Labor Regulations, Firm Dynamics and Sectoral Reallocation: Evidence from India

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Abstract

Employment protection legislation can shape firm dynamics and aggregate productivity by altering the cost of adjusting labor. In this paper, we show that size-dependent firing restrictions contract manufacturing activity and induce reallocation toward unregulated sectors. We exploit a major tightening of India's Industrial Disputes Act: the 1982 amendment requiring factories with 100300 workers to obtain government permission before layoffs, retrenchment, or closure. Using a district-industry panel from the Annual Survey of Industries, we show that units with greater pre-policy exposure to the new threshold experience sharp declines in employment (27 percent), revenues (36 percent), and firm counts (41 percent), with effects concentrated in labor-intensive industries. To quantify the aggregate implications of these responses, we develop a three-sector general equilibrium model in which firing restrictions enter as a labor wedge in regulated manufacturing. Firms trade off the increased cost of labor adjustment against the productivity gains from operating at efficient scale. Calibrated to pre-reform microdata, the model implies that aggregate output in 1986 was 7.5 percent lower than in a preliminary counterfactual without the firing restrictions, with the regulation inducing substantial reallocation of labor toward unregulated sectors and slowing capital accumulation.

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1 Introduction

Employment protection legislation can shape firm dynamics and aggregate outcomes by altering the cost of adjusting labor. In many developing economieswhere manufacturing accounts for a relatively small share of employment and firms operate close to size thresholdssuch regulations may have particularly large effects on employment creation, input choices, and sectoral allocation. Despite this, there is limited causal evidence on how size-dependent firing restrictions affect the evolution of manufacturing activity and the broader allocation of labor across sectors.

This paper studies a major tightening of Indias employment protection regime: the 1982 amendment to the Industrial Disputes Act (IDA), implemented in 1984, which required factories with 100-300 workers to obtain prior government permission before layoffs, retrenchment, or closure. Plants with 300 or more workers had been subject to the same requirement since 1976; the 1982 amendment substantially expanded the scope of the regulation by bringing mid-sized establishments under identical restrictions. These changes applied nationally and imposed a sharp increase in the expected cost of labor adjustment for establishments above the 100-worker threshold.

Using repeated cross-sections of the Annual Survey of Industries (ASI), we first document that aggregate manufacturing employment declines by 14.3 percent between 1982 and 1986, reversing a rising trend in the preceding years. The firm-size distribution shifts leftward, and total manufacturing output contracts. While these descriptive patterns are suggestive, we move beyond them by constructing a district-industry panel that exploits cross-district variation in pre-policy exposure: locations with a greater pre-1982 mass of plants in the 100-300 worker range are more affected when the amendment becomes binding.

Event-study estimates show sharp and persistent declines in exposed district-industry units after 1984 relative to less exposed units within the same industry: employment falls by 27 percent more, man-days by 38 percent more, revenues by 36 percent more, and the number of firms by 41 percent more. The effects are concentrated in labor-intensive industries, consistent with the amendment effectively raising the shadow cost of labor more in these sectors. These responses are broad-based and combine intensive-margin contractions with substantial exit.

To interpret these reduced-form estimates and quantify economy-wide effects, we develop a three-sector general equilibrium model with two regulated manufacturing sectors and an unregulated sector. The firing requirement enters as an effective labor wedge in the regulated sectors. Calibrated to pre-reform ASI microdata and disciplined by the observed sectoral responses, the model implies that output in 1986 was 7.45 percent lower than in a preliminary counterfactual without the firing restrictions, with average post-reform losses of 6.33 percent. The regulation induces a pronounced reallocation of labor away from regulated manufacturing toward the unregulated sector and slows capital accumulation, amplifying long-run output losses.

The IDAs size-dependent firing restrictions have re-emerged at the center of policy debates. Indias recently implemented 2025 Labour Codesincluding the Industrial Relations Coderaise the permission threshold for layoffs and retrenchment from 100 to 300 workers, partially reversing the 1982 tightening. The evidence in this paper quantifies the economic costs of the earlier expansion of the regulatory threshold and provides empirical guidance for understanding the likely consequences of its relaxation.

Related Literature. This paper contributes to four related literatures. First, we add to work on labor-market frictions and structural transformation. A large body of research emphasizes supply-side constraints such as human-capital scarcity, barriers to skill acquisition, and technology adoption frictions in shaping structural change (Ngai and Pissarides, 2007; Buera et al., 2018). A smaller but growing literature highlights demand-side distortions and the role of firms in limiting the creation of wage jobs (Donovan and Schoellman, 2021). Our empirical focus on firing restrictions provides direct evidence that demand-side wedges can slow the transition from informal/self-employment toward wage work by depressing firm scale and formal job creation. In doing so, we complement recent syntheses that call for more causal evidence linking specific policies to the organization of labor along the development path.

Second, we contribute to the literature on size-dependent regulation and misallocation. Models of heterogeneous firms predict that discontinuities tied to establishment size can distort firm growth, induce inefficient factor substitution, and lower aggregate TFP through both within-sector and cross-sector misallocation (Garicano et al., 2016; Restuccia and Rogerson, 2008). Empirically, work on size thresholds in Europe and elsewhere has documented bunching, stunted firm size distributions, and productivity losses from such regulations. We provide evidence that size-dependent firing restrictions in a low-income context generate large contractions even without sharp bunching at the regulatory cutoff, and that the equilibrium response operates strongly through extensive-margin exit and entry deterrence. Our calibration translates these responses into aggregate productivity and output costs.

Third, our paper complements and extends the India-specific literature on the Industrial Disputes Act and pro-worker labor institutions. Prior research has studied the effects of IDA-related provisions on plant productivity, industrial growth, and investment, exploiting state-level variation in enforcement or comparing firms across thresholds (Besley and Burgess, 2004; Aghion et al., 2008; Bertrand et al., 2021). While these studies establish that firing restrictions can depress output and formal employment, they have not quantified the magnitude of the resulting structural reallocation across regulated manufacturing and unregulated sectors, nor mapped reduced-form effects into aggregate welfare and growth losses. By combining event-study evidence with a disciplined general-equilibrium model, we link micro-incidence to macro consequences.

Fourth, we relate to the broader development literature quantifying productivity gaps across sectors and the costs of distorted factor allocation (**?**). A central theme in this work is that moving labor into higher-productivity manufacturing is key for growth, but that policy-induced wedges can trap factors in low-productivity activities. Our counterfactual simulations show that firing restrictions can generate exactly this pattern, shifting labor out of regulated manufacturing and into unregulated sectors, lowering output even when tax revenues are rebated lump-sum. The paper therefore provides a concrete policy channel through which sectoral misallocation arises in developing economies.

2 Institutional Background: The Industrial Disputes Act and Firing Restrictions

In this section we describe the institutional setting and the specific labour law changes that we study. Our focus is on the Industrial Disputes Act (IDA), 1947 and its subsequent amendments that introduced size-dependent firing restrictions for Indian manufacturing plants. These provisions govern layoffs, retrenchment, and plant closure, and are widely regarded as the core of Indias formal employment protection legislation for the organised sector (e.g. Besley and Burgess, 2004; Aghion et al., 2008).

2.1 The Industrial Disputes Act, 1947

The IDA was enacted shortly before Indias independence to regulate the resolution of industrial disputes between employers and "workmen" in factories, mines and plantations. The Act lays out procedures for conciliation, adjudication through labour courts and industrial tribunals, and defines a set of employer actions that require prior notice or compensation. Three concepts are central for our analysis:

- *Layoff*: temporary inability of the employer to provide work for reasons such as shortage of raw materials, power cuts, or breakdown of machinery.
- *Retrenchment*: termination of a workmans service for any reason other than disciplinary action, voluntary retirement, superannuation, or continued ill-health.
- *Closure*: permanent shutdown of a unit or undertaking.

For covered "workmen," the Act specifies minimum notice periods, severance pay, and procedural requirements that must be satisfied before layoffs, retrenchment, or closure can occur. However, in its original form the IDA did *not* require prior government permission for such actions; employers were obliged to give notice and compensation but retained unilateral authority, subject to ex post dispute resolution.

Coverage is restricted to establishments employing a minimum number of workers, and to workers who meet the legal definition of "workman" (broadly, non-supervisory and non-managerial employees below a salary threshold). Professional, managerial, and some supervisory staff are excluded. Thus, the IDAs employment protection provisions primarily affect blue-collar and lower white-collar workers in larger, registered manufacturing plants.

2.2 Chapter V-B and the 1976 and 1982 Amendments

The policy changes we study arise from the introduction and subsequent expansion of Chapter V-B of the IDA. Chapter V-B was added by the Industrial Disputes (Amendment) Act, 1976, and later modified by the Industrial Disputes (Amendment) Act, 1982.

1976 amendment: introduction of Chapter V-B and 300-worker threshold. The 1976 amendment introduced Chapter V-B, titled "Special Provisions Relating to Lay-off, Retrenchment and Closure in Certain Establishments." This chapter applied to industrial establishments employing *300 or more* workmen on an average per working day in the preceding twelve months. For such covered establishments, the amendment fundamentally changed the legal status of employment adjustment:

- Employers were required to obtain *prior permission* from the "appropriate government" (typically the state government) before effecting layoffs, retrenchment, or closure.
- Applications for permission had to be submitted in a prescribed form, stating reasons for the proposed action. The government could grant or refuse permission within a stipulated time period, after making such enquiry as it deemed fit.
- If the government did not communicate a decision within the statutory time, permission was deemed to be granted (*deemed approval*).
- Any action taken without permission, or after refusal, was deemed illegal, with workmen entitled to all benefits as if no layoff, retrenchment, or closure had occurred.

