Contract Labor and Firm Growth in India

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September 2015

Abstract

Since the late 1990s, large Indian manufacturing firms have increasingly relied on contract workers supplied by staffing companies. By 2011, contract workers accounted for 36 percent of total employment of firms with more than 100 workers. At the same time, the thickness of the right tail of the firm size distribution in formal Indian manufacturing plants has increased, the average product of labor large firms has declined, the volatility of growth rates among large firms has increased, and the probability that large firms introducing new products and use new inputs has increased. We use the geographical heterogeneity in the spread of the use of contract labor due to the initial spatial heterogeneity in the spatial distribution of staffing companies to measure the causal effect of the increased supply of contract labor on the relaxation of employments among the large Indian manufacturing establishments.

*We are grateful to the University of Chicago’s India Trust for financial support and to Manish Sabharwal for helping us understand the labor contracting business in India.
1 Introduction

Many observers have pointed to the bargaining power of organized labor in India, as initially implemented by the Industrial Disputes Act (IDA) of 1947, as an important constraint on growth in India. This Act raises the cost of labor and of laying off workers, particularly for large firms with more than 100 workers. In particular, the IDA requires firms with more than 100 workers that shrink their employment to provide severance pay, mandatory notice, and obtain retrenchment authorization. The IDA thus potentially constrains growth in two ways. First, the most productive Indian firms are likely to be sub-optimally small. Consistent with this, the Indian manufacturing sector is characterized by a large number of informal firms, a small number of large firms and a high marginal product of labor in large firms (see Hsieh and Olken 2014 for some evidence). Second, the high costs faced by large firms in retrenching may dissuade them from undertaking risky investments, which may be one of the forces behind the low growth over the life-cycle of Indian firms (see Hsieh and Klenow 2014).

In this paper, we present suggestive evidence that the employment constraints on large Indian firms have declined since the late 1990s. First, the thickness of the right tail of formal Indian manufacturing firms has increased since 2000. Second, we show that the gap between the average product of labor of large Indian firms vs. that of small firms has declined while, in contrast, the gap between the average product of capital of large Indian firms vs. that of small firms has remained essentially constant over the same period. Third, we show that the dispersion of employment growth has increased among large firms.

Although these patterns suggest that the regulation of labor has diminished in India, there is actually little de jure change at the aggregate level in the formal regulation of labor (as opposed to Industrial Licensing where reservations for small scale industries have diminished since 1991). We suggest that the change in employment restrictions on large firms was not due to a formal change in the IDA, but rather due to a greater reliance on contract workers hired through a staffing company who are their formal employer. The staffing companies themselves have to abide by the IDA and have to provide minimum wage and social benefits to the contract workers (like all formal firms). However, the contract workers they place into their customer firms are not formally employees of the customers. This arrangement provides customer firms with the flexibility to return the contract workers to the staffing company (who then places the workers in another firm) without being in violation of the layoffs and retrenchment rules imposed by the IDA.

While a legal framework for the deployment of contract labor has been in existence since the early 1970s, the staffing model only boomed starting in the mid-to-late 1990s. We show in the micro-data of Indian manufacturing establishments that the share of establishments with more than hundred workers that use contract labor increased from under 30 percent in 1990 to almost 60 percent by 2011. And among the firms that employ contract labor, the share of contract workers in total employment increases from about 40 percent in 1990 to almost 60 percent by 2011. By 2011, contract workers accounted for about 36 percent (60 percent x 60 percent) of total employment among Indian establishments with more than 100 workers.
There are three main channels through which a greater availability of contract workers may have changed the formal manufacturing landscape in India. First, the IDA places size-dependent restrictions on the ease of firing workers. When productivity is mean-reverting, the firing cost due to the IDA makes it more unlikely that large firms will change employment in response to a productivity shock. Because contract workers are exempted from firing costs, employment among large firms that rely more on contract workers should be more responsive to productivity shocks. Using Bartik-style labor demand shocks at the district level, we show that firms in district where the contract labor share is higher are more responsive in their hiring (and firing) to such demand shocks. Second, the use of contract labor may allow large firms to undertake risky investments because the contract workers can be returned to the staffing companies at a lower cost if the investment does not succeed. Our data indicates that the probability that large manufacturing firms in India are introducing new products and sourcing new inputs has increased since the late 1990s. Third, a greater availability of contract labor may have reduced the extent to which large firms face a higher marginal cost of labor because of greater unionization and other constraints proportionately imposed on large firms by the regulatory environment. Consistent with this channel, we see that among firms that have paid the fixed cost of securing a relationship with a staffing company (e.g. hire at least some contract labor), the intensity of contract worker use had become monotonically increasing in firm size by the late 2000s, suggesting that large firms were disproportionately able to reduce their marginal costs by employing more contract workers.

We exploit the heterogeneity across Indian districts in the spread of the labor contracting industry to get at the causal effect of the availability of contract labor. We use the distance-weighted sum of staffing industry employment around an Indian district in 1998 as an instrument for the intensity of the growth of contract labor in a district after 1998. We show that the instrument is correlated with the growth in the use of contract employment among firms in a district. Relying on this instrument, we show that a greater supply of contract labor in a district increases the thickness of the right tail of the firm size distribution in that district, decreases the gap in the average product of labor between large and small firms, increases the dispersion of employment growth among large firms, and increases the number of new products offered and new inputs sourced by large firms in that district.

We then use a standard model of monopolistic competition with heterogeneous firms to quantify the impact of contract labor on aggregate growth in Indian manufacturing. We parameterize the effect of contract labor as changing the marginal cost of labor and the adjustment costs of labor faced by large firms. We then use our estimates based on the micro data to quantify the effect of contract labor on these two parameters. This exercise suggests that the growth of contract labor during the 2000s provided a cumulative .56% boost to GDP in the Indian manufacturing sector from 1998 to 2011.
2 Institutional Background: Labor Laws in India

Labor laws in India are covered by a large number of separate Acts setting minimum wages, conditions of work, payment of wages, benefits, workers’ welfare, health and safety provisions, procedures for the resolution of industrial disputes, conditions for hiring and firing workers, and conditions for the closure of establishments.

The key piece of central labor regulation legislation in India is the Industrial Disputes Act of 1947 (IDA, 1947) which deals with the conditions for hiring and retrenching workers and with the closure of establishments. The IDA specifies the powers of government, courts and tribunals, unions and workers and the exact procedures that have to be followed in resolving industrial disputes.

A 1976 amendment to the IDA made layoff, retrenchment and closure illegal except with the previous permission of the appropriated government for all firms with more than 300 workers. This coverage was subsequently extended in 1982 to all firms with more than 100 employees. Permission to retrench or to close is rarely granted and unapproved separations carry a potential punishment of both a substantial fine and a prison sentence for the employer. Actual compensation for retrenchment is however quite low by international standards: any worker (as defined by the IDA) with more than 240 days of service is entitled to one month’s notice and 15 days of compensation for every year of service at 50 percent of basic wages plus dearness allowance.

The Industrial Employment (Standing Orders) Act also requires firms of more than 100 employees (and in some states 50) to specify to workers the terms and conditions of their employment, while the IDA requires employers to provide Notice of Change (Section 9-A). This requirement states that no employers can effectuate any change in the conditions of service of any worker without giving 21 days of notice. Shifting weekly schedules or days off without notice could be in non compliance.

The IDA also sets conciliation, arbitration and adjudication procedures to be followed in the case of an industrial dispute. It empowers national or state governments to constitute Labour Courts, Tribunals, National Tribunals, Courts of Inquiry, and Boards of Conciliation. The government has the monopoly in the submission of industrial disputes to Conciliation Boards, Courts, Tribunals or National Tribunals. In industrial disputes originated by the discharge or dismissal of a worker, the court of tribunals can reinstate the work in the conditions they see fit if they deem such discharge unjustified. If the employer decides to pursue the matter in a higher court, the employer is liable to pay the foregone wages during the period of proceeding.

During the seventies and particularly during the eighties, a number of state amendments increased the variability of the labor laws across states (Besley and Burgess, 2004). In most cases, these amendments increased employment protection. They also increased the cost to employers of solving an industrial dispute, although some changes in the opposite direction were also observed. In the nineties the legislative activity came to a halt, with no new amendments in the IDA.

A number of studies have attempted to estimate the effects of labor market regulations on economic outcomes in India. Fallon and Lucas (1991) and (1993) analyze the effects of the 1976 amendment of IDA, which mandated firms employing 300 or more workers to request permission
from the government prior to retrench. They find that formal employment for a given level of output declined by 17.5 percent after the 1976 amendment. Also, Dutta Roy (2004) examined the effects of the 1982 amendment to the IDA, which extended the prohibition to retrench workers without government authorization to firms that employed hundred or more workers. Roy finds evidence of substantial adjustment costs in employment but no evidence that such costs are driven or altered by the 1982 amendment.

While both of the studies above are limited by their sole reliance on time series variation, Besley and Burgess (2004) go a step further by exploiting the state-level variation that is induced by the state-level amendments to the labor laws. They show that states which amended the IDA in a pro-worker direction experienced lowered output, employment, investment and productivity in registered or formal manufacturing. In contrast, output in unregistered or informal manufacturing increased. Regulating in a pro-worker direction was also associated with increases in urban poverty.

