



Trade openness, labour institutions and flexibilisation: Theory and evidence from India[☆]



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HIGHLIGHTS

- We develop a model where firms choose a mix of contract and permanent workers.
- We find that increased import penetration leads to greater use of contract labour.
- Stronger bargaining power of workers leads to greater usage of contract workers.

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ABSTRACT

There is a global trend of substituting permanent workers by workers on fixed term contracts, job outsourcing and production subcontracting. Labour institutions and globalisation are often taken to be causally related to this phenomenon, but the evidence remains inconclusive. In India, there has been an increasing use by firms in the formal manufacturing sector of temporary workers employed through contractors (contract workers) who are not represented by trade unions and do not fall under the purview of the labour laws that are applicable to directly employed workers on long-term contracts (permanent workers). We develop a model of labour demand where firms choose a mix of contract workers and permanent workers rather than permanent workers alone, essentially to counter the bargaining power of permanent workers. Our model predicts that greater import penetration will cause an increase in the employment of contract workers, while greater export orientation will have the opposite effect on contract labour usage. Our model also predicts that greater worker bargaining power will increase contract labour usage. We then test the model using state-industry-year panel data for Indian manufacturing. Consistent with our theoretical model, we find that increased import penetration leads to greater use of contract labour in Indian manufacturing, and that the effect of trade exposure on contract labour usage is stronger in states with pro-worker labour institutions.

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1. Introduction

There is a global trend of substituting permanent workers by workers on fixed term contracts, job outsourcing and production subcontracting (ILO, 2002; Autor, 2003; IMF, 2010).¹ This phenomenon dubbed as ‘flexibilisation’ of labour has given rise to some concerns,

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¹ IMF reports that this trend has intensified in developed countries since 2008 and “countries with the strictest provisions for permanent, open-ended contracts experienced a large increase in the share of fixed-term (temporary) contracts in total dependent employment” (IMF, 2010, p. 8).

especially for the workers in developing countries (WTO, 2009). Moreover, as this trend has coincided with trade liberalisation, one might wonder whether this is an unintended outcome of globalisation.

Intuitively, import competition may force firms to seek short-run efficiency and flexibility in labour use by hiring workers on fixed-term contracts. On the other hand, firms mindful of long-run efficiency or concerned about quality improvement (a key issue for exporting firms) may invest in productivity improvement of permanent workers. So the effect of globalisation (or at least the trade liberalisation component of globalisation) can go either way. Currie and Harrison (1997) observed that Moroccan private sector firms responded to 1980s trade and labour reforms by trying to improve productivity rather than resorting to low-wage employment; and only state-owned firms increased low-wage employment. Goldberg and Pavcnik (2003) also noted that in Brazil trade reform did not lead to the employment of low-wage informal workers, but

in Colombia trade reform led to increased employment of informal workers, lasting only for the period preceding a major labour market reform. These two studies suggest that ‘flexibilisation’ (or informalisation depending on the context of the study) may not necessarily result from trade reform, but from labour market rigidities or a combination of labour market rigidities and trade reform. This would indicate that the recent trend of ‘flexibilisation’ is in response to labour market rigidities (Botero et al., 2004; Djankov and Ramalho, 2009); but this view has not gone unchallenged and the debate is far from over.²

In this paper, we study hiring of contract workers (that is, workers on temporary contracts hired through a government licensed intermediary or contractor) for Indian formal sector firms amidst growing trade liberalisation for the last twenty years.³ Despite opening up steadily to foreign trade and investment and dismantling unfriendly business regulations rather swiftly in 1991, India has left its labour regulations largely unchanged, even though they were regarded as extremely rigid and favoured a minority of workers with permanent contracts employed in the formal sector (Dougherty, 2008). Large and strong trade unions resisted job cuts, job outsourcing or any other measures that they saw as detrimental to the interest of the permanent workers. Yet firms found ways to bring in contract workers; and after 1991 the practice became open and blatant. Not surprisingly the share of contract workers in the total employment has increased from a meagre 12 per cent in 1985 to a substantial 26 per cent in 2004 in the registered manufacturing sector (NCEUS, 2007).

Hiring of contract labour was first permitted by a Central legislation enacted in 1970, and the practice received some boosts from several state-level amendments of the key features of the legislation. A curious aspect of the Indian regulatory system is that a central legislation can be applied with different ferocity in different states, because states are free to amend certain operational aspects to strike a balance between the local level diversity and the national objective. The states have made use of this freedom in all matters of regulation, particularly concerning labour and industry. But not all states have tweaked the labour laws in the same way; some have tweaked them in favour of the workers, and some in favour of the employers. Besley and Burgess (2004) have shown that there are enough state level variations in the labour laws that can explain the growth patterns of the formal and informal sector employment. Several other papers followed this trail to explain the unequal effects of trade and industrial reforms (Hasan et al., 2007; Aghion et al., 2008).

In this paper we focus on the specific problem of contract labour use by formal sector firms in India and we aim to determine as to what extent this pattern of labour use has been affected by labour regulations and trade reforms. Our identification strategy will exploit variations in trade exposure of firms by industry and over time and variations in labour regulations by state. To steer our empirical analysis in a clear direction we first develop a theoretical model, which helps to deal with some thorny issues. Why would firms hire contract workers who might be less skilled, and why do they hire both contract and permanent workers? How would the bargaining power of unions affect the optimal mix of employment between contract and permanent workers? Is the mix of employment also sensitive to exposure to foreign trade?

To get a grip over these issues, we propose a simple insider–outsider model, where a modern firm that prefers to use skilled labour in combination with capital may not hire all workers as permanent, because the permanent status will enable them to form a union and demand

higher wages. So it can strategically hire some contract workers, both skilled and unskilled, to curb the union’s wage demand. While this seems to be a profitable option, there are some downsides to it. Unskilled labour is not only less productive itself, but also it can reduce the productivity of capital (which is plausible for modern technology). In addition, there might be some contracting cost to set the terms of employment on worker-by-worker basis, as opposed to collectively contracting with a union. We show that the firm’s optimal choice of contract labour (whether skilled or unskilled or both) depends on the nature of contracting. If the contract workers can be used only in conjunction with permanent workers, but not in strikes and other industrial disputes, (which we call a case of ‘limited contracting’), the optimal type of contract labour will be unskilled labour. On the other hand, if the firm could use contract workers in any situations, (which we call ‘unlimited contracting’) optimal contract workers can be skilled and unskilled both, and a more general pattern of labour use would emerge.

However, we argue that the Indian scenario resembles the case of limited contracting, where the outcome is simply dichotomous – the skilled workers made permanent and the unskilled workers made temporary.⁴ We embed this simple model in a broader economy with technologically backward formal sector firms coexisting with modern firms, and a large informal sector. It is shown that the share of contract workers in total (formal sector) employment increases if the permanent workers’ bargaining power rises, or if there is a reduction in tariff making imports easier. These findings may be seen as a novel contribution to the theoretical literature on the developing country labour markets.

We then show using a three dimensional panel of 58 industries over the period of 1998 to 2004 for fifteen major Indian states that import penetration does increase the share of contract workers in formal firms, and so does the union’s bargaining power, as our theoretical model predicts. However, we also see that export orientation does not affect the contract labour usage to the same degree. In line with Besley and Burgess (2004) and others, we also find that the positive effect of import penetration and the negative effect of export promotion on the share of contract labour are both stronger in those states, which have pro-worker labour laws, and that stricter labour regulations increase contract labour usage. Our results are robust to alternate measures of worker bargaining power, and to possible endogeneity concerns with the key explanatory variables of interest – trade openness and labour institutions.

The remainder of the paper is in five parts. In the next section, we provide a brief introduction of the Indian labour market. We then develop our theoretical model in Section 3. Section 4 proposes the methodology for the empirical analysis, describes the data, and provides a discussion of some of the variables used. Section 5 discusses the econometric results. Section 6 concludes.

2. The Indian labour market

The Indian labour market is highly segmented with only 20 per cent of all manufacturing workers employed in the formal sector.⁵ Firms in the formal sector can employ workers via two routes – the ‘permanent’ route, where the worker is on a long-term contract, and the ‘contract’ route, where the worker is employed through government licensed intermediaries or contractors. The permanent route comes with job security rendered by some of the most protective employment legislations in the developing world. A large proportion of the permanent workers are members of trade unions as well, and they collectively negotiate

² Djankov and Ramalho (2009) find that developing countries with rigid employment laws tend to have larger informal sectors. This finding has been disputed by ILO (2002). With respect to trade and informality, WTO (2009) argues that the available evidence does not allow any general conclusions about their causal connections. Our question is about trade, labour laws and labour flexibilisation; but we restrict our attention only to the formal sector, not to the whole economy.

³ India’s degree of trade openness increased from 16 per cent in 1990 to 25 per cent in 2005, with significant reductions in tariffs, removal of quotas and import controls (Panagariya, 2008; Sen, 2009).

⁴ Successful strikes in India mean total shutdown of the firm’s activities. Workers show great solidarity during industrial disputes. Labour laws also prohibit the employers from taking any measures that may be construed an unfair and disguised attempt to infringe on workers’ rights.

⁵ By the formal sector, we mean the ‘organised’ sector in Indian manufacturing, which are registered under the Factories Act of 1948 of the Government of India. All firms with 10 workers or more that use electricity and 20 workers or more that do not use electricity are required to register with Indian state governments under this Act.

wage and working conditions.⁶ In general, they extract significantly higher remunerations than contract workers.

The National Commission on Enterprises in the Unorganised Sector (NCEUS, 2007) set up by the Government of India estimated that the poverty rate among the permanent workers is much lower than the poverty rates among the contract workers and the informal sector workers. Only 4.3 per cent of the permanent workers were poor as compared to the 20.4 per cent of the contract workers and 20.1 per cent of the (urban) informal sector workers; the identical poverty rate among the contract and informal workers is noticeable. NCEUS (2007) also reports that 40 per cent of the contract workers had very little education (primary or less) as compared to only 23 per cent of the permanent workers. Thus, there seems to be a clear skill gap between the two types of workers, an observation that will be incorporated in our theoretical model in the next section.

Industrial relations in India fall under the joint jurisdiction of the central and state governments. The key piece of central legislation in industrial relations is the Industrial Disputes Act (IDA) of 1947, which applies only to 'permanent' workers directly employed by the formal sector firms and not to other workers. IDA also specifies a multi-tier conciliation cum adjudication system, where the tiers are created and maintained by state governments. For this purpose each state has amended the regulation many times since 1947 in response to their local conditions creating natural variations of IDA across the states, which are important for our empirical work. In general, across all states, IDA imposes significant restrictions on employers regarding changes in conditions of employment (such as hours of work, leave and holidays) and compensation to workers (such as wages and pension provisions), layoffs, retrenchments and closures.⁷ Judging by the rigidity of employment index of the World Bank, Indian labour laws are more protective than the international average or an average of a group of comparator countries composed of large developing countries and countries in East and South Asia.⁸

While contract workers are not protected by the IDA, all firms employing twenty or more contract workers must register with the relevant state government, and provide minimum health, safety and welfare conditions to contract workers as well as pay at least the minimum wage under the Contract Labour (Regulation and Abolition) Act of 1970. In these respects, the contract workers are better off than the informal workers. While the intention of the Contract Labour Act was to provide some flexibility in hiring for 'non-core' tasks, critics say that firms are increasingly using them in core tasks as well (NCEUS, 2009).

There are two other pieces of legislation that deserve mention. They are inherited from the colonial era – the Trade Union Act of 1926 (amended in 1964 and 2001) and the Industrial Employment (Standing Orders) Act of 1946. Like IDA, the Trade Union Act has also been amended substantially by different states, some weakening the unions' powers. Both the Trade Union and Industrial Employment Acts make it difficult for employers to execute even minor changes in employment contracts without going through collective consultations.

3. A theoretical model

In modelling the choice of contract labour one can take different approaches. The first approach is the trade union and insider–outsider approach (Grout, 1984; Lindbeck and Snower, 1986). A second approach

⁶ About 60 to 70 per cent of permanent workers in large firms are members of trade unions.

⁷ Under Chapter VB of the IDA, labour courts and Tribunals can set aside any discharge or dismissal referred to them as not justified. In units employing more than 100 workers, retrenchment requires seeking authorization from the state government and this authorization is rarely granted (Saha, 2006).

⁸ In a sample of 34 OECD and emerging market economies, India's employment protection legislation was the third most stringent after the Czech Republic and Portugal with respect to permanent contracts and the most stringent with respect to collective dismissals (Dougherty, 2008).

could be a human capital model with or without unions. There is a large literature on firms providing on-the-job training creating firm-specific or transferrable skills. See Booth and Chatterji (1998) for instance, where it is argued that unions may alleviate the underinvestment problem in training. A third possibility is to take a more dynamic approach and incorporate hiring and firing cost induced by job-security regulations as in Bertola (2004). A fourth approach to consider is the search and vacancy posting approach developed by Pissarides (1985). While each approach provides different insights, we choose the trade union and insider–outsider approach along the line of Grout (1984), mainly because we feel that it fits the Indian scenario well, and it helps us focus on the labour rigidity aspect that has been widely regarded as a serious problem for India. However, to make the model truly relevant for India we need to bring in three types of dualism: formal and informal sector of firm operations (which is common to all developing countries), skill dualism among workers, and dual modes of hiring – permanent and contract.

