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Labour Reforms in the Indian State of Rajasthan: a boon or a bane?

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Labour Reforms in the Indian state of Rajasthan: A boon or a bane?

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The authors examine the impact of labour law deregulations in the Indian state of Rajasthan on plant employment and performance. In 2014, after a long time, Rajasthan was the first Indian state that introduced labour reforms in the Industrial Disputes Act (1947), the Factories Act (1948), the Contract Labour (Regulation and Abolition) Act (1970), and the Apprentices Act (1961). Exploiting this unique quasi-natural experiment, the authors apply a difference-in-difference framework using the Annual Survey of Industries longitudinal data of India's manufacturing establishments. Their results show that reforms had an unintended consequence of the decline in labour use. Also, worryingly, the flexibility resulted in a disproportionate decline in the directly employed worker. Evidence suggests that the reforms positively impact the value-added and productivity of the establishments. The strength of these effects varies depending on the underlying industry and reform structure. These findings prove robust to a set of specifications.

Keywords: labour law reforms, employment, productivity, difference-in-differences, establishment level, India.

Internationally, Indian labour laws are considered rigid and complex. In this vein, recently, the Indian government passed three major labour code bills by the Parliament: The Industrial Relations Code Bill, 2020; the Code on Social Security Bill, 2020; and the Occupational Safety, Health, and Working Conditions Code Bill, 2020 along with the Code on Wages Bill enacted in 2019. After a long time, the government introduced these new laws to reduce complexities, bring more transparency and accountability, and help employers and workers. These reforms in the labour laws with a high degree of political and public interest started back in 2014, with Rajasthan being the first Indian state to deregulate the labour laws in four major Acts (Government of India, 2018).

The reforms in India's labour laws resulted from a rigorous debate. One strand of literature argued the restrictive labour laws hurt the firms by forcing them to remain small and use contractual workers or capital-intensive technologies (Hasan, Kapoor, Mehta, and Sundaram 2017; Ahluwalia, Hasan, Kapoor, and Panagariya 2018; Amirapu and Gechter 2020; Hasan, Mehta, and Sundaram 2020). In contrast, the other strand of literature opined the labour laws could not be held responsible for the Indian economy's sluggish growth (D'Souza 2010; Roychowdhury 2014; Chatterjee and Kanbur 2015; Deakin and Haldar 2015; Roy, Dubey, and Ramaiah 2020). These two strands of opinion on the Indian labour market flexibility differ in various theoretical understanding, methodological details, and empirical ground.

Believing that the strict labour laws are detrimental to the Indian economy, the Indian government started relaxing some of the significant Indian labour laws at the national and sub-national levels (Government of India, 2018). These critical reforms in the Indian labour market require careful, independent evaluation. The labour reforms in 2014 in the Indian state of Rajasthan provide a natural experiment to understand such reforms' impact. In particular, in this paper, we find the causal impact of Rajasthan's labour law reforms on plant employment and performance. Rajasthan deregulated the labour laws in the Industrial

Disputes Act (1947), the Factories Act (1948), the Contract Labour (Regulation and Abolition) Act (1970), and the Apprentices Act (1961). These reforms in the labour laws in Rajasthan allowed us to utilise a quasi-natural experimental research design. We use a difference-in-difference specification to the establishment-level Annual Survey of Industries (ASI) longitudinal data from 2011-12 to 2016-17 to examine the effects of Rajasthan's pro-employer reforms on employees, direct and contractual workers, capital, inputs, gross value added (GVA), total factor productivity (TFP), profits, and workers' emoluments. As the existing literature does not provide any clear-cut opinion of the benefits of the labour market flexibility in the Indian economy, it is not surprising that the empirical outcome of the newly introduced labour reforms on plant employment and performance is ambiguous. Our work contributes to the existing literature by providing evidence on whether the newly introduced flexibility in the labour laws is gainful or not. Our work's novelty is that understanding the impact of deregulations in the Indian state of Rajasthan will help predict the implications of the recent national amendments in labour laws that affect nearly 425 million Indian working-age population. Thus our study on the causal effect of deregulations in the labour laws generates important policy-relevant insights.

Our empirical analysis provides evidence that the reforms had an unintended consequence of the decline in labour use. The implications regarding employment change are similar to D'Souza (2010), Kapoor (2014), Chandru (2014) , Chatterjee and Kanbur (2015), Deakin and Haldar (2015), Roychowdhury (2019a), Roy, Dubey, and Ramaiah (2020) in the sense that higher flexibility causes weaker employment growth. Also, worryingly, the increased flexibility resulted in a disproportionate decline in the directly employed worker. We find the plants that are likely to be affected under the Industrial Disputes Act (1947) reforms experience an expansion in labour compared to the plants that are not under the direct ambit of the Industrial Disputes Act (1947) reforms. Moreover, our data show that the plants that

fall directly under the Contract Labour (Regulation and Abolition) Act (1970) reforms experience greater use of contractual workers than the plants that are likely to be unaffected. We also find reforms to cause the plants in the labour-intensive industries to restructure their production mix by reducing their labour use. In contrast, the newly introduced labour laws' flexibility caused the plants in export-oriented industries to use more contractual workers. Regarding the impact of the reforms on plant inputs and performance, we find the reforms to positively impact the plants' value-added and productivity. Thus we find a tradeoff between employment and performance in Indian manufacturing. The parallel test result indicates no change in the plant outcomes before the reforms in the treatment and control states. Furthermore, the authors find that the reforms did not cause new manufacturing plants in Rajasthan. The findings are robust to a set of specifications.

Literature Review

Indian labour laws have been the focus of many debates. One strand of literature argues against labour protection on the grounds of strict labour laws; i) directly ii) indirectly reducing the economy's efficiency, and iii) increasing labour substitution with capital or contractual workers. In contrast, the other literature opines that the labour laws could not be held responsible for the Indian economy's sluggish growth.