Hasan, Mitra and Ramaswamy (2007) examine whether differences in labor laws explain differences in the way labor markets adjusted to trade reforms. They find that states with more stringent labor regulations (measured as in Besley and Burgess 2004) have lower demand elasticities and these elasticities are less affected by trade reforms. Aghion et al. (2008) argue that pro-worker states benefited less from the industrial reforms launched in 1991.

While there has not been any substantive de jure changes in Indian labor laws since the early for the last quarter century, we document in the next section that the composition of the Indian workforce has however experienced some striking changes, suggesting that some de facto changes have occurred. In particular, we will show that there has been a sharp increase in the use of contract workers, e.g. workers on temporary contracts hired through a government-licensed intermediary or contractor.

### 3 Aggregate Trends in Indian Manufacturing

We start by documenting a number of trends in the formal Indian manufacturing sector. Unless otherwise indicated, we rely on the micro-data from the Annual Survey of Industries (ASI) conducted by the India’s Statistical Office (NSSO). The ASI is a census of formal Indian manufacturing establishments with more than 100 workers and a random survey of formal firms with less than 100 workers.\(^1\) From 1998 on, the ASI provides establishment identifiers that allows us to exploit the panel dimension of the data. The key variables we use are value-added, employment, labor compensation, book value of capital, main industry of the establishment, and the geographical district. Importantly, the ASI provides information on workers directly employed by the establishment and workers hired through staffing companies. We also use the information in the ASI on the detailed products produced by the establishment and inputs used by the establishments. The unit of ob-

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\(^1\)The 1948 Factories Act requires that establishments with more than 20 workers have be formally registered (the threshold is 10 or more workers if the establishments uses electricity). One third of the plants with less than 100 workers were sampled in the ASI prior to 1994. After 1994 the sampling probability of small plants (less than 100 workers) is about one-seventh.
observation is the establishment. The ASI does not provide firm identifiers so we can not group establishments into firms. The ASI collects data over the fiscal year, which runs from April 1 to March 31 of the following year. When we refer to a year, we refer to data collected between April 1 of the year and March 31 of the following year (e.g., 2011 refers to data collected over the 2011-2012 fiscal year).

Fact 1. The right tail of the firm size distribution has thickened.

This is shown in Figure 1. Panel (a) plots the distribution of employment by firm size in 2000 and 1990. The two plots are quite similar - if anything, there is slightly more mass amongst smaller firms in 2000 than there was in 1990. Panel (b) plots the employment distribution by firm size in 2011 and 2000. shows a clear thickening of the right tail during the 2000s. Every size bin above around 50 employees contains more mass by the end of the decade. Figure 2 plots the trend in the 30th, 50th, 70th and 90th firm size quantiles between 1983 and 2011. This confirms an impressive and sustained growth in the upper quantiles during the 2000s.

Fact 2. The average product of labor has declined for large firms.

Figure 3 plots the elasticity of the average product of labor with respect to total employment between 1985 and 2011. We define average product of labor as value added over total employment. We regress log average product of labor on log employment interacted with year dummies, as well as a full set of industry-year dummies to control for changes in composition. We then plot the coefficients on log employment in each year. The elasticity shows a persistent increasing between 1985 and 2000, before declining steadily during the 2000s. While we hypothesize that the increasing elasticity during the 1990s is reflecting the difficulties firms had in increasing employment in response to newly liberalized markets as India deregulated over the period (Hasan, Mitra and Ramaswamy, 2003), the decrease in the elasticity during the 2000s will be the primary focus of this paper.

To highlight where in the firm size distribution the reduction in this elasticity is coming from, Figure 4 plots the non-parametric relationship between the average product of labor and firm employment in 2000 and 2011. This shows that the reduction in elasticity is coming from a reduction amongst larger firms, especially those with 100 employees or more.

Figure 5 plots the elasticity of the average product of capital with respect to firm employment. As can be seen, the elasticity of the average product of capital with respect to employment is decreasing during the 1990s whereas the elasticity of the average of the average product of labor with respect to employment increases over the same period. This is consistent with the mass liberalization and delicensing occurring during the 1990s, which likely increased access to finance but did not change employment restrictions for large firms. Second, the elasticity of the average product of capital did not change after the late 1990s, in contrast to the elasticity of the average of labor. This suggests that whatever is affecting the average product of labor vs. employment schedule after the late 1990s is doing so through the labor channel specifically, rather than through all input (or output) markets.

Fact 3. Adjustment costs have decreased for large firms
Figure 6 plots the distribution of job creation and destruction in Indian manufacturing over 1998 to 2000 with that in the US. We use the Davis, Haltiwanger and Schuh (1998) measure of employment growth. Two facts stand out when comparing the distribution of adjustment rates in the US and India. First, there is far more inaction in India than in the US. Most firms are clustered around very small growth rates in India when compared to the US. Note that measurement error would tend to go in the opposite direction, and fan the distribution outward. Second, there is far less exit and entry in India than in the US.

Although Figure 6 suggests that even now, the volatility of employment in Indian establishments is very low (compared to the US), the dispersion has increased since the late 1990s. This is shown in Figure 7, which plots the share of firms in an action zone (defined as changes in employment of less than 5 percent), the size of employment increases conditional on expanding employment, and the size of employment contractions conditional on shrinking employment. To construct the plots, we first regress the outcome variable of interest on size dummies (column 1) or labor regulation dummies (column 2) fully interacted with year dummies, as well as log employment and a set of industry fixed effects. Figure 7 plots the coefficients on firm size or labor regulation dummies in each year, with all other covariates evaluated at their sample averages.

In the first row, we consider the share of firms in an inaction region, which we define as changes in log employment less than 0.05 in absolute value. Panel (a) shows that large firms are more likely to be in their inaction region than small firms. However this is hard to interpret, since small firms are more likely to be growing to their steady state size and therefore we would mechanically expect to observe less inaction. Panel (b) shows that, for the most part, an average firm is more likely to be in their inaction region in a state with pro-worker legislation than in a state with pro-employer regulation. While the effect is only significant in certain years, this suggests labor regulation is having an effect on firm dynamics. Moreover, there is a slight downward trend in the share of firms in the inaction region over the decade.

In the second row, we restrict the sample to firms that increase employment between a pair of years and compare the size of adjustments (conditional upon expansion) across different groups. Panel (c) shows that large firms expand by less than small firms, subject to the same caveat as previously mentioned. Panel (d) shows that expanding firms in pro-employer states grow by more than expanding firms in pro-worker states. There is an increase in both series during the decade. Note this is unlikely to be driven by aggregate growth trends for the simple reason that we’re taking conditional expectations over the set of firms which expand, and any marginal firms pushed into this set by aggregate growth would bring the series down.

In the third row, we restrict the sample to firms that decrease employment between a pair of years and compare the size of adjustments (conditional upon contraction) across different groups.

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2 Figure 6 plots the distribution the absolute change in employment between two years divided by average of employment in the two years. The construction of the plot for India is adjusted for the fact that the ASI is only a census of firms with more than 100 employees (in most years), as outlined in the appendix.

3 When we compare small vs large firms, we omit log employment as a control. Our labor regulation measures come from Besley and Burgess (2004).
Panel (e) shows that large firms contract by less (in absolute value) than small firms, subject to the same caveat as previously mentioned. Panel (f) shows that firms in pro-worker states fire less workers when they contract than do firms in pro-employer states. The same downward trend during the 2000s is present.

**Fact 4. Firms are more likely to grow**

Figure 8 plots the probability a firm will add a new product or use a new input over time. Specifically, we first regress dummies for adding output products (panel (a)), domestic inputs (panel (b)) and imported inputs (panel (c)) against log employment, industry dummies and year dummies. We then plot the year dummies evaluating all other covariates at their sample averages. As can be seen, there is a marked increase in the probability that firms add new output and input products.

**Fact 5. The use of contract labor has spread, especially amongst large firms**

In Figure 9, we plot the share of all firms hiring contract workers, e.g. workers on temporary contracts hired through a government-licensed intermediary or contractor, across different size bins. Two facts stand out. First, the overall share of firms using any contract workers has gone up during the last twenty years, especially so during the late 1990s and 2000s. Second, this increase has been especially marked for larger firms. Panel (b) reiterates this point by plotting a non-parametric plot of the linear probability model in employment for 1993 and 2011. The difference across years is much greater for large firms.

In Figure 10, we consider only large firms (with over 100 workers) and look at how the contract share developed in states with different labor regulations according to the Besley and Burgess (2004) measure. The growth rates is higher in pro-worker states, suggesting a relationship between the use of contract labor and the regulatory environment.

In Figure 11, we again consider only large firms and examine both the extensive and intensive margins simultaneously. The extensive margin is the share of firms hiring contract workers as before. The intensive margin is the relative share of contract workers within the set of firms which hire any such workers. We see that contract labor use is spreading both along the extensive and intensive margin. If the changes in contract labor use is driven solely by a reduction in the fixed cost of hiring, we would see movement along the extensive margin but nothing on the intensive margin. We therefore interpret this figure as evidence that the (relative) marginal cost of contract workers must also be falling over the period.