In effect, the 1976 amendment converted firing and closure decisions in covered plants into a regulated activity requiring ex ante state approval, rather than a unilateral employer decision subject only to ex post dispute resolution. The expected cost of workforce adjustment for plants with 300+ workers therefore increased sharply relative to smaller plants.

1982 amendment (implemented 1984): extension to 100–300 workers. The 1982 amendment broadened the scope of Chapter V-B by lowering the employment threshold from 300 to *100* workers. Although the amendment was passed in 1982, its relevant provisions came into force in 1984.[1]

After implementation, all industrial establishments employing *100 or more* workmen on average in the previous year were required to obtain government permission for layoffs, retrenchment, and closure. Plants with 100–299 workers were thus newly brought under the purview of Chapter V-B, while plants below 100 workers remained exempt.

Taken together, the 1976 and 1982 amendments created a size-dependent regime of firing restrictions:

- Plants with fewer than 100 workers: subject to the baseline IDA provisions (notice, severance) but *no* prior government permission required for layoffs, retrenchment, or closure.
- Plants with 100–299 workers: baseline IDA provisions *plus* mandatory prior government permission from 1984 onward.
- Plants with 300 or more workers: baseline IDA provisions *plus* mandatory prior government permission from 1976 onward.

Our empirical strategy exploits this expansion of Chapter V-B coverage. The 1976 amendment establishes a pre-existing regime in which large plants (300+) faced firing restrictions; the 1982/84 change extends the same regime to mid-sized plants (100300). The key quasi-experimental variation arises from cross-district differences in the pre-reform distribution of plant sizes around the 100300 worker range.

2.3 Coverage, Enforcement, and Practical Implications

The bite of Chapter V-B depends on both legal design and enforcement. Three institutional features are particularly important for interpreting our estimates.

First, the requirement of prior government permission introduces administrative and political risk into any decision to adjust employment at scale. Applications can be refused, delayed, or approved with conditions. Even when permission is ultimately

[1]The 1982 Act also introduced other changes to the IDA, but the reduction of the Chapter V-B threshold from 300 to 100 workmen is the key change for our analysis.

granted, the process implies legal costs and uncertainty. For establishments whose profitability depends on being able to shrink or close loss-making operations, this acts like an implicit tax on job destruction and a wedge between the social and private value of employment adjustment.

Second, the relevant unit of application is the *industrial establishment*, often defined at the plant or factory level. A multi-plant firm can, in principle, reorganize across establishments to reduce the number of workers in any given unit, or to open new units below the threshold. However, fragmentation is not costless, and the need to comply with other regulations (such as the Factories Act) limits the extent to which firms can costlessly avoid Chapter V-B by splitting operations. In practice, contemporary accounts and subsequent empirical studies (e.g. Besley and Burgess, 2004; Aghion et al., 2008; Chaurey, 2015) suggest that the amendments were regarded as binding for a large subset of organised manufacturing.

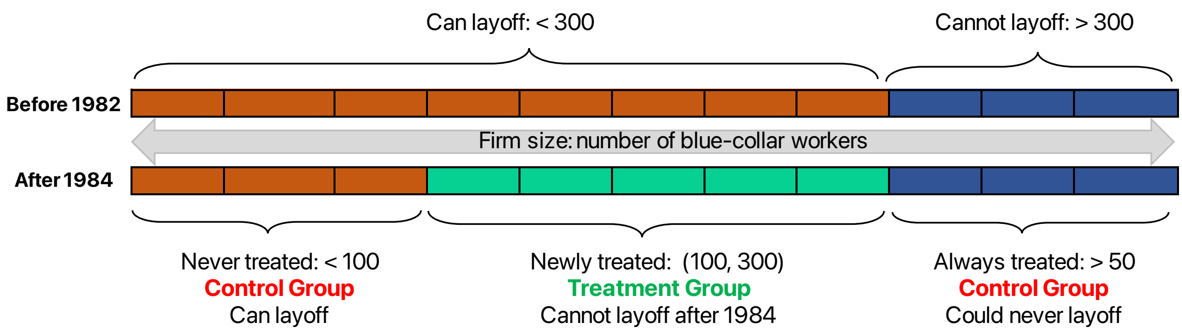
Third, enforcement authority rests largely with state governments. While the text of Chapter V-B is uniform at the national level, states differ in their administrative capacity, political attitudes towards large employers and unions, and propensity to grant or deny permission. This state-level heterogeneity has been exploited in previous work that classifies states as "pro-worker" or "pro-employer" based on court decisions or subsequent amendments (Besley and Burgess, 2004). Our approach instead leverages within-industry variation in the pre-reform size distribution across districts, holding national law constant.

2.4 Relation to Other Labour Regulations

The IDA operates alongside other labour regulations that also contain size thresholds, notably the Factories Act, 1948, and the Contract Labour (Regulation and Abolition) Act, 1970. The Factories Act regulates working conditions, safety, and hours in establishments with 10 or more workers using power (or 20 or more without power), but does not itself impose firing restrictions. The Contract Labour Act governs the use of contract workers and created its own regulatory environment for outsourcing labour; later judicial decisions in 2001 clarified that contract workers need not be automatically absorbed as permanent employees, affecting firms use of contract labour as a way around IDA constraints.

Our empirical window focuses on the period around the 1982 amendment, during which Chapter V-B is the main legal source of size-dependent firing restrictions for regular manufacturing workers. While other regulations shape the broader labour market environment, they do not generate the sharp change in firing costs at the 100-worker threshold that we exploit.

Figure 1: Exposure to Industrial Disputes Act



Notes:

2.5 Persistence and Contemporary Reforms

The Chapter V-B regime with a 100-worker threshold remained a central feature of Indias labour law landscape for several decades. In 2020, Parliament passed a set of consolidated Labour Codes, including the Industrial Relations Code, which raises the threshold for mandatory government permission for layoffs and retrenchment from 100 to 300 workers. These Codes were implemented nationally in November 2025. The contemporary reform therefore partially reverses the 1982 expansion of Chapter V-B studied in this paper, making our estimates directly relevant for understanding the likely consequences of relaxing size-based firing restrictions in a low- and middle-income setting.

3 Data

The main data source for this paper is the Annual Survey of Industries (ASI), conducted by the Ministry of Statistics and Programme Implementation of the Government of India. The ASI is the principal source of information on the organised manufacturing sector in India. It covers all factories registered under the Factories Act that employ at least ten workers with power or twenty workers without power, and is designed to be nationally representative of formal manufacturing activity. The survey is conducted annually under the legal framework of the Collection of Statistics Act, and reporting is mandatory for sampled establishments.

We use establishment-level ASI microdata from 1974 to 1990. These data take the form of repeated cross-sections rather than a panel of plants, since unique firm identifiers are not consistently available for this time period. In each year the ASI follows a stratified sampling design that divides the universe of registered factories into two schemes. The "Census" sector consists of all relatively large factories, which are surveyed with certainty every year. During our period of study this census covers plants with greater than 50 workers. The "Sample" sector consists of a rotating random sample of smaller registered factories surveyed with a 50 percent probabilty each year. Sampling weights supplied by the ASI allow us to construct representative aggregates for Indian manufacturing. On average, about 60,000 establishments are surveyed each year, yielding a rich picture of the size distribution and input choices of formal plants.

The unit of observation in our baseline data is an establishment (plant). For each plant and year, the ASI reports detailed information on employment, production, and balance-sheet items. The key variables used in the analysis are: the number of workers employed during the reference year, total man-days worked, total revenues, total value of intermediate inputs, and the book value of fixed capital. We also observe the plant's location (state and district) and its primary industry according to the National Industrial Classification 1974. Monetary variables are reported in current rupees.

We impose a set of sample restrictions that mirror the scope of our empirical questions. We restrict attention to factories classified in manufacturing industries, dropping mining, utilities, and plantations. We exclude observations with missing or clearly miscoded information on employment, output, or location, and plants with zero or negative values for revenues, inputs, or fixed capital. After these restrictions, our core sample contains 469,985 plant-year observations over the 1974-1990 period.

Table 1 summarises the main variables used in the analysis. The average plant in our sample employs 77 workers and generates about 9.2 million rupees of annual revenue, with substantial dispersion across the distribution. Average man-days worked equal roughly 27,000 per year, indicating that even among formal plants many operate at relatively small scale. Mean fixed capital is about 2.1 million rupees. The large standard deviations for monetary variables underscore the high degree of heterogeneity in plant size and capital intensity within Indian organised manufacturing, which is central to the mechanisms studied in this paper.

Table 1: Summary Statistics

	Obs	Mean	p10	p90	SD
Workers	469,985	77	6	159	181
Man-days Employed	469,985	26,996	1,825	53,200	68,099
Total Inputs	469,985	7,110,057	39,658	13738427	22705170
Total Revenue	469,985	9,221,122	98,130	17080431	29964906
Fixed Capital	469,985	2,092,044	10,365	2,846,843	8,245,180

Notes: This table presents summary statistics for firms included in our analysis, using data from the Annual Survey of Industries (ASI). "Workers" represents the total number of workers employed by the firm. "Man-days Employed " refers to total number of man-days worked, which captures the aggregate labor input accounting for both the number of workers and days worked. "Total Inputs" denotes the total value of inputs used in production. "Total Revenue" represents the total revenue generated by the firm. "Fixed Capital" refers to the total value of fixed capital assets. All monetary values are in Indian Rupees (INR); Workers and Man-days Employed are in numbers. Columns represent the total observations, mean, 10th percentile, 90th percentile and standard deviation of each variable. *Source:* Annual Survey of Industries

4 Empirical Design and Results

This section examines the aggregate effects of the 1982 IDA amendment on Indian manufacturing employment. We begin with descriptive evidence before turning to causal identification.