3.1. Firms and workers

Consider an industry that consists of n formal sector firms, which may serve both the domestic and foreign markets. They are subjected to a host of regulations affecting their input choices. Workers can be hired by two alternative modes. In one mode their terms of employment are governed by collective agreements between the firm and the workers' union; in the other mode the terms of employment are set out in individual contracts.⁹ This can be thought of as emerging in two following situations. If a group of workers are hired on a permanent basis, they will be able to form a union and negotiate the terms of pay and work collectively. We call them permanent workers. But if the workers are hired on a short term contract, they will not be able to be part of a union, and thus negotiations, if any, will at best be individualised. We call these workers contract workers.

In our static setting this difference boils down to cost of contracting (or cost of hiring). For the permanent workers the cost of contracting is small (due to collective negotiation); we assume this cost to be zero. But for contract workers there is a strictly positive cost of contracting per worker, denoted by t . This can be an additional charge to be paid to the labour contractor.

The firms can be of two types – modern or backward. The modern firm is somewhat capital intensive and requires skilled and trained workers to conduct its operations. Formally, capital and skilled workers are complementary inputs. Let the number of modern firms be n_1 . In the backward firms, worker's skill does not matter and labour is substitute for capital. Let the number of such firms be n_2 . Assume $n_1 + n_2 = n$. The modern firm is more export oriented than the backward firm.

Besides these formal firms there are some small informal sector firms (which are technologically more backward) competing domestically only; they are unregulated and unfit for exports. These firms will remain in the background outside our explicit consideration. This sector is summarised by an aggregate supply function $Q_I = Q_I(p)$ with standard properties such as $\delta Q_I / \delta p > 0$. See Ulyssea (2010) for an alternative approach to informal sector modelling.

There are two types of workers in the economy – skilled (or high skilled) and unskilled (or low skilled). The skilled workers are employed only by the formal sector modern firms. They bear, we assume, *complementarity* with capital, a reflection of their essentiality in the use of the modern technology. Unskilled workers are not ideal for these firms; however they can be an imperfect substitute. Likewise, high skilled workers are not ideal for (formal sector) backward firms. Since their skills are not valued and they are costlier, backward firms do not hire skilled workers.

⁹ As we have noted, in the Indian context, the difference between the permanent and contract workers boils down to security of tenure and union rights. We restrict our attention only to union rights.

Either type of firms may use both the contract mode and the permanent (unionised) mode of employment. While hiring via the contract route a modern firm can hire both skilled and unskilled workers. The following notations will be useful: F_R^S for skilled permanent labour, F_C^S for skilled contract labour, L_R^U for unskilled permanent labour and L_C^U for unskilled contract labour. Corresponding wages are denoted by similar notations as w_R^S, w_R^U , etc. In particular, the wage of unskilled contract workers must not fall below the minimum wage: $w_C^U \geq \underline{w}$.

3.2. Unions

Firms are price takers in the output market, which may contain both export (X) and import (IM). With respect to permanent workers, each firm faces a firm-specific union with which it negotiates their wage and employment following the ‘efficient bargaining’ protocol of McDonald and Solow (1981). The bargaining power of the union is exogenously given by α and the bargaining power of the firm by $(1 - \alpha)$, $0 \leq \alpha \leq 1$. In a modern firm, the union (of size N^M) tries to maximize its gross wage bill, $u^M = w_R^S F_R^S + (N^M - F_R^S) \gamma \underline{w}$. Upon reaching an agreement F_R^S workers are chosen randomly out of N^M workers and $(N^M - F_R^S)$ workers receive $\gamma \underline{w}$ ($\gamma > 1$) each from a self-employment sector (which we take as exogenously given). γ can be interpreted as a skill conversion unit; that is, one unit of skilled labour is equivalent to γ unit of unskilled labour. In a backward firm, the union’s objective is to maximize $u^B = w_R^U L_R^U + (N^B - L_R^U) w_i$. The union members who are not employed by the firm work in the informal sector and receive a wage w_i , which can be less than the minimum wage.

3.3. Production technology of a modern firm

The production technology of a modern firm is $q^M = f(k, F^S, L^U)$ satisfying the following assumptions.

- (i) $f(k, F^S, 0) > 0, f(0, F^S, L^U) = f(k, 0, L^U) = 0$. Capital and skilled labour are essential.
- (ii) $f(\cdot)$ is strictly concave with $f_{11} < 0, f_{22} < 0, f_{33} < 0$, but $f_{12} > 0, f_{13} < 0, f_{23} < 0$. There are diminishing returns to each factor. Capital and skilled labour are complementary, but substitutes to unskilled labour.
- (iii) $\frac{|f_{331}|}{f_3} < \frac{|f_{33}|}{f_1}$: An increase in unskilled labour reduces the marginal product of capital proportionately more than the own marginal product of the unskilled labour.¹⁰

Assumptions (i) and (ii) are standard and emphasize the role of skill in modern firms. Mixing the two types of labour together inflicts some productivity loss on capital. Assumption (iii) states that an increased application of unskilled labour adversely affects the marginal product of capital much more than its own marginal product.

3.4. Production technology of a backward firm

In a backward firm the production technology is given as $q^B = g(k, L^U)$, which satisfies the following assumptions.

- (a) $g(0, L^U) > 0, g(k, 0) = 0$. Capital is not essential, but labour is.
- (b) $g(\cdot)$ is strictly concave with $g_{11} < 0, g_{22} < 0$, and $g_{12} < 0$. There are diminishing returns, and capital and labour are substitutes.
- (c) $|g_{12}(\cdot)|$ is small relative to $|g_{11}|$ and $|g_{22}|$.

Assumptions (a) and (b) are standard. Assumption (c) is helpful to ensure that both inputs are normal.

¹⁰ An example of the production function satisfying all the assumptions is $f(\cdot) = h(k, F^S) + g(\gamma F^S + L^U) + a(L^U)k$, where $h(\cdot)$ is strictly concave in (k, F^S) , $g'(\cdot) < 0$ and $a'(L^U) < 0$ and $a''(\cdot) < 0$.

3.5. Market for high skilled labour

The high skilled workers are in short supply. Hence, when they are contracted individually firms face an increasing supply curve. Even though individually each firm is a price taker, higher demand for them will raise their market wage. Of course, a skilled worker has a choice of being hired as a permanent worker (or equivalently joining a union), or taking up a contract job.

3.6. Timeline of decisions/events

Stage 1 (capital and contract labour hiring stage): Each formal sector firm chooses capital and contract labour (skilled or unskilled).

Stage 2 (negotiation and permanent labour hiring stage): Each firm–union pair negotiates over firm-specific (w_R^S, F_R^S) in a modern firm and (w_R^U, L_R^U) in a backward firm.

Stage 3 (market clearing stage): The unskilled labour market, which serves both formal and informal firms, determines w_i and w_C^U . The skilled labour market determines w_C^S , and the output market determines the domestic output price p . The foreign prices are determined externally.

3.7. Efficient bargaining and choice of permanent workers in modern firms

Suppose in stage 3 all markets are cleared, and the following configuration arises for the unskilled wage: $w_i = w_C^U = \underline{w}$. That is, the unskilled non-unionised workers, wherever they are employed receives the minimum wage.¹¹ The skilled contract workers’ market wage is strictly above their self-employment income: $w_C^S > \gamma \underline{w}$. By backward induction we solve for permanent employment first (which occurs in stage 2) and then for capital and contract labour (stage 1 choice).

First consider the case of a modern firm. Suppose along with capital some skilled and unskilled contract labour have already been chosen in the first stage. Now the unionised wage and employment are to be determined through generalised Nash bargaining, where the disagreement payoffs (or outside options) matter.

For the union the disagreement payoff is $\underline{u}^M = N^M \gamma \underline{w}$. That is, all (skilled) workers of the union return to their self-employment sector. For the firm what happens depends on the nature of contracting. If the contract stipulates the use of contract workers only after an agreement with the union, but not in the event of disagreement (such as in a situation of strike), then the firm can only shut down and dispose of capital. This is known in the literature as the ‘Groutian’ exit cost¹² after Grout (1984). This may be seen as a case of ‘limited contracting’. Assuming sunk capital cost the disagreement payoff is to be written as $\underline{\pi}^M = -rk$.

Alternatively, the firm could have ‘unlimited’ contracting capacity, and could use the contract workers in any situations including strikes and disagreements. Its disagreement payoff then would be: $\underline{\pi}^M = \underline{R} = pf(k, F_C^S, L_C^U) - (w_C^S + t)F_C^S - (\underline{w} + t)L_C^U - rk$.

We will consider both types of contracting and see that the input choices can be significantly different between the two scenarios. The bargaining problem is to choose w_R^S and F_R^S to maximize $z^M = [u^M - \underline{u}^M]^\alpha [\pi^M - \underline{\pi}^M]^{(1-\alpha)} = [(w_R^S - \gamma \underline{w})F_R^S]^\alpha [\pi^M - \underline{\pi}^M]^{(1-\alpha)}$.

In the above π^M refers to profit following an agreement, which is $\pi^M = pf(k, F_R^S + F_C^S, L_C^U) - w_R^S L_R^S - (w_C^S + t)F_C^S - (w_C^U + t)L_C^U - rk$.

The solution to the bargaining problem is (see Appendix A for details):

$$w_R^S = \frac{\alpha}{\beta} \left[pf(\cdot) - (w_C^S + t)F_C^S - (\underline{w} + t)L_C^U - rk - \underline{\pi}^M \right] + (1 - \alpha) \gamma \underline{w} \quad (1)$$

¹¹ One can consider other scenarios; but this simplifies our analysis without any loss of insight.

¹² Grout (1984) modelled a situation of wage bargaining between firm and its unionised workers. In the event of a disagreement, the union leaves the firm and the firm disposes of capital. Since the capital cost cannot be fully recovered, such exits are costly.

$$\gamma w = pf_2(k, l_R^S + l_C^S, l_C^U). \quad (2)$$

Eq. (1) says that the wage of a permanent worker will be a weighted average of his disagreement payoff and the average net revenue product. Clearly, the firm's choice of contract workers helps to reduce the average revenue product and also the wage of the permanent workers. Eq. (2) specifies efficient employment of permanent labour.

3.7.1. Stage 1 choice

Now let us turn our attention to the stage 1 choice. As said above, these choices will affect the bargaining agreements by keeping the union's wage demand in check. Substituting Eqs. (1) and (2) in the firm's profit function we rewrite it as

$$\pi^M = \alpha \pi^M + (1-\alpha) [pf(\cdot) - \gamma w l_R^S - (w_C^S + t) l_C^S - (w + t) l_C^U - rk]. \quad (3)$$

Now by maximizing Eq. (3) we determine the firm's optimal choice of k , l_C^S and l_C^U respectively as follows:

$$\frac{\partial \pi^M}{\partial k} = \alpha \frac{\partial \pi^M}{\partial k} + (1-\alpha) [pf_1(\cdot) - r] = 0 \quad (4)$$

$$\frac{\partial \pi^M}{\partial l_C^S} = \alpha \frac{\partial \pi^M}{\partial l_C^S} + (1-\alpha) [pf_2(\cdot) - w_C^S - t] = 0 \quad (5)$$

$$\frac{\partial \pi^M}{\partial l_C^U} = \alpha \frac{\partial \pi^M}{\partial l_C^U} + (1-\alpha) [pf_3(\cdot) - w - t] = 0. \quad (6)$$

The properties of the optimal input choices depend on the nature of contracting. First consider the case of 'limited contracting'. The permanent labour will be efficiently employed, but the contract labour will be underemployed because of the (regulation inflicted) hiring cost, and capital will be underinvested because of the potential exit cost in the event of a disagreement.

But there is an interesting twist. From the technological point of view, two units of skilled labour are indistinguishable from each other, regardless of their mode of hiring. Therefore, their marginal products must be equal. But that is not possible, because their effective prices are different: $w_C^S + t$ for the contract workers and γw for the permanent workers. Hence, the modern firm will not hire the skilled labour as contract labour. The only workers to be hired on contract are the unskilled workers.

Under 'unlimited contracting' the firm can use the contract workers in all situations. In the event of a disagreement it can reduce its loss by maintaining partial production. One might regard this as a benefit of early contracting, similar to strategic commitment often featured in the industrial organisation literature (Dixit, 1980). Because of this benefit, both types of labour may be efficiently employed creating room for the marginal productivity of the skilled labour to vary between the two modes of hiring. Thus, the firm can hire the skilled workers by either route. We state these results in the following two propositions, relegating their proofs to Appendix A.

