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We examine implications of industrial deregulations, trade liberalisation and labour regulations on workers' bargaining power and firms' markup in Indian manufacturing industries, using state-wise three-digit industry-level panel data for the period 1980-2007. Results of our econometric analysis suggest that both industrial deregulations and trade liberalisation led to significant declines in workers' bargaining power, which was already less than 6.7% on an average during pre-reform era. However, none of these reforms appears to have any significant effect on firms' markup. Our results also suggest that amendments to labour regulation by State governments, which aim to simplify procedures and reduce costs of industrial dispute resolutions, have a significant positive effect on workers' bargaining power. Surprisingly, amendments to Employment Protection Legislations do not appear to have any significant effect on workers' bargaining power. We also document considerable variation in firms' markup and workers' bargaining power across industry-groups and States.

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JEL Code: J50, L13, F16, L60, O14

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1. Introduction

This paper attempts to estimate workers' bargaining power and firms' markups (price-marginal cost ratios) in Indian manufacturing industries over the 27 years period from 1980, spanning the two major reform episodes – industrial deregulations and trade liberalisation. In particular, we are interested to answer the following questions. What are the effects of industrial deregulations and trade liberalisation on workers' bargaining power and firms' markup? Does pro-worker labour regulation enhance workers' bargaining power? To what extent workers' bargaining power and firms' markup vary across different manufacturing industries and States in India?

The division of economic surplus between capital and labour owners has for long been at the cynosure of the distributional conflict. While there are long standing disagreements among economists regarding the effects of economic growth on shares of labour and capital owners, recent empirical studies seems to suggest that since the advent of the twenty first century there has been a significant spurt in capital income with a corresponding stagnation of labour incomes (Piketty, 2014; OECD, 2011). Thus, in the era of increasing globalisation, skepticism surrounds depressing industrial wages, employment and its consequences across the developed and developing world.

It is argued that increased globalisation augments elasticity of labour demand, since it makes labour input increasingly substitutable via outsourcing, trade and foreign investments (Rodrik, 1997). It follows that increased globalisation impinges on workers' bargaining power, since higher elasticity of labour demand results in relatively weaker labour union. However, empirical studies on the indirect negative effect of globalisation on workers' bargaining power, via its positive effect on labour demand elasticity, offer a rather mixed verdict. While Hasan et al. (2007) document that there is a significant positive impact of economic liberalisation on labour demand elasticity in India, Slaughter (2001), Krishna et al. (2001) and Haouas and Yagoubi (2008) document that there is no clear evidence in support of Rodrik (1997)'s argument in the

case of the US, Turkey and Tunisia, respectively. Nonetheless, globalisation may affect workers' bargaining through other channels as well.

According to the Heckscher-Ohlin-Samuelson (HOS) model and the Stolper Samuelson effect, owners of the abundant factors of production of a country will gain from increased trade liberalisation at the cost of owners of scarce factors of production of that country, since a country's exports will embody its abundant resources and its imports will comprise of factors that are scarce in that country. It suggests that, in labour surplus economies like India, trade liberalisation would enhance labour demand and, thus, increase workers' bargaining power. Further, firms are likely to face more competition due to industrial deregulations and greater integration of product markets around the world. Adverse effects of more intense product market competition on a firm's profitability might induce its labour union to make sacrifices, in order to facilitate the firm to gain competitive advantage. On the other hand, increased product market competition due to entry of new firms may enhance workers' outside options and, thus, their bargaining power.[1] Overall, the effects of industrial deregulations and globalisation on workers' bargaining power and firms' markup remain open for empirical investigation.

Recently, a number of studies have attempted to estimate workers' bargaining power and firms' markup simultaneously, by adopting a more direct approach that allows for imperfections in both product and labour markets. For example, using data from manufacturing industries in Belgium for the period 1988-1995, Dobbelaere (2005) demonstrates that estimates of firms' markup will be downwardly biased, if labour market imperfections are ignored. She also argues that workers' bargaining power and firms' markup are positively associated. Brock and Dobbelaere (2006) extend this analysis to examine the effects of international trade and foreign direct investment on workers bargaining power and find that the effect is negligible. Dumont et al. (2006) document that in France and Germany workers' bargaining power was significantly higher than that in Italy and UK during the period of 1994 to 1998. Hirsch et al. (2011) conclude that workers' bargaining power in Germany fell by about 33 per cent between 1999 and 2007. Boulhol et al. (2011) find that in UK's manufacturing sector both the workers' bargaining power and firms'

[1] See, for example, Dowrick (1989) for a theoretical analysis of implications of product market competition on labour unions' behavior.

markup have declined significantly during 1994 to 2003. Using an unbalanced panel of French manufacturing firms from 1978 to 2001, Dobbelaere et al. (2008) argue that imperfect competition in the product market and efficient bargaining (i.e., bargaining over both employment and wage) in the labour market are the most common. This stream of literature has primarily concentrated on developed economies. Little is known about the implications of industrial deregulations and trade liberalisation on workers' bargaining power in developing economies, where the dynamics of workers' bargaining power and firms' markup may pan out quite differently.

In recent years print and electronic media has reported various cases of strife among the manufacturing sector workers from different regions of India. These include the large scale violence at the Manesar plant of Maruti Suzuki (The Hindu Business Line 2012) and Honda Motorcycle and Scooter India Private Limited (HMSI) (The Hindu Business Line 2005) among others. Similar incidents have been reported from Odisha's Bolangir in 2011, Tamil Nadu's Coimbatore in 2009 and Uttar Pradesh's Greater Noida in 2008 (The Hindu Business Line 2011). These anecdotal evidences seem to suggest that the distributional inequality in Indian context has manifested into a growing sense of injustice and discontentment amongst the industrial labour force in recent decades. It highlights the importance to assess the dynamics of workers' bargaining power across different manufacturing industries in countries like India.

Drawing on recent empirical literature, we estimate sub-period wise workers' bargaining power and firms' markup, simultaneously, in Indian manufacturing industries during 1981-2007. Results of generalised methods of moments (GMM) estimations reveal that union-firm bargaining frameworks in Indian manufacturing industries can be considered to be 'efficient bargaining'. However, workers could exercise a very low bargaining power. While in the pre-industrial deregulation era (1980-1985) workers' bargaining power was only 0.0666, it declined by more than 34.53 percent due to industrial deregulations during 1986-1990 and this declining trend continued in subsequent periods which witnessed trade liberalisation as well. Joint effect of industrial deregulations and trade liberalisation brought down workers' bargaining power to just 0.0194 during 2000s. It implies that both industrial deregulations and trade liberalisation has led to significant decline in workers' bargaining power in Indian manufacturing industries. On the

other hand, we find that firms' markup also declined to some extent. However, it appears that neither industrial deregulations nor trade liberalisation had any significant effect on PCM in Indian manufacturing industries. This result is in sharp contrast to the findings of existing studies, which attempts to examine the implications of deregulations on PCM without controlling for labour market imperfections.

Analysis of this paper also reveals that amendments to labour laws that regulate procedures of dispute resolution and reduce the cost of such disputes significantly improve the bargaining power of workers. However, amendments to Employment Protection Legislations and Industrial Dispute Act do not have any significant impact on workers bargaining power. This result seems to be consistent with Ahsan and Pages (2008)'s finding that amendments to disputes resolution procedures have a greater effect on output of Indian manufacturing sector compared to that of amendments to employment protection legislations. Thus, it appears that greater flexibility of firms to hire and fire workers need not necessarily be detrimental for workers' bargaining power in India, unlike as commonly perceived. We also document that there is considerable variation in terms of both firms' markup and workers' bargaining power across different manufacturing industries and States in India.

We mention here that there are two studies, which are closely related to the present paper. Using firm level data from 1988 to 2008 Ahsan and Mitra (2014) examine the effect of tariff reduction on workers' bargaining power in India and Maiti (2012) analyses two digit ASI data for the period 1998-2005 to assess the effects of exports and imports on workers' bargaining power. This paper differs from the two studies in following respects. First, unlike Ahsan and Mitra (2014), estimation strategy of this paper allows us to estimate workers' bargaining power and firms' price cost margins simultaneously without resorting to any proxy for markup. Moreover, we can verify whether Right to Manage (RTM) model or the Efficient Bargaining (EB) model is more suitable to explain union-firm bargaining in Indian context. Second, Ahsan and Mitra (2014) and Maiti (2012) exclusively focus on tariff reduction and value of exports and imports respectively, though industrial deregulations and trade liberalisation has other dimensions as well. This paper adopts an alternative strategy that allows us to trace overall impact of industrial deregulations and trade liberalisation on workers' bargaining power and firms' markup. Third,

note that in India, the reform process picked up steam in the mid-1980s when the industrial deregulations were initiated with dismantling of the 'licence-permit raj'. This was followed by trade liberalisation measures in the wake of a foreign exchange crisis in 1991. Thus, the overall economic reforms had a progressive impact on the variables of interest and therefore, the implications of these reforms in short run may be different from those in the long run. Unlike existing studies, the present analysis addresses this issue. Fourth, it is necessary to consider sufficiently long time periods, both before and after reforms, in order to assess implications of reforms on variables of interest. Consideration of data from 1981-2007 allows us to do so. Fifth and most importantly, unlike the existing studies, this paper examines the effects of labour regulations on workers' bargaining power.

The rest of the paper proceeds as follows. Section 2 provides a brief description of the policy background. Section 3 presents the econometric methodology and estimation issues. Section 4 describes data and descriptive statistics. Estimation results are analyzed in Section 5. Section 6 concludes.

2. Policy Background

In this section we briefly describe the industrial and trade policies and labour regulations in India, with a special focus on the manufacturing sector.

2.1 Industrial and Trade Policies

Pre Industrial Deregulation Era (Pre 1986)

On the eve of Independence, rapid industrialisation was viewed as an indispensable cog in the wheel for India's arduous climb to economic self-sufficiency, growth and development. However, self-sufficiency soon became a defense for massive import substitution and protectionist policies (Bhagwati and Panagariya, 2012). In an attempt to chart out a clear road map, the first industrial policy resolution was announced in 1948. With the Constitution in place by 1950, the Industrial (Development and Regulation) Act 1951 (IDRA) came into existence with the objective of regulating the pattern of industrial development via licensing. This was the precursor to the Industrial policy Resolution of 1956, which laid emphasis on the heavy industries to accelerate growth. In light of capital scarcity and the risks associated, the resolution

assigned a pivotal role to the central government to shoulder the responsibility for industrial development. The resolution of 1956 classified industries into three categories. The first category consisted of 17 industries under the exclusive domain for the government. The second comprised of 12 industries where the private sector was expected to complement the role of the state. The third contained the remaining industries where the private sector was expected to take lead but remained open to the state (Jadhav, 2005).

Since the objective was to attain self-sufficiency without impinging on efficiency, the import controls were relaxed via the expansion of Open General Licensing (OGL) during the first five year plan (1951-56) and this marked a brief period of "progressive liberalisation" (Bhagwati and Desai, 1970). However, due to the foreign exchange constraints in 1956, the trend was reversed and import controls were reinstated (Panagariya, 2004). This trend persisted through the 1960s and early 1970s, with a strong focus on import substitution of goods via domestic production. However, these policies led to a spurt in demand for import of capital goods, which were not locally manufactured or produced in scarce amounts. Though there was an attempt to cater to this demand of capital goods locally via investment in research and development, the increasing costs and erosion of competitiveness gave way to increased imports by end of 1970s.