4.1 Aggregate

We use the Annual Survey of Industries (ASI) data with appropriate sample weights to examine aggregate employment trends in Indian manufacturing before and after the IDA amendment. This allows us to construct representative measures of total manufacturing employment and track how the sector evolved around the policy change.

Aggregate employment in Indian manufacturing drops by 14.3% following the 1982 amendment, falling from 37 million employees in 1982 to 32 million by 1986. More striking than the level effect is the break in trend: employment had been steadily increasing before 1982, consistent with industry-led growth typical of developing economies **[cite]**. This upward trajectory reverses sharply after the amendment, with year-on-year employment declines from 1982 to 1986. These figures account for sample weights, making them representative of the population of manufacturing firms and comparable across time. The sampling frame remained unchanged during this period, and we identify no other contemporaneous domestic or international shocks that could explain these aggregate patterns.

To examine heterogeneous effects, we categorize firms into three groups based on their regulatory status: firms with fewer than 100 workers (not yet treated), firms with 100-300 workers (newly treated), and firms with more than 300 workers (always treated). All three categories experience employment declines and trend reversals, but the magnitude is largest for firms above 300 workersthose for whom the regulation was already binding or continued to bind.

We examine the firm size distribution to identify potential distortions around the regulatory threshold. The density plots follow lognormal distributions typical of industry structures **[Joao and Gomes, Syverson]**. Surprisingly, we find no evidence of bunching around the revised 100-worker threshold, regardless of bandwidth choice. While this contrasts with some studies finding regulatory distortions, it aligns with other work documenting absence of bunching **[Klenow].** Two factors likely explain this pattern: first, the regulation's recent introduction and prohibition on firing made immediate employment adjustments difficult for firms near the threshold; second, enforcement may have been sufficiently uncertain that firms did not perceive sharp discontinuities at the threshold.

The overall firm size distribution shifts leftward after 1982. This reverses the pre-policy pattern: between 1976 and 1982, the distribution had been shifting rightward as firms grew and the modal firm size increased. After the amendment, firms become smaller on average in both treated and control populations, suggesting broad equilibrium effects beyond directly affected firms.

While these aggregate patterns suggest substantial impacts from the IDA amendment, they cannot establish causality. Concurrent policy changes or macroeconomic shocks could drive these patterns. To identify the causal effect of labor regulations, we next employ an event study approach comparing regions with differential exposure to the policy.

4.2 Event studies

We find the effects of amendment to IDA on economic outcomes using an event study approach. To do this, we construct a panel dataset aggregated at the district level. Then, we construct a measure of policy exposure across districts—places that have more or fewer firms affected by the policy on the basis of pre-policy composition. This exploits cross-district variation in pre-policy firm size distributions to identify the causal effect of the IDA amendment.

Empirical Strategy We construct a panel dataset aggregated at the district-industry level. This approach overcomes a key challenge in the ASI datathe absence of firm-level identifiers prevents us from tracking individual firms over time. By aggregating to geographic units, we create a stable panel that allows us to trace the policy's effects.

Our measure of policy exposure exploits pre-existing variation in firm size distributions. For each district-industry unit, we calculate the number of firms employing 100-300 workers in 1981 (the year before the policy announcement). We then create a binary exposure indicator equal to one if this count exceeds the within-industry median across districts. This binary specification provides clean identification and our results are robust to alternative cutoffs beyond the median.

Concretely, let y_{jmt} be the outcome (total employment, wages, number of firms etc.) aggregated at district j, industry m in year t. We estimate the following two-way fixed effects specification:

$$\log(y_{jmt}) = \alpha_{jm} + \gamma_t + \sum_{\tau \neq -1} \beta_\tau \cdot \mathbb{1}_{t_0+\tau} \cdot \mathbb{1}\{\text{exposed}\}_{jm} + \epsilon_{jmt} \tag{1}$$

where y_{jmt} represents outcomes (employment, wages, number of firms) for district j, industry m in year t. The indicator $\mathbb{1}\{\text{exposed}\}_{jm}$ denotes high-exposure units, α_{jm} and γ_t are unit and time fixed effects, and $\mathbb{1}_{t_0+\tau}$ indicates year $t_0 + \tau$ relative to 1982. We weight observations by 1981 employment and cluster standard errors at the year-by-industry level. The coefficients β_τ measure differential outcomes between high and low exposure units τ years from the policy.

The main parameters of interest are the coefficients β_τ that measure difference in outcomes between units with higher and lower exposure τ years after IDA amendment. If the policy primarily impacts directly affected firms, units with more exposure will have larger effects on outcomes. The coefficients can be interpreted as the ATT (Average Treatment effect on Treated units) for district-industry pairs, where treatment is the relative difference in exposures of these units.

The identifying assumption requires parallel trends between high and low exposure units absent the policy. Our event study graphs show no differential pre-trends during the three pre-policy years for which we have data. Importantly, while the policy was announced in 1982, implementation began in 1984, and we observe that most effects materialize after 1984, consistent with the implementation timeline.

To address spatial spillovers, we estimate specifications at both district and state levels. State-level aggregation yields very similar point estimates with reduced precision, suggesting that cross-district spillovers within states are minimal. Our unit fixed effects absorb time-invariant differences across district-industries, and the within-industry construction of exposure measures ensures we compare similar economic activities.

Note that, we cannot rule out spillovers across industries within these geographic units. Our pooled specification should be interpreted as a weighted average of effects that includes cross-industry adjustments.

4.3 Results

Figure 2 presents event study coefficients for key outcomes, revealing substantial economic contractions in high-exposure units relative to low-exposure units following the IDA amendment.

Output and revenue experience the sharpest declines, falling by 36 percent more in exposed units compared to less exposed units within the same industry. This differential effect on production materializes primarily after 1984, consistent with firms adjusting to the new regulatory environment once implementation began. The magnitude of this decline suggests that the policy substantially reduced productive capacity in affected areas.

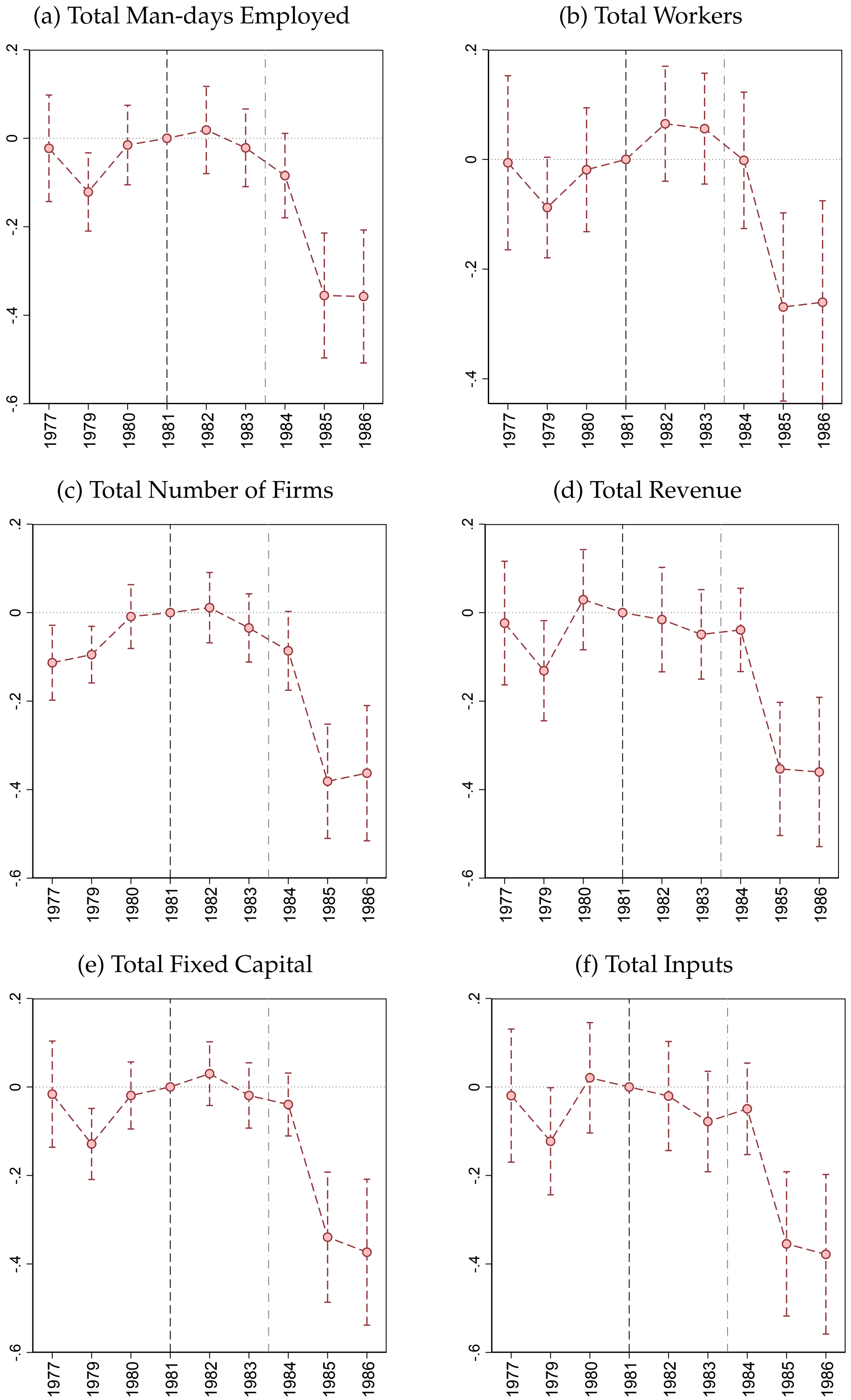
Employment outcomes show similarly large effects, with total employment dropping by 27 percent more in exposed units while employee man-days fall by an even larger 38 percent differential. The larger decline in man-days relative to headcount suggests that firms reduced both the number of workers and hours per worker, potentially reflecting attempts to stay below regulatory thresholds while maintaining some operational flexibility. These employment effects align directly with the policy's impact on firing costs and the increased rigidity in labor adjustment.

