Fairness and Subcontracts

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Abstract: What explains the proliferation of contract labor? What determines the pay gap between contract and regular work? What are the efficiency consequences of this wage inequality? This paper presents a model of two-tiered labor market where pay gaps deemed unfair by workers give rise to worker reprisal via a reduction in effort. We show that the subcontracting relationship combined with a preference for fairness together give rise to a dual hold-up problem. This dual hold-up forms the basis of three key findings: (i) contract workers are treated "unfairly" and devote less than full effort in equilibrium, while regular workers receive at least the fair wage and offer full effort, (ii) the demand for a "fair share" by regular workers raises contract employment, and narrows the wage spread between regular workers, and between regular and contract workers, and consequently, (iii) a ban on contract work delivers sharp efficiency and distributional consequences, depending on the interplay between effort allocation and employment allocation between the two types of workers, as well as the magnitude of regular workers' fair share demand. We test the model using a panel data set from the Annual Survey of Industries in India. Uniquely, this data set contains detailed employment and wage records of contract and regular employment at the firm level. We find support for the three empirical implications of the model, linking fair share demand to contract employment, to wage inequality among regular workers, and to wage inequality between contract and regular workers in India.

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1 Introduction

Third-party labor market intermediaries, often simply known as subcontractors, are responsible for over 65% of the man days hired in Indian manufacturing (Ramaswamy 2013; Soundararajan 2015) in the last decade. Likewise in many low income country labor markets (Powell and Skarbek 2006), the importance of subcontractors have been growing. Over 50% of the knitwear factories in Bangladesh, for example, uses contract labor (Chan 2013). These labor market intermediaries are popularly seen as a cost saving device to sidestep labor market regulations governing hiring and firing (Chan 2013; Barrientos 2008; Barrientos 2011; Rajeev 2006), but at the potential cost of day-to-day erosion of worker morale (Panagariya 2004), or outright work disruption due to strikes and labor disputes (Seghal 2012; Gulati 2012). What explains the proliferation of contract labor? What determines the pay gap between contract and regular work? What are the efficiency consequences of this wage inequality?

The widespread practice of labor subcontracting in developing countries notwithstanding, our understanding of the key features of this market, whether in employment or wage dimensions, has so far been very limited.[1] Thus, we begin our discussion with a look at a uniquely rich data set, the Annual Survey of Industries in India, containing detailed records of both the employment and wage dimensions of firm-level hiring of regular and contract workers in all 40 manufacturing industries (at the one-digit level) spanning the period 1998-2011. We aggregate the data to the industry-state-year level. Figure 1 presents kernel density plots of the share of contract man days in total man days in an industry by state consecutively in 1999, 2003 and 2009. Figure 2 presents kernel density plots of the same share in low wage industries where the average wage per man day is less than 300 rupees. As shown, the share of contract work is nontrivial in a sizeable share of the industries across states, and this share is growing over time, and higher in low wage industries. Averaging across industries and years, the share of contract man days in total man days rose from 20.01% in 1998 - 2005 to 29.7% in 2005-2011 (Table 1). In Table 2, we show the same statistics in the low wage sample. The share of contract workers is higher in both periods in this sample, going from 25.5% in 1998 - 2005 to 35.5% in 2005 - 2011.

For a picture of the wage gap across contract types within industry and state, kernel density plots of the average wage per man day for contract workers and regular workers respectively in 1999 and 2009 are presented in Figure 3. Figure 4 presents these same plots for low wage industries

[1] Indeed, all existing research has focused on high income countries where only 1 - 2% or workers are hired by subcontractors (Hirsch and Mueller 2010, Bryson 2013, CIETT 2012).

where average wage per man day is less than 300 rupees. These figures reveal a number of salient features: (i) the ranges of contract and regular wages are dispersed, (ii) the range of dispersed regular wages first order stochastically dominate the range of contract wages, and (iii) over time wages for both types of workers have improved, but their rank order has remained unchanged.

