Labor Regulations and Contract Labor Use: Evidence from Indian Firms

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Abstract: Labor regulations in India differ by states and apply differently across types of laborers. The most restrictive laws make it harder to fire permanent workers for firms. However, these laws do not apply to workers hired through contractors (contract workers). Using firm-level data from India, I find that compared to firms in flexible labor regulations, those in more restrictive labor regimes hire more contract workers as a response to transitory local demand shocks. I find no differential response in hiring of permanent workers by firms faced with these shocks. This suggests that firms circumvent labor laws by hiring workers indirectly through contractors in the face of economic fluctuations.

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I Introduction

The Industrial Disputes Act (IDA, 1947) and its various amendments that have made layoffs, retrenchments, and firm closures harder, has been the focus of many studies on Indian labor regulations. One strand of literature has found negative economic impacts of amending the IDA regulations that make it harder to fire workers - lower output, employment, investment, and productivity in formal manufacturing [Besley and Burgess (2004), Ahsan and Pages (2009)], lower demand elasticities that respond less to trade reforms [Hasan, Mitra, and Ramaswamy (2007)], lower growth in industrial output following delicensing [Aghion, Burgess, Redding, and Zilibotti (2008)], lower sensitivity of industrial employment to local demand shocks [Adhvaryu, Chari, and Sharma (2013)] and lower employment in the retail sector [Amin (2009)].[1] Other scholars however, have questioned whether amendments made to the IDA have increased or decreased flexibility in firing [Bhattacharjea (2006)] or whether these regulations have even been enforced [Nagaraj (2002)]. There is some evidence that the use of contract workers (employed through contractors and not directly employed by the firm) has increased in states with stricter labor regulations because these workers are not covered by the IDA [Sen, Saha, and Maiti (2010)]. This might be suggestive evidence that firms are circumventing the labor laws through the use of contract workers. However, there is a lack of rigorous empirical work investigating the relationship between labor laws and contract labor use.

In this paper, I test whether firms in stricter labor regulations differentially hire more contract/temporary workers in response to transitory demand

[1] Fallon and Lucas (1993) looked at a particular amendment to the IDA that required larger firms to seek permission from the government before retrenchment of workers and found a large drop in employment.

shocks. Specifically, I use an empirical strategy similar to Adhvaryu, Chari, and Sharma (2013) - (hereafter ACS), interacting rainfall shocks with various measures of labor regulations to look at employment responses of firms. Indian states and districts provide an ideal setting to analyze the firm-level employment responses to demand shocks in different labor regimes for a number of reasons. First, different states in India have amended various labor laws to make the regime either more worker-friendly or employer-friendly, providing variation in labor regulations over space. Secondly, India is still largely an agrarian economy that is dependent on rainfall. Rainfall shocks directly affect the income and consumption levels of households through their effect on agricultural production. Finally, India has detailed firm-level panel data that can be used to analyze responses of firms to demand shocks across labor regimes. I use labor regulation measures constructed by Besley and Burgess (2004) and Gupta, Hasan, and Kumar (2009) that vary cross sectionally over states/districts. I find that compared to firms in more flexible labor regimes, those in more restrictive labor regimes hire more contract workers (not covered under IDA) in response to demand shocks. There is no differential response in the hiring of permanent workers (covered by the IDA regulations) by firms across labor regimes (in response to shocks). This suggests that firms in stricter labor regimes might be hiring contract workers to get around the strict labor laws.

This paper is closely related to ACS, who use state-industry and district-level data[2] to find that total employment in states/districts with more flexible labor regimes are more responsive to demand shocks. However, it is more appropriate to use firm-level panel data to look at the employment responses of

[2]They aggregate three years of firm level data from 1987, 1990, and 1994 to construct a district-level data set.

firms to demand shocks rather than studying aggregated industrial outcomes. In this paper, I use the Indian firm-level panel dataset from 1998 to 2008, that allows me to control for time invariant firm characteristics. Furthermore, in contrast to the ACS dataset, the firm-level panel data divides total employment into workers hired directly by the firm and workers hired through contractors (contract workers). This distinction is central to this paper because the IDA regulations only affect directly hired workers and firms are thus free to hire and fire contract workers at will. Moreover, the firm-level data set can be used to look at firm size cutoffs as an additional measure of labor regulation.[3]

This paper adds to existing work on cross-country analysis of the effects of labor regulations on employment [Botero, Djankov, Porta, and Lopez-De-Silanes (2004), Micco and Pages (2006), Kahn (2007)], within-country analysis of employment protection on productivity [Autor, Kerr, and Kugler (2007), Dougherty, Robles, and Krishna (2011)], and regulation enforcement on firm size and informality [Almeida and Carneiro (2012), Almeida and Carneiro (2009)]. The results of this paper are also broadly related to theoretical work on employment protection and temporary workers in the European context [Blanchard and Landier (2002), Cahuc and Postel-Vinay (2002)].

This paper is organized as follows. The next section discusses labor laws in India. Then, Section III discusses the empirical strategy, Section IV describes the data and the results, and robustness are discussed in Sections V and VI. Finally, Section VII concludes.

[3]This also allows me to address the Bhattacharjea (2006) critique of the Besley and Burgess (2004) labor regulation measure.

II Labor Laws in India

The Industrial Disputes Act (IDA) of 1947 is the core of labor laws in India and covers various aspects such as resolution of industrial disputes by setting up tribunals and labor courts, hiring and firing workers, closure of establishments, strikes and lockouts etc. in the formal sector. Although the IDA was passed by the federal government, it has been amended several times by state governments. Some amendments have made the states more employer-friendly by making it easier to hire and fire workers and some have made them more worker-friendly by increasing job security for laborers. Through these amendments, different states in India have developed different labor regimes.

