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Consequences, Costs and Rationale

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Multiplying Multi-Plants and Large Plant Size

Consequences, Costs and Rationale

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Naveen Thomas[3]

Abstract

The under-performance of Indian manufacturing has been a development failure. This paper finds a new clue that sheds light on this failure in the relatively undocumented phenomenon of multi-plants, whereby a firm sets up multiple production facilities within a state. Multi-plants have grown dramatically over time, now accounting for 35 percent of employment in large firms (greater than 200 employees). They are important for three reasons. They change our understanding of the evolution of the size of large firms: contrary to recent research, this paper finds that accounting for multi-plants shows that large plants have not grown in size (and may even have shrunk) despite increasing recourse to contract labour. Second, multi-plant firms have lower productivity than single-plant firms of equivalent size, which potentially impacts competitiveness and export performance. Finally, multi-plants shed light on how regulations and labour markets work. They seem to be another mechanism (along with contractualization) for large firms to not expand plant size in order to diversify political and regulatory risk. India does have large plants that operate well beyond thresholds in any of the labour laws. But there are not enough of them; and even those that exist are too small by international standards, undermining India's manufacturing competitiveness. Multi-plants offer one clue to understanding why that is so.

Keywords

Plant Size Distribution, Multi-plants, Productivity, Regulatory Risk

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1. Introduction

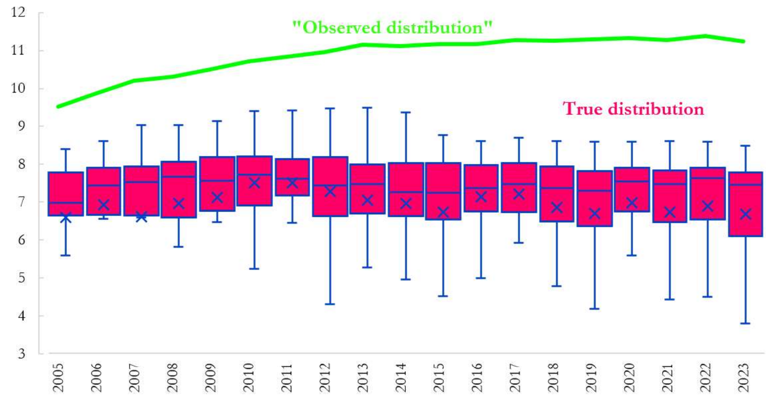
Consider the employment profile of one of India's most successful, exporting firms and one of the largest employers. Figure 1 shows the evolution in the average size and employment distribution of all plants located in one of the Indian states of this firm since India's economic boom, beginning in the early 2000s. The average employment per plant has averaged between 1400 and 2400 employees; and maximum employment size at these plants has never exceeded 9500 and has remained between 4000 and 6000 for most years.

However, because all these plants are in one state, the Annual Survey of Industries (ASI) allows firms with multiple plants in a state (but not across states) to file joint returns for such plants but with the requirement that they report the number of plants in operation (see Appendix 1 for details). If that is the case, in 2022, the data captured in the ASI would be as in the green line. It would suggest that the firm has one plant that has grown over time, employing about 14,000 workers in 2005 and about 76,000 workers in 2023, a nearly 5.5-fold increase in plant size in less than 20 years. This would speak well of India's labor and broader industrial environment to have allowed/facilitated a plant to grow so big (to near Foxconn proportions). But this inference would, of course, be mistaken as the box and whiskers plot shows.

In sum, plant size, especially of large plants (the so-called right tail of the employment distribution), would be exaggerated by the official data. Even one of the most successful exporting plants is a relative midget by international standards.

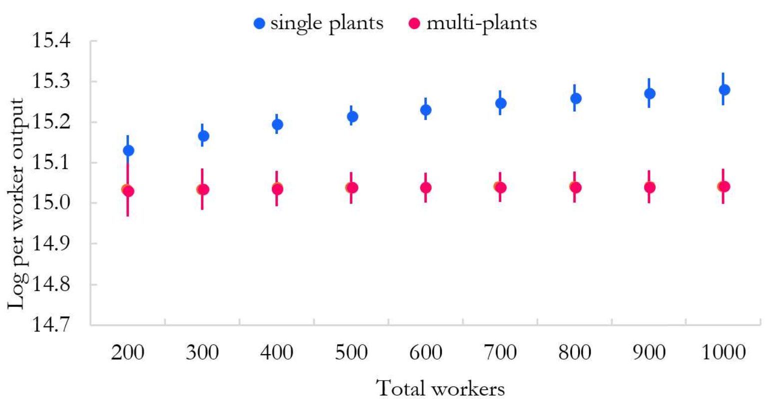
In this paper we will documents three new facts and illustrate why they matter for our understanding of plant size distribution. Throughout this paper we will be focused on plants and not on firms for reasons as follows. First, that this phenomenon of multi-plants has been growing over time and is quantitatively significant, accounting today for over 25.16 percent of total employment in all plants and 35.48 percent of employment in large plants.

Figure 1. Observed Versus True Employment Distribution of Firm X (log employment)



Source: Proprietary data. "x" denotes the mean size and the horizontal lines the median.

Figure 2. Average output per worker and plant size (All private manufacturing, 2022)



Source: ASI; Authors' estimates. Based on regressions of log output per worker on log employments size with state and industry fixed effects.

Second, ignoring it leads to over-stating the change in the size of plants since the early 2000s. It is popularly believed that Indian plants have become larger (Bertrand et al. 2021) but we show that that is not the case and on some metrics large plants may have even become smaller. This is striking if account is taken of the fact that this period was one of remarkable economic dynamism and of the incontrovertible fact that recourse to contract labour increased sharply.

Third, that the multi-plant phenomenon seems to be a response to some underlying friction. It seems to be an endogenous device for Indian capital to keep their operations small, presumably as a way of coping with the regulatory burdens and risks imposed not, or not just, by labor laws but the broader political environment, shaping capital-labor relations. It seems to be a substitute for the other endogenous change documented extensively, namely the rise of contract labor in Indian industry. The contract labour phenomenon is much greater—almost twice as large—in single plants compared to multi-plants.

Finally, should we care about this mismeasurement? Figure 2 shows the difference in output per worker between single plants and multi-plants for plants in the same industry and within the same state. Single plants are both more "productive" than multi plants for any given level of employment and this differential increases as employment size increases. For example, at employment of 200 workers, single plants are about 9 percent more productive and at 1000 worker plant size, that wedge increases to over 21 percent.

We discuss how to interpret this finding but *prima facie* it seems that the mismeasurement matters for estimates of productivity.

An important point to note is this: much of the literature on employment size has focused on the Industrial Disputes Act (IDA) and on examining whether the thresholds in them have shaped plant size. This has been a distraction, impeding our understanding of plants size and the labor market. The real problem in India, and for manufacturing and export performance, is not that there are many small plants but that there aren't enough large, very large (and hence competitive) plants which matter in labor-intensive export industries. We find that there is a clear tendency for plants to remain small even beyond the 100 worker threshold set in the IDA so that it is not the law per se (which is after all legally irrelevant beyond the threshold) but other factors that shape firm behaviour. Establishing multi-plants seems to be one way of doing so.

In this paper, we focus on the right tail, which we define as plants above the 200 employment (non-managerial) threshold. We do so for a number of reasons. First and foremost, there is the objective fact that large plants in any international context employ well above 200 workers, and that 200 is if anything a modest threshold for size. For example, the International Labor Office (ILO) classifies large plants as those with greater than 250 employees. Not doing so, and say defining a right tail based on the entire distribution, leads to awkward and even absurd assessments: for example, even in 2022, the 75th percentile plant in India employed about 53 workers, and the 90th percentile firm employed 128 workers. These cannot be considered large by any means. Second, the multi-plant phenomenon that is the focus of this paper is relevant for plants that employ more than 200 workers. Finally, it is also the case that several plants employing more than 100 workers are in the unregistered or informal sector whereas we want to focus on formal employment.

There is a long-standing and unsettled debate over the relative importance of plant size versus firm size for achieving scale efficiency. Larger plants can lower per-unit costs by distributing fixed costs across a greater output and enhancing process efficiencies (Syverson, 2004). Firms, on the other hand, can realize efficiency gains through centralized management and shared services, which help in reducing overall costs (Bloom & Van Reenen, 2010). Consequently, both plant and firm size play roles in achieving scale efficiency, with their significance varying according to the economic and operational context. However, given that much of the available analysis for India is derived from plant-level data, such as that from the Annual Survey of Industries (ASI), this paper focuses on plants, not firms, and within plants on the distinction between single plants and multi-plants.

The rest of the paper is organized as follows. Section 2 quantifies the multi-plant phenomena. Section 3 discusses the consequential errors in measurement and offers a way of correcting for them. Using this correction, Section 4 documents the evolution of estimated "true" plant size in India, focusing on the right tail, that is plants with more than 200 workers. Section 5 focuses on the apparel sector and contrasts India's firm size outcomes with Bangladesh, highlighting the measurement distortion and how it obscures understanding of true firm size. Section 6 discusses the role of contract labor and especially of multi-plants in imparting more flexibility to labor markets and firm choices. Section 7, using a fixed effect regression model, discuss the cost of multi-plants. Section 8 concludes.

2. Multi-Plant Phenomena

How important are multi-plants plants and how has that changed over time? According to the law, firms can file joint returns only if they have at least 2 plants each with 100-plus employees. The phenomenon of multi-plants will therefore only be meaningful for observed multi-plant sizes greater than 200 employees. Within this category, their importance is shown in Figures 3 and 4.

