Organisational Restructuring and Firm Size Dynamics in Indian Manufacturing

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Abstract

This paper examines firm size dynamics in Indian manufacturing by incorporating organisational restructuring into the analysis of size-distribution. Using ASI panel data from 2001-2023, we combine distributional estimations with bimodality diagnostics, transition matrices and panel regressions to study firm's scale, growth and mobility. Findings suggest that size distribution remains skewed toward small firms, with a gradual shift in density toward intermediate sizes, though with limited evidence of bimodality. We find that organisational strategies, particularly the increasing reliance on contractual labour and multi-plant expansion, are pervasive features of firm behaviour that is shaping size dynamics in India. Firms do not exhibit systematic bunching around statutory cut-offs, instead, they adjust organisationally across the size distribution. Once these adjustments are taken into accounted, average factory size sees a declining trend. Transition dynamics reveal strong persistence within same size classes and limited upward mobility, implying that firm growth is very modest. These findings suggest that firm size dynamics are shaped not by regulatory constraints but by broader organisational strategies, offering a reinterpretation of missing-middle phenomenon and overall firm-size distribution in Indian manufacturing.

1. Introduction

Firm size is central to industrial development and has long been linked to productivity, employment generation and structural transformation. Beyond reflecting economies of scale, scope and degree of capital intensity, it captures how production is organised across heterogeneous firms and reflect underlying technological and organisational dynamics (Lucas, 1978; Hopenhayn, 1992).

A large body of literature on firm dynamics builds on the stochastic theory of firm growth, first articulated by Gibrat (1931) as law of proportionate effect. Gibrat posits that firm growth is independent of its initial size. Under this assumption, firm size follows a log-normal distribution that remain stable over time. Subsequent theoretical and empirical work treated this as a benchmark for understanding industrial dynamics and structural change (Simon & Bonini, 1958; Sutton, 1997; Luttmer, 2007). However, later contributions show that this benchmark need not hold once firm heterogeneity, financial constraints and institutional distortions are taken into account (Lucas, 1978; Hopenhayn, 1992; Restuccia & Rogerson, 2008). Growth may decline with size and size distributions may evolve over time rather than remain stationary (Evans, 1987; Hall, 1987; Cabral and Mata, 2003).

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These deviations are likely to be more pronounced in developing country settings, where credit market imperfections, unequal access to markets and technology constrain firm growth, while size-dependent regulations and policy incentives favouring small firms create additional disincentives for expansion beyond threshold level, leading to a dualistic structure characterised by a mass of small firms and a small number of large firms (Hsieh and Olken, 2014; De Mel et al., 2013). Explanation for this pattern range from wage distortions and fixed costs of formality (Hsieh and Olken 2014) to regulatory thresholds and compliance burdens that discourage firms from expending beyond specific size levels (Banerjee and Duflo, 2005; Levy, 2008; Krueger, 2013; Hopenhayn 2014; Hsieh and Olken 2014). Such a structure generates persistent productivity and wage gaps across firm sizes and may give rise to hollowing-out of middle, often described as missing-middle (Mazumdar and Sarkar 2009; Thomas 2016).

In the Indian context, this debate has attracted considerable attention. Early studies show that large factories (employing 1,000 workers or more) accounted for a significant share during the pre-independence (Rao 1940) and early post-independence periods (Ishikawa 1962)[2]. However, institutional frameworks[3] in the early post-independence shaped the firm-size dynamics in ways that encouraged the coexistence of very small and very large units (Ishikawa 1962). Contrary to Ishikawa's interpretation, Nagaraj (1985) documented a shift in the relationship between firm size, capital intensity and profitability in favour of smaller plants, contributing to their rapid growth and resultant decline in average factory size from 140 workers in 1950 to about 60 workers by 1976. Subsequent work highlighted that regulatory distortions, financial constraints, infrastructure bottlenecks and weak market access prevent small firms from scaling up (Tybout, 2000; Mazumdar and Sarkar, 2009, 2013; Hasan and Jandoc, 2010; Krueger, 2013; Chatterjee and Kanbur, 2014). Hsieh and Klenow (2014) reported that Indian firm do not seem to be growing beyond a particular size, especially due to the lack of investment in process efficiency, quality and variety and domestic market access. However, way back in 90s, Little (1987) study argued that institutional factors like the labour regulations and policy incentives favouring small scale firms, while market forces favouring large firms, inhibited the growth of mid-sized firms and gave rise to the notion of missing-middle in Indian manufacturing. In particular, size-dependent labour regulations have been widely cited as a key factor discouraging firms from expanding beyond statutory cut-offs (Little, 1987; Levy, 2008; Ramaswamy, 2013).

A parallel strand of literature questios whether the missing-middle phenomenon is a genuine structural feature or partly an artefact of measurement and aggregation. Studies using density-based methods show that the evidence for bimodality weakens when the full distribution is considered and when arbitrary size bins are avoided (Hsieh and Olken, 2014; Ghosh and Abraham, 2021; Das et al., 2025). Nagaraj (2018) provide a critical perspective to missing-

[2] Ishikawa study reported that the weighted share of firms employing 1,000 or more workers was higher in 1931 than in 1956.

[3] Especially, the Industrial (Development and Regulation) Act, 1951, Industrial Policy Resolution, 1956, and Monopolies and Restrictive Trade Practices (MRTP) Act, 1969, together with industrial licensing, small-scale industry promotion, and labour regulation, promoted the expension of small-scale industries through targeted institutional support and market reservation policies (as summarised in Ghosh and Abraham, 2021).

middle debate and argued that conclusions about firm size distribution are sensitive to empirical strategy and measurement choices.

Most literature implicitly assumes that firms respond to regulatory and institutional constraints primarily by restricting their size. We believe that this is an incomplete preposition. Firms may adjust not only along the scale margin, but also along organisational margins that allow them to expand output without proportionately increasing observed employment. These dimensions that relate with the organisational restructuring have remained underexplored. In Indian context, two such margins are particularly relevant, discussed in conceptual framework section.

2. Conceptual Framework: Institutional and Organisational Context

Firms in India operate within a regulatory environment characterised by size-dependent compliance requirements that vary across employment thresholds. For instance, Factories Act, 1948 defines entry into the formal manufacturing sector, applies to factories employing 10 or more workers with power or 20 or more workers without power. Crossing these thresholds marks the transition into the formal regime. The provision under Industrial Disputes Act (IDA)[4] 1947 impose additional obligations. Its provisions are defined in terms of permanent workers listed on the factory muster roll. It imposes stricter regulations on establishments employing 100 or more regular workers, particularly prior government approval required for their lay-off and retrenchment (Ramaswamy 2013). Similarly, the Industrial Employment (Standing Orders)[5] Act 1946 introduces further regulatory requirements that vary across states and influence firm size decisions.

It is often argued that such size-dependent regulations create incentives for firms to remain below statutory thresholds to avoid compliance costs, thereby discouraging expansion beyond specific size levels (Little, 1987; Levy, 2008; Krueger, 2013; Ramaswamy 2013). Most existing analyses interpret these institutional features through a scale-based framework, where firms are assumed to adjust primarily by limiting their size to avoid regulatory costs or to avoid compliance. Under this view, size-dependent regulations generate bunching below thresholds and contribute to the emergence of a missing middle. However, in practice, firms can expand output without proportionately increasing the number of workers counted for regulatory purposes, thereby avoiding discrete jumps in compliance costs as well as avoid compliances. Our framework abstracts from the possibility that firms may respond along organisational margins. In the Indian context, tow such organisational margins are particularly important.

First, firms may increase their reliance on contract labour and/or substitute regular workers with contract workers. This is because, the regulatory provisions under the IDA are defined in terms of permanent workers listed on the muster roll, firms can expand production by employing contract workers, whose termination does not require notice, compensation or

[4] As per Chapter V-A, establishments employing 50 or more workers are required to provide notice and compensation in cases of lay-off, retrenchment, or closure. Chapter V-B imposes more stringent provisions on firms employing over 100 workers where they need prior government permission for lay-off, retrenchment, and closure.

[5] Industrial Employment (Standing Orders) Act, 1946 mandates formalized service conditions for firms crossing the 100-worker threshold, although this cut-off varies across states, as its implementation vary across states.

government approval (Ramaswamy 2013) and who are typically paid lower wages (Kapoor and Krishnapriya, 2019),), providing further cost advantages to firms operating near regulatory cut-offs[6]. This allows firms to decouple production scale from regulatory exposure.

Second, literature on firm size dynamic is formulated at the level of firms. However, in reality, production in manufacturing unit is technically organised at the level of plants or factories. That is, the plant constitutes the operational unit where labour, capital and technology are combined, and plant size therefore directly reflects production techniques and scale (Syverson 2011). Thus, distribution of plant size provides a theoretically meaningful representation of the technological structure of manufacturing and of within-industry reallocation. The evolution of this distribution over time captures processes of entry, exit, learning and differential growth across cohorts - a central mechanism in theories of industry dynamics and creative destruction (Jovanovic 1982; Hopenhayn 1992). One must note that a firm may respond to regulatory and institutional constraints, not only through contract labour substitution but also through organisational restructuring, like the firms may adopt multi-plant organisational structures. Firms can expand by establishing additional plants rather than scaling up a single factory, thereby keeping individual units below regulatory thresholds while increasing aggregate output. Conventional firm-size analyses may therefore underestimate the true organisational scale of production. Ignoring multiplant structure risks conflating regulatory avoidance with structural fragmentation, thereby potentially biasing inference about the missing-middle phenomenon. A recent study in Indian context has cautioned that failure to account for multi-plant structure can generates systematic measurement error in size distributions (Anand et al., 2025) especially by overstating the right-tail thickening of size-distribution. We believe that once multi-plants are properly identified, large plants appear not to have expanded in size and may even have contracted.

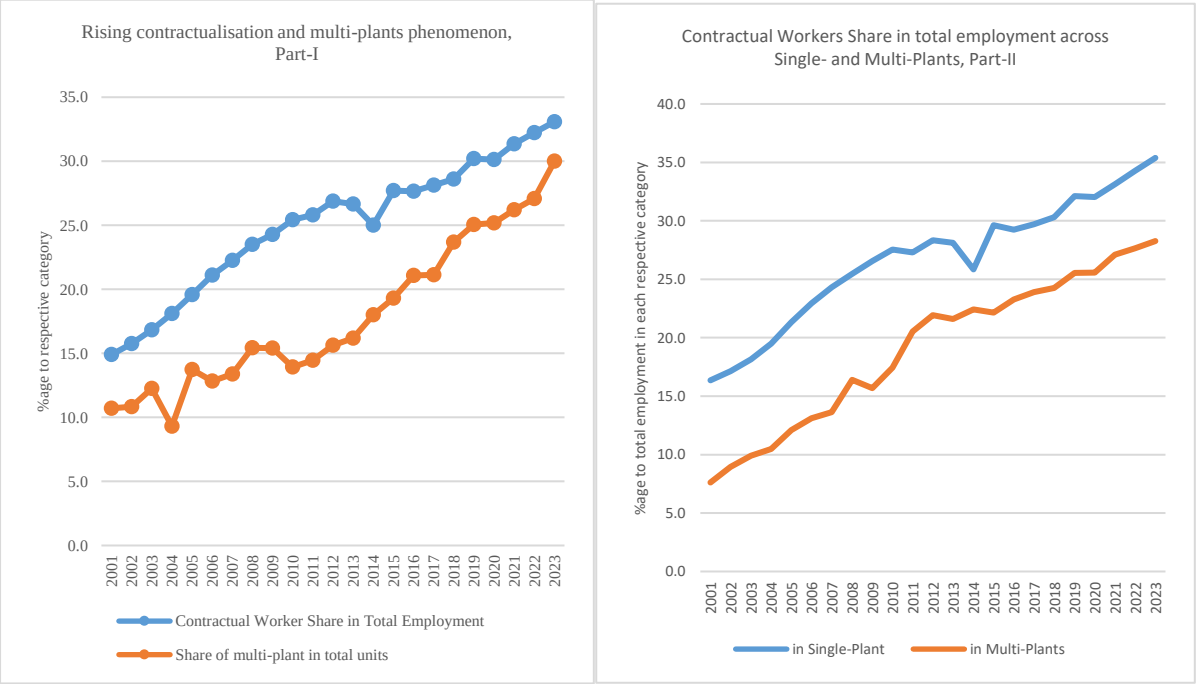
Importantly, these strategies are not mutually exclusive. Frms may simultaneously rely on contract labour as well as expanding through multi-plant structures to mitigate regulatory costs and operational constraints. These patterns are consistent with emerging evidence on rising contractualisation (Bertrand et al. 2021[7]; Amirapu and Gechter 2019; Kapoor & Krishnapriya 2019) and increasing prevalence of multi-plant firms (Anand et al. 2025). Our preliminary findings suggest that such organisational adjustments are widespread. For instance, the contract worker intensity (share of contract workers in total employment) increased to almost double from about 15 percent in 2001 to about 33 percent in 2023 (Figure-1, Part-I). The proportion of establishments with multi-plants organisational structure increased from 10.7 per cent to nearly 30 per cent, almost a three-fold increase between the periods. Contract-worker intensity has been increasing in both single and multi-plant organisational form (Figure-1, Part-II). It increased from 16 percent to over 35 percent in single plant and from 8 percent to 28 percent in multi-plnat establishment during the same period. The contractualisation and multiplanting

[6] Ramaswamy (2013) study shows that contract-worker intensity peaks in the 50-99 size class, suggesting that firms substitute non-permanent workers to avoid higher adjustment costs associated with crossing the 100 workers threshold.

[7] Bertrand et al. (2021) argue that withdrawal of employment restrictions under the Industrial Disputes Act relaxed the reservations on small-scale industry on one side and broader reforms of 1991 on the other, have led to the increased use of contract labour in India.

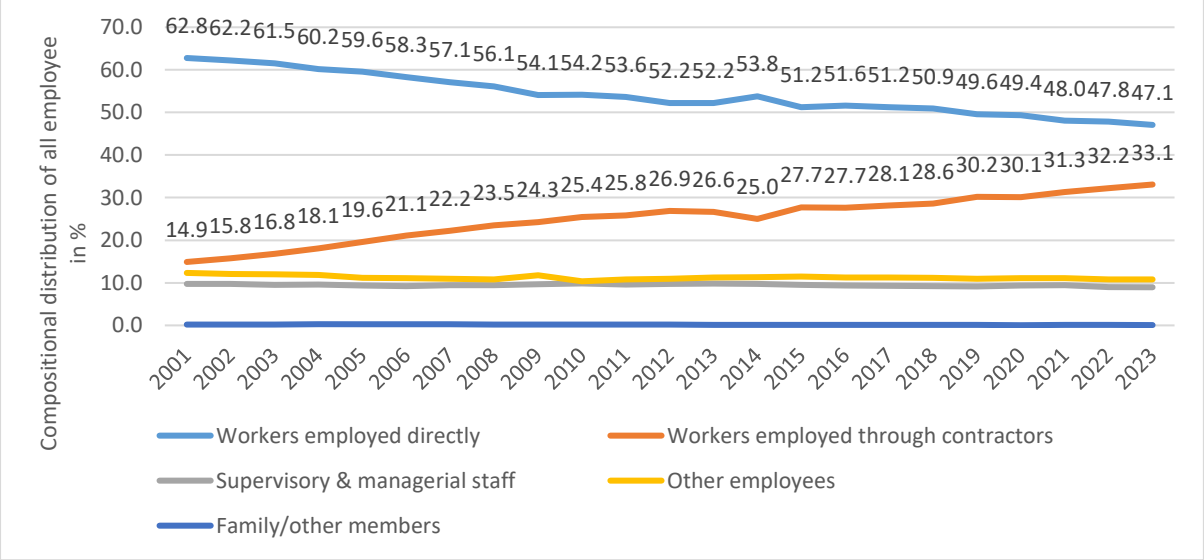
phenomenon found to be more prelevant in large size firms (results not presented), indicating that such strategies are increasingly been adopted by large scale operations. We observed a tendency of substituting permanent workers with contract workers (Figure 2), indicating that firms rely disproportionately on contract labour to accommodate expansion, reshaping the composition of the workforce even as overall employment grows. This can have significant implication for firm size analysis. Both these mechanisms enable large firms to expand and adjust more efficiently, and contribute to a thickening of right tail of the firm-size distribution, but have not been explored while studying the firm size distribution dynamics.