The Industrial Deregulations Era (1986 to 1990)

Panagariya (2004) argues that the Industrial Deregulations were of greater importance than what is commonly perceived. Tentatively, these deregulations picked up steam by the middle of 1980s and were largely in place by 1988. Several industrial controls were dismantled during this period and de-licensing received major boost. In 1986, provision of broad banding was introduced. This allowed firms in 28 industrial groups to switch production in similar production lines. This list was further expanded and allowed increased flexibility to various industries in optimising on their production. Moreover, industries which had utilised 80 percent of its installed capacity in any of the five years preceding 1985 were allowed to expand its capacity to 133 percent of maximum capacity utilisation. The firms which were subjected to the Monopolies and Restrictive Trade Practices (MRTP) Act could not reap benefits of the easing of the licensing norms. However, the asset limit to qualify under the MRTP Act was raised from Rs. 200 million to Rs. 1,000 million. Also, MRTP clearance requirements for 27 industries were waived off

completely. Moreover, by 1990, the investment limits below which no licenses were warranted was raised to Rs.500 million in the backward areas and to Rs. 150 million in others regions (Panagariya, 2004). In addition, whereas all industries with a minimum installation of Rs. 3.5 million worth of fixed capital were subject to licensing, only 27 major industries remained under its purview. Also, the asset ceiling for industries under the small scale industries (SSI) reservations was raised from Rs. 2 million to Rs. 3.5 million, thus fostering competition and ameliorating efficiency.

Though the industrial sector witnessed increased robustness from the deregulation process, the Gross Domestic Product (GDP) growth rates during this period were also being fuelled by increased external borrowing and public expenditure. Despite a steeper growth in exports than imports, the difference between the two remained sizable due to the initial mismatch. The level of external debt remained high and increased from 20.6 billion dollars in 1980-81 to 64.4 billion dollars by 1989-90 (Joshi and Little, 1994). Besides external borrowing, the rising current government expenditures on defense, subsidies, interest obligations, fourth pay commission among others also contributed to the growth in GDP (Srinivasan and Tendulkar, 2003). Thus, high public expenditure and external borrowing, coupled with the first Gulf War culminated into unsustainable fiscal deficits and an eventual foreign exchange crisis in 1991.

Liberalisation (1991 onwards)

Following the foreign exchange reserve crisis of 1991, a comprehensive economic liberalisation program was undertaken by July 1991. To overhaul the existing set up, sweeping reforms was undertaken by the government under the stewardship of P.V. Narasimha Rao. Various import controls were abolished, licensing regime was dismantled, taxes were reduced, currency devalued and public sector monopolies broken (Das, 2000). The entrepreneurial confidence also turned bullish with the belief that markets would be given a priority over the domineering government in the functioning of the economy and that the state intervention would require valid justification rather than it being accepted as a rule (Panagariya, 2004).

Also, the 1991 reforms revoked the exchange rate controls and a dual exchange rate system was introduced in 1992. This facilitated the exporters to trade 60 percent of foreign exchange on the

free market and sell the remaining to the government at a lower price. Following this step, the official exchange rate was unified with the market exchange rate. In addition, importers were allowed to purchase foreign exchange in the open market. The measures eventually led to India complying with International Monetary Fund's (IMF) article VIII obligation which made rupee convertible on the current account[2] (Panagariya, 2004).

The New Industrial Policy (1991) officially dismantled the investment licensing, restricted public sector monopoly and did away various entry restrictions on firms under the ambit of MRTP Act. In the immediate aftermath of liberalisation in 1991, the import licensing procedures on intermediate goods and capital goods were completely removed. The licenses on consumer goods were revoked in 2001 and today, except a few items restricted on grounds of health, environment, safety and a few others that are canalised, almost all goods can be imported without a license (Panagariya, 2004). The quantitative restrictions on imports were also gradually removed by 2002. In addition, there was gradual compression of the top tariff rates, which collapsed to 85 percent in 1993-94 and subsequently to 50 percent in 1995-96, accompanied with reduction in the number of tariff bands. Also, automatic approval of foreign technology agreements and foreign direct investment of up to 51 percent were approved by 1992 to attract foreign investment (Panagariya, 2004).

However, as per some commentators, the most disappointing aspect of the liberalisation has been the lack of growth and contribution of the manufacturing sector in the overall Gross Domestic Product (GDP). This poor growth has often been attributed to harsh and restrictive labour laws in India (Bhagwati and Panagariya, 2012). Thus, we look into the evolution and status of labour laws in India.

2.2 Labour Regulations

Under the article 246 of the Indian Constitution, labour and related issues come under the Concurrent list. It allows both the Union and the State governments to promulgate laws on the subject. Despite India having a natural comparative advantage in labour intensive mode of

[2] Article VIII stipulates that the member countries cannot impose restrictions on making payments or transfers towards current international transactions, practice discriminatory currency arrangements without the approval of the fund

production, in recent years it has been argued that labour laws in India are highly pro workers and this has led to distortions in the labour market with firms increasingly moving towards capital intensive mode of production (Datta and Sil, 2007). The four critical piece of legislations concerning labour regulation are The Industrial Employment (Standing Orders) Act (1946), Trade Unions Act (1926), Industrial Disputes Act (IDA, 1947) and Contract Labour (Regulation and Abolition) Act 1970. While these central legislations provide broad guidelines to states, most of the state governments have amended to weaken or strengthen various provisions of these legislations from time to time. As a result, there is wide variation across states and over time in terms of labour legislations.

The Industrial Employment Act stipulates that the status of industrial employee along with information on working and recruitment conditions, holidays and leaves, misconduct, discharge, disciplinary action among others must be shared with the worker clearly. The act allows for severance pay and is applicable to all industries across India which employs 50 or more workers (Pal and Saha, 2014). In addition, Workers are allowed to organise into trade unions as per the Trade Union Act (1926), which allows them to express grievance and discontentment, promote political and civil interests along with engagement in collective bargaining agreements with the employer. The act was amended in 1964 and its section 4 allowed seven or more workers to constitute a trade union. The Act also allowed half of the office bearers of the union to outsiders and such a clause is unique to India and does not exist in any other country (Nath, 2006 ; Datta and Sil, 2007). Importantly, trade union members and office bearers are immune from criminal and civil proceedings in relation to legitimate trade union activities, a provision that has been open to misuse. Also, there has been increased skepticism regarding the representative nature of trade unions due to lack of provisions for secret ballot voting for matters concerning workers' welfare or calling for strikes. This has led to proliferation of trade unions within the same establishment (Nath, 2006; Pal and Saha, 2014). The regulatory provisions of the amended Trade Unions Act (1964) continued to be in force until it was finally amended in 2001. As per the amendments, a registered trade union was stipulated to have at least 10 percent or 100 workers as members with a minimum of seven members engaged in the establishment or industry. Importantly, the 2001 amendment restricted the number of outside office bearers of the union to five or one third share, whichever is lower. With liberalisation and easing of government

controls, the bargaining agreements have become increasingly decentralised with weakened need for political support (Pal and Saha, 2014).

The formal sector manufacturing firms employing at least 10 workers and deploying electricity or 20 workers without electricity, must be registered under the Factories Act (1948). Unlike the contract workers, the permanent workers are protected under various labour legislations such as the IDA (1947). IDA governs the industrial disputes for the permanent workers and establishes the legitimacy of strikes and lockouts, lists out provisions and regulations for retrenchment, closure, associated compensation. It also covers steps for resolution of industrial disputes in a three tier adjudication system where internal reconciliation is followed by the dispute being visited by labour courts and tribunals. Though the legislation prohibits strikes in public utilities without notice, no such criterion exists for private establishments. The Act has undergone several amendments. In 1976, chapter V (B) was added to the legislation as per which the firms with greater than or equal to 300 permanent workers had to consult the labour department before retrenchment, layoff or closure of the unit. Such permission was often difficult to secure, even when the unit was unprofitable (Bhagwati and Panagariya, 2012). In 1982, this section was amended and applied to workers greater than or equal to 100. Moreover, states have amended the act various times to suit their local requirements. For example, states such as Andhra Pradesh have made amendments to make the Act more congenial for employers whereas states like West Bengal have sided with the workers' unions (Pal and Saha, 2014).

It must be noted that contract workforce is not covered under the IDA. However, firms employing more than 20 workers are obligated to provide a minimum of health, safety standards and pay a minimum wage under the Contract Labour (Regulation and Abolition) Act (1970). Unlike the popular belief, existence of contract labour does not allow greater flexibility in production to employers in a legitimate manner. The Supreme Court of India in 1960 and then in 1972 pronounced that if work done by the contract labour is in domain of the core activity carried out by the employer, then the worker must be absorbed as a regular worker and conract labour of this nature should be abolished. Though the regulatory framework is often viewed as pro workers, under the large scale flouting of norms and laws, the debate of rigidity in labour

laws impeding growth in manufacturing output and employment is an obscured one (Datta and Sil 2007).

3. Methodology

Hall (1988) provides a method to estimate markup through the estimation of the Solow residual, when price and marginal costs are not observable. However, this method relies on the assumption that the labour market is perfectly competitive, although bargaining between labour unions and firms is a widely observed phenomenon. As a result, estimates of markup based on Hall (1988)'s method are biased. Crepon et al. (1999, 2005) extend Hall (1988)'s framework to allow for imperfections in input markets. Subsequently, several studies, including Dobbelaere (2005), Brock et al. (2006), Dobbelaere et al. (2008), Abraham et al. (2009) and Dobbelaere and Mairesse (2011), have estimated markup and workers' bargaining power by considering this extended framework or its variations. Following this stream of literature, we estimate workers' bargaining power, firms' markup and scale factor, simultaneously, as described below.

We consider that the production function of firm *i* and at time *t* is as follows.

$$Q_{it} = \emptyset_{it} F(L_{it}, K_{it}, M_{it}) , \quad (1)$$

where *Q* denotes output, *L* denotes labour, *K* denotes capital, *M* denotes raw material and $\emptyset$ is the technological parameter. The function *F*(.) is considered to be homogenous of degree $(1+\lambda)$. $\lambda = 0$ indicates constant returns to scale and $\lambda < 0$ $(\lambda > 0)$ indicates decreasing (increasing) returns to scale. We do not assume any specific value of λ a priori. Expressing equation (1) in growth terms, we get the following.

$$\Delta q_{it} = \Delta\theta_{it} + \left(e_L^Q\right)_{it} \Delta l_{it} + \left(e_K^Q\right)_{it} \Delta k_{it} + \left(e_M^Q\right)_{it} \Delta m_{it}, \quad (1a)$$

where q_{it}, θ_{it}, l_{it}, k_{it} and m_{it} denote natural logarithms of Q_{it}, $\emptyset_{it}$, L_{it}, K_{it} and M_{it}, respectively, and e_j^Q is the elasticity of output with respect to factor inputs with *j*= *L*, *K*, *M*. Clearly, the Solow residual, which accounts for the productivity growth, can be expressed as follows.

$$SR_{it} = \Delta q_{it} - \left(e_L^Q\right)_{it} \Delta l_{it} - \left(e_K^Q\right)_{it} \Delta k_{it} - \left(e_M^Q\right)_{it} \Delta m_{it}. \quad (2)$$

Now, let us consider that the objective function of firm *i*'s labour union at time *t* is given by

$$U(w_{it}, L_{it}) = [L_{it}v(w_{it}) + (L_{it}^{*} - L_{it})v(w^{*}_{it})] - L_{it}^{*}\, v(w^{*}_{it})$$
$$= L_{it}\,[v(w_{it}) - v(w^{*}_{it})]\,, \qquad (3)$$

where L^* is the total union membership, L is the level of employment in the firm, w^* is the alternative wage rate, w is the wage rate offered by the firm and $v(.)$ is the utility function of any individual worker: $L^* \geq L \geq 0$, $w \geq w^*$, $v'(.) > 0$ and $v''(.) < 0$ (i.e. individual workers are risk averse).