Finally, for a look at the scale of wage dispersion within-contract types, by industry, and by state, we compute the wage spread per man day between regular workers as one minus the ratio of the minimal and the maximal firm-level regular wage for each industry-state-year observation. Likewise, we also compute the wage spread per man day among contract workers as one minus the ratio of the minimal and the maximal firm-level contract wage. We refer to these two measures respectively as the regular worker wage spread and the contract worker wage spread. As the incidence of contract employment has increased over time from 20.01% in 1998 - 2005 to 29.7% in 2005-2011, we find that the regular worker wage spread per man day has fallen from 74.0% to 67.1%, while the contract worker wage spread has remained more or less stable at 50%. A similar pattern can be seen in the low wage sample.

We take away from this look into the data four salient features of the market for contract and regular work in the manufacturing industries in India. First, contract employment is a central feature in most of the industries considered. Second, there is a persistent wage gap between contract work, and regular work. Third, in addition to a wage gap between contract and regular workers, there is dispersion in wages between regular workers, and likewise between contract workers by industry and by state. Finally, from this firm-level data, the mix of contract and regular work is evident not just at the aggregate industry level, but at the firm level as well. Our first task in this paper, therefore, is to set out a model of a two-tiered labor market of contract and regular work consistent with these features of the market for contract work.

To begin with, the two-tiered market for contract and regular work is distinct from a number of alternative two-tiered labor market models in the literature. For example, in the two-tiered labor market model of Eswaran and Kotwal (1985), permanent workers enjoys implicit insurance throughout the year, while casual workers are only employed in peak periods, and benefit from higher pay depending on demand. By contrast, permanent workers typically receive lower wages overall as implicit payment for the wage insurance they receive. This suggest a pay gap that goes in opposite direction to what we observe in the data between regular and contract workers. In the two-tiered labor market model incorporating informal sector work (for example, Fields 1974), informality is typically defined at the firm level, in such a way that precludes the simultaneous hiring of higher paid formal workers, and lower paid informal workers by the same firm. In Jones (1987), a model of good jobs and bad jobs are presented where good jobs entail complex task, and requires the payment of an efficiency wage, while workers with a bad jobs are paid the reservation wage. In Acemoglu (2001), a matching model of good jobs and bad jobs is presented where jobs differ by job creation cost and productivity. Unlike these settings, we model contract and regular work as ostensibly the same job, differing only by contract type.

In particular, our model emphasizes a fairness channel so far overlooked in the literature, wherein workers' effort depend explicitly on whether they deem the wage they receive as fair (Akerlof and Yellen 1998). Our contention is that these conspicuously inequitable conditions of work, and the consequent low morale and silent resistance by workers (Panagariya 2004), have productivity consequences. The model presents a setting where the demand for a fair wage by regular workers give rise to firm level demand for workers hired at a lower cost through subcontractors. While subcontracted work may be accomplished at a lower cost, the low wage paid to workers implies that each worker may devote less than full effort whenever their low wage are deemed as unfair. Since firms do not directly control the wage that subcontractors pay to workers, they cannot directly internalize the effort consequences of their pricing decisions to subcontractors. Meanwhile, since subcontractors do not extract additional gains from higher efforts by workers, they too do not internalize the effort consequences of their wage decisions to workers. Our model characterizes the general equilibrium consequences of this dual hold-up problem in a setting where effort is endogenously determined, where firm level pricing of subcontracted work can only reflect the average equilibrium effort contribution of contract workers, and where there is an endogenous dispersion in both regular and contract worker wages in equilibrium accounting for these effort decisions at the worker level.

Due to the dual hold-up, we show that (i) contract workers are treated "unfairly" and devote less than full effort in equilibrium, while regular workers receive at least the fair wage and offer full effort, (ii) the demand for a "fair share" by regular workers raises contract employment, and narrows the wage spread between regular workers, and between regular and contract workers, and consequently, (iii) a ban on contract work delivers very nuanced efficiency and distributional consequences, depending on the interplay between effort allocation and employment allocation between the two types of workers, as well as the magnitude of regular workers' fair share demand.