Layoffs and retrenchments are covered under Sections V-A and V-B of the IDA. Section V-A lays down regulations for establishments with 50 or more workers.[4] For example, a retrenched worker is entitled to compensation equaling 15 days' average pay for each year of service and for layoffs, every worker is paid fifty percent of basic wages and a dearness allowance for each day that they are laid off (maximum of 45 days).[5] Regulations in Section V-B cover all establishments with 100 or more workers. This section is more stringent and requires firms to take government permission to lay-off or retrench a single worker. Closing down of establishments also requires sixty days (Section V-A) or ninety days (Section V-B) of prior notification with the government. Both these sections of the IDA make it costly for firms to fire workers.

IDA regulations however, do not cover contract workers and casual workers. Contract workers are hired through contractors and are hence not directly on the payrolls of the principal employing firm. Contract workers are also gen-

[4]See Malik (2007) for details.

[5]For layoffs - workers need to be given a month's notice.

erally paid lesser than permanent workers and are not covered by trade unions. Firms are free to hire and fire contract workers as market conditions change without being subject to the provisions of the IDA. Figure 1 shows the growth in the use of contract workers across states with different labor regulations. There has clearly been a large increase in the use of contract workers by firms.

III Data

In this paper, I use (i) Annual Survey of Industries (ASI) firm-level panel data set from 1998-2008, (ii) Rainfall data from Terrestrial Precipitation: 1900-2010 Gridded Monthly Time Series (version 3.01), Center for Climatic Research, University of Delaware, (iii) Labor regulation measures from Besley and Burgess (2004) and (Gupta, Hasan, and Kumar (2009) and (iv) National Sample Survey (NSS) employment-unemployment rounds from 1999-2000, 2004-05 and 2009-10.

The firm-level panel data comes from the Annual Survey of Industries (ASI), conducted by the Ministry of Statistics and Program Implementation (MoSPI) in India. The ASI covers all registered industrial units, which includes units with 10 or more workers and use electricity, or have least 20 workers but do not use electricity. The ASI frame is divided into census (surveyed every year) and sample (sampled every few years) sectors. The definition of these two sectors, however, has undergone some changes over the years. The census sector covers all firms in five industrially backward states (Manipur, Meghalaya, Nagaland, Tripura and Andaman and Nicobar Islands) and large factories. In the ASI, the definition of a large factory to be covered in the census sector has changed from 200 or more employees (1998-2000) to 100 or more employees (2001 onwards). The rest of the firms are covered in the sample sector. A

third of these firms are randomly selected in the survey each year. The reference year for the ASI is the accounting year from 1st April of the previous year to 31st March of the next year. For example, data from 2004-05 will include the period from 1st April 2004 to 31st March 2005. In this paper, I restrict the sample to the major states and remove Jammu & Kashmir and the states in the north-east namely Manipur, Meghalaya, Nagaland and Tripura and the union territories. This data set is well suited for this paper as it has employment broken down by permanent and contract workers at the firm level. Furthermore, I restrict the data to cover only the manufacturing sector firms and do not include firms involved in agriculture, hunting and forestry, fishing, mining and quarrying, electricity, gas and water supply, construction, wholesale and retail trade or services. For the employment variables, I "winsorize" by setting the value above the 99th percentile to the value at the 99th percentile, thereby reducing the influence of outliers.

I use rainfall data from Terrestrial Precipitation: 1900-2010 Gridded Monthly Time Series (version 3.01) collected by Center for Climatic Research, University of Delaware. The rainfall data is available for 0.5 by 0.5 degree latitude-longitude grids and this is matched to the geographic center of each district. The rainfall measure used in this paper is the rainfall in the previous calendar year. For example, to correspond to the ASI accounting year from 1st April 2004 to 31st March 2005, I use rainfall measures from January 2003-December 2003. This gives firms time to respond to demand shocks arising from the effects of rainfall on the local economy. I define rainfall shocks in the same way as Jayachandran (2006), Kaur (2012), and ACS where

$$\text{rainfall shock}= \begin{cases} 1 & \text{if rainfall in the district is above the 80th percentile} \\ 0 & \text{if rainfall in the district is between the 20th and 80th percentile} \\ -1 & \text{if rainfall in the district is below the 20th percentile} \end{cases}$$

This definition follows from the basic logic that higher (lower) rainfall is associated with higher (lower) crop yields as is clearly elucidated in Kaur (2012).

Labor regulations measures used in this paper come from two sources - Besley and Burgess (2004)(BB henceforth) and (Gupta, Hasan, and Kumar (2009) (GHK henceforth). BB code each state level amendment made to the IDA between 1958-92 as being either pro-worker (+1), neutral (0), or pro-employer (-1). A pro-worker (pro-employer) amendment was one that decreased (increased) a firm's flexibility in hiring and firing of workers while a neutral amendment left it unchanged. The cumulated sum of these scores in all previous years would determine the state's labor regime in a particular year. ACS use the same methodology and only change the code for Karnataka from neutral to pro-employer based on an amendment in 1987. I follow ACS and BB and use the following categorizations: "pro-worker states" - West Bengal, Maharashtra, Orissa, "pro-employer states"- Rajasthan, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh and Gujarat[6] and "neutral states" - Punjab, Haryana, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Bihar, Assam, Chhattisgarh, Jharkhand, and Madhya Pradesh. Hence this measure of labor regulation varies both across states and over time. I also use the composite measure of labor regulation compiled by GHK that takes into account