Throughout this paper, we present all the data for manufacturing as a whole and for labor-intensive industries (that account for close to half the employment of the organized sector) because that is where labor laws are going to be particularly important and also where scale is necessary to achieve efficiency (a description of labor-intensive industries and the criteria for inclusion is contained in Appendix 2).

Figures 3 and 4 demonstrate a few important points. Today, multi-plants account for a small share of total plants (3.74 percent in 2022) but a large share of non-managerial employment (25.16 percent) and output (21.26 percent). These shares are significantly greater in labor-intensive industries and, almost by definition, in plants employing 200 workers.

Figure 3A. Share of Multi-Plants in Total Plants (All Manufacturing)

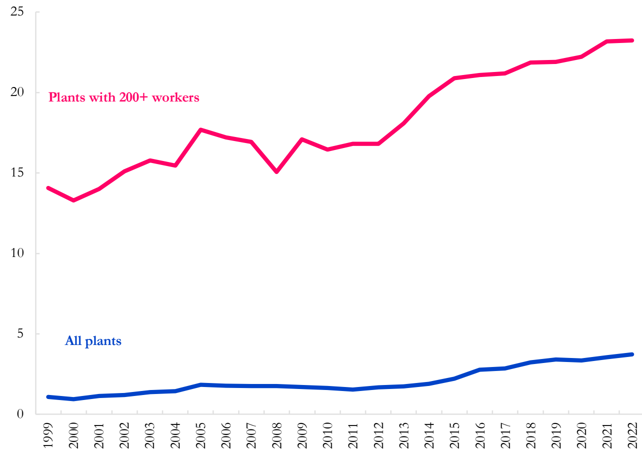
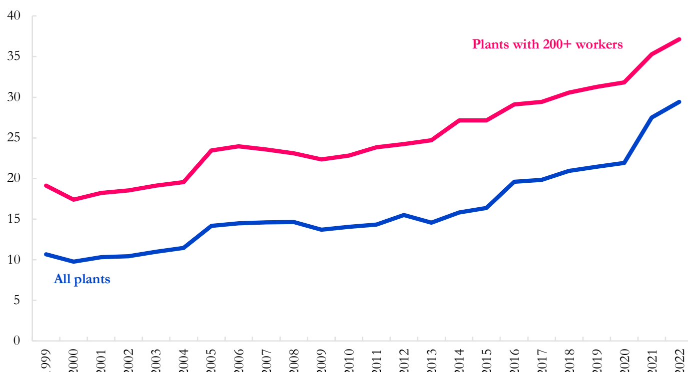


Figure 3B. Share of Multi-Plants in Non-Managerial Employment (All Manufacturing)



Source: ASI; Authors' estimates.

Figure 4A. Share of Multi-Plants in Total Plants (Labor-Intensive Manufacturing)

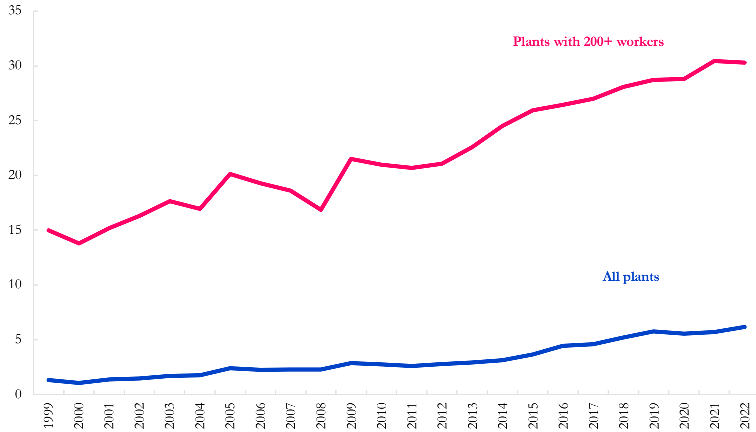
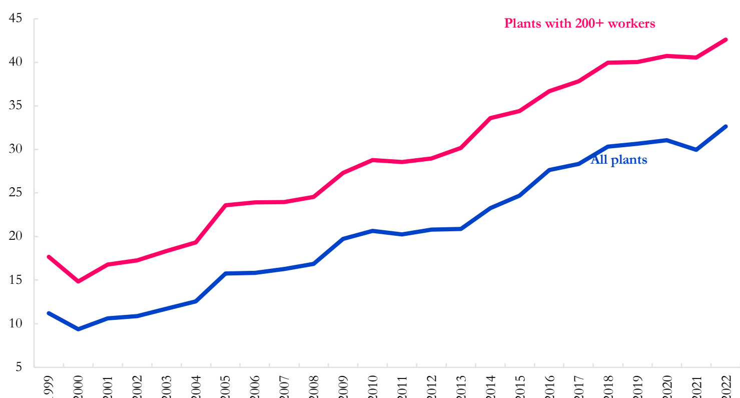


Figure 4B. Share of Multi-Plants in Non-Managerial Employment
(Labor-Intensive Manufacturing)



Source: ASI; Authors' estimates.

Significantly, the multi-plant phenomenon has expanded in scope over the last 2 decades. For example, in 2000, the share of multi-plants in non-managerial employment was 9.8 percent compared to 25.2 percent in 2022. In labor-intensive industries, the comparable numbers were 9.4 percent and 32.6 percent. Within labor-intensive industries, multi-plants now account for close to a third of non-managerial employment. Similar trends are evident in the share of multi-pants in total output (Appendix 3).

3. Errors in Measurement

Because multi-plants are treated as single plants, errors are committed in understanding the true number of plants and in the distribution of employment and output by size. Start first with the number of plants (In Appendix 4 we discuss all the issues arising from sampling weights).

3.1 The number of "true" plants

In 2000, the ASI data suggests that there were 92,732 plants which increased to 136,096 plants by 2022, an increase of 47 percent (Table 1). However, since a large and rising share of these plants were multi-plants, there is an error in measuring the true number of plants. Once we disaggregate the multi-plants, we find that the true number of plants increased from 94,382 to 145,308, an increase of 54 percent. There was a much larger increase on the extensive margin than suggested by the data. Indeed, as we show, the tantalizing but very plausible development might well be that firms increase the number of plants in order to keep them small. If true, this leads to the sobering finding that even during the era of liberalization and opening up and increased trading opportunities, Indian plants especially in labor-intensive export sectors, remained midgets.

Since overall employment and output is not mismeasured, this error would translate into errors in average size of employment and output per plant, and more importantly into errors in measuring the size distribution.

Table 1: Errors in Measuring Number of Plants

Employment size	True		Observed		Error	
	No. of plants (All manufacturing)					
	2001	2022	2001	2022	2001	2022
<200	90,851	135,524	88,745	124,605	-2%	-8%
>200	3,531	9,784	3,987	11,491	13%	17%
>1000	374	1,091	489	1,713	31%	57%
Total	94,382	145,308	92,732	136,096	-2%	-6%
	No. of plants (Labour-intensive manufacturing)					
<200	41,380	40,728	40,143	35,440	-3%	-13%
>200	1,852	3,419	2,105	4,124	14%	21%
>1000	238	398	296	677	24%	70%
Total	43232	44147	42248	39564	-2%	-10%

Source: ASI; Authors' estimates.

Table 2. Evolution in Plants Size of Plants Employing More than 200 Workers

	All Manufacturing			Labor-Intensive Manufacturing		
	Early 2000s	2020s	Increase (% age pts.)	Early 2000s	2020s	Increase (% age pts.)
	75th Percentile					
Observed	608	686	13	636	718	13
Estimated True	564	608	8	591	620	5
	90th Percentile					
Observed	1107	1298	17	1233	1422	15
Estimated True	997	1058	6	1121	1108	-1
	95th Percentile					
Observed	1741	2010	15	2104	2294	9
Estimated True	1549	1551	0	2050	1699	-17
	Mean					
Observed	643	709	10	731	789	8
Estimated True	614	602	-2	719	661	-8
	Median					
Observed	368	397	8	382	406	6
Estimated True	351	371	6	366	372	2

Source: ASI, Authors' estimates.

Note: We take the average of 2001-2004 and of 2019-2022 to represent, respectively, the early 2000s and 2020s.

Errors in measuring the size distribution and correcting for it

But this aggregate picture under-states the error because nearly all the error is on the right tail of the distribution, namely plants with employment size greater than 200 workers. In this category, the data indicates that the number of plants increased from 3,987 in 2001 to 11,491 plants, an increase of 188 percent. In fact, when measured correctly to account for multi-plants, the number of plants increased over the same period from 3531 to 9784. In effect, in the above 200 worker category, there were 1,707 fewer plants than suggested by the official data. Similar discrepancies arise if the right tail is defined as plants employing greater than 500 or 1000 workers. And the discrepancies are magnified for labor-intensive industries. For example, in 2022, in the labor-intensive sector, there is a 70 percent error in the number of plants with more than 1000 employees.