Figure 1: Rising Contractualisation and Multi-Plants Phenomenon in Indian Manufacturing



Source: Estimated using ASI unit level data

Figure 2: Rising Contractualisation: Changing Workforce Composition (in %)



Source: Estimated using ASI unit level data

To bring these dimensions in testable form, consider a firm that chooses output Q, employment L, contract labour share c, and number of plants N. The firm faces a regulatory cost r(L), which increases discretely when employment exceeds (e.g., 100 workers) a threshold $\bar{L}$. In this setting, expanding scale through higher L raises regulatory costs, while increasing c or N allows the firm to reduce effective exposure to these costs. Firms therefore optimise not only over scale but also over organisational form, shifting from the scale margin to organisational margins in the presence of discrete regulatory distortions.

This framework allows us to test three testable prepositions. First, bunching at regulatory thresholds may be limited if organisational margins provide viable alternatives to scale adjustment. Second, there should be discontinuities in organisational behaviour – such as higher contract labour intensity and greater prelevance of multi-plant operation – around relevant thresholds. Third, firm dynamics are likely to exhibit persistence, as firms expand through organisational restructuring rather than discrete jumps in size. These prepositions imply that the observed firm size distribution may reflect not only constraints on growth, but also the organisational strategies firms adopt in response to institutional and operational conditions. The empirical analysis in this paper is designed to thest these prepositions by jointly examining size-distribution, organisational behaviour and firm dynamics and offer a new interpretation to firm-size distribution and missing-middle phenomenon. The specific objectives the study are as follow:

3. Objectives

To examine the evolution of firm size distribution in Indian manufacturing and reassess the "missing-middle" phenomenon using both distributional and density-based approaches, accounting for alternative definitions of firm size.

To evaluate whether size-dependent labour regulations, particularly around the 100-worker threshold, constrain firm growth or induce discrete behavioural responses, including bunching or discontinuities in firm size and labour composition.

To analyse the role of organisational restructuring, specifically contractualisation and multi-plant expansion, in shaping firm size dynamics, and assess whether these represent threshold-driven responses or broader, continuous strategies of firm growth.

Following the introduction and conceptual framework context in section-1 and section-2, the remainder of the paper proceeds as follows. Section-3 describes the data, variable construction/ measurements and empirical strategy. The subsequent sections present the findings on firm-size distribution, regulatory thresholds, organisational restructuring and transition dynamics.

4. Data, Measurements and Emperical Strategy

4.1. Data

The empirical analysis is based on unit-level data from Annual Survey of Industries (ASI) for the most recent period 2001-2023. The use of most recent data allows us to assess whether recent policy changes like the Make in India, revised MSME definition and Production Linked

Incentive (PLI) scheme, have altered incentives for scaling, formalisation, and restructuring (ISID-IIDR, 2025).

ASI is the principal source of information on registered manufacturing sector in India conducted annually by the Ministry of Statistics and Programme Implementation (MoSPI). It covers factories registered under the Factories Act 1948, which defines the formal manufacturing sector and capture information on employment, production, capital and organisational characteristics of factories. Using consistent factory identifiers across survey rounds, we constructed a longitudinal panel for 2001-2023. After cleaning and harmonisation8, the working sample consists of 8,92,684 firms-years observations. The panel data allows us to move beyond static distributional analysis and examine firm growth, mobility and organisational dynamics over time.

4.2. Defining Size and Organisational Structure

A central contribution of this paper lies in distinguishing between alternative measures of firm size and explicitly incorporating organisational restructuring into the analysis.

Firm size is measuring using three alternative measures like the total employment (total person engaged), total workers (direct and contract workers combined) and regular workers (workers directly hired by factory). Unlike the previous study, distinguishing between these measures is important, as labour regulations, particularly under IDA, apply to regular workers listed on the muster roll. As a result, firms may adjust their workforce composition without proportionately increasing regulatory exposure.

To capture organisational responses, we construct two key variables. That is, contract labour intensity (ContractShareit), defined as the share in total employment and multi-plant structure (MultiPlantit), a dummy variable indicating whether a firm operates multiple establishment, identified using joint return information in ASI. To distinguish between scale expansion and organisational replication, we construct plant-adjusted measures of firm-size, defined as: Plant-adjusted Size= Workforce/Number of Plant. All three definitions of workforce are used separately. This distinction is important because production in manufacturing is organised at the plant level and firm-level measures may overstate scale if growth occurs through the addition of plants rather than expansion of existing units.

To examine their joint role, we also construct an interaction term between contractualisaiton and multi-plant organisaiton and firms are classified into four mutually exclusive categories such as: (i) single-plant firms without contractualisation, (ii) single-plant firms with contractualisation, (iii) multi-plant firms without contractualisation and (iv) multi-plant firms with contractualisation. The fourth category helps assess whether firms employ both strategies simultaneously.

[8] We followed the following filters to clean the data. First, we kept only operational units if a12<=3. At second stage, units with zero total workers and also not having regular employment were filtered out. Third, units that eithr did not disclose their year of initial production or filled unusual years were removed. After that we are left with around 25 percent less than the original sample units cross all firm-years from 2001-2023.

4.3. Distributional Measures

To examine the evolution of firm size distribution, we employ both bin-based and continuous measures. Since definition of medium-size firm varies across the context/globe[9], therefore, we adopted a broad based size-class categories like the 1–9, 10–19, 20–49, 50–99, 100–249, 250–499, 500–999, 1000–1999, 2000–4999, and 5000 or more, using different size of employment (particularly regular and total). These categories correspond to commonly used thresholds in the literature and align with regulatory cut-offs (at least first four).

For continuous measure of size, we employed kernel density estimation of log firm-size.

4.4. Testing Bimodality and Distributional Shape

To assess the presence of bimodality, first we compute a local minimum between two adjacent modes by measuring trough location: $\hat{f}'(xt) = 0$ and $\hat{f}''(xt) > 0$, where, xt denote the trough location. However, to distinguish genuine bimodality from local clustering within an otherwise continuous distribution, the bimodality coefficient (BC) is computed as:$BC = \{Skewness^2 + 1\}/\{Kurtosis\}$. We followed standard conventions that BC > 0.55 represents strong bimodality, between 0.50-0.55 moderate bimodality and below 0.50 indicate unimodal distribution. We also estimated skewness to measure the degree of asymmetry in distribution. A positive values indicate a longer right tail and a greater relative influence of large firms. Further, to examine whether the upper-tail has thickened over time, Pareto tail index is estimated as: Pareto Tail Index $=P(X > x) \propto x^{-\alpha}$. Where, X = firm size; α = Pareto tail index. Lower values of α indicate a heavier upper tail and a greater relative prevalence of very large firms. The analysis focuses particularly on establishment with 200 or more workers. These measures allow us to distinguishbetween genunine structural bimodality and local clustering.

4.5. Emperical Strategy

The empirical strategy is designed to distinguish between firm growth through scale expansion and growth through organisational restructuring. Accordingly, the analysis combines threshold-based tests, panel regressions, and dynamic models.

4.5.1. Threshold Analysis

To examine whether firms alter behaviour around 100-worker thresholds, we estimated local regressions for contract worker intensity and multi-planting as:

$$ContractShare_{it}=\alpha+\beta1Above100_{it}+\beta2Dist100_{it}+\beta3(Above100_{it}\times Dist100_{it})+\beta4X_{it}+\mu i+\gamma t+\varepsilon it \quad ---(1)$$

$$MultiPlant_{it}=\alpha+\beta1Above100_{it}+\beta2Dist100_{it}+\beta3(Above100_{it}\times Dist100_{it})+\beta4X_{it}+\mu i+\gamma t+\varepsilon it \quad --------(2)$$

[9] Around 50–249 workers in advanced economies like OECD/EU countries (Axtell, 2001; Cabral and Mata, 2003; EU, 2003; OECD, 2005), around 10–49 in developing countries (Tybout, 2000), and in India, its range differ from 20–99 (ASI report) to 100–499 in missing-middle literature (Little, 1987; Mazumdar and Sarkar, 2009), with MSME classifications typically used 50–249 workers.

ContractShareit is the share of contract workers in total employment and MultiPlantit is dummy variable representing multi-plant firms as 1, zero for signle plant firm i at time t. Above100it is a dummy variable equal to 1 if the firm employs 100 or more regular workers, and 0 otherwise. Dist100it=|RegEmpit−100| measures the distance of firm size from the regulatory threshold. Xit is a vector of firm-level controls (e.g., fixed capital and age). The estimated sample is restricted to ±50 workers window (Window100it = 1 if |RegEmpit−100| ≤50), which allows comparison of firms of similar size that lie near the cutoff, just below and just above the threshold. μi captures firm fixed effects and δt captures year fixed effects. The eq(1) is estimated using panel fixed effect, while Linear Probability Model (LPM) with fixed effects is employed for eq(2).

Further, to investigate how firm growth and mobility behave around the threshold, and whether organisational restructuring affects it, we estimated the following equation:

$$Yit=\alpha+\beta1Above100it+\beta2Dist100it+\beta3(Above100it\times Dist100it)+\beta4ContractShareit+\beta5MultiPlantit+\beta6Xit+\mu i+\gamma t+\varepsilon it \text{ ----(3)}$$

Yit alternatively represents (i) regular employment growth (d_ln_reg_emp) and (ii) upward mobility across employment size classes (moveup)[10]. This equation captures firm growth around the thresholds.

Given the significant variation in flexibility and enforcement intensity in labour-law across Indian states (Besley and Burgess 2004; Bhattacharjea 2009; Ramaswamy 2013), state dummy is used by classified them into relatively rigid and flexible labour-regulation regimes[11]. In addition, industriries are grouped into labour-intensive and capital-intensive categoies[12] to capture technological heterogeneity in firm-size dynamics.

4.5.2. Organisational Restructuring and Firm Size Dynamics

In order to examine how organisational restructuring affect firm size, growth and mobility, we estimate following panel regressions:

Size equation:

$$\ln(Sizeit)=\beta0+\beta1ContractShareit+\beta2MultiPlantit+\beta3(ContractShareit\times MultiPlantit)+\beta4Xit+\mu i+\gamma t+\varepsilon it \text{ ----------(4)}$$

[10] First, we clubbed 10 size-bins codes into 5 codes, and moving up between t-1 to t is estimated for thse categories: 1= 1-19, 2=20-49, 3=50-99, 4=100-249; 5=250+

[11] Following the modified classification of Ramaswamy (2013), we defined labour regulations states as: Flexible-Telangana, Andhra Pradesh, Karnataka, Gujarat, Tamil Nadu; Intermediate- Himachal Pradesh, Uttarakhand, Delhi, Madhya Pradesh, Rajasthan, Haryana, Uttar Pradesh; Rigid/Inflexible- Goa, Bihar, Jharkhand, Chhattisgarh, Odisha, Assam, Kerala, West Bengal, Punjab, Maharashtra. However, clubbing the states has attracted considerable criticism (see Bhattacharjea 2009 & 2021)

[12] Industry classifications are harmonized across time using concordance between NIC-1998, NIC-2004, and NIC-2008. Four-digit industry codes from earlier classifications are mapped to the three-digit NIC-2008 classification, which is then collapsed to the two-digit level to obtain consistent industry groupings over time. The empirical analysis focuses on manufacturing industries corresponding to NIC-2008 codes 10–32, covering 23 industrial sectors.

Growth equation:

$$\Delta \ln(Size_{it}) = \alpha_0 + \alpha_1 \ln(Size_{i,t-1}) + \alpha_2 ContractShare_{i,t-1} + \alpha_3 MultiPlanti_{,t-1} + \alpha_4 (ContractShare_{i,t-1} \times MultiPlanti_{,t-1}) + \alpha_5 X_{i,t-1} + \mu_i + \gamma_t + \varepsilon_{it} \quad \text{----------(5)}$$

It assesses whether organisational and multi-plant status is associated with subsequent growth.

Mobility equestion:

$$MoveUpit = \theta_0 + \theta_1 ContractShare_{i,t-1} + \theta_2 MultiPlanti_{,t-1} + \theta_3 (ContractShare_{i,t-1} \times MultiPlanti_{,t-1}) + \theta_4 \ln(Size_{i,t-1}) + \theta_5 X_{i,t-1} + \gamma_t + \varepsilon_{it} \quad \text{----------(6)}$$

This examines whether organisational restructuring influences the likelihood of firms move up into higher employment size categories. Where, MoveUpit is a binary variable which take value equal to one if firm moves to a higher employment size category[13] between t−1 and t, and zero otherwise.

Xit is a vector of control variables representing firm characteristics such as fixed capital and age. Explanatory variables in growth and mobility equations are lagged to reduce simultaneity concerns. Firm μi and year γt fixed effects are included to control for unobserved heterogeneity and macroeconomic shocks. These equations are estimated using fixed effect model, while equation MoveUp equations are estimated using linear probability model (LPM) with fixed effects and logistic regression specification.

4.5.3. Firm Dynamics: Transition and Markov Analysis

To assess whether firms remain in their initial size categories or transition to higher or lower employment classes over time, the Transition Probability Matrices (TPM) for one period is estimated as: $P_{ij} = Pr(S_{t+1} = j \mid S_t = i)$. Where, St represents size class of a firm in period t. This captures the probability that a firm in size class i in period t moves to size class j in period t+1. The resulting matrices are summarised and visualised using heatmaps to highlight persistence, upward mobility and downward mobility across size classes. We further estimated multi-period Markov transitions for capturing medium and long-run mobility as: P5ij [Pr(St+5 = j |St = i)] and P20ij { Pr(St+20 = j |St = i)]. It is estimated by raising the one-period transition matrix to higher powers. This single and multi-period framework allows us to assess whether the observed distributional shifts represent persistent structural transformation or merely temporary reallocations across size categories.

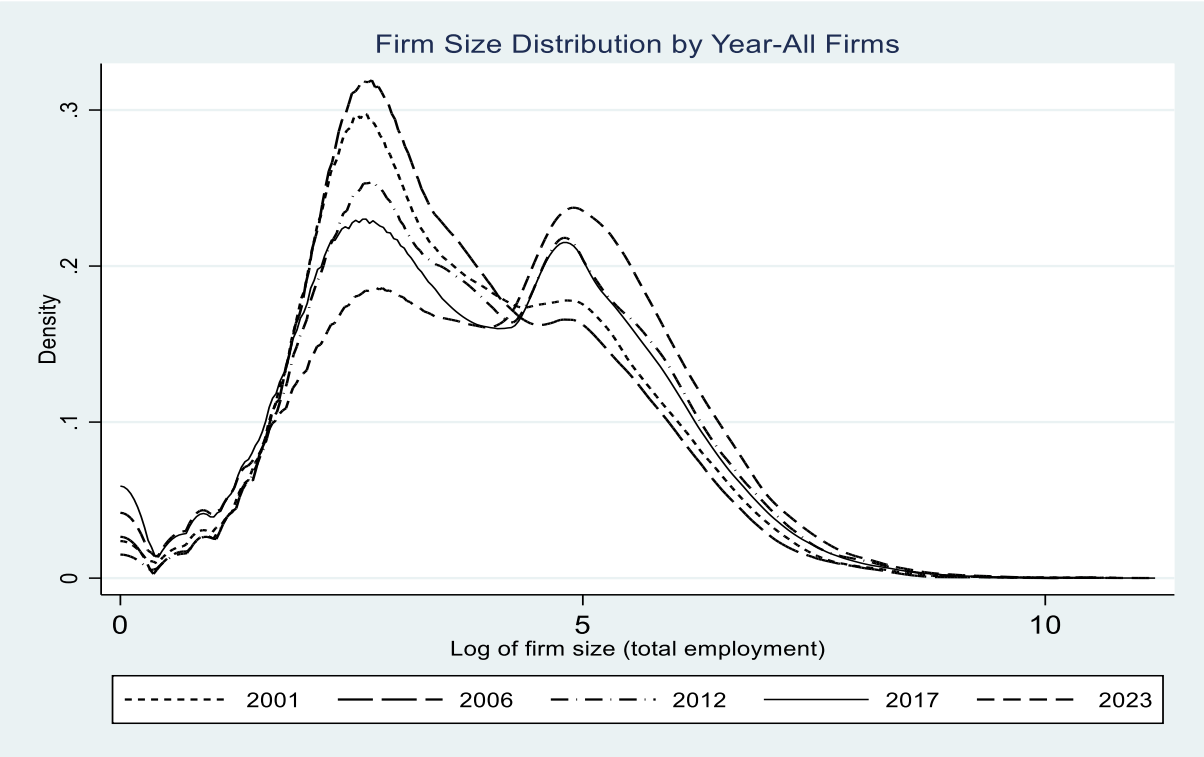
5. Evolution of Firm Size Distribution: Stylised Facts on Missing-Middle Debate

The distribution of firm size in Indian manufacturing exhibits a persistent right-skewed pattern over the period 2001-2023, as evident from the kernel density estimates (Figure 3). The density is characterised by a pronounced concentration of firms at lower employment levels and a long upper tail, indicating that a relatively small number of firms account for large employment sizes. While the overall shape of the distribution remains stable over time, a gradual rightward

[13] First, we clubbed 10 size-bins codes into 5 codes, and moving up between t-1 to t is estimated for thse categories: 1= 1-19, 2=20-49, 3=50-99, 4=100-249; 5=250+

shift is observed, particularly in the post-2012 period, suggesting a modest increase in the presence of larger firms.