The model provides predictions on the empirical relationship between the fair share demand and the wage spread among workers within and across contract types. We apply these predictions to develop proxies for industry-state-year specific fair share demand by regular workers using a panel data set from the Annual Survey of Industries in India. We test and find support for the implications of the model linking fair share demand and the employment patterns of contract and regular employment in India.

The rest of this paper is organized as follows. In Section 2, we present a two-tiered labor market model of regular and contract work. In Section 3, we define and characterize the equilibrium both in terms of employment allocation and wage distribution. In Section 4, we examine the wage and employment implications of a ban on contract work. In Section 4, we present an empirical verification of a key implication of our model, namely, that the demand for a fair wage is systematically correlated with the incidence of contract labor at the industry level. Section 5 concludes.

2 A Two-Tiered Labor Market of Regular and Contract Work

The economy houses a large pool of $\bar{N}$ workers. A large number of firms offer an endogenous number vacancies of two types, including regular employment, and contract employment. In regular employment, firms sign wage contracts directly with workers (N_r). In contract employment, these same firms sign contracts with intermediary subcontractors (N_c), who in turn contract workers directly at an independently determined wage. The nature of contract employment are otherwise no different than regular employment. The unemployment pool consists of all workers not employed either in regular or contract work. The reservation wage of each worker is normalized at zero. Each employed worker supplies inelastically one unit of labor input. The effective labor contribution associated with this unit of labor depends on worker's effort $e_r,\ e_c \in [0,1]$. These are endogenously determined based on actual wages and workers' preference for wage fairness.

The Fair Wage-Effort Relationship

Regular and contract workers exert effort depending on whether they deem the wage they receive to be fair. The Akerlof and Yellen fair wage-effort hypothesis (Akerlof and Yellen 1990) posits that if workers receive wage payment less than the fair wage, worker reprisal in the form of a proportionate reduction in effort arises. Suppose therefore that w_r^* and w_c^* are the fair wages as perceived by regular and contract workers respectively. Worker effort is given by:

$$e_j = \min\{\frac{w_j}{w_j^*}, 1\}, \quad j = r, c. \tag{1}$$

Thus full effort is offered only when a worker receives at least the fair wage. Payment below the fair wage leads to a proportionate reduction in effort by an amount equal to the proportionate underpayment of the fair wage.

The fair wage-effort hypothesis furthermore posits that the fair wage w_j^* is given by a weighted average of the marginal product of a worker at full effort to his direct employer, p_j, and the economy wide average wage, $\bar{w}$, $w_j^* = \beta p_j + (1-\beta)\bar{w}$. $\beta \in [0,1]$ is a preference parameter indicating workers' demand for pay commensurate with productivity.[2]

Let ϵ_w denote the economy-wide average wage as a fraction of the marginal product of regular workers at full effort, $\epsilon_w = \bar{w}/p_r$. Also let ρ denote the productivity differential between contract and regular workers, $\rho = p_c/p_r \in \mathbb{R}^+$. The fair wage as perceived by regular workers is given by:

$$w_r^* = (\beta + (1-\beta)\epsilon_w)\, p_r \equiv \delta_r p_r, \quad \beta \in (0,1). \tag{2}$$

The "fair share" as seen by regular workers, $\delta_r = \beta + (1-\beta)\epsilon_w$, combines the fairness preference parameter β and the strength of the opt out option ϵ_w, and gives the fair wage demand as a fraction of the full marginal product of a regular worker.

The fair wage demand of contract workers is given by:

$$w_c^* = \left(\beta + (1-\beta)\frac{\epsilon_w}{\rho}\right) \rho p_r \equiv \delta_c \rho p_r, \quad \beta \in (0,1). \tag{3}$$

In addition to β, ϵ_w and p_r, w_c^* depends on the productivity differential ρ. From (3), if and only if there is a productivity deficit associated with contract work $\rho < 1$, contract workers demand a lower fair wage than regular workers ($w_c^*/w_r^* < 1$). Interestingly, under the same condition ($\rho < 1$), contract workers demand a higher fair share ($\delta_c = \beta + (1-\beta)\epsilon_w/\rho > \delta_r$). Intuitively, whenever there is a contract worker productivity deficit, the opt out option is always relatively more desirable to contract than to regular workers $\bar{w}/p_c > \bar{w}/p_r$, or equivalently $\epsilon_w/\rho > \epsilon_w$. This relative readiness to accept the opt out option justifies the demand for a higher fair share by contract workers. Our next task is to investigate the determinants of ρ, along with the other ingredients of the two fair wages including p_r, and ϵ_w.