i) Adverse impact of the strict labour regulation: Direct Effect

Besley and Burgess (2004) find the Indian states' pro-worker regulations to cause lower output, employment, productivity, and investment in the formal manufacturing sector. Another similar study by Ahsan and Pagés (2009), find an adverse impact of employment protection and cost of dispute resolution on employment and output. Moreover, this adverse impact is more for the states and time-frame, where the cost to resolve a dispute is high. Workers do not benefit from these protections as the authors do not find an increase in labour

share or wage bill. Bhattacharya, Narayan, Popp, and Rath (2011) find the rigid labour market in India to hinder the multinationals from operating in the labour-intensive production process compared to countries like China and the Philippines. Also, Lee (2019) finds a lack of labour demand in rigid labour markets in India. This strand of literature opines labour market reforms to arrest high labour costs and rigidity's detrimental effects. The reforms will improve wage share, control the increase of informal employment, and increase aggregate productivity (Dougherty 2009). Amin (2009) analyse the impact of labour laws on the employment of 1948 retail stores in India. He reports that 27 per cent of the stores find labour regulation as a hinder to their business activities. He finds that the labour reforms will increase employment by 22 per cent for an average store. Further, he finds the strict labour laws to increase labour costs, resulting in firms substituting labour with the computer (Amin 2007). Pro-worker legislation or labour unrest also adversely impact the location choice and investments (Sanyal and Menon 2005; Menon and Sanyal 2007). Dougherty, Robles, and Krishna (2011) find that strict labour regulations are likely to harm industries with high labour intensity or high sales volatility. They estimate that firms experience a 14 per cent higher TFP in labour-intensive industries and the states with the flexible labour market than the firms in the labour-intensive but rigid labour market. Similarly, they experience 11per cent higher TFP in a pro-employer state than in the volatile industries' pro-worker state. One recent study by Hasan, Mehta, and Sundaram (2020) finds that rigid labour regulations adversely impact the exporters by reducing the output. The rigid firing restriction reduces the firm's employment responses to temporary shocks (Adhvaryu, Chari, and Sharma 2013). Another impact of rigid labour laws is an increase in corruption. A recent study by Amirapu and Gechter (2020) estimates that regulations increase firms' labour costs by around 35per cent, which increases the possibility of corruption[i].

ii) Adverse impact of the strict labour regulation: Indirect Effect

The impact of some policies (like trade liberalisation) can be associated with labour rigidity. Aghion, Burgess, Redding, and Zilibotti (2008) find the dismantling of License Raj helps the industries in pro-employer states to grow more quickly than in pro-worker states. Mitra and Ural (2008) find the positive impact of trade liberalisation on productivity more pronounced for states with a flexible labour market. They also find that trade liberalisation helps the export-oriented industries in states that have flexible labour laws. Labour demand elasticity is also higher with trade liberalisation for the states with flexible labour markets (Hasan, Mitra, and Ramaswamy 2007). Labour regulations are not only limited to generate gains from trade liberalisation and are also crucial in the firm size distribution. Larger sized firms are prevalent in the states with flexible labour regulation. The prevalence of large-sized firms in flexible states is more prominent among the firms that started production after 1982, when labour laws were tightened (Hasan and Jandoc 2012). Thus, Hasan and Jandoc (2012) claim labour regulations to affect the firm's size adversely. Hasan, Kapoor, Mehta, and Sundaram (2017) emphasise that even if India is one of the largest producers and exporter of apparel, the sector is still to operate at its potential. They point to this incapability to the labour regulations that cause the firms to operate at scales that are insufficient to use the advanced techniques. A recent study by Ahluwalia, Hasan, Kapoor, and Panagariya (2018) analyses the impact of labour regulations on employment and wages. They use the 2005 abolition of the quota restrictions on the export of apparel and textile products from developing to developed countries and the variation in the labour regulations across the Indian state as a natural experiment to find the effect of labour regulation. They find significant benefits in employment and wages post 2005 in the apparel and textile industries in states with flexible labour laws.

iii) Strict labour regulation cause substitution of labour with capital and temporary employment

Hasan, Mitra, and Sundaram (2013b) find the capital intensity higher for India's firms than other countries with the same economic development level or factor endowments. They find strict labour regulations as one of the primary reasons for the high capital intensity. The rigid labour laws do not help trade gains based on factor abundance comparative advantage (Hasan, Mitra, and Sundaram 2013a). Hasan, Mehta, and Sundaram (2020) find that producers in pro-worker states replace labour with capital. Firms use contractual or fixed-term workers for many reasons (Singh, Das, Abhishek, and Kukreja 2019). Some of the reasons are; to reduce the high labour cost (Sapkal 2016; Basu, Chau, and Soundararajan 2018), reduce the bargaining power of the permanent workers (Saha, Sen, and Maiti 2013), stay away from the legal establishment size threshold of 100 workers (Ramaswamy 2013a; Ramaswamy 2013b), increase flexibility as the employers are free to hire and fire the contract workers (Srivastava 2016), deal with temporary shocks (Chaurey 2015), and many more. Ramaswamy (2013a) finds the strict labour laws to cause the higher intensity of contract workers for the size group of 55-99 workers and in labour-intensive inflexible states. A regional case study by Barnes, Das, and Pratap (2015) in North India's automotive components production shows how a regional contract labour system has helped the employers to keep the wages low, enjoy more flexibility, skip the burden of monitoring and controlling the workers, and weaken the labour rights. However, the use of a contract worker has its demerits. As it is an 'incomplete contract', the workers' underinvest in specific skills (Singh, Das, Kukreja, and Abhishek 2017; Singh, Das, Abhishek, and Kukreja 2019).

Criticism of the view that Indian labour regulations harm the Indian economy

The regulations on job security do not negatively affect (D'Souza 2010) as firms transform the work practices and make it flexible through non-compliance or weak enforcement of laws

(Chatterjee and Kanbur 2015). Badigannavar and Kelly (2012) finds that even a pro-worker state like Maharashtra provides weak protection to the formal sector workers and the labour unions. A recent study by Roy, Dubey, and Ramaiah (2020) finds no evidence of the spatial variation in labour regulations flexibility in explaining employment growth variation. They find that higher flexibility associates with weaker employment growth. In a similar vein, Roychowdhury (2019a) and Roychowdhury (2019b) explain that the labour laws cannot be held responsible for the employment stagnation in India's organised manufacturing as it applies to less than 35per cent of aggregate employment. He further finds that the worker's bargaining power is declining in Indian manufacturing. A study on Gujarat's deregulatory reforms by Deakin and Haldar (2015) proposes very little evidence linking law deregulation to growth. In response to the belief that employment protection legislation restricts employment adjustment from demand shock, Sofi and Kunroo (2018) find no evidence from 2000-01 to 2011-12. Moreover, Rodgers and Menon (2013) find that employment adjustment and dispute settlement restrictions cause higher job quality for women.

One of the most influential studies by Besley and Burgess (2004) has been criticised on various conceptual and measurement issues, coding errors, methodological problems, failure to replicate the findings (Bhattacharjea 2006; Jha and Golder 2008; Bhattacharjea 2009; D'Souza 2010; Storm 2019) and, difficulties in the enforcement of the labour laws in India (Fagernäs 2010). Some scholars find the labour laws changes are endogenous to several other economic factors and do not explicitly determine economic indicators (Dutta Roy 2004; Deakin, and Sarkar 2011). Another study that has been severely criticised is Basu, Fields, and Debgupta (2009), which find flexible labour laws beneficial to workers' wages and employment. Roychowdhury (2014) examine their theoretical argument and find their policy conclusion to be unsustainable.