Figure 3: Kernel Density of Firm-Size for Selected Years

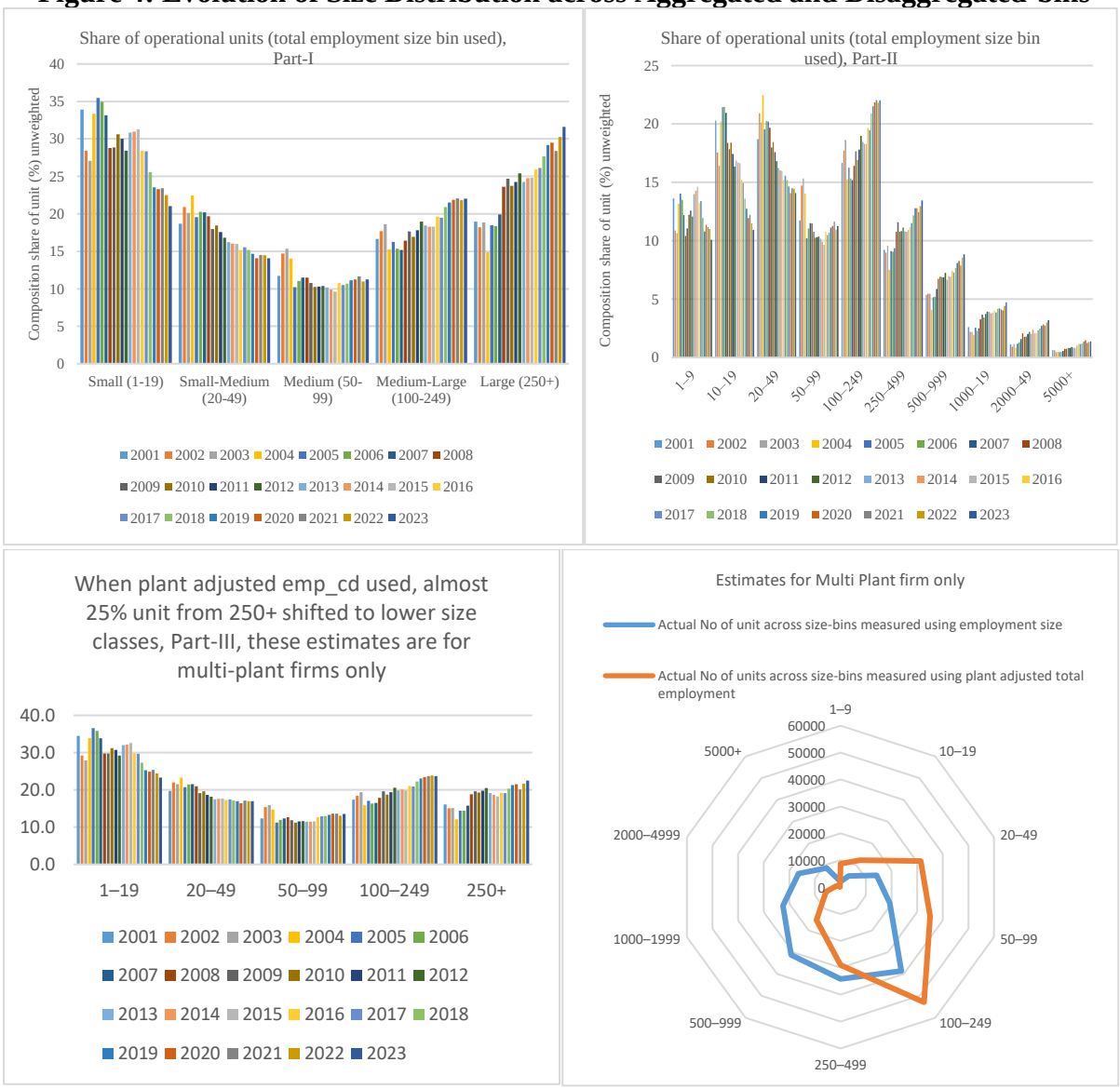


Source: Estimated using ASI unit level data

Evidence based on size-class provides additional insight into these dynamics (Figure 4, Part-I). When firms are grouped into broad (five) size categories, the share of small firms (1-19 workers) declines over time, while the share of large firms (250+ workers) increases. The medium-large category (100-249 workers) shows a moderate rise, whereas the intermediate categories, particularly the 50-99 worker range, remain relatively stable. If one view size distribution through this aggregation, the pattern appears consistent with a hollowing-out of the middle segment, where small firms remain dominant, large firms expand, and the intermediate segment does not experience proportional growth.

However, this interpretation is highly sensitive to the choice of size aggregation. When the same distribution is examined using more (ten) disaggregated size bins (Figure 4, Part-II), the apparent compression of the middle weakens considerably. The distribution becomes smoother, with gradual transitions across size classes rather than distinct gaps. This indicates that the missing-middle pattern is not a robust feature of the data, but rather emerges under specific aggregation schemes.

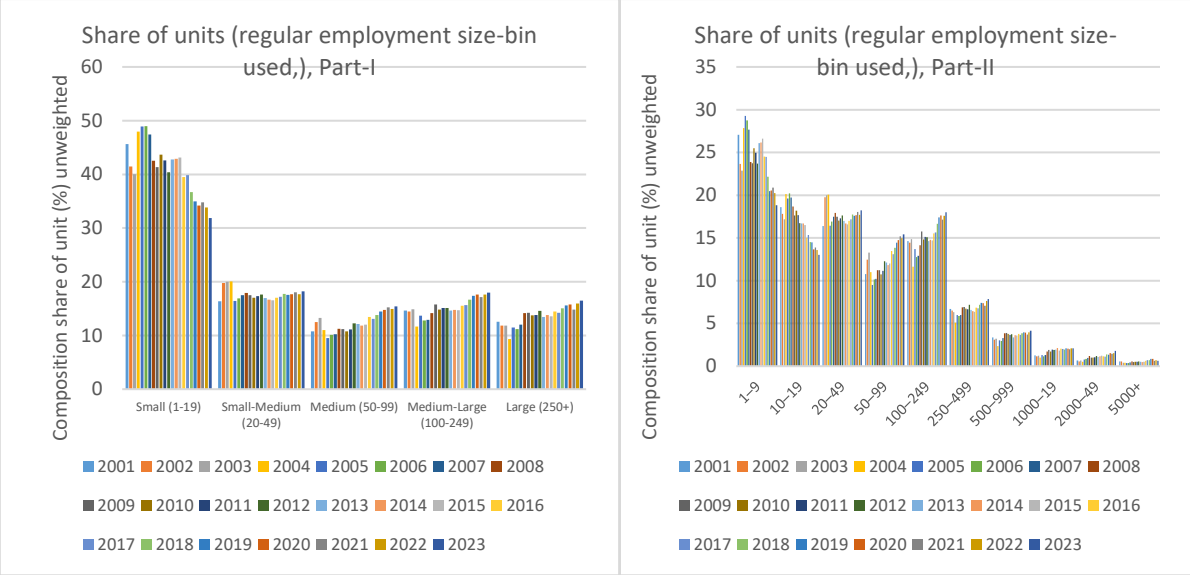
Figure 4: Evolution of Size Distribution across Aggregated and Disaggregated-bins



Source: Estimated using ASI unit level data

The sensitivity of the distribution to measurement is further evident when alternative definitions of firm size are employed. When firm size is measured using regular workers instead of total employment (Figure 5), the concentration of firms in the lower size categories, even if one takes either aggregated (five) or disaggregated (ten) size-bins, becomes more pronounced, and the apparent expansion of intermediate and larger size categories diminishes. The distribution turned out to be similar when weighted distributions is presented, which rurther reinforce the view that the inference of a missing middle depends critically on how firm size is defined and measured.

Figure 5: Firm Size Distribution across Size-Bins

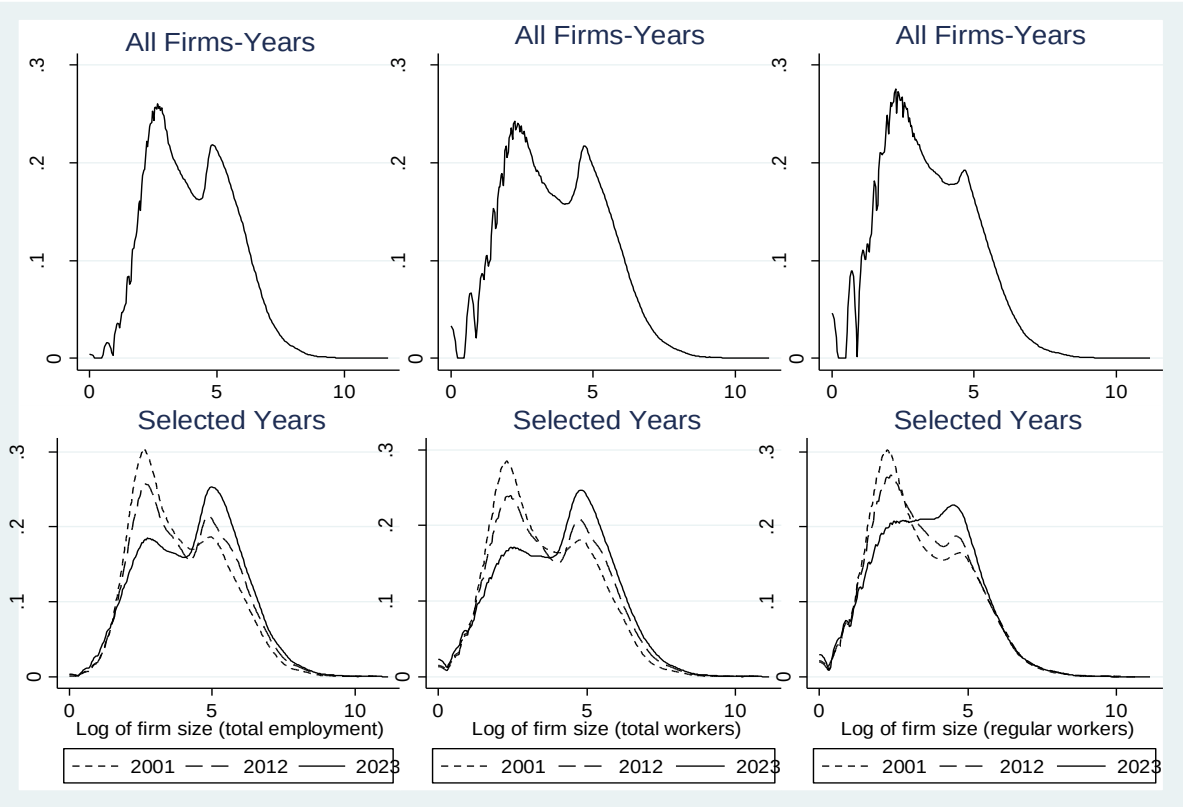


Source: Estimated using ASI unit level data

Kernel density estimates across different employment definitions provide further clarity (Figure 6). A secondary mass in the upper-middle range is visible when size is measured using total employment, this feature weakens significantly when total workers are considered and almost disappears when size is defined using regular workers alone. These pattern appears to be consistent even if one plots firm-years or year-wise size distribution. This suggests that the observed rightward movement in the distribution is driven largely by increases in total employment, which may reflect changes in labour composition rather than genuine expansion in regular employment.

From year-wise density plots, it can be observed that the firm size distribution, measured in terms of total employment, is characterised by a pronounced peak at smaller sizes, with a secondary concentration gradually emerging in the upper-middle range over time (Figure 6). For instance, in 2001, the distribution was strongly concentrated among smaller firms. From 2012 onward, the intermediate range began to thicken modestly. During 2016-2018, the distribution appeared nearly bimodal, with the lower and upper peaks reaching almost similar heights (Appendix 1). By 2023, a clearer rightward shift become evident. This pattern point to a gradual rightward movement in the distribution and a growing presence of firms in the upper-middle size segment over time. Similar patterns are observed across flexible and rigid labour regulation states and across labour- and capital-intensive industrial sectors (Appendix 2 & 3).

Figure 6: Kernel Density of Firm-Size at Aggregate Leval and for Selected Years

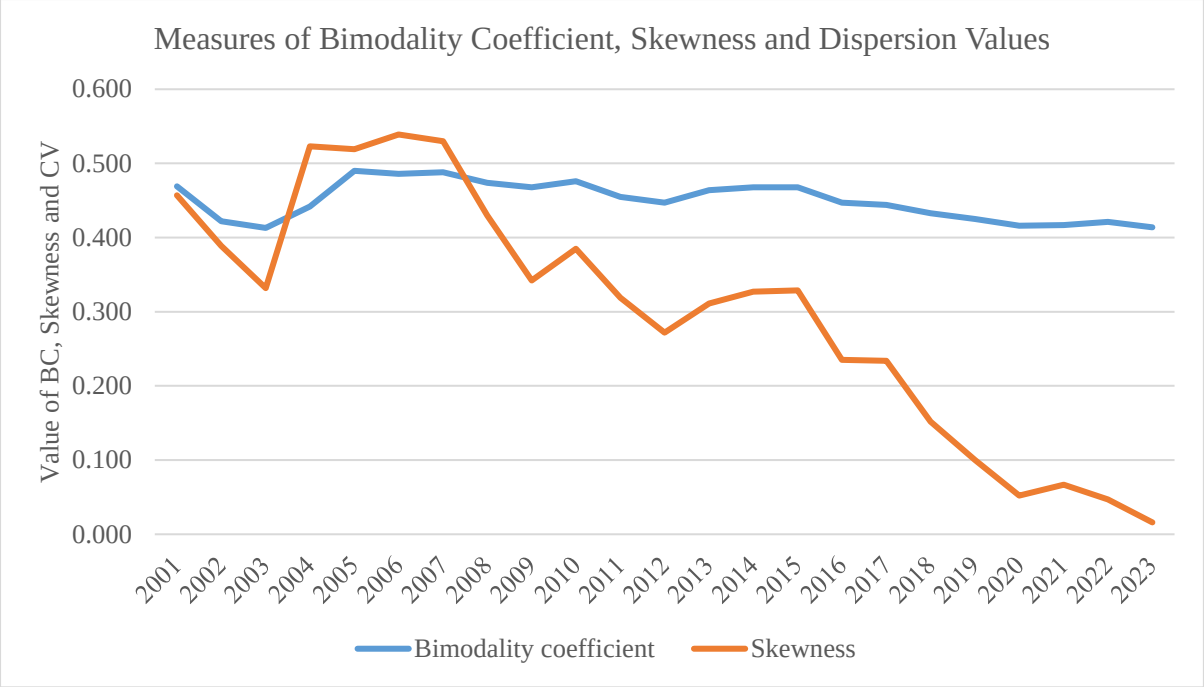


Source: Estimated using ASI unit level data

However, to assess whether the observed distribution exhibits genuine bimodality, we examine the location of peaks and troughs from Figure-6. The distribution shows a dominant peak at smaller sizes, typically around 10-25 workers, followed by a shallow trough in the intermediate range (around 40-70 workers), and a secondary, less pronounced peak in the upper-middle range (approximately 90-220 workers). The estimated trough occurs well below conventional medium-size thresholds. The trough remains relatively shallow across years, indicating that the two peaks are not strongly separated. Thus, observed clustering reflects gradual redistribution within the size spectrum rather than a pronounced hollowing-out of the middle.