In the remaining sections of this paper, we take on the task of assessing whether facts 1 to 4 above can be explained at least in part by fact 5, e.g. the increase use of contract labor in the Indian manufacturing sector.
4 The Effect of Contract Labor on Manufacturing Firms

4.1 Contract Labor and the Staffing Industry

Contract workers are not considered workmen under the IDA and are thus exempted from the application of severance pay, mandatory notice or retrenchment authorization. Labor laws in India thus create important incentives to hiring non permanent workers: by resorting to contract employment, an employer can bypass some of the restrictive regulations of the IDA. Not surprisingly, the use of contract workers has been met with vigorous opposition from the unions. Furthermore, restrictions on the use use contract labor are imposed by the Contract Labour Regulation and Abolition Act of 1970. This Act regulates the service conditions of contract labor in firms of 20 or more employees, providing for welfare amenities (minimum wage, health, safety, pension) and provisions against the delay in wage payment. Section 10 of the Contract Labour Regulation and Abolition Act also gives authority to the State to control the use of contract labor in any establishment. The relevant factors considered are whether contract labor is employed in work which is of perennial nature and whether it is also done through regular employers in those establishments or in other establishment of similar nature. In other words, contract workers are de jure not supposed to be in charge of tasks within a firm that are typically completed by permanent workers in that firm or other firms in that industry. De facto, it is unclear whether companies are restricting their use of contract workers to such non-core activities; most likely, an increased willingness by companies to operate in a grey legal zone might explain the sharp rise in the use of contract labor over the last 15 years or so we have documented above (fact 5).

While a key benefit for companies that rely on intermediaries and contract workers is escaping the labor laws covering permanent employment, another benefit is the regulatory support the intermediaries provide in handling a complex web of state labor laws. The story of Whirlpool’s entry in the India, as reported in the New York Times in 2011, provide a good example: “In 1997, a few years after Whirlpool arrived in India, it hired hundreds of salesmen and sent them to independent retail stores to sell washing machines, refrigerators and air-conditioners to middle-class Indians who had never bought such appliances before. But soon executives were overwhelmed trying to keep abreast of changes in labor laws and various minimum-wage rules in India’s 28 states. So Whirlpool began outsourcing its sales staff, which has since grown to 1,850 people — first to a staffing agency called Adecco and later to TeamLease. Excluding 250 people who work at the company’s own stores, most of its sales workers are employed by TeamLease, which handles their wages, commissions, health care and retirement savings.”

Anecdotal evidence also suggests that, unlike in the United States where temporary workers often rotate between establishments employers. in India contract workers often stay in the same job for years. However, we are not aware of any datasource that would allow us to confirm this anectodal claim.

Staffing companies count as “industries” under the IDA and so are supposed to follow all of the provisions therein, including those regarding hiring and firing. In particular, staffing companies have to abide by the retrenchment conditions of the IDA when a contract worker has been on its rolls for more than 240 days. So technically, the contract labor system shifts retrenchment liability from the client firm that is actually using workers to the staffing firm.

Staffing companies charge a tax to firms that rely on their services on a monthly basis. The effective service tax rate is about 12.4%.5

A 2014 report by Staffing Industry Analysts, the leading global advisor on contingent work estimates the Indian staffing market to be worth approximately USD 5 billion. While staffing companies also assist firms with permanent recruitment (12% of revenue) and various HR solutions (13% of revenue), temporary staffing consists of the bulk of their business (75% of revenues). As of 2012, the three largest staffing companies in India were Adecco, Teamlease and Randstad and accounted for about 15% of the total market. The market share of the top ten staffing companies was about 26%. Staffing industry analysts estimate that 1.3 million contract workers were employed in the organized sector as of 2014 and predict that it will swell to 9 million workers in the next 10 years.6

It remains unclear why, with a legal framework for the deployment of contract labor in existence since the early 1970s, the staffing model only boomed starting in the mid-to-late 1990s. Conversations with industry insiders suggest that it took until the mid-1990s for a critical mass of large companies to come to understand the various ways that an institutionalized flexible workforce could improve their cost structure. Also, the deployment of contract labor was low until the 1990s because India’s huge public sector monopolies stifled growth in the private sector; after the reforms of 1991, private industry began to flourish in India and use of contract labor grew with it.

There have been few empirical studies to date on the determinants of the rise of contract labor in India. In an industry-state-year panel, Sen et al. (2010) find that a positive relationship between import penetration and the share of contract workers; they also find that pro-worker legislation and greater bargaining power of permanent workers (as proxied for by the lockout-to-strike ratio or union density) increase the share of contract workers.

5This service tax is actually composed of three components: 1) A flat 12% service tax levied on the total value of taxable services. The value of taxable services includes the total compensation paid to the contract workers (including benefits such as provident fund payments and health insurance) and the TeamLease administrative fees; 2) a 2% “Education Cess” tax which is levied on the payable service tax calculated from (1); and 3) a 1% “Senior and Higher Education Cess” tax which is levied on the payable service tax calculated from (1). For example, consider a firm that hires five contract workers who are each paid Rs. 5000 in combined total compensation per month, and the staffing firm monthly administrative fee is Rs. 500 per contract worker. The total value of taxable services will be Rs. 25,500 (25,000 + 2,500). The firm will pay Rs. 3,300 for the flat 12% service tax. 2) Rs. 66 for the 2% Education Cess (3,300*.02). 3) Rs. 33 for the 1% Senior Cess (3,300*.01). The firm’s total tax liability for this month will be Rs. 3,399. For this month, the staffing company will bill the firm for a total of Rs. 30,899 (27,500 in services + 3,399 in taxes). The Indian government has announced increases to the service tax as part of their proposed 2015 budget. The government is also considering levying an additional service cess tax of up to 2% to pay for its “Clean India” campaign.

4.2 Possible Channels

We now discuss the most likely through which contract labor might affect firm outcomes.

4.2.1 Reduction in Adjustment Costs

As discussed above, the IDA places strict size-dependent restrictions on the ease of firing workers. These regulations bite for firms with more than 50 and 100 workers, with the latter being especially costly. We think of these as an asymmetric variable adjustment cost, in the line of the Hopenhayn and Rogerson (1993) model. When productivity is mean-reverting, the firing cost introduces an inaction band into firms’ employment decisions - large firms subject to a moderate positive shock today will not hire additional workers with the knowledge that they’ll most likely have to fire them in the future. Furthermore, the firing cost could discourage firms from undertaking risky investments. Because contract workers are exempted from the application of severance pay, mandatory notice or retrenchment authorization, firms that rely more on them for their staffing needs should have smaller inaction in their employment decisions and perhaps be more willing to undertake risky investments.

4.2.2 Reduction in Labor Costs

Contract labor may have reduced the extent to which large firms face a higher marginal cost of labor because of unionization and other characteristics of the regulatory environment. Within this story, we see three separate (and non-mutually exclusive) margins through which contract labor might reduce labor costs for large firms.

Not unionized, so cheaper. In this story, firms face a lower marginal cost of labor for contract workers than full-time employees, with the difference potentially increasing in firm size. Since there is likely a fixed cost to hiring contract workers given the institutional environment outlined above, a reduction in marginal costs would drive an increase in the share of firms using contract labor. However, this could also be driven by a reduction in the fixed cost of hiring these workers, perhaps driven by the proliferation of staffing firms. To identify this channel, we need to look at the intensity with which firms that hire contract workers use contract workers (relative to permanent employees), since this reflects their relative marginal costs. If this intensity is greater for large firms, this would suggest that contract workers bring down marginal costs especially so for large firms. If this intensity is growing over time, this would suggest that the relative marginal cost (benefit) of contract workers is falling (rising). In addition, we can look within firms that ever hire contract workers and see how the time path of employment varies around the date they first hire contract workers. If the average marginal cost of labor is lower, then we expect to see growth in total employment.

Cheaper, and weakens unions bargaining power. The main story here is the same as above, with the caveat that we anticipate the use of contract workers to have knock-on effects on the market for full-time workers from the proliferation of contract labor. In particular, the improved outside option available to firms bargaining with unions might reduce the latter’s bargaining power,
reducing wages for permanent workers. We can test for this additional channel by examining the time path of full-time wages within firms after the date they first hire contract workers.

**Act as Intermediaries, Increasing Match Quality.** Staffing firms that provide contract workers may also act as an intermediary, reducing the search and matching frictions that manufacturing firms face in the labor markets. If these staffing firms increase the effective units of labor per worker (because of a higher quality match), this will act as a level decrease in marginal cost of contract workers, but one that is symmetric in firm size. With a constant fixed cost of negotiating with staffing firms, this would show up as an increase in the share of firms hiring contract workers, and an increase in the share of contract workers hired (conditional on hiring), but no change in the slope of this relative share in firm size which would remain constant. Therefore, while we cannot reject that this story is going on at the same time as those described above, examining trends in the intensity of contract labor use across firm size (conditional on hiring) will allow us to reject that this is the only story going on.

### 4.3 Evidence of Channels

#### 4.3.1 Reduction in Adjustment Costs

In Figure 12, we plot the fraction of firms that do not change employment, employment growth conditional on growing, and employment decline conditional on shrinking employment. In the first column, we compare firms which hire contract labor to those that do not. In the second column, we first compute each district’s change in their contract labor share between 1998-1999 (pooled) and 2008-2009 (pooled). We then bin districts into quartiles based on their change in contract share over the decade and compare dynamics in districts in the top quartile (High CL Change) and bottom quartile (Low CL Change). In the first column, we see that firms hiring contract labor are much less likely to be in their inaction region. They also expand by more (conditional on expanding), although the difference is only significant in a couple of years (panel (c)). There is no significant difference in average employees fired amongst contracting firms between firms which hire or do not hire contract workers (panel(e)). In the second column, we see very interesting time trends across districts which experience different degrees of contract labor growth over the decade. In particular, we see a downward relative trend both in inaction in districts experiencing high contract labor growth compared to those with low contract labor growth (panel (b)), and in the average size of expansions amongst growing firms (panel (d)). Again, we do not see significant differences in the size of downward adjustments. However, we stress that we do not interpret these plots as any formal test of the adjustment channel, since the direction of causation is not apparent from these plots.