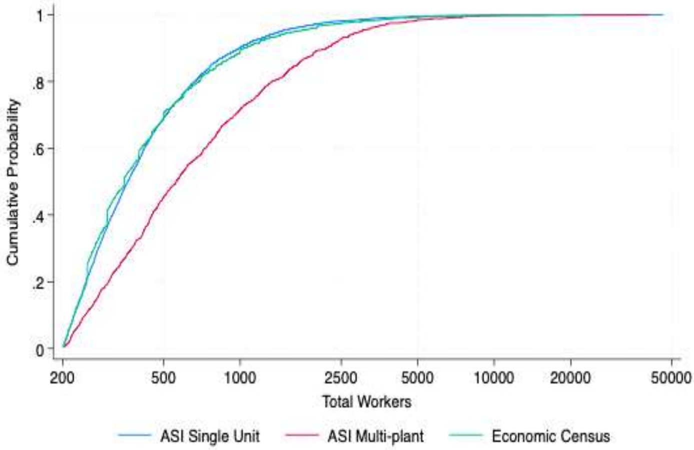
The fact of multi-plants leads to errors in the employment and output size distribution as well. Unlike in the case of the number of plants where it is possible to identify the "true" number of plants, in the case of employment and output that cannot be done: data for multi-plants comes aggregated and it is difficult therefore to tease out the size distribution from aggregated data. We were able to do so in Figure 1 because we were able to obtain the disaggregated data from the company itself.

We know from Figure 1 that the size distribution that emerges from multi-plants alone is mismeasured. The question is whether there is any way of "guesstimating" the size distribution of multi-plants. Our simple but intuitive assumption is that the size distribution of multi-plants should resemble that of single plants. Is there any evidence to support this assumption?

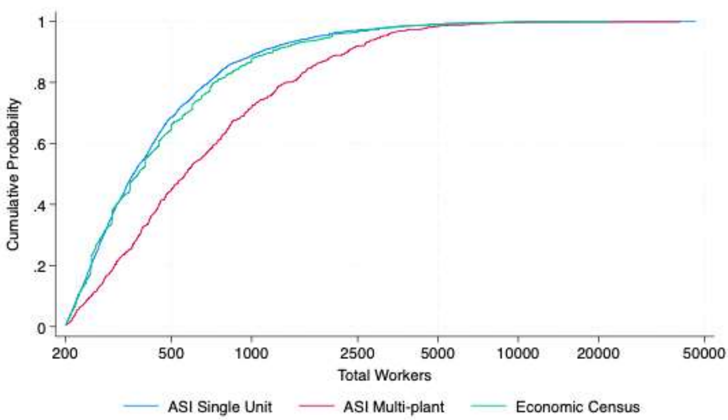
There is another data source for plant size, which is the Economic Census (EC) produced by the National Sample Survey which purports to capture all plants (hence "Census"). The latest available one is for 2012-13 (the next one is due for publication soon). For that year, we can compare the size distribution of plants from the Census with that for all single plants and multi-plants from the ASI. The results are shown in Figure 5a and 5b, respectively for all manufacturing plants and for plants in labor-intensive industries.

Figure 5. Size Distribution of Plants from Economic Census, Single and Multi-Plants from ASI (2012-13)

A. All Manufacturing



B. Labor-intensive Manufacturing



Source: ASI; Authors' estimates.

In both cases, it is clear that for the right tail, the EC distribution is very close to that of single plants and very different from that of multi-plants. The multi-plant distribution lies to the right not just of the single plant distribution but also that of the EC as expected, exaggerating the number of workers employed by large plants. For example, in the EC and single plant distribution, 60 percent of workers are employed in plants with less than 500 workers whereas for the multi-plant distribution, about 40 percent of workers are employed in plants employing less than 500 workers.

The single plant distribution being close to that of the EC holds true when we define the right tail as plants employing more than 100 workers. This also holds true for 2005-06, the other year for which the EC is available (see Appendix 5). We use this as suggestive evidence that the size distribution of units that comprise multi-plants and of single plants are probably quite close. With this evidence, we can then compute our estimated true distribution of employment and output. Essentially, we apply the single plant distribution to the aggregates for employment and output and then compare the resulting numbers with what we observe in the data.

4. Plant size distribution over time: "Observed" versus estimated "True"

Bertrand et. al. (2021) make the claim that there has been an increase in the size of plants since the early 2000s because of the possibility available to firms—in light of Supreme Court decisions and other developments—of hiring contract labour that do not fall within the purview of some provisions of key labor laws, especially the IDA. They find that between 2000 and 2015-16, the size distribution of plants shifted to the right: specifically: "T*he 90th and 95th percentiles of firm size ... have grown steadily since 2001. The 95th percentile firm has 43 percent larger employment in 2015 compared to 2000, while the 90th and 75th percentile firms have 36 and 28 percent larger employment. And their explanation is contract workers: "By 2015, contract workers accounted for 38% of total employment at firms with more than 100 workers compared to 20% in 2000."*

Is this claim true once we account for the mismeasurement arising from ignoring the phenomenon of multi-plants? Before we present the results, it is worth outlining that there are two ways of measuring the right tail. Drawing upon the helpful discussion in Hsieh and Olken (2014), we can measure the right tail in terms of plant size or of employment share: "the employment share distribution reveals in what size plant a typical worker in the economy works, whereas the plant size distribution reveals the distribution of plants. While the employment share statistic is interesting for understanding the aggregate distribution of employment, most theories about the existence of the missing middle discussed are about plant size itself. For example, theories about tax and regulatory notches and credit constraints are all about whether plants should grow above a certain size, not about the employment share in aggregate."

We are agnostic between these two definitions and present results for both. Using a series of size thresholds—mean, median, 75th, 90th and 95th percentiles and the top 100 plants— we show results based on the (employment) size of plants at these thresholds and based on the share of employment above the various thresholds. As a matter of arithmetic, the latter is obtained by multiplying the number of plants in each bin of plant size by the average employment in them.

We find that between the early 2000s and the 2020s the observed (i.e. mismeasured) data suggests an increase in the right tail. However, when the mismeasurement is corrected, the increase is smaller and in some cases there is no real increase in the right tail and on some metrics there is even a shrinking of the right tail. These findings hold even more starkly for labor-intensive manufacturing.

Table 2 shows the plant size in the 2000s and 2020s for the metrics detailed above both for the mismeasured and estimated true distribution and for overall and labor-intensive manufacturing. Take for example, the 95th percentile plants: the mismeasured data suggests that there was a 15 percent increase in the size of that plants but the corrected data suggests that there was no increase. In labor-intensive manufacturing, the comparable numbers are 9 percent and –17 percent: that is, the uncorrected data shows an increase in plant size but the corrected data shows a substantial decrease in plant size.

Consider next the mean number of workers. The mean is sensitive to inequality, and that is exactly what we want to identify, namely whether there has been an increase in large plants at the very right tail of the distribution. In the Table, the observed data suggests an increase in the mean number of workers but the corrected data show the opposite trend of a decline in average firm size.

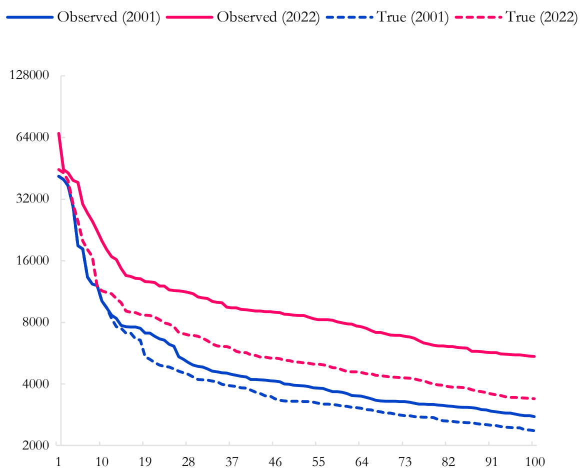
Finally, a more direct way to assess the evolution in the right tail is to look at the top 100 plants at each point in time (Figure 6A and 6B). In the case of all manufacturing, the reported data show a substantial increase in the size of the top 100 plants (the gap between the dotted lines) of about 100 percent, or a doubling of the plants size of these plants. When corrected for the multi-plant phenomenon, the size distribution goes up but only by half as much (gap between undotted lines).

In the case of labor-intensive plants, the results are even starker (Figure 6b). The observed data show roughly a 50 percent increase in the size of top 100 plants. But the corrected data show that the size of the top 100 plants remained unchanged, and again to emphasize, employment size includes contract workers (the 2 undotted lines are indistinguishable in Figure 6b). In other words, even after hiring more contract workers, the top 100 plants' overall workforce remained unchanged in labor-intensive industries over 2 decades.

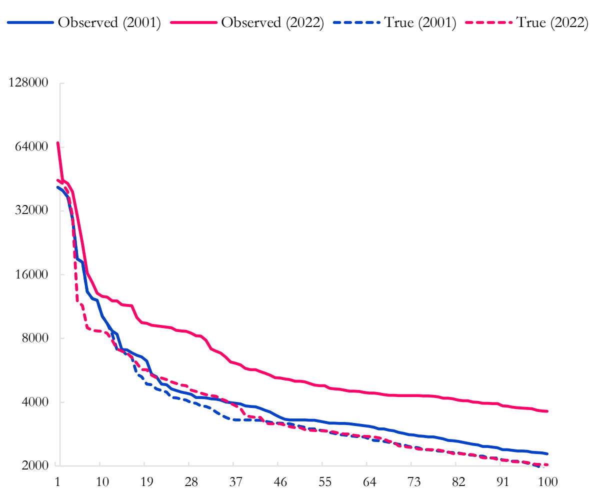
When we measure the right tail in terms of employment shares, specifically shares above the 75^{th}, 90^{th} and 95^{th} percentiles, our results are even stronger. For example, as Table 3 shows, the observed data for the manufacturing sector as a whole indicate that employment share above the 75^{th} percentile has increased by 1 percentage point, whereas in fact it declined by 3 percentage points. For the 95^{th} percentile, the observed employment share is nearly the same whereas the reality is a decline of 5 percentage points. In labor-

Figure 6. Employment Size of Top 100 Plants (number of non-managerial workers; log scale)

A. All Manufacturing



B. Labor-intensive Manufacturing



Source: ASI, Authors' estimates.