A more formal test of bimodality however suggests that the distribution is closer to unimodal, with only weak clustering in the upper-middle segment. The estimated bimodality coefficient remains below the conventional threshold of 0.55 across most years and shows a declining trend over time (Figure 7). We extended this analysis across sector-years, to understand the location-sector of bimodality. Evidence reveals that existence of bimodality is rare (Appendix-4). Only a few industries had bimodal characteristics in few years, while majority converge toward more unimodal firm-size structures.

Figure 7: Trends in Bimodality Coefficient and Skewness



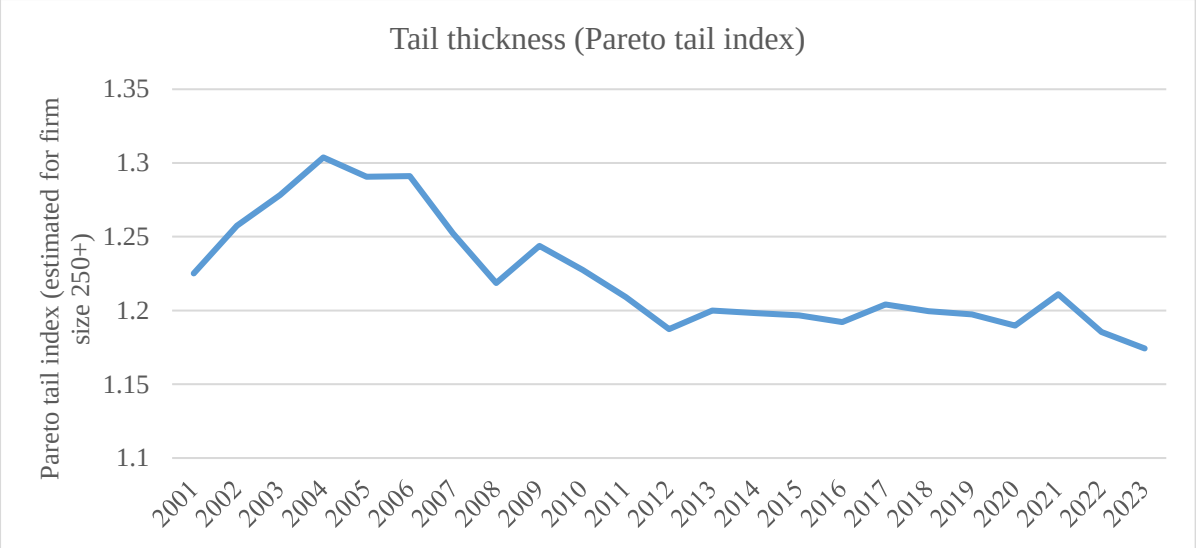
Source: Estimated using ASI unit level data

Additional evidence from higher-order moments further reinforces this conclusion. The skewness of the distribution declines gradually over time, indicating a reduction in asymmetry, while the Pareto tail index also declines, suggesting a thickening of the upper tail (Figure 8). These trends point to a gradual rebalancing of the distribution, with some expansion in larger size categories, but without a structural break in the overall shape.

These evidence suggests that the missing-middle phenomenon in Indian manufacturing is not a stable or structural feature. Instead, the observed patterns are highly sensitive to aggregation, measurement, and the definition of firm size. The distribution appears better characterised as continuously evolving, with gradual shifts toward larger sizes rather than a discrete absence of firms in the intermediate range.

Importantly, these findings also indicate that changes in the distribution are closely linked to how employment is organised within firms. The divergence between total and regular employment measures suggests that part of the observed expansion in firm size reflects changes in workforce composition. This provides an important motivation for examining the threshold and organisational restructuring as key mechanisms in shaping firm size dynamics.

Figure 8: Tail Thickness (Pareto Tail Index)



Source: Estimated using ASI unit level data

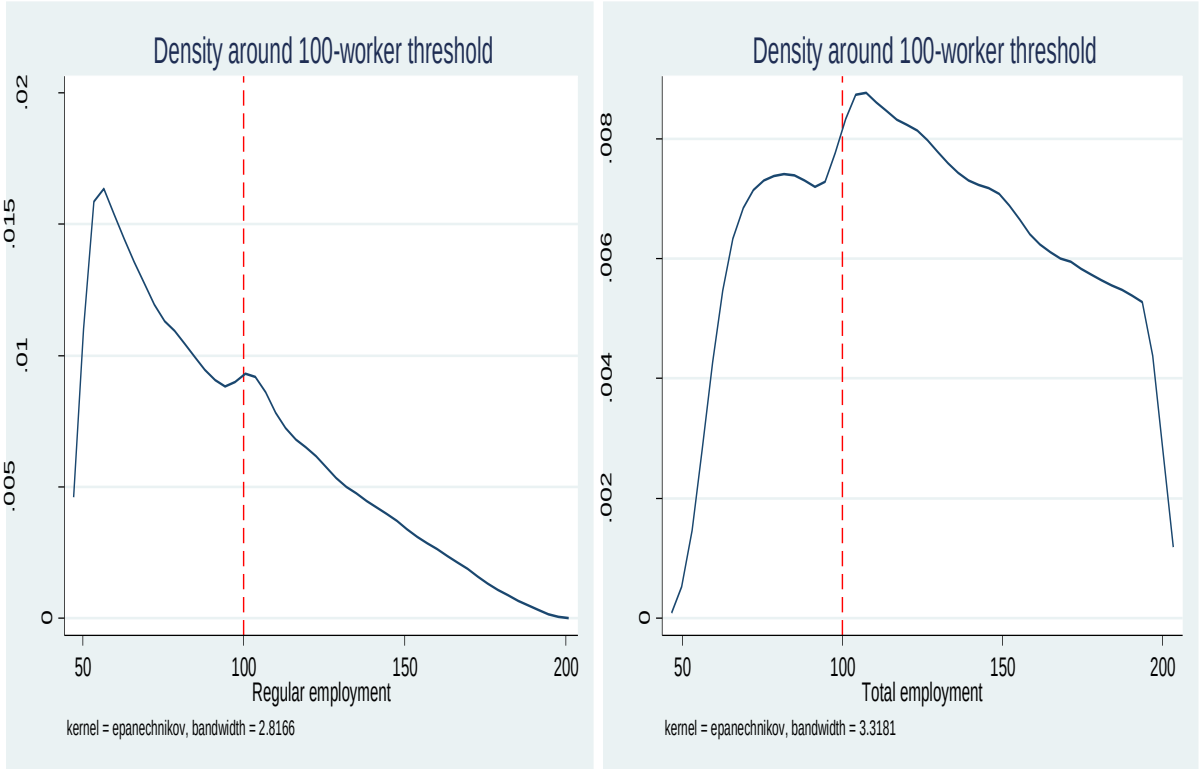
6. Regulatory Threasholds and Distributional Dynamics

A central argument in the literature on firm size distribution in India is that size-dependent labour regulations create disincentives for firms to expand beyond statutory thresholds, particularly the 100-worker cut-off under the Industrial Disputes Act. This section examines whether such thresholds lead firms to cluster below regulatory cut-offs or halt their growth, using both descriptive and empirical evidence.

6.1. Do Firms bunch around the Threshold

We begin by examining the distribution of firms in the vicinity of the 100-worker threshold. Kernel density estimates for firms within the 50–200 worker range (Figure 9) do not reveal any sharp discontinuity or spike at the threshold. Instead, the distribution remains smooth across both sides of the cut-off, with only mild local elevation at threshold and no discontinuous spike that would indicate strong strategic clustering. The share of firms rises modestly at 100 workers (about 5.2% for total employment and 5.1% for regular employment) relative to adjacent bins, but the increase is small compared to overall gradual decline in density as firm size increases. At the same time, firms operating near threshold exhibit a higher average contract labour share (about 18.7%) than firms outside the 80-120 range (about 16.2%), suggesting that adjustment might occur more through labour composition than through strict size avoidance.

Figure 9: Kernel Density and Labour Regulation Thresholds: Firm-Size across All Firms-Years

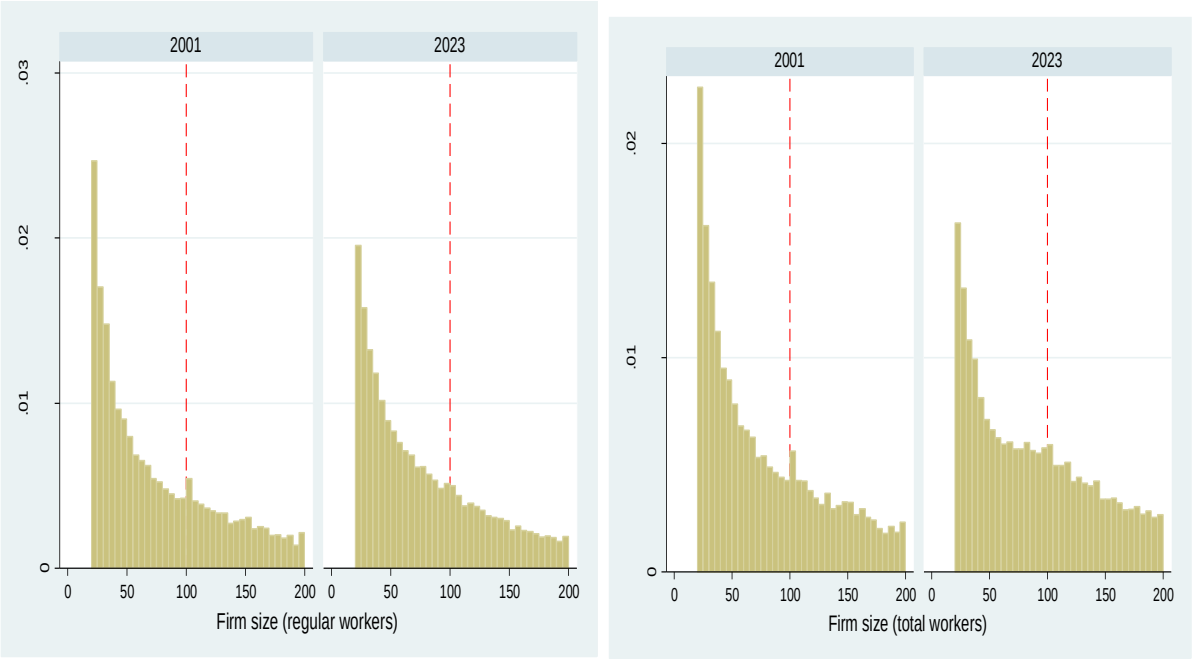


Source: Estimated using ASI unit level data

Histogram-based evidence also provides a similar picture (Figure 10). The frequency of firms declines gradually on either side of the threshold, without any clear break or accumulation just below the cut-off. While a modest concentration is observed at round-number value 100 workers, comparable patterns are also visible in adjacent size categories, suggesting that these reflect reporting heaping rather than strategic bunching.

Over time, the distribution becomes progressively smoother, and the mass of firms above the threshold increases, particularly when firm size is measured using total employment as compared to regular worker. This indicates that firms are not systematically constrained below the threshold in effective employment terms rather it indicates a gradual shift toward larger operational scales using contractualisation.

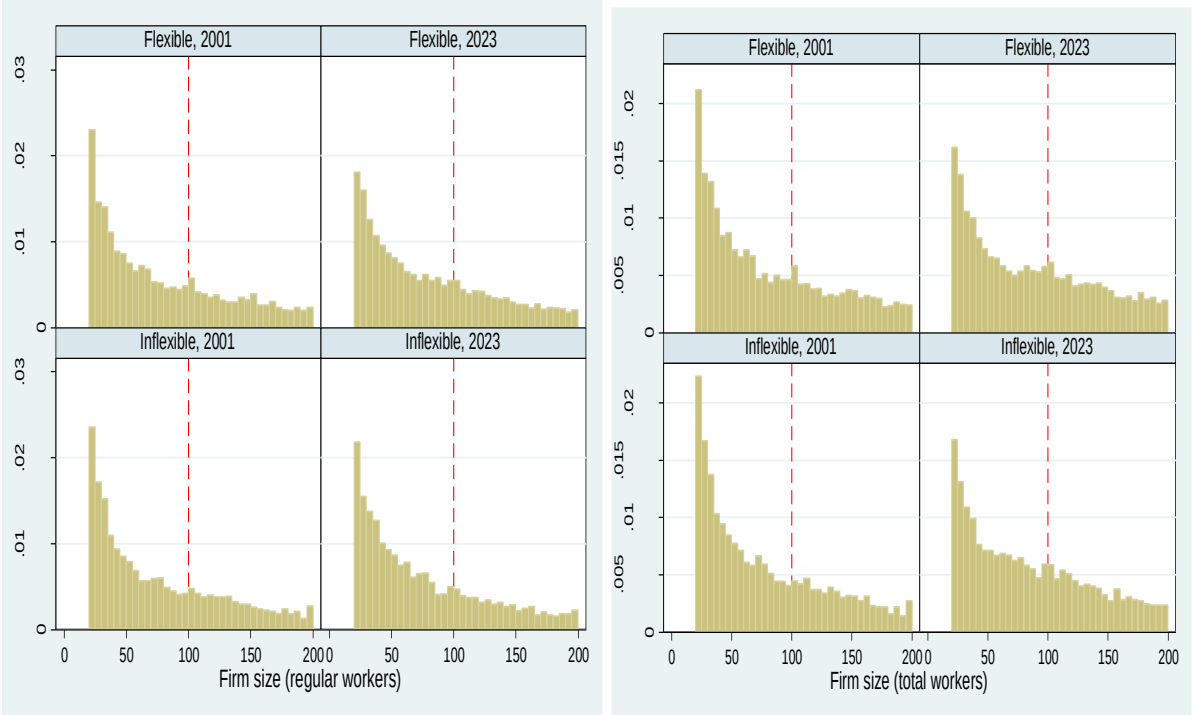
Figure 10: Histogram for Firm-Size around Regulatory Thresholds: 2001 & 2023



Source: Estimated using ASI unit level data

Both flexible and rigid labour regulatin states exhibit a declining size distribution with a slight visible concentration of firms around the 100-worker threshold (Figure 11). The rigid regulation states display some clustering of firms in the small-size range and a steeper decline just beyond the threshold, but evidence is not indicative of adjustment frictions in scaling up. Flexible states show a smoother gradient and a thicker middle-size tail. Such threshold impact became visible when firm size is measured using regular workers rather than total workers.

Figure 11: Histogram of Firm-Sise Distribution across Labour Regulation Regimes for 2001 and 2023



Source: Estimated using ASI unit level data

6.2. Do Organisational Restructuring Prevalent around Thresholds

Our empirical evidences also confirm that firms do not exhibit discontinuous behavioural responses at the 100-worker regulatory threshold (Table 1). Contract labour intensity does not jump at the threshold; instead, it increases smoothly as firms approach the threshold (coeff = 0.0019, $p < 0.01$), reflecting gradual adjustment in labour composition, with the negative interaction term (coeff = −0.0026, $p < 0.01$) suggesting a flattening beyond the cut-off.

Whether firms repond through multi-plnant expenstion around the thresholds, findings indicate no significant discontinuity at the threshold (coeff = −0.0027, $p = 0.191$). Rather, its relationship with firm size evolves gradually, declining slightly below the threshold (coeff = −0.0005, $p < 0.01$) and increasing thereafter (interaction coeff = 0.00085, $p < 0.01$). These findings suggest that firms adjust organisational strategies continuously with size, rather than responding discretely to regulatory thresholds.