[6]Gujarat was coded as pro-worker in ACS. All accounts suggest that this coding was incorrect as it was based on a single amendment in 1973 that had an ambiguous effect. I begin by coding Gujarat as a neutral state and then code it as pro-employer after 2004, when the state passed the SEZ Act and provided exemptions from Chapter VB of IDA. See Malik (2007) and Ahsan and Pages (2009) for details.

the various labor regulation measures in different papers such as BB, Ahsan and Pages (2009) and Bhattacharjea (2006) and uses a simple majority rule to assign codes to states. Following this GHK code states as follows: "pro-worker states" - West Bengal, Maharashtra, Orissa, "pro-employer states"- Rajasthan, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh and "neutral states" - Punjab, Haryana, Himachal Pradesh, Uttarakhand, Uttar Pradesh, Bihar, Assam, Chhattisgarh, Jharkhand, Madhya Pradesh, Goa, Gujarat and Kerala. This measure of labor regulation thus only varies cross sectionally. Finally, I use firm size cutoffs based on the IDA legislations of 50 and 100 permanent workers as additional measures of labor regulations.

To look at measures like monthly per capital consumption expenditure, agricultural wages, and industrial wages, I use the 55th (1999-2000), 61st (2004-05) and 66th (2009-10) Employment/Unemployment rounds of the National Sample Survey (NSS). These are nationally representative household surveys conducted by the Ministry of Statistics and Program Implementation (MoSPI) in India. These surveys provide information on wages for each household member in the seven days preceding the interview. I use the National Industrial Classification (NIC) codes to construct industrial and agricultural wages.

The summary statistics for these different datasets are shown in Table 1. The summary statistics are divided by different labor regulations - pro-worker, neutral, and pro-employer. Pro-worker states have a larger number of permanent and contract workers per firm as compared to firms in neutral or pro-employer states. However, positive and negative rainfall shocks are of similar magnitude across the three regimes. Figure 2 provides visual evidence that the industrial distribution across labor regimes is similar, thereby suggesting that the effect of rainfall across regimes will not be different.

IV Empirical Strategy

In this paper, I test the employment response of firms located in different labor regimes to transitory demand shocks. Before looking at firm-level outcomes it is important to determine whether rainfall shocks represent a demand shock or a labor supply shock for firms. A rainfall shock can induce opposing effects on firms. For example, a good rainfall might lead to higher agricultural income and a larger demand for industrial goods (a demand shock) or it might lead to a higher demand for agricultural labor (a labor supply shock for industrial labor). However, as long as rainfall shocks are exogenous to the labor regime and firms' employment decisions, and represent comparable shocks across labor regimes, they should be valid exogenous shocks to firms' employment decisions. Jayachandran (2006), Kaur (2012) and Adhvaryu, Chari, and Sharma (2013) have shown that a good rainfall is associated with higher agricultural yields. Given the direct effects of rainfall on agricultural yields, I then test whether rainfall shocks affect other outcomes such as monthly consumption expenditure of households, wages of agricultural workers, and wages of industrial workers (via the effect on agricultural yields). I use regressions of the form:

$$y_{dt} = \delta_d + \lambda_t + \alpha(rainshock_{dt}) + \varepsilon_{dt} \tag{1}$$

where δ_d and λ_t represent district and time fixed effects respectively. The coefficient α on $rainshock_{dt}$ represents the direct effect of rainfall shocks on outcomes such as monthly consumption expenditure of households, wages of agricultural workers, and wages of industrial workers. These regressions separate out the demand and labor supply effects of rainfall on industrial firms. If monthly per capita expenditure and industrial wages increase as a response to

rainfall, it would be suggestive evidence that the rainfall shocks represent demand shocks for firms. On the other hand, if agricultural wages also increase in response to rainfall shocks, it might attract more workers into agriculture causing a negative labor supply shock on firms.

To test the employment response of firms, I run regressions similar to ACS of the form:

$$\begin{aligned} y_{idt} &= \theta_i + \lambda_t + \beta_0 rainshock_{dt} + \beta_1 (rainshock_{dt} \times Proworker_{dt}) \\ &\quad + \beta_2 (rainshock_{dt} \times Proemployer_{dt}) + \varepsilon_{idt} \end{aligned} \tag{2}$$

where θ_i represents firm fixed effects (and subsumes district and state fixed effects). This regression looks at the impact of demand shocks on firms across different labor regimes, with states/districts with neutral labor laws being the omitted category. The coefficient β_1 on the interaction between the rainfall shock and an indicator for a district with pro-worker labor laws shows the differential effect of firms in *pro-worker* labor regimes as compared to *neutral* labor regimes. Similarly β_2 measures the differential effect of a demand shock on a firm in a district with *pro-employer* laws compared to a firm in a *neutral* district.

Finally, I run triple differences regressions (DIDID) of the form:

$$\begin{aligned} y_{idt} &= \beta_1(rainshock_{dt} \times Proworker_{dt} \times Large_{idt}) \\ &\quad +\beta_2(rainshock_{dt} \times Proemployer_{dt} \times Large_{idt}) \\ &\quad +\beta_3(rainshock_{dt} \times Proworker_{dt} \times Medium_{idt}) \\ &\quad +\beta_4(rainshock_{dt} \times Proemployer_{dt} \times Medium_{idt}) \\ &\quad +\beta_5(rainshock_{dt} \times Proworker_{dt} \times Small_{idt}) \\ &\quad +\beta_6(rainshock_{dt} \times Proemployer_{dt} \times Small_{idt}) \\ &\quad +\theta_i + \lambda_t + \delta_{rk} + \delta_k + \varepsilon_{idt} \end{aligned} \tag{3}$$

where the size categories are defined as follows: $Small_{idt}$ - less than 50 permanent workers, $Medium_{idt}$ - between 50 and 100 permanent workers, and $Large_{idt}$ - more than 100 permanent workers. In this regression specification, δ_{rk} represents rainfall shocks interacted with size dummies and δ_k represents size dummies. This triple difference specification tests whether rainfall shocks affect firms of different sizes differently across labor regimes. For example, IDA regulations do not apply to small firms and hence we should not expect any differential response across pro-worker and pro-employer states in terms of hiring of contract workers. If IDA regulations are binding, we would expect to see differential hiring of contract workers by medium and large firms as opposed to small firms.