We consider that the firm retains the right to decide the amounts of capital and raw material, while the level of employment and wage rate are determined through bargaining with its labour union. That is, the amount of capital (raw material) will be such that marginal revenue product of capital (raw material) equals its price. The amounts of capital and raw material are considered to be fixed at the bargaining stage. Thus, we can write the union-firm bargaining problem as follows.

$$\underset{w_{it}, L_{it}}{\text{Max}}\; Z(w_{it}, L_{it}) = [L_{it}\{v(w_{it}) - v(w^{*}_{it})\}]^{\rho}[R_{it} - w_{it}L_{it}]^{(1-\rho)}, \qquad (4)$$

where ρ $(0 \leq \rho \leq 1)$ and $(1-\rho)$ denote bargaining powers of the union and the firm, respectively, and R denotes the revenue of the firm. Clearly, higher value of ρ indicates higher bargaining power of workers.

From the first order conditions of (4) we get (omitting subscripts),

$$w = \frac{\partial R}{\partial L} + \left(\frac{\rho}{1-\rho}\right)\left(\frac{R - wL}{L}\right) \quad \text{and} \qquad (5)$$

$$v(w) = v(w^{*}) + \left(\frac{\rho}{1-\rho}\right)\left(\frac{R - wL}{L}\right)v'(w) \qquad (6)$$

Clearly, wage premium $\left(w - \frac{\partial R}{\partial L}\right)$ and individual workers' gain in utility $(v(w) - v(w^*))$ are increasing in union's bargaining power ρ. Now, let μ be the mark-up, i.e. the ration of output price over marginal cost ($C_Q = \partial C/\partial Q$). That is,

$$\mu = \frac{P}{\partial C/\partial Q} \qquad (7)$$

Note that firm's profit maximisation with respect to output results in marginal revenue equal to marginal cost: $R_Q = C_Q$. Also, $R_L = R_Q Q_L$. Thus, $R_L = C_Q Q_L = \frac{PQ_L}{\mu}$, by (7). Substituting this expression for R_L in (5) we get, $w = \frac{PQ_L}{\mu} + \left(\frac{\rho}{1-\rho}\right)\left(\frac{R-wL}{L}\right) \Longrightarrow \frac{\delta Q}{\delta L} = \left[w - \left(\frac{\rho}{1-\rho}\right)\left(\frac{R-wL}{L}\right)\right]\frac{\mu}{P}$.

Multiplying both sides by *L/Q* we get the following.

$$e_L^Q = \alpha_L \mu - \left(\frac{\mu\rho}{1-\rho}\right)(1-\alpha_L), \tag{8}$$

where $\alpha_L = \frac{wL}{PQ}$ is the share of labour out of total revenue.

As mentioned before, the firm unilaterally decides the amount of material and capital before bargaining with its labour union takes place. Thus, firm *i*'s profit at time *t* can be written as $\pi_{it} = R_{it} - w_{it}L_{it} - j_{it}M_{it} - r_{it}K_{it}$, where $j = \frac{\partial R}{\partial M}$ and $r = \frac{\partial R}{\partial K}$. The elasticity of output with respect to raw material can be expressed as follows.

$$e_M^Q = \frac{\partial Q}{Q}\frac{M}{\partial M} = \mu\, \alpha_M, \tag{9}$$

since $C = wL + jM + rK$ and $R = PQ$ implies that $\frac{\delta C}{\delta M} = j = \frac{\delta R}{\delta M} = \frac{P\delta Q}{\delta M} + \frac{Q\delta P}{\delta M}$, and we have $\mu = P/C_Q$ and $\frac{\delta R}{\delta M} = j$.

Now, since *F*(.) is homogenous of degree $(1 + \lambda)$, using (8) and (9) we can write the elasticity of output with respect to capital (e_K^Q) as follows.

$$e_K^Q = 1 + \lambda - e_L^Q - e_M^Q = 1 + \lambda - \alpha_L\mu - \alpha_M\mu + \mu\left(\frac{\rho}{1-\rho}\right)(1-\alpha_L). \tag{10}$$

Since, the Solow residual accounts for that part of output growth which cannot be explained by contributions of factor inputs, we can write

$$SR \equiv \Delta q - \alpha_L\, \Delta l - \alpha_M\, \Delta m - \left(1 - \alpha_L - \alpha_M\right)\Delta k \ . \tag{11}$$

We can also write

$$\Delta q = \Delta q\left(\frac{\mu-1}{\mu} + \frac{1}{\mu}\right), \tag{12a}$$

$$-\alpha_L\Delta l = \left(\frac{\rho}{1-\rho}\right)(\alpha_L - 1)\Delta l - \frac{\frac{1}{\mu}\mu\rho}{1-\rho}\,(\alpha_L - 1)\Delta l - \alpha_L\Delta l - \alpha_L\Delta l$$

$$= \left(\frac{\rho}{1-\rho}\right)(\alpha_L - 1)\Delta l + \frac{1}{\mu}\left(-\alpha_L \mu \Delta l + \frac{\mu\rho}{1-\rho}(1-\alpha_L)\Delta l\right)$$

$$= \left(\frac{\rho}{1-\rho}\right)(\alpha_L - 1)\Delta l + \frac{1}{\mu}(-e_L^Q \Delta l), \text{ by (8),} \qquad (12b)$$

$$-\alpha_m \Delta m = -\frac{1}{\mu}\,\mu\,\alpha_m \Delta m = -\frac{1}{\mu} e_M^Q \Delta m, \text{ by (9), and} \qquad (12c)$$

$$-\Delta k(1-\alpha_L-\alpha_M) = \Delta k\left(-1+\frac{1}{\mu}-\frac{1}{\mu}+\frac{\lambda}{\mu}-\frac{\lambda}{\mu}+\frac{\rho}{1-\rho}(\alpha_L-1)-\frac{\rho}{1-\rho}(\alpha_L-1)+\alpha_L+\alpha_M\right)$$

$$= -(\tfrac{\mu-1}{\mu})\Delta k + \frac{\lambda}{\mu}\Delta k - \frac{\rho}{1-\rho}(\alpha_L-1)\Delta k + \frac{1}{\mu}(-e_K^Q \Delta k), \text{ by (13).} \qquad (12d)$$

From 11, (12a), (12b), (12c) and (12d), we get

$$SR = \frac{(\Delta q - \Delta k)(\mu-1)}{\mu} + \frac{\lambda}{\mu}\Delta k + \frac{\rho}{1-\rho}(\alpha_L - 1)(\Delta l - \Delta k) + \frac{1}{\mu}(\Delta q - e_L^Q\,\Delta l - e_M^Q\,\Delta m - e_K^Q\,\Delta k). \qquad (13)$$

Now, from (1a) and (13), we get the following.

$$SR = \frac{(\mu-1)}{\mu}(\Delta q - \Delta k) + \frac{\lambda}{\mu}\Delta k + \frac{\rho}{1-\rho}(\alpha_L - 1)(\Delta l - \Delta k) + \frac{1}{\mu}(\Delta\theta\ \ ). \qquad (14)$$

Let,

$(\Delta q_{it} - \Delta k_{it}) = LER_{it}$,

$\left(\alpha_{L_{it}} - 1\right)(\Delta l_{it} - \Delta k_{it}) = BAR_{it}$,

$\frac{(\mu_{it}-1)}{\mu_{it}} = \beta_{it}$ and $\frac{\rho_{it}}{(1-\rho_{it})} = \gamma_{it}$. Clearly, β is the Lerner Index of monopoly power and γ is an increasing function on workers' bargaining power. Using these notations, we re-write equation (14) as follows.

$$SR_{it} = \beta_{it} LER_{it} + \gamma_{it} BAR_{it} + \frac{\lambda_{it}}{\mu_{it}}\Delta k_{it} + (1-\beta_{it})\Delta\theta_{it} \qquad (15)$$

We consider the reduced-form equation (15) as the base equation for our econometric analysis. Note that we can compute the Solow residual (SR=$\Delta q\ \ -\alpha_L\ \Delta l\ \ -\alpha_M\ \Delta m\ \ -\left(1-\alpha_L\ -\alpha_M\ \right)\Delta k\ \ $), LER, BAR and Δk using data on output, employment, raw materials used, capital,

share of labour and share of raw material. However, the productivity shock term $(1-\beta_{it})\Delta\theta_{it}$ in equation (15) cannot be observed and, thus, it needs to be considered as the error term in order to estimate (15). By estimating equation (15) we can retrieve workers' bargaining power (ρ) and firms' markup (μ) from the estimated coefficients of *BAR* and *LER*, respectively. Further, note that, if the coefficient of BAR turns out to be significantly different from zero, we can conclude that union-firm pairs are engaged in efficient bargaining (EB); otherwise, union-firm pairs bargain only over wage rates (i.e., right-to-manage bargaining (RTM)) or labour market is close to be perfectly competitive.

Note that the unobserved productivity shock ($\Delta\theta$) can be potentially endogenous. This is because, though productivity shocks are unobservable to researchers, firm's management can forecast it at least to some extent before they decide on specific levels of factor inputs (Boulhol et al. 2011). Thus, explanatory variables may be correlated with the error term. It implies that OLS estimates of equation (15) are likely to be biased and inconsistent (Wooldridge 2002, Abraham et al. 2009 and Boulhol et al. 2011). Harrison (1994) and Boulhol et al. (2011) argue that this problem can be resolved by resorting to a fixed effects approach, by decomposing the productivity growth term, $\Delta\theta_{it}$, into firm specific and time specific fixed effects and a pure disturbance term: $u_{it} = (1-\beta_j)\Delta\theta_{it} = \varepsilon_i + \varepsilon_t + \tau_{it}$. However, productivity shocks can be either systematic or random. Further, since inputs and outputs are simultaneously determined in the model, the fixed effect estimates may still be biased. Also, note that the Solow residual (SR) may be persistent over time, which we have not taken in to account. In that case, we need to include lagged value(s) of the dependent variable in the set of regressors, which makes OLS estimator biased and inconsistent even if productivity shock is not endogenous. In the latter case, if we estimate the model after carrying out a within group transformation or by random effect GLS, estimated coefficients will still be biased and their consistency will depend on the length of time period considered. In order to address both these issues, the Generalised Method of Moments (GMM) approach is particularly useful.