Table 1: Threshold Effects on Organisational Behaviour: Contract Labour and Multi-Plant Evidence

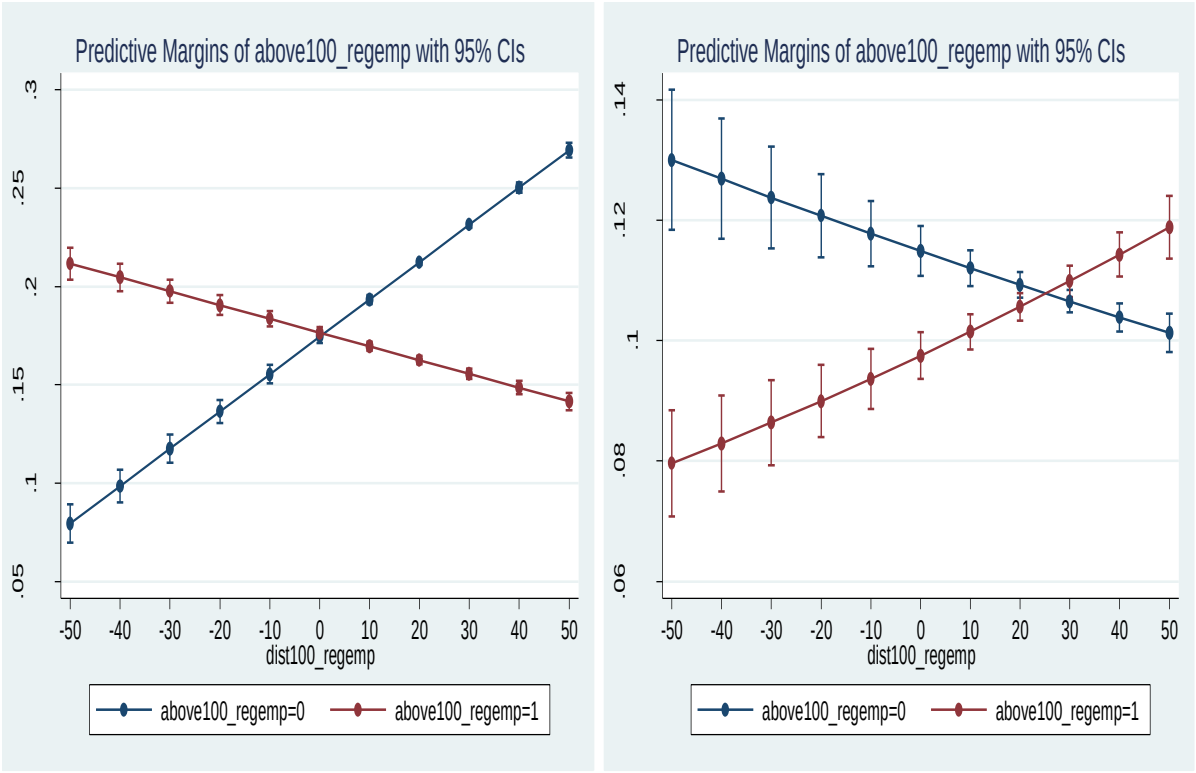
Variables	(1) Contract Share	(2) Multi-Plant
Distance from threshold (Dist100)	0.00190***	-0.00051***
	(-0.00007)	(-0.00006)
Above 100 workers (Dummy)	0.00213	-0.00269
	(-0.00203)	(-0.00206)
Interaction (Dist100 × Above100)	-0.00260***	0.00085***
	(-0.00009)	(-0.00009)
ln(Fixed Capital)	0.02114***	0.01898***
	(-0.00119)	(-0.00144)
Age	0.00012	0.00040***
	(-0.00008)	(-0.00011)
Year Fixed Effects	Yes	Yes
Firm Fixed Effects	Yes	Yes
Observations	1,79,931	1,79,931
Number of Firms	49,436	49,436

Note: the incertion of labor-regulation regimes (rigid vs flexible) did not result in change of the findings, similar results emerged in both right and flexible regime states separately and its did not work in regression due to collinearity.

The predictive margins plots reinforce these findings, which show that both contract labour intensity and multi-plant probability evolve smoothly across the regulatory threshold, with no visible discontinuity (Figure 12). Contract labour increases steadily up to the threshold and stabilises thereafter, while multi-plant probability rises progressively with firm size, becoming more pronounced only beyond the threshold (around 20–30 workers above it). This suggests a sequential adjustment process in which firms initially rely on contractualisation and subsequently adopt multi-plant structures as they scale up. Overall, the absence of any sharp

break indicates that firms do not respond abruptly to regulatory cut-offs; instead, organisational restructuring occurs gradually and continuously across the size distribution.

Figure 12: Predictive Margins above and below the Threshold



Source: Estimated using findings of Table-1.

6.3. Do Regulations Constrain Firm Growth?

The empirical examination of firm behaviour around 100-worker threshold shows that firms employing 100 or more regular workers experience a modest decline in growth of regular employment (Table-2, Col-1). The negative threshold coefficient (-0.0148) suggest that once firms enter 100-worker regime, growth of their permanent workforce slows slightly. At the same time, firm growth increases as firms become larger when they are below the threshold, as coefficient turn positive 0.0064. This positive relationship becomes weaker once firms cross the threshold, as indicated by negative interaction term (-0.0029). This suggests that firms continue to expand as they approach the threshold, but pace of regular employment growth becomes flatter once they operate in regulated segment.

The examination of probability that a firm moves to a higher regular-employment size class shows that firms employing 100 or more workers are significantly more likely to move into a higher size category, with a coefficient of 0.418 (Col-4). The negative relationship between firm size and mobility beyond the threshold indicates that upward movement is strongest around the cutoff and weakens as firms become substantially large. In other words, firms that reach 100-worker mark tend to transition into a higher size group, but further expansion becomes less frequent as firms grow larger. Negative coefficient on contract labour share (-0.0207 in LPM and -0.0927 in logit models) also suggests that firms relying more heavily on

contract workers are less likely to expand their regular workforce sufficiently to move into higher employment categories.

The estimates in Col-2&3 examine whether threshold effects differ across institutional and sectoral environments. The results show that threshold effect is not statistically significant in flexible states. The interaction terms show that slowdown in regular employment growth is stronger in more regulated environments. In mid/mix labour-regulation states, additional decline in growth was -0.033, and in inflexible states the decline was -0.031, reflecting almost no difference across labour regime states The threshold effect varies with technological structure of industries. Relative to labour-intensive industries, firms in mid-intensity sectors experience an additional decline in growth of -0.020, while firms in capital-intensive sectors show a somewhat larger decline of -0.023 after crossing the threshold. This pattern indicates that firms operating in sectors requiring higher capital intensity are less likely to expand employment beyond 100-worker limit, they might like to replace labour with capital.

Table 2: Examining Firm Growth Dynamic around Labour Regulation Threshold

Variables	(1) Δln(Reg Emp) FE	(2) Δln(Reg Emp) with Labour Regime FE	(3) Δln(Reg Emp) with Industry Type FE	(4) Move-Up Reg (LPM-FE)	(5) Move-Up Reg (Logit)
Above 100 workers	-0.0148***	0.0056	-0.0020	0.4179***	3.0364***
	(0.0049)	(0.0067)	(0.0064)	(0.0049)	(0.0410)
Distance variable	0.0064***	0.0064***	0.0064***	-0.0039***	-0.0598***
	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0010)
Above100×DistVar	-0.0029***	-0.0029***	-0.0029***	-0.0013***	0.0200***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0013)
Contract Share	-0.0296***	-0.0275**	-0.0299***	-0.0207**	-0.0927***
	(0.0108)	(0.0112)	(0.0108)	(0.0084)	(0.0308)
Multi-plant Dummy	-0.0247**	-0.0263**	-0.0247**	0.0107	0.3109***
	(0.0115)	(0.0117)	(0.0115)	(0.0093)	(0.0242)
ln(Fixed Capital)	-0.0149***	-0.0162***	-0.0149***	-0.0031*	0.0353***
	(0.0024)	(0.0025)	(0.0024)	(0.0018)	(0.0046)
Age	-0.0008***	-0.0007***	-0.0008***	-0.0006***	-0.0214***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0006)
Above100 × Mid/Mix regime		-0.0330***			
		(0.0091)			
Above100 × Inflexible regime		-0.0310***			
		(0.0088)			
Above100 × Mid-intensive industry			-0.0205**		
			(0.0098)		
Above100×Capital-intensive industry			-0.0235***		
			(0.0080)		
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	No
Observations	132,930	126,923	132,930	132,930	132,930
Firms	33,141	31,683	33,141	33,141	33,141
R^2 / Pseudo R^2	0.076	0.076	0.076	0.106	0.094

Notes: Standard errors clustered at the firm level in parentheses. Column (2) is a fixed-effects linear probability model. Column (3) is a logit model. In column (5), the main effects of labour-regime categories are absorbed by firm fixed effects; only interaction terms are identified. *** p < 0.01, ** p < 0.05, * p < 0.10.

Source: Estimated using ASI unit level data

This analysis suggests that labour regulations do not operate as binding constraints that prevent firms from growing beyond statutory thresholds. The absence of sharp bunching, discontinuities, or trapping indicates that firms are not halting their expansion to avoid regulatory compliences. Instead, the evidence points to a more nuanced mechanism. Firms appear to internalise regulatory thresholds and adjust their behaviour accordingly, but primarily through organisational margins rather than scale restrictions. In particular, firms modify their labour composition by increasing reliance on contract workers and potentially reorganise production structures, allowing them to expand output while limiting exposure to regulatory provisions tied to regular employment. Thus, labour regulations matter not in the sense of preventing firm growth, but in shaping how growth occurs. Rather than restricting scale, they influence the organisational form of expansion. This interpretation provides an important bridge to the subsequent analysis, which examines how organisational restructuring, both contractualisation and multi-plant expansion, emerges as a central mechanism driving firm size dynamics in Indian manufacturing.

7. Organisational Restructuring and Firm Size Dynamics

7.1. Average Firm Growth across Organisational Restructuring

We begin by examining whether the observed increase in firm size reflects genuine scaling of production units or organisational expansion across multiple establishments. For the prupose we presents evolution of average firm size across unadjusted and plant-adjusted measures and employment measures.

At the aggregate level, average total employment per firm increases substantially over time, rising from about 181 employees in 2001 to about 268 employees in 2023 (Figure 13). This pattern suggests that firms are expanding in scale. However, once employment is normalised by the number of plants operated by a firm, the magnitude of this increase declines significantly, with plant-adjusted employment rising only from around 161 to 210 workers over the same period. The divergence between firm-level and plant-adjusted measures widens considerably over time, indicating that an increasing share of firm growth is driven by the addition of production units rather than by expansion of individual plants. This pattern becomes even more pronounced when firm size is measured using regular workers. While average regular employment per firm increases from about 114 to 126 workers, plant-adjusted average regular employment declines from 100 to 96 workers during this period (Figure 13).

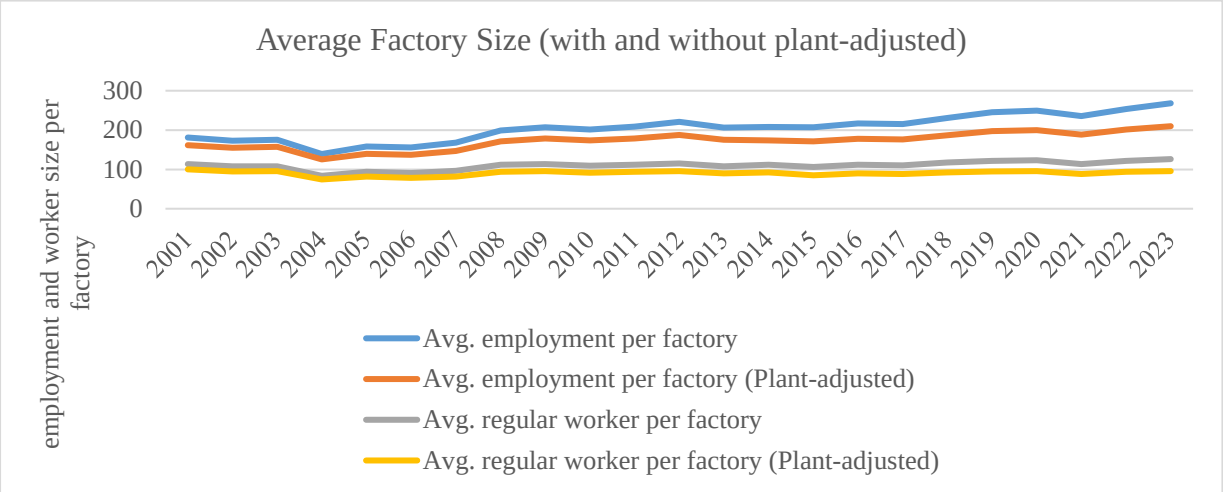
These results suggest that the observed growth in firm size does not correspond to proportional expansion of production units. Instead, firms appear to be reorganising production by distributing employment across multiple establishments and adjusting labour composition. In this sense, firm growth increasingly reflects organisational expansion rather than technological or scale-based transformation at the plant level.

A comparison of firm size between single-plant and multi-plant firms provides an interesting insight on nature of firm scale. At firm-level, multi-plant firms appear substantially larger, employing on average about 672 workers compared to roughly 170 workers in single-plant firms (Table 3). However, when employment is adjusted for the number of plants, the size advantage of multi-plant firms diminishes sharply, with plant-adjusted employment falling to

approximately 226 workers. This brings multi-plant firms much closer in scale to single-plant firms.

Among larger firms (those employing 100 or more workers), this pattern becomes even more striking. While multi-plant firms appear significantly larger at the aggregate level with employment size around 901 employees. Their plant-adjusted size falls to 300 employees, which is even lower than the 430 employees observed for single-plant firms. This suggests that the apparent scale of multi-plant firms arises primarily from organisational replication rather than expansion of individual production units. These findings point to a growing divergence between firm-level size and plant-level scale. As firms expand, they increasingly rely on the addition of plants rather than scaling up existing units. This has important implications for interpreting firm size distribution, as aggregate measures may overstate the extent of scale expansion.

Figure 13: Trends in Average Factory Size: With and without Plant-Adjusted



Source: Estimated using ASI unit level data

Table 3: Plant-level scale of Indian manufacturing

Average of Total employment		Average Factory Size (All)			Average Factory Size (Plant-Adjusted)		
		mean	p50	sd	mean	p50	Sd
For full sample	Single-Plant Firms	170	42	633	170	42	633
	Multi-Plants Firms	672	252	1779	226	103	433
For firm emp. size ≥100	Single-Plant Firms	430	237	1012	430	237	1012
	Multi-Plants Firms	901	415	2031	300	162	485

Source: Estimated using ASI unit level data

To assess whether these patterns are confined to specific industries or represent a broader structural phenomenon, we examine sectoral variation in firm size and plant-adjusted measures (Table 4).

The results show that while total firm size increases across most industries, plant-adjusted size exhibits a much more heterogeneous pattern. In several sectors, such as wearing apparel, electronics, and pharmaceuticals, there is some evidence of genuine scaling at the plant level. However, in a large number of industries, including textiles, food processing, chemicals, and electrical equipment, plant-adjusted employment stagnates or declines over time.

In some sectors, such as tobacco and petroleum-related industries, the decline in plant-adjusted size is particularly pronounced. This indicates that the divergence between firm-level and plant-level size is not confined to a few sectors, but is a widespread feature of Indian manufacturing. These sectoral evidences suggest that organisational restructuring is not an isolated phenomenon, but a general feature of firm behaviour across industries.

Table 4: Change in Average Size of Factory across Industrial Sectors for 2001 & 2023

		Average number of regular workers per-factory				Average number of total workers per-factory				Average of total employment (number of person engaged)			
	NIC: 10-32	**Per Factory**		**Per Factory (Plant-adj)**		**Per Factory**		**Per Factory (Plant-adj)**		**Per Factory**		**Per Factory (Plant-adj)**	
		2001	2023	2001	2023	2001	2023	2001	2023	2001	2023	2001	2023
10	Food products	99	89	87	73	119	142	106	117	155	181	141	150
11	Beverages	69	63	67	59	97	134	94	123	131	168	126	154
12	Tobacco	283	142	274	118	844	614	824	578	873	630	851	591
13	Textiles	231	252	215	203	247	298	229	239	285	346	265	278
14	Wearing apparel	177	306	131	149	184	343	138	171	212	391	159	198
15	Leather products	116	222	94	130	129	288	106	169	153	341	126	200
16	Wood & wood products	23	28	23	27	26	43	25	42	34	56	33	54
17	Paper & paper products	84	74	81	65	111	131	107	113	143	161	138	139
18	Printing & recorded media	41	49	37	41	42	65	38	55	74	98	66	81
19	Coke & refined petroleum	107	42	106	39	132	140	131	132	186	175	184	165
20	Chemicals& chemical products	112	87	104	74	135	179	127	152	189	239	176	203
21	Pharmaceuticals	91	137	83	109	115	272	104	211	204	424	181	322
22	Rubber & plastics	68	93	57	75	78	172	67	140	102	212	89	174
23	Non-metallic minerals	65	61	62	56	86	127	82	116	113	158	108	143
24	Basic metals	169	149	108	112	215	331	147	250	290	402	193	304
25	Fabricated metal products	50	71	48	58	67	127	64	106	91	158	88	132
26	Electronics & optical	91	143	81	117	98	323	88	260	155	418	137	334
27	Electrical equipment	81	85	73	72	94	182	84	154	136	231	120	195
28	Machinery & equipment	72	105	67	83	80	189	74	150	125	260	114	205
29	Motor vehicles	161	189	134	145	180	420	152	324	252	520	213	398
30	Other transport equipment	156	161	143	132	178	351	163	302	240	440	222	374
31	Furniture	63	50	41	40	78	82	52	66	110	108	72	85
32	Other manufacturing	77	179	68	136	88	244	78	188	111	304	99	234
	Total	114	126	100	96	141	215	126	168	181	268	161	210
	Avg.2001-2023	**110**		**90**		**187**		**153**		**208**		**175**	

Source: Estimated used unit-level data of ASI.