Table 3. Evolution in Employment Share of Plants Employing More Than 200 Non-Managerial Employees

200+ plants (All private manufacturing)							
Estimated "True"				Observed			
Employment share	Early 2000s	2020s	Change (% age points) (2001-22)	*Employment share*	Early 2000s	2020s	Change (% age points) (2001-22)
75th percentile & above	61.6%	59.0%	-2.6	75th percentile & above	61.8%	63.0%	1.2
90th percentile & above	44.4%	40.2%	-4.2	90th percentile & above	43.9%	44.4%	0.5
95th percentile & above	35.2%	30.5%	-4.8	95th percentile & above	34.2%	34.1%	-0.1

200+ plants (Labour-intensive manufacturing)							
Estimated "True"				Observed			
Employment share	Early 2000s	2020s	Change (% age points) (2001-22)	*Employment share*	Early 2000s	2020s	Change (% age points) (2001-22)
75th percentile & above	66.1%	62.5%	-3.6	75th percentile & above	65.9%	65.3%	-0.3
90th percentile & above	50.4%	45.0%	-5.4	90th percentile & above	48.1%	48.5%	0.4
95th percentile & above	41.2%	35.6%	-5.6	95th percentile & above	37.8%	38.8%	1

Source: Authors' estimates based on ASI.

intensive sectors, the results are similar. Across the three thresholds, there is a decline in estimated true employment share.

The question then is why our results are different from those in Bertrand et. al. (2021). The answer is that their metrics for large plants (or the right tail) are based on the entire plant size distribution. If we take their approach, we find results broadly similar to theirs although less pronounced because of the mis-measurement from ignoring multi-plants. But the real issue with their approach is the definition of the right tail. For example, their median plant in 2022 has 21 employees (contract and non-contract), the 75th percentile firm has 59 employees, their 90th percentile firm has 164 employees. Deeming these as large plants would seem to set the bar low for size.

Moreover, when we measure the right tail in terms of employment shares, then even deploying the Bertrand et. al. (2021) approach of looking at the entire distribution, we see that the observed data misleads (see Table A3.3 in Appendix 3): for example, the observed data suggests that the employment share above of plants above the 75th percentile increased by 3.3 percentage points whereas it only increased by 1.7 percentage points. The numbers for labor-intensive manufacturing are starker, with the observed data showing broad increases in employment share above the 75th, 90th and 95th percentile and the estimated "true" employment shares showing broad declines.

In sum, we can conclude that ignoring multi-plants obscures and even misleads about the true evolution in the right tail: whether we measure the right tail in terms of firm size or employment shares, and using various thresholds, it seems that correcting for the bias and taking account of the fact of multi-plants, the right tail of large plants either stagnated or shrunk between the early 2000s and 2020s. Relatively large Indian plants did not become larger and did not account for a larger share of employment over two decades despite this being a period of dynamism over two decades (oughties and teens) and a veritable boom in the first decade.

We now illustrate how measurement distorts our understanding of firm size and performance with reference to the apparel sector.

5. Plant Size: An International Comparison with the Bangladesh Apparel Sector

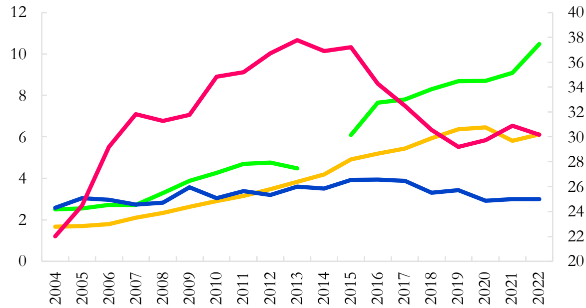
Most journeys to industrialization begins with textile mills. The two most important and canonical categories of unskilled exports are clothing and footwear. Table 4 from the Economic Survey (2016) shows the growth in exports of these categories in growth time. Every successful case of growth surge and success in the post-war period in Asia has been associated with dramatic surges (about 20 percent growth or more annually) in exports of apparel, and leather and footwear. This was true for all three successful waves of export-cum-development success: Korea, Thailand, Indonesia, and Taiwan in the first wave beginning in the late 1960s/1970s, China in the second, post-1990, and Vietnam and Bangladesh in the third, post-2000. India lagged significantly behind.

Turning to the more recent period, we see that after the elimination of the Multi Fiber Agreement in 2005, India which had until then been ahead of Bangladesh and Vietnam lost ground to them. Over a 20 plus year period, Bangladesh's market share soared from 2.5 percent to 8 percent while India's has languished at 3 percent (Figure 7).

Many factors explain the diverging fortunes of the Indian and Bangladesh apparel sector but could size be one of them? (Here we don't even bother to compare India with China because that is open to the criticism that China is an unfairly high benchmark as it accounts for close to 35-40 percent of global export market share). Our aim is to compare India against a modest benchmark such as Bangladesh.

Table 5 compares the size of large plants in India and Bangladesh in the apparel sector in 2013. We use five metrics or thresholds for size. It is striking how if we ignored multi-plants we would think that Indian plants were larger (compare columns 1 and 3 in Table 5); we would then be left with the puzzle of why Bangladesh is a more successful and competitive exporter and why Bangladeshi plants export on average 95 percent of their output compared to 37 percent for India.

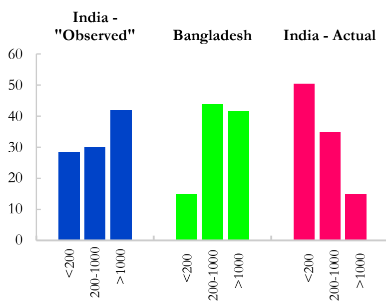
Figure 7. Global Export Shares in Apparel



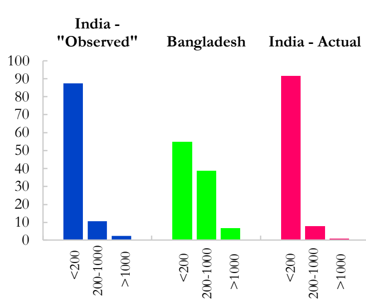
Source: UN Comtrade; Authors' estimate.

Figure 8. Size Distribution of Plants (Apparel)

A. Share in total employment



B. Share in total plants



Source: ASI; Bangladesh SMI; Authors' estimates.

Table 4: Economic Growth and Growth of Unskilled Labor Exports (percent)

Country	Year of take off	Apparel	Leather and Footwear	Overall economic growth
Korea	1962	30.4	69.9	9.0
Bangladesh	1985	27.9	29.8	5.2
Thailand	1960	53.8	44.1	7.5
Indonesia	1967	65.8	48.6	7.0
Malaysia	1970	33.4	27.5	6.9
China	1978	18.6	27.7	9.8
Vietnam	1985	17.8	16.1	6.6
India	1980	12.7	5.4	5.6

Source: Economic Survey, 2016

Note: All growth rates are annual averages for the 20 years after economic take-off. For apparel and leather and footwear they refer to growth of the current dollar value of exports.

Table 5. Size of Plants in Apparel Sector, Bangladesh and India, 2013
(200+ Non-managerial Workers)

	India		**Bangladesh**
	Observed	*Estimated True*	*True*
Mean	818	497	651
Median	409	342	378
75th Percentile	764	529	660
90th Percentile	1686	974	1368
95th Percentile	2423	1549	2160

Source: ASI, SMI.

But in fact there is no puzzle if we look for the right data (column 2 in Table 5). Now, if we compare plants size in India and Bangladesh, we find that Bangladeshi plants are consistently bigger at every threshold with the size differential rising as we go to higher thresholds for size: for example, the 95th percentile firm in Bangladesh is about 40 percent larger than its Indian counterpart (if we looked at the uncorrected data it would seem that the Indian firm is lager). There is no longer any puzzle because Bangladeshi plants are bigger and hence probably more efficient, exporting substantially more than Indian plants.

As discussed earlier, there is an alternative measure of size which is the employment share of large plants. India's uncorrected data show that larger Bangladeshi plants employ more than their Indian counterparts (Figure 8A). But this differential is substantially greater if we look at the correct data. Plants employing more than 200 workers account for roughly 85 percent of all employment in Bangladesh. In India, the comparable correct number is 50 percent. And plants employing more than 1000 workers account for roughly 41 percent of all employment of Bangladeshi plants. In India, the comparable correct number is 15 percent.

Whether assessed in terms of firm size or employment share, Bangladeshi plants are substantially bigger consistent with Bangladesh's superior export performance.

In other words, a high and rising share of workers in Bangladesh work in large plants while in India they continue working in relatively small plants. Of course, the causation from size to export success works in both directions but it is stark how much smaller are Indian plants in apparel even compared to Bangladesh.

6. Contract Workers and Multi-Plants

One of the striking developments in the Indian labour market—both in government and the private sector—has been the increased recourse to contractual labour. Manufacturing has witnessed this in spades. As Figure 9 (and Appendix 6) show, from virtually negligible levels in 1983, the share of contract labour in the total work force increased to 15 percent just around the time of major deregulation in the early 1990s and stands today at close to 40 percent. Whether this rise is due to a generalized search for cheaper labour, a change in ideology that made the labor market more competitive with less protections for those employed or because of a change in the legal environment (Bertrand et al., 2021; Chaurey, 2015; Kapoor & Krishnapriya, 2019) is a matter of debate. We don't propose to wade into these debates.