GMM provides a very general framework concerning issues of statistical inference and allows for convenient estimation of dynamic models without exhaustive details of the probability

distribution of data (Baltagi 2001).[3] In this IV approach, instruments are chosen from within the data set and instruments dated (t-2) and beyond are valid as long as there is no serial correlation between the error terms. However, if the levels error is MA(1), one needs to consider higher order lags as instruments. Based on this principle, we use the difference GMM technique as suggested by Arellano-Bond (1991), which leads to unbiased and efficient estimates by utilising all possible orthogonality conditions, to estimate the markups and bargaining power of manufacturing sector in India using an unbalanced panel of three digit industries from 1980 to 2007 following Roodman (2009).

We verify the appropriateness of including of one period lagged dependent variables in regressors using a test for second order serial correlation in the differenced residuals. We also test for suitability of set of instruments using Hansen test of over-identification restrictions. In addition, Roodman (2009) procedure allows us to perform Windmeijer (2005) sample correction to the standard errors in the two-step estimation. We consider difference GMM rather than system GMM, since the test for exogeneity of instruments in difference GMM performs better. In addition, system GMM generates additional instruments which weaken the Sargan/Hansen test statistic (Rodman, 2009).

We have estimated equation (15) and its variations, which are explained in detail in Section 5, both by fixed/random effect method and by GMM. We have controlled for period-specific fixed effects in each regression. We first estimate the model without considering any interactive terms with period dummies in the set of regressors. Next, we have introduced interactions of appropriately defined dummy variables, as described in the following section, with LER, BAR and Δk variables, in order to assess effects of reforms on the coefficients of these variables. Finally, we introduce labour regulation variables, as defined in the following section, in the model.

[3] When the moments are of the form $E(K_i' u_i) = 0$ and the model is exactly identified (L=M), the GMM estimator is the same as the IV approach. However, the advantage of GMM lies in the over-identified models where the numbers of instruments exceed the number of explanatory variables. In such cases, GMM is asymptotically efficient given the weight matrix is optimal. In addition, for cases of heteroskedasticity, the GMM estimates are found to be more efficient than the 2SLS (Soderbom 2009).

4. Data and Descriptive Statistics

4.1 Data

Our analysis is based on a data set of state-wise three-digit manufacturing industries in India from 1980 to 2007 collated from the ASI database. This database includes all factory units registered under the sections 2m (i) and 2m (ii) of the Factories Act (1948), which (a) employ at least 10 workers and use electricity or (b) employ at least 20 workers but does not use electricity. In the data set for the period 1980-1997, industries are classified according to the Industrial Classification (NIC) of 1987, subsequently industries are classified according to NIC-1998 and NIC-2004 for the periods 1999-2003 and 2004-2007, respectively. For consistency, we map each three-digit industry to a unique group of NIC-1987 two-digit industries, on the basis of concordance tables available from the Ministry of Statistics and Programme Implementation (MOSPI), Government of India, New Delhi. This mapping exercise results in 14 distinct industry-groups for the period of study (see Table A2.2 in Appendix 2 for details). On an average, there are about seven three-digit industries under each of these 14 industry groups per state per year. Thus, we have an unbalanced panel data set with 39,047 observations. We have considered all the 15 major States and two Union Territories of India.[4] (See Table A2.1 in Appendix 2 for the list of States/UTs.) We mention here that our sample accounts for about 97.94 percent of total manufacturing output in India.

For the purpose of this analysis, we have collected data on output, capital, number of workers, number of man-days, material used and wages. The value of material inputs is calculated by subtracting the gross value added from gross value of output. Number of man-days employed rather than number of workers is considered as the proxy for labour input in this analysis. This is because, it is likely that at least some factory units operate in multiple shifts and workers also work in more than one shift, which is likely to vary across industries and over time. Nonetheless, we mention here that qualitative results of this analysis go through, if we consider number of workers as a proxy for labour inputs. The list of variables considered and their definitions are

[4] In the latter periods, data for Uttarakhand and Uttar Pradesh have been clubbed to represent the earlier, undivided state of Uttar Pradesh (pre 2000) and facilitate inter year comparisons. Similar exercise has been undertaken for the States of Jharkhand and Chhattisgarh which were also carved out in 2000 from Bihar and Madhya Pradesh respectively. Given its size and industrial activity, our sample includes only Assam from the north-eastern part of India. This is also the only special category state that is part of our sample. We mention here that our results are not sensitive to exclusion of two UTs and Assam from the sample.

provided in Table A2.3 in Appendix 2. All nominal variables have been deflated by Wholesale Price Index for the base year 1982 to convert those in real-terms. The labour and material shares (α_L and α_M) are computed by dividing the labour cost and value of material inputs by the value of output and taking a simple arithmetic average of the ratio over adjacent years.

In order to examine the implications of industrial deregulations and trade liberalisation, we consider the following dummy variables as independent variables in the regression analysis.

$$TD2 = \begin{cases} 1, \text{if year } \geq 1986 \text{ and year} < 1991 \\ 0, \text{otherwise} \end{cases}$$

$$TD3 = \begin{cases} 1 \text{ if year } \geq 1991 \text{ and year} < 2000 \\ 0, \text{otherwise} \end{cases}$$

$$TD4 = \begin{cases} 1, \text{if year } \geq 2000 \\ 0, \text{otherwise} \end{cases}$$

Note that industrial deregulation was initiated in 1986, which was complemented with gradual trade liberalisation starting from 1991. Therefore, the dummy variable $TD2$ controls for effects of industrial deregulations during the second half of 1980s, while $TD3$ and $TD4$ controls for joint effects of industrial deregulations and trade liberalisation during 1990s and 2000s, respectively. Pre-industrial deregulation period (1980-1985) is considered as the base period. Consideration of separate dummy variables for different sub-periods seems to be appropriate, since effects of these reforms are likely to vary over time.[5]

To study the impact of labour regulations on worker's bargaining power, we focus on amendments enacted by state governments to the following central labour laws: (1) laws that regulate the procedures for resolution of industrial disputes, (2) employment protection legislations and (3) the IDA. For laws which impact procedures for resolution of industrial disputes, an amendment is coded as 1, if that amendment expedites dispute resolution and/or reduce the ability of either of the party to initiate and sustain an industrial dispute; 0, if that amendment is considered to be neutral; and -1 (minus one), if that amendment delays resolution of dispute or enhances the ability of either of the party to initiate and sustain an industrial dispute. Amendments which empower the labour courts/tribunals and reduce the average dispute resolution period are judged to expedite the industrial disputes and hence coded as 1. In other

[5] We note that our results go through if we redefine TD3 (=1, if 1991 ≤ year≤ 2000) and TD4 (=1, if year≥2001)

words, amendments that decrease the cost of labour disputes are also coded as 1. Next, turning to amendments to laws that govern job security we consider following categorisation. Any amendment that restricts a firm's ability to fire workers, initiate layoffs or restrict closure of unit is coded as 1. If an amendment is considered to be neutral, that amendment is coded as 0, and an amendment is coded as -1 (minus one) if that amendment enhance the ability of firm to fire workers, initiate lay off or make closure of production units easier. Finally, an amendment to the IDA is coded as 1 if that amendment is considered to be pro-workers, coded as 0 if it is considered to be neutral and coded as -1 (minus one) if that amendment is considered to be pro employer.

For this analysis, we use annual data on amendments by state governments as reported in Ahsan and Pages (2008), which is available for the period 1981-2002 for 15 major States. We mention here that for state-wise scores relating to resolution of industrial disputes and employment protection, we directly refer to Tables 1A and 2B of Ahsan and Pages (2008). We have considered both (a) coding of amendments to IDA as suggested by Besley and Burgess (2004) and extended by Sachdeva (2003), which we refer to as extended Besley-Burgess coding and (b) coding of amendments that takes care of Bhattacharjea (2006) criticism of the Besley-Burgess coding system, which we refer to as Bhattacharjea coding system, separately, in this analysis[6]. Labour regulation dummies LR1_BB and LR1_Bh encapsulate the amendments to IDA as per Besley-Burgess and Bhattacharjea scoring systems, respectively. Similarly, LR2_BB and LR2_Bh are regulation dummies for amendments to laws which regulate procedures of industrial disputes as per Besley-Burgess's and Bhattacharjea's scoring system, respectively. Likewise, LR3_BB and LR3_Bh are dummies for employment protection legislations. Thus, LR ϵ {LR1_BB, LR2_BB, LR3_BB, LR1_Bh, LR2_Bh, LR3_Bh}.

We note here that both markup and workers' bargaining power are likely to vary across firms within an industry. Thus, it seems to be more appropriate to consider firm-level data in order to estimate markup and workers' bargaining power. However, existing firm level databases in India, such as PROWESS of the Centre for Monitoring of Indian Economy, Capitaline database,

[6] Bhattacharjea (2006) argues that seven specific amendments to IDA have been wrongly coded in Besley and Burgess (2004) and, thus, Besley and Burgess (2004)'s coding may generate misleading results.

and the database maintained by the Reserve Bank of India, do not contain information on number of workers or man-days, which is crucial for our estimation. Moreover, these databases do not offer any information on location of firms' production units, which is necessary in order to assess the implications of labour regulations on workers' bargaining power in Indian context. Last, but not the least, these databases collect balance-sheets' information of only large firms, and thus are not representative for Indian manufacturing industries, unlike our sample.

4.2 Descriptive Statistics

We report summary statistics of key variables in Table 1. It shows that the share of labour in overall output of manufacturing sector is on an average around 11 percent. This share increases moderately to about 13 percent if we look at the third quartile in the distribution. This average figure is low in comparison to a few studies for the OECD countries (UK, France and Belgium), where the share of labour is found to be around 28 to 31 percent (Boulhol et al., 2011; Dobbelaere et al., 2008; Dobbelaere 2005). The average share of material inputs in output for India is found to be about 78 percent. This figure as per the above mentioned studies ranges from about 50 percent to 65 percent for the manufacturing sectors in developed economies. Further, the share of labour in output has declined with industrial and trade reforms (see Table 2). The decline in the mean value is observed to be around 24 percent between pre industrial deregulation era (1980-1985) and the second decade of trade liberalisation (2000-2007). The average value of material used, which was already at a high level has increased in this period by about three percent.

Table1: Summary Statistics

Variables	1980-2007				
	Obs.	Mean	SD	Q1	Q3
Real output growth rate	38760	-0.0010	2.8172	-1.6286	1.6279
Labour growth rate	35229	0.0014	2.1185	-1.2888	1.3004
Real capital growth rate	38801	0.0008	2.9649	-1.7580	1.7760
Real Intermediate inputs growth rate	38814	-0.0003	2.8595	-1.6389	1.6422
Share of labour in output (α_L)	38773	0.1129	0.2450	0.0584	0.1261
Share of intermediate inputs in output(α_M)	38773	0.7797	0.1794	0.7187	0.8412
Solow Residual	35183	0.0001	0.7940	-0.1345	0.1350
LER	38735	-0.0005	1.2138	-0.6959	0.6891
BAR	35197	0.0018	1.8491	-0.8739	0.8801

$SR = \Delta q_{it} - \alpha_{L_{it}} \Delta l_{it} - \alpha_{M_{it}} \Delta m_{it} - (1 - \alpha_{L_{it}} - \alpha_{M_{it}}) \Delta k_{it}$

Table 2: Share of Wages and Material Input in Output

	1980-1985		1986-1990		1991-1997		1999-2007	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
α_L	0.1325	0.3504	0.1112	0.1744	0.1063	0.2469	0.1005	0.1379
α_M	0.7725	0.1695	0.7741	0.1770	0.7811	0.2227	0.7938	0.0960

$\alpha_{L\ is}$ share of labour in output and $\alpha_{M\ is}$ share of intermediate inputs in output

A negative average value for LER shows that real capital on an average has grown faster than real output. Similarly, positive average value of BAR shows that on an average, real capital used has increased at a faster rate than labour. Although the overall share of capital in output remains low, these values may suggest a gradual move towards more capital intensive forms of production.