Proposition 1. *If the modern firm can do only 'limited contracting' in the sense that the contract labour can be used only in conjunction with permanent labour, then it is optimal to hire only the unskilled labour as contract labour, and skilled labour as permanent workers. On the other hand, if 'unlimited contracting' is allowed, then the skilled labour can also be hired as contract labour.*

Proposition 2. *In both scenarios of contracting (limited and unlimited contracting) permanent labour is efficiently employed, but capital will be underinvested. As for the contract labour, under limited contracting it will*

be underemployed, while under unlimited contracting it may (but not necessarily will) be efficiently employed.

3.8. Employment choice in backward firms

The analysis of a backward firm is analogous. It hires only the unskilled workers both as permanent and contract workers. Contract workers are given only the minimum wage – their outside opportunity.

The bargaining solution is obtained by maximizing $z^B = [u^B - \underline{u}^B]^\alpha [\pi^B - \underline{\pi}^B]^{(1-\alpha)} = [(w_R^U - w) l_R^U]^\alpha [\pi^B - \underline{\pi}^B]^{(1-\alpha)}$. The disagreement payoff of the firm is $\underline{\pi}^B = -rk$ under limited contracting and $\underline{\pi}^B = R^B = pg(k, l_C^U) - (w + t) l_C^U - rk$ under unlimited contracting. When an agreement is struck, the firm earns

$$\pi^B = \alpha \pi^B + (1-\alpha) [pg(\cdot) - w l_R^U - (w + t) l_C^U - rk]. \quad (7)$$

The wage and employment of permanent workers are given by the following equations:

$$w_R^U = \frac{\alpha}{l_R^U} [pg(\cdot) - (w + t) l_C^U - rk - \underline{\pi}^B] + (1-\alpha) w \quad (8)$$

$$w = pg_2(k, l_R^U + l_C^U). \quad (9)$$

As in a modern firm, the bargained wage is a weighted average of the workers' outside opportunity (i.e. the minimum wage) and the average net revenue product, and the permanent employment will be efficient.

The stage 1 choices of capital and contract labour are given by

$$\frac{\partial \pi^B}{\partial k} = \alpha \frac{\partial \pi^B}{\partial k} + (1-\alpha) [pg_1(\cdot) - r] = 0 \quad (10)$$

$$\frac{\partial \pi^B}{\partial l_C^U} = \alpha \frac{\partial \pi^B}{\partial l_C^U} + (1-\alpha) [pg_2(\cdot) - w - t] = 0. \quad (11)$$

As was the case with the modern firm, under limited contracting the same type of workers will not be hired through both modes. The marginal product of an unskilled worker must be equal to his effective price which is different between the two routes of hiring. Therefore, all workers will be permanent workers, and all will be unionised. As the exit cost cannot be avoided, capital will be underinvested. But under unlimited contracting, some contract workers may be hired to reduce the wage of the permanent workers, and capital then will be overinvested to reduce permanent labour.

Proposition 3. *In a backward firm under limited contracting no contract labour is used; capital is underinvested. Under unlimited contracting unskilled workers can be hired through either modes (permanent or contract). Capital is overinvested and contract labour may also be overemployed. The permanent labour, however, is efficiently employed in both scenarios.*

3.8.1. Limited or unlimited contracting?

Given that capital and labour choices are going to be quite different between the two scenarios of contracting, it is important to ask which scenario is more plausible for the Indian industries. There is plenty of evidence in India for limited contracting. Though the terms and conditions of the contract workers' jobs are freely set by the employers, rarely the contract workers are used in situations of strikes or similar industrial actions. Contract workers also try to avoid antagonizing their unionised colleagues.¹³ In industries, such as banking or airlines, the

¹³ The militancy of the union workers is not to be underestimated. A telling report of the leading organisation of employers in India (FICCI, 2012) describes how time and again strikes have turned violent and workers have directed their anger to management staff and factory properties. In 2012 the leading car maker of India, Maruti Ltd, saw one of its managers killed by striking workers.

managerial staff (who cannot form unions) sometimes step in to provide some essential services, when the permanent employees go on strike. But that is not common in most industries. Therefore, we will now restrict our attention only to ‘limited contracting’, though all the key results can be established for the case of unlimited contracting as well, *albeit* with some additional assumptions.

3.9. Comparative statics

Before considering the full equilibrium of the model, it would be useful to take note of some (partial equilibrium) comparative statics, especially with respect to two key parameters of interest – α and p . As argued above, we will consider only the limited contracting scenario.

For the modern firm in addition to Eq. (2) the following versions of Eqs. (4) and (6) will be relevant ($l^F_C = 0$ under limited contracting):

$$(1-\alpha)pf_1(k, l^F_R(k, l^U_C), l^U_C) - r = 0 \tag{4'}$$

$$pf_3(k, l^F_R(k, l^U_C), l^U_C) - w - t = 0. \tag{6'}$$

Eq. (2) is needed to derive the effects of k and l^U_C on the agreed level of l^F_R . It can be easily established that l^F_R will rise with k (due to complementarity) and fall with l^U_C (due to substitutability). Then from Eqs. (4') and (6') we derive the total effects of α and p on k and l^U_C occurring directly as well as indirectly via l^F_R .

As the bargaining power of the union increases, the prospect of exit rises and hence the firm will cut back its investment and its complementary input skilled labour as well. In turn the substitute input unskilled labour or the contract labour will be increased. The exactly opposite incentives are released if the product price rises. For the contract labour there are two opposite forces: higher price directly exerts a positive effect, but via capital and permanent labour there is a substitute good effect. Due to Assumption (iii) the substitute good effect dominates, and the contract labour becomes an *inferior* input, responding negatively to a product price rise.

For the backward firm in addition to Eq. (9) the following version of Eq. (10) will be relevant (as $l^U_C = 0$ under limited contracting):

$$(1-\alpha)pg_1(k, l^U_R) - r = 0. \tag{10'}$$

Capital in a backward firm is just as vulnerable to threats of bargaining disagreement as it is in a modern firm. So here too capital will be inversely related to the union bargaining power α , and in turn the substitute input permanent labour will be positively related to α . From an increase in the product price p both inputs will get a boost (despite being substitutes), because neither of them are inferior inputs.

Proposition 4. (i) In a modern firm optimal capital and (skilled) permanent labour will decrease and optimal (unskilled) contract labour will increase with an increase in the union's bargaining power α . The effects of an increase in the product price p will be exactly opposite. That is to say, the (skilled) contract labour will be an inferior input. (ii) In a backward firm employment of the (unskilled) permanent workers increases with the union's bargaining power α as well as the product price p .

3.10. Equilibrium and trade liberalisation

The equilibrium of our economy is a vector of the product price and wages for all types of the workers for all modes of hiring. Under the assumption of ‘limited contracting’ skilled workers will not be hired as contract workers in modern firms and there will be no contract workers in backward firms; hence the equilibrium price vector is $(p^*, w_R^*, w_C^*, w_R^{U*}, w_C^{U*})$ and the associated labour distribution in the formal sector is (l_R^{S*}, l_C^{U*}) in n_1 modern firms and l_R^{U*} in n_2 backward firms.

Among these prices, w_R^* depends on both γw and w_i ; w_R^{U*} and w_C^{U*} both depend on w_i . A number of possible scenarios may emerge; however, for simplification, we have focussed on the scenario (in the previous section) where $w_i^* = w_i$; that is, the informal sector equilibrium wage rises up to the minimum wage. Hence, the equilibrium price vector reduces to a single price p^* in the equilibrium.

The equilibrium price p^* is given by the equality of demand and supply. Let $Q^D = Q^D(p; \beta)$ be the aggregate demand for the product, which includes not only the domestic demand but also the overseas (or export) demand. β is an export facilitating shift parameter; in its simplest interpretation β can be an autonomous export. The demand curve is continuous in p and downward sloping with standard properties. The supply curve is given by the sum of outputs supplied by n formal sector firms, the informal firms, and import. Without being too detailed, we denote this parsimoniously as $Q^S = Q^S(p; \theta)$, where θ is an import facilitating shift parameter. The supply curve is positively sloped and continuous in p with standard properties.

In Figs. 1 and 2 we depict the market equilibrium and the effects of an exogenous increase in import and export respectively. In Fig. 1 we assume that the industry does not export; it is a net importer. In Fig. 2 we assume that the industry does not import, but exports to meet the overseas demand. These are simplifying assumptions made for clearer graphical presentation. In panel A of Fig. 1, the inverse demand curve (which represents only domestic demand) is given by the line D . On the supply side there are three components: output supplied by the informal sector firms denoted by the inverse supply curve S_i , output supplied by the formal sector firms denoted by the inverse supply curve S_f , and import denoted by IM . From the intersection point of the aggregate supply and demand, we can trace the three individual output components at the equilibrium price. On panel B we show how this output distribution changes, if there is an increase in the autonomous import, say following an exchange rate liberalisation or trade reform, or a reduction in tariff. Both the formal and informal firms reduce their output supply, even though the economy as a whole consumes more output. Increased import substitutes for the output of the domestic firms and claims a larger share of the market as a whole. More importantly, both formal and informal firms respond similarly to the import shocks.

But when it comes to an increase in export demand they behave asymmetrically, and the main reason for that is that the informal sector firms cannot export. In Fig. 2, we have the aggregate supply consisting of two types of firms' outputs and no import. But on the demand side, we have both the domestic demand denoted by D and the export demand denoted by X . The inverse aggregate demand curve is given by the line $D + X$. On panel A, we show the output composition of the two types of the firm at a given equilibrium. The formal sector firm's output is divided between the domestic market and the overseas market. On panel B, we depict the effects of an increase in autonomous export. The formal sector firms raise their exports and overall production, but also cut down their domestic supply. Since the equilibrium price rises, the quantity demanded in the domestic economy falls; but the formal sector's supply to the domestic market falls by a greater magnitude, and this creates an opportunity for the informal sector to expand their supply. Essentially there is an output substitution between the formal and the informal sector.

Formally, the effects of an increase in θ (shift parameter for import) and β (shift parameter for export) on the equilibrium price are obtained as follows.

$$\frac{\partial p^*}{\partial \theta} = \frac{\partial Q^S(\cdot)}{\partial \theta} [Q^{D'(\cdot)} - Q^{S'(\cdot)}]^{-1} < 0, \quad \frac{\partial p^*}{\partial \beta} = -\frac{\partial Q^D(\cdot)}{\partial \beta} [Q^{D'(\cdot)} - Q^{S'(\cdot)}]^{-1} > 0.$$

The denominator $[Q^{D'(\cdot)} - Q^{S'(\cdot)}]$ is negative for stability. It should be noted that the marginal impacts of the shift parameters θ and β depend not only on how they increase import supply and export demand, but also on the structural characteristics of the two types of the firm, and

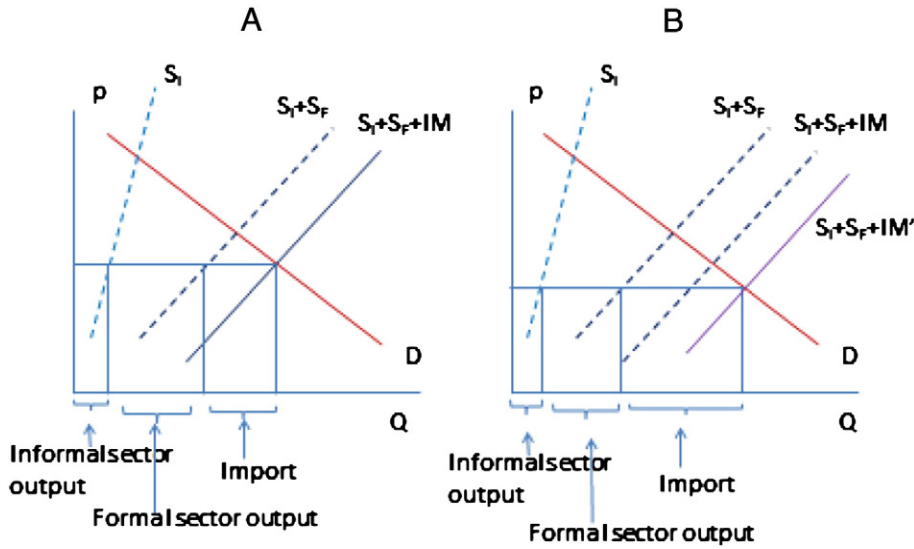


Fig. 1. Effects of an increase in autonomous import supply.

particularly on the informal sector firms' inability to supply to the overseas sector.