Firms also adjust other production inputs substantially. Input usage declines by 40 percent more in exposed units, while capital falls by 39 percent more, indicating that the labor market rigidities induced broader production adjustments. The similar magnitudes of input and capital responses suggest complementarity between labor and other factors of productionas firms reduce employment, they simultaneously scale back capital investments and intermediate input purchases.

Importantly, since these aggregates sum outcomes at the district-industry level, they combine both intensive margin adjustments (changes within continuing firms) and extensive margin effects (firm entry and exit). We can isolate the pure extensive margin by examining firm counts directly.

The number of firms falls by 41 percent more in exposed units, a dramatic reduction indicating that the policy not only caused existing firms to shrink but also led to significant exit from affected markets or deterred entry entirely. This extensive margin

Figure 2: Firms Contract after IDA amendment



Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (1). *Source:* Annual Survey of Industries.

response amplifies the policy's aggregate effects beyond what intensive margin adjustments alone would generate.

4.3.1 Heterogeneity across Industries

We examine whether the policy's effects vary by industry labor intensity, measured as the ratio of workers to fixed capital in 1981 at the 4-digit industry level. We split industries at the median labor-to-capital ratio, yielding **3,000** district-industry units in low labor-intensity industries and **6,781** units in high labor-intensity industries. This split allows us to test whether industries more dependent on labor face differentially larger impacts from the increased firing restrictions.

The results reveal striking heterogeneity. Labor-intensive industries bear the brunt of the policy's negative effects. Total man-days in high labor-intensity industries fall by 50 percent more in exposed versus unexposed units, compared to only an 18 percent differential in low labor-intensity industries. This nearly three-fold difference in employment responses demonstrates that industries relying more heavily on labor could not easily adjust to the new regulatory constraints.

Revenue impacts follow a similar pattern. High labor-intensity industries experience a 51 percent differential decline between exposed and unexposed units, while low labor-intensity industries see only a 17 percent differential. The magnitude of these revenue effects suggests that labor-intensive industries faced not just employment constraints but fundamental disruptions to their production processes. These disruptions reduced their ability to generate output efficiently.

The heterogeneous effects extend across all margins of adjustment. Total employment falls by 36 percent more in exposed units for labor-intensive industries versus 16 percent for less labor-intensive ones. Capital adjustments show even starker differences. We observe a 52 percent differential decline in labor-intensive industries compared to 20 percent in capital-intensive ones. This pattern suggests that complementarities between labor and capital are particularly strong in labor-intensive production. The extensive margin tells a similar story. Firm counts drop by 46 percent more in exposed labor-intensive units versus 21 percent in capital-intensive ones.

These patterns prove robust to alternative measures of labor intensity. Using labor-to-output ratios instead of labor-to-capital ratios yields similar results. Defining intensity using 1974-75 data rather than 1981 data also produces comparable effects. The consistency across definitions confirms that industries structurally dependent on labor faced substantially larger contractions from the IDA amendment.

Summary Using variation in policy exposure across district-industries, we find that the IDA amendment significantly reduced manufacturing activity. The effects are particularly pronounced in labor-intensive industries and materialize after the 1984 implementation, supporting a causal interpretation.

Figure 3: Firms Contract after IDA amendment

(a) Total Man-days Employed

(b) Total Number of Firms

(c) Total Revenue

Notes: The figure plots the estimated θ_k event study coefficients from a regression of the form given in (1). *Source:* Annual Survey of Industries.

However, these reduced-form estimates incorporate both direct effects and equilibrium adjustments. To disentangle these channels and quantify aggregate welfare effects, we develop a general equilibrium model in the next section.

5 Model

To understand how labor market regulations like the IDA affect the broader economy, we develop a general equilibrium model that captures the key distortions these policies create. The IDA amendments impose significant costs on firms when they adjust their workforceeffectively creating a tax on labor in the regulated sectors. This distortion has two main effects: it shifts economic activity away from the regulated manufacturing sectors toward unregulated sectors, and it creates inefficiencies within manufacturing as firms substitute toward capital-intensive production methods.

Our model focuses on the first channelthe reallocation of economic activity across sectorswhich we view as the primary source of aggregate productivity losses. We abstract from within-sector distortions to isolate this key mechanism, though these could be incorporated in extensions.

The economy consists of three sectors that differ in their factor intensities and regulatory status. Two manufacturing sectorsone labor-intensive and one capital-intensiveface the labor adjustment costs imposed by the IDA. A third sector, representing agriculture or informal services, remains unregulated. This structure captures the essence of India's dual economy, where formal manufacturing faces heavy regulation while agriculture and informal sectors operate with greater flexibility.

We embed this sectoral structure in a dynamic framework with two key components. Within each period, firms in all sectors choose inputs to maximize profits, and an aggregator combines sectoral outputs into a final good used for consumption and investment. Across periods, a representative household makes consumption and savings decisions that determine capital accumulation. The labor tax distorts production choices within each period, reducing current output, while also discouraging capital formation and lowering long-run growth.

This framework allows us to trace through both the immediate effects of labor market distortionsas resources shift away from regulated manufacturingand their dynamic consequences as reduced investment slows capital accumulation over time.

5.1 Static Environment

We begin by characterizing production and resource allocation within a single period, taking the economy's capital stock as given. This static analysis reveals how labor market distortions immediately affect sectoral production, factor demands, and aggregate output.

Production Technology Each of our three sectors produces output using capital and labor with Cobb-Douglas technology. Let $i \in \{1, 2, 3\}$ index the sectors, where sectors 1 and 2 represent the regulated manufacturing sectors and sector 3 represents the unregulated sector. Sector i produces output according to:

$$y_i = m_i k_i^{\alpha_i} \ell_i^{1-\alpha_i}, \qquad 0 < \alpha_i < 1,$$

where k_i and l_i are capital and labor inputs, $m_i > 0$ captures sectoral productivity, and $\alpha_i$represents capital's share in production. The differences in $\alpha_i$across sectors allow us to capture varying factor intensitiesfor instance, sector 2 might be capital-intensive manufacturing while sectors 1 and 3 are more labor-intensive.

Labor Market Distortions The key feature of our model is that the IDA creates a wedge between the market wage and the effective cost of labor in the regulated sectors. Specifically, the effective wage faced by firms is:

$$w_1^{\text{eff}} = w(1+\tau), \qquad w_2^{\text{eff}} = w(1+\tau), \qquad w_3^{\text{eff}} = w,$$

where w is the market clearing wage and $\tau > 0$ represents the proportional increase in labor costs due to adjustment frictions, and the unregulated sector faces no distortion. This wedge captures the shadow cost of the IDA's restrictions: even when firms can eventually adjust their workforce, the regulatory burden makes labor effectively more expensive in the covered sectors.

$$y_i \;=\; m_i \, k_i^{\alpha_i} \, \ell_i^{1-\alpha_i}, \qquad 0 < \alpha_i < 1,$$

The factor prices for sector 1 and 2 feature a labor wedge:

$$w_1^{\text{eff}} = w(1+\tau), \qquad w_2^{\text{eff}} = w(1+\tau), \qquad w_3^{\text{eff}} = w.$$

Final Good Production A competitive final-good producer aggregates sectoral outputs into a consumption/investment good using CES technology:

$$Y = \left(\gamma_1 y_1^{\frac{\varepsilon-1}{\varepsilon}} + \gamma_2 y_2^{\frac{\varepsilon-1}{\varepsilon}} + \gamma_3 y_3^{\frac{\varepsilon-1}{\varepsilon}} \right)^{\frac{\varepsilon}{\varepsilon-1}},$$

where $\gamma_i > 0$ represents the weight of sector i in final production and $\varepsilon > 0$ governs the elasticity of substitution between sectoral goods. We normalize the price of the final good to unity, and let p_i denote the price of sector i's output.

Market Clearing Capital and labor markets must clear each period:

$$\sum_{i=1}^{3} k_i = K, \qquad \sum_{i=1}^{3} \ell_i = L,$$

where K and L represent the economy's total capital and labor endowments.

Firm Behavior and Allocation Effects of Tax With this setup, we can trace how the labor tax distorts resource allocation throughout the economy. Profit maximization by sectoral producers yields the standard conditions equating factor payments to marginal revenue products:

$$rk_i = \alpha_i p_i y_i, \qquad w_i^{\text{eff}} \ell_i = (1 - \alpha_i) p_i y_i, \tag{2}$$

where r is the rental rate of capital. These conditions reveal how the labor tax creates two interconnected distortions that reshape the economy's structure. First, the capital-labor ratio in each sector becomes:

$$\frac{k_i}{\ell_i} = \frac{\alpha_i}{1 - \alpha_i} \cdot \frac{w_i^{\text{eff}}}{r}. \tag{3}$$

Since regulated sectors face $w_i^{\text{eff}} = w(1 + \tau) > w$, they substitute toward more capital-intensive production methods relative to the unregulated sector.