A better test of the theory is to construct shocks to a firm’s optimal employment, and examine how the availability of contract labor affects the responsiveness of firms to these shocks. We run specifications of the form

\[
\Delta \log L_{dt} = X_{dt}'\gamma + \beta_1\text{Shock}_d + \beta_2\text{Shock}_d \cdot \text{Contract}_d + \epsilon
\]
So long as the shock we use is uncorrelated with observables factors affecting employment growth, as well as the contract measure, then our estimate of $\beta_2$ identifies the extent to which having a higher share of firms hiring contract workers increases the emploum
tment response to shocks. We describe the shock we use below.

We follow Bartik (1991) in creating local demand shocks using national industry changes interacted with a district’s initial distribution of employment across industries. Specifically, we generate predicted district-level growth rate defined as

$$g_{dt} = \sum_k s_{dkt-\tau} \left( \frac{L_{-dkt} - L_{-dkt-\tau}}{L_{-dkt-\tau}} \right)$$

$$\hat{L}_{dt} = (1 + g_{dt})L_{dt-\tau},$$

where $L_{-dkt}$ is total employment in industry $k$, year $t$, in all districts other than $d$, and $s_{dkt-\tau}$ is the employment share of industry $k$ in district $t$ in year $t - \tau$. We use longer time lags, comparing growth over $\tau$ years, since pass-through of national demand changes into local labor markets is likely to be a medium-run process, rendering annual measures that will be too noisy. Specifically, we compare growth between 1998-1999 and 2006-2007 averages. We restrict the sample to include a balanced panel of industries within each district that appear in both periods. We also use a district’s initial contract share in 1998-1999. Our identification assumption is that changes in aggregate employment within an industry (outside a given district) is uncorrelated with a district’s initial employment share in that industry, as well as its initial contract labor share. Since our plots discussed previously controlled for industry composition, and showed that aggregate growth was driven by within-industry rather than between-industry changes, this assumption does not appear too restrictive.

Table 1 displays the results. Column (1) presents the first stage, which shows that the instrument has good predictive power for district-level employment changes. The slope is 0.755, and the F-stat is 24.99. Column (2) then examines how the initial contract share of a district affects the responsiveness of actual employment growth to predicted employment growth. The results suggest that contract labor has a statistically and economically significant effect on responsiveness to shocks: increasing the contract share from 0 to 1 raises the elasticity approximately seven-fold. Column (3) tests how the responsiveness varies across pro-worker and pro-employer states (relative to neutral states). We see the response is much more muted in pro-worker states, as if firms under this regulatory environment find it costlier to adjust to shocks. Finally, column (4) shows the marginal improvement in the employment response from an increase in the contract share is higher in districts located in pro-worker states. Since the effect of contract labor on adjustment is greater exactly where we would expect it to be, this provides more evidence of the positive effect of contract labor in reducing adjustment costs.
4.3.2 Reduction in Labor Costs

We have already seen in Figure 9 that large firms are more likely to hire contract workers, and increasingly more so by the end of the 2000s. This suggests that, for at least a set of tasks performed within firms, contract workers might be less costly than permanent workers. In Figure 13 we provide evidence that these workers are on average less costly by comparing the cost (wages plus all benefits and welfare payments) of contract workers relative to full-time workers. Contract workers on average provide a 25% discount on full-time workers. However, as mentioned above staffing companies charge firms that hire contract labor from them a 3-part service tax, which amount in total to about 12% of total compensation paid by the firm to each contract worker. This still suggests around a 13% cost reduction for contract workers. Of course, this is assuming that contract workers supply the same effective units of labor as permanent workers.

Recall the positive relationship between the average product of labor and employment shown in Figures 3 and 4. Under certain modelling assumptions laid out below, this suggests the marginal cost of labor is higher for large firms. The non-homothetic adoption of contract workers across firm size is certainly consistent with contract labor reducing this marginal cost of labor. However, this is not necessarily indicative that the marginal benefit of hiring contract workers is greater for large firms. It could simply be that contract workers are equally beneficial across firm size, but only large firms are willing to cover any fixed costs associated with their employment. We now consider how the intensity of contract worker employment varies with firm size to examine whether the marginal benefit differs between firms.

In Figure 14 we plot the relative employment share of contract workers to total workers across firm size in 3 years. We demean employment shares by industry averages to control for changes in composition. Panel (a) compares 1993 and 2000. Two points stand out. First, there is no change during the 1990s in the shape of the schedule - firms which hire any contract workers tend to employ relatively more of these workers by the end of the decade, but this increase occurs evenly across firm size. Second, the schedules display a distinct inverted-U shape. For firms with less than 50 workers, the share is increasing in size. However, for firms with more than 50 employees the share is sharply decreasing in size. We interpret this fact as suggesting that during this period, contract workers are used for a fixed set of tasks that is independent of firm size (at least for firms with more than 50 employees). For example, this could be janitorial tasks that scale at a much slower rate than total employment. By contrast, panel (b) shows that by 2011 this relationship had completely changed. The relative employment of contract workers is now monotonic in firm size with a fairly constant semi-elasticity. This suggests that the surge in contract workers during the 2000s was associated with a proliferation of a very different type of work performed by contract workers, one that was substitutable with full-time workers for the entire range of tasks that manufacturing firms perform. Moreover, since the intensity of use is increasing in firm size, this suggests that this proliferation asymmetrically benefitted large firms who were able to disproportionately reduce their marginal costs by employing more contract workers.

To further support the idea that this spread of contract workers reduced constraints on large
firms and allowed them to expand, we run the following event study specification to examine within-firm dynamics of various outcomes around the date they first hire contract workers

\[ Y_{it} = \alpha_i + \gamma_t + \sum_{\tau} \beta_{\tau} \mathbb{I}\{\text{Years Since First Hire}_{it} = \tau\} + \epsilon_{it}. \]

Here \( \alpha_i \) is a firm fixed effect, \( \gamma_t \) is a year fixed effect, and \( \mathbb{I}\{\text{Years Since First Hire}_{it} = \tau\} \) is a dummy equal to one when firm \( i \) first hired contract workers \( \tau \) years before year \( t \). \( \beta_{\tau} \) will therefore identify the difference in outcome \( Y_{it} \) \( \tau \) years after first hiring contract labors. We also restrict the sample the sample to (i) firms which we observe an uninterrupted window spanning 2 years before and 3 years after they first hire contract workers and (ii) firms which continue to hire these contract workers for all 3 years following the first hire. This allows us to abstract from selection issues. This leaves us with a panel of 641 firms.

The results are displayed in Figure 15. Each point corresponds to a \( \beta_{\tau} \) coefficient, with 2-years prior to a firm’s first hire being the base category. Panel (a) shows the dynamics of total employment. There is a huge on-impact increase in employment around the year a firm first hires contract labor, followed by a more modest period of growth in the years after. Reassuringly, there is no pre-trend in employment. Panel (b) shows the growth in contract workers following the year they are first hired. Panel (c) shows that while there is some substitution between full-time and contract workers in the first and second years, there is an upward trend thereafter as full-time employment grows closer to the initial level.

Panel (d) shows the dynamics of daily wages of full-time workers. If we see a sharp decrease around and following the year the firm first hires contract labor, this would provide support of the additional bargaining channel discussed above, with contract workers weakening the bargaining position of permanent workers. We see no significant dynamics in the wages for full-time employees, suggesting that this bargaining channel is not first order. Of course, one limitation of this exercise is that it assumes that permanent workers supply the same effective units of labor before and after a firm start hiring contract workers, e.g. the exercise does not account for possible compositional changes in the pool of permanent employees.

Finally, panel (e) shows the dynamics of the average product of labor. It falls significantly and persistently after the year of first hire, supporting the story that the availability of contract workers reduces the marginal cost of labor to manufacturing firms.

Taken together, this evidence suggests that during the 2000s contract labor proliferated in a way that reduced the marginal cost of labor asymmetrically for large firms, which in turn allowed them to expand.
5 Causal Effect

5.1 Staffing Industry

We use the micro-data of the Indian Economic Census to provide information on the growth of the staffing industry. The staffing industry is classified as “Labor recruitment and provision of personnel” in the Census. Table 2 presents the total number of employees (not including the contract workers outsourced to the customers) and the number of staffing companies in the three Census years. As can be seen, there is a huge growth in the industry between 2005 and 1998 compared to that over the 1998 to 1990 period. Figure 19 shows how the spatial variation in this growth over time. Panel (a) shows the absence of staffing in the vast majority of the country in 1990. Panel (b) shows the growth had started to occur in certain centers, namely near Delhi, Kolkata, Mumbai, Nagpur, Chennai, Vijayawada, Bangalore and Mysore. Panel (c) mirrors the huge growth with saw in Table 2, and it appears somewhat correlated with the initial spatial patterns observed in 1998. Panel (d) shows the overall growth between 1990 and 2005 - since there was almost no staffing in 1990, this mirrors the spatial distribution of the level of staffing employment in 2005.