V Results

A rainfall shock may represent a demand shock or a labor supply shock for manufacturing firms. Higher rainfall would lead to higher agricultural produc-

tion (see Jayachandran (2006), Kaur (2012) and ACS), which in turn would increase household income levels. This increase in household incomes may lead to higher demand for industrial goods and higher demand for workers by firms, thereby causing an increase in industrial wages. On the other hand, a good rainfall might increase the demand for agricultural labor and raise agricultural wages, leading to a negative labor supply shock for firms. To test whether a rainfall shock is a demand or a labor supply shock, I run regressions looking at the direct effect of rainfall shocks (lagged) on outcomes like monthly per capita expenditure, agricultural and industrial wages. If higher rainfall increases monthly per capita expenditure and industrial wages, it must be a demand shock for firms working via its effect on agricultural production. However, if rainfall shocks increase agricultural wages, the labor supply channel might also be at work.

In Table 2, all columns show the outcome variable of interest regressed on lagged rainfall shocks and includes district and year fixed effects. Year fixed effects control for any macroeconomic shocks affecting the entire country, and district fixed effects control for time invariant district characteristics. Note that the rainfall shock variable takes values -1, 0, and 1, and is increasing in the amount of rainfall. Hence, a positive coefficient on rainfall shock in the regressions implies a positive association with rainfall. Column 1, shows that a higher rainfall is associated with higher monthly per capita expenditure. In Columns 2 and 3, I look at the impact of rainfall shocks on agricultural and industrial wages respectively. I find that rainfall does not affect agricultural wages[7] in Column 2. In Column 3, I find that industrial wages increase with higher rainfall. Taken together, the three columns show that rainfall increases

[7]ACS also find a weak and statistically insignificant effect of rainfall on agricultural wages.

household consumption expenditure and industrial wages but has no effect on agricultural wages. This suggests that rainfall shocks represent demand shocks for firms in this setting. I now look at the impact of these transitory demand shocks on the employment responses of firms located across labor regimes.

In Tables 3, 4, and 5, I look at the effect of lagged rainfall shocks and lagged rainfall shocks interacted with various measures of labor regulations at the district level on total workers, contract workers, and permanent workers in the firm. I use the actual number of different kinds of workers as opposed to logarithms because some firms hire zero contract workers in many years. All columns include firm fixed effects, year fixed effects, and control for age and age squared. The firm fixed effects control for time invariant firm-level characteristics, that might be important confounders while analyzing employment responses of firms. Column 1 looks at the direct effect of lagged rainfall on the outcome variable of interest. In Columns 2 and 3, I interact lagged rainfall with the BB and GHK measures of labor regulations respectively. The omitted category of labor regime is a neutral state in both Columns 2 and 3.

In Table 3, Column 1, I look at the direct effect of lagged rainfall shocks on total number of workers in the firm, and find a statistically insignificant effect. Columns 2 and 3, looks at the effect of rainfall shocks interacted with various measures of labor regulations, and I find no differential effect on firms in pro-employer districts as compared to neutral or pro-worker districts. However, it is possible that faced with demand shocks, firms adjust by changing the number of contract workers because there are no firing restrictions for them, and leave the number of permanent workers unchanged.

In Table 4, I look at the impact on contract workers. As mentioned earlier, IDA regulations do not cover contract workers, and firms are free to hire and fire contract workers according to their needs. We would thus expect to

see firms adjusting the number of contract workers, when faced with demand shocks. Column 1, confirms this. In Column 1, I find that firms increase the number of contract workers on average when there is more rainfall. For instance, moving from the 80th percentile to the 20th percentile of the rainfall distribution, increases the number of contract workers hired by a firm by 0.75. In Columns 2 and 3, I look at the impact of rainfall shocks on the hiring of contract workers by firms located in different labor regimes. In Column 2, I find that coefficient on the interaction between lagged rainfall shock and an indicator for pro-worker districts (BB measure) is positive and statistically significant. The coefficient shows that faced with a demand shock, firms in a pro-worker labor regime hire 3.03 additional contract workers as compared to firms in neutral states. The coefficient on the interaction between lagged rainfall shock and the pro-employer indicator is not statistically significant. This implies that firms in pro-employer states do not respond to demand shocks by hiring/firing more contract workers relative to firms in neutral states. This might be because they have more flexibility in the hiring and firing of permanent workers and do not need to rely more on contract workers. Column 3, shows a similar relationship for the interaction between rainfall shocks and the GHK measure of labor regulations. The column shows that firms in pro-worker states differentially hire more contract workers (around 3.4 additional workers) as compared to firms in neutral states when faced with a demand shock. Furthermore, firms in pro-employer states do not show a differential response to firms in neutral states. Taken together, the results imply that firms in pro-worker states differentially adjust the number of contract workers when faced with a demand shock, whereas firms in pro-employer states do not.

In Table 5, I look at the impact on permanent workers. Permanent workers, once hired are not easy to fire, especially in pro-worker states and hence

firms may not want to adjust their numbers in response to transitory demand shocks. In Column 1, I find no direct effect of rainfall shocks on the hiring/firing of permanent workers. In Columns 2 and 3, I find no differential effects of rainfall shocks on firms located in pro-worker states as compared to firms in neutral states. These results imply that firms do not adjust on the margin of permanent workers when they are faced with transitory shocks.