We want to focus on another dimension. What is striking is that this rise in contractualization has been mostly a feature of non-labor intensive industries (Figures 9A and 9B). The share of contract workers in such industries rose from 17 percent to a striking 48 percent (a near 3-fold increase) but in labor-intensive industries they have remained broadly flat at around 25-28 percent. The same trend is true in plants with greater than 200 workers but the levels are much greater: for example, in non-labor-intensive sectors, the share of contractual workers reached 55 percent in 2022. (Figure 9B).

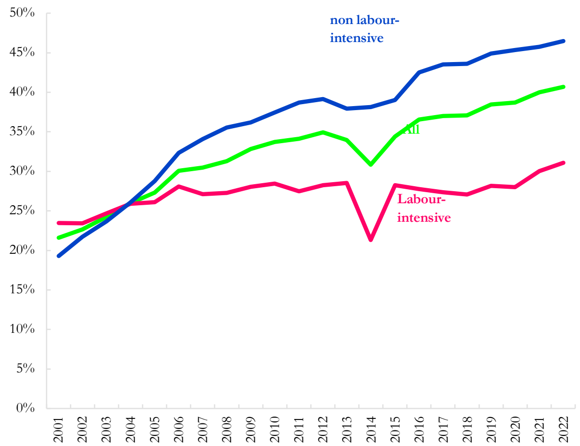
This is puzzling because it is precisely in labor-intensive industries that we should expect to see contractualization to overcome any burdens imposed by labor regulations. Probing further we find that a possible reason is the multi-plant phenomenon.

Figure 10 plots the share of contractual workers by employment size both for single and multi-plants. Two features are striking. First, the level of contractual labour is higher at all levels of employment in single plant units than in multi-plants. Second, at the margin, the incentive to substitute contract labor for full-time employees rises with employment size in single plants but does not do so uniformly for multi-plant units. In Appendix 6, we show that this relationship between contract labor and multi-plants broadly holds for labor-intensive manufacturing and also for the whole employment distribution, starting at plants with 10 workers.

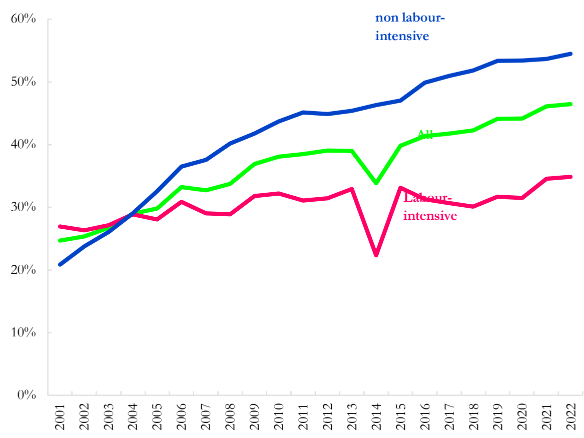
One explanation is simply that in multi-plant units flexibility in hiring and firing labor comes from the fact of having many plants. In

Figure 9. Share of contractual workers in total workforce

A. All Plants



B. Plants with 200+ employment



Source: ASI; Authors' estimate.

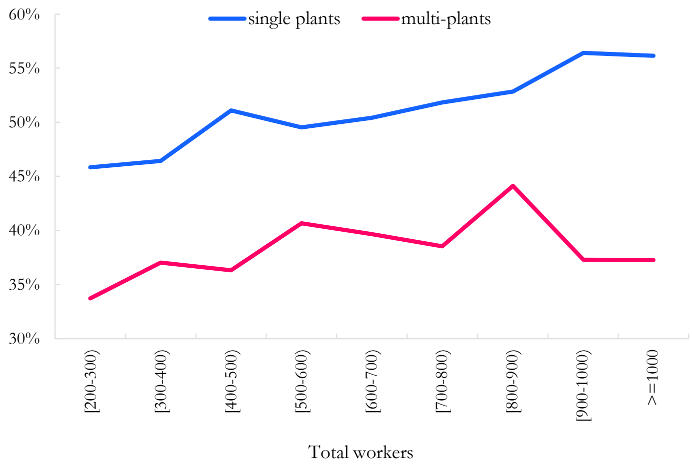
single plants, there is no such flexibility which renders the use of contract labor more important. In the case of the firm we depicted in Figure 1, we were told by its CEO that in the event of say a drop in orders from one client that affects one plant, the firm can redeploy labour in another plant without having to terminate their employment which would be the only option in a single plant establishment. In other words, multi-plants and contract labour are both devices that increase flexibility but in different ways and for different situations and work as substitutes.

Figure 10 is also important in another critical respect. All the results in the paper show that plants in India try and remain small but at all points in the employment distribution and not just around the thresholds in various laws. Similarly, Figure 10 (and Appendix 3 figure A3.2) shows that the desire for flexibility either via contract labour or via recourse to multi-plants also exists all along the employment distribution well above the 100 worker threshold that has been the focus of nearly all the academic discussions and debates (Besley & Burgess, 2004).

According to the CEO of the firm depicted in Figure 1, it would be more competitive internationally if its plant sizes could be greater. But it chooses not to grow as a matter of diversifying policy and legal risks and because of onerous regulations. The risks are not the law, per se, but stem from the broader political environment in which the firm feels it would be disadvantaged relative to the central government, to state governments where the plants are located, and also to labor in the event of any kind of labor-related dispute.

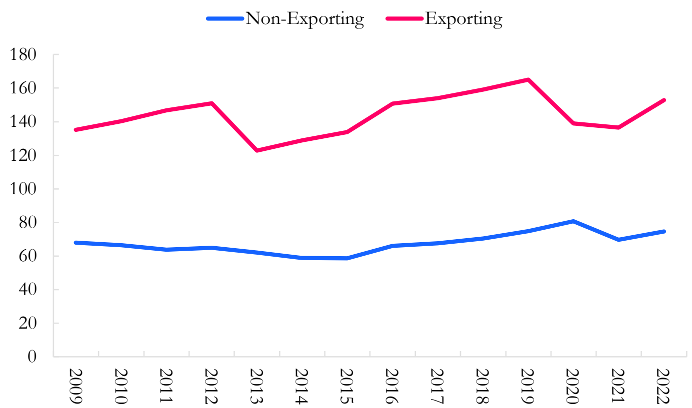
A dispute in a big plant would entail greater risks relative to that in a smaller plant: *in extremis,* shutting down a plant with five hundred employees is less costly than one with five thousand employees. Note that this problem is not the narrow one related to the Industrial Disputes Act because in most plants the firm shown in Figure 1 employs well above the thresholds set forth in it. Note also that this firm feels it prudent not just to diversify risks across states but also within states. Risk spreading in a highly uncertain political environment is one reason why manufacturers chose not to become too big.

Figure 10. Share of Contract Workers in Single and Multi-Plants, 2021-22



Source: ASI; Authors' estimate.

Figure 11. Average Non-Managerial Employees in Labor Intensive Sectors



Source: ASI; Authors' estimates.

Whether this risk is seen as originating in democratic politics or in the broader operation of the law is unclear. Regardless, the consequence is that entrepreneurs choose to remain midgets to make widgets and choose to forego the benefits of scale and the attendant global export opportunities. Regulations—the creations of a precocious democracy preoccupied with protecting the weak against the strong and the small against the big—are therefore another reason why plants remain midgets.

Finally, since the phenomenon of multi-plants is so pervasive and leads to serious measurement error especially in the right tail of the distribution, all the research on the presence of discontinuities around thresholds in the IDA need to be re-evaluated.

7. Costs of Multi-Plants

Why should we care about the growing multi-plant phenomenon?

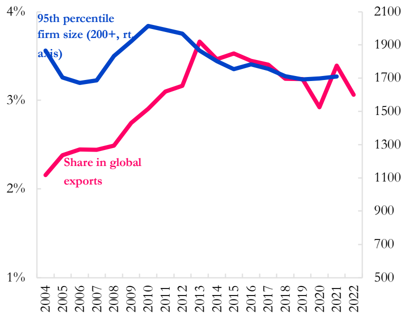
If multi-plant phenomenon is a response to some friction it should entail some cost which is the loss in size and hence in some economies of scale at plant level. We know in general that there are efficiency benefits to scale; Bertrand et. al. (2021) show this for scale of plants in India, highlighting that the average product of labor increases with size in Indian industry. Large plants are more efficient.

We can show this in a slightly different form for labor-intensive manufacturing in India. Among single plants, the average firm size for exporting units is substantially larger than for non-exporting (Figure 11). Also, there is a broad correlation between large plants size in labor-intensive manufacturing and global export market share (Figure 12). It plots the size of the 95th percentile firm (defined in terms of firm size in Figure 12A and in terms of employment share in Figure 12B) against India's global export market share.