Figure 20 shows the growth in the share of firms hiring contract workers between 1998-1999 and 2008-2009. We first regress a dummy for hiring contract workers on a full set of industry dummies, and average the residual in each district to control for compositional differences. We also plot only districts for which we observe 50 firms in the 2008-2009 period, to avoid comparing precisely and imprecisely estimated districts. Panel (a) plots deciles of the growth rate of the contract share amongst all firms, while panel (b) considers the contract share amongst large firms with more than 50 employees. We observe that growth in the contract share appears higher around Kolkata, Delhi, Mumbai and a triangle between Bangalore, Chennai and Hyderabad.

5.2 Instrumenting for Contract Labor Growth

The previous evidence has indicated that there is spatial variation in the growth of contract labor in India during the 2000s. However, we do not want to correlate the growth in a district’s contract labor share with our outcomes of interest. The direction of causation in this sort of exercise would not be clear – regional productivity shocks could be driving both the growth in demand for contract labor and growth in outcomes. Instead, we seek an instrument that is correlated with the growth in the share of firms hiring contract labor, but unrelated with unobserved factors driving manufacturing outcomes at the district level.

We draw on the following three insights to arrive at our choice of instrument. First, the rapid proliferation of contract labor during the 2000s seems to be associated with a different type of contract worker that is substitutable with full-time employees for a wide set of tasks within firms. Second, our anecdotal evidence suggests that the staffing industry provided this type of worker to manufacturing firms by canvassing firms near their regional offices. Third, we see an explosion in the staffing industry during the 2000s. We therefore want to use our data on the location of staffing industry as an instrument driving the growth in contract labor employment. However, to avoid the
possibility that the staffing industry responds to changes in the manufacturing sector, we use the initial level of staffing employment in 1998. As we see in Figure 2, this is correlated with growth in the staffing industry, but should be uncorrelated with changes in related to simultaneous changes in manufacturing. Specifically, we propose the following instrument

$$\text{Staffing}_{d,1998} = \sum_k e^{-\kappa \text{dist}_{dk}} \times l_{k,1998}^{\text{Staffing}}$$

This instrument is a distance-weighted sum of staffing employment around a district \(d\) in 1998. We measure distance in km, and use decay \(\kappa = 0.005\) in our specifications, but have tested robustness to different values from 0.5 to 0.0001 with qualitatively equivalent results. A decay of 0.005 is reasonable. For example, the average distance between all districts in Maharashtra is 358km with a minimum of 32km and maximum of 891km. With \(\kappa = 0.005\), this implies a weight of 0.16 on the average and 0.01 on the furthest apart in the state.

### 5.2.1 First Stage Regressions

We begin with a first stage where we examine how well this measure of initial staffing employment in 1998 predicts growth in the contract share over the decade. We run regressions of the form

$$\Delta \text{Contract}_d = \gamma' X_d + \beta \ln \text{Staffing}_{d,1998} + \epsilon_d.$$ 

\(\Delta \text{Contract}_d\) is the change in the contract share between 1998-1999 and 2008-2009 in a given district. We control for growth in the contract share driven by changes in composition by first regressing a dummy for whether a firm hires contract labor on a full set of industry dummies, and averaging the residuals within a district. We consider only districts with at least 50 firms to reduce noise in our estimate of the contract share. Our results are robust to including more districts, but weighting by measures of the number of observations in a district. We also control for various district characteristics in \(X_d\) such as initial employment, initial urban share of employment, as well as the initial contract share to control for aggregate patterns of convergence. In some specifications, we also include the log distance-weighted average of service sector employment to test whether the staffing instrument is only capturing variation in total service sector employment. This serves a sort of falsification test, to ensure contract labor growth is not just driven by proximity to large, service-sector-oriented cities for example.

Table 3 presents the results. Column (1) shows there a statistically significant, positive relationship between the staffing instrument and a district’s contract labor growth. A 1% increase in the staffing intensity measures increases the change in the contract labor share by 0.024 points. This is a fairly large effect, considering that the aggregate share for India as a whole rose from 0.18 to 0.28 between 1998 and 2011. Column (2) adds distance-weighted service sector employment as an additional control, since we might be concerned that this is driven solely by proximity to large, service-intensive cities. Reassuringly, the coefficient on weight-service employment is insignificant.
(and negative), while the coefficient on the staffing measure remains significant and even increases slightly. This suggests our instrument is capturing some meaningful variation related specifically to the staffing industry, rather than proximity to service-oriented, large cities in general. Columns (3) and (4) repeat the exercise using the share of firms with over 100 employees using contract labor as the outcome of interest. The main difference is that the effect on staffing growth seems larger, exactly as we would have predicted. The point estimates on the staffing instrument remain significant at the 1% level, and the effect is again not driven by proximity to service-intensive cities.

5.2.2 Reduced Form Regressions

Table 4 presents the reduced form results. Column (1) and (2) consider the growth of the 95th and 90th percentiles of the firm size distribution in a given district as dependent variables. A doubling of the staffing measure is associated with roughly an 8% increase in the growth rate of the 95th percentile, and a 6% increase in the growth rate of the 90th percentile. In other words, our instrument for the supply of contract labor is associated with a thickening of the right tail of the firm size distribution, especially so for the very largest firms.

Column (3) includes a measure of the relative labor-capital distortion from Hsieh and Klenow (2009) - a higher value is associated with a lower distortion on labor relative to that on capital. We see that staffing is associated with growth in this measure, consistent with the view that firms near staffing centers are experiencing a relative reduction in the distortions on labor.

Columns (4) and (5) show the staffing measure is associated with a relative reduction in the fraction of firms in inaction regions. Column (6) shows it is also associated with growth in formal manufacturing employment.

Column (7) and (8) consider the effect on the standard deviation of the log average product of labor. An adjustment cost story would predict that this dispersion measure would fall with proximity to staffing companies. However, even controlling for differences caused by variation in the firm size distribution, column (7) shows a positive relationship. We return to this finding below.

5.2.3 Second Stage Regressions

The second stage regressions, reported in Table 5, broadly confirm the reduced form findings above. An increase in the share of contract labor in a district is associated with a thickening of the right tail of the firm size distribution in that district (columns 1 and 2) and a decline in the relative distortions on labor (column 3). It is also associated with a reduction in the share of firms in that district that are in the inaction ranges (columns 4 and 5) and an increase in total formal manufacturing employment in that district (column 6). Finally, and in contradiction with the implication of a simple model where contract labor would only operate through its lowering of adjustment costs for firms, we find that an increase in a share of contract labor in a district increases the dispersion of the log average product of labor among firms in that district (column 7).
5.2.4 Evidence for Increased Churn

In the results above, we have noted an a priori counter-intuitive result on the relationship between the growth contract labor share and the change standard deviation of the log average product of labor in a district. Indeed, the adjustment cost story we outlined above would predict a negative relationship. More importantly, our findings of a reduction in firms’ inaction bands as access to contract labor increases is consistent with a decline in adjustment costs and should in theory translate in a reduced dispersion of marginal products of labor between firms. However, in a more dynamic model, both the reduction in adjustment costs induced by the availability of contract labor as well as the reduction in the marginal cost of labor - with largest firms expanding, total employment growing, and the average relative distortion on labor falling) would imply that firms may now be undertaking more risky investments, selling in new markets, introducing new products, or exploring new methods of production. This new dynamism, which we would predict to be concentrated among the largest firms, would act against any direct reduction in the dispersion of the marginal products of labor caused by the growth of contract labor, perhaps sufficiently so that we could observe on net a positive relationship.

Table 6 provides suggestive evidence that this counteracting force is at play, and that perhaps once these districts settle into a new equilibrium over time we might see the increased allocative efficiency our theory predicts. In particular, Table 6 tests whether district growth in contract share (instrument with our staffing measure) is associated with growth in 4 measures of churn. All outcome variables are detrended by log employment and industry-year fixed effects before taking averages within districts, to control for changes driven by changes in composition. In column (1), we consider leverage, which we define as the ratio of total liabilities to total assets. We see a statistically and economically significant effect - a 1% increase in staffing is associated with a 0.064% increase in the growth rate of leverage (holding firm size constant). Since we saw the distortion on labor is falling relative to capital in these districts, this is unlikely to be driven solively by relaxation of frictions in financial markets. Instead, we interpret this as evidence that firms in districts where the supply of contract labor is higher are taking on more risk. The remaining columns then look at firms’ propensities to add new products (column 2), as well as source new products from either domestic or international suppliers (column 3 and 4, respectively). We observe increased growth in the former two categories for districts closer to staffing clusters. In summary, the evidence in 6 suggests that greater access to contract labor increases the dynamism and risk-taking of formal manufacturing firms, which may contribute to the greater dispersion in average products of labor we have observed above.