Thus, the impact of strict labour laws on the Indian economy is inconclusive. One group of scholars advocate relaxation in labour laws, while the other group supports labour protection. The differences in opinion stem from both analytical as well as methodological understanding. In this context, the Indian government deregulated the labour laws in recent years, believing that the pre-existing labour laws are detrimental (Government of India, 2018). We analyse the impact of these recent relaxations in labour laws on plant employment and performance. This study adds to the existing literature by finding whether the recent relaxations in the labour laws that one group of scholars have been advocating over the years have been gainful or not. Thus, this paper contributes to the literature on the Indian institutional reform effects, plant employment, and performance in Indian manufacturing, quasi-natural experiment, and the recent developments in the Indian labour market.

Background

Under the Constitution of India, labour is a subject in the concurrent list where both the Central and the state governments are capable of enacting legislation. After a long time, Rajasthan was the first Indian state that introduced labour reforms in four majors Acts: The Industrial Disputes Act (1947), The Factories Act (1948), The Contract Labour (Regulation and Abolition) Act (1970), and the Apprentices Act (1961) in 2014. Table 1 describes the amendments in each of these Acts.

Table 1: Labour Reforms in Rajasthan

	Major Amendments
The Industrial	i. Government approval is not required for companies with 300 or

Disputes Act (1947)		fewer workers to shut down or retrench workers. The earlier limit was 100 workers.
	ii.	The membership requirement to form a union has increased from 15per cent to 30per cent of the total workmen.
	iii.	The time limit for any worker to object has been reduced to three years from an indefinite period.
The Factories Act (1948)	i.	The threshold limit increased from 10 or more workers with the power to 20 or more workers with power, and 20 or more workers without power to 40 or more workers without power.
	ii.	Any complaint against the employer about the violation of this Act will not receive cognisance by a court without prior permission from the state government.
The Contract Labour (Regulation and Abolition) Act (1970)	i.	Applicable to establishments that employ 50 or more workers on contract against the former 20 or more workers.
The Apprentices Act (1961)	i.	Apprentice's stipend will be no less than the minimum wage.
	ii.	Government to bear part of the costs of apprentice training in order to encourage skilling.

Most of these reforms were pro-employer. These deregulations in the labour laws provide an interesting setup to examine the reforms' impact on plant employment and performance.

Diluting the labour laws can have an ambiguous impact on plant employment and performance. The flexibility in labour laws can increase plant employment as the reform reduces the hiring and firing cost, and therefore, the employers can adjust the labourers according to their requirements and prefer cheap labour. The labour's bargaining power also reduces, and this might act as a catalyst to increase employment. These reforms can also increase contractual workers' use because of their added advantage (Kuroki 2012; Drager and Marx 2017). However, these pro-employer reforms can also cause employment to decline as employers get the authority to shed workers quickly. The lack of powerful labour unions further makes the dismissal process easy (Watanabe 2018; Roychowdhury 2019a; Roychowdhury 2019b). As the labour cost declines with the reforms, plants might increase capital investments to complement the labour. Also, flexible labour laws result in less costly bank loans as the borrower's default risk declines due to the increased flexibility to adjust labour (Alimov 2015). On the contrary, the low cost of labour can cause employers to substitute labour for capital (Hasan, Mitra, and Sundaram 2013a; Hasan, Mitra, and Sundaram 2013b; Hasan, Mehta, and Sundaram 2020). Plant productivity may increase because employers can adjust labourers and lay off unproductive workers resulting in the most productive skill matches (Caballero, Cowan, Engel, Micco 2013; Maida and Tealdi 2020). The worker's effort can also increase because of the fear of dismissal (Bradley, Green, and Leeves 2014). On the contrary, productivity can decrease as low job security might cause the workers to invest less in plant-specific human capital value addition (Acharya, Baghai, and Subramanian 2013), discourage the workers from providing effort, and high wage inequality among the workers (Shimizutani, and Yokoyama 2009; Silva, Martins and Lopes

2018). Thus, the effect of the labour laws reforms on plant employment and performance warrants an empirical examination.

Empirical Methodology

We use the difference-in-difference (DID) framework to compare the plant outcomes before and after the reforms in the treatment and the control state. To the best of our knowledge, we find no other policy or reforms implemented in Rajasthan in 2014 that impacted plant-level outcomes differentially more or less than in the control state. This will help us identify the treatment effect of labour reforms in Rajasthan.

Ideally, we would like to compare the plants in Rajasthan with an observationally similar control group. We choose the establishments in Punjab as a control group because of the following reasons: i) Punjab is a neighbouring state of Rajasthan and have similar characteristics in various aspects ii) Among the other neighbouring states of Rajasthan, i.e., Gujarat, Madhya Pradesh, Uttar Pradesh, and Haryana had also started to think of introducing flexibility in labour laws around 2014 mostly because of the similar political affiliation in those states (ruling party). Thus, we would not get unbiased estimates if we use these states as a control group. iii) Punjab and Rajasthan experience a similar degree of flexibility in labour restrictions before the reform (Government of India, 2018). Furthermore, as a robustness check, we choose establishments from other states as a control group.

Figure 1: Treatment and the control state in India

Treatment
Rest of India
Control
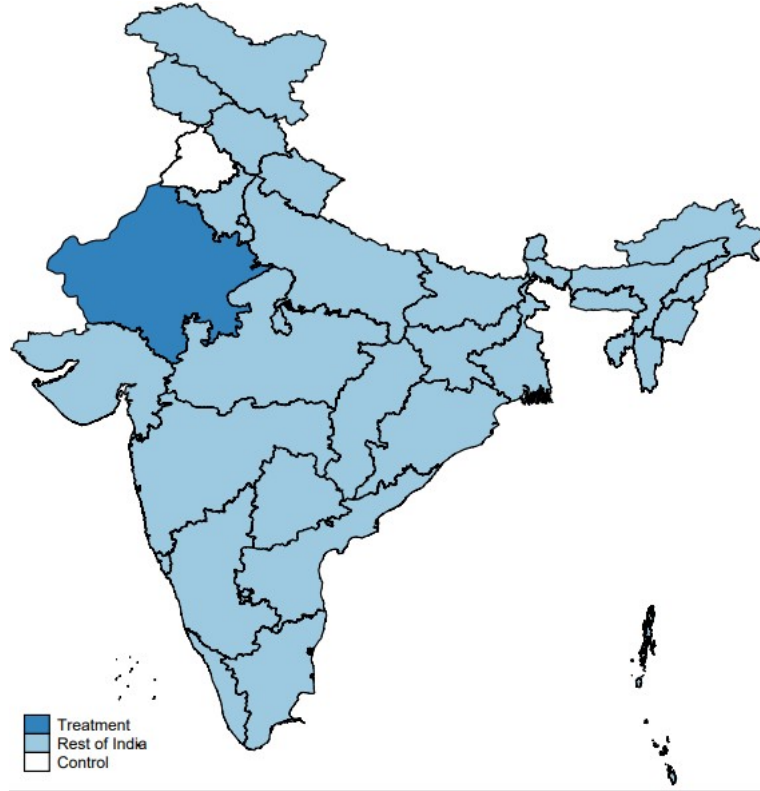
The identifying assumption of the DID estimator is that the treatment and the control group should have similar trends before the reform. In the subsequent section, we show that Rajasthan and Punjab have similar trends in pre-2014. We estimate the following plant level reduced form regression specification in Equation (l) to find the impact of labour laws reforms on various plant outcomes.