[2] Thus, for example, for all $\beta \in [0,1)$, if all $\bar{N}$ workers are employed, if employment via subcontractor makes no difference to productivity ($\rho = 1$), and if all workers contribute full effort and are paid accordingly ($w_r = w_c = p_r$), then regular workers' fair wage demand is simply p_r. Alternatively, if all workers are employed as regular workers, and all contribute full effort and are paid accordingly, the regular workers' fair wage demand is likewise p_r. Unemployment and / or underpayment of full marginal product to at least some workers (thus $\epsilon_w < 1$) undercut the fair wage demand by regular workers.

Firms and Subcontractors

Firms in the economy produce an output Y via a constant returns to scale technology. At given world price normalized to unity, these firms jointly generate revenue $Y(E, K)$. E denotes a composite labor input, and K is likewise a composite term including all other inputs. Denote p_e and p_k, both functions of E and K, as the marginal product of labor and capital, $Y_E(E, K)$ and $Y_K(E, K)$ respectively.

Economy-wide supply of K is given exogenously at $\bar{K}$. We take the market for K to be competitive, and let r_k denote the competitively determined unit returns to owners of K evaluated at $\bar{K}$ in equilibrium.

Each unit of the composite labor input E is assembled upon the completion of a continuum of tasks $i \in [0, 1]$. We normalize units so that each task i is completed by 1 unit of effective labor input. All tasks can be completed either by regular or contract workers. The effort contribution of regular workers is subject to the firms' wage decisions according to the fair wage-effort hypothesis in (2).

By contrast, contract workers are hired by subcontractors, and as such firms have no direct control over the wage, and hence effort, of the individual contract worker. This lack of control arises whenever contract worker wages are not observable or verifiable. Instead of tailoring pay to incentivize effort, the firm takes the economy-wide average effort $\bar{e}_c \in [0, 1]$ of contract workers as a gauge of the expected effort of a contract worker at the point of hiring. Due to this ex ante homogeneity in effort expectation, all subcontractors face a uniform market determined price r_c for every unit of contract labor regardless of the actual contract wage paid.

Let s denote the share of tasks performed by regular workers in a representative firm, and E the total amount of composite labor input in use. In order to attain E, the following number regular and contract workers are required:

$$N_r = \frac{sE}{e_r}, \quad N_c = \frac{(1-s)E}{\bar{e}_c}. \tag{4}$$

As should be expected, (4) shows an inverse relationship between employment (N_r and N_c) and effort (e_r and $\bar{e}_c$), at given s and E.

Match Friction and the Cost of Hiring

Vacancies for regular and contract work are given by M_r and M_c, to be determined endogenously in the model. Each one of the $M = M_r + M_c$ number of employers with a job vacancy chooses and proposes a wage offer w to a job seeker chosen at random. Let $F(w)$ be the cumulative distribution function of all such expected wage offers, including regular job offers and subcontracted job offers.

Every job seeker rates any and all offers received, and the best job offer is chosen. We assume that search friction prevents the job seeker from receiving the full set of offers made by every employer in the economy.[3] Instead, the likelihood that an unemployed job seeker is met with $z = 0, 1, 2, ...$ offers is given by a Poisson distribution with parameter $\lambda = (M_r + M_s)/\bar{N}$, or, $\Pr(z;\ \lambda) = e^{-\lambda}\lambda^z/z!$ (Mortensen 2003). The associated cumulative distribution of the maximal offer received is:

$$H(w) \equiv \sum_{z=0}^{\infty} \frac{e^{-\lambda}\lambda^z F(w)^z}{z!} = e^{-\lambda(1-F(w))}. \tag{5}$$

$H(w)$ gives the probability that the best offer that a worker receives is less than w. From an employer's perspective, $H(w)$ is thus the likelihood of consummating a match with a worker by offering w. Let Ω_r and Ω_c, subsets of $\mathbb{R}^+$, respectively denote the set of regular and contract wages with positive support.