For amendments to the IDA, as per both the extended Besley Burgess and the Bhattacharjea's scoring systems, West Bengal seems to be the most proactive state in enacting worker friendly amendments. Similarly, Tamil Nadu and Karnataka appear to be the most employers friendly. The above also holds true in case of laws and amendments to dispute resolution procedures. For employment protection legislations, West Bengal and Maharashtra appear to be most restrictive towards layoffs and dismissal of workers (see Tables 1.A and 2.A. in the appendix of Ahsan and Pages (2008) for details).

5. Results

In this section we present the results of the econometric analysis. We first estimate the following model, which we get after substituting the last term of equation (15) by the error term u_{it} , using data for the entire period of the study (1980-2007).

$$SR_{it} = \beta LER_{it} + \gamma BAR_{it} + \alpha \Delta k_{it} + u_{it} \text{ , where } \alpha \text{ is } \frac{\lambda}{\mu}. \qquad (16)$$

As mentioned before, the coefficient of LER and BAR provides the Lerner's Index $\left(\frac{P-MC}{P}\right)$ and an increasing function of workers' bargaining power, respectively. Column 1 and 3 of Table 3 reports the overall FE and GMM estimates (1981 to 2007)[7]. Results of both estimations seem to

[7] Although the data for the study ranges from 1980 to 2007, the relevant yearly estimates range from 1981 to 2007 as the estimated equation requires variables from the previous period.

suggest that efficient bargaining (EB) model is suitable to explain union-firm bargaining in Indian manufacturing industries: the coefficient of BAR is positive and significant (see Columns 1 and 3 of Table 3). However, it turns out that workers' bargaining power was only 0.052 during 1980-2007, which is in line with low labour's share in revenue. It indicates that for Indian manufacturing industries, workers enjoy some power to set wages and employment, but only to a limited extent. Our GMM results also suggest that on an average, the Lerner Index was about 0.185, i.e., the markup $(\frac{P}{MC})$ was about 1.227, in Indian manufacturing industries during the period 1981 to 2007. We also find that the coefficient of Δk is positive and significant, which suggests that manufacturing units have increasing returns to scale, on an average.

Next, we turn to examine possible implications of industrial deregulations and trade liberalisation on markup and workers' bargaining power. For this purpose, we include interactive period dummies along with their levels in the model, as shown in equation (17).

$$SR_{it} = \beta LER_{it} + \beta_2 LER_{it}.TD2 + \beta_3 LER_{it}.TD3 + \beta_4 LER_{it}.TD4 + \gamma_{it} BAR_{it} + \gamma_2 BAR.TD2 + \gamma_3 BAR.TD3 + \gamma_4 BAR.TD4 + \alpha \Delta k_{it} + \alpha_2 \Delta k_{it}.TD2 + \alpha_3 \Delta k_{it}.TD3 + \alpha_4 \Delta k_{it}.TD4 + \sum_{i=2}^{4} \delta_i TD_i + u_{it}, \quad (17)$$

where TD2, TD3 and TD4 are dummy variables for periods 1986-1990, 1991-1999 and 2000-2007, respectively. We report the results of FE and GMM estimations, respectively, of model (17) in Column 2 and Column 4 of Table 3. We observe that the coefficients of 'BAR.TD2', 'BAR.TD3' and 'BAR.TD4' are negative and highly significant and the coefficient of 'BAR' is remains significant (at less than 10% level) and larger in magnitude. This is true under both FE and GMM estimation, though the magnitudes of GMM coefficients are somewhat different from that of FE estimates – the correlation coefficient of GMM and FE estimates is 0.791, similar to findings of Boulhol et al. (2011) in the context of UK. Since GMM estimates are superior to FE estimates, as argued in Section 3, we consider GMM estimates to draw conclusions. These results seem to suggest that both industrial deregulations and trade liberalisation have led to significant decline in workers' bargaining power in Indian manufacturing industries.

Table 3: Fixed Effects and GMM Estimation Results: 1981 to 2007

Dependent Variable=SR

	(1-FE)		(2-FE)		(3-GMM)		(4-GMM)	
Independent Variables	Coeff.	p-value	Coeff.	p-value	Coeff.	p- value	Coeff.	p-value
L.SR					**0.0171**	0.164	**0.0184**	0.149
LER	0.1905	0.000	0.1957	0.000	0.1849	0.000	0.1960	0.000
BAR	0.0770	0.000	0.0859	0.000	0.0545	0.000	0.0714	0.000
K	0.0084	0.000	0.0081	0.000	0.0149	0.003	**0.0057**	0.316
LER.TD2			**-0.0032**	0.301			**-0.0097**	0.474
LER.TD3			**0.0001**	0.980			**-0.0185**	0.294
LER.TD4			-0.0267	0.000			**-0.0356**	0.172
BAR.TD2			-0.0121	0.000			-0.0258	0.005
BAR.TD3			-0.0113	0.000			-0.0265	0.017
BAR.TD4			-0.0111	0.000			-0.0516	0.029
k.TD2			**0.0022**	0.153			0.0092	0.024
k.TD3			**0.0001**	0.937			0.0126	0.020
k.TD4			**-0.0019**	0.260			0.0407	0.006
Cons.	0.0111	0.000	0.0116	0.000				
Period Dummies	Yes		Yes		Yes		Yes	
No. of Obs.	31587		31587		25055		25055	
R-Square	0.547		0.548					
Hausman	0.000		0.000					
Hansen					0.223		0.533	
AR(2)					0.874		0.809	
No. of Grps.					2385		2385	
No. of Inst.					400		400	

Notes: $SR_{it} = \beta_{it} LER_{it} + \gamma_{it} BAR_{it} + \frac{\lambda_{it}}{\mu_{it}} \Delta k_{it} + (1-\beta_{it})\Delta\theta_{it}$, where $(\Delta q_{it} - \Delta k_{it}) = LER_{it}$ and $(\alpha_{L_{it}} - 1)(\Delta l_{it} - \Delta k_{it}) = BAR_{it}$ and $\alpha_{L_{it}}$ refers to wage share in total output. L.SR denotes one year lagged value of SR. Figures in bold represents insignificant coefficients (at 10% level). p-values corresponding to Hausman test for suitability of FE estimation, Hansen test for validity of instruments used in GMM, and AR(2) test for second order autocorrelation are reported in the second panel of the Table.

Table 4, which reports period-wise average of workers' bargaining power based on estimated coefficients (Column 4 in Table 3), reveals that bargaining power of workers has declined by more than 34.53 percent due to industrial deregulations during 1986-1990 from its average level of 0.0666 in the pre-industrial deregulation period (1981-1985) and further declined in subsequent periods which witnessed trade liberalisation as well. Joint effect of industrial deregulations and trade liberalisation brought down workers' bargaining power to 0.0430 during the 1990s and further down to 0.0194 only during the last-period (2000-2007) of the study – a

drastic decline by about 58 percent from that in 1990s.[8] However, we note here that in estimating equation (17), we have not controlled for labour regulation in our model specification. This is taken care of in the subsequent sub-section.

Table 4: Evolution of Workers' Bargaining Power and Mark-up (GMM estimates)

Period	Mark-up (P/MC)	Union Bargaining Power	Trade Union Density
1981-1985	1.2438	0.0666	0.0796
1986-1990	1.2290	0.0436	0.1478
1991-1997	1.2158	0.0430	0.0932
2000-2007	1.1910	0.0194	0.0968

Note: Union Bargaining, $\rho = \frac{\gamma}{1+\gamma}$ and mark-up, $\mu = \frac{1}{1-\beta}$ where γ is an increasing function of workers' bargaining power and β is the Lerner Index. Results are based on the GMM estimates of column 4 in Table 3. Trade Union Density is the ratio of membership of unions submitting returns to number of workers. Data on union memberships comes from various issues of Indian Labour Statistics, Government of India, Ministry of Labour and Employment, Labour Bureau, Shimla/Chandigarh.

Interestingly, reported data on union membership suggest that trade union density in Indian manufacturing industries increased by a large extent during 1986-1990 from that during 1981-85, thereafter it declined during 1990s and again increased to some extent during 2000-2007 (see Column 3 in Table 4). It highlights unsuitability of union density to qualify as a proxy for workers' bargaining power in Indian context. As mentioned before, existence of multiple trade unions with conflicting objectives in the same factory unit is a wide spread phenomenon in India. Moreover, trade unions are open-shops in nature, there is no mechanism to select union representatives through secret-ballots in place and office bearers are often outsiders, who are pursued by political agenda. Therefore, higher union density does not necessarily indicate higher bargaining power of workers in Indian context.

It turns out that, though coefficients of 'LER.TD2', 'LER.TD3' and 'LER.TD4' are negative, none of these are found to be significant at 10% level.[9] That is, we do not observe any sign of decline in markup due to trade liberalisation and/or industrial deregulations in India. It seems to suggest that policy reforms have not led to any significant change in markup. This result is in contrast to findings of existing studies. For example, Krishna and Mitra (1998) and De Loecker

[8] We obtain similar results, if we consider a Liberalisation Dummy (=1, if year>1990; otherwise, zero) in place of TD3 and TD4.

[9] The correlation coefficient of GMM and FE estimates of period-wise markups is 0.860, which is similar to the findings of Boulhol et al. (2011) in the context of UK.

et al. (2012) argue that trade liberalisation has led to decline in markup. On the other hand, results of Balakrishnan et al. (2006) and Pushpagandhan and Shanta (2008) suggest that markup has increased due to trade liberalisation. However, unlike the present analysis, these studies consider product market imperfections in isolation and, thus, fail to take care of implications of imperfections in labour market on firms' behaviour in product market, which leads to biased estimates of markup.

5.1 Impact of Labour Regulation on Markup and Bargaining Power

Next, we turn to examine the effects of labour regulation on markups and bargaining power of workers. For this purpose, we include the labour regulation variable (LR) and interaction terms 'LER.LR' and 'BAR.LR' as explanatory variables, as shown in equation (18).

$$\begin{aligned} SR_{it} = {} & \beta LER_{it} + \beta_2 LER_{it}.TD2 + \beta_3 LER_{it}.TD3 + \beta_4 LER_{it}.TD4 + \gamma_{it} BAR_{it} + \gamma_2 BAR.TD2 \\ & + \gamma_3 BAR.TD3 + \gamma_4 BAR.TD4 + \alpha \Delta k_{it} + \alpha_2 \Delta k_{it}.TD2 + \alpha_3 \Delta k_{it}.TD3 + \alpha_4 \Delta k_{it}.TD4 \\ & + \eta_1 LR_{it} + \eta_2 LER.LR_{it} + \eta_3 BAR.LR_{it} + \sum_{i=2}^{4} \delta_i TD_i \\ & + u_{it} \end{aligned} \quad (18)$$

where, $TD2, TD3$ and $TD4$ are dummy variables for periods 1986-1990, 1991-1999 and 2000-2007 and LR are the labour regulation dummies. As mentioned in the preceding section, $LR \in$ {LR1_BB, LR2_BB, LR3_BB, LR1_Bh, LR2_Bh, LR3_Bh}. To avoid the problem of multicollinearity, we consider one particular scoring, out of total six, for amendments to labour laws by state governments at a time. We report the results of FE and GMM estimators, respectively, of model (18) in Column 1 and Column 3 of Table 5 and Table 6 for the extended Besley-Burgess and Bhattacharjea's scoring system respectively.