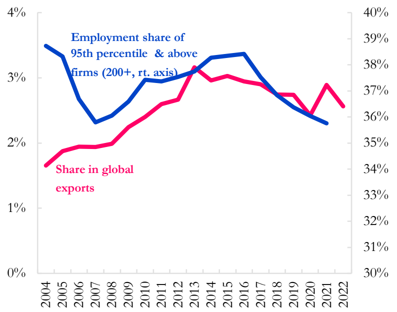
The increase in plant size during the boom period and the subsequent stagnation coincides with the surge and subsequent stalling of India's overall manufacturing exports and especially

Figure 12. Share in Global Exports and Large Plant Size (Labour-intensive manufacturing)

A. Firm size and exports share

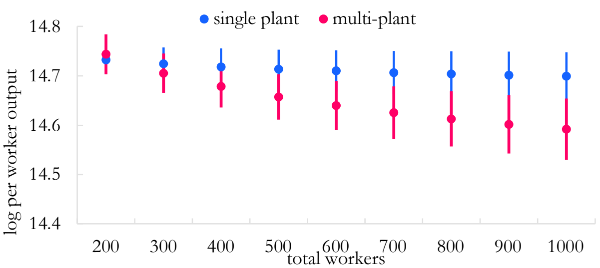


B. Employment and exports share



Source: ASI; Authors' estimates.

Figure 13. Plant size and labour productivity (labour-intensive manufacturing, 2022)



Source: ASI; Authors' estimates.

Note: Mean values and 95% confidence intervals are generated by regressing log per worker output on log total workers with industry and state fixed effects.

labor-intensive exports. Clearly, the causation between plant size and exports runs both ways—large plants lead to efficiency and international competitiveness and rising exports allow or facilitate plants to become larger—but the fact of the correlation is important.

The question is whether multi-plants are leading to a shrinking of firm size which entails the attendant costs. In Figure 2, we showed that the average product of labor for both single and multi-plants after controlling for location (states) and industry. It was significantly lower in multi-plants. In Figure 13, we show the same for labor-intensive industries.

In order to test this more formally, we run the following cross-industry regressions for several points in time:

$$Ln(Y_{is}) = F_i + F_s + \alpha\ (D) + \beta\ (E) + \gamma\ (D^*\ E_{is}) + \varepsilon$$

Where

- ❑ Y_{is} is output per worker in industry i in state s;
- ❑ $F_i + F_s$ are industry and state fixed effects, respectively
- ❑ D is an indicator (dummy) which takes on a value of 1 for multi-plants and zero otherwise;
- ❑ E_{is} is employment in industry i in state s;
- ❑ and ε is the error term.

Our key coefficient of interest is γ because our hypothesis is that if multi-plants are smaller versions of equivalent-size single plants, then there is a scale penalty associated with adding one worker in the former as opposed to the latter. As can be seen, γ is negative, implying that multi-plants are less productive than single plants at the margin (see Appendix 7 for more details).

A caveat needs to be drawn here. One interpretation of Figures 2 and 13 and the results in Tables 6 and 7 are that multi-plants are less productive than singe plants. But that would not be strictly correct. Rather, these results are more a confirmation of mismeasurement itself. We know that for any measured employment size, a multi-plant is actually smaller than a single

Table 6: All Private Manufacturing employing more than 200 workers

	Year 2001			Year 2022		
	(1)	(2)	(3)	(4)	(5)	(6)
multi-plant	1.37***	0.40***		0.59***	0.13***	
	(0.47)	(0.08)		(0.19)	(0.03)	
Log (total worker)	0.02			0.09***		
	(0.04)			(0.02)		
plant_size (500-1000)		0.15**	0.22**		0.07**	0.11***
		(0.06)	(0.09)		(0.03)	(0.04)
plant_size (>1000)		0.01	0.23**		0.12***	0.18***
		(0.08)	(0.1)		(0.04)	(0.04)
No. of plants			0.18***			0.06***
			(0.04)			(0.02)
No. of plants X plant_size (500-1000)			-0.08			-0.04**
			(0.05)			(0.02)
No. of plants X plant_size (>1000)			-0.19***			-0.06***
			(0.05)			(0.02)
multi-plant X log (total_worker)	-0.17**			-0.08***		
	(0.07)			(0.03)		
multi-plant X plant_size (500-1000)		-0.19			-0.08	
		(0.13)			(0.06)	
multi-plant X plant_size (>1000)		-0.32**			-0.13**	
		(0.16)			(0.06)	
R-sq.	0.24	0.24	0.24	0.24	0.24	0.24
N	3371	3371	3371	10072	10072	10072
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
* p<0.10, ** p<0.05, *** p<0.01						

Table 7. Labour-intensive private manufacturing employing more than 200 workers

	Year 2001			Year 2022		
	(1)	(2)	(3)	(4)	(5)	(6)
multi-plant	1.02*	0.35***		0.52*	0.24***	
	(0.58)	(0.10)		(0.28)	(0.05)	
Log (total worker)	-0.15***			-0.04		
	(0.05)			(0.03)		
plant_size (500-1000)		0.04	0.08		0.03	0.08
		(0.08)	(0.11)		(0.06)	(0.07)
plant_size (>1000)		-0.38***	-0.19		-0.06	0.05
		(0.11)	(0.13)		(0.07)	(0.07)
No. of plants			0.16***			0.10***
			(0.04)			(0.02)
No. of plants X plant_size (500-1000)			-0.07			-0.06**
			(0.05)			(0.03)
No. of plants X plant_size (>1000)			-0.15***			-0.09***
			(0.05)			(0.02)
multi-plant X log (total_worker)	-0.12			-0.05		
	(0.09)			(0.04)		
multi-plant X plant_size (500-1000)		-0.28*			-0.13	
		(0.17)			(0.09)	
multi-plant X plant_size (>1000)		-0.19			-0.09	
		(0.21)			(0.09)	
R-sq.	0.28	0.28	0.28	0.23	0.23	0.23
N	1842	1842	1842	3676	3676	3676
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
* p<0.10, ** p<0.05, *** p<0.01						

Notes: "multi-plant" and "plant size" are the relevant dummies. "X" denotes an interaction term. Standard errors are in parentheses below the coefficient estimate.

plant. The fact that its productivity is lower simply confirms the Bertran and Tsieh (2021) finding that plants with smaller employment size are less productive than those with more workers.

8. Conclusions

The entire research on size distribution of plants has been based on not taking account of a significant feature of the data in the ASI: namely, the phenomenon of multi-plants and how that can distort our understanding of firm size distribution. Figure 1 provided a particularly stark example of this phenomenon. But the paper has attempted to generalize that finding.

The main findings are that once we correct our measurement to account for the multi-plant phenomenon, we find that over the 2 decades beginning this millennium–a period of overall economic dynamism–the right tail of the plant size distribution has stagnated or become smaller rather than bigger, and particularly so in labor-intensive sectors. Put differently, India's large plants have not grown and may in fact have shrunk and importantly this has happened despite the sharp increase in contract workers. In the particular case of the apparel sector that we examined in detail, this constancy or shrinking size of large plants correlates strongly with the poor performance of India's exports compared to Bangladesh.

Second, the multi-plant phenomenon is important in understanding the nature of the labor market. Specifically, it seems that having multiple plants (with fewer workers) is a mechanism–along with recourse to contract labor–for firms to endow themselves with greater flexibility either in response to economic or political shocks. It is also important to emphasize that both these flexibility mechanisms happen along the employment distribution even beyond any threshold in the labor laws. This speaks to challenges in the broader climate of capital-worker relations rather than any specific feature of labor laws.

Finally, there is anecdotal good news. Whether triggered by the China plus one opportunity or government policies relating to the new subsidy scheme, in Tamil Nadu and Karnataka, there have been a series of investments in which worker size has been 10,000 and upwards in electronics, apparel and footwear. We will have to wait and see if this will amount to a quantitatively significant, India-wide trend relating to firm size outcomes in India.

For the last 2 decades, however, these outcomes–midgets-making-widgets despite overall dynamism– have been grim, a grimness obscured by incomplete and even faulty understanding of the data.

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Appendix 1: Joint Returns in Annual Survey of Industries (ASI)

The primary unit of enumeration in the ASI is an establishment which is essentially a factory/plant for the manufacturing sector. An establishment is defined as a productive unit which is situated in a single location and engaged in a single productive activity or where multiple productive activities are carried out; the principal productive activity accounts for most of the value of products and by-products produced (ASI Instruction Manual, 2021-22). However, owners of two or more establishments are permitted to furnish a single consolidated return, termed as a 'Joint Return (JR)' under specific conditions.

The criteria for compiling joint returns are as follows:

Same State Code: The plants must be located within the same state.

Same Management: The plants should be managed under the same organizational structure.

Combined Accounts: Separate unit-wise accounts are not available; only combined accounts are available.

Non-separable Resources: Resources that go into the manufacturing activities in the plants are not separately identifiable.

Same Industry Group: The plants must belong to the same industry group at the 3-digit NIC level.

Compilation Process: Joint returns are typically compiled during the frame updation stage by the Field Operations Division (FOD) before the sample selection for the survey. At this stage, plants that meet the aforementioned criteria are identified, and joint returns are formed accordingly.

Importantly, units that form joint returns must belong to the same scheme at survey stage. This means that units from the Census Scheme cannot form joint returns with units from the Sample Scheme, and vice versa. Even if units meet the joint return criteria after the sample selection stage, they must be segregated by scheme. However, when the frame is updated, joint returns can be filed in subsequent surveys for the survey scheme plants as well. (Chapter 3, ASI Instruction Manual, 2021-22).

Appendix 2: Definition and Selection of Labor-Intensive Industries

The methodology to define labor-intensive industries is as follows:

Data Source: The analysis is based on data from the Annual Survey of Industries (ASI) 2021-22.

Aggregation: The Gross Capital Formation (GCF) and the total number of workers employed are aggregated at the 2-digit industry group level, using National Industrial Classification (NIC) codes.

Capital to Labor Ratio Calculation: For each 2-digit industry group, the capital to labor ratio (K/L ratio) is calculated by dividing the Gross Capital Formation by the total number of workers. A higher K/L ratio indicates greater labor intensity.