In Table 6, I analyze the adjustment of contract laborers by firms separately for rural and urban firms. Since rainfall shocks affect local incomes and demand through their effect on agricultural production, we would expect a larger impact of these shocks on rural firms. Table 6 confirms this prediction. Columns 1 through 3 restrict the sample to rural firms. In Column 1, I find that rainfall shocks directly affect the number of contract workers hired by rural firms, and Columns 2 and 3, show that the firms in pro-worker regimes respond to transitory shocks by hiring more contract workers (3.7 to 4.3 additional contract workers) as compared to firms in neutral regimes. I find no differential effect on the hiring of contract workers by firms in pro-employer states relative to firms in neutral states. Columns 4 through 6 restrict the sample for urban firms. In Column 4, I find that the direct effect of rainfall on contract worker hiring is not statistically significant for urban firms. Columns 5 and 6, show the differential effect of rainfall shocks on urban firms in pro-worker districts as compared to pro-employer districts. Firms in pro-worker regimes hire more contract workers relative to neutral states (between 2.3 and 2.6 contract workers), but the magnitude is smaller than rural firms. Since the results are stronger for firms in rural areas than in urban areas, these results provide additional supporting evidence that the rainfall shocks are demand shocks working via their effects on agriculture.

Table 7 then breaks down the rainfall shocks into positive (rainfall above

the 80th percentile) and negative shocks (rainfall below the 20th percentile) and also looks at the impact of the interaction between these shocks and measures of labor regulation on the employment decisions of rural firms. In Column 1, I find that a positive rainfall shock leads to firms hiring more contract workers on average and a negative shock leads to more firing of contract workers, although these results are not statistically significant. In Columns 2 and 3, I find that the firms in pro-worker states hire more contract workers as compared to those in neutral states in response to a positive rainfall shock (7.3 to 7.5 additional workers), but firms in pro-employer states do not show any differential response relative to firms in neutral regimes. Although the coefficient on a negative rainfall shock interacted with an indicator for pro-worker districts is negative, the effect is statistically insignificant. The effects are also statistically insignificant for interactions of positive and rainfall shocks with indicators of pro-employer labor regulations. This suggests that most of the effects of rainfall shocks are being driven by positive shocks on firms in pro-worker regimes. In Table 8, I find a direct effect of rainfall shocks on wages of contract workers. However, I find no differential effects on the wages of contract workers in firms in pro-worker states as compared to pro-employer states.

In Table 9, I test whether the differential effect between firms in pro-worker districts and pro-employer districts in terms of hiring of contract workers is different for larger firms as opposed to smaller firms. These are regressions similar to triple differences regressions. I define the size categories as follows - small (below 50 permanent workers), medium (between 50 and 100 workers), and large (greater than 100 workers). We would expect no difference in the hiring/firing of contract workers by small firms since IDA regulations do not apply to firms with less than 50 permanent workers. Table 9 confirms this for

the number of contract workers (Column 1) and man days of contract workers employed (Column 2). The coefficient on the triple interaction of rainfall shocks, an indicator for the labor regime, and an indicator for the size category of the firm is only significant for large and medium firms in pro-worker states. This implies that medium and large firms in pro-worker states differentially hire more contract workers as compared to such firms in pro-employer states. I also explicitly test whether firms of different size categories have differential employment responses in different labor regimes. I find that there is no difference between small firms across labor regimes, but large and medium firms hire differentially more contract workers in pro-worker states. The table also shows that the difference-in-differences between large and small firms, and between medium and small firms is also statistically significant. This implies that medium and large firms have different employment responses when faced with rainfall shocks as compared to small firms.

VI Robustness

In this section, I check whether the main results are robust to different specifications. First, there might be a concern that different states trend differentially in terms of economic variables. These differential trends might then cause the differential response in hiring behavior of firms across labor regimes. In Table 10, I control for state specific time trends in the regression specification. Column 1 confirms that rainfall shocks have a direct effect on the hiring of contract workers by firms. Columns 2 and 3 look at the differential response of firms across labor regimes in the hiring of contract workers. In columns 2 and 3, I find that firms in pro-worker regimes differentially hire more contract workers than firms in neutral regimes (between 2.2

and 2.6 additional contract workers depending on choice of labor regulation measure). I find no differential effect in the hiring behavior of contract workers in pro-employer states in comparison to firms in neutral states.

A second concern relates to the non-random location decisions of firms. Firms might decide to locate in a particular state depending on whether the labor regime is pro-employer or pro-worker. This in turn may result in different industrial composition in different states and cause differential response of firms to demand shocks. I address this concern in Table 11. In columns 1, and 2, I interact rainfall shocks with 3-digit industry indicator variables, and in columns 3, and 4, state×3-digit industry fixed effects are included. I find that across the four columns, firms in pro-worker regimes differentially hire more contract workers than firms in neutral states. However, firms in pro-employer states show no differential response.

Finally, in Table 12, I control for baseline characteristics such as the gini coefficient (including landless laborers) in 1997,[8] average size per holding of agricultural land in 1995-96,[9], and cumulative years (in 1997) since 1957 that hard left parties were in majority in the state legislature[10]. In columns 1, 2, and 3, I interact the control variables with a time dummy and in columns 4, and 5, the control variables are interacted with rainfall shocks. In columns 1 through 3, I also control for industry×year fixed effects and in columns 4, and 5, 3-digit industry indicator variables are interacted with rainfall shocks. The results remain stable across specifications and show that firms in pro-worker states differentially hire more contract workers in response to rainfall shocks.