5.2.5 Reduced Form Elasticities

Further evidence on the effect of staffing on our central outcome of interest, the elasticity of the average product of labor with respect to firm size, is given in Figure 18. We bin districts into the top and bottom terciles of our staffing measure distribution. First, we compare the average product of labor versus size schedule in 1998-1999 and 2008-2009 in both types of districts. These plots are
contained in panel (a) and (b) in the first row. If contract labor has an effect through the labor cost channel, we would expect a reduction in the slope of this schedule as labor costs are reduced disproportionately for large firms. Second, we examine how the square residual from this regression varies by firm size (allowing for a different slope coefficient in each year). We view this as an indirect way of looking for evidence of reductions in adjustment costs. If the IDA has a strong effect on firm dynamics, we would expect this linear fit to become progressively worse as we increase firm size. In other words, there should be a positive relationship between heteroscedasticity and firm size. If contract labor has an effect through the adjustment cost channel, then we would expect to see a reduction in this size-dependent heteroscedasticity in high staffing districts and little change in low staffing districts. As before, we detrend log APL by industry-year means before making any comparisons.

Figure 18 provides evidence exactly in line with both channels. In the first row, panel (a) shows a reduction in the size-average product elasticity that occurs almost exclusively for large firms with more than 100 workers. By contrast, panel (b) shows no change in this schedule in low staffing districts. In the second row, panel (c) shows a reduction in the size-heteroscedasticity relationship, again occurring primarily for large firms. Panel (d) shows no change in low staffing intensity districts.

A regression-version of this analysis is provided in Table 7. A higher staffing presence in proximity to a given firm’s district in 1998 reduces the positive association between average product of labor and firm size in the 2000s (column 1). A higher staffing presence in proximity to a given firm’s district in 1998 increases the positive association between TFPQ and firm size in the 2000s (column 2). Finally, while a larger APL increases the dispersion of future employment growth, this relationship is further strengthened in the 2000s for firms located in closer proximity to a staffing center in 1998 (column 3).

With these findings in hand, we now turn to a model which will allow us to map these patterns into implications for the contribution of contract labor to TFP growth in Indian manufacturing.

6 Contract Labor and Aggregate Growth

6.1 An Equilibrium Model of Size-Dependent Labor Market Frictions

We now extend the baseline model of Hsieh and Klenow (2009) in order to infer the aggregate impact of contract labor on TFP growth in Indian manufacturing. Aggregate output is given by a CES composite of individual firms

\[ Y = \left( \sum_{i=1}^{M} Y_i^{\sigma-1} \right)^{\frac{\sigma}{\sigma-1}} \]  

(1)

Here \( i \) indexes establishments, \( M \) is the total mass of firms, and \( \sigma \) is the elasticity of substitution between varieties.

Each plant is a monopolistic competitor, taking demand for its output as given and choosing
its price and factor inputs. To focus on labor alone, we assume that firms produce according to a linear technology $Y_i = A_i L_i$, where $A_i$ is plant $i$’s physical productivity, or $TFPQ$, and $L_i$ is its labor input. We assume that firms face frictions in input markets only, so that each firm chooses price and employment to maximum current profits:

$$\pi_i = P_i A_i L_i - w(1 + \tau_i) L_i.$$  \hspace{1cm} (2)

We depart from the Hsieh and Klenow (2009) model by imposing additional structure on the form of the frictions in the labor market. Motivated by the evidence above, we assume that

$$(1 + \tau_i) = \tau_i L_i^\gamma$$ \hspace{1cm} (3)

with $\ln \tau_i \sim N(0, \exp(\eta_0 + \eta_1 \ln A_i))$.

The distortion on a firm is composed of two parts. First, a deterministic component $L_i^\gamma$ controls on average how much distortions vary with size. This reflects the evidence we have provided that large firms face a higher marginal cost of labor. Second, an idiosyncratic component $\tau_i$ varies randomly across firms and is exogenous with respect to their pricing or employment decisions. However, we will model the variance of $\tau_i$ as being size dependent to capture in a reduced form way the widening inaction bands that size-dependent firing costs in the IDA may deliver. In this way, the specification allows us to very simply capture both the adjustment cost and the labor costs stories of size-dependent policies in India.

Closing the model proceeds in exactly the same way as Hsieh and Klenow (2009), to which we refer the reader for any omitted derivations. Solving the profit maximization problem, we find that prices and employment are given by

$$P_i = \frac{\sigma}{\sigma - 1} \frac{w(1 + \gamma) \tau_i L_i^\gamma}{A_i}$$ \hspace{1cm} (4)

$$L_i = \left(\frac{\sigma}{\sigma - 1} \frac{w(1 + \gamma) \tau_i}{Y_i^\gamma \sigma P} \right)^{\frac{\sigma}{1+\gamma \sigma}} A_i^{\frac{\sigma - 1}{1+\gamma \sigma}}$$ \hspace{1cm} (5)

In addition to the idiosyncratic terms $\tau_i$ that mirror those in the baseline model, we see the effect of the size-elasticity $\gamma$ which disproportionately raises the prices of large firms and reduces the elasticity of employment with respect to physical productivity $A_i$.

Using the labor market clearing condition, the model admits the following closed form expression for aggregate productivity

$$A = \left(\sum_i \left(\frac{MRPL}{\text{MRPL}_i}\right)^{\sigma-1}\right)^{\frac{1}{\sigma-1}}$$ \hspace{1cm} (6)
where

$$\text{MRPL} \equiv \frac{1}{\sum_i \frac{1}{\text{MRPL}_i} P_i L_i P_i Y_i}$$

$$\text{MRPL}_i \propto \tau_i L_i^\gamma.$$

We have already assumed the idiosyncratic distortions $\tau_i$ are log-normal. If we additionally assume that $A_i$ is log-normal with mean $E[\ln A]$ and variance $\sigma_A^2$. In this case, the expression for TFP losses is given by

$$\log A^e - \log A = \frac{\sigma}{2} \text{Var}(\ln \text{MRPL}_i). \quad (7)$$

We can depart from the baseline model by decomposing this variance in terms of the size elasticity $\gamma$ and the size-dependent heteroscedasticity $\eta_1$. Our distribution assumptions imply that

$$\text{Var}(\ln \text{MRPL}_i) = \left( \frac{1}{1 + \gamma \sigma} \right)^2 \exp \left( \eta_0 + \eta_1 (E[\ln A_i] + \frac{\sigma_A^2}{2}) \right) + \left( \frac{\gamma (\sigma - 1)}{1 + \gamma \sigma} \right)^2 \sigma_A^2. \quad (8)$$

Reassuringly, it collapses to the homoscedastic variance $\exp(\eta_0)$ where $\gamma = \eta_1 = 0$. This decomposition allows us to quantify the relative impact of the labor cost channel - through the elasticity $\gamma$ - and the adjustment cost channel - through the heteroscedastic term $\eta_1$ - on TFP. We now turn to estimating these parameters from the microdata.

### 6.2 Taking the Model to the Data

Using the expressions above, we can write the average product of labor schedule as

$$\ln APL_i = \kappa + \gamma \ln L_i + \epsilon \quad (9)$$

where $\kappa = (1 - \gamma) \ln \left( \frac{\sigma - 1}{\sigma} Y^p P \right)^{\frac{\sigma}{\sigma - 1}}$ is an industry constant. Note that since $\epsilon = \ln \tau_i = v \sqrt{\exp(\eta_0 + \eta_1 \ln A_i)}$ where $v$ is a standard normal variable, we can estimate this equation consistently. We assume that our parameters of interest depend on the availability of contract labor in the following way

$$\eta_1(C_d) = \eta_0 + \eta_1 \text{C}_d \quad (10)$$

$$\gamma(C_d) = \gamma_0 + \gamma_1 \text{C}_d \quad (11)$$

where $C_d$ is the contract labor share. In this case, the estimating equation becomes

$$\ln APL_{idkt} = \alpha_d + \alpha_{kt} + \gamma_0 \ln L_{idkt} + \gamma_1 \ln L_{idkt} \cdot C_{dt} + \epsilon, \quad (12)$$

where we have included district- and industry-year fixed effects as additional controls. $\gamma_1$ is therefore identified off within-district variation in the average product of labor vs size elasticity and a district’s contract share.
We estimate equation (12) using data from the 1998-1999 and 2008-2009 periods. We use robust standard errors in the face of the assumed size-dependent heteroscedasticity. With the first stage estimate in hand, we use the fitted residuals to estimate

$$\ln \hat{u}_{it}^2 = \eta_{kt} + \eta_1^0 \ln A_i + \eta_1^1 \ln A_i \cdot C_{it} + \nu$$ (13)

Table 8 shows the results. We see the size elasticity is substantial, but almost completely flattens by going from a contract share of 0 to 1. The results for heteroscedasticity are weaker - the overall TFPQ elasticity is positive yet insignificant, but the interaction term is significantly negative. In what follows, we use all point estimates as defined in the table. The remaining parameters in (8) are $\sigma, \eta_0, E[\ln A], \sigma_A^2$. We use a conservative value of $\sigma = 3$ as in Hsieh and Klenow (2009). We set $\eta_0 = -1.263$ from the average constant term in the output from (13). We normalize $E[\ln A] = 0$ since the model is only identified up to scale. We set $\sigma_A^2 = 2.96$ from the variance of the log $A$ terms, demeaned by industry in 2011.