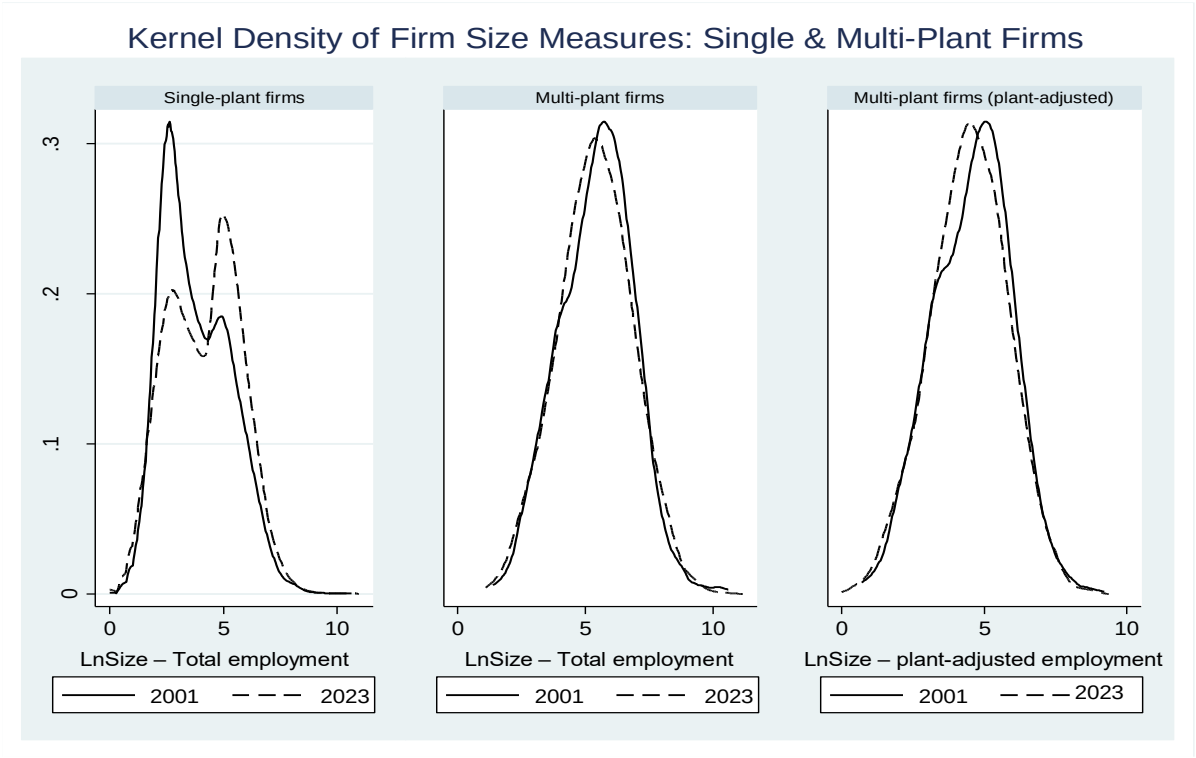
7.2. Distributional Evidence across Organisational Structure

The firm size density distribution across different organisational structures like for single-plant and multi-plant firms reveal distinct patterns (Figure 14). For single-plant establishments, distribution shifts rightward between 2001 and 2023, indicating an increase in typical size of single-unit over time. In contrast, distribution for multi-plant firms does not exhibit a similar rightward movement. Instead, the peak of 2023 distribution shifts modestly to the left relative to 2001, suggesting that the typical scale of multi-plant firms has not expanded in same manner.

When employment is normalized by number of plants, this pattern becomes more evident. Plant-adjusted distribution for multi-plant firms in 2023 again lies slightly to the left of its 2001 counterpart, indicating that average scale of individual plants within multi-plant organizations has remained broadly stable or even declined marginally. However, the modal peak of multi-

plant firms continues to locate at higher employment levels than that of single-plant firms in both years, reflecting their structurally larger organizational scale. However, same is not true when plant adjusted size measure is used.

Figure 14: Density of Firm-Size Distribution for Single and Multi-Plants Firms



Source: Estimated using ASI unit level data

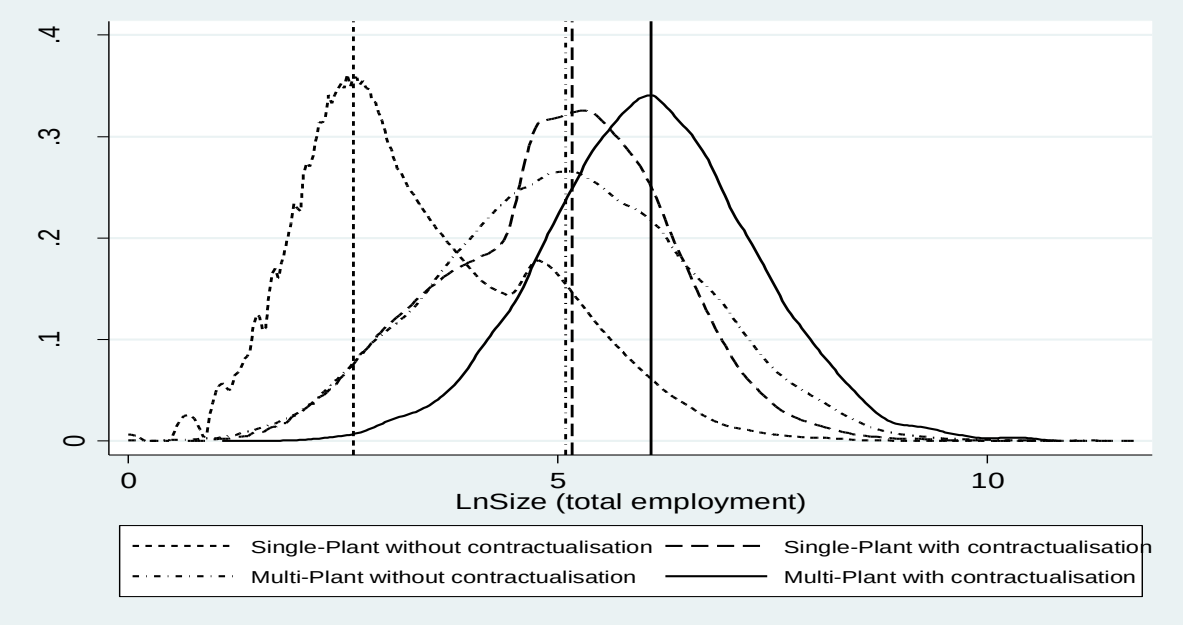
The joint role of contractualisation and multi-plant expansion measuring by distinguishes single-plant and multi-plant establishments with and without contractualisation, reveals substantial heterogeneity in firm size dynamics (Figures 15 & 16).

Single-plant firms without contractualisation are concentrated in the lower and middle size ranges, with limited presence in the upper tail. Its primary peak concentrated around 20-30 workers and a smaller secondary peak near 120 workers (Figure 15). This category accounts for roughly 65 percent of the total sample observations, and its continued concentration around relatively small sizes suggests that Indian manufacturing production units remain predominantly small in scale. In contrast, firms adopting either contractualisation or multi-plant structures exhibit distributions shifted toward higher size categories, with more pronounced upper tails.

Firms that combine both multi-planting with contractualisation strategies occupy the highest apparent size ranges and display a unimodal distribution. However, when firm size is measured using regular workers, these differences become much less pronounced. The distributions across organisational categories converge, indicating that much of the observed variation in firm size reflects differences in labour composition rather than proportional expansion in permanent employment.

These findings suggest that contractualisation and multi-plant expansion operate as complementary strategies. Firms use contract labour to manage workforce flexibility and regulatory exposure, while multi-plant structures allow them to expand production capacity without increasing the size of individual establishments.

Figure 15: Keral Density of Firm-Size by Organisational Restructuring Indicators



Source: Estimated using ASI unit level data

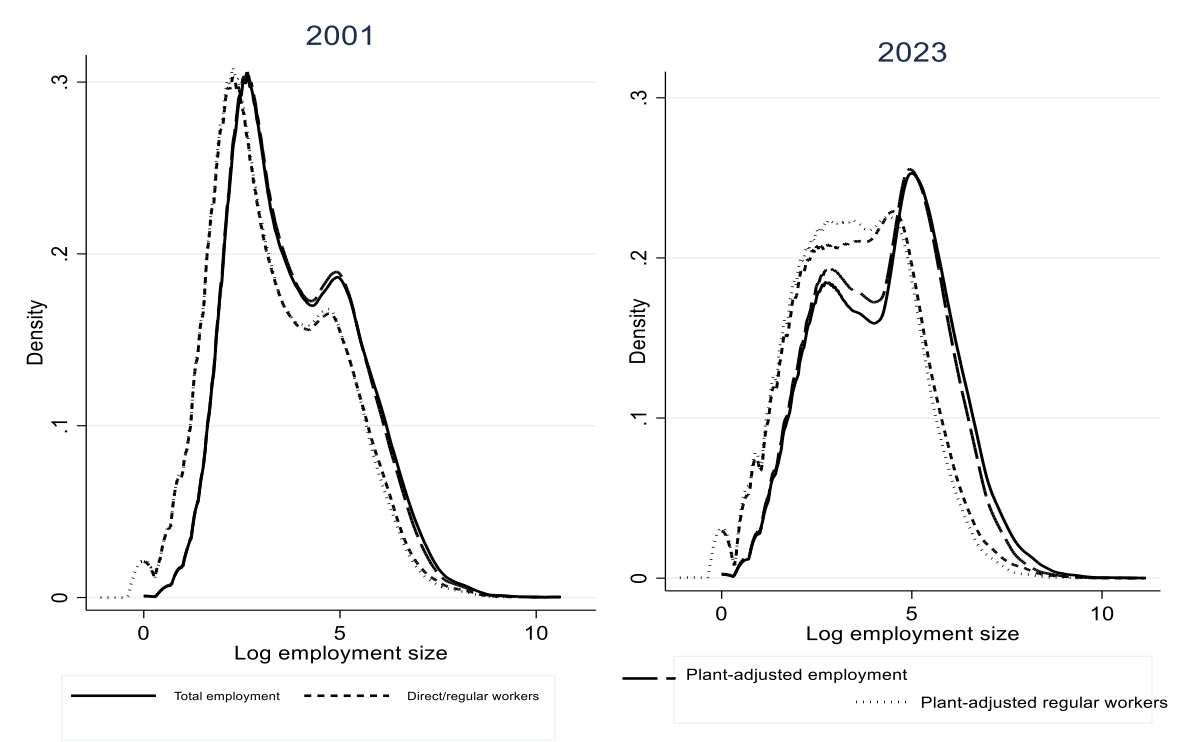
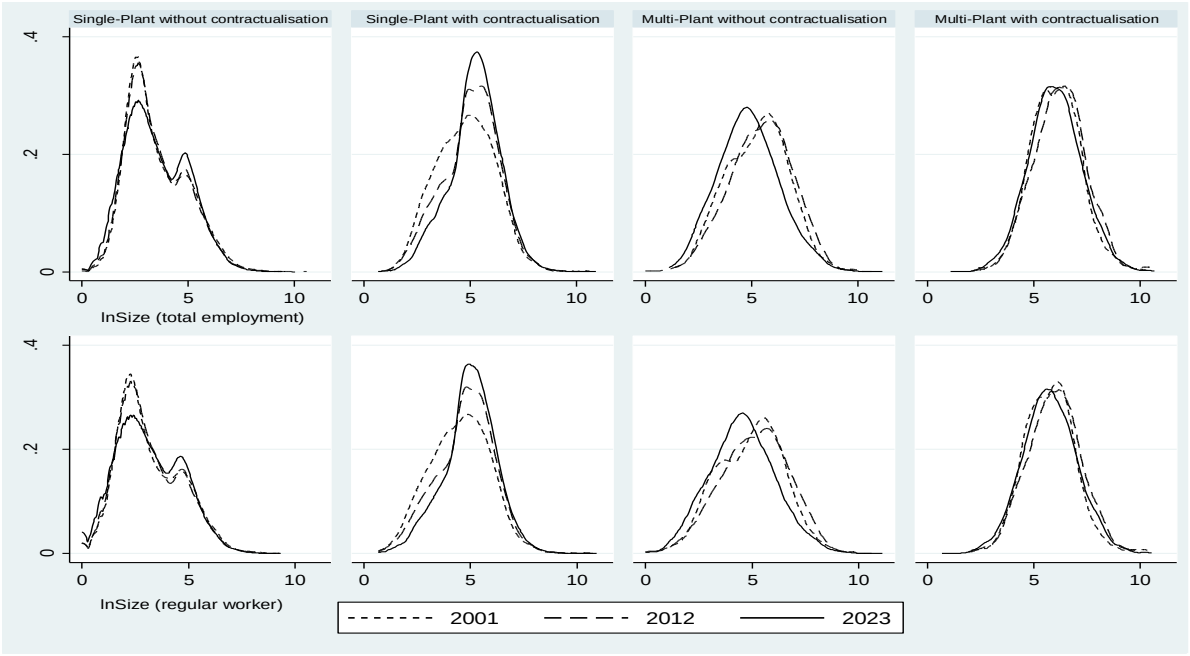


Figure 16: Keral Density of Firm-Size by Organisational Restructuring



Source: Estimated using ASI unit level data

Findings from above sections reveals that organisational restructuring appears to be the primary mechanism of firm growth. Firms do not appear to halt growth at regulatory thresholds. Instead, they expand through strategies that allow them to increase size while managing regulatory exposure. Contractualisation enables firms to adjust labour composition, while multi-plant expansion allows them to distribute production across establishments.

As a result, firm-level size increasingly diverges from plant-level scale. This implies that conventional measures of firm size may overstate the extent of structural transformation, as they do not account for the organisational form through which growth occurs.

Findings also suggest that organisational restructuring is not a marginal or threshold-specific response, but a pervasive feature of firm behaviour in Indian manufacturing. Understanding firm size dynamics therefore requires moving beyond a narrow focus on regulatory thresholds to consider the broader organisational strategies through which firms expand.

8. Firm Dynamics: Growth, Mobility and Structural Persistence

The preceding sections establish that firms in Indian manufacturing do not halt growth at regulatory thresholds and instead expand through organisational restructuring. This section examines whether these organisational strategies are reflected in firm dynamics, particularly in terms of growth, mobility, and persistence across size classes.

8.1. The Growth Dynamics

The panel regression estimates show that organisational restructuring, captured through contractualisation and multi-plant expansion, plays a significant role in shaping firm growth dynamics (Table 5). The coefficient of contract worker intensity turned positively (0.853) and significant in influencing the firm size (measuring as total employment) in level terms, but its

effect on growth indicator is more nuanced. Firms with higher contract labour shares tend to exhibit slower growth in total employment. This suggests that contractualisation allows firms to stabilise workforce size by adjusting labour composition rather than continuously expanding employment. In this sense, contract labour functions as a flexibility mechanism that reduces the need for sustained expansion in the permanent workforce.

However, the interaction between contractualisation and multi-plant structure reveals a complementary effect. Firms that combine both strategies exhibit stronger growth, indicating that while contractualisation alone may dampen growth, it becomes growth-enhancing when paired with organisational expansion across multiple plants. This suggests that firms use these strategies jointly to manage scale and flexibility.

The results however differ when same estimation is done for regular employment (Col-3). The contract labour share has a strong negative association with regular employment (-0.986). This implies that firms that rely more heavily on contract labour tend to employ fewer permanent workers, even though their overall employment size may be large. At the same time, multi-plant firms employ significantly more regular workers (0.467). This might be because organisational expansion across plants still requires a certain base of permanent workforce for managerial, technical, and supervisory functions.