$$Y_{ijst} = \beta_0 Treat_i + \beta_1 Post_t + \beta_2 Treat_i * Post_t + X_{ijt} + \kappa_i + \gamma_t + \delta_j t + \epsilon_{ijst} \quad (1)$$

where i,j,s,t index plants, industry (2-digit), state and year. Y_{ijst} represents plant-level outcomes like employers, direct workers, contractual workers, capital, inputs, GVA, TFP, profit, and emoluments. $Post_t$ is an indicator variable that takes the value of 1 for the years after the amendments (2014-15 to 2016-17) and 0 otherwise. $Treat_i$ is an indicator variable that takes the value of 1 if the plant is in the treated state Rajasthan and 0 if the plant belongs to Punjab. κ_i is the plant fixed effect that controls for any time-invariant unobserved

heterogeneity. γ_t is the year fixed effect that controls the year specific unobserved changes. We should keep in mind that $Post_t$ will be completely absorbed by the year fixed effects whereas, $Treat_i$ will be completely absorbed by the plant fixed effects. X_{ijt} are the controls, namely, age of the plant, percentage of the output that the plant export, import dummy trend, GVA, capital, inputs, profit, emoluments, and workers[ii]. $\delta_j t$ represents industry trends and ϵ_{ijst} is the stochastic error term. We cluster standard errors at the state levels. The coefficient of the interaction of $Treat_i$ and $Post_t$, β_2 is the coefficient of our interest that captures the causal impact of the labour laws reform on the plant outcomes. We consider the entrants, incumbents, and exiters during the sample period.

The reforms in the labour laws may be more pronounced for the "affected plants". Affected plants are those that are most likely to be affected by the labour laws reforms. We identify affected plants in two ways; i) Plants that fall directly under the Industrial Disputes Act (1947) reforms, and ii) Plants that fall directly under the Contract Labour (Regulation and Abolition) Act (1970) reform, in the pre-treatment period. To find the impact of the reforms on the affected plants, we use triple difference and estimate the following reduced-form regression specification:

$$Y_{ijst} = \beta_0 Treat_i + \beta_1 Post_t + \beta_2 Affected_i + \beta_3 Treat_i * Post_t + \beta_4 Post_t * Affected_i + \beta_5 Treat_i * Affected_i + \beta_6 Treat_i *$$

(2)

The coefficient, β_6 captures whether the affected and the non-affected plants responded differently after the reform to before in Rajasthan compared to Punjab. A significant β_6 indicates that the law changes were effective in impacting those plants that were intended to.

We further analyse the impact of the reform on heterogeneous industry categories. Plants in labour-intensive industries or export-oriented industries are more likely to be impacted by increased labour laws flexibility. Many studies find the strict labour regulations to affect the exporters and the labour-intensive industries adversely (Mitra and Ural 2008; Dougherty, Robles, and Krishna 2011; Hasan, Mitra, and Sundaram 2013a; Ramaswamy 2013a; Saha, Sen, and Maiti 2013; Hasan, Mehta, and Sundaram 2020). Therefore, in a similar vein, the increase in flexibility in labour laws should be differentially larger in these types of industries. To test this, we estimate the following regression specification:

$$Y_{ijst} = \beta_0 Treat_i + \beta_1 Post_t + \beta_2 IndustryType_i + \beta_3 Treat_i * Post_t + \beta_4 Post_t * IndustryType + \beta_5 Treat_i * IndustryType$$

(3)

β_6 finds the heterogeneous impact of the changes in labour laws on plant outcomes. $IndustryType_i$ is an indicator variable that takes a value of 1 if a plant is in labour-intensive/export-oriented industries and zero otherwise.

Data

We use the Indian manufacturing sector's plant-level longitudinal data from the Annual Survey of Industries (ASI) provided by the Ministry of Statistics and Programme Implementation, Government of India. The ASI is a nationally representative survey of plants/establishments registered under The Factories Act, 1949. The Factories Act, 1949, is important legislation that regulates India's manufacturing activities and includes all establishments that employ 10 or more workers (with electricity) or 20 or more workers (without electricity). Our data set covers India's formal manufacturing. The establishments in ASI data are divided into a census sector and a survey sector. The plants with more than 100 workers or that file joint returns in the ASI survey or are situated in some industrially

backward states like Manipur, Meghalaya, Nagaland, Tripura, Andaman, and Nicobar Island are surveyed every year and hence are called census sector. Plants that do not fall in the census sector are randomly sampled using a systematic circular sampling technique within each state*Industry*Sector*4 digit stratum and form the survey sector. We use the information from both the census and the sample sector for manufacturing plants. Furthermore, as a robustness check, we restrict our sample with the census sector's establishments and use a balanced panel. Table 2 presents the number of observations by the census and the sample sector in the treatment and control group.

Table 2:Number of Observations

	Rajasthan(Treatment)		Punjab(Control)	
	Census	Sample	Census	Sample
2011-12	638(34.71)	1200	731(27.02)	1974
2012-13	1726(72.12)	667	1568(65.33)	832
2013-14	1462(67.03)	719	1392(58.14)	1002
2014-15	683(29.21)	1655	684(27.15)	1835
2015-16	1810(66.27)	921	1200(46.11)	1402
2016-17	1608(60.47)	1051	1215(43.37)	1586

Source: Authors' calculation based on ASI data.

Notes: The bracketed number is the observation percentage in the census sector in that particular group year.

In this study, we utilise the ASI dataset from 2011-12 to 2016-17. The reference period of the ASI data is a fiscal year between April to March. We use plant-level information on employees, direct and contractual labour, capital, inputs, profits, emoluments, GVA, and TFP. Capital is measured as the average of fixed capital's net book value at the beginning and the end of the fiscal year. The labour input is measured as the average number of person worked. The average number of person worked is the ratio of total person-days to the number of working days. We estimate TFP using the methodologies proposed by Woolridge (2009) and Levinsohn and Petrin (2003) refereed in this paper as TFP (method 1) and TFP (method 2), respectively. The procedure for estimating the TFP is presented in the Appendix. GVA is deflated by the suitable wholesale price index (WPI) by groups using 2005 as the base year.