### 6.3 Quantifying the Impact of Contract Labor on TFP

We first extend the expression in (8) to allow for the contract-dependent parameters, which delivers the following expression for TFP losses in 2011

$$\log \frac{A^e_{2011}}{A_{2011}} = \frac{\sigma}{2} \left( \frac{1}{1 + \gamma(C_{2011})\sigma} \right)^2 \exp \left( \eta_0 + \eta_1(C_{2011})(E[\ln A_i] + \frac{\sigma_A^2}{2}) \right) + \frac{\sigma}{2} \left( \frac{\gamma(C_{2011})(\sigma - 1)}{1 + \gamma(C_{2011})\sigma} \right)^2$$ (14)

where $\gamma(C_{2011})$ and $\eta_1(C_{2011})$ are the estimated expressions in (10) and (11) evaluated at the aggregate contract share in 2011. By evaluating this expression at $C_{1998}$, we can compute counterfactual TFP losses in 2011 were the aggregate contract share back at its 1998 level. Calling this $A^e_{1998}$, this delivers expressions for $\log \frac{A^e_{2011}}{A_{2011}}$ and $\log \frac{A^e_{1998}}{A_{1998}}$. We can then compute GDP growth due to contract labor as follows

$$\hat{Y} = \hat{A} = \frac{\exp \left( \log \frac{A^e_{2011}}{A_{2011}} \right)}{\exp \left( \log \frac{A^e_{1998}}{A_{1998}} \right)}$$ (15)

Furthermore, by switching $\gamma_1$ and $\eta_1$ to zero independently, we can compute the share of the total gains which accrue along each margin.

The results are shown in Table 9. Our model implies that the growth of contract labor during the 2000s provided a 0.56% boost to GDP. Moreover, 86% of this gain came through the labor cost channel, suggesting this is the primary channel through which contract labor improved GDP.

Figure 19 plots the spatial distribution of these gains, assuming that labor is immobile.
7 Conclusion

We provide evidence that the employment restrictions on large Indian firms appears to have diminished since the late 1990s. We argue that this is driven by the expansion of formal staffing companies that provide contract workers primarily to large firms. The use of contract labor allows large Indian firms to respond to shocks to profitability, expand employment, and invest in new products and inputs. In the data, this shows up as an increase in the thickness of the right tail of the firm size distribution in India, a decrease in the average product of labor of large Indian firms, and an increase in the dispersion of employment growth. We estimate that the change in the Indian manufacturing sector driven by the increased supply of contract workers increased manufacturing GDP by 0.56% from 1998 to 2011. To be sure, this is only a small fraction of aggregate TFP growth in Indian manufacturing over this period, as other forces were clearly operating over this period as well. Furthermore, it is clear that the use of contract labor is only a partial solution to the problem. Despite the improvements seen in the data since the late 1990s, it is still the case that average product of labor in large Indian firms is substantially higher than that of smaller firms, the dispersion of employment growth is still significantly lower than in the US, and that Indian manufacturing is still dominated by a large number of small informal establishments.
References


### Tables

**Table 1: Bartik District Shocks: 98-99 to 06-07**

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<th>Dependent variable</th>
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<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
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<td>$\Delta \log L$</td>
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<td>$0.422^{***}$</td>
<td>$1.130^{**}$</td>
<td>$0.937^{**}$</td>
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</tr>
<tr>
<td>$\Delta \log L_d \cdot \text{ProW}_d \cdot \text{Contract}_d$</td>
<td>$6.197^{***}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta \log L_d \cdot \text{ProE}_d \cdot \text{Contract}_d$</td>
<td>$1.705$</td>
<td></td>
<td></td>
<td>$(2.455)$</td>
</tr>
</tbody>
</table>

First Stage F-Stat 24.99

| N | 305 | 305 | 281 | 281 |

Note: $\Delta \log L_d$ is predicted change in district employment using Bartik measure as described in text. Contract$_d$ is the share of firms using contract labor in a district in 1998-1999. Regressions weighted by initial district employment. ProW (ProE) is a dummy for belonging to a pro-worker (pro-employer) state by the Besley and Burgess (2004) measures. Standard errors clustered at state level.

**Table 2: Staffing Industry Growth**

<table>
<thead>
<tr>
<th>Year</th>
<th>Staffing Employment</th>
<th>Staffing Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>1,107</td>
<td>219</td>
</tr>
<tr>
<td>1998</td>
<td>6,295</td>
<td>1,137</td>
</tr>
<tr>
<td>2005</td>
<td>41,587</td>
<td>12,024</td>
</tr>
</tbody>
</table>

Note: Staffing industry corresponds to code 7491 in NIC 2004 classification and 8980 in NIC 1987.
Table 3: First Stage Regressions

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta\text{Contract}_{dt}$</td>
<td>$\Delta\text{Contract}_{dt}$</td>
<td>$\Delta\text{ContractLarge}_{dt}$</td>
<td>$\Delta\text{ContractLarge}_{dt}$</td>
</tr>
<tr>
<td>log $\text{Staffing}_{d,1998}$</td>
<td>0.024***</td>
<td>0.041***</td>
<td>0.034***</td>
<td>0.055***</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.014)</td>
<td>(0.012)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>log $\text{ServiceEmployment}_{d,1998}$</td>
<td>-0.060</td>
<td></td>
<td></td>
<td>-0.078</td>
</tr>
<tr>
<td></td>
<td>(0.041)</td>
<td></td>
<td></td>
<td>(0.057)</td>
</tr>
<tr>
<td>$\text{Urban}_{d,t-1}$</td>
<td>-0.088**</td>
<td>-0.096**</td>
<td>-0.053</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td>(0.037)</td>
<td>(0.057)</td>
<td>(0.052)</td>
</tr>
<tr>
<td>log $\text{ManEmployment}_{d,t-1}$</td>
<td>0.001</td>
<td>0.002</td>
<td>-0.024</td>
<td>-0.027</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.011)</td>
<td>(0.019)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>log $\text{TotalEmployment}_{d,t-1}$</td>
<td>-0.001</td>
<td>-0.007</td>
<td>0.043*</td>
<td>0.046**</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.012)</td>
<td>(0.022)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>F-Stat</td>
<td>4.03</td>
<td>3.32</td>
<td>2.55</td>
<td>2.61</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.05</td>
<td>0.06</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>$N$</td>
<td>230</td>
<td>230</td>
<td>228</td>
<td>228</td>
</tr>
</tbody>
</table>

Note: $\Delta\text{Contract}$ is the change in the contract share between 1999-1998 and 2009-2008. $\Delta\text{ContractLarge}$ is the change in the contract share amongst firms with more than 100 employees. Contract dummies are detrended by industry averages beforehand. log $\text{Staffing}$ is a distance weighted average of staffing employment in the Economic Census in 1998 as described in the text. log $\text{ServiceEmployment}$ is a distance weighted average of service employment in the Economic Census in 1998 as described in the text. $\text{Urban}_{d,t-1}$, log $\text{ManEmployment}_{d,t-1}$ and log $\text{TotalEmployment}_{d,t-1}$ are initial levels of urban share, log manufacturing employment in ASI and log total employment in Economic Census in 1998. Standard errors clustered at district level. Only districts with over 50 firms in the 2008-2009 period included.
### Table 4: Reduced Form Regressions

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta \log p_{95d} )</td>
<td>(0.079^{***})</td>
<td>(0.062^{***})</td>
<td>(0.060^{***})</td>
<td>(-0.029^{***})</td>
<td>(-0.035^{***})</td>
<td>(0.064^{**})</td>
<td>(0.028^{*})</td>
</tr>
<tr>
<td>( \Delta \log p_{90d} )</td>
<td>(0.029)</td>
<td>(0.023)</td>
<td>(0.023)</td>
<td>(0.008)</td>
<td>(0.009)</td>
<td>(0.032)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>( \Delta \log \frac{1-\alpha_s}{\alpha_s} )</td>
<td>(\log L_{dt})</td>
<td>(\Delta \text{Inaction}^1_{dt})</td>
<td>(\Delta \text{Inaction}^2_{dt})</td>
<td>(\Delta \log \text{ManEmp}_{dt})</td>
<td>(\Delta \text{sd}(\log APL)_{dt})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>\log \text{ManEmployment}</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>\log \text{TotalEmployment}</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Urban Share</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Growth</td>
<td>(\log L_{dt})</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>\log \text{ManEmployment}</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>\log \text{TotalEmployment}</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.21</td>
<td>0.27</td>
<td>0.47</td>
<td>0.67</td>
<td>0.66</td>
<td>0.21</td>
<td>0.48</td>
</tr>
<tr>
<td>(N)</td>
<td>227</td>
<td>228</td>
<td>223</td>
<td>219</td>
<td>219</td>
<td>228</td>
<td>223</td>
</tr>
</tbody>
</table>