We also take account of the marginal impacts of θ and β . In a modern firm greater import leads to an increase in the contract labour and a decrease in capital and permanent labour. Greater export has opposite effects. For backward firms the effects are similar.

$$\frac{\partial k}{\partial \theta} = \frac{\partial k}{\partial p} \frac{\partial p^*}{\partial \theta} < 0, \quad \frac{\partial L_R^S}{\partial \theta} = \frac{\partial L_R^S}{\partial p} \frac{\partial p^*}{\partial \theta} < 0, \quad \frac{\partial L_C^U}{\partial \theta} = \frac{\partial L_C^U}{\partial p} \frac{\partial p^*}{\partial \theta} > 0$$

$$\frac{\partial k}{\partial \beta} = \frac{\partial k}{\partial p} \frac{\partial p^*}{\partial \beta} > 0, \quad \frac{\partial L_R^S}{\partial \beta} = \frac{\partial L_R^S}{\partial p} \frac{\partial p^*}{\partial \beta} > 0, \quad \frac{\partial L_C^U}{\partial \beta} = \frac{\partial L_C^U}{\partial p} \frac{\partial p^*}{\partial \beta} < 0.$$

The above results can be stated in terms of the share of the contract workers in total (industry level) employment for the formal sector. The total contract labour (over n_1 modern firms) is given by $L_C = \sum_{i=1}^{n_1} L_{Ci}^U$.

Total employment of skilled permanent labour is $L_R^S = \sum_{i=1}^{n_1} L_{Ri}^S$ and the total unskilled permanent labour is $L_R^U = \sum_{i=1}^{n_2} L_{Ri}^U$. Total employment (in

unskilled labour unit) is $L = \gamma L_R^S + L_C + L_R^U$. The effect of import (or export) on aggregate employment will be positive if the firm level effect is positive, e.g. $(dL_C/d\theta) > 0$ because $(dL_{Ci}^U/d\theta) > 0$. Thus, we derive the following:

$$\frac{d}{d\theta} \left(\frac{L_C}{L} \right) = \frac{1}{L^2} \left[(\gamma L_R^S + L_R^U) \frac{dL_C}{d\theta} - L_C \left(\gamma \frac{dL_R^S}{d\theta} + \frac{dL_R^U}{d\theta} \right) \right] > 0,$$

$$\frac{d}{d\beta} \left(\frac{L_C}{L} \right) = \frac{1}{L^2} \left[(\gamma L_R^S + L_R^U) \frac{dL_C}{d\beta} - L_C \left(\gamma \frac{dL_R^S}{d\beta} + \frac{dL_R^U}{d\beta} \right) \right] < 0.$$

Proposition 5. The share of the unskilled contract workers in total industry employment will rise (fall) in the formal sector firms if there is a change in the factors that facilitate greater import (export).

3.10.1. Welfare implication

Trade liberalisation tends to reallocate resources efficiently across various sectors. However, given labour market rigidities in India, the

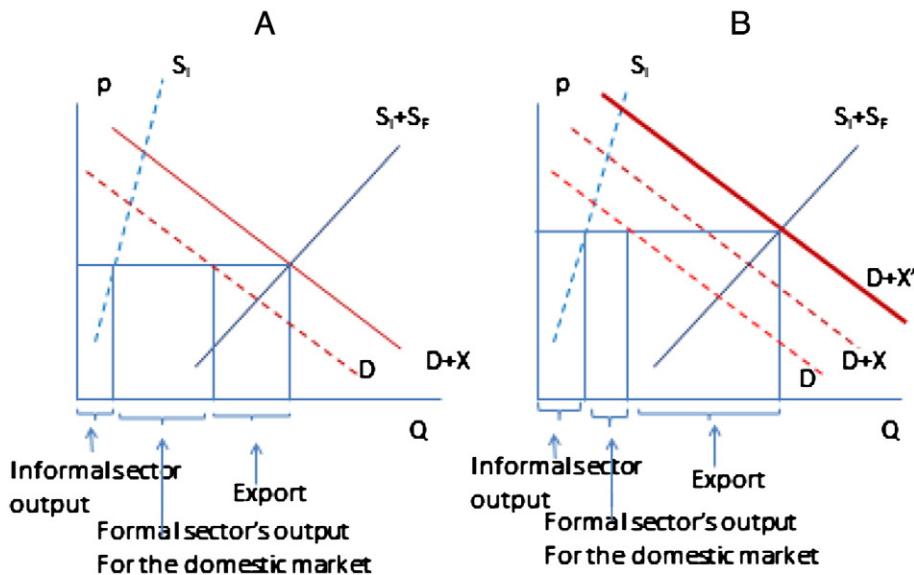


Fig. 2. Effects of an increase in autonomous export demand.

Table 1
Summary statistics.

Variable	Number of observations	Mean	Standard deviation	Variation
Share of contract worker in total workers	4915	0.178	0.185	By industry, by year and by state
Besley–Burgess measure of labour regulation	15	0.049	1.550	By state
OECD measure of strength of union rules	15	0.188	0.245	By state
Lockout to strike ratio	105	1.005	1.945	By state and by year
Union density	71	0.013	0.012	By state and by year
Import penetration ratio (one year lag)	406	0.143	0.226	By industry and by year
Export to output ratio (one year lag)	406	0.221	0.387	By industry and by year
Literacy rate (percentage)	105	69.819	8.663	By state and by year
Development expenditures (as a ratio of GDP, per cent)	105	4.930	2.559	By state and by year
Per capita electricity consumption	105	496.617	287.898	By state and by year

Notes: The original OECD measure coded states by the reforms undertaken by each in reducing the inflexibility of union rules (so higher values in the original measure implied greater reforms); here we take the inverse of the original measure to capture the pro-worker nature of trade union rules by state.

main route of reallocation of labour is the contract route. As our analysis shows, firms are clearly better off by hiring contract labour. Will the workers also be better off? From the point of view of the unskilled workers, those who are hired as contract workers in the formal sector may experience a wage gain, or at least will be guaranteed of the minimum wage, in addition to working in a better environment. So these workers are most likely to be better off. The permanent workers, who now experience a wage reduction due to strategic hiring of contract workers, will probably be worse off. So the overall welfare effect for the whole economy is somewhat ambiguous. However, if one factors in dynamic *employment effects* due to greater flexibility in labour usage, there may be secondary and tertiary welfare generated elsewhere in the economy. A bigger question is whether export opportunities will provide a boost for labour intensive industries, and the answer to that question depends on to what extent the contract route becomes more accessible and the unions become more compromising. Given the current trend, it may not be unrealistic to expect that in the long run there will be a welfare improvement for the whole economy.

4. Methodology, data, and variables

4.1. Methodology

We will now empirically examine how import and export demand (denoted by θ and β respectively in Section 3.10) and the union bargaining power (denoted by α in Section 3) can explain the pattern of contract labour use. We estimate the following regression equation:

$$c_{i,s,t} = \alpha_0 + \alpha_1 IM_{it} + \alpha_2 EO + \alpha_3 WBP_{st} + \sum_{k \geq 3} \alpha_k X_{kt} + \gamma_i + \delta_t + \lambda_s + e_{ist} \quad (12)$$

where c is the ratio of contract workers to total workers (= contract workers + permanent workers), the subscript i stands for industry, s stands for state and t for time.¹⁴ Thus, our specification involves a three dimensional panel data varying across industry, state and year. We have a panel of 58 industries, 15 states and 7 years.

IM and EO are the import penetration and the export to output ratios respectively. We lag both import penetration and export orientation by one year to take into account possible endogeneity concerns – for example, if industries that use contract labour are more competitive because of the lower wages that firms in these industries to contract workers, then they may be more likely to withstand import competition.¹⁵ WBP is the bargaining power of permanent workers (as captured in our theoretical model by α). We describe below how we measure worker

bargaining power. Finally, $\sum X_{kt}$ is a vector of control variables, γ_i are industry-specific fixed effects, δ_t are the time-specific fixed effects (year effects) and λ_s are state-specific fixed effects.

Industry fixed effects control for the variations in contract labour usage across industry due to industry specific technological factors that influence the ease of substitution between contract and permanent workers. Year fixed effects control for common shocks to industry production functions which may change relative productivity differentials between contract and permanent workers and consequently, the relative use of contract workers. State fixed effects control for unobserved state-specific effects that may drive both contract labour usage and some of our independent variables such as proxies of state-level labour institutions that capture worker bargaining power.

We experiment with different control variables in some of the regressions. We are agnostic on what these could be – previous studies on the effects of labour regulations on industrial growth in India have used state development expenditures and per capita electricity consumption (see Besley and Burgess, 2004 for example) and we do so too. We also include the literacy rate as a measure of the skill gap between permanent and contract workers – in states where there is a larger literate population it is more likely that permanent workers would be better equipped with the skills necessary in production.

4.2. Data and variables

Our data comes from the Annual Survey of Industries (ASI) published by the Central Statistical Organisation (CSO), Government of India, which is an annual data-set on output, employment, capital stock, wages and so on, at the 3 digit NIC classification industry level (corresponding broadly to 3/4 digit ISIC classification) and at the state level (CSOa, CSOb). This data is only for formal sector firms (defined in Footnote 5, Section 2).¹⁶ We have data on the number of contract workers and permanent workers by industry, year and state. The time-period of our analysis is 1998/99 to 2004/05. The data is not available prior to 1998/1999 at the state-industry level, and 2004/05 is the most recent year for which the data is available from the CSO on contract and permanent workers.¹⁷

We calculate import penetration and export orientation ratios from the trade and industrial output data of the World Bank Trade Data-base (World Bank, 2007). The World Bank Trade Data-base provides the data at the ISIC 3 digit level of classification, and we match the data to the NIC

¹⁴ Replacing the ratio of contract workers to total workers by its log did not change any of the results presented in the paper.

¹⁵ Import penetration is the ratio of imports to imports + domestic demand, where domestic demand is total output minus exports. Export orientation is the ratio of exports to gross output.

¹⁶ The data on the formal manufacturing sector in India is considered to be reliable for the mandatory reporting by firms, as well as the experience of the CSO in collating and processing the data.

¹⁷ The lack of availability of state-industry data on contract labour use prior to 1998 is a limitation of our analysis, as the trade reforms in India occurred mostly in the mid-1980s and early 1990s. However, it should be noted that the increase in contract labour use in India has occurred mostly since the late 1990s, during the period when the Indian manufacturing sector was increasingly globalised (Sen, 2009).

Table 2
Share of contract workers in total workers and measures of worker bargaining power by Indian state.

State names	Share of contract worker in total workers		Measures of worker bargaining power			
	1998	2004	Besley–Burgess index of labour regulation	OECD measure of strength of union rules	Lockout to strike ratio	
					1998	2004
Andhra Pradesh	0.15	0.51	−2	0.4	2.67	0.28
Assam	0.08	0.14	0	0	0.63	3.00
Bihar	0.46	0.53	1	0	0.20	4.00
Gujarat	0.26	0.33	0	0.2	0.18	0.21
Haryana	0.31	0.41	−1	0.2	0.18	0.06
Karnataka	0.08	0.13	2	0.4	0.32	0.14
Kerala	0.04	0.07	−1	0	0.48	0.13
Madhya Pradesh	0.16	0.28	2	0.4	0.04	0.00
Maharashtra	0.15	0.27	0	0.8	0.50	0.33
Orissa	0.27	0.36	1	0	0.09	1.33
Punjab	0.19	0.27	0	0	0.23	0.13
Rajasthan	0.21	0.33	−1	0	0.27	0.54
Tamil Nadu	0.09	0.13	−2	0	0.16	0.25
Uttar Pradesh	0.22	0.29	0	0	1.56	0.29
West Bengal	0.06	0.14	4	0.4	3.12	7.00

Note: Higher values of the Besley–Burgess and the OECD measures indicate higher worker bargaining power; higher value of the Lockout to Strike ratio indicate lower worker bargaining power. The original OECD measure coded states by the reforms undertaken by each in reducing the inflexibility of union rules (so higher values in the original measure implied greater reforms); here we take the inverse of the original measure to capture the pro-worker nature of trade union rules where higher values of the measure presented in the Table indicate more pro-union labour laws.

Source: Our calculations, from *Annual Survey of Industries* and *Indian Labour Yearbooks*. Besley–Burgess measure obtained from Besley and Burgess (2004) and OECD Measure obtained from Dougherty (2008).

3 digit classification of the Annual Survey of Industries. Thus, our import penetration and export orientation variables vary across industries and over time (but not across states). One limitation both of the World Bank Trade Data-base and the Annual Survey of Industries is that the output data available in these two data sources are for the formal/registered/organised manufacturing sector in India, while the trade data covers both the formal and informal sectors (there is no annual industry-level data on manufacturing output of the informal sector in India). This implies that our import penetration and export orientation variables would be higher values in most cases than would have been the case if we used total industrial output (combining formal and informal manufacturing output) in the denominator in the calculation of these two variables. However, given that our interest is in capturing the effects of trade exposure on the formal manufacturing sector, it could be argued that the use of formal manufacturing output in the denominator of the import penetration and export orientation variables capture more accurately the pressure of trade exposure on labour market adjustment in the formal manufacturing sector.