[8]This variable is available on the EOPP Indian States Database and also used in Besley and Burgess (2004).

[9]Available from the Agricultural Census 1995-96.

[10]Data used in Aghion, Burgess, Redding, and Zilibotti (2008) and available from the American Economic Review website.

VII Conclusion

Over the years, different states in India have amended the regulations of the Industrial Disputes Act, making them either more worker-friendly or more employer-friendly. In pro-worker states as compared to pro-employer states, once a worker is hired on the firm's payroll (permanent worker), it is relatively difficult to fire them. However, these labor regulations are not applicable to the number of workers hired by firms through contractors (contract workers). Although it has been argued that contract workers provide flexibility to firms in their hiring and firing decisions as they are faced with changing demand conditions, previous empirical work has not shown this rigorously.

In this paper, I empirically test whether firms located in different labor regimes differentially hire contract workers, when they face demand shocks. I use an empirical strategy similar to Adhvaryu, Chari, and Sharma (2013), where I interact rainfall shocks with different measures of labor regulation and look at the impact on firm-level employment. The firm-level panel dataset I use, allows me to separate a firm's total employment into permanent and contract workers. I find that faced with transitory demand shocks, firms located in pro-worker labor regimes differentially hire more contract workers as compared to firms in pro-employer regimes. There is however, no difference in the hiring/firing of permanent workers across labor regimes in response to demand shocks. This suggests that the category of contract workers has indeed added more flexibility to firms' hiring decisions, especially in regions where there are restrictions on the firing of permanent workers.

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Table 1: Summary statistics

Variables	Pro-worker	Neutral	Pro-employer
Total Workers	119.876	94.497	110.295
	[221.287]	[186.474]	[194.934]
Permanent Workers	92.765	72.606	90.38703
	[193.903]	[160.952]	[174.058]
Contract Workers	27.110	21.89	19.908
	[72.525]	[64.651]	[63.781]
% using contract workers	0.324	0.275	0.249
	[0.468]	[0.447]	[0.433]
Positive rainfall shock	0.121	0.135	0.137
	[0.326]	[0.342]	[0.344]
Negative rainfall shock	0.126	0.122	0.122
	[0.332]	[0.327]	[0.287]
Contract wages	33575.75	27944.19	28069.92
(per year)	[21452.49]	[17096.31]	[17847.79]
Firm-year observations	60,000	129,281	130,644
Monthly per capita consumption	948.13	955.18	899.12
expenditure (mpce)	[1152.3]	[1012.3]	[899.15]
Agricultural wages	234.48	303.36	265.86
(per week)	[207.41]	[304.71]	[648.14]
Industrial wages	889.39	820.23	659.25
(per week)	[1803.53]	[1086.48]	[939.18]

Standard deviation in square brackets.

Table 2: Direct effect of rainfall shocks

	(1)	(2)	(3)
	mpce	agricultural wages	industrial wages
Rainshock (t-1)	91.45***	0.515	110.3*
	(25.94)	(5.553)	(62.09)
Constant	578.8***	195.0***	491.0***
	(1.562)	(0.627)	(8.447)
Observations	300,632	72,158	32,925
R-squared	0.161	0.028	0.168
Year FE	YES	YES	YES
District FE	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the district level.

Table 3: Total workers

	(1)	(2)	(3)
	total workers	total workers	total workers
Rainshock (t-1)	0.788	0.862	0.234
	(0.750)	(1.046)	(1.147)
Rainshock (t-1) x			
Pro-employer states (BB)		-0.580	
		(1.927)	
Pro-worker states (BB)		0.893	
		(2.404)	
Pro-employer states (GHK)			0.737
			(2.149)
Pro-worker states (GHK)			1.525
			(2.547)
Constant	89.36***	89.40***	89.37***
	(2.638)	(2.650)	(2.648)
Observations	311,348	311,348	311,348
R-squared	0.917	0.917	0.917
firm FE	YES	YES	YES
year FE	YES	YES	YES
Age controls	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the district level.

Table 4: Contract workers

	(1)	(2)	(3)
	contract workers	contract workers	contract workers
Rainshock (t-1)	0.749*	0.342	-0.0484
	(0.444)	(0.670)	(0.960)
Rainshock (t-1) x			
Pro-employer states (BB)		-0.321	
		(0.843)	
Pro-worker states (BB)		3.033**	
		(1.336)	
Pro-employer states (GHK)			0.500
			(1.303)
Pro-worker states (GHK)			3.425**
			(1.567)
Constant	13.60***	13.69***	13.67***
	(1.547)	(1.547)	(1.544)
Observations	311,348	311,348	311,348
R-squared	0.779	0.779	0.779
firm FE	YES	YES	YES
year FE	YES	YES	YES
Age controls	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the district level.

Table 5: Permanent workers

	(1)	(2)	(3)
	permanent workers	permanent workers	permanent workers
Rainshock (t-1)	0.0389	0.520	0.282
	(0.789)	(1.262)	(1.676)
Rainshock (t-1) x			
Pro-employer states (BB)		-0.259	
		(1.703)	
Pro-worker states (BB)		-2.140	
		(2.026)	
Pro-employer states (GHK)			0.238
			(2.446)
Pro-worker states (GHK)			-1.901
			(2.386)
Constant	75.76***	75.72***	75.71***
	(3.029)	(3.049)	(3.044)
Observations	311,348	311,348	311,348
R-squared	0.916	0.916	0.916
firm FE	YES	YES	YES
year FE	YES	YES	YES
Age controls	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the district level.