Second, perfect competition ensures that sectoral prices equal marginal costs, so the unit cost function becomes:

$$p_i = c_i(w, r, \tau) = \frac{1}{m_i} \left(\frac{r}{\alpha_i} \right)^{\alpha_i} \left(\frac{w_i^{\text{eff}}}{1 - \alpha_i} \right)^{1-\alpha_i}. \tag{4}$$

This directly increases production costs in the regulated sectors, making their goods relatively more expensive and reducing demand for their output. The final-good producer's CES optimization, with $\rho = (\varepsilon - 1)/\varepsilon$ yields:

$$p_i = Y^{1-\rho}\gamma_i \rho y_i^{\rho-1}.$$

Together, these conditions generate a reallocation of economic activity away from the regulated manufacturing sectors toward the unregulated sector. Resources flow out of potentially high-productivity manufacturing into lower-productivity activities, while remaining manufacturing becomes artificially capital-intensive. Both margins reduce aggregate efficiency, with the magnitude depending on sectoral productivity differences and the elasticity of substitution between sectors.

5.1.1 Static Equilibrium

A static equilibrium consists of prices $\{p_i, w, r\}$, quantities $\{y_i, k_i, \ell_i, Y\}$, and allocations such that all agents optimize and all markets clear. Specifically, we need:

Sectoral Profit Maximization:

$$rk_i = \alpha_i p_i y_i \quad \text{for } i = 1,2,3 \tag{5}$$

$$w_i^{\text{eff}}\ell_i = (1-\alpha_i)p_i y_i \quad \text{for } i = 1,2,3 \tag{6}$$

Production Functions:

$$y_i = m_i k_i^{\alpha_i}\ell_i^{1-\alpha_i} \quad \text{for } i = 1,2,3 \tag{7}$$

Final Good Production:

$$Y = \left(\gamma_1 y_1^{\frac{\varepsilon-1}{\varepsilon}} + \gamma_2 y_2^{\frac{\varepsilon-1}{\varepsilon}} + \gamma_3 y_3^{\frac{\varepsilon-1}{\varepsilon}}\right)^{\frac{\varepsilon}{\varepsilon-1}} \tag{8}$$

Final Good Producer's Optimality:

$$p_1 = \frac{\partial Y}{\partial y_1} = Y^{1-\rho}\gamma_1\rho y_1^{\rho-1}, \quad \text{where } \rho = \frac{\varepsilon-1}{\varepsilon} \tag{9}$$

$$p_2 = \frac{\partial Y}{\partial y_2} = Y^{1-\rho}\gamma_2\rho y_2^{\rho-1} \tag{10}$$

$$p_3 = \frac{\partial Y}{\partial y_3} = Y^{1-\rho}\gamma_3\rho y_3^{\rho-1} \tag{11}$$

Market Clearing:

$$\sum_{i=1}^{3} k_i = K \tag{12}$$

$$\sum_{i=1}^{3} \ell_i = L \tag{13}$$

This system contains 15 equations in 15 unknowns: $\{p_1, p_2, p_3, y_1, y_2, y_3, k_1, k_2, k_3, \ell_1, \ell_2, \ell_3, Y, w, r\}$.

Solution Method We can exploit its structure to find a tractable solution. The key insight is that once we determine the factor prices (w, r), everything else follows mechanically. Here's why:

Given (w, r), we can immediately compute all sectoral prices using the zero-profit conditions:

$$p_i = \frac{1}{m_i} \left(\frac{r}{\alpha_i} \right)^{\alpha_i} \left(\frac{w_i^{\text{eff}}}{1 - \alpha_i} \right)^{1-\alpha_i} \tag{14}$$

These prices, combined with the CES structure, determine the revenue shares of each sector. Define the CES weights:

$$s_i = \frac{\gamma_i^{\varepsilon} p_i^{1-\varepsilon}}{\sum_{j=1}^{3} \gamma_j^{\varepsilon} p_j^{1-\varepsilon}}, \qquad \sum_i s_i = 1$$

Then sectoral revenues are simply $p_i y_i = Y \cdot s_i$, and the factor demands become:

$$k_i = \frac{\alpha_i Y s_i}{r} \tag{15}$$

$$\ell_i = \frac{(1 - \alpha_i) Y s_i}{w_i^{\text{eff}}} \tag{16}$$

This reduces our problem to finding (w, r) that satisfy just two market-clearing conditions:

$$\frac{Y}{r} \sum_{i=1}^{3} \alpha_i s_i = K \tag{17}$$

$$Y \sum_{i=1}^{3} \frac{(1-\alpha_i)s_i}{w_i^{\text{eff}}} = L \tag{18}$$

Dividing 17 by 18, we get:

$$\frac{K}{L} = \frac{1}{r} \frac{\sum_{i=1}^{3} \alpha_i s_i}{\sum_{i=1}^{3} \frac{(1-\alpha_i)s_i}{w_i^{\text{eff}}}} \tag{19}$$

Since the CES price index must equal 1 (our normalization), we also have:

$$\sum_{i=1}^{3} \gamma_i^{\varepsilon} p_i^{1-\varepsilon} = 1 \tag{20}$$

These two equations–19 and 20–let us solve for (w, r). Once solved, we can recover all sectoral quantities and prices.

5.2 Comparative Statics

Having characterized the static equilibrium, we now examine how labor market distortions reshape the economy. Our main interest is understanding how increases in the labor tax τ affect resource allocation, factor prices, and aggregate output.

Proposition 1 (Aggregate output falls in τ). Let $Y^*(K, L; \tau)$ be the competitive equilibrium output given factor endowments (K, L) and labor tax τ. Then Y^* is non-increasing in τ , and strictly decreasing whenever taxed sectors are used in equilibrium.

The intuition is straightforward: the labor tax creates a wedge between the social cost of labor and the private cost faced by regulated firms, leading to inefficient input choices and sectoral misallocation. Resources flow away from potentially productive manufacturing toward less regulated but potentially less productive sectors.

The specific patterns of adjustment depend critically on the elasticity of substitution between sectors, ε. When sectors are highly substitutable ($\varepsilon > 1$), consumers can easily replace expensive manufactured goods with output from the unregulated sector, amplifying the reallocation effects. When sectors are complementary ($\varepsilon < 1$), the adjustment occurs primarily through changes in factor prices rather than quantities.

For labor allocation specifically, we can express sectoral employment as:

$$\ell_i = \frac{(1-\alpha_i)Y s_i}{w_i^{\text{eff}}}$$

where $s_i = \gamma_i^\varepsilon p_i^{1-\varepsilon} / \sum_j \gamma_j^\varepsilon p_j^{1-\varepsilon}$ are the endogenous CES revenue shares. As τ increases, regulated sectors face higher effective wages, reducing their employment both directly (through the denominator) and indirectly (through lower revenue shares s_1 and s_2 as their prices rise).

The adjustment of factor prices follows general equilibrium logic. With aggregate capital and labor fixed, the economy must achieve factor market clearing through price changes. When $\varepsilon > 1$, the wage w typically falls as regulated sectors shed labor: with more labor competing for jobs in the unregulated sector, wages decline to restore equilibrium. The rental rate r may rise or fall depending on the capital intensity of the expanding versus contracting sectors.

Proposition 2 (Cobb-Douglas case, $\varepsilon = 1$). When sectors aggregate with a Cobb-Douglas technology ($\varepsilon = 1$), an increase τ generates the following adjustments:

1. The wage w falls.
2. Labor in taxed sectors falls (ℓ_1, ℓ_2) decrease while labor in the untaxed sector rises (ℓ_3 increases.
3. Sectoral capital allocations remain unchanged (k_i), so capital-labor ratios rise in taxed sectors and fall in the untaxed sector.

The Cobb-Douglas case provides particularly clean results because sectoral revenue shares become fixed, eliminating substitution effects between sectors. All adjustment occurs through factor price changes and within-sector factor substitution, making the reallocation patterns transparent. We derive expressions more generally for the comparative statics in the appendix A.4.1

These static results capture the immediate impact of labor market distortions but miss the dynamic consequences for capital accumulation and long-term growth. We now turn to embedding this static structure within an intertemporal framework.

The changes in labor inputs l_i and wages will depend on whether the factor goods are substitutes or complements $\epsilon > 1, \epsilon < 1$, as well as the relative importance of each sector.

$$l_i = \frac{(1-\alpha_i) Y \gamma_i^\epsilon p_i^{1-\epsilon}}{w_i}$$

Generically, labor falls when $\varepsilon > 1$. We know that Y decreases. For $\varepsilon > 1$, the wage generically falls when τ rises: labor becomes relatively more expensive in the taxed sectors, and with aggregate K/L fixed the economy must lower w relative to r to restore balance. Because the rental rate does not fall as much as the wage, the relative price of labor rises in taxed sectors, leading them to shed labor.