We capture the workers' bargaining power by a variety of measures. Firstly, we use the Lockout to Strike ratio, which is the number of lockouts in a state as a ratio of the number of strikes in the state for a given year.¹⁸ Lockouts are unilateral decisions of the management of the firm to shut down operations of the firm. Strikes are unilateral decisions of workers to disrupt activity in their place of employment. Either side may resort to their option when it is most advantageous to them. In the Indian context, where the relative strength of trade unions vis-a-vis firm management in a particular state has been historically conditioned by the presence of a well organised and large working class in that state, and by nature of the political regime in the state (for example, Indian states with left of centre governments have tended to be more sympathetic to trade union concerns), the Lockout to Strike ratio provides an accurate measure of the degree of worker bargaining power, with lower values of this ratio indicating higher bargaining power for workers.¹⁹ We compute this measure using data on the number of lockouts and strikes for all the 15 major Indian states for the period 1998 to

2004.²⁰ In addition to the Lockout to Strike ratio, we also include another measure that has been commonly used in the literature as a proxy for worker bargaining power – union density.²¹ We would expect that higher values of this variable and a lower value of the Lockout to Strike ratio reflect higher bargaining power of workers in the state in question.

In addition to the measures above, we use the commonly used Besley and Burgess (2004) measure of labour regulation and a measure of the strength of union rules in different states compiled by the OECD. As discussed in Section 2, the IDA been extensively amended by state governments during the post-independence period. Besley and Burgess code each state amendment to labour laws as neutral, pro-worker or pro-employer. For neutral amendments, they assign a score of zero, for a pro-worker amendment a score of +1 and for a pro-employer amendment a score of −1. They then cumulate the scores over time for the period 1947–1997. In their sample, the state of West Bengal has the most pro-worker labour institutions with a score of +4 in 1997, and Andhra Pradesh and Tamil Nadu the most pro-employer labour institutions, each with a score of −2 in 1997. We use the Besley–Burgess measure for the last year for which the measure has been calculated – that is, 1997.

While the Besley–Burgess measure applies exclusively to the IDA, the OECD has compiled state-level indices that assess the strength of other aspects of the Indian labour laws, including laws relating to the formation of trade unions and their role in collective bargaining (Dougherty, 2008). As discussed in Section 2, the operational aspects of the labour laws relating to the formation of trade unions and their role in collective bargaining differ widely across Indian states. The OECD code state-level labour law reform with respect to trade unions such as the minimum number of workers required to form an union, provisions to restrict unions in enterprises, the minimum number of workers required to support a strike, additional restrictions beyond the IDA to declare a strike and the code of conduct between unions and employers in collective bargaining negotiations. We use the OECD

²⁰ Since there are several cases of zero lockouts for a state in a given year, we took lockouts as the denominator rather than as the numerator to maximise the number of years and states for which we could compute the ratio.

²¹ Following Besley and Burgess (2004), we measure this as the proportion of union members in total urban population. The data on union membership comes from the Indian Labour Yearbooks, and are patchy, with missing observations for many states in some years. In contrast, data on the Lockout to Strike ratio is complete, with no missing observations.

¹⁸ In the industrial relations literature, lockouts and strikes are seen as weapons of 'equal value'.

¹⁹ An important advantage of this measure is that there is pronounced variation in the Lockout to Strike ratio both across states and over time.

Table 3
Share of contract workers in total workers, import penetration and export to output ratio by industry group.

Industry group	Share of contract workers in total workers		Import penetration ratio		Export to output ratio	
	1998	2004	1997	2003	1997	2003
Food products and beverages	0.25	0.34	0.07	0.09	0.03	0.08
Tobacco products	0.12	0.61	0.02	0.02	0.00	0.00
Textile products	0.11	0.15	0.17	0.26	0.02	0.06
Wearing apparel	0.06	0.29	0.50	0.58	0.00	0.01
Leather products	0.10	0.17	0.39	0.49	0.06	0.10
Wood products	0.04	0.12	0.06	0.08	0.07	0.07
Paper and paper products	0.18	0.26	0.03	0.05	0.24	0.24
Publishing and printing	0.07	0.13	0.03	0.07	0.09	0.15
Chemicals and chemical products	0.18	0.24	0.11	0.15	0.16	0.19
Rubber and plastic products	0.11	0.20	0.06	0.11	0.03	0.05
Other non-metallic mineral products	0.32	0.35	0.08	0.03	0.06	0.02
Basic metals	0.24	0.30	0.20	0.20	0.59	0.37
Fabricated metal products	0.19	0.37	0.13	0.32	0.07	0.14
Machinery and equipment	0.09	0.17	0.15	0.43	0.40	0.67
Office, accounting and computing machinery	0.28	0.24	0.15	0.30	0.40	6.13
Electrical machinery	0.14	0.20	0.06	0.63	0.15	0.86
Radio, television and communication equipment	0.04	0.18	0.06	0.80	0.15	0.80
Medical precision and optical instruments	0.03	0.10	0.31	0.69	0.71	0.89
Motor vehicles	0.13	0.27	0.06	0.18	0.07	0.28
Other transport equipment	0.15	0.23	0.06	0.18	0.07	0.28

Source: Our calculations, from *Annual Survey of Industries* and *World Bank Trade data*.

index of strength of trade union rules as an additional measure of worker bargaining power.²²

A limitation of the Besley–Burgess and the OECD measures is that while they vary across states, they do not vary over time.²³ We interact these measures with import penetration and export orientation and include the interaction terms in the regressions that we run. Our model predicts that while greater import penetration will lead to an increase in contract labour usage (since contract labour is an inferior input when both types of labour are used, a fall in price due to import penetration will increase contract labour usage), the positive relationship between import penetration and contract labour usage will be stronger in states with pro-worker labour institutions as firms would be more inclined to hire contract workers instead of permanent workers in states where permanent workers have higher bargaining power. Similarly, while our model predicts that greater export orientation will lead to a fall in contract labour usage (with an increase in price due to greater exports), the negative relationship between export promotion and contract labour usage will be weaker in states with pro-worker labour institutions as the positive effect of pro-worker labour institutions would work against the stronger incentive of firms to hire permanent workers with greater export orientation in such states. Therefore, we would expect that the interaction term of pro-worker labour institutions (captured by the Besley–Burgess and OECD measures of labour regulations) and import penetration to be positive, and the interaction term of pro-worker labour institutions and export orientation to be negative (along with the signs of import penetration and export orientation being positive and negative respectively).

With respect to control variables such the literacy rate, government development expenditures and per capita electricity usage which vary across Indian states and over time, the data is obtained from the various issues of the *Statistical Abstract* of the Government of India.

²² The index is compiled using primary surveys conducted with assistance from the key employers' organisations and business associations, and in consultation with local union leaders, state labour commissioners and independent labour law experts. The original OECD measure gives states with the most number of labour law reforms the highest score. We use the inverse of this index in our empirical analysis as a measure of pro-worker labour institutions in the area of trade union rules.

²³ Hence, they cannot be included in the regressions, when we include state fixed effects.

5. Empirical analysis

We begin the empirical analysis by presenting the summary statistics, followed by a description of patterns of contract labour use by the Indian states and industries, and variations in our different measures of worker bargaining power across Indian states and trends in import penetration and export orientation by industry. We then present the main results of the econometric analysis.

5.1. Descriptive statistics

We present summary statistics of the key variables used in the empirical analysis in *Table 1*. The average share of contract workers across state-industry and year is 0.178 with a standard deviation of 0.185. The average import penetration ratio is 0.143 and the average export to output ratio is 0.221.

5.2. Patterns in contract labour use across Indian states and across industries

In *Table 2*, we present the share of contract workers in total workers for the 15 states in two points in time – 1998 and 2004. All states have seen an increase in the share of contract workers in total workers over the period 1998–2004, with some states more doubling the share of contract workers in total workers in this period.²⁴ The state with the highest share of contract workers in total workers in 2004 is Bihar, with 53 per cent. The state with the lowest share of contract workers in total workers in 2004 is Kerala with 7 per cent. We also find that there is wide variation over time in the Lockout to Strike ratio across Indian states – in some states, there has been an increase in this measure between 1998 and 2004 while in other states, there has been a decrease in the same period. There also seems to be a positive correlation between the Besley–Burgess and the OECD measures of pro-worker labour institutions (the correlation coefficient is a positive 0.41).

²⁴ The increase in the use of contract workers in the state of Andhra Pradesh from 15 per cent in 1998 to over 50 per cent in 2004 is particularly striking and can be attributed in part to the relaxation of labour laws which allows greater flexibility in the use of contract workers (NCEUS, 2009).

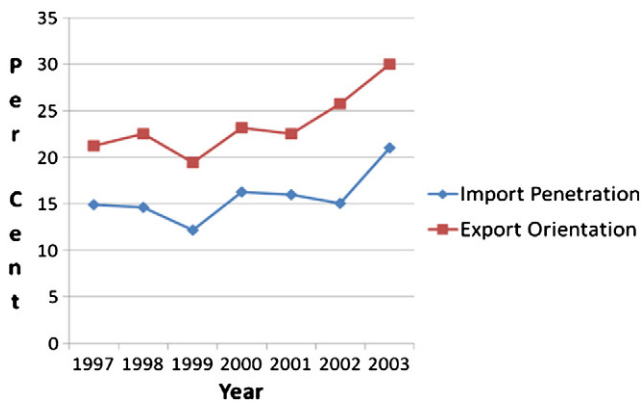


Fig. 3. Import Penetration and Export Orientation, 1997–2003. Sources: *Annual Survey of Industries*, Central Statistical Organisation, Government of India and World Bank Trade Data-Base. Note: Unweighted shares; Import Penetration = Imports/(Imports + Output-Exports); Export Orientation = Exports/Output.

In Table 3, we present the share of contract workers in total workers by 2 digit NIC industry groups in 1998 and 2004, along with import penetration and export to output ratios for the same industry groups in 1997 and 2003. Contract labour usage has also increased all industry groups, except Office, Accounting and Computing Machinery. There is a significant variation in contract labour usage across industries, with the lowest being Medical Precision and Optical Instruments at 10 per cent, and highest being Tobacco Products in 2004 at 61 per cent. The variations in contract labour usage across industries will be determined among other factors by the technological parameters in each industry that allow the ease of substitution between contract workers and permanent workers and the relative wage rates between contract and permanent workers. Since we do not observe technological parameters by industry and do not have industry-level data on wage rates of permanent and contract labours, we control for these factors by using industry fixed effects in the empirical analysis.

We also find that import penetration rates have been increasing over the period 1997–2003 across all industries, and in the aggregate (col. 4 of Table 3 and Fig. 3). Export to output ratios, however, do not show a clear pattern across industries, though there has been an increase in the overall ratio. We also observe a wide variation in import penetration and export to output ratios across industry groups.

5.3. Results

Table 4 presents the main results.²⁵ In all our regressions, we include industry, year and state dummies. In our basic specification in Col. (1), we regress the share of contract workers in total workers against the Lockout to Strike ratio, and the measures of trade orientation – the one period lagged import penetration and export orientation ratios. The coefficient on the Lockout to Strike ratio is highly significant at 1 per cent level and of the right sign (that is, negative) – higher worker bargaining power leads to a higher use of contract workers. Among the two trade orientation variables, the coefficient on the export orientation variable is negative, as postulated in Section 3, but not significant. However, as our theory predicts, the import penetration variable is positive and significant at the 5 per cent level and positive. The share of contract workers in total employment increased by 9 percentage points at the all India level from 1998 to 2004. Our estimates suggest that approximately three-tenths of this can be attributed to increasing import penetration during this period.

In Col. (2), we introduce additional state-level controls that vary with time – the literacy rate, per capita development expenditures undertaken by state governments and per capita electricity consumption.

We find that the literacy rate is negative as would be expected, if the literacy rate can be seen as a measure of the skill gap between permanent and contract workers, but is not statistically significant. Per capita electricity consumption has a positive and significant effect on contract labour use but not development expenditures. The inclusion of these variables does not affect the significance of the key variables – union bargaining power and trade orientation.

In Col. (3), we include another measure of worker bargaining power – union density. As hypothesised, an increase in union density leads to an increase in contract labour usage, with the coefficient on union density positive and significant at the 5 per cent level. The coefficient on the Lockout to Strike ratio remains negative and statistically significant in this regression.

A key implication of our theoretical model that we have discussed in Section 4 is that industries located in states with labour laws favouring permanent workers will witness greater contract labour usage with greater import penetration and less contract labour usage with greater export orientation. We test for these predictions using interaction terms, where the Besley–Burgess and OECD measures are interacted with the import penetration and export orientation variables, and present the estimates in Col. (4).²⁶ We find that the interaction term between the Besley–Burgess measure and import penetration is positive, but not significant. However, the interaction term between the OECD measure and import penetration is positive and significant at the 10 per cent level. This indicates that the positive effect of import penetration on contract labour use is particularly strong in states which have labour laws that are more in favour of trade unions. Interestingly, the interaction terms between the Besley–Burgess and the OECD measures are negative and statistically significant at the 10 per cent level or less, suggesting that with greater export orientation, industries in more pro-worker states tend to use less contract labour. These results are consistent with the predictions of our theoretical model and indicate that contract labour is an inferior input, as our theory suggests. Our findings confirm that the effects of trade exposure on contract labour usage is stronger in states with pro-worker labour institutions, with industries in pro-worker states more inclined to use contract labour with greater import penetration and less inclined to use contract labour with greater export orientation.²⁷

In Col. (5), we include state specific minimum wages in our regression model as another proxy for the bargaining power of permanent workers. Minimum wages are determined in India by respective state governments, and thus, vary across states and over time, but not by industry. We have data on the average minimum wage rate by state and year.²⁸ Since contract workers are required (by law) to be paid at least the minimum wage, an increase in the minimum wage should lead to a stronger bargaining power of permanent workers, causing a substitution away from contract workers towards permanent workers. We find that, as expected, an increase in minimum wages leads to a decrease in contract labour usage – the coefficient on the minimum wage variable is negative and significant at the 10 per cent level.