Matching the detailed categories of WPI with the 2-digit industry classification was impossible due to data limitations. However, a close and mindful comparison of the groups was undertaken to choose appropriate price deflators. Fixed capital is deflated using WPI for machinery and equipment. The consumer price index (CPI) of rural labourers and industrial workers is used as a deflator for workers' emoluments. We classify an industry as labour intensive if the capital intensity[iii] is below the total manufacturing median (Kapoor 2015). To find the export-oriented industries, we use the 2 digit industry trade information from U.N.

Comtrade and calculate the value of T, where $T = \dfrac{M - X}{Q - X + M}$ M is import, X is export, and Q is production. If T's values are negative, then that particular industry is export-oriented (Erlat 2000; Krueger, Lary, Monson, and Akrasanee 1981). We use the output data (Q) from the United Nations Industrial Development Organization. We use the information from the pre-treatment years (2011-12 to 2013-14) to categorise the industries. The industries in each category are mentioned in the Appendix. Table 3 summarises the data used in our analysis for the treatment and the control groups pre and post-reform.

Table 3: Summary Statistics

	Treatment		Control	
	Pre Treatment	Post Treatment	Pre Treatment	Post Treatment
Observations	6,412	7,728	7,499	7,922
Panel A: Plant Employment				
Log Employees	3.120	0.700	3.134	0.004

	[1.214]	[0.150]	[1.165]	[0.124]
Contractual to Total Workers Ratio	0.213	0.195	0.294	0.322
	[0.382]	[0.368]	[0.413]	[0.430]
Direct to Total Workers Ratio	0.923	0.882	0.858	0.785
	[0.212]	[0.284]	[0.276]	[0.361]
Log Contractual Workers	3.433	3.590	3.043	3.111
	[1.210]	[1.306]	[1.143]	[1.108]
Log Direct Workers	2.579	2.541	2.504	2.459
	[1.148]	[1.191]	[1.244]	[1.301]
Panel B: Plant Performance and Inputs				
Log Capital	10.220	7.549	9.845	9.355
	[3.017]	[1.184]	[2.229]	[1.482]
Log Inputs	11.811	11.819	11.324	4.602
	[2.171]	[2.242]	[2.011]	[1.607]
Log GVA	10.485	10.902	10.165	10.568
	[1.612]	[1.838]	[1.383]	[1.554]
Log TFP (Method 1)	7.364	7.735	7.122	7.487
	[0.987]	[1.159]	[0.771]	[0.914]
Log TFP (Method 2)	7.476	7.850	7.227	7.593
	[1.000]	[1.173]	[0.782]	[0.926]
Log Profit	8.720	9.705	8.298	9.184
	[2.011]	[2.338]	[1.602]	[1.865]
Log Emolument	9.234	3.139	9.017	5.203
	[1.545]	[0.353]	[1.394]	[0.391]

Source: Authors' calculation based on ASI data.

Notes: The main entries and the brackets' entries are the mean and the standard deviation of each variable. We use the sample weights provided by ASI in the calculation.

Results

Parallel Trends

We establish that the parallel trends assumption between the treatment and the control group holds using two approaches. First, we graphically inspect the parallel trend assumption. Figure 2 provides the detrended values of employees, both directly employed and contractual workers, for treated and the control states. Visually, the trends are parallel until 2014-15 and diverge after that. Second, we use a formal placebo regression to check the potential treatment effects before the reforms (2011-12 to 2013-14).

$$Y_{ijst} = \beta_0 Time_t + \beta_1 Treat_i * Time_t + X_{it} + \kappa_i + \gamma_t + \delta_j t + \epsilon_{ijst} \qquad (4)$$

where $Time_t$ is a continuous variable (0,1,2) for the years 2011-12, 2012-13 and 2013-14 respectively. If the treatment and the control state hold parallel trends, then β_1 should be zero. In and Table 5, we find the coefficient of the interaction term $Treat_i * Time_t$ to be statistically insignificant. Thus the parallel trend assumption holds and confirms that the results are not driven by spurious effects.

Figure 2: Employment by treatment status
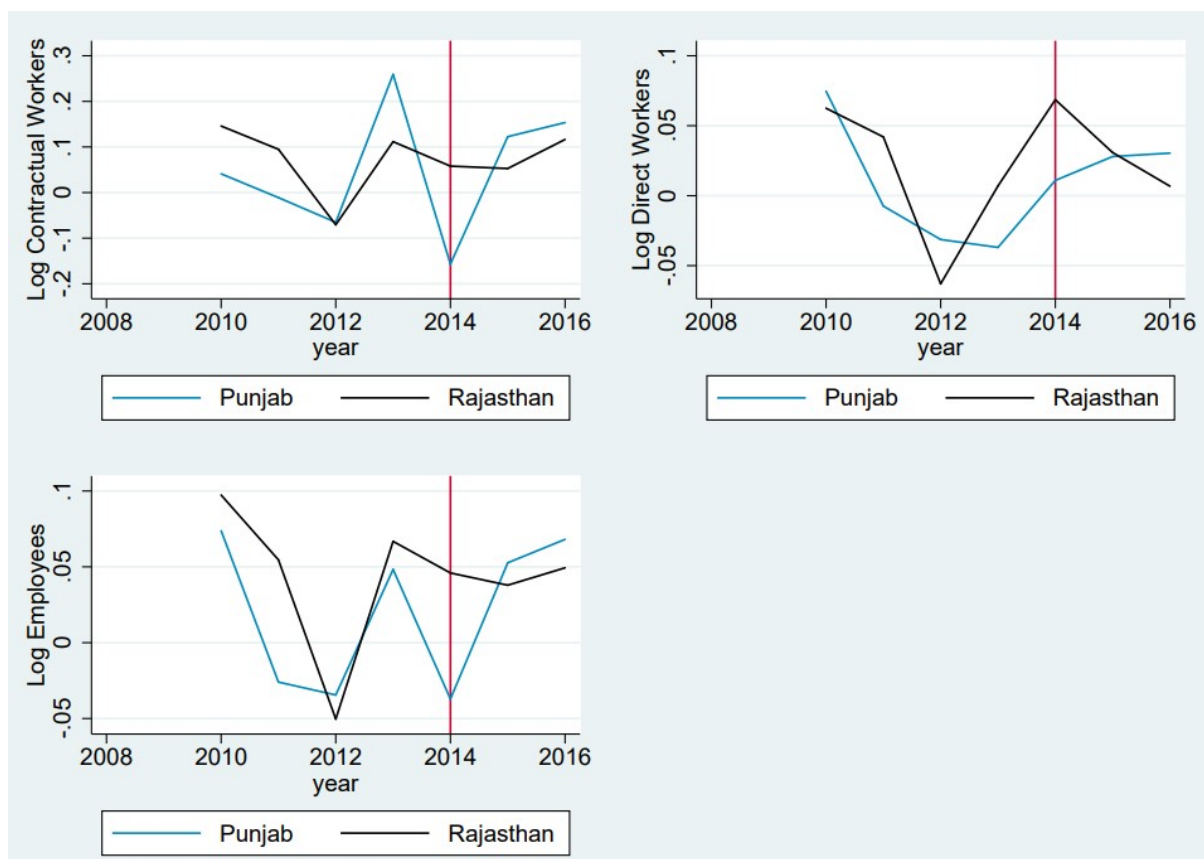
Source: Authors' calculation based on ASI data.