We shall provide general comparative statics for the model under various parameters in the appendix. A Cobb-Douglas aggregator presents a special case where we have clean predictions:

Proposition (CobbDouglas across sectors, $\varepsilon = 1$). When τ increases, the competitive equilibrium adjusts as follows:

1. The wage w falls.
2. Labor in the taxed sectors falls: ℓ_1, ℓ_2 decrease, while ℓ_3 rises.
3. Sectoral capital stocks k_i remain constant, so capitallabor ratios rise in taxed sectors ($k_1/\ell_1,\ k_2/\ell_2$) and fall in the untaxed sector (k_3/ℓ_3).

The static model only adjusts for production within the period. To understand how a sectoral labor tax would impact the economy, we turn to the dynamic problem that nests this static allocation.

6 Dynamics

The static analysis revealed how labor market distortions immediately reduce aggregate output and misallocate resources across sectors. However, these distortions also have dynamic consequences: by reducing the return to capital and discouraging investment, they slow capital accumulation and further depress long-run growth. To capture these effects, we embed our three-sector production structure within a standard neoclassical growth model.

Environment. Time is discrete, indexed by $t = 0, 1, 2, \ldots$ Capital depreciates at rate $\delta \in (0, 1)$ each period. We assume that sectoral productivities $\{m_{it}\}$ may vary over time but take labor supply L as constantthus abstracting from demographic changes to focus on the interaction between distortions and capital accumulation.

Household. A representative household lives for an infinite horizon and owns the economy's capital and labor. The household chooses consumption and next-period capital $\{C_t, K_{t+1}\}_{t\geq 0}$ to maximize discounted utility:

$$\sum_{t=0}^{\infty} \beta^t u(C_t), \qquad u(C) = \frac{C^{1-\sigma}}{1-\sigma}, \quad \sigma > 0, \beta \in (0, 1)$$

The household faces a sequence of budget constraints:

$$C_t + K_{t+1} - (1-\delta)K_t = w_t L + r_t K_t + T_t$$

along with the standard no-Ponzi condition:

$$\lim_{T\to\infty} \beta^T u'(C_T) K_{T+1} = 0$$

Here, w_t and r_t are the equilibrium factor prices determined by our static model, given the current capital stock K_t and sectoral productivities $\{m_{it}\}$. The transfer T_t represents the government's rebate of labor tax revenues:

$$T_t = \tau_t w_t (\ell_{1t} + \ell_{2t})$$

This transfer ensures that the labor tax creates pure distortions without affecting aggregate resourcesall tax revenue is returned to households lump-sum.

Resource Constraint and Market Clearing A key simplification emerges from the zero-profit conditions in our static model. Since all firms earn zero profits in equilibrium, the household's labor and capital income exactly equals the value of aggregate output. This allows us to rewrite the budget constraint as:

$$C_t + K_{t+1} - (1-\delta)K_t = Y_t$$

This is simply the economy's resource constraint: output Y_t can be used for consumption or net investment. The static equilibrium, characterized in the previous section, determines Y_t as a function of the current capital stock and policy parameters.

Intertemporal Optimization The household's first-order conditions yield the standard Euler equation:

$$u'(C_t) = \beta u'(C_{t+1})[1 + r_{t+1} - \delta]$$

This condition links consumption growth to the net return on capital, which in our model equals the marginal product of capital minus depreciation. Crucially, r_{t+1} depends on the equilibrium of the next period's static problem, creating a link between current investment decisions and future production distortions.

The transversality condition ensures that the household does not over-accumulate capital:

$$\lim_{T\to\infty} \beta^T u'(C_T)K_{T+1} = 0$$

Dynamic Equilibrium A dynamic equilibrium is a sequence of allocations $\{C_t, K_{t+1}, Y_t\}$ and prices $\{w_t, r_t\}$ such that:

1. Household optimization: The consumption-savings choice satisfies the Euler equation and transversality condition.

2. Static equilibrium: In each period t, given K_t, the static equilibrium determines $\{Y_t, w_t, r_t\}$ and sectoral allocations.

3. Resource constraint: $C_t + K_{t+1} = Y_t + (1-\delta)K_t$

This framework captures how labor market distortions affect the economy through two channels. The level effect operates within each period: for any given capital stock, the distortions reduce output Y_t, leaving less available for consumption and investment. The growth effect operates across periods: by reducing the marginal product of capital r_t, distortions discourage investment, slowing capital accumulation and compounding the output losses over time.

7 Calibration

This section describes how we discipline the model parameters using microdata from the Annual Survey of Industries (ASI) and existing empirical work. The goal is to ensure that the sectoral production structure, technology levels, and behavioral elasticities in the model reflect the Indian economy prior to the 1982 reform. The reform then identifies the effective labor tax wedge and the strength of substitution across sectors.

We proceed in steps. First, we use pre-reform ASI microdata to discipline sectoral production parameters, labor shares, and productivity levels. Second, we calibrate agriculture's production parameters using established evidence, since agriculture is not covered in the ASI. Third, we estimate sectoral productivity gaps and map them to the model's technology terms. Finally, we use the observed change in sectoral labor allocation following the 1982 policy to calibrate the labor tax wedge and the implied elasticity of substitution across sectors.

We begin by recovering factor shares from the 1981 ASI data. For each industry at the four-digit NIC level and district, we compute the share of labor compensation in value added:

$$\alpha_{L,\text{nic}} = \frac{\sum_{\text{firms}} \text{Labor Compensation}}{\sum_{\text{firms}} \text{Value Added}}, \qquad \alpha_{K,\text{nic}} = 1 - \alpha_{L,\text{nic}}.$$

We classify industries into labor-intensive and capital-intensive groups based on exogenous characteristics. Computing weighted averages across districts using revenue weights, winsorized at the 1st and 99th percentiles, yields labor shares of approximately 0.57 for labor-intensive sectors and 0.53 for capital-intensive sectors. For agriculture, which is not covered in the ASI, we adopt a labor share of 0.58 following Gollin, Lagakos, and Waugh (2022). These shares satisfy the expected ordering: $\alpha_L^L > \alpha_L^A > \alpha_L^K$, where superscripts denote labor-intensive, agriculture, and capital-intensive sectors respectively. These values discipline $(\alpha_L^L, \alpha_L^K, \alpha_L^A)$ in the model.

Next, we discipline relative technology parameters across sectors using firm-level productivity measures. We compute Solow residuals for each firm using industry-year specific factor shares:

$$TFP_i = \ln Y_i - \alpha_{K,\text{nic},y} \ln K_i - \alpha_{L,\text{nic},y} \ln L_i.$$

Aggregating these residuals by sector using revenue weights provides sectoral technology levels $A_s = \mathbb{E}[TFP_i \mid s]$ for $s \in \{L, K, A\}$. These moments discipline the relative technology parameters (A_L, A_K, A_A) in the model. The model's expenditure shares across sectors, $\gamma = (\gamma_L, \gamma_K, \gamma_A)$, are calibrated to match the observed pre-reform revenue share distribution across the three sectors in the ASI and national accounts.

The 1982 reform provides identification for two key parameters: the effective labor tax wedge and the elasticity of substitution across sectors. The reform increased effective labor costs differentially across sectors due to the regulatory threshold. We use the observed post-policy change in sectoral employment shares between 1981 and 1986 to jointly identify the labor tax wedge τ and the substitution elasticity σ. Specifically, we choose these parameters to minimize the distance between model-predicted and observed sectoral labor reallocations:

$$\{\tau, \sigma\} \text{ solve } \quad \Delta\ell_s^{\text{model}}(\tau, \sigma) \approx \Delta\ell_s^{\text{data}} \quad \text{for } s \in \{L, K, A\}.$$

As validation, we verify that the model also reproduces the observed changes in output and capital accumulation over the same period. Table 2 summarizes the calibrated parameters and their data targets.

Table 2: Calibrated objects and targets

Object	Symbol	Target / Source	Method
Labor share, labor-intensive	α_L^L	ASI (1981)	Revenue-weighted cost shares
Labor share, capital-intensive	α_L^K	ASI (1981)	Revenue-weighted cost shares
Labor share, agriculture	α_L^A	Gollin–Lagakos–Waugh	External estimate
Technology levels	(A_L, A_K, A_A)	ASI Solow residuals	Firm-level TFP, revenue weights
Sector expenditure shares	$(\gamma_L, \gamma_K, \gamma_A)$	National accounts shares	Match revenue share moments
Labor tax wedge	τ	Post-1982 reallocation	Match labor share drop
CES elasticity across sectors	σ	Reallocation strength	Match policy-induced response

8 Growth with Labor Tax

We simulate two economies to quantify the economic cost of the labor regulations. Both economies share the same observed TFP path and preferences. The factual economy applies the calibrated labor wedge to the two regulated manufacturing sectors from 1982 onward. The counterfactual economy maintains zero tax throughout. To avoid terminal artifacts in our finite-horizon simulation, we append a smooth continuation that converges to steady state after the final data year. This ensures all comparisons within the sample window are free from endpoint distortions.

The key result is that output drops substantially under the labor regulation. Aggregate output in 1986 falls 7.45 percent below its counterfactual level without the regulation. The average output loss over the entire post-1982 period equals 6.33 percent. These large magnitudes demonstrate that firing restrictions impose significant economic costs beyond their direct labor market effects.

The first channel driving output losses is sectoral misallocation. The regulation triggers massive reallocation of labor away from regulated manufacturing sectors. By 1986, the labor-intensive manufacturing sector's share drops 7.56 percentage points below its counterfactual, while the capital-intensive sector falls 8.64 percentage points. The untaxed agricultural sector absorbs these workers, with its labor share rising 16.19 percentage points above the counterfactual. These patterns persist throughout the post-policy period, with average gaps of 7.41, 8.64, and 16.05 percentage points respectively. The total variation distance across sectoral shares reaches 16.19 percentage points in 1986, providing a summary measure of misallocation severity.