As we have seen in Section 3, if contract labour is an inferior input, we would expect a negative relationship between the real domestic

²⁶ We include the Besley–Burgess measure by normalising it so that it lies between a range of zero to one, with higher values denoting more pro-worker labour institutions.

²⁷ As a further robustness test, we estimate our basic specification, with and without state-level controls, and without state fixed effects, where we include the Besley–Burgess measure of labour regulation directly in the set of Right Hand Side variables, along with region fixed effects (dummies for whether states are located in North, West, East and the South of the country). We report these regression results in Col. (1) and (2) of Appendix Table A1. As predicted by our model, we find that the coefficient on the Besley–Burgess measure is positive and significant, indicating that an increase in labour regulation leads to an increasing use of contract workers. The other key regressors – the Lockout to Strike ratio and the Import Penetration variable – have the right signs and are significant.

²⁸ The data is obtained from the various issues of the Indian Labour Yearbook. The Yearbook reports maximum and minimum values of the minimum wage rate for a given state for a given year as some industries have different minimum wage rates – we take the average of the minimum and maximum values.

²⁵ We use Ordinary Least Squares, with robust standard errors.

Table 4
Regression results.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.122*** (0.000)	0.152 (0.307)	−0.315 (0.178)	0.182 (0.780)	0.365*** (0.000)	0.310** (0.015)	0.485*** (0.000)
Lockout to Strike ratio	−0.011*** (0.000)	−0.007*** (0.002)	−0.003*** (0.004)	−0.017** (0.000)	–	−0.011*** (0.000)	−0.010*** (0.000)
Union density	–	–	0.034** (0.481)	–	–	–	–
Import penetration	0.027** (0.047)	0.027** (0.048)	0.029* (0.093)	0.028* (0.067)	0.028* (0.063)	–	0.028** (0.049)
Export orientation	−0.002 (0.766)	−0.002 (0.761)	−0.004 (0.757)	−0.003 (0.832)	−0.005 (0.576)	–	−0.002 (0.830)
Besley–Burgess measure* import penetration	–	–	–	0.027 (0.710)	–	–	–
Besley–Burgess measure* export orientation	–	–	–	−0.048** (0.038)	–	–	–
OECD measure * import penetration	–	–	–	0.015* (0.062)	–	–	–
OECD measure * export orientation	–	–	–	−0.012* (0.053)	–	–	–
Development expenditure	–	0.001 (0.675)	–	–	–	–	–
Literacy rate	–	−0.001 (0.645)	–	–	–	–	–
Per capita electricity consumption	–	0.001* (0.065)	–	–	–	–	–
Minimum wage	–	–	–	–	−0.001* (0.000)	–	–
Real domestic price	–	–	–	–	–	−0.027 (0.126)	–
Out-sourcing	–	–	–	–	–	–	−0.071*** (0.001)
Industry effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.33	0.33	0.33	0.33	0.30	0.29	0.28
No of obs.	4503	4503	4115	4503	3533	4503	4503

Note: a) The dependent variable is the share of contract workers in total workers; b) Figures in parentheses represent level of significance; c) * p < 0.10, ** p < 0.05, *** p < 0.01; c) OLS: Ordinary Least Squares; d) Robust standard errors.

price of the product and contract labour usage. We test for this directly and present the estimates in Col. (6). As expected, the coefficient on the real domestic price is negative, though it is only significant at the 12 per cent level.

One potential area of concern with our estimates is that it is possible that firms which are seeking flexibility in labour use in the face of greater trade exposure or stronger bargaining power of permanent workers may decide to out-source certain activities to firms in the informal sector rather than undertake them in-house with the help of contract workers. To control for this possibility, we construct a variable that captures outsourcing of formal sector activities to informal sector firms. This variable is the share of informal sector output in total informal and formal sector output for the given 3 digit NIC industry (we have no direct measure of outsourcing of formal firms to informal firms in the data). We obtain informal sector output data from the NSSO quinquennial surveys of informal/unorganised manufacturing – the output data is only available for 2001 and 2005, and we compute the share of informal output in total output for these years, and we use the observations for 2001 for the years 1998 to 2001 and the observations for 2005 for the years 2002 to 2004.²⁹ When we include the variable measuring outsourcing in Col (7), we find that the variable has the right sign – the coefficient of it is negative – and is significant at the 1 per cent level.³⁰ This implies that industries that have higher levels of out-

sourcing are less likely to employ contract labour – outsourcing can be seen as a substitute for contract labour usage. However, the signs and significance on the explanatory variables of interest – measures of worker bargaining power and import penetration – do not change with the inclusion of the out-sourcing variable.

In sum, we find that our results on import penetration and worker bargaining power are robust to the inclusion of industry, year and state fixed effects, and other relevant control variables, and to alternate specifications. Our results indicate that greater import penetration and stronger bargaining power of workers lead to a substitution of permanent workers in favour of contract workers, while the effect of export orientation on contract labour, though negative as predicted by our theory is statistically insignificant in most specifications. We also find that the effect of trade exposure on contract labour usage is stronger in states with more pro-worker labour institutions as predicted by our model.

An important remaining concern is the possible endogeneity of the two key explanatory variables – import penetration and the Lockout to Strike ratio. If import penetration is correlated over time for a given industry, lagged import penetration may be endogenous to current contract labour usage. We use one period lagged tariffs (both the mean and standard deviation of weighted tariffs, given the wide variation of tariff rates within NIC 3 digit industries in India) as instruments for the one period lagged import penetration ratio.³¹ We present the first stage results in Col. (1) of Panel A in Table 5, and the IV estimates in Col (1) of Panel B in Table 5. The first stage results show that both the

²⁹ The quinquennial surveys of the informal manufacturing sector undertaken by the NSSO are a nationally representative survey, using stratified random sampling, and surveys all informal firms, including own account enterprises.

³⁰ We report in Col. (3) of Appendix Table A1 an expanded version of the regression estimated in Col. (3) in Table 4, with the state-level controls, *Development Expenditures*, *Literacy Rate* and *Per Capita Electricity Consumption*, included, with similar results for the *Out-Sourcing* variable as reported in Table 4.

³¹ The tariff data is obtained from the World Bank Trade Data-base.

Table 5
Instrumental variable (IV) estimation results.

Variables	(1)	(2)	(3)
<i>Panel A: First stage results</i>			
Constant	0.122*** (0.000)	0.103*** (0.009)	1.61*** (0.000)
Mean tariffs (weighted)	–0.001 (0.251)	–	–0.001 (0.834)
Standard deviation of tariffs	–0.001*** (0.001)	–	–0.001*** (0.000)
Congress Party–Share of seats	–	–0.338*** (0.000)	–0.102 (0.910)
Hard Left Parties–Share of seats	–	1.220 (0.840)	–0.0031 (0.887)
Soft Left Parties–Share of seats	–	–0.717** (0.010)	–0.612* (0.09)
Hindu Parties–Share of seats	–	1.042*** (0.000)	0.982* (0.004)
Controls	Lockout to Strike ratio, export orientation, industry dummies, year dummies, state dummies	Import penetration, export orientation, industry dummies, year dummies, state dummies	Export orientation, industry dummies, year dummies, state dummies
R-square	0.71	0.81	0.71
<i>Panel B: IV Estimates</i>			
Constant	–0.416 (0.410)	0.178*** (0.000)	–0.640 (0.236)
Import penetration	0.042* (0.091)	0.028** (0.058)	0.054* (0.010)
Export orientation	–0.015 (0.263)	–0.002 (0.803)	–0.019 (0.194)
Lockout to Strike ratio	–0.011*** (0.000)	–0.014*** (0.000)	–0.014*** (0.000)
Industry, year and state effects?	Yes	Yes	Yes
R ²	0.22	0.28	0.21
No of obs.	4503	4503	4503
Hansen's J test of over-identification – p value	0.681	0.140	0.231

Note: a) The dependent variable is the share of contract workers in total workers; b) Figures in parentheses represent level of significance; c) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; c) IV: Instrumental Variables; Two Stage Least Squares, Robust standard errors.

higher level and the higher standard deviation of tariffs have a negative effect on import penetration, though the coefficient on the former is not statistically significant. The high R-squared indicates that the instruments can explain a large part of the variation in import penetration, and the lack of significance of the J-test for over-identifying restrictions indicates the validity of the instruments. We see from the second stage results that the coefficient on the import penetration variable is positive and increases in magnitude compared to the OLS case (and remains significant at the 10 per cent level). Thus, our finding on the positive relationship between import penetration and contract labour usage is robust to potential endogeneity concerns with the former variable.

The second endogeneity concern is with the Lockout to Strike variable – more intensive use of contract labour may lead permanent workers to resort to more strikes, leading to a negative relationship between contract labour usage and the Lockout to Strike ratio. To obtain suitable instrumental variables for the Lockout to Strike ratio, we exploit the fact that different states in India have been ruled by political parties of different ideological persuasion in the period 1998–2004 and that there were at least two rounds of elections for state legislatures in most of the major Indian states, leading to changes in state governments in several cases in 1998–2004. As has been found by *Botero et al. (2004)*, political parties of the left are associated with more stringent labour regulations across the world, and this has been the case in India, where states which have been ruled by left of centre parties have tended to be anti-business, as well as have been more sympathetic to the demands of trade unions (*Aghion et al., 2008; Cali and Sen, 2011*). We adopt the classification of political parties in *Besley and Burgess (2004)* and *Aghion et al. (2008)*, where we have four political groupings – the Congress Party (which is broadly left of centre), the parties of the ‘Hard Left’, the parties of the ‘Soft Left’, and the right of centre Hindu nationalist

parties.³² We use the seats won in state legislatures by these political party groupings as instruments – the seats won by these groupings vary substantially across states and over time in our period of analysis, providing a set of instruments that both vary across Indian states and over time.³³ The ideological orientation of the political parties at the state level would not expect to affect firms' decision to use contract labour except through their indirect effects on state-level worker bargaining power and would satisfy the necessary exclusion conditions to be used as instruments for the Lockout to Strike ratio.

We present the first stage results in Col. (2) of Panel A in *Table 5*, and the IV estimates in Col (2) of Panel B in *Table 5*. The first stage results show that the left of centre Congress Party and the Soft Left Parties are negatively associated with the Lockout to Strike ratio, while the right of centre Hindu Nationalist Parties are positively associated with the Lockout to Strike ratio, as we would expect (and the coefficients on these variables are statistically significant). Surprisingly, the Hard Left Parties do not seem to be negatively associated with the Lockout to Strike ratio, which may reflect the marginalisation of these political parties in the trade union movement in India. The F-test (not reported) strongly rejects the hypothesis that the instruments are jointly not significantly different from zero, and the high R-squared indicates that a large proportion of the variation in the Lockout to Strike ratio can be explained by ideological orientation of political parties, suggesting that

³² The groupings are: (i) Congress: Congress Party (Indian National Congress + Nationalist Congress Party), (ii) Hard Left: Communist Party of India + Communist Party of India Marxist, (iii) Soft Left: Socialist Party + Praja Socialist Party, and (iv) Hindu parties: Bharatiya Janata Party + Bharatiya Jana Sangh. The fifth and residual groupings are the regional parties and independents.

³³ The data on the share of seats won by political parties in Indian state legislatures is obtained from the website of the Election Commission of India.

these variables are valid instruments of the Lockout to Strike ratio (and the J-test statistic is not statistically significant).³⁴

The IV two stage least squares estimates provide very similar results as the Ordinary Least Squares estimates with respect to the negative and statistically significant coefficient on the instrumented Lockout to Strike ratio. The level of significance of the Lockout to Strike ratio remains at 1 per cent. The value of the coefficient on the Lockout to Strike ratio in the IV case is higher than in the OLS case, suggesting that increasing contract labour usage may indeed have been contributing to a retaliatory response from permanent workers in terms of higher incidence of strikes relative to lockouts. Our finding that the coefficient on the Lockout to Strike ratio remains negative and significant in the IV case increase our confidence that the higher incidence of strikes relative to lockouts is a cause and not a consequence of greater contract labour usage by industries. Finally, in Col. (3) of Table 5, we estimate two-stage least squares regressions where both import penetration and the Lockout to Strike ratio are taken to be endogenous, and instrumented by the mean and variance of tariffs, and the electoral outcome variables. The signs on Import penetration and the Lockout to Strike ratio remain the same as in previous estimates, and are statistically significant.