Notes: The values are detrended using first-order differencing.

Table 4: Testing the Parallel Trends for Plant Employment

	Log Employees	Log Contractual Workers	Log Direct Workers	Contractual to Total Workers Ratio	Direct to Total Workers Ratio
Treat * Time	-0.008	-0.036	-0.020	0.001	-0.002
	(0.004)	(0.007)	(0.005)	(0.000)	(0.002)
N	9981	3043	8764	9914	8775

r2	0.46	0.32	0.26	0.06	0.08
Plant FE	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry Trends	Yes	Yes	Yes	Yes	Yes
Plant Controls	Yes	Yes	Yes	Yes	Yes

Source: Authors' calculation based on ASI data.

Notes: Robust standard errors clustered at the state level in parentheses. All regressions include Treat and Time as control variables apart from various other plant controls. *** statistical significance at 1%; ** statistical significance at 5%; * statistical significance at 10%.

Table 5: Testing the Parallel Trends for Plant Inputs and Performance

	Log Capital	Log Inputs	Log GVA	Log TFP (Method 1)	Log TFP (Method 2)	Log Profit	Log Emoluments
***Treat* Time**	0.005	-0.010	-0.001	-0.000	-0.000	-0.086	-0.007
	(0.005)	(0.007)	(0.004)	(0.002)	(0.002)	(0.024)	(0.002)
N	9922	9922	9922	9917	9917	9930	9930
r2	0.13	0.23	0.64	0.48	0.48	0.07	0.50
Plant FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plant Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Authors' calculation based on ASI data.

Notes: Robust standard errors clustered at the state level in parentheses. All regressions include Treat and Time as control variables apart from various other plant controls. *** statistical significance at 1%; ** statistical significance at 5%; * statistical significance at 10%.

Effect of Labour Law Amendments on Employment

Table 6 presents the baseline results of the impact of labour reforms on employment outcomes. The outcome variables are log employees, log contractual workers, log direct workers, contractual to total workers, and direct to total workers. We find that Rajasthan's establishments differentially reduced total employees by around 3per cent compared to plants in Punjab, after relative to before the reforms. Furthermore, the plants responded to the reforms by decreasing the number of direct workers by around 2per cent, whereas the decline in contract workers is insignificant. We notice that the ratio of both contractual to total workers and direct to total workers declined significantly by around 1per cent in Rajasthan after the reforms.

Table 6: Effect on Employment

	Log Employees	Log Contractual Workers	Log Direct Workers	Contractual to Total Workers	Direct to Total Workers
***Post* Treat**	-0.029***	0.056	-0.020**	-0.009***	-0.005**
	(0.000)	(0.020)	(0.001)	(0.000)	(0.000)
N	20128	6411	17579	20012	18021
r2	0.51	0.27	0.26	0.05	0.07
Plant FE	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry Trends	Yes	Yes	Yes	Yes	Yes
Plant Controls	Yes	Yes	Yes	Yes	Yes

Source: Authors' calculation based on ASI data.

Notes: Robust standard errors clustered at the state level in parentheses. All regressions include Post and Treat as control variables apart from various other plant controls. *** statistical significance at 1%; ** statistical significance at 5%; * statistical significance at 10%.

The impact of the reforms is different for the plants that are most likely to be "affected" from the "unaffected". According to the Industrial Disputes Act (1947) reforms, we notice that the plants with workers greater than 100 and less than 300, and plants with less than or equal to 100 workers in 2014 are most likely to be affected. The triple difference estimates from Equation 2 in panel A of Table 7 indicate that the plants that had workers between 100 and 300 in 2014 experienced a significant increase in total employment and contractual workers, compared to the plants that had greater than 300 workers in Rajasthan compared to Punjab, in post compared to pre-treatment period. However, worryingly, these types of plants experienced a significant decline in direct to total workers. The plants with less than 100 workers in 2014 experienced a significant increase in total employment and direct employment compared to the plants with greater than 300 workers in Rajasthan compared to Punjab, in post compared to the pre-treatment period. Thus, the Industrial Disputes Act (1947) reforms successfully impacted those targeted plants.

According to the Contract Labour (Regulation and Abolition) Act (1970) reforms, we find that the plants with contractual workers more than 20 and less than 50 in 2014 are most likely

to be "affected". Consistent with the hypothesis, the affected plants experienced a significant increase in the ratio of contractual to total workers compared to the "unaffected" in Rajasthan compared to Punjab in post compared to the pre-treatment period (panel B of Table 7). The reforms caused these "affected" plants to have a higher proportion of contractual workers. In the Appendix, we notice a significant decline in workers and insignificant impact on contractual workers. Also, these affected plants experienced a significant decline in both log direct and log contractual workers. Thus the impact on the "affected" plants is twofold i) experienced a decline in both contractual and direct workers (total workers) ii) The decline in total workers is such that the proportion of contractual workers to total workers increased, which means the employers prefer more of contractual workers.

Table 7: Heterogeneity in Employment for Affected Plants

	Log Employees	Log Contractual Workers	Log Direct Workers	Contractual to Total Workers	Direct to Total Workers
Panel A: Based on Changes in the Industrial Disputes Act (1947)					
Treat* Post* 1. Affected	0.061**	0.055*	-0.004	0.015	-0.024***
	(0.003)	(0.007)	(0.007)	(0.003)	(0.000)
Treat*Post*2.Affected	0.037*	-0.002	0.016**	0.005	0.004
	(0.438)	(0.695)	(0.590)	(0.082)	(0.074)
N	20128	6411	17579	20012	18021
r2	0.51	0.28	0.26	0.05	0.07
Plant FE	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry Trends	Yes	Yes	Yes	Yes	Yes
Plant Controls	Yes	Yes	Yes	Yes	Yes
Panel B: Based on Changes in the Contract Labour (Regulation and Abolition) Act (1970)					
Treat*Post*Affected	-0.035	-0.154**	-0.115***	0.034*	-0.008
	(0.006)	(0.008)	(0.000)	(0.005)	(0.005)
N	20128	6411	17579	20012	18021
r2	0.51	0.27	0.26	0.05	0.07
Plant FE	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry Trends	Yes	Yes	Yes	Yes	Yes
Plant Controls	Yes	Yes	Yes	Yes	Yes

Source: Authors' calculation based on ASI data.