Selection of Labor-Intensive Industries: The top 10 industry groups with the highest labor intensity are identified, accounting for nearly 45 percent of the total workforce. These industry groups are categorized as labor-intensive.

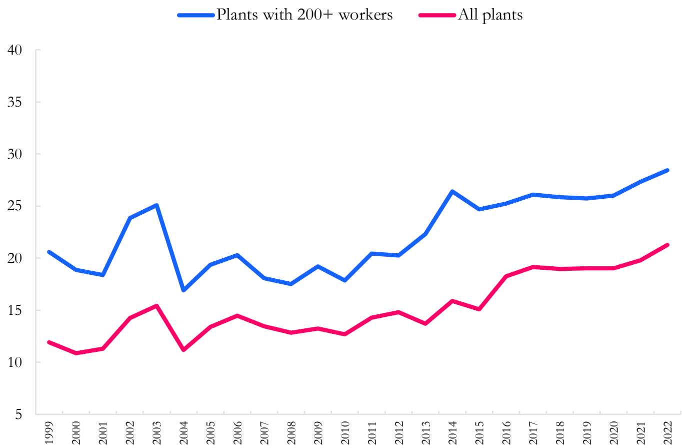
Table A2.1: Industry Groups and Capital to Labor Ratios

NIC Code	Industry Description	K/L Ratio	Employment Share
12	Manufacture of tobacco products	7700	3%
14	Manufacture of wearing apparel	70462	8%
15	Manufacture of leather and related products	95021	3%
13	Manufacture of textiles	108093	10%
10	Manufacture of food products	146444	12%
32	Other manufacturing	159545	3%
18	Printing and reproduction of recorded media	210497	1%
16	Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	205789	1%
25	Manufacture of fabricated metal products, except machinery and equipment	228420	4%
31	Manufacture of furniture	248447	1%
23	Manufacture of other non-metallic mineral products	225851	7%
28	Manufacture of machinery and equipment n.e.c.	305891	6%
30	Manufacture of other transport equipment	299502	3%
26	Manufacture of computer, electronic and optical products	341159	2%
27	Manufacture of electrical equipment	338677	4%
22	Manufacture of rubber and plastics products	358474	5%
17	Manufacture of paper and paper products	360654	2%
21	Manufacture of pharmaceuticals, medicinal chemical and botanical products	536374	5%
20	Manufacture of chemicals and chemical products	463694	6%
11	Manufacture of beverages	520782	1%
29	Manufacture of motor vehicles, trailers and semi-trailers	592539	7%
24	Manufacture of basic metals	672981	8%
19	Manufacture of coke and refined petroleum products	2859327	1%

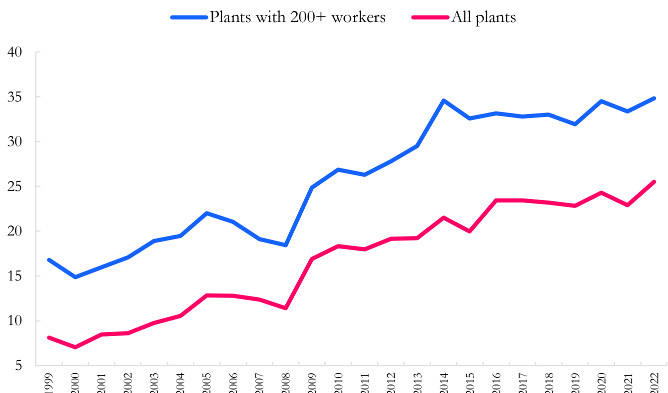
Appendix 3: Additional Figures and Tables

Figure A3.1 Share of Multi-Plants in Total Output

A. All manufacturing

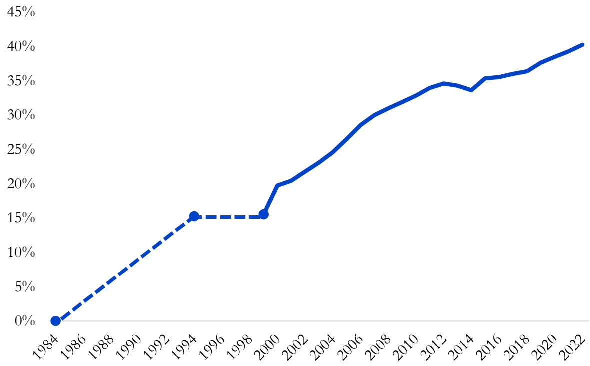


B. Labour-intensive manufacturing



Source: ASI; Authors' estimates.

Figure A3.2 Contract Workers as % of Total Workers (All Manufacturing)



Source: ASI; Authors' estimates.

Note: The dotted line is an interpolation between years for which data are available.

Table A3.3 Evolution in Employment Share of Plants for Entire Plant Size Distribution (Non-Managerial Workers)							
All Manufacturing							
Estimated "True"				"Observed"			
Employment share	2000s	2020s	Change	*Employment share*	2000s	2020s	Change
(2001-22)				(2001-22)			
75th percentile & above	80.1%	81.9%	1.7%	75th percentile & above	81.6%	84.8%	3.3%
90th percentile & above	64.5%	65.7%	1.2%	90th percentile & above	66.8%	70.5%	3.7%
95th percentile & above	54.4%	54.7%	0.2%	95th percentile & above	57.0%	59.5%	2.5%
Labor Intensive Manufacturing							
Estimated "True"				"Observed"			
Employment share	2000s	2020s	Change	*Employment share*	2000s	2020s	Change
(2001-22)				(2001-22)			
75th percentile & above	82.7%	82.7%	0.0%	75th percentile & above	83.9%	86.0%	2.1%
90th percentile & above	68.3%	67.2%	-1.1%	90th percentile & above	70.3%	72.1%	1.7%
95th percentile & above	58.9%	56.2%	-2.7%	95th percentile & above	60.8%	61.0%	0.1%

Appendix 4: Errors in Sampling Establishments

The ASI follows a unique sampling design where the updated frame for a given year is divided into census and sample schemes. All units in the census scheme are surveyed and establishments are drawn from the residual sample scheme using Circular Systematic Sampling technique from strata formed based on State x District x Sector x 3-digit NIC-2008. The sampling methodology has undergone several changes between 2000 and 2022. The first update was in 2004-05, the second in 2007-8, third in 2012-13 and fourth in 2015-16. The details of the changes in sampling design can be found in the ASI study documents and instruction manuals.

The sample sector is broadly representative of establishments with 100 or less workers (100 or less employees since 2012-13). However, the sample is drawn from an updated frame but despite the updates, the workers employed by establishments often change by the time the survey is conducted. This often leads to sample establishments having over 100 workers, sometime over 1000 workers, being assigned sampling weights.

This is a worrying problem as such establishments are not representative of the sample scheme and the sampling weights assigned to these establishments can exaggerate the numbers, employment and output of establishments with over 100 workers. We demonstrate the problem using two years 2000-01 and 2021-22. Table A4.1 gives the distribution of establishments in the private manufacturing sector which have been assigned sampling weights but have on average over 200 workers. We see that for 2000-01, 74 establishments have been assigned a sampling weight greater than 1. As a result, these 74 establishments have been inflated to 508, an inflation of 6.9 times. A similar inflation is seen in the aggregate of total workers. For 2021-22 the inflation is steeper at 9.2 times for establishments and 8.8 times for the aggregate of total workers.

Table A4: Errors due to Sampling Weights Assigned to Establishments with 200+ Workers

2000-01					
Average Workers	Total Establishments without Sampling Weights	Total Establishments with Sampling Weights	Average Workers	Total Workers without Sampling Weights	Total Workers with Sampling Weights
200-500	62	425	200-500	17284	119321
500-1000	11	75	500-1000	7208	46894
2000-3000	1	8	2000-3000	2619	20952
Total	74	508	Total	27111	187167
2021-22					
Average Workers	Total Establishments without Sampling Weights	Total Establishments with Sampling Weights	Average Workers	Total Workers without Sampling Weights	Toal Workers with Sampling Weights
200-500	129	1,209	200-500	35389	331602
500-1000	17	147	500-1000	10093	79965
1000-2000	6	51	1000-2000	8934	73945
2000-3000	1	6	2000-3000	2142	12852
Total	153	1,413	Total	56558	498364

Table A4.2 Error in Total Plants in Private Manufacturing Establishments with 200+ Workers			
Average Workers	Total Establishments without Sampling Weights	Total Establishments with Sampling Weights	Error
2000-01	3,353	3,787	12.9%
2021-22	10,020	11,280	12.6%

Table A4.3 Error in Total Workers in Private Manufacturing Establishments with 200+ Workers			
Average Workers	Total Workers without Sampling Weights	Total Workers with Sampling Weights	Error
2000-01	2192525	2352581	7.3%
2021-22	7015889	7457695	6.3%

Referring to Tables A4.2 and A4.3. In 2000-01, the sampling weights inflate private manufacturing establishments with more than 200 workers by 12.9 percent and total workers employed by 7.3 percent and in 2021-22, establishments by 12.6 percent and total workers 6.3 percent. This can distort any analysis of plant size distribution.

We avoid distorting our calculation by using modified multipliers which are forced to take a value of 1 for all establishments hiring more than 100 workers.

Appendix 5: Comparison of ASI and Economic Census

In this appendix, we provide additional charts as robustness checks for our assumption that the "true" plant size distribution is indicated by the ASI single plant distribution and not the combined ASI distribution which includes multi-plants. The working assumption is that the Economic Census provides the true plant size distribution. Charts A5.1 and A5.2 compare the ASI and Economics Census for 2012-13 for plants with 100+ workers.