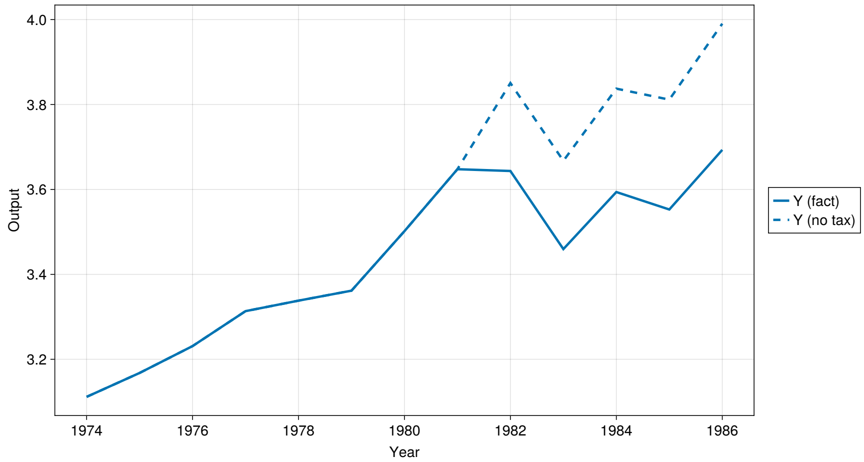
The second channel is reduced capital accumulation stemming from this misallocation. Capital stock in 1986 sits 5.45 percent below its counterfactual level, with an average gap of 2.82 percent over the post-1982 window. The smaller capital shortfall relative to output indicates that while the regulation's immediate impact works through labor distortions, these distortions subsequently depress investment. The growing capital gap amplifies output losses over time, creating a dynamic multiplier effect.

These patterns reflect distinct economic mechanisms operating at different speeds. The static channel works immediately: the labor wedge raises unit costs in regulated sectors, increasing their prices and reducing their weights in the CES aggregator. This lowers aggregate output even at fixed capital levels, generating immediate productivity losses from misallocation.

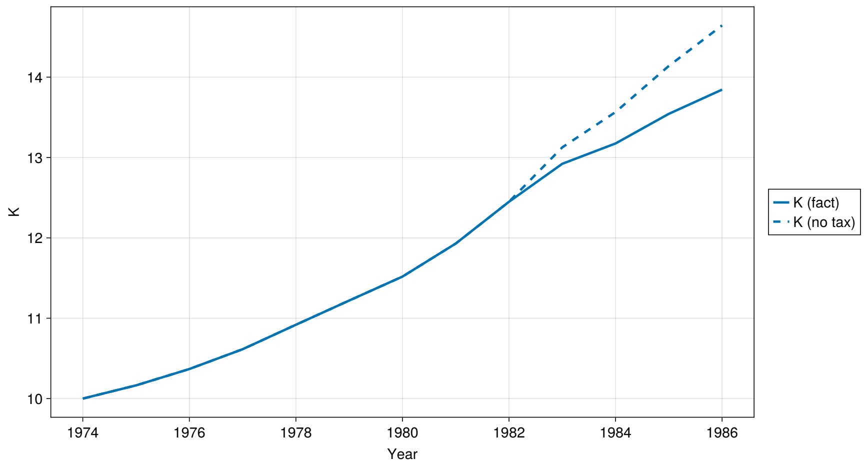
The dynamic channel unfolds gradually through investment decisions. Lower output and distorted factor prices reduce the marginal product of capital in future periods. Through the Euler equation, this weakens firms' incentives to invest, slowing capital accumulation. The resulting capital shortfall feeds back into production, widening output losses over time. Together, these static and dynamic forces explain why a labor market regulation generates persistent and growing aggregate costs that extend well beyond the directly affected sectors.

Figure 4: Economic Impacts of Labor Market Regulations: Model Simulations

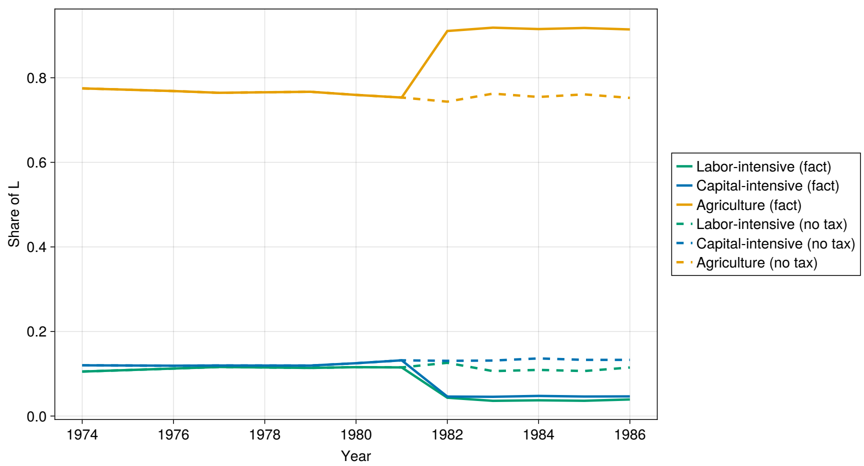
(a) Output trajectories with and without labor market regulations



(b) Capital stock dynamics with and without labor market regulations



(c) Sectoral labor allocation with and without labor market regulations



Notes:

9 Conclusion

This paper provides causal and quantitative evidence on the effects of size-dependent firing restrictions in a large developing economy. Exploiting the 1982 expansion of Chapter V-B of Indias Industrial Disputes Actwhich required establishments with 100300 workers to obtain government permission for layoffs, retrenchment, and closurewe document large contractions in manufacturing activity. Districtindustry units with greater pre-policy exposure experience substantial and persistent declines in employment, man-days, revenues, and firm counts. Labor-intensive industries are disproportionately affected, consistent with the policy raising the shadow cost of labor adjustment.

A general equilibrium model calibrated to pre-reform microdata shows that these distortions translate into sizable aggregate losses. The firing restriction induces a reallocation of labor from regulated manufacturing into unregulated sectors, lowers output even for fixed capital, and reduces incentives to invest, generating dynamic output losses over time. The model implies that by the mid-1980s, aggregate output was 78 percent below the counterfactual without the regulatory wedge.

The findings highlight that employment protection regimes with sharp size thresholds can meaningfully distort firm behaviour and aggregate performance. These results are directly relevant to contemporary labour reforms: Indias 2025 Industrial Relations Code raises the permission threshold from 100 to 300 workers, effectively undoing the policy expansion studied here. Our estimates provide a benchmark for assessing the likely impact of such reforms on formal job creation, firm growth, and economy-wide productivity.

References

Aghion, Philippe, Robin Burgess, Stephen J Redding, and Fabrizio Zilibotti, "The unequal effects of liberalization: Evidence from dismantling the License Raj in India," *American Economic Review*, 2008, *98* (4), 1397–1412.

Bertrand, Marianne, Chang-Tai Hsieh, and Nick Tsivanidis, "Contract labor and firm growth in india," Technical Report, National Bureau of Economic Research 2021.

Besley, Timothy and Robin Burgess, "Can labor regulation hinder economic performance? Evidence from India," *The Quarterly journal of economics*, 2004, *119* (1), 91–134.

Buera, Francisco J, Joseph P Kaboski, Richard Rogerson, and Juan I Vizcaino, "Skill-Biased Structural Change," *Mimeo, Washington University in St. Louis*, 2018.

Chaurey, Ritam, "Labor regulations and contract labor use: Evidence from Indian firms," *Journal of Development Economics*, 2015, *114*, 224–232.

Donovan, Kevin J and Todd Schoellman, "The Role of Labour Market Frictions in Structural Transformation," 2021.

Garicano, Luis, Claire Lelarge, and John Van Reenen, "Firm size distortions and the productivity distribution: Evidence from France," *American Economic Review*, 2016, *106* (11), 3439–79.

Ngai, L Rachel and Christopher A Pissarides, "Structural change in a multisector model of growth," *American economic review*, 2007, *97* (1), 429–443.

Restuccia, Diego and Richard Rogerson, "Policy distortions and aggregate productivity with heterogeneous establishments," *Review of Economic dynamics*, 2008, *11* (4), 707–720.

A Appendix

A.1 Aggregate data plots

revenue, value add, other inputs

A.2 More distribution plots

- Distribution of firms in levels before 1984
- Distribution of firms in levels after 1984
- Distribution of firm in log levels before 1984
- Distribution of firms in log levels after 1984

A.3 Robustness checks for ES/DiD

- Main specifications for other variables
- Arcsin inverse specification for all variables

A.4 Static Model

CES aggregator and price index.

$$Y = \left(\sum_{i=1}^{3} \gamma_i \, y_i^{\frac{\varepsilon-1}{\varepsilon}} \right)^{\frac{\varepsilon}{\varepsilon-1}}, \qquad \rho \equiv \tfrac{\varepsilon-1}{\varepsilon}.$$

Let the firm solve the dual problem of minimizing cost to produce output.

$$P(p) \equiv \min_{y \geq 0} \sum_i p_i y_i \quad \text{s.t.} \quad \sum_i \gamma_i y_i^{\rho} \geq 1.$$

This implies the following first order conditions

$$p_i = \lambda \gamma_i \rho \, y_i^{\rho-1} \quad \Rightarrow \quad y_i = \left(\tfrac{\lambda \gamma_i \rho}{p_i} \right)^{\varepsilon}.$$

Now, the constraint will be satisified with equality at the optimum. Then, we can solve for the lagrange multiplier as:

$$\sum_i \gamma_i \left(\tfrac{\lambda \gamma_i \rho}{p_i} \right)^{\varepsilon-1} = 1 \;\; \Rightarrow \;\; \lambda^{\varepsilon-1} \rho^{\varepsilon-1} \sum_i \gamma_i^{\varepsilon} p_i^{1-\varepsilon} = 1.$$

Substituting the lagrange multiplier into the prices, and summing them up gives us:

$$P(p) = \Big(\sum_i \gamma_i^\varepsilon p_i^{1-\varepsilon}\Big)^{\frac{1}{1-\varepsilon}}.$$

With $P(p) = 1$ (final good as numeraire),

$$\sum_{i=1}^{3} \gamma_i^\varepsilon p_i^{1-\varepsilon} = 1.$$

Derivation of shares From CES FOCs to $p_i y_i = Y\,\gamma_i^\varepsilon p_i^{1-\varepsilon}$.