The matching of vacancies with workers is costly. The cost of job creation is expressed as units of labor time forgone, $\theta \in (0, 1)$. On average, therefore, a wage offer w generates a net increase of $H(w) - \theta$ amount of labor inputs,[4] at an average cost of $wH(w)$. Put another way, the wage cost associated with generating one additional unit of labor input is

$$c(w) \equiv \frac{w}{1 - \theta/H(w)}. \tag{6}$$

Worker Decisions

Once employed at wage w_j, $j = r, c$, the worker's only remaining decision is his effort e_j. Since each employed worker contribute $(1 - \theta)$ net units of labor input to the employer after accounting for job creation cost, the marginal revenue associated with the hiring of a regular worker at full effort is given by $p_r = p_e(1 - \theta)$, where to recall, p_e is the marginal revenue of one effective unit of labor input. For a subcontractor, the marginal revenue associated with the hiring of a contract worker is $r_c(1 - \theta)$, since r_c denotes the market price of one unit of contract work. From (1), therefore, the effort of the two types of workers are given by:

$$e_r = \min\{\frac{w_r}{p_e(1-\theta)}, 1\},\quad e_c = \min\{\frac{w_c}{r_c(1-\theta)}, 1\}.$$

[3]Our specification of search friction allows us to match the model's implication with the data. As will be discussed, there is significant wage dispersion not just between regular and contract workers, but between regular workers in the same industry as well.

[4]We show in the sequel that this difference $H(\cdot)$ is positive for all w_r and w_c in Ω_r and Ω_c respectively

and the average $\bar{e}_c$ is given by

$$\bar{e}_c = \frac{\int_{w\in\Omega_c} \min\{w_c/(r_c(1-\theta)), 1\} dH(w)}{\int_{w\in\Omega_c} dH(w)}.$$

Employer Decisions

All firms maximize profits by taking as given the fair wage preference in (2), the distribution of wage offers $H(w)$, and hence the unit cost of hiring labor $c(w)$ in (6). As discussed, firms also take the economy-wide average $\bar{e}_c$ as the average effort contribution of each contract worker. The problem of a representative firm can thus be stated as:

$$\begin{aligned} & \max_{E,K,w_r,s} Y(E,K) - [c(w_r)N_r + r_c N_c + r_k K] \\ = & \max_{E,K,w_r,s} Y(E,K) - [c(w_r)\frac{sE}{e_r} + r_c \frac{(1-s)E}{\bar{e}_c} + r_k K]. \end{aligned} \tag{7}$$

Subcontractors likewise maximize expected profits by choice of wage offers to contract workers w_c:

$$\max_{w_c} r_c - c(w_c). \tag{8}$$

(7) - (8) underscore a dual hold-up problem. First, since contract worker wages are not contractible and efforts to verify are imperfect at best, firms cannot directly internalize the effort consequences of its payment to subcontractors. Second, subcontractors maximize problem by taking as given the market determined price of contract workers r_c. Thus, they too, cannot directly internalize the effort (to firms) consequences of their wage decisions. In what follows, we describe an equilibrium in this economy which brings together the interplay between these two sources of holdups.

3 Equilibrium

We define an equilibrium in this labor market as (i) a wage distribution inclusive of regular and contract wages $H(w_r)$ and its range $\Omega_c \bigcup \Omega_r$, (ii) the effort contribution of each employed regular and contract workers, (iii) the price of subcontracted work r_c, and (iv) an allocation of the N workers into regular workers N_r, contract workers N_c, and unemployed workers $U = N - N_r - N_c$. In equilibrium, four conditions are satisfied. First, employers inclusive of firms and subcontractors maximize profits based on (7) and (8). Second, there is free entry among all employers so that profits are driven to zero. Third, individual workers exert effort at work according to the fair wage effort hypothesis in (1), and finally, match frictions and costly search give rise to a wage-dependent unit labor hiring cost function in (6).