Notes: Robust standard errors clustered at the state level in parentheses. "1.Affected" in Panel A are the plants with workers greater than 100 and less than 300, "2.Affected" in Panel A are the plants with less than equal to 100 workers, and the base is greater than 300 workers in 2014. All regressions in Panel A include Treat*Post, Post*Affected, Treat*Affected, Treat, Post, and Affected as control variables apart from various other plant controls. "Affected" in Panel B are the plants with contractual workers greater than 20 and less than 50 in 2014. All regressions in Panel B include Treat*Post, Post*Affected, Treat*Affected, Treat, Post, and Affected as control variables apart from various other plant controls. *** statistical significance at 1%; ** statistical significance at 5%; * statistical significance at 10%.

Heterogeneity in Industry Characteristics

Table 8 presents the estimates of the reforms' heterogeneous impact based on industry characteristics. The results indicate that total employees and contractual to total employees declined whereas direct to total workers increased for the plants in labour-intensive industries compared to capital intensive industries in Rajasthan versus Punjab, and after compared to before the reform. These industries are preferring direct workers. This might be because of the plant-specific skill that the direct workers involve. Thus, the reforms helped the plants in the labour-intensive industries restructure the production factors according to their requirements.

As expected, plants in export-oriented industries experienced an increase in contractual to total workers than non-exporting industries in Rajasthan versus Punjab, and after compared to before the reform. The flexibility in the labour laws caused the plants in export-oriented industries to use contractual workers. The export market volatility causes this type of plant to choose contractual workers and reduce labour's fixed cost.

Table 8: Heterogeneity in Employment based on Industry Characteristics

	Log Employees	Log Contractual Workers	Log Direct Workers	Contractual to Total Workers	Direct to Total Workers
Panel A: Labour Intensive Industries					
*Treat*Post*LI*	-0.046*	-0.150	0.019	-0.053**	0.036*
	(0.004)	(0.027)	(0.015)	(0.004)	(0.004)
N	20128	6411	17579	20012	18021
r2	0.51	0.27	0.26	0.05	0.07
Plant FE	Yes	Yes	Yes	Yes	Yes

Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry Trends	Yes	Yes	Yes	Yes	Yes
Plant Controls	Yes	Yes	Yes	Yes	Yes
Panel B: Export Oriented Industries					
Treat*Post*EO	-0.010	0.026	-0.007	0.019***	-0.003
	(0.007)	(0.052)	(0.012)	(0.000)	(0.003)
N	20128	6411	17579	20012	18021
r2	0.51	0.27	0.26	0.05	0.07
Plant FE	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry Trends	Yes	Yes	Yes	Yes	Yes
Plant Controls	Yes	Yes	Yes	Yes	Yes

Source: Authors' calculation based on ASI data.

Notes: Robust standard errors clustered at the state level in parentheses. LI= labour Intensive industries. All regression in Panel A includes Treat*Post, Post*LI, Treat*LI, Treat, Post, and LI as control variables apart from various other plant controls. EO= export-oriented industries. All regressions in Panel B include Treat*Post, Post* E.O., Treat* E.O., Treat, Post, and E.O. as control variables apart from various other plant controls. *** statistical significance at 1%; ** statistical significance at 5%; * statistical significance at 10%.

Effect of Labour Law Amendments on Plant Performance and Inputs

We estimate Equation 1 to find the effect of deregulating the labour laws on various plant inputs and performance like capital, inputs, GVA, TFP, profits, and emoluments. The estimates are presented in Table 9. We find that the value added and productivity increased significantly by around 3 per cent due to the new flexibility in labour laws in Rajasthan compared to Punjab. We present the estimates of the impact of the reform on plant inputs and performance by "affected" plants and industry heterogeneities in the Appendix.

Table 9: Effect on Plant Inputs and Performance

	Log Capital	Log Inputs	Log GVA	Log TFP (Method 1)	Log TFP (Method 2)	Log Profit	Log Emoluments
Post*Treat	-0.026	-0.045	0.013*	0.030*	0.030*	0.025	-0.011
	(0.006)	(0.008)	(0.002)	(0.003)	(0.003)	(0.014)	(0.002)
N	20020	20020	20020	20015	20015	20037	20037
r2	0.10	0.28	0.77	0.70	0.70	0.38	0.55
Plant FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plant Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Plant Entry

Is there more new plants' entry due to the increased flexibility in labour laws post 2014 in Rajasthan? To examine this change at the extensive margin, we estimate Equation 5 at the 2-digit industry*state*year level. We identify a plant birth from the "year of initial production" in the ASI data.

$$Entr\ y_{jst} = \beta_0 Treat_s + \beta_1 Post_t + \beta_2 Treat_s * Post_t + X_{jt} + \delta_j + \theta_t + \alpha_s + \omega_j t + \gamma_s t + \epsilon_{jst} \tag{5}$$

where $Entr\ y_{jst}$ is the total entry of new plants in a year t, state s, and industry j. $Treat_s$ is an indicator variable that takes on the value 1 if the plant is in the treated state Rajasthan and 0 if the plant belongs to Punjab. $Post_t$ is an indicator variable that takes on the value 1 for the years after the amendments (2014-15 to 2016-17) and 0 otherwise. δ_j is the industry fixed effect that control for any time invariant unobserved heterogeneity at the industry level. θ_t is the year fixed effect and α_s is the state fixed effects. $\omega_j t$ is the industry trend and $\gamma_s t$ is the state trend. X_{jt} are the control variables, namely, age of the plant, percentage of the output that the plant export, import dummy trend, gva, capital, inputs, profit, emoluments and workers. β_2 is the coefficient of interest that finds the impact of the reforms on the entry of new plants. We find from Table 10 that β_2 is statistically insignificant, and thus the impact of the reforms on plant employment and performance is from the incumbent plants in Rajasthan. We do not find the reforms to cause entry of new plants.

Table 10: Effect on the number of plant entry

	Plant Entry	Plant Entry
Post*Treat	-0.160	-0.463
	(0.552)	(0.543)
N	300	300
r2	0.78	0.82
Industry F.E.	Yes	Yes
Industry Trends	Yes	Yes
Year F.E.	Yes	Yes
State F.E.	Yes	Yes
State Trends	Yes	Yes
Control Variables	No	Yes

Source: Authors' calculation based on ASI data.

 Notes: This regression is estimated at a two-digit industry*state*year level. *** statistical   significance at 1%; ** statistical significance at 5%; * statistical significance at 10%.