Note: \(\log \text{Staffing}_{d,1998}\) is a distance weighted average of staffing employment in the Economic Census in 1998 as described in the text. All outcomes except district total employment are detrended first by industry-year averages to control for changes in composition. \(\text{sd}(\log APL)\) in column (7) is additionally detrended by \(\log L\) to control for variation in the sd that is driven by changes in the firm size distribution across districts. \(\text{Inaction}^1\) and \(\text{Inaction}^5\) consider the share of firms with adjustments less that 0.01 and 0.05 log points respectively. \(\text{ManEmployment}\) is manufacturing employment in ASI, \(\text{TotalEmployment}\) is total employment in Economic Census. Initial rows contain initial values of variables in 1998-1999, and Growth rows contain growth of variables between 2008-2009 and 1998-1999. Outliers in top and bottom 1% of growth variables are dropped. Standard errors clustered at district level. Only districts with over 50 firms in the 2008-2009 period included.
<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\Delta \log p_{95_d})</td>
<td>3.510**</td>
<td>2.621**</td>
<td>1.864**</td>
<td>-1.062**</td>
<td>-1.276**</td>
<td>2.558*</td>
<td>1.061*</td>
</tr>
<tr>
<td>(\Delta \log p_{90_d})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \log \frac{1-\alpha_{s}}{\alpha_{s}} \frac{w_{L}}{K_{L}})</td>
<td></td>
<td></td>
<td>1.864**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \text{Inaction}_{1}^{d})</td>
<td>-1.062**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \text{Inaction}_{2}^{d})</td>
<td>-1.276**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \log \text{ManEmp}_{d})</td>
<td>2.558*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \text{sd}(\log APL)_{dt})</td>
<td>1.061*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta \text{Contract}_{d})</td>
<td></td>
<td>2.621**</td>
<td>1.864**</td>
<td>-1.062**</td>
<td>-1.276**</td>
<td>2.558*</td>
<td>1.061*</td>
</tr>
<tr>
<td>Initial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(\log \text{ManEmployment})</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>(\log \text{TotalEmployment})</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Urban Share</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Growth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\log L_{d})</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>(\log \text{ManEmployment})</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>(\log \text{TotalEmployment})</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>(N)</td>
<td>226</td>
<td>227</td>
<td>222</td>
<td>219</td>
<td>219</td>
<td>227</td>
<td>222</td>
</tr>
</tbody>
</table>

Note: \(\Delta \text{Contract}_{d}\) is instrumented with \(\log \text{Staffing}_{1998}\). All outcomes except district total employment are detrended first by industry-year averages to control for changes in composition. \(sd(\log APL)\) in column (7) is additionally detrended by \(\log L\) to control for variation in the \(sd\) that is driven by changes in the firm size distribution across districts. \(\text{Inaction}_{1}^{d}\) and \(\text{Inaction}_{2}^{d}\) consider the share of firms with adjustments less than 0.01 and 0.05 log points respectively. ManEmployment is manufacturing employment in ASI, TotalEmployment is total employment in Economic Census. Initial rows contain initial values of variables in 1998-1999, and Growth rows contain growth of variables between 2008-2009 and 1998-1999. Outliers in top and bottom 1% of growth variables are dropped. Standard errors clustered at district level. Only districts with over 50 firms in the 2008-2009 period included.
Table 6: Churn Regressions

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \log \text{Staf}_{d,1998} )</td>
<td>0.064***</td>
<td>0.027****</td>
<td>0.032****</td>
<td>0.022</td>
</tr>
<tr>
<td>Initial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>log ManEmployment</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>log TotalEmployment</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Urban Share</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Growth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \log L_d )</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>log ManEmployment</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>log TotalEmployment</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Urban Share</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.26</td>
<td>0.22</td>
<td>0.27</td>
<td>0.30</td>
</tr>
<tr>
<td>( N )</td>
<td>218</td>
<td>218</td>
<td>218</td>
<td>170</td>
</tr>
</tbody>
</table>

Note: \( \log \text{Staf}\_{d,1998} \) is a distance weighted average of staffing employment in the Economic Census in 1998 as described in the text. All outcomes are detrended first by log employment industry-year averages to control for changes in composition. In Column (1), leverage is defined as the ratio of total liabilities to assets. In Column (2), adding a product is defined as occurring when a firm adds a product in a different 5-digit category. Column (3) and (4) construct the same statistic, for domestic and imported input products respectively. ManEmployment is manufacturing employment in ASI, TotalEmployment is total employment in Economic Census. Initial rows contain initial values of variables in 1998-1999, and Growth rows contain growth of variables between 2008-2009 and 1998-1999. Outliers in top and bottom 1% of growth variables are dropped. Standard errors clustered at district level. Only districts with over 50 firms in the 2008-2009 period included.
Table 7: Reduced Form Elasticity Regressions

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>log $L$</td>
<td>0.121***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late $\times$ log $L$ $\times$ log staffing$_{d,1998}$</td>
<td>-0.005***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>log $TFPQ$</td>
<td>0.301***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late $\times$ log $TFPQ$ $\times$ log staffing$_{d,1998}$</td>
<td>0.004***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>log $APL_{t-3}$</td>
<td></td>
<td>0.100***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.006)</td>
<td></td>
</tr>
<tr>
<td>Late $\times$ log $APL_{t-3}$ $\times$ log staffing$_{d,1998}$</td>
<td>0.002**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.001)</td>
<td></td>
</tr>
</tbody>
</table>

Controls

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>District fixed effects</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Industry-Year fixed effects</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.29</td>
<td>0.34</td>
<td>0.10</td>
</tr>
<tr>
<td>$N$</td>
<td>100,522</td>
<td>99,065</td>
<td>37,038</td>
</tr>
</tbody>
</table>

Note: log staffing is a distance weighted average of staffing employment in the Economic Census in 1998 as described in the text. $TFPQ$ is defined as in the text. $\Delta_3 \log L$ is employment growth within a firm over a 3 year period. Late is a dummy equal to one in 2008-2009 and zero in 1998-1999. Standard errors clustered at district level.

Table 8: Model Estimates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\gamma_0$</td>
<td>0.126***</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
</tr>
<tr>
<td>$\gamma_1$</td>
<td>-0.092**</td>
</tr>
<tr>
<td></td>
<td>(0.037)</td>
</tr>
<tr>
<td>$\eta_0^0$</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
</tr>
<tr>
<td>$\eta_1^0$</td>
<td>-0.025**</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
</tr>
</tbody>
</table>

Note: See text for description of regressions.
Table 9: Model Counterfactuals

| GDP Growth from Contract Labor between 2009 and 2011 | 0.56% |
| Share from labor cost margin                        | 0.86  |
| Share from adjustment cost margin                    | 0.14  |

Note: See text for description of procedure
Figures

Figure 1: Distribution of Employment by Firm Size
(a) 1990-2000
(b) 2000-2011

Figure 2: Firm Size Quantiles over Time
Figure 3: APL-L Elasticity over time

Figure 4: APL-L Elasticity in 2000 and 2011
Figure 5: APK-L Elasticity over time

Figures plot coefficients from regression of log APK on log L interacted with year dummies, as well as a full set industry-year fixed effects. 90% confidence bands plotted with robust se's.
Figure 6: Job Creation and Destruction in the US and India


(b) Employment Growth Rates India 1998-2010
Figure 7: Aggregate Employment Dynamics over Time

(a) Inaction by Size

(b) Inaction by Labor Regulation

(c) Expansions by Size

(d) Expansions by Labor Regulation

(e) Contractions by Size

(f) Contractions by Labor Regulation
Figure 8: Product Addition Probabilities over Time

(a) Prob. Add Product

(b) Prob. Add Domestic Input

(c) Prob. Add Product
Figure 9: Contract Labor Use by Firm Size

(a) Time Series by Size Bins

(b) Non-Parametric Plot in 1993 and 2011

Figure 10: Contract Labor Use by Labor Regulation, Large firms
Figure 11: Contract Labor Use Intensive vs. Extensive Margin, Large Firms

Series show, respectively, (i) share of firms hiring CL, (ii) within those firms, the share of average annual workers accounted for by CL. Firms with L>100 included.
Figure 12: Aggregate Employment Dynamics over Time

(a) Inaction by Contract Dummy

(b) Inaction by Contract Share Change Districts

(c) Expansions by Contract Dummy

(d) Expansions by Contract Share Change Districts

(e) Contractions by Contract Dummy

(f) Contractions by Contract Share Change Districts

Rate annual average observed adjustment amongst expanding firms, adjusting for composition. Inaction and expansions dummy on CL measure estimated fully interacted with year dummies. It is well understood that CL measure sizes a full set of industry fixed effects. We then plot the marginal effect of the CL dummy at each year, evaluating all other covariates at their sample averages.

Rate annual share of firms in action region changes in employment less than 3.5% in magnitude, adjusting for composition. Inaction, inaction dummy on CL measure dummy fully interacted with year dummies, as well as log employment and a full set of industry fixed effects. We then plot the marginal effect of the CL dummy at each year, evaluating all other covariates at their sample averages. Low (High) are districts in bottom (top) quartile of annual CL districts share change distribution.
Figure 13: Relative Cost of Contract Workers

Figure 14: Employment Share of Contract Workers Amongst Adopters

(a) 1993 vs 2000
(b) 2000 vs 2011
Figure 15: Event Study Plots of Dynamics Around Year of First Contract Labor Hire

(a) Total Employment
(b) Contract Workers
(c) Full-Time Employment
(d) Full-Time Wages
(e) Average Product of Labor
Figure 16: Staffing Industry over Time

(a) Staffing Industry in 1990

(b) Staffing Industry in 1998
Figure 16: Staffing Industry over Time

(c) Staffing Industry in 2005

(d) Staffing Industry Growth 2005-1998
Figure 17: Contract Share Growth

(a) Contract Share Growth, All Firms

(b) Contract Share Growth, Large Firms ($L > 50$)
Figure 18: APL-L Elasticity Change across Low and High Staffing Measure Districts

(a) APL-L Elasticity, Top Staffing Measure Tercile
(b) APL-L Elasticity, Bottom Staffing Measure Tercile

(c) APL-L Heteroscedasticity, Top Staffing Measure Tercile
(d) APL-L Heteroscedasticity, Bottom Staffing Measure
Figure 19: Model Implied % GDP Gains from Contract Labor spread 1998-2009