Table 6: Rural and Urban Firms

	(1)	(2)	(3)	(4)	(5)	(6)
	contract workers	contract workers	contract workers	contract workers	contract workers	contract workers
Rainshock (t-1)	1.183**	0.925	0.349	0.638	0.216	-0.0604
	(0.575)	(0.834)	(0.799)	(0.562)	(0.866)	(1.339)
Rainshock (t-1) x						
Pro-employer states (BB)		-0.806			-0.0633	
		(1.322)			(0.908)	
Pro-worker states (BB)		3.775*			2.355*	
		(2.065)			(1.294)	
Pro-employer states (GHK)			0.282			0.542
			(1.404)			(1.697)
Pro-worker states (GHK)			4.373**			2.624
			(2.162)			(1.689)
Constant	16.36***	16.46***	16.43***	12.42***	12.49***	12.48***
	(1.815)	(1.799)	(1.798)	(2.021)	(2.033)	(2.028)
Observations	121,122	121,122	121,122	190,193	190,193	190,193
R-squared	0.794	0.795	0.795	0.793	0.793	0.793
firm FE	YES	YES	YES	YES	YES	YES
year FE	YES	YES	YES	YES	YES	YES
Age controls	YES	YES	YES	YES	YES	YES
Sample	Rural	Rural	Rural	Urban	Urban	Urban

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the district level.

Table 7: Asymmetric effects

	(1)	(2)	(3)
	contract workers	contract workers	contract workers
Positive shock (t-1)	1.533	0.249	0.105
	(0.979)	(1.304)	(1.159)
Negative shock (t-1) x	-0.832	-1.425	-0.578
	(0.674)	(1.197)	(1.052)
Positive shock (t-1) x			
Pro-worker states (BB)		7.357*	
		(3.778)	
Negative shock (t-1) x			
Pro-worker states (BB)		-0.598	
		(1.950)	
Positive shock (t-1) x			
Pro-employer states (BB)		0.239	
		(1.853)	
Negative shock (t-1) x			
Pro-employer states (BB)		1.672	
		(1.674)	
Positive shock (t-1) x			
Pro-worker states (GHK)			7.507*
			(3.944)
Negative shock (t-1) x			
Pro-worker states (GHK)			-1.425
			(1.886)
Positive shock (t-1) x			
Pro-employer states (GHK)			0.547
			(2.106)
Negative shock (t-1) x			
Pro-employer states (GHK)			-0.0554
			(1.545)
Constant	16.30***	16.45***	16.43***
	(1.842)	(1.812)	(1.809)
Observations	121,122	121,122	121,122
R-squared	0.794	0.795	0.795
firm FE	YES	YES	YES
year FE	YES	YES	YES
Age controls	YES	YES	YES
Sample	Rural	Rural	Rural

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the district level.

Table 8: Wages of contract workers in rural firms

	(1)	(2)	(3)
	wages_contract	wages_contract	wages_contract
Rainshock (t-1)	436.1*	655.4	671.5*
	(260.9)	(402.0)	(395.3)
Rainshock (t-1) x			
Pro-employer states (BB)		-571.1	
		(649.5)	
Pro-worker states (BB)		-97.60	
		(598.9)	
Pro-employer states (GHK)			-614.8
			(539.4)
Pro-worker states (GHK)			-103.9
			(594.8)
Constant	24,826***	24,842***	24,841***
	(914.2)	(912.6)	(913.7)
Observations	40,964	40,964	40,964
R-squared	0.704	0.704	0.704
firm FE	YES	YES	YES
year FE	YES	YES	YES
Age controls	YES	YES	YES
Sample	Rural	Rural	Rural

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the district level.

Table 9: Size regressions

	(1)	(2)
	contract workers	mandays (contract workers)
Rainshock (t-1) x		
Pro-employer states x Small factory	-0.500	-173.4
	(0.947)	(295.5)
Pro-worker states x Small factory	0.606	225.0
	(0.852)	(268.0)
Pro-employer states x Medium factory	-2.505	-782.8
	(1.916)	(612.9)
Pro-worker states x Medium factory	4.915*	1,621*
	(2.671)	(884.1)
Pro-employer states x Large factory	-0.696	-293.6
	(2.114)	(681.6)
Pro-worker states x Large factory	5.356*	1,634*
	(2.773)	(904.3)
Observations	311,348	311,348
R-squared	0.780	0.781
size dummies	YES	YES
rain shock x size dummy	YES	YES
firm FE	YES	YES
year FE	YES	YES
Age controls	YES	YES
Sample	ALL	ALL
Response of small firms across labor regimes	1.61	2.04
	[0.2054]	[0.1540]
Response of medium firms across labor regimes	7.77	7.29
	[0.0055***]	[0.0071***]
Response of large firms across labor regimes	4.11	3.88
	[0.0431**]	[0.0495**]
Diff-in-diff for large firms relative to small	2.74	2.41
	[0.0985*]	[0.1216]
Diff-in-diff for medium firms relative to small	6.49	5.83
	[0.0112**]	[0.0161**]

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the district level.

Table 10: Robustness - state-specific time trend

	(1)	(2)	(3)
VARIABLES	contract workers	contract workers	contract workers
Rainshock (t-1)	0.551*	0.325	-0.0474
	(0.320)	(0.563)	(0.628)
Rainshock (t-1) x			
Pro-employer states (BB)		-0.410	
		(0.775)	
Pro-worker states (BB)		2.206**	
		(1.027)	
Pro-employer states (GHK)			0.364
			(0.921)
Pro-worker states (GHK)			2.578**
			(1.072)
Constant	-1,415*	-1,391*	-1,365*
	(832.3)	(827.4)	(816.0)
Observations	311,348	311,348	311,348
R-squared	0.779	0.779	0.779
firm FE	YES	YES	YES
year FE	YES	YES	YES
Age controls	YES	YES	YES
State-specific trend	YES	YES	YES
Sample	ALL	ALL	ALL

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the district level.