Table 5 shows that GMM estimate of the coefficient of 'BAR.LR2_BB' is positive and significant (at 5% level). It indicates that a decrease in cost of labour disputes and/or simplified procedures for dispute resolutions enhances workers' bargaining power significantly – workers' bargaining power increases by about 67 percent from an average value of 0.045 (which corresponds to LR2_BB=0) to 0.075 (which corresponds to LR2_BB=1).

Table 5: Implications of Labour Regulations – Amendments to Laws Pertaining to Industrial Disputes Resolutions Procedures: 1981 to 2002 (extended Besley Burgess's scoring system)

Dependent Variable=SR								
	(1-FE)		(2-FE)		(3-GMM)		(4-GMM)	
Independent Variables	Coeff	p-value	Coeff	p-value	Coeff	p-value	Coeff	p-value
L.SR					**0.0175**	0.188	**0.0160**	0.247
LER	0.1952	0.000	0.1971	0.000	0.1806	0.000	0.1818	0.000
BAR	0.0796	0.000	0.0868	0.000	0.0468	0.000	0.0569	0.000
K	0.0085	0.000	0.0084	0.000	0.0122	0.027	0.0109	0.075
LR2_BB	**-0.0100**	0.184	**-0.0111**	0.137	**-0.0095**	0.381	**-0.0112**	0.300
BAR.LR2_BB	**0.0088**	0.107	0.0115	0.035	0.0346	0.044	0.0463	0.018
LER.LR2_BB	0.0141	0.044	0.0152	0.031	**0.0539**	0.193	**0.0563**	0.175
LER.TD2			**-0.0040**	0.214			**0.0039**	0.779
LER.TD3			**0.0013**	0.683			**0.0017**	0.926
LER.TD4			-0.0279	0.000			**-0.0479**	0.337
BAR.TD2			-0.0133	0.000			-0.0275	0.003
BAR.TD3			-0.0102	0.000			-0.0213	0.053
BAR.TD4			**-0.0042**	0.312			**0.0050**	0.889
k.TD2			**0.0017**	0.267			**0.0059**	0.199
k.TD3			**-0.0004**	0.819			**0.0043**	0.477
k.TD4			-0.0041	0.096			**0.0063**	0.796
Cons	0.0103	0.000	0.0105	0.000				
Period Dummies	Yes		Yes		Yes		Yes	
No. of Obs.	25779		25779		20024		20024	
R-Square	0.542		0.543					
Hausman	0.000		0.000					
Hansen					0.496		0.612	
AR(2)					0.270		0.288	
No. of Grps.					2165		2165	
No. of Inst.					395		395	

Notes: $SR_{it} = \beta_{it} LER_{it} + \gamma_{it} BAR_{it} + \frac{\lambda_{it}}{\mu_{it}} \Delta k_{it} + (1 - \beta_{it}) \Delta \theta_{it}$, where $(\Delta q_{it} - \Delta k_{it}) = LER_{it}$ and $(\alpha_{L_{it}} - 1)(\Delta l_{it} - \Delta k_{it}) = BAR_{it}$ and $\alpha_{L_{it}}$ refers to wage share in total output. L.SR denotes one year lagged value of SR. Figures in bold represents insignificant coefficients (at 10% level). p-values corresponding to Hausman test for suitability of FE estimation, Hansen test for validity of instruments used in GMM, and AR(2) test for second order autocorrelation are reported in the second panel of the Table. LR2_BB refers to extended Besley Burgess categorisation of amendments to procedures for resolution of industrial disputes using updated figures as per Sachdeva (2003) from Ahsan Pages (2008).

We obtain qualitatively similar results if LR2_BB is replaced by LR2_Bh (see Table 6). Thus, under both the Besley-Burgess and Bhattacharjea's scoring system, we find that workers' bargaining power increases with amendments to labour laws that aims to expedite dispute

resolution and/or decrease the cost disputes resolution. On the other hand, results of GMM estimations show that effects of these regulations on markups are not significant (at 10% level).

Table 6: Implications of Labour Regulations – Amendments to Laws Pertaining to Industrial Disputes Resolutions Procedures: 1981 to 2002 (Bhattacharjea 2006's scoring system)

Dependent Variable=SR								
	(1-FE)		(2-FE)		(3-GMM)		(4-GMM)	
Independent Variables	Coeff	p-value	Coeff	p-value	Coeff	p- value	Coeff	p-value
L.SR					**0.0174**	0.179	**0.0158**	0.241
LER	0.1952	0.000	0.1968	0.000	0.1816	0.000	0.1820	0.000
BAR	0.0796	0.000	0.0868	0.000	0.0475	0.000	0.0578	0.000
K	0.0085	0.000	0.0084	0.000	0.0129	0.022	0.0110	0.090
LR2_Bh	**-0.0132**	0.104	-0.0145	0.074	-0.0159	0.100	-0.0197	0.046
BAR.LR2_Bh	0.0108	0.063	0.0129	0.027	0.0387	0.030	0.0517	0.013
LER.LR2_Bh	**0.0118**	0.119	0.0127	0.093	**0.0618**	0.198	**0.0615**	0.189
LER.TD2			**-0.0037**	0.254			**0.0024**	0.864
LER.TD3			**0.0015**	0.629			**0.0054**	0.767
LER.TD4			-0.0277	0.000			**-0.0411**	0.410
BAR.TD2			-0.0133	0.000			-0.0283	0.003
BAR.TD3			-0.0101	0.000			-0.0200	0.071
BAR.TD4			**-0.0041**	0.320			**0.0009**	0.980
k.TD2			**0.0018**	0.264			**0.0069**	0.143
k.TD3			**-0.0003**	0.822			**0.0057**	0.349
k.TD4			**-0.0041**	0.097			**0.0077**	0.755
Cons	0.0104	0.000	0.0106	0.000				
Period Dummies	Yes		Yes		Yes		Yes	
No. of Obs.	25779		25779		20024		20024	
R-Square	0.542		0.543					
Hausman	0.000		0.000					
Hansen					0.374		0.461	
AR(2)					0.288		0.305	
No. of Grps.					2165		2165	
No. of Inst.					395		395	

Notes: $SR_{it} = \beta_{it} LER_{it} + \gamma_{it} BAR_{it} + \frac{\lambda_{it}}{\mu_{it}} \Delta k_{it} + (1 - \beta_{it}) \Delta \theta_{it}$, where $(\Delta q_{it} - \Delta k_{it}) = LER_{it}$ and $(\alpha_{L_{it}} - 1)(\Delta l_{it} - \Delta k_{it}) = BAR_{it}$ and $\alpha_{L_{it}}$ refers to wage share in total output. L.SR denotes one year lagged value of SR. Figures in bold represents insignificant coefficients (at 10% level). p-values corresponding to Hausman test for suitability of FE estimation, Hansen test for validity of instruments used in GMM, and AR(2) test for second order autocorrelation are reported in the second panel of the Table. LR2_Bh refers to re-coded categorisation of amendments to the procedures for resolution of industrial disputes as per Bhatthcharjea (2006) from Ahsan Pages (2008).

In Table A1.1 and Table A1.2 (in Appendix 1), we report the results for amendments to employment protection legislations. The GMM coefficients of 'BAR.LR3_BB' and 'BAR.LR3_Bh' in Column 3 of Table A1.1 and Table A1.2 are not significant at 10% level. It seems to imply that there is no significant impact of employment protection legislations on workers' bargaining power in Indian manufacturing industries. This result is in line with the finding of Ahsan and Pages (2008) that there is a greater impact of amendments to disputes resolution procedures on registered manufacturing sector's output compared to that of employment protection legislations. Given that the registered manufacturing output is more sensitive to amendments to laws which regulate dispute resolution procedures, this channel may provide workers with greater bargaining power in sharing of economic surplus as against amendments to employment protection legislations. The effect of these amendments on markup turns out to be insignificant as well, as observed in the case of amendments to legislations pertaining to dispute resolutions. Similarly, Table A1.3 and Table A1.4 (presented in Appendix 1) shows that the influence exerted by amendments to the IDA on workers' bargaining power and markup are not significant.

Next, we revisit implications of industrial deregulations and trade liberalisation on workers' bargaining power and markup, after controlling for possible implications of labour regulations as specified in equation (18). We report the results of FE and GMM estimations, respectively, of model (18) in Column 2 and Column 4 of Tables 5 and 6 respectively. We observe that the coefficients of 'BAR.TD2', 'BAR.TD3' are negative and significant as before; however, the coefficient of 'BAR.TD4' turns out to be insignificant. This is true under both FE and GMM estimation for extended Besley-Burgess and Bhattacharjea approach. Further, the FE and GMM estimation results of 'LER.TD2', 'LER.TD3' and 'LER.TD4' in Tables 5 and 6 are qualitatively similar to our findings in Table 3. These findings are consistent with results for Employee Protections Legislations (Table A1.1 and Table A1.2) and IDA (Table A1.3 and Table A1.4) as well. As noted before, since data on amendments to labour regulations are available only up to the year 2002, this analysis is based on data from 15 major sates for the period 1981-2002. As a result, the coefficients of 'BAR_TD4' and 'LER_TD4' obtained after controlling for labour regulation variable are not comparable to those without labour regulation variables. Thus, we can

say that our results of (a) adverse effects of reforms on working bargaining power and (b) no significant effect on markup are quite robust.

5.2 Heterogeneity in Bargaining Power and Markup across Industries and States

Finally, we look at the industry-wise and state-wise evolution of bargaining power and markups in India by estimating equation (17) separately for (a) each industrial group and (b) each State and UT. Table 7 shows that there is considerable heterogeneity in terms of workers' bargaining power across different industrial groups. We note a trend of increased variability in industry group-wise bargaining power vis-à-vis all India figures, which is evident by looking at the standard deviation figures. Moreover, only industrial groups 1 (food products), 4 (Textile products including Wearing Apparel) and 6 (Paper, paper products and printing, publishing and allied industries) show persistent decline in workers' bargaining power, which is consistent with the all India results estimated from equation (17) in Table 3. Remaining industrial groups do not show any secular decline in workers' bargaining power, but in most of the industry-groups workers' bargaining power has decreased by and larger.[10] On an average, worker's bargaining power has been highest in industrial group 3 (0.112) followed by industrial group 10 (0.129), while lowest in industrial group 1 (0.052) followed by 11 (0.043). We note here that on an average, markup for industrial groups 3 (10) are higher than those for industrial groups 1 (11).

