)
N	99634	69318	11815	8430	49073

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

V. CONCLUSIONS

Dynamism at the enterprise level underlies the growth of the manufacturing sector and productive job creation. Therefore, this study has attempted to understand the sluggish employment performance of India's manufacturing sector using firm level data. This has enabled us to identify what type of firms create productive jobs, where jobs have been concentrated and what factors have held back firms from growing and expanding.

A comprehensive analysis of the size distribution of enterprises indicates that the manufacturing landscape is dominated by a very large number of small old firms. This phenomenon implies a weak process of firm growth and expansion. India's policy of protecting its small firms through programs such subsidized credit, tax exemptions or product reservations has not relaxed the constraints faced by these firms, but further incentivized them to remain small. Concomitantly, we also find that young firms witness faster employment growth than older firms. This finding coupled with the fact that the small firms are not drivers of employment growth in our dataset suggests that policy interventions

directed at small firms ignoring the role of firm age are unlikely to have the desired impact on job creation. Policies which support and nurture young firms, as opposed to those which protect small firms, would have the additional advantage of not having to provide indefinite support to firms.

Further, we characterize firms on the basis of their input use pattern and find that firms which are more reliant on infrastructure and external finance witness slower employment growth than their respective control groups. This is unsurprising as there exists a vast literature which attributes the dismal performance of the organised manufacturing sector to credit constraints and inadequate infrastructure. We also find that large firms having high import input intensity observe faster employment growth. Small and medium sized firms appear to have not been able to exploit the improved access to imported inputs. These results highlight the importance of firm characteristics in designing policies aimed at fostering productive job creation. Effective policy design requires greater understanding of firm life cycle dynamics. Empirical evidence suggests that different establishments follow distinct life cycle patterns and it is crucial to study these to identify the constraints which inhibit firms from expanding and becoming more productive as they age.

Before concluding, it is important to reiterate that despite witnessing over a decade of rapid economic growth, low productivity and low income yielding jobs in the unorganised sector continue to account for a disproportionately large share of total employment in the manufacturing sector. Furthermore, firms in the unorganized sector rarely seem to make the transition to the organized sector and continue their existence for decades without much growth and improvement. The persistence of dualism has slowed down the expected dynamic role of the manufacturing sector in productive job creation.

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