In growth equation, lagged contract labour share negatively affects overall employment growth (-0.065), indicating that firms with higher contract labour intensity tend to experience slower growth in total employment (Col-2). However, interaction between contractualisation and multi-plant structure is positive and significant (0.078), suggesting that contract labour becomes growth-enhancing when combined with a multi-plant organisational structure. In the regular employment growth equation (Col-4), contract labour share has a positive effect (0.136), indicating that although contract labour substitutes for permanent workers in levels, it may still facilitate selective expansion of regular employment over time. This may appear counterintuitive given the negative relationship between contract labour and regular employment levels, but firms that rely on contract labour tend to have a smaller permanent workforce base, which allows them to adjust regular employment upward when operational needs require stabilisation of production or managerial capacity. In other words, contractualisation may initially substitute for permanent labour but can subsequently create conditions for selective expansion of regular employment. The negative and highly significant coefficient on lagged firm size (-0.392) indicates strong mean reversion in firm growth, consistent with the widely documented phenomenon that larger firms tend to grow more slowly. Overall, the growth regressions suggest that firm expansion is closely linked to organisational strategies rather than purely scale-based dynamics.

8.2. The Mobility Dynamics

Whether organisational restructuring affects the likelihood of firms moving across size categories, we examined the mobility using both linear probability and logit models (Table 5), where the dependent variable captures upward transitions across employment size classes.

The results show that contract labour plays a significant role in shaping mobility. When size is measured using regular employment, higher contract labour intensity increases the probability of upward movement. This suggests that firms use contractualisation to expand relative to regulatory thresholds, enabling them to move into higher size categories without proportionately increasing permanent workforce.

In contrast, multi-plant firms are less likely to exhibit upward mobility when size is measured at the establishment level. The multi-plant dummy coefficient turned negative (-0.022). This reflects the fact that such firms distribute employment across multiple plants rather than concentrating growth within a single unit. As a result, their expansion is not captured as discrete transitions across size classes.

The interaction between contractualisation and multi-plant structure reveals a more complex pattern. While each strategy independently supports expansion, their combined effect reduces upward mobility across size categories. This suggests that firms adopting both strategies tend to stabilise their organisational structure, expanding in scale without moving sharply across size thresholds.

When mobility is defined using total employment, the role of contractualisation changes. Higher contract labour intensity reduces the probability of upward movement, indicating that firms relying heavily on contract labour tend to remain within existing size categories while expanding through workforce flexibility rather than discrete increases in employment size. Multi-plant firms also show lower upward mobility in total employment terms (-0.018), again consistent with employment dispersion across plants.

These results suggest that firm mobility is shaped by organisational strategies, and that conventional measures of size transitions may understate the extent of expansion when growth occurs through restructuring.

Table 5: Organisational Restructuring and Firm Size Dynamics: Empirical Evidences

Variables	(1) ln(Size) FE	(2) Δln(Size) FE	(3) ln(Reg Emp) FE	(4) Δln(Reg Emp) FE	(5) Move-Up (Regu Emp, LPM-FE)	(6) Move-Up (Total Emp, LPM-FE)
Contract Share	0.853***		-0.986***			
	(0.0068)		(0.0092)			
L.Contract Share		-0.065***		0.136***	0.053***	-0.017***
		(0.0054)		(0.0074)	(0.0039)	(0.0033)
Multi-plant Dummy	0.439***		0.467***			
	(0.0102)		(0.0118)			
L.Multi-plant Dummy		0.031***		0.059***	-0.022***	-0.018***
		(0.0064)		(0.0078)	(0.0039)	(0.0038)
Contract × Multi-plant	0.006		-0.030			
	(0.0195)		(0.0252)			
L.Contract×Multi-plant		0.078***		-0.0004	0.022**	0.027***
		(0.0126)		(0.0162)	(0.0087)	(0.0071)
L.Initial Size		-0.392***		-0.422***	-0.129***	-0.130***
		(0.0033)		(0.0034)	(0.0014)	(0.0013)
Capital (lnFC)	0.132***		0.133***			
	(0.0022)		(0.0024)			
L.Capital		0.035***		0.036***	0.0096***	0.0069***
		(0.0016)		(0.0017)	(0.0008)	(0.0008)

Age	0.0020***		0.0020***			
	(0.0001)		(0.0002)			
L.Age		0.0001		0.0003**	-0.0001**	-0.0002***
		(0.0001)		(0.0001)	(0.0001)	(0.0001)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	892,684	493,449	892,684	493,449	493,449	493,449
Firms	233,125	102,888	233,125	102,888	102,888	102,888
R^2 / Pseudo R^2	0.178	0.196	0.140	0.221	0.064	0.065

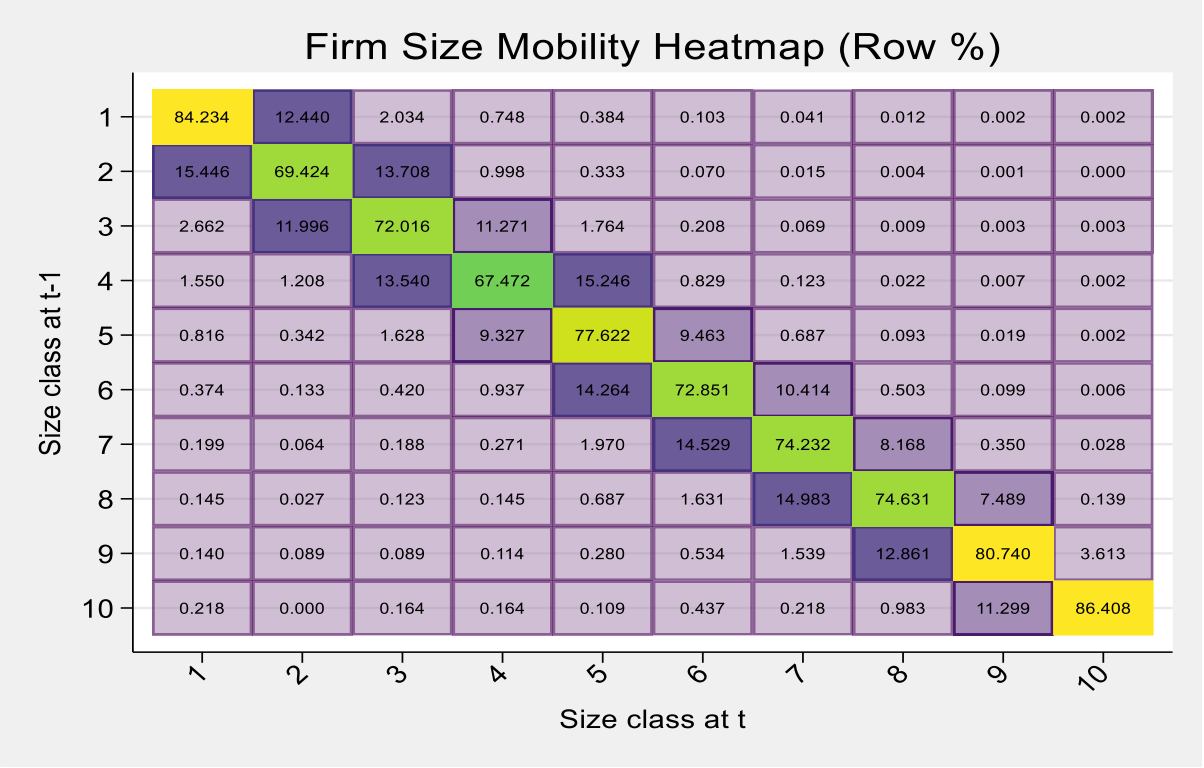
Source: Estimated using ASI unit level data

8.3. Short-Term Transition Dynamics and Persistence

To further assess firm dynamics, we examine (one-period) transition probability matrices across size classes (Figure 17). The probability represented through diagonal elements show strong persistence within size categories, with a large proportion of firms remaining in their initial size class between consecutive periods. For instance, around 84 percent of firms in smallest size (1-9 employment) category remain in the same class. The persistence rate recorded around 70 percent for several intermediate size groups. The larger firm exhibit high persistence, with more than 80 percent of firms remain in same category.

Evidence suggests that upward transitions are relatively rare and are typically confined to adjacent size classes, suggesting that firm growth occurs incrementally rather than through large jumps. The Shorrocks mobility indices, which provide a summary measure of the degree of movement across size classes, turn out to be around 0.27. A low value of index indicates that only a limited fraction of firms changes their size category between consecutive periods. That is, upward transitions are largely confined to adjacent bins, and movements from micro or small categories directly into medium or large categories are rare.

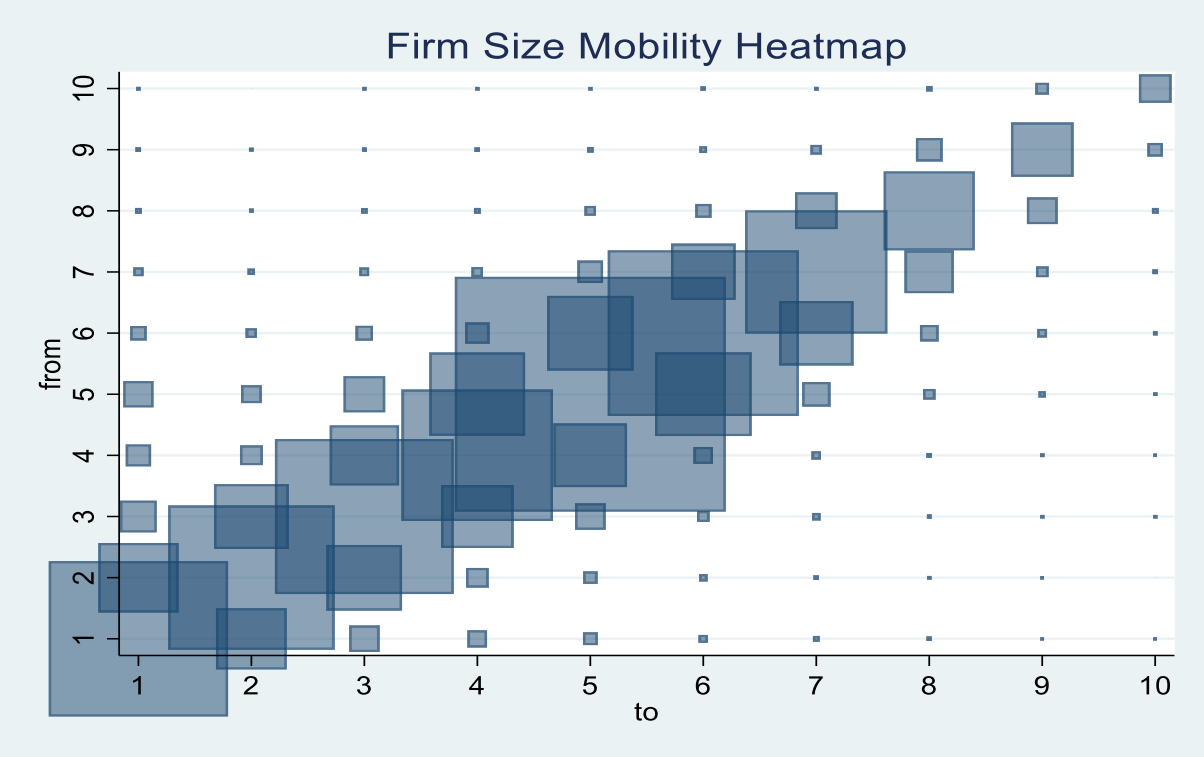
Figure 17: One-period Transition Probability Matrix across Employment Size Classes



Note- right (left) to diagonal is upword (downward) movement.
Source: Estimated using ASI unit level data.

These findings are reinforced by heatmap representations of transition probabilities (Figure 18), which visually highlight the dominance of persistence and the limited extent of upward mobility across the distribution. A comparison of transition dynamics across organisational forms reveals important differences in firm mobility (results not presented). Single-plant firms largely replicate the aggregate transition pattern, exhibiting strong diagonal persistence and relatively limited movement into higher employment categories. Multi-plant firms however show lower persistence in smaller size bins and a greater probability of upward movement into intermediate size categories such as 20-49, 50-99, and 100-249 workers. This suggests that firms operating multiple plants are more likely to expand across size thresholds. Howeverthe nature of this mobility remains largely incremental. Since multi-plant firms constitute only around one-thrid share of total sample firm, their relatively greater dynamism does not significantly alter the overall structure of the firm size distribution. Consequently, while organisational restructuring through multi-plant expansion is associated with somewhat higher mobility, the aggregate transition pattern continues to be dominated by persistence among single-plant firms.

Figure 18: Mobility Heatmap of Transition Probabilities across Size Classes



Source: Estimated using ASI unit level data

8.4. Long-Run Dynamics: Markov Transition Analysis

To assess whether the observed distributional shifts reflect temporary adjustments or a longer-run structural tendency, we compute multi-period Markov chain transition matrices by raising the one-period transition probability matrix *P* to higher powers say P2, P3, P5 and P20 (Table 6). The results show that even over extended periods, a substantial share of firms remains concentrated in lower and middle size categories. After two periods (P^2), more than 72 percent of micro firms remain in the 1-9 category, and less than 0.1 percent reach 100-249 range. Over three periods (P^3), mobility increases marginally, particularly among firms in 50-99 and 250-499 bins, but transitions remain concentrated in adjacent classes (p2-p3 results are not presented). After five periods (P^5), micro persistence declines to roughly 43 percent, and a greater share of firm transition into 100-249 category. However, transitions into 1000+ categories remain below 1 percent.

The long-run (steady-state represented through P^{20}) distribution indicates convergence toward intermediate size classes, but with a persistently thin upper tail. While some firms gradually move out of the smallest size categories, transitions into large-scale operations remain rare. Approximately 65 percent of firms converge to the 100-249 class and 14.9 percent to the 250-499 class, while less than 0.3 percent reach 1000+ workers. These dynamics indicate a regime of persistent stratification rather than transformative scaling in Indian manufacturing.

Table 6: Multi-Period Markov Transition Matrix

Multi-Period Markov Dynamics P^5[10,10]										
	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10
r1	43.36	22.70	13.11	5.28	12.36	2.71	0.42	0.049	0.007	0.002
r2	24.96	26.04	23.08	8.33	14.23	2.88	0.42	0.047	0.008	0.002
r3	8.76	12.90	23.87	13.23	33.37	6.81	0.93	0.096	0.016	0.002
r4	2.48	2.55	6.88	12.61	60.53	12.99	1.76	0.173	0.027	0.002
r5	1.51	1.01	3.53	11.27	65.65	14.74	2.06	0.201	0.031	0.002
r6	1.40	0.88	3.00	9.76	59.09	21.17	4.23	0.420	0.051	0.004
r7	1.39	0.87	2.71	8.48	52.34	24.85	8.20	1.045	0.102	0.006
r8	1.64	1.06	3.01	8.72	52.49	22.71	8.69	1.497	0.169	0.008
r9	2.48	1.77	3.89	9.67	55.84	19.37	5.75	1.056	0.181	0.009
r10	3.99	2.78	5.39	10.12	54.59	18.50	4.02	0.514	0.083	0.006
π = steady-state distribution vector P^{20}[10,10],]										
r1	1.58	1.09	3.64	11.22	65.14	14.93	2.14	0.21	0.032	0.003

Note: The important property of Markov chain is that $P^k \rightarrow \pi$. That is, when k becomes large, all rows converge to the same vector (the steady-state distribution). Our, P^{20} clearly shows that. The P^5 and P^{20} are estimated using transition matrix P.
Source: Estimated using unit level data of ASI, in TPM analysis, we left with 597,529 observations, P for t is traced for one period lag (t-1).

The dynamic evidence suggests that firm growth in Indian manufacturing is not characterised by large, discrete transitions across size categories, but by incremental adjustments within existing size classes.

Organisational restructuring plays a central role in this process. Contractualisation allows firms to adjust labour composition and manage workforce flexibility, while multi-plant expansion enables them to increase overall scale without expanding individual production units.

As a result, firm growth is not always captured by conventional measures of size transitions. Instead, it is reflected in changes in organisational structure and labour composition, leading to a divergence between observed firm size and underlying production scale.

This means the persistence of firm size distribution is not solely a consequence of constraints on growth, but also reflects the organisational form through which growth occurs. This provides a dynamic foundation for reinterpreting the missing-middle phenomenon, not as an absence of growth, but as a manifestation of how firms organise expansion in the presence of institutional and operational constraints.