Chart A5.1

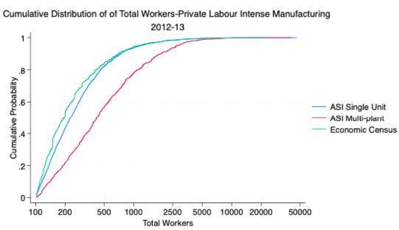
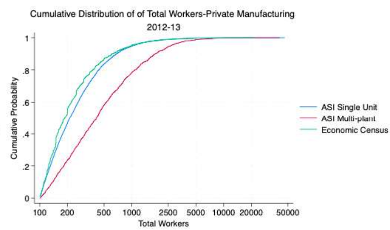


Chart A5.2



Charts A5.3 and A5.4 compare the ASI and Economics Census for 2005-06 for plants with 100+ workers. And Charts A5.5 and A5.6 compare the ASI and Economics Census for 2005-06 for plants with 200+ workers. In all cases, our assumption that the single plant distribution is close to that of the EC is borne out.

Chart A5.3

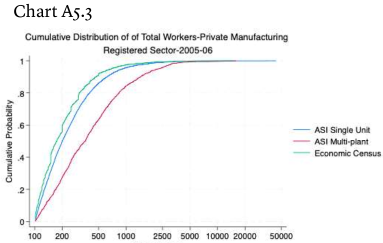


Chart A5.4

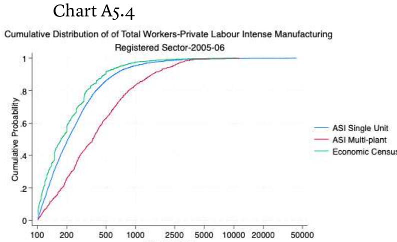


Chart A5.5.

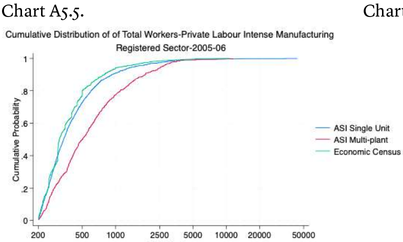
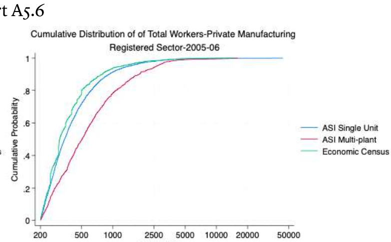


Chart A5.6



Appendix 6: Fractional Polynomial Fit Graphs for Contract Share vs. Average Total Workers

This appendix provides additional graphs as robustness checks for the claim that multi-plants hire fewer contract workers at every level of employment. Chart A6.1 and A6.2 show the fractional polynomial fit for private manufacturing sector for the range 200-1000 and 10-1000 total workers. We observe a lower share of contract workers in multi-plants.

Chart A6.1

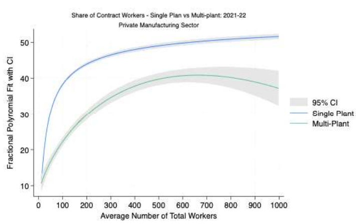
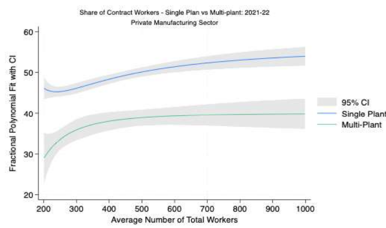


Chart A6.2



Charts A6.3 and A6.4 provide analogous graphs for the labour-intensive manufacturing sector. Here again, we observe the lower contract labour share in multi-plants. The overlapping confidence intervals in A6.3 is due to fewer data points. The larger number of establishments in A6.4 provides tighter confidence intervals and hence a statistically significant lower level of contract labour share at every level of total workers.

Chart A6.3

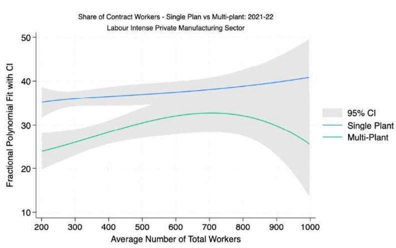
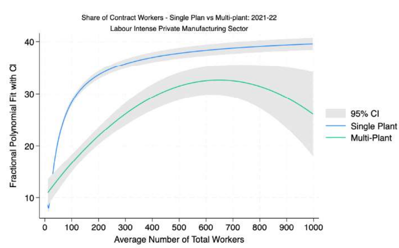


Chart A6.4



Appendix 7: Additional Regression Results

	All Private Manufacturing 2022							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	-8
multi-plant	0.10***	0.08***	0.59***	0.09***	0.13***			
	(0.03)	(0.03)	(0.19)	(0.03)	(0.03)			
Log (total worker)		0.06***	0.09***					
		(0.01)	(0.02)					
multi-plant X log (total_worker)			- 0.08***					
			(0.03)					
plant_size (500-1000)				0.05*	0.07**		0.05**	0.11***
				(0.03)	(0.03)		(0.03)	(0.04)
plant_size (>1000)				0.08**	0.12***		0.09***	0.18***
				(0.03)	(0.04)		(0.03)	(0.04)
multi-plant X plant_size (500-1000)					-0.08			
					(0.06)			
multi-plant X plant size (>1000)					-0.13**			
					(0.06)			
No. of plants						0.01***	0.01*	0.06***
						(0.01)	(0.01)	(0.02)
No. of plants X plant_size (500-1000)								-0.04**
								(0.02)
No. of plants X plant_size (>1000)								- 0.06***
								(0.02)
R-sqr	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
N	10018	10072	10072	10072	10072	10072	10072	10072
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01

	All Private Manufacturing 2001							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
multi-plant	0.29***	0.30***	1.37***	0.29***	0.40***			
	(0.06)	(0.06)	(0.47)	(0.06)	(0.08)			
Log (total worker)		-0.01	0.02					
		(0.03)	(0.04)					
multi-plant X log (total_worker)			-0.17**					
			(0.07)					
plant_size (500-1000)				0.12**	0.15**		0.13**	0.22**
				(0.06)	(0.06)		(0.06)	(0.09)
plant_size (>1000)				-0.06	0.01		-0.05	0.23**
				(0.07)	(0.08)		(0.07)	(0.10)
multi-plant X plant_size (500-1000)					-0.19			
					(0.13)			
multi-plant X plant_size (>1000)					-0.32**			
					(0.16)			
No. of plants						0.10***	0.10***	0.18***
						(0.02)	(0.02)	(0.04)
No. of plants X plant_size (500-1000)								-0.08
								(0.05)
No. of plants X plant size (>1000)								-0.19***
								(0.05)
R-sqr	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
N	3352	3371	3371	3371	3371	3371	3371	3371
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
					* p<0.10, ** p<0.05, *** p<0.01			

	L-intensive Private Manufacturing 2022							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
multi-plant	0.17***	0.19***	0.52*	0.19***	0.24***			
	(0.04)	(0.04)	(0.28)	(0.04)	(0.05)			
Log (total worker)		-0.06**	-0.04					
		(0.02)	(0.03)					
multi-plant X log (total_worker)			-0.05					
			(0.04)					
plant_size (500-1000)				-0.01	0.03		-0.01	0.08
				(0.04)	(0.06)		(0.04)	(0.07)
plant_size (>1000)				-0.10**	-0.06		-0.10**	0.05
				(0.05)	(0.07)		(0.05)	(0.07)
multi-plant X plant_size (500-1000)					-0.13			
					(0.09)			
multi-plant X plant_size (>1000)					-0.09			
					(0.09)			
No. of plants						0.03***	0.03***	0.10***
						(0.01)	(0.01)	(0.02)
No. of plants X plant_size (500-1000)								-0.06**
								(0.03)
No. of plants X plant_size (>1000)								-0.09***
								(0.02)
R-sqr	0.22	0.23	0.23	0.22	0.23	0.22	0.22	0.23
N	3661	3676	3676	3676	3676	3676	3676	3676
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
					* p<0.10, ** p<0.05, *** p<0.01			

	L-intensive Private Manufacturing 2001							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
multi-plant	0.20**	0.25***	1.02*	0.25***	0.35***			
	(0.08)	(0.08)	(0.58)	(0.08)	(0.10)			
Log (total worker)		-0.17***	-0.15***					
		(0.04)	(0.05)					
multi-plant X log (total_worker)			-0.12					
			(0.09)					
plant_size (500-1000)				-0.01	0.04		-0.01	0.08
				(0.07)	(0.08)		(0.07)	(0.11)
plant_size (>1000)				-0.42***	-0.38***		-0.42***	-0.19
				(0.10)	(0.11)		(0.10)	(0.13)
multi-plant X plant_size (500-1000)					-0.28*			
					(0.17)			
multi-plant X plant_size (>1000)					-0.19			
					(0.21)			
No. of plants						0.07***	0.09***	0.16***
						(0.02)	(0.02)	(0.04)
No. of plants X plant_size (500-1000)								-0.07
								(0.05)
No. of plants X plant_size (>1000)								-0.15***
								(0.05)
R-sqr	0.27	0.28	0.28	0.28	0.28	0.27	0.28	0.28
N	1832	1842	1842	1842	1842	1842	1842	1842
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p<0.10, ** p<0.05, *** p<0.01

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