Similarly, we observe considerable variation in terms of estimated markups across different industry groups (see Table 8). However, unlike the workers' bargaining power, there is no specific trend in variability in price cost margins. On an average, markup has been highest in industrial group 2 (1.329) followed by industrial group 10 (1.431), while the markup has been lowest in industrial group 1 (1.115) followed by industrial group 5 (1.209). We again note that the average level of workers' bargaining power in industrial group 2 (10) is higher than that in industrial group 1 (5).

[10] We mention here that such decline is not necessarily statistically significant.

Table 7: Industry-Group and Sub-Period wise Estimates of Workers' Bargaining Power

Industry-group	1981-85	1986-90	1991-97	2000-07
1	0.056	0.055	0.052	0.045
2	0.094	0.075	0.043	0.113
3	0.090	0.102	0.078	0.178
4	0.074	0.068	0.061	0.055
5	0.096	0.067	0.083	0.011
6	0.094	0.058	0.053	0.037
7	0.099	0.074	0.083	0.090
8	0.017	0.067	0.078	0.076
10	0.156	0.120	0.180	0.061
11	0.057	0.014	0.041	0.062
12	0.109	0.114	0.101	0.082
All Industries	0.067	0.044	0.043	0.019
Standard Deviation	0.039	0.041	0.051	0.069

Notes: Details of industry-groups are reported in Table A2.2 in Appendix 2. For Industrial Groups 9, 13 and 14, which are not reported in this table, estimated bargaining power turned out to be negative. Standard Deviation is calculated with respect to the All Industries' average for respective periods

Table 8: Industry-Group and Sub-Period wise Estimates of Markup

Industry Group Number	1981-85	1986-90	1991-97	2000-07
1	1.129	1.114	1.114	1.106
2	1.546	1.351	1.021	1.397
3	1.201	1.262	1.144	1.323
4	1.273	1.270	1.193	1.311
5	1.188	1.272	1.274	1.102
6	1.227	1.173	1.331	1.127
7	1.286	1.247	1.240	1.143
8	1.182	1.185	1.191	1.159
10	1.477	1.389	1.599	1.259
11	1.221	1.235	1.231	1.229
12	1.245	1.316	1.291	1.261
All Industries	1.244	1.229	1.216	1.191
Standard Deviation	0.125	0.081	0.143	0.099

Notes: Details of industry-groups are reported in Table A2.2 in Appendix 2. For Industrial Groups 9, 13 and 14, which are not reported in this table, estimated bargaining power turned out to be negative. Standard Deviation is calculated with respect to the All Industries' average for respective periods

Now, let us turn to differences in workers' bargaining power and markup across states and UTs. The relevant coefficients are reported in Table 9 and Table 10. Table 9 shows that, on an average, workers' bargaining power was highest in West Bengal followed by Kerala and Assam, while it was lowest in Uttar Pradesh, Gujarat and Punjab during the period of study. On the other hand, Assam, Karnataka, Bihar belongs to the top of the scale in terms of estimated markup, while in Punjab, Gujarat and Andhra Pradesh belongs to the bottom of the scale (see Table 10). Overall, our results for a majority of States suggest that both workers' bargaining power and firms' markup in the second decade of trade liberalisation (2000-2007) were less than corresponding estimates for the pre-deregulation era (1981-1985).

Table 9: State-wise Estimates of Workers' Bargaining Power in Different Sub-Periods

States	**1981-1985**	**1986-1990**	**1991-1997**	**2000-2007**
Andhra Pradesh	0.092	0.061	0.070	0.068
Assam	0.075	0.082	0.068	0.093
Bihar	0.076	0.083	0.103	0.070
Gujarat	0.072	0.066	0.058	0.061
Haryana	0.072	0.062	0.066	0.071
Karnataka	0.090	0.077	0.074	0.067
Kerala	0.089	0.096	0.070	0.063
Madhya Pradesh	0.079	0.078	0.086	0.068
Maharashtra	0.078	0.074	0.077	0.073
Odisha	0.080	0.069	0.068	0.075
Punjab	0.068	0.063	0.067	0.072
Rajasthan	0.079	0.056	0.066	0.072
Tamil Nadu	0.079	0.058	0.068	0.078
Uttar Pradesh	0.070	0.062	0.058	0.051
West Bengal	0.098	0.070	0.081	0.099
Chandigarh	0.092	0.102	0.051	0.069
New Delhi	0.075	0.077	0.060	0.078
Standard Deviation	0.008	0.013	0.012	0.011

Notes: Standard Deviation is calculated with respect to the All India average for respective periods.

Table 10: State-wise Estimates of Markup in Different Sub-Periods

States	1981-1985	1986-1990	1991-1997	2000-2007
Andhra Pradesh	1.219	1.207	1.241	1.221
Assam	1.332	1.255	1.226	1.299
Bihar	1.257	1.250	1.287	1.231
Gujarat	1.213	1.190	1.230	1.196
Haryana	1.250	1.217	1.219	1.207
Karnataka	1.250	1.265	1.297	1.254
Kerala	1.280	1.267	1.244	1.215
Madhya Pradesh	1.239	1.256	1.253	1.183
Maharashtra	1.259	1.256	1.255	1.218
Odisha	1.275	1.293	1.191	1.182
Punjab	1.215	1.204	1.212	1.144
Rajasthan	1.217	1.230	1.249	1.213
Tamil Nadu	1.218	1.234	1.256	1.218
Uttar Pradesh	1.265	1.245	1.232	1.167
West Bengal	1.243	1.256	1.250	1.189
Chandigarh	1.202	1.232	1.157	1.182
New Delhi	1.230	1.234	1.196	1.226
Standard Deviation	0.031	0.025	0.033	0.034

Notes: Standard Deviation is calculated with respect to the All India average for respective periods.

6. Concluding Remarks

In this paper we have estimated workers' bargaining power and firms' markup simultaneously using a comprehensive panel data on Indian manufacturing industries for the period 1981-2007, which spans over two major reform episodes – industrial deregulations (initiated in 1986) and trade liberalisation (initiated in 1991). For this purpose we have considered a reduced-form equation, which is derived from a theoretical model that takes in to account imperfections in both product and labour markets. Results of both fixed effects and GMM estimations suggest that consideration of efficient bargaining framework is largely appropriate to analyze industrial relations in Indian manufacturing industries. However, it turns out that workers' bargaining position is considerably weak. The average bargaining power of workers during the period of study is found to be only 0.052, in a zero-to-one scale. This low value of estimated bargaining power of workers is consistent with the finding that workers' share in revenue is only about 11% on an average. Our empirical results also suggest that workers' bargaining power in Indian manufacturing industries has decreased considerably due to industrial deregulations and trade

liberalisation compared that in the pre industrial deregulation era. Firms' markup also registered a declining tendency to some extent during the period of study. However, it appears that industrial and trade reforms did not have any significant effect on markup, which is in contrast to the existing results. Taken together, these results are suggestive for growing income inequality in India in recent decades, which is well documented in the literature. We have also documented that there is considerable variation across States as well as across industry-groups in terms of workers' bargaining power and markup. Changing patterns of these two indicators have been quite different in different States (industry-groups) during the period of study. It indicates that industry and state specific factors play crucial roles in determining the dynamics of relative positions of workers vis-à-vis employers.

Further, results of our econometric analysis suggest that amendments of labour regulation concerning resolutions of industrial disputes by State government(s), which aims to reduce costs of dispute resolution and/or to simplify the procedures involved, strengthen workers' bargaining power. Amendments of other clauses of the Industrial Disputes Act turn out to be neutral as far as workers' bargaining power is concerned. Surprisingly, it seems that pro-employer amendments of the Employment Protection Legislation, which offer greater flexibility to employers to hire and fire workers, do not have any significant adverse effect on workers' bargaining power. It indicates that greater labour market flexibility need not necessarily weaken workers' bargaining position in Indian manufacturing industries. These results are robust to consideration of alternative methods to quantify amendments of labour regulations.

APPENDIX 1:

Table A1.1: Implications of Amendments to Employment Protection Legislations Based On Extended Besley-Burgess Scoring System: 1981 – 2002

Dependent Variable=SR								
	(1-FE)		(2-FE)		(3-GMM)		(4-GMM)	
Independent Variables	Coeff	p-value	Coeff	p-value	Coeff	p- value	Coeff	p-value
L.SR					0.0290	0.077	**0.0273**	0.112
LER	0.1949	0.000	0.1963	0.000	0.1690	0.000	0.1661	0.000
BAR	0.0796	0.000	0.0868	0.000	0.0411	0.001	0.0508	0.001
K	0.0085	0.000	0.0085	0.000	0.0125	0.017	**0.0103**	0.111
LR3_BB	**0.0067**	0.341	**0.0061**	0.391	**-0.0066**	0.505	**-0.0065**	0.496
BAR.LR3_BB	**-0.0026**	0.615	**-0.0054**	0.304	**-0.0110**	0.646	**-0.0264**	0.331
LER.LR3_BB	**0.0080**	0.251	**0.0077**	0.275	**-0.0021**	0.966	**-0.0127**	0.799
LER.TD2			**-0.0035**	0.270			**0.0047**	0.743
LER.TD3			**0.0020**	0.519			**0.0101**	0.613
LER.TD4			-0.0272	0.000			**-0.0534**	0.302
BAR.TD2			-0.0128	0.000			-0.0247	0.009
BAR.TD3			-0.0102	0.000			-0.0209	0.075
BAR.TD4			**-0.0041**	0.318			**0.0023**	0.949
k.TD2			**0.0017**	0.289			**0.0075**	0.123
k.TD3			**-0.0004**	0.803			**0.0048**	0.471
k.TD4			-0.0041	0.092			**0.0092**	0.690
Cons	0.0102	0.000	0.0105	0.000				
Period Dummies	Yes		Yes		Yes		Yes	
No. of Obs.	25779		25779		20024		20024	
R-Square	0.542		0.544					
Hausman	0.000		0.000					
Hansen					0.389		0.451	
AR(2)					0.188		0.197	
No. of Grps.					2165		2165	
No. of Inst.					409		409	

Notes: $SR_{it} = \beta_{it}LER_{it} + \gamma_{it}BAR_{it} + \frac{\lambda_{it}}{\mu_{it}}\Delta k_{it} + (1-\beta_{it})\Delta\theta_{it}$, where $(\Delta q_{it} - \Delta k_{it}) = LER_{it}$ and $(\alpha_{L_{it}} - 1)(\Delta l_{it} -$ *Δkit=BARit* and *αLit* refers to wage share in total output. L.SR denotes one year lagged value of SR. Figures in bold represents insignificant coefficients (at 10% level). p-values corresponding to Hausman test for suitability of FE estimation, Hansen test for validity of instruments used in GMM, and AR(2) test for second order autocorrelation are reported in the second panel of the Table. LR3_BB refers to the extended Besley Burgess categorisation of amendments to the employment protection legislation using updated figures as per Sachdeva (2003) from Ahsan Pages (2008).