9. Conclusion and Discussion

This paper re-examines firm size dynamics in Indian manufacturing by integrating organisational restructuring into the analysis of firm size distribution. Using firm-level panel data from the Annual Survey of Industries for the period 2001-2023, the study combines distributional analysis, threshold-based evidence, and dynamic firm behaviour to revisit the missing-middle debate and the role of labour regulations.

The results show that the firm size distribution remains strongly right-skewed, with a high concentration of firms at smaller sizes and a thin upper tail. While bin-based aggregation may

suggest a hollowing-out of the intermediate segment, this pattern is not robust to alternative definitions of firm size, disaggregated size bins, or density-based methods. Bimodality diagnostics further indicate that the distribution is closer to unimodal, suggesting that the missing-middle phenomenon is sensitive to measurement and empirical strategy rather than representing a stable structural feature.

Contrary to the conventional view, the evidence does not support the hypothesis that firms systematically cluster below regulatory thresholds or halt their growth to avoid compliance costs. The distribution of firms around the 100-worker threshold is smooth, and regression estimates show that firms continue to expand beyond this cut-off, even though the growth of regular employment slows modestly. These findings suggest that labour regulations do not operate as binding constraints on firm expansion in a mechanical sense.

Instead, the analysis points to organisational restructuring as the primary mechanism through which firms adjust and expand. Firms increasingly rely on contractual labour and multi-plant organisational structures to grow while managing regulatory exposure. Once these dimensions are taken into account, the apparent increase in firm size weakens considerably. Plant-adjusted measures indicate that the scale of individual production units remains stable or even declines over time, highlighting a growing divergence between firm-level size and plant-level scale.

The dynamic analysis reinforces this interpretation. Transition probability matrices and Markov simulations reveal strong persistence within size classes and limited upward mobility across the distribution. Firm growth occurs primarily through incremental adjustments rather than discrete jumps across size categories. Importantly, organisational strategies shape these dynamics: contractualisation facilitates flexible expansion, while multi-plant structures enable firms to distribute growth across establishments rather than concentrate it within a single unit.

Our findings offer a reinterpretation of missing-middle phenomenon for Indian manufacturing. The absence of a large intermediate segment does not necessarily reflect an inability of firms to grow. Rather, it reflects the manner in which firms organise production and expansion. Growth is not absent, but is mediated through organisational margins that are not fully captured by conventional measures of firm size.

These results have important implications for both policy and research. Policies aimed at promoting firm growth have often focused on easing regulatory constraints or encouraging firms to cross size thresholds. However, the evidence suggests that firms are already expanding, albeit through organisational forms that decouple firm-level growth from plant-level scaling. This implies that policy should move beyond a narrow focus on size thresholds and instead address the broader organisational environment in which firms operate, including labour market institutions, contract enforcement, and the costs associated with scaling production units.

At the same time, the findings highlight the importance of measurement in understanding firm dynamics. Analyses that rely solely on aggregate firm size may overstate the extent of structural transformation, as they do not account for organisational fragmentation. Incorporating plant-level adjustments and labour composition provides a more accurate picture of how firms grow and organise production.

The results point to several avenues for future research. Further work is needed to examine how organisational restructuring affects productivity, wages, and technological upgrading, and whether these strategies support or constrain long-term industrial transformation. Understanding the trade-offs between flexibility and scale will be critical for designing policies that promote both firm growth and employment quality in the Indian manufacturing sector.

10. References

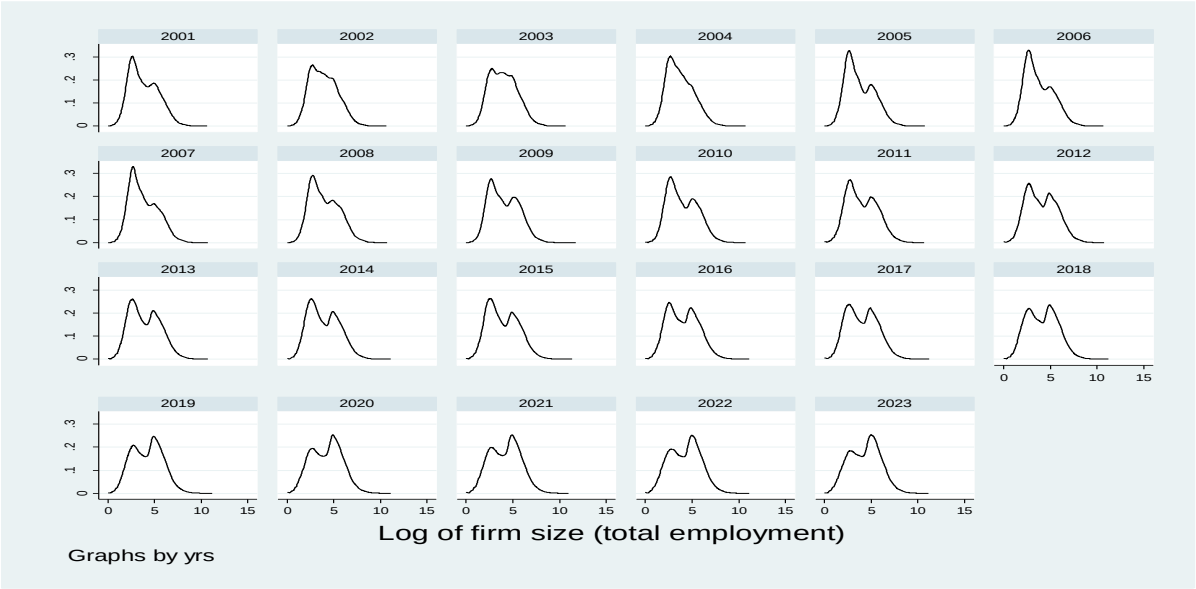
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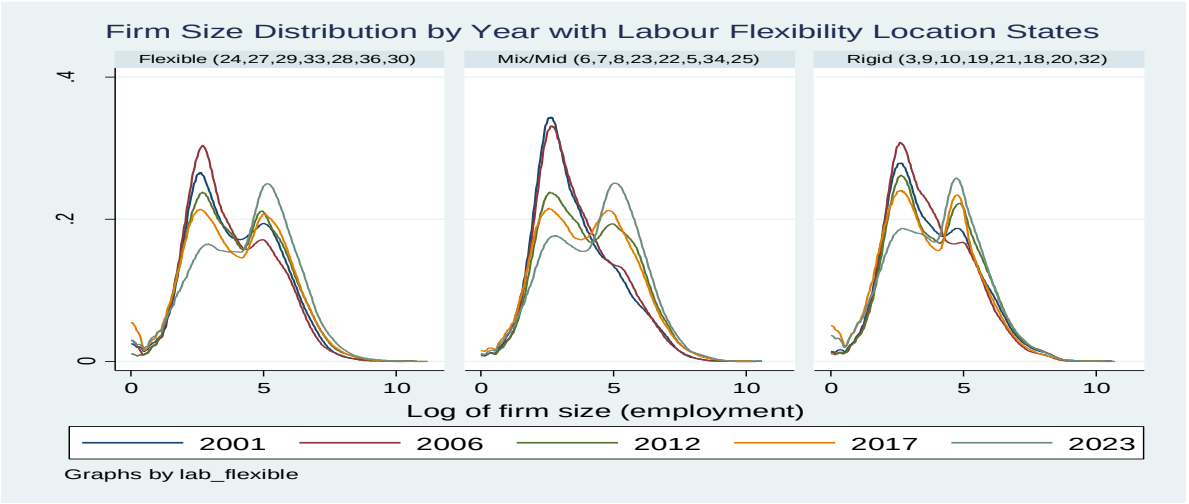
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11. Appendices

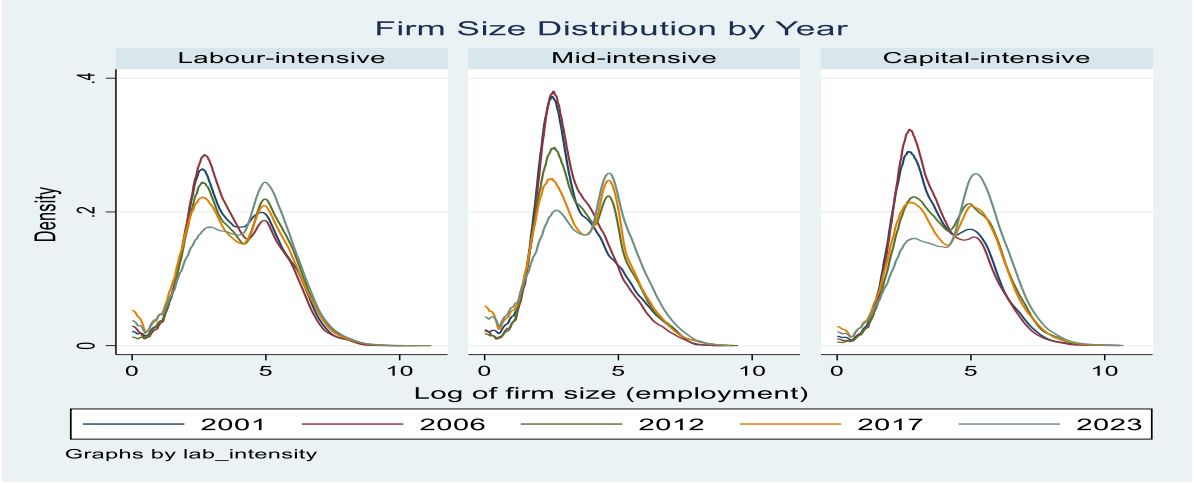
Appendix 1: Kernal Dinsity of Firm Size Distribution by Years



Appendix 2: Kernal Dinsity of Firm Size Distribution for Flexible-Rigid Labour Regulation States



Appendix 3: Kernal Dinsity of Firm Size Distribution for Labour-Capital Itensive Industrial Sectors



Appendix 5: Bimodality Coeficient across industrial sector from 2001 to 2023

NIC-2	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Food products	0.45	0.41	0.41	0.43	0.48	0.49	0.49	0.49	0.48	0.50	0.48	0.48	0.49	0.51	0.50	0.48	0.48	0.48	0.48	0.47	0.47	0.46	0.45
Beverages	0.48	0.47	0.47	0.46	0.50	0.52	0.52	0.49	0.53	0.49	0.52	0.52	0.49	0.49	0.50	0.51	0.52	0.53	0.52	0.52	0.55	0.55	0.56
Tobacco	0.39	0.39	0.38	0.36	0.41	0.39	0.38	0.38	0.39	0.44	0.40	0.41	0.44	0.40	0.42	0.27	0.28	0.29	0.28	0.29	0.30	0.31	0.32
Textiles	0.46	0.42	0.41	0.43	0.46	0.46	0.45	0.45	0.45	0.46	0.44	0.42	0.43	0.44	0.44	0.41	0.41	0.41	0.41	0.39	0.38	0.40	0.39
Wearing apparel	0.43	0.39	0.40	0.42	0.41	0.39	0.40	0.37	0.37	0.38	0.39	0.35	0.32	0.33	0.33	0.34	0.33	0.32	0.30	0.28	0.29	0.31	0.30
Leather products	0.51	0.42	0.42	0.46	0.49	0.50	0.49	0.50	0.46	0.48	0.44	0.44	0.44	0.46	0.44	0.41	0.40	0.40	0.40	0.37	0.38	0.39	0.36
Wood & wood products	0.51	0.50	0.46	0.51	0.50	0.51	0.52	0.49	0.53	0.52	0.50	0.49	0.50	0.53	0.49	0.51	0.50	0.50	0.49	0.51	0.48	0.49	0.52
Paper & paper products	0.56	0.49	0.47	0.49	0.55	0.55	0.54	0.53	0.54	0.54	0.51	0.49	0.50	0.52	0.50	0.52	0.50	0.44	0.45	0.42	0.45	0.45	0.43
Printing & recorded media	0.43	0.38	0.39	0.40	0.43	0.42	0.45	0.43	0.40	0.47	0.40	0.43	0.46	0.45	0.45	0.44	0.44	0.43	0.42	0.41	0.40	0.39	0.39
Coke & refined petroleum	0.52	0.48	0.41	0.42	0.50	0.45	0.50	0.51	0.47	0.44	0.49	0.47	0.46	0.47	0.46	0.45	0.46	0.47	0.44	0.43	0.42	0.42	0.42
Chemicals & chemical products	0.44	0.40	0.40	0.42	0.47	0.47	0.49	0.48	0.49	0.46	0.45	0.45	0.48	0.50	0.49	0.48	0.46	0.46	0.45	0.44	0.45	0.45	0.46
Pharmaceuticals	0.45	0.43	0.43	0.43	0.47	0.46	0.45	0.43	0.45	0.45	0.40	0.41	0.44	0.42	0.42	0.43	0.43	0.41	0.40	0.38	0.37	0.38	0.37
Rubber & plastics	0.52	0.47	0.46	0.49	0.55	0.55	0.55	0.52	0.49	0.51	0.49	0.48	0.51	0.50	0.51	0.49	0.47	0.45	0.45	0.43	0.43	0.43	0.43
Non-metallic minerals	0.57	0.50	0.49	0.51	0.57	0.56	0.55	0.57	0.55	0.55	0.53	0.53	0.51	0.50	0.51	0.49	0.47	0.45	0.47	0.46	0.47	0.47	0.47
Basic metals	0.45	0.40	0.40	0.43	0.48	0.46	0.47	0.45	0.45	0.45	0.43	0.42	0.43	0.44	0.44	0.43	0.43	0.43	0.41	0.39	0.39	0.39	0.39
Fabricated metal products	0.54	0.47	0.46	0.47	0.54	0.51	0.51	0.51	0.49	0.51	0.46	0.45	0.48	0.48	0.50	0.48	0.47	0.47	0.46	0.45	0.44	0.45	0.44
Electronics & optical	0.41	0.40	0.41	0.41	0.42	0.43	0.42	0.42	0.45	0.40	0.40	0.38	0.43	0.41	0.40	0.41	0.41	0.39	0.38	0.38	0.39	0.35	0.35
Electrical equipment	0.54	0.48	0.45	0.47	0.52	0.51	0.51	0.48	0.48	0.47	0.45	0.43	0.46	0.45	0.46	0.45	0.44	0.43	0.43	0.42	0.43	0.44	0.45
Machinery & equipment	0.51	0.47	0.45	0.46	0.55	0.53	0.52	0.51	0.49	0.51	0.46	0.47	0.49	0.49	0.49	0.45	0.46	0.44	0.43	0.42	0.42	0.42	0.42
Motor vehicles	0.44	0.40	0.37	0.42	0.45	0.46	0.47	0.45	0.44	0.43	0.42	0.40	0.43	0.42	0.42	0.43	0.43	0.40	0.38	0.38	0.39	0.39	0.41
Other transport equipment	0.51	0.46	0.46	0.47	0.55	0.50	0.50	0.47	0.50	0.52	0.50	0.48	0.49	0.47	0.47	0.46	0.47	0.47	0.44	0.44	0.42	0.43	0.43
Furniture	0.50	0.44	0.43	0.42	0.50	0.44	0.44	0.40	0.49	0.43	0.46	0.44	0.48	0.51	0.52	0.55	0.48	0.48	0.47	0.47	0.49	0.50	0.48
Other manufacturing	0.52	0.47	0.45	0.44	0.48	0.46	0.46	0.45	0.48	0.48	0.47	0.43	0.46	0.46	0.46	0.44	0.42	0.41	0.39	0.38	0.37	0.38	0.38

Note: This Appendix shows that in non-metallic minerals, BC values recorded above 0.55 in mid-2000s. Paper and paper products and rubber and plastics also show brief episodes of strong bimodality during the same period. In contrast, most industries including textiles, wearing apparel, chemicals, pharmaceuticals, electronics, and motor vehicles remain largely below 0.50 for most years, indicating weak bimodality and relatively unimodal firm-size distributions. Several industries that initially exhibited moderate bimodality such as leather, fabricated metals, machinery and electrical equipment, displayed a gradual decline toward weaker bimodality after 2010. An exception is the beverage sector, where BC values increase from moderate levels in early 2000s to strong bimodality after 2020, making it the only sector showing a clear upward trajectory. The sectors such as tobacco and wearing apparel show pronounced declines in BC values, suggesting increasing convergence in firm sizes. This suggests that the dominant trend across manufacturing sectors is a shift from moderate toward weak bimodality over time.