Write the aggregator as

$$Y \;=\; \Big(\sum_{j=1}^{3} \gamma_j\, y_j^\rho\Big)^{1/\rho}, \qquad \rho \equiv \frac{\varepsilon-1}{\varepsilon} \in (0,1).$$

The final-good firm (price of Y normalized to 1) solves $\max_{y\geq 0}\; Y(y) - \sum_j p_j y_j$, so the FOC is

$$p_i \;=\; \frac{\partial Y}{\partial y_i} \;=\; \Big(\sum_j \gamma_j y_j^\rho\Big)^{\frac{1}{\rho}-1} \gamma_i\,\rho\, y_i^{\rho-1} \;=\; Y^{1-\rho}\,\gamma_i\,\rho\, y_i^{\rho-1}.$$

Since $\rho - 1 = -1/\varepsilon$, solve the FOC for y_i:

$$y_i^{\rho-1} \;=\; \frac{p_i}{Y^{1-\rho}\gamma_i\rho} \quad\Rightarrow\quad y_i \;=\; \Big(\frac{Y^{1-\rho}\gamma_i\rho}{p_i}\Big)^\varepsilon.$$

Multiplying by p_i,

$$p_i y_i \;=\; p_i\Big(\frac{Y^{1-\rho}\gamma_i\rho}{p_i}\Big)^\varepsilon \;=\; Y^{\varepsilon(1-\rho)}\,\gamma_i^\varepsilon\,\rho^\varepsilon\, p_i^{1-\varepsilon}.$$

Use $\varepsilon(1-\rho) = \varepsilon\big(1 - \frac{\varepsilon-1}{\varepsilon}\big) = 1$ and absorb the constant ρ^ε into the definition of γ_i (or equivalently, note it cancels across i and with the price-index normalization). Thus

$$p_i y_i \;=\; Y\,\gamma_i^\varepsilon\, p_i^{1-\varepsilon} \;\equiv\; Y\, s_i, \qquad s_i \;\equiv\; \gamma_i^\varepsilon p_i^{1-\varepsilon}.$$

Summing over i and using Eulers theorem (homogeneity of Y) gives $\sum_i p_i y_i = Y$, hence $\sum_i s_i = 1$ under the numeraire normalization.

Y decreases with τ **Proposition 1 (Aggregate output falls in τ).** Let $Y^\star(K, L; \tau)$ be the competitive equilibrium output with (K, L). Then $Y^\star$ is non-increasing in τ, and strictly decreasing if taxed sectors are used in cost-efficient production.

Proof. The unit cost of the final good is $P(p) = \left(\sum_i \gamma_i^{\varepsilon} p_i^{1-\varepsilon}\right)^{1/(1-\varepsilon)}$ with $p_i = c_i(w, r, \tau)$, and c_i is increasing in τ for $i = 1, 2$. Thus P is increasing in τ. By CRS duality, $Y^\star(K, L; \tau) = \inf_{w,r} \frac{wL+rK}{P(w,r;\tau)}$ is nonincreasing in τ, strictly if the cost-minimizer uses $i \in \{1, 2\}$. □

A.4.1 General Comparative Statics with respect to τ

We study $d \ln k_i$, $d \ln \ell_i$, $d \ln Y$ when τ changes. Let

$$\widehat{x} \equiv d \ln x, \qquad t \equiv \frac{d\tau}{1+\tau}.$$

From (**??**), the price responses are

$$\widehat{p}_i \;=\; \alpha_i \widehat{r} + (1-\alpha_i)\widehat{w} + (1-\alpha_i)\, t \cdot \mathbf{1}\{i = 1, 2\}. \tag{21}$$

Wage and Rental Rate of Capital Differentiating (**??**) and the K/L condition yields two linear relations:

$$\underbrace{\sum_i s_i \alpha_i}_{A_s} \widehat{r} + \underbrace{\sum_i s_i (1-\alpha_i)}_{B_s} \widehat{w} + \underbrace{\sum_{i=1}^{2} s_i (1-\alpha_i)}_{C_s} t = 0, \tag{E1}$$

$$\left[1 - (1-\varepsilon) R_1\right] (\widehat{r} - \widehat{w}) = \left[(1-\varepsilon) R_3 + \theta_{12}\right] t, \tag{E2}$$

where (all evaluated at the baseline equilibrium)

$$\omega_i \equiv \frac{\alpha_i s_i}{\sum_k \alpha_k s_k}, \quad \theta_i \equiv \frac{(1-\alpha_i) s_i / w_i^{\text{eff}}}{\sum_k (1-\alpha_k) s_k / w_k^{\text{eff}}}, \quad \theta_{12} \equiv \theta_1 + \theta_2,$$

$$R_1 \equiv \sum_i (\omega_i - \theta_i) \alpha_i, \qquad R_3 \equiv \sum_{i=1}^{2} (\omega_i - \theta_i)(1-\alpha_i).$$

Solving (E1)(E2) gives

$$\widehat{r} = (B_s D - C_s)\, t, \qquad \widehat{w} = -(A_s D + C_s)\, t,$$

$$D \equiv \frac{(1-\varepsilon) R_3 + \theta_{12}}{1 - (1-\varepsilon) R_1}.$$

Sectoral Labor and Capital Responses Using $\ell_i = \frac{1-\alpha_i}{w_i^{\text{eff}}} Y s_i$ and $s_i \propto p_i^{1-\varepsilon}$, the log change in sectoral labor is

$$\begin{aligned}\widehat{\ell}_i = &\underbrace{\Big[1 + (1-\varepsilon)\alpha_i - (1-\varepsilon)\textstyle\sum_k \omega_k \alpha_k\Big]}_{\Phi_i} \widehat{r} \\ &+ \underbrace{\Big[(1-\varepsilon)(1-\alpha_i) - 1 - (1-\varepsilon)\textstyle\sum_k \omega_k (1-\alpha_k)\Big]}_{\Psi_i} \widehat{w} \\ &+ \underbrace{\Big[(1-\varepsilon)(1-\alpha_i)\mathbf{1}\{i \le 2\} - \theta_{12} - (1-\varepsilon)\sum_{k\le 2} \omega_k (1-\alpha_k)\Big]}_{\Xi_i} t.\end{aligned} \tag{22}$$

Plugging $(\widehat{r}, \widehat{w})$ above yields a closed form

$$\frac{d \ln \ell_i}{d\tau} = \frac{1}{1+\tau}\Big\{\Phi_i(B_s D - C_s) + \Psi_i(-A_s D - C_s) + \Xi_i\Big\}.$$

For capital, use $k_i/\ell_i = \frac{\alpha_i}{1-\alpha_i}\frac{w_i^{\text{eff}}}{r}$ from (**??**):

$$\widehat{k}_i = \widehat{\ell}_i + \underbrace{(\widehat{w} - \widehat{r})}_{=-Dt} + t \cdot \mathbf{1}\{i \le 2\}. \tag{23}$$

Signs **(i) Gross substitutes across sectors ($\varepsilon > 1$).** Taxed sectors 1, 2 become relatively expensive; the share effect reinforces the direct wedge. Generically,

$$\frac{d\ell_1}{d\tau} < 0, \quad \frac{d\ell_2}{d\tau} < 0, \quad \frac{d\ell_3}{d\tau} > 0,$$

and $dY/d\tau < 0$. (Exact magnitudes depend on $\{s_i, \alpha_i, \gamma_i\}$.)

(ii) CobbDouglas across sectors ($\varepsilon = 1$). All $(1-\varepsilon)$ terms vanish and $D = \theta_{12}$. Then

$$\widehat{\ell}_i = (\theta_{12} - \mathbf{1}\{i \le 2\})\, t, \qquad \widehat{k}_i = 0 \quad \text{for all } i, \qquad \widehat{Y} = \widehat{r} = \big[C_s - (1-A_s)\theta_{12}\big](-t),$$

i.e. taxed sectors labor falls, untaxed sectors labor rises, *sectoral capital levels are invariant*, and output falls with a slope pinned by baseline shares. This delivers very sharp signs.

(iii) Gross complements across sectors ($\varepsilon < 1$). The share effect works against substitution, so the signs of $\widehat{\ell}_{1,2}$ depend on how strongly total spending Y contracts and on baseline shares (via $A_s, B_s, C_s, \theta_{12}, \omega_i$). The direct wedge in (22) still pushes $\ell_{1,2}$ down; ℓ_3 typically rises unless the income effect dominates.