Table 11: Robustness - industrial composition

	(1)	(2)	(3)	(4)
VARIABLES	contract workers	contract workers	contract workers	contract workers
Rainshock (t-1)	-3.382	-3.716	0.390	-0.0141
	(2.523)	(2.568)	(0.678)	(0.967)
Rainshock (t-1) x				
Pro-employer states (BB)	0.0507		-0.361	
	(0.928)		(0.853)	
Pro-worker states (BB)	3.051**		3.066**	
	(1.257)		(1.333)	
Pro-employer states (GHK)		0.753		0.482
		(1.316)		(1.309)
Pro-worker states (GHK)		3.366**		3.471**
		(1.418)		(1.564)
Constant	17.54***	17.52***	11.93	6.054
	(3.718)	(3.715)	(7.799)	(5.485)
Observations	311,348	311,348	311,348	311,348
R-squared	0.779	0.779	0.780	0.780
firm FE	YES	YES	YES	YES
year FE	YES	YES	YES	YES
Age controls	YES	YES	YES	YES
industry×rainshock	YES	YES	NO	NO
state×industry FE	NO	NO	YES	YES
Sample	ALL	ALL	ALL	ALL

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the district level.

Table 12: Robustness - controlling for baseline characteristics

	(1)	(2)	(3)	(4)	(5)
VARIABLES	contract workers	contract workers	contract workers	contract workers	contract workers
Rainshock (t-1)	0.862*	0.599	0.145	-2.608	-1.952
	(0.478)	(0.918)	(1.301)	(5.629)	(5.531)
Rainshock (t-1) x					
Pro-employer states (BB)		-0.680		-0.000813	
		(0.949)		(0.996)	
Pro-worker states (BB)		3.049**		4.075***	
		(1.443)		(1.542)	
Pro-employer states (GHK)			0.117		0.780
			(1.551)		(1.482)
Pro-worker states (GHK)			3.517**		4.490***
			(1.761)		(1.723)
Constant	17.02**	17.13**	17.14**	18.03***	17.96***
	(6.725)	(6.728)	(6.721)	(4.280)	(4.265)
Observations	267,280	267,280	267,280	267,280	267,280
R-squared	0.780	0.780	0.780	0.777	0.777
firm FE	YES	YES	YES	YES	YES
year FE	YES	YES	YES	YES	YES
Age controls	YES	YES	YES	YES	YES
Industry×year FE	YES	YES	YES	NO	NO
Controls×time dummies	YES	YES	YES	NO	NO
Controls×rainshock	NO	NO	NO	YES	YES
Industry dummies×rainshock	NO	NO	NO	YES	YES
Sample	ALL	ALL	ALL	ALL	ALL

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the district level.

Figure 1: Share of contract workers across labor regimes

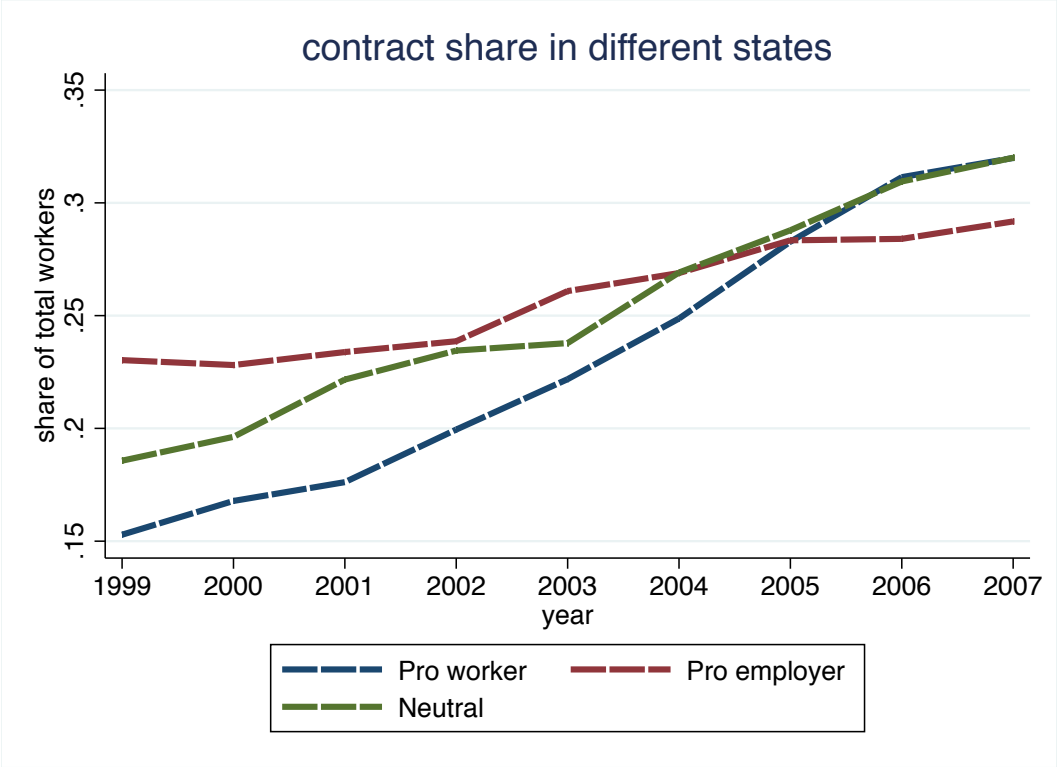

Figure 2: Industrial distribution across labor regimes