6. Conclusions

There has been increasing flexibilisation of labour use in developed countries and in developing countries such as India, with workers on temporary contracts being used in place of permanent workers. One important feature of flexibilisation in India has been the use of workers on short-term contracts (contract workers) hired through an intermediary by firms in the formal sector, where these workers do not have employment protection and trade union representation that are accorded to workers on indefinite contracts (permanent workers). This paper develops a model of labour demand where formal sector firms need to decide on the number of contract workers versus permanent workers to use. We are specifically interested in the role of labour institutions and trade openness in determining this choice. The model predicts that greater bargaining power of permanent workers will lead to higher contract labour usage in total employment. Our theory also predicts that greater import penetration will lead to greater contract labour usage and that greater export orientation will lead to less contract labour usage.

We then examine the determinants of contract labour usage using a panel of 58 industries for the formal manufacturing sector for 15 Indian states over 7 years. We find that pro-worker labour institutions and increasing exposure to imports lead to greater use of contract labour relative to permanent labour. Our results suggest that increased trade exposure leads to greater ‘flexibilisation’ of formal labour markets, as understood by a substitution of permanent workers for contract workers by manufacturing firms. While we are not able to capture the adjustment of the entire labour market (both formal and informal workers) to trade liberalisation due to the lack of panel data on informal workers, our results suggest that India’s trade reforms have led to increasing precariousness of workers in the formal labour market, with firms preferring to employ more workers on temporary contracts.

Our results also indicate that stronger bargaining power of permanent workers may have perverse negative outcomes on their employment, as firms substitute away from permanent labour and in favour of contract labour. We also find, consistent with our theoretical model, that the effects of trade exposure on contract labour usage is stronger in states with pro-worker labour institutions, with industries in pro-worker states more inclined to use contract labour with greater import penetration and less inclined to use contract labour with greater export orientation. Our

findings provide some support to the proposition that in the presence of labour market rigidities, increasing trade exposure can contribute to the ‘flexibilisation’ of the formal work-force of developing countries.

Appendix A

A.1. Derivation of Eqs. (1)–(2) and (8)–(9)

By maximizing the function $z^M(\cdot)$ we get the following first order conditions:

$$\begin{aligned} \frac{\partial z^M}{\partial w_R^S} &= \alpha(u^M - \underline{u}^M)^{\alpha-1} l_R^S (\pi^M - \underline{\pi}^M)^{1-\alpha} + (1-\alpha)(u^M - \underline{u}^M)^\alpha (\pi^M - \underline{\pi}^M)^{-\alpha} (-l_R^S) = 0 \\ &= (u^M - \underline{u}^M)^{\alpha-1} l_R^S (\pi^M - \underline{\pi}^M)^{-\alpha} [\alpha(\pi^M - \underline{\pi}^M) - (1-\alpha)(u^M - \underline{u}^M)] = 0 \\ \frac{\partial z^M}{\partial l_R^S} &= \alpha(u^M - \underline{u}^M)^{\alpha-1} (w_R^S - \gamma w) (\pi^M - \underline{\pi}^M)^{1-\alpha} \\ &\quad + (1-\alpha)(u^M - \underline{u}^M)^\alpha (\pi^M - \underline{\pi}^M)^{-\alpha} [pf_2(\cdot) - w_R^S] = 0 \\ &= (u^M - \underline{u}^M)^{\alpha-1} (\pi^M - \underline{\pi}^M)^{-\alpha} \left[\alpha(\pi^M - \underline{\pi}^M) (w_R^S - \gamma w) \right. \\ &\quad \left. + (1-\alpha)(u^M - \underline{u}^M) [pf_2(\cdot) - w_R^S] \right] = 0. \end{aligned}$$

Since $u^M > \underline{u}^M$ and $\pi^M > \underline{\pi}^M$, $\partial z^M / \partial w_R^S = 0$ implies $\alpha(\pi^M - \underline{\pi}^M) = (1-\alpha)(u^M - \underline{u}^M)$, in which we substitute the relevant expressions for π^M , u^M , etc. and get Eq. (1). Next substitute $\alpha(\pi^M - \underline{\pi}^M) = (1-\alpha)(u^M - \underline{u}^M)$ in the first order condition for l_R^S and obtain Eq. (2).

By maximizing $z^B(\cdot)$ with respect to w^U and l^U and following exactly the same procedure as above, we arrive at Eqs. (8) and (9).

A.2. Derivation of Eqs. (4)–(6) and (10)–(11)

Consider the profit expression given in Eq. (3) and substitute the optimal l_R^S , which is a function of first stage capital and contract labour, i.e. $l_R^S = l(k, l_C^S, l^U)$ to arrive at

$$\pi^M = \alpha \underline{\pi}^M + (1-\alpha) [pf(\cdot) - \gamma w l_C^S(k, l_C^S, l^U) - (w_C^S + t) l_C^S - (w + t) l_C^U - rk].$$

Now maximize the above with respect to k , l_C^S and l^U . The first order conditions are:

$$\begin{aligned} \frac{\partial \pi^M}{\partial k} &= \alpha \frac{\partial \underline{\pi}^M}{\partial k} + (1-\alpha) \left[(pf_1 - r) + \underbrace{(pf_2 - \gamma w)}_{=0} \frac{\partial l_R^S}{\partial k} \right] = \alpha \frac{\partial \underline{\pi}^M}{\partial k} \\ &\quad + (1-\alpha)[pf_1 - r] = 0 \\ \frac{\partial \pi^M}{\partial l_C^S} &= \alpha \frac{\partial \underline{\pi}^M}{\partial l_C^S} + (1-\alpha) \left[(pf_2 - w_C^S - t) + \underbrace{(pf_2 - \gamma w)}_{=0} \frac{\partial l_R^S}{\partial l_C^S} \right] = \alpha \frac{\partial \underline{\pi}^M}{\partial l_C^S} \\ &\quad + (1-\alpha)[pf_2 - w_C^S - t] = 0 \\ \frac{\partial \pi^M}{\partial l^U} &= \alpha \frac{\partial \underline{\pi}^M}{\partial l^U} + (1-\alpha) \left[(pf_3 - w - t) + \underbrace{(pf_2 - \gamma w)}_{=0} \frac{\partial l_R^S}{\partial l^U} \right] = \alpha \frac{\partial \underline{\pi}^M}{\partial l^U} \\ &\quad + (1-\alpha)[pf_3 - w - t] = 0 \end{aligned}$$

In the above equations we use Eq. (2) and the resultant equations are Eqs. (4)–(6). Eqs. (10) and (11) are derived in the same way; but l_C^S does not apply for the backward firms.

A.3. Proof of Proposition 1

First consider the case of limited contracting. As $\underline{\pi}^M = -rk$, Eqs. (4)–(6) reduce to

$$\frac{\partial \pi^M}{\partial k} = (1-\alpha)pf_1(\cdot) - r = 0 \tag{4'}$$

³⁴ We also ran the second stage regression with the instruments included with the Lockout to Strike ratio, and found that none of the instruments are statistically significant, confirming the validity of the exclusion restrictions of the instruments used in the first stage.

$$\frac{\partial \pi^M}{\partial f_C^S} = (1-\alpha)[pf_2(\cdot) - w_C^S - t] = 0 \tag{5'}$$

$$\frac{\partial \pi^M}{\partial l_C^U} = (1-\alpha)[pf_3(\cdot) - w - t] = 0. \tag{6'}$$

But we will see that Eqs. (5') and (2) cannot hold simultaneously. If they did, we must have $\gamma w = w_C^S + t$, which is possible only if $\gamma w > w_C^S$. But then the skilled contract labour will resort to self-employment. So Eq. (5') cannot hold with equality; hence optimal f_C^S must be zero.

Now consider the case of 'unlimited contracting' where $\pi^M = \underline{R}$. Eqs. (4)–(6) are modified as

$$\frac{\partial \pi^M}{\partial k} = p[\alpha f_1^0 + (1-\alpha)f_1(\cdot)] - r = 0 \tag{4''}$$

$$\frac{\partial \pi^M}{\partial f_C^S} = p[\alpha f_2^0 + (1-\alpha)f_2(\cdot)] - w_C^S - t = 0 \tag{5''}$$

$$\frac{\partial \pi^M}{\partial l_C^U} = p[\alpha f_3^0 + (1-\alpha)f_3(\cdot)] - w - t = 0 \tag{6''}$$

where f^0_i ($i = 1, 2, 3$) represents the partial derivatives of the production function that applies in the event of disagreement: $f^0 = f(k, f_C^S, l_C^U)$.

Now Eqs. (2) and (5'') can hold simultaneously. Substituting Eq. (2) in Eq. (5'') we obtain $[\alpha pf_2^0 + (1-\alpha)\gamma w] = w_C^S + t$, which yields $\alpha(pf_2^0 - \gamma w) - t = (w_C^S - \gamma w)$. So w_C^S can be greater than γw and then it is possible to hire the skilled workers as contract labour alongside permanent labour.

A.4. Proof of Proposition 2

From Eq. (4'), which corresponds to the case of limited contracting, it is clear that capital is underinvested because $f_1 > r$. Eq. (5') does not hold, as $f_C^S = 0$. From Eq. (6') we see that $f_3 = w + t$, i.e. $f_3 > w$; hence the contract (unskilled) labour is underemployed.

Under unlimited contracting Eqs. (4'')–(6'') apply. By Assumption (ii) capital and skilled labour are complementary, which means that marginal productivity of capital is greater under agreement than under disagreement. That is, $f^0_1 < f_1(\cdot)$. Therefore, $pf_1 > r$ and so capital is underinvested.

Since l^U and f^S are substitutes, we have $f^0_2 > f_2(\cdot)$ and $f^0_3 > f_3(\cdot)$, and in turn $pf_2 < w_C^S + t$ and $pf_3 < w + t$. So it is possible to have $pf_2 = w_C^S$ and $pf_3 = w$. So both types of contract labour may be (but not necessarily will) efficiently employed. Finally, that the permanent labour will be efficiently employed is obvious from Eq. (2) which is valid for either types of contracting.

A.5. Proof of Proposition 3

Under limited contracting $\pi^M = -rk$, and Eqs. (10) and (11) reduce to

$$\frac{\partial \pi^B}{\partial k} = (1-\alpha)pg_1(\cdot) - r = 0 \tag{10'}$$

$$\frac{\partial \pi^B}{\partial l_C^U} = (1-\alpha)[pg_2(\cdot) - w - t] = 0 \tag{11'}$$

It is clear that Eqs. (9) and (11') cannot hold simultaneously. So if Eq. (9) is satisfied then Eq. (11') cannot; hence l_C^U must be zero. Capital is underinvested, which is obvious from Eq. (10').

Under unlimited contracting $\pi^M = \underline{R}^B$, and Eqs. (10) and (11) are modified as:

$$\frac{\partial \pi^B}{\partial k} = p[\alpha g_1^0 + (1-\alpha)g_1(\cdot)] - r = 0 \tag{10''}$$

$$\frac{\partial \pi^B}{\partial l_C^U} = p[\alpha g_2^0 + (1-\alpha)g_2(\cdot)] - w - t = 0 \tag{11''}$$

where g^0_i ($i = 1, 2$) represents the partial derivatives of the production function that applies in the event of disagreement: $g^0 = g(k, l_C^U)$.

By Assumption (b) capital and labour are substitutes and under disagreement less labour is used; therefore, $g^0_1 > g_1$, and so $g_1 < r$ from (10''), and hence we can conclude that capital will be overinvested. Similarly two types of labour are substitutes, which implies $g^0_2 > g_2$ and $g_2 < w + t$, and so it is possible to have $g_2 = w$. So the contract labour may (but not necessarily will) be efficiently employed. It is also apparent that Eqs. (9) and (11'') can hold simultaneously, and therefore the unskilled workers can be hired through both modes.