Table A1.2: Implications of Amendments to Employment Protection Legislations Based On Bhattacharjea's Scoring System: 1981 – 2002

Dependent Variable=SR								
	(1-FE)		(2-FE)		(3-GMM)		(4-GMM)	
Independent Variables	Coeff	p-value	Coeff	p-value	Coeff	p- value	Coeff	p-value
L.SR					0.0231	0.173	0.0227	0.199
LER	0.1951	0.000	0.1967	0.000	0.1668	0.000	0.1633	0.000
BAR	0.0797	0.000	0.0867	0.000	0.0399	0.003	0.0489	0.001
K	0.0085	0.000	0.0084	0.000	0.0107	0.046	**0.0080**	0.201
LR3_Bh	0.0158	0.088	**0.0149**	0.108	**0.0055**	0.757	**0.0035**	0.836
BAR.LR3_Bh	-0.0107	0.126	**-0.0098**	0.163	**0.0239**	0.705	**0.0216**	0.749
LER.LR3_Bh	0.0051	0.559	**0.0061**	0.497	0.1764	0.041	0.1712	0.043
LER.TD2			**-0.0038**	0.241			**-0.0029**	0.835
LER.TD3			**0.0017**	0.590			**0.0099**	0.612
LER.TD4			-0.0275	0.000			**-0.0538**	0.293
BAR.TD2			-0.0124	0.000			-0.0257	0.009
BAR.TD3			-0.0101	0.000			-0.0223	0.054
BAR.TD4			**-0.0040**	0.333			**0.0093**	0.790
k.TD2			**0.0017**	0.277			**0.0070**	0.138
k.TD3			**-0.0003**	0.837			**0.0059**	0.357
k.TD4			-0.0041	0.096			**0.0116**	0.575
Cons	0.0103	0.000	0.0105	0.000				
Period Dummies	Yes		Yes		Yes		Yes	
No. of Obs.	25779		25779		20024		20024	
R-Square	0.542		0.544					
Hausman	0.000		0.000					
Hansen					0.722		0.776	
AR(2)					0.254		0.251	
No. of Grps.					2165		2165	
No. of Inst.					381		381	

Notes: $SR_{it} = \beta_{it} LER_{it} + \gamma_{it} BAR_{it} + \frac{\lambda_{it}}{\mu_{it}} \Delta k_{it} + (1 - \beta_{it}) \Delta\theta_{it}$, where $(\Delta q_{it} - \Delta k_{it}) = LER_{it}$ and $(\alpha_{L_{it}} - 1)(\Delta l_{it} -$ *Δkit=BARit* and *αLit* refers to wage share in total output. L.SR denotes one year lagged value of SR. Figures in bold represents insignificant coefficients (at 10% level). p-values corresponding to Hausman test for suitability of FE estimation, Hansen test for validity of instruments used in GMM, and AR(2) test for second order autocorrelation are reported in the second panel of the Table. LR3_Bh refers to the re-coded categorisation of amendments to the amendments to employment protection legislation as per Bhattacharjea (2006) from Ahsan Pages (2008).

Table A1.3: Implications of Amendments to The Industrial Disputes Act: 1981 – 2002 (Extended Besley- Burgess's Scoring System)

Dependent Variable=SR								
	(1-FE)		(2-FE)		(3-GMM)		(4-GMM)	
Independent Variables	Coeff	p-value	Coeff	p-value	Coeff	p- value	Coeff	p-value
L.SR					0.0304	0.067	0.0288	0.097
LER	0.1952	0.000	0.1968	0.000	0.1721	0.000	0.1688	0.000
BAR	0.0795	0.000	0.0865	0.000	0.0413	0.001	0.0494	0.001
K	0.0085	0.000	0.0084	0.000	0.0134	0.011	**0.0101**	0.112
LR1_BB	**0.0001**	0.983	**-0.0008**	0.892	**-0.0072**	0.428	**-0.0078**	0.375
BAR.LR1_BB	**0.0042**	0.309	**0.0038**	0.357	**0.0226**	0.172	**0.0244**	0.178
LER.LR1_BB	**0.0038**	0.490	**0.0039**	0.479	**0.0098**	0.774	**0.0043**	0.896
LER.TD2			**-0.0036**	0.260			**0.0090**	0.513
LER.TD3			**0.0016**	0.605			**0.0054**	0.772
LER.TD4			-0.0276	0.000			**-0.0454**	0.375
BAR.TD2			-0.0129	0.000			-0.0230	0.019
BAR.TD3			-0.0098	0.000			**-0.0185**	0.107
BAR.TD4			**-0.0038**	0.356			**0.0033**	0.930
k.TD2			**0.0017**	0.281			0.0091	0.062
k.TD3			**-0.0004**	0.802			**0.0069**	0.287
k.TD4			-0.0041	0.094			**0.0097**	0.695
Cons	0.0105	0.000	0.0108	0.000				
Period Dummies	Yes		Yes		Yes		Yes	
No. of Obs.	25779		25779		20024		20024	
R-Square	0.542		0.543					
Hausman	0.000		0.000					
Hansen					0.349		0.409	
AR(2)					0.185		0.193	
No. of Grps.					2165		2165	
No. of Inst.					437		437	

Notes: $SR_{it} = \beta_{it} LER_{it} + \gamma_{it} BAR_{it} + \frac{\lambda_{it}}{\mu_{it}} \Delta k_{it} + (1 - \beta_{it}) \Delta \theta_{it}$, where $(\Delta q_{it} - \Delta k_{it}) = LER_{it}$ and $(\alpha_{L_{it}} - 1)(\Delta l_{it} -$ *Δkit=BARit* and *αLit* refers to wage share in total output. L.SR denotes one year lagged value of SR. Figures in bold represents insignificant coefficients (at 10% level). p-values corresponding to Hausman test for suitability of FE estimation, Hansen test for validity of instruments used in GMM, and AR(2) test for second order autocorrelation are reported in the second panel of the Table. LR1_BB refers to the extended Besley Burgess categorisation of amendments to the IDA using updated figures as per Sachdeva (2003) from Ahsan Pages (2008).

Table A1.4: Implications Of Amendments to The Industrial Disputes Act: 1981 – 2002 (Bhattacharjea's Scoring System)

Dependent Variable=SR								
	(1-FE)		(2-FE)		(3-GMM)		(4-GMM)	
Independent Variables	Coeff	p-value	Coeff	p-value	Coeff	p- value	Coeff	p-value
L.SR					**0.0272**	0.125	**0.0269**	0.149
LER	0.1953	0.000	0.1969	0.000	0.1725	0.000	0.1662	0.000
BAR	0.0796	0.000	0.0866	0.000	0.0414	0.001	0.0459	0.002
K	0.0085	0.000	0.0084	0.000	0.0129	0.016	**0.0105**	0.107
LR1_Bh	**0.0008**	0.905	**0.0003**	0.970	**-0.0053**	0.542	**-0.0048**	0.582
BAR.LR1_Bh	**-0.0008**	0.876	**-0.0012**	0.822	**0.0115**	0.533	**0.0124**	0.553
LER.LR1_Bh	**-0.0071**	0.296	**-0.0073**	0.286	**0.0073**	0.853	**-0.0064**	0.865
LER.TD2			**-0.0034**	0.287			**0.0083**	0.556
LER.TD3			**0.0014**	0.651			**0.0084**	0.656
LER.TD4			-0.0278	0.000			**-0.0302**	0.554
BAR.TD2			-0.0128	0.000			-0.0214	0.033
BAR.TD3			-0.0099	0.000			**-0.0181**	0.111
BAR.TD4			**-0.0039**	0.346			**0.0123**	0.724
k.TD2			**0.0017**	0.281			**0.0080**	0.104
k.TD3			**-0.0004**	0.807			**0.0080**	0.215
k.TD4			-0.0041	0.094			**0.0124**	0.585
Cons	0.0106	0.000	0.0108	0.000				
Period Dummies	Yes		Yes		Yes		Yes	
No. of Obs.	25779		25779		20024		20024	
R-Square	0.542		0.543					
Hausman	0.000		0.000					
Hansen					0.433		0.474	
AR(2)					0.211		0.205	
No. of Grps.					2165		2165	
No. of Inst.					423		423	

Notes:$SR_{it} = \beta_{it} LER_{it} + \gamma_{it} BAR_{it} + \frac{\lambda_{it}}{\mu_{it}} \Delta k_{it} + (1 - \beta_{it}) \Delta\theta_{it}$, where $(\Delta q_{it} - \Delta k_{it}) = LER_{it}$ and $(\alpha_{L_{it}} - 1)(\Delta l_{it} -$ *Δkit=BARit* and *αLit* refers to wage share in total output. L.SR denotes one year lagged value of SR. Figures in bold represents insignificant coefficients (at 10% level). p-values corresponding to Hausman test for suitability of FE estimation, Hansen test for validity of instruments used in GMM, and AR(2) test for second order autocorrelation are reported in the second panel of the Table. LR1_Bh refers to the re-coded categorisation of amendments to the IDA as per Bhattacharjea (2006) from Ahsan Pages (2008).

APPENDIX 2:

Table A2.1: List of States

State Code	States
1	Andhra Pradesh
2	Assam
3	Old Bihar
4	Gujarat
5	Haryana
6	Karnataka
7	Kerala
8	Old Madhya Pradesh
9	Maharashtra
10	Odisha
11	Punjab
12	Rajasthan
13	Tamil Nadu
14	Old Uttar Pradesh
15	West Bengal
16	Chandigarh
17	Delhi

Table A2.2: List of Industry-Groups

Industry-group	Description
1	Food products
2	Beverages, tobacco and related products
3	Cotton, wool, silk, jute, other vegetable and man-made fibre textiles
4	Textile products (including Wearing Apparel)
5	Wood and wood products; furniture and fixtures
6	Paper, paper products and printing, publishing and allied industries
7	Leather, leather products and fur products
8	Basic chemicals and chemical products (except products of petroleum, coal)
9	Rubber, plastic, petroleum and coal products
10	Non-metallic mineral products
11	Basic metal and alloy industries
12	Metal products, parts, machinery and equipment except transport equipment
13	Transport equipment and parts
14	Other Manufacturing Industries

Note: Based on concordance exercise for two digit industrial groups for NIC 1987, NIC 1998 and NIC 2004

Table A2.3: Variables and Definitions

Variable	Definition
Output	Value of Gross Output. It Comprises total ex-factory value of products and by-products manufactured as well as other receipts such as receipts from non-industrial services rendered to others, work done for others on material supplied by them, value of electricity produced and sold, sale value of goods sold in the same condition as purchased, addition in stock of semi- finished goods and own construction
No. of Employees	Measured by the number of Man-days Employees. No. of workers have been considered as an alternative measure.
Capital	Fixed Capital. It r epresents the depreciated value of fixed assets owned by the factory as on the closing day of the accounting year. Fixed assets are those that have a normal productive life of more than one year. Fixed capital includes land including lease- hold land, buildings, plant & machinery, furniture and fixtures, transport equipment, water system and roadways and other fixed assets such as hospitals, schools, etc. used for the benefit of the factory personnel.
Material Inputs	Value of Gross Output *minus* Gross Value Added. Gross Value Added is calculated by deducting total input from total output.
Profits	Profits
Wages	Total Emoluments, which is defined as the sum of wages and salaries, employers' contribution as provident fund and other funds and workmen and staff welfare expenses

Note: Units for value figures are in Rs. thousands up to 1997 and denoted in Rs. Lakh from 1999 onwards. Man-days data is in thousands and rest in numbers. *Source:* ASI database

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