Robustness Checks

In this section, we test the robustness of the impact of the reforms in Rajasthan on employment. We use the establishments in the Indian states of Gujarat, Madhya Pradesh, Haryana, Uttar Pradesh as a control group (Panel A, B, C, D, and E of Table 11). We also estimate the DID in Equation 1 by assuming the control group as all the formal manufacturing establishments in India except those in Rajasthan (Panel F of Table 11). The results indicate that Rajasthan's labour reforms negatively impacted the total number of employees in an establishment. Moreover, this decline in employment is primarily through the decline in employment for directly employed workers. These results are qualitatively and quantitatively, similar to the main results in Table 6, which indicate the labour laws' deregulations to cause a decline in employment.

We also limit the sample of establishments to the census sector and a balanced panel (Panel G and Panel H of Table 11). These establishments are larger, with greater than 100 employees. We do not notice a significant fall in the number of employees, but we notice a shift in the usage from directly employed workers to contractual workers. Worryingly, we find the labour deregulations in Rajasthan cause a decline in the direct workers and an increase in the

contractual workers in these types of establishments. Further, in panel I of Table 11, we control a treatment group-specific trend for further robustness (Bossler and Hans-Dieter Gerner 2020). Similar to the baseline results, we find the reforms to cause a decline in employment by 3.2per cent after controlling for treatment-specific trends. We further perform a regression-based placebo test and artificially assign the treatment period in 2012-13 and find the opposite sign of our baseline results (Panel J of Table 11).

Table 11: Effect of the labour reforms on employment for various specifications and various samples

	Log Employees	Log Contractual Workers	Log Direct Workers	Contractual to Total Workers Ratio	Direct to Total Workers Ratio
Panel A: Control group are the establishments in Gujarat					
*Post*Treat*	-0.028**	-0.003	-0.048*	0.000	-0.009
	(0.001)	(0.002)	(0.004)	(0.001)	(0.002)
N	29236	10272	26801	29118	27196
r2	0.50	0.27	0.20	0.05	0.07
Panel B: Control group are the establishments in Madhya Pradesh					
*Post*Treat*	-0.067**	-0.052**	-0.088*	-0.004	-0.003
	(0.002)	(0.001)	(0.011)	(0.004)	(0.000)
N	15937	5177	14409	15823	14677
r2	0.48	0.29	0.23	0.06	0.08
Panel C: Control group are the establishments in Haryana					
*Post*Treat*	-0.082*	-0.057*	-0.092**	-0.027	0.006
	(0.009)	(0.006)	(0.002)	(0.011)	(0.010)
N	19651	7999	17184	19510	17651
r2	0.48	0.25	0.19	0.05	0.06
Panel D: Control group are the establishments in Uttar Pradesh					
*Post*Treat*	-0.024*	0.063	-0.077*	0.007*	-0.023**
	(0.003)	(0.017)	(0.006)	(0.001)	(0.001)
N	26608	9446	24425	26487	24791
r2	0.50	0.23	0.19	0.05	0.06
Panel E: Control group are the establishments in all the neighbouring states of Rajasthan					
*Post*Treat*	-0.041**	0.011	-0.068***	-0.004	-0.010
	(0.011)	(0.024)	(0.012)	(0.005)	(0.005)
N	73328	26089	67122	73054	68204
r2	0.50	0.23	0.19	0.03	0.05
Panel F: Control group are the establishments in all the Indian states except Rajasthan					
*Post*Treat*	-0.042***	-0.017	-0.059***	-0.005*	-0.006**
	(0.004)	(0.012)	(0.006)	(0.003)	(0.002)
N	209474	74889	191922	208572	194956

r2	0.49	0.21	0.20	0.02	0.04
Panel G: Establishments in the census sector					
Post*Treat	-0.024	0.107**	-0.037*	-0.004	-0.012*
	(0.006)	(0.005)	(0.004)	(0.001)	(0.002)
N	10300	3737	9346	10259	9530
r2	0.53	0.24	0.26	0.07	0.08
Panel H: Balanced panel					
Post*Treat	-0.020	0.056*	-0.058**	0.012*	-0.025*
	(0.003)	(0.005)	(0.003)	(0.002)	(0.002)
N	5107	2102	4826	5104	4873
r2	0.50	0.23	0.30	0.10	0.11
Panel I: Controlling Treatment group-specific trends					
Post*Treat	-0.032***	-0.043	-0.013	-0.008**	-0.004
	(0.000)	(0.007)	(0.004)	(0.000)	(0.002)
N	20128	6411	17579	20012	18021
r2	0.51	0.27	0.26	0.05	0.07
Panel J: Placebo test: Treatment period artificially assigned as 2012-13					
Treat*2012dummy	0.011*	-0.054	0.020	0.008	0.005
	(0.002)	(0.050)	(0.005)	(0.001)	(0.002)
N	20128	6411	17579	20012	18021
r2	0.51	0.27	0.26	0.05	0.07

Source: Authors' calculation based on ASI data.

Notes: Robust standard errors clustered at the state level in parentheses. *** statistical significance at 1%; ** statistical significance at 5%; * statistical significance at 10%. We have controlled Post, Treat, plant fixed effects, year fixed effects, industry trends, and various other plant controls in all the regressions.

Conclusion

In this paper, we empirically examined the impact of the 2014 labour laws deregulations in the Indian state of Rajasthan on plant employment and performance. The reform in the labour laws allowed us to utilise a quasi-natural experimental research design. We use a difference-in-difference specification to the establishment-level ASI panel data to examine the effects of Rajasthan's labour reforms.

Our empirical analysis shows the reforms to have an unintended consequence of the decline in labour use. The implications regarding employment are similar to those presented by

D'Souza (2010); Kapoor (2014); Chandru(2014); Chatterjee and Kanbur (2015); Deakin and Haldar (2015); Roychowdhury (2019a); Roy, Dubey, and Ramaiah (2020) in the sense that higher flexibility is associated with weaker employment growth. Also, worryingly, the increased flexibility results in a disproportionate reduction in the directly employed workers. Heyes and Lewis (2015) and Avdagic (2015) find similar results for the European Union. If we consider plants as those affected under the Industrial Disputes Act (1947) reforms, then we find these "affected" plants expand in labour use due to the reforms. If we consider the plants that fall directly under the Contract Labour (Regulation and Abolition) Act (1970) reforms, then we find that these "affected" plants experience greater use of contractual workers proportion. We also find the reforms to cause the plants in the labour-intensive industries to restructure its production mix by reducing the labour use and preferring more directly employed workers. On the other hand, the labour laws' flexibility caused the plants in export-oriented industries to use more contractual workers. We also evaluate labour laws' reforms on the plants' outcomes beyond the employment effects and find a positive impact on GVA and productivity.

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[i] The adverse impact of the strict labour laws have been discussed for other countries also; like Yoo and Kang (2012) and Baek and Park (2018) for South Korea, Ingham and Ingham (2011) for Poland, Bossler and Gerner (2020) for Germany .

[ii] We exclude the variable as a control that is the dependent variable for a particular regression specification.

[iii] Capital intensity is the ratio of fixed capital to total persons engaged.