A.5.1. Proof of Proposition 4

First consider the case of a modern firm. From Eq. (2) we get

$$\frac{\partial f^S_R}{\partial k} = -\frac{f_{21}}{f_{22}} > 0 \quad \frac{\partial f^S_R}{\partial l_C^U} = -\frac{f_{23}}{f_{22}} < 0.$$

Now in Eqs. (4') and (6') allow a change in α :

$$(1-\alpha)p \left\{ f_{11} + f_{12} \frac{\partial f^S_R}{\partial k} \right\} \frac{dk}{d\alpha} + (1-\alpha)p \left\{ f_{12} \frac{\partial f^S_R}{\partial l_C^U} + f_{13} \right\} \frac{dl_C^U}{d\alpha} = pf_1$$

$$p \left\{ f_{31} + f_{32} \frac{\partial f^S_R}{\partial k} \right\} \frac{dk}{d\alpha} + p \left\{ f_{32} \frac{\partial f^S_R}{\partial l_C^U} + f_{33} \right\} \frac{dl_C^U}{d\alpha} = 0.$$

Substituting the expressions for $\frac{\partial f^S_R}{\partial k}$ and $\frac{\partial f^S_R}{\partial l_C^U}$ we derive the following:

$$(1-\alpha)p \left\{ \frac{f_{11}f_{22} - f_{12}^2}{f_{22}} \right\} \frac{dk}{d\alpha} + (1-\alpha)p \left\{ \frac{f_{22}f_{13} - f_{12}f_{23}}{f_{22}} \right\} \frac{dl_C^U}{d\alpha} = pf_1$$

$$p \left\{ \frac{f_{22}f_{31} - f_{12}f_{32}}{f_{22}} \right\} \frac{dk}{d\alpha} + p \left\{ \frac{f_{22}f_{33} - f_{32}^2}{f_{22}} \right\} \frac{dl_C^U}{d\alpha} = 0.$$

Applying the Cramer's rule the following comparative statics are obtained:

$$\frac{dk}{d\alpha} = \frac{f_1}{f_{22}\Delta} \left\{ \frac{f_{22}f_{33} - f_{32}^2}{>0} \right\} < 0, \quad \frac{dl_C^U}{d\alpha} = -\frac{f_1}{f_{22}\Delta} \left\{ \frac{f_{22}f_{31} - f_{32}f_{12}}{>0} \right\} > 0,$$

$$\frac{df^S_R}{d\alpha} = \frac{df^S_R}{dk} \frac{dk}{d\alpha} + \frac{df^S_R}{dl_C^U} \frac{dl_C^U}{d\alpha} < 0.$$

In the above $(f_{22}f_{33} - f_{32}^2) > 0$ by the concavity of the production function $f(\cdot)$, and $\Delta > 0$ by the second order condition of profit maximization, where

$$\Delta = \frac{(1-\alpha)p^2}{f_{22}^2} \left\{ (f_{11}f_{22} - f_{12}^2)(f_{22}f_{33} - f_{32}^2) - (f_{22}f_{13} - f_{12}f_{23})^2 \right\}.$$

Now consider the effect of a change in p . First note that f^S_R is directly positively related to p . From Eq. (2) derive $\frac{\partial f^S_R}{\partial p} = -\frac{f_2}{pf_{22}} > 0$. Then from

Eqs. (4') and (6') we get:

$$(1-\alpha)p \left\{ f_{11} + f_{12} \frac{\partial l_R^S}{\partial k} \right\} \frac{dk}{dp} + (1-\alpha)p \left\{ f_{12} \frac{\partial l_R^S}{\partial l_C^U} + f_{13} \right\} \frac{dl_C^U}{dp}$$

$$= -(1-\alpha) \left\{ f_1 + pf_{12} \frac{\partial l_R^S}{\partial p} \right\}$$

$$p \left\{ f_{31} + f_{32} \frac{\partial l_R^S}{\partial k} \right\} \frac{dk}{dp} + p \left\{ f_{32} \frac{\partial l_R^S}{\partial l_C^U} + f_{33} \right\} \frac{dl_C^U}{dp} = -f_3 - pf_{32} \frac{\partial l_R^S}{\partial p}$$

Substitute the expressions for $\frac{\partial l_R^S}{\partial k}$, $\frac{\partial l_R^S}{\partial l_C^U}$ and $\frac{\partial l_R^S}{\partial p}$, and apply the Cramer's rule to arrive at:

$$\frac{dk}{dp} = \frac{(1-\alpha)}{pf_{22}^2 \Delta} \left\{ \left(\underbrace{f_{12}f_2 - f_{22}f_1}_{>0} \right) \left(\underbrace{f_{22}f_{33} - f_{32}^2}_{>0} \right) \right.$$

$$\left. - \left(\underbrace{f_{22}f_{13} - f_{12}f_{23}}_{>0} \right) \left(\underbrace{f_{32}f_2 - f_{22}f_3}_{<0} \right) \right\} > 0,$$

$$\frac{dl_C^U}{dp} = \frac{(1-\alpha)}{pf_{22}^2 \Delta} \left\{ \left(\underbrace{f_{32}f_2 - f_{22}f_3}_{<0} \right) \left(\underbrace{f_{11}f_{22} - f_{12}^2}_{>0} \right) \right.$$

$$\left. - (1-\alpha) \left(\underbrace{f_{22}f_{13} - f_{12}f_{23}}_{>0} \right) \left(\underbrace{f_{12}f_2 - f_{22}f_1}_{>0} \right) \right\} < 0,$$

$$\frac{dl_R^S}{dp} = \frac{\partial l_R^S}{\partial p} + \frac{dl_R^S}{dk} \frac{dk}{dp} + \frac{dl_R^S}{dl_C^U} \frac{dl_C^U}{dp} > 0.$$

In the above critical for the signs of the comparative statics is the term $(f_{32}f_2 - f_{22}f_3)$ which is negative by Assumption (iii). Two other terms, $(f_{22}f_{33} - f_{32}^2)$ and $(f_{11}f_{22} - f_{12}^2)$ are positive for $f(\cdot)$ to be strictly concave.

Appendix Table A1
Further regression results.

Variables	(1)	(2)	(3)
Constant	0.986** (0.013)	0.205*** (0.000)	0.485*** (0.000)
Besley–Burgess measure	0.006*** (0.000)	0.009*** (0.000)	–
Lockout to Strike ratio	–0.008*** (0.000)	–0.007*** (0.000)	–0.004*** (0.001)
Import penetration	0.028* (0.098)	0.028* (0.096)	0.029** (0.091)
Export orientation	–0.002 (0.855)	–0.001 (0.861)	–0.001 (0.921)
Development expenditure	–	0.003** (0.039)	0.004** (0.003)
Literacy rate	–	–0.002*** (0.000)	–0.002*** (0.000)
Per capita electricity consumption	–	0.001*** (0.000)	0.001*** (0.000)
Out-sourcing	–	–	–0.097*** (0.000)
Industry effects?	Yes	Yes	Yes
Year effects?	Yes	Yes	Yes
State effects?	No	No	Yes
Region effects?	Yes	Yes	No
R ²	0.28	0.30	0.29
No of obs.	4503	4503	4503

Note: a) The dependent variable is the share of contract workers in total workers; b) Figures in parentheses represent level of significance; c) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; c) OLS: Ordinary Least Squares; d) Robust standard errors. Region fixed effects: North (Punjab, Haryana, Rajasthan, Madhya Pradesh, Uttar Pradesh), West (Maharashtra, Gujarat), South (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu), East (Assam, Bihar, Orissa, West Bengal).

Finally, consider the case of a backward firm. From Eq. (9) we derive

$$\frac{\partial l_R^U}{\partial k} = -\frac{g_{21}}{g_{22}} < 0 \quad \frac{\partial l_R^U}{\partial p} = -\frac{g_2}{pg_{22}} > 0.$$

From Eq. (10') we directly calculate the effect of α on k : $\frac{dk}{d\alpha} = \frac{g_1}{(1-\alpha)(g_{11}+g_{12}\frac{\partial l_R^U}{\partial k})} = \frac{g_1g_{22}}{(1-\alpha)(g_{11}g_{22}-g_{12}^2)} < 0$ as $(g_{11}g_{22}-g_{12}^2) > 0$ by concavity of $g(\cdot)$. Then this implies $\frac{dl_R^U}{d\alpha} = \frac{\partial l_R^U}{\partial k} \frac{dk}{d\alpha} > 0$. Similarly, with respect to p we derive $p \left\{ g_{11} + g_{12} \frac{\partial l_R^U}{\partial k} \right\} \frac{\partial k}{\partial p} = - \left\{ g_1 + pg_{12} \frac{\partial l_R^U}{\partial p} \right\}$. Substituting the expressions for $\frac{\partial l_R^U}{\partial k}$ and $\frac{\partial l_R^U}{\partial p}$ we then arrive at $\frac{\partial k}{\partial p} = \frac{g_{12}g_2 - g_{22}g_1}{p(g_{11}g_{12} - g_{12}^2)} > 0$ if $(g_{12}g_2 - g_{22}g_1) > 0$. In turn we can derive $\frac{dl_R^U}{dp} = \frac{\partial l_R^U}{\partial p} + \frac{\partial l_R^U}{\partial k} \frac{dk}{dp} = \frac{g_{21}g_1 - g_{11}g_2}{p(g_{11}g_{22} - g_{12}^2)} > 0$ if $(g_{12}g_1 - g_{11}g_2) > 0$. Both conditions are ensured by Assumption (c).

References

Aghion, P., Burgess, R., Redding, S., Zilibotti, F., 2008. The unequal effects of liberalization: evidence from dismantling the License Raj in India. *Am. Econ. Rev.* 98 (4), 1397–1412.

Autor, D., 2003. Outsourcing at will: the contribution of unjust dismissal doctrine to the growth of employment outsourcing. *J. Labour Econ.* 23 (1), 1–42.

Bertola, G., 2004. A pure theory of job security and labour income risk. *Rev. Econ. Stud.* 71, 43–61.

Besley, T., Burgess, R., 2004. Can labour regulation hinder economic performance? Evidence from India. *Q. J. Econ.* 119 (1), 91–134.

Booth, A., Chatterji, M., 1998. Unions and efficient training. *Econ. J.* 108, 328–343.

Botero, J., Djankov, S., Porta, R.L., Lopez-De-Silanes, F., Shleifer, A., 2004. The regulation of labour. *Q. J. Econ.* 119 (4), 1339–1382.

Cali, M., Sen, K., 2011. Do effective state-business relations matter for economic growth? Evidence from Indian states. *World Dev.* 39 (9), 1542–1557.

Central Statistical Organisation (CSO) (1997–98 and 2004–05), Annual Survey of Industries. Ministry of Statistics and Programme Implementation: Government of India, Delhi.

Central Statistical Organisation (CSO) (1997–98 and 2004–05), Statistical Abstract. Ministry of Statistics and Programme Implementation: Government of India, Delhi.

Currie, J., Harrison, A., 1997. Trade reform and labor market adjustment in Morocco. *J. Labor Econ.* 15, S44–S71.

Dixit, A., 1980. The role of investment in entry deterrence. *Econ. J.* 90, 95–106.

Djankov, S., Ramalho, R., 2009. Employment laws in developing countries. *J. Comp. Econ.* 37, 3–13.

Dougherty, S., 2008. Labour regulation and employment dynamics at the state level in India. OECD Economics Department Working Papers, No. 624.

Federation of Indian Chamber of Commerce and Industries (FICCI), 2012. Industrial Relations & contract Labour in India. <http://www.ficci.com/spdocument/20189/Industrial-Relations-and-Contract-Labour-in-India.pdf>.

Goldberg, P.K., Pavcnik, N., 2003. The response of the informal sector to trade liberalization. *J. Dev. Econ.* 72, 463–496.

Grout, P., 1984. Investment and wages in the absence of binding contracts: a Nash bargaining approach. *Econometrica* 42, 449–460.

Hasan, R., Mitra, D., Ramaswamy, K.V., 2007. Trade reforms, labor regulations and labour-demand elasticities: empirical evidence from India. *Rev. Econ. Stat.* 119 (3), 466–481.

International Labour Organisation (ILO), 2002. Decent Work and the Informal Economy. ILO, Geneva.

International Monetary Fund (IMF), 2010. Unemployment Dynamics During Recessions and Recoveries: Okun's Law and Beyond (Ch. 3, Washington DC, USA).

Lindbeck, A., Snower, D., 1986. Wage setting, unemployment and insider-outsider relations. *Am. Econ. Rev. Pap. Proc.* 76, 235–239.

McDonald, I.M., Solow, R.M., 1981. Wage bargaining and employment. *Am. Econ. Rev.* 71 (5), 896–908.

National Commission for Enterprises in the Unorganised Sector (NCEUS), 2007. Conditions of Work and Promotion of Livelihood in the Unorganised Sector. Report. Government of India, New Delhi.

NCEUS, 2009. The Challenge of Employment in India: An Informal Economy Perspective. Report. Government of India, New Delhi.

Panagariya, A., 2008. India: The Emerging Giant. Oxford University Press, New York.

Pissarides, C., 1985. Short-run equilibrium dynamics of unemployment, vacancies and real wages. *Am. Econ. Rev.* 75, 676–690.

Saha, B., 2006. Labour institutions in India and China: a tale of two nations. *J. S. Asian Dev.* 1, 179–205.

Sen, K., 2009. Trade Policy, Inequality and Performance in Indian Manufacturing. Routledge, London.

Ulyssea, G., 2010. Regulation of entry, labor market institutions and the informal sector. *J. Dev. Econ.* 91, 87–99.

World Bank, 2007. India: Land Policies for Growth and Poverty Reduction (Washington D.C.).

WTO, 2009. Globalization and Informal Jobs in Developing Countries. World Trade Organization and International Labour Office, Geneva.