4 Equilibrium Outcomes

In the ensuing sections 4.1 - 4.3, we assume for the moment that that contract and regular work co-exist in equilibrium. In section 4.4, we show the conditions under which co-existence is guaranteed, In section 4.5, we assume that the conditions for co-existence is guaranteed, and investigate the wage, employment, and overall efficiency consequences of a policy ban on contract work. In what follows, we offer an intuitive presentation of the findings of the paper. Detailed proofs of each Proposition can be found in Appendix A.

4.1 Equilibrium Efforts and Wage Distribution for Regular Work

We note that profit maximization in (7) by choice of w_r is equivalent to unit cost minimization ($c(w)$). In addition, profit maximization in (8) also equates the marginal product of effective input p_e with the cost of hiring $c(w)$. Combining these observations, the equilibrium effort of regular workers and the range of regular worker wages that maximize profits are summarized below:

Proposition 1. *In equilibrium, no firms pay less than the fair wage w_r^*, and all regular workers devote full effort. The fair wage w_r^* represents a wage floor above which a dispersed range of regular wages are offered and paid in equilibrium. The associated wage distribution is*

$$H(w) = \frac{\theta}{1 - w/p_e}$$

for $w \in \Omega_r = [w_r^*, p_e(1-\theta)]$.

Thus, as in Akerlof and Yellen (1990), Proposition 1 confirms that the potential of worker reprisal is costly to firms, and firms respond by setting the fair wage as the wage floor to maximize profit. But contrary to Akerlof and Yellen (1990), firms do not stop at the fair wage in the presence of search friction, for firms that offer more are rewarded with a higher probability of acceptance $H(w)$. The wage distribution $H(w)$ displayed in Proposition 1 strikes a balance between the cost and hiring likelihood consequences of higher wages. The maximal regular wage is given simply by the marginal product of labor at full effort, accounting for the cost of job creation $p_e(1-\theta)$, where $H(p_e(1-\theta)) = 1$.

4.2 Equilibrium Efforts and Wage Distribution for Contract Work

Like regular workers, efforts by contract workers depend on the wage decisions of their employment (1). But unlike employment by firms, employment by subcontractors yield a constant market price

r_c regardless of effort. Firms, in their decision to hire contract workers (s), take this hold up problem into account. These observations lead to a dispersed range of contract worker wages and correspondingly a dispersed range of contract worker effort in equilibrium. The market price for contract labor takes this dispersion of equilibrium effort into account:

Proposition 2. *In equilibrium, no subcontractors pay more than the fair wage, and all contract workers devote less than full effort. There exists a dispersed range of contract worker wages that are offered and paid in equilibrium, with distribution:*

$$H(w) = \frac{\theta}{1 - w/r_c}$$

for $w \in \Omega_c = [0, w_c^+]$*, where contract wage ceiling is* $w_c^+ \equiv \delta_r r_c$*. The average of the corresponding range of contract worker effort solves*

$$\bar{e}_c = \frac{\int_{w\in\Omega_c} w_c/(\delta_c p_c) dH(w)}{H(w_c^+)} = \frac{\delta_r(1-\theta) + (1-\delta_r(1-\theta))\ln(1-\delta_r(1-\theta))}{\delta_c(1-\theta)(1-\delta_r(1-\theta))} < 1,$$

and equilibrium productivity deficit ρ *is equal to the effort deficit:*

$$\rho = \frac{r_c}{p_e} = \bar{e}_c < 1.$$

Proposition 2 shows that one of the consequences of the dual hold-up problem discussed earlier is that paying at least the fair wage is no longer the profit maximizing strategy for subcontractors. As a result contract workers will not supply full effort. This in turn implies that firms apply an effort adjusted discount $\bar{e}_c$ to its willingness to pay for contract labor via subcontractors, $r_c = \bar{e}_c p_e$. This discount revises contract workers' assessment of their productivity downwards $p_c = r_c(1-\theta) = \bar{e}_c p_e(1-\theta)$, and confirms the expectation that contract workers offer less than full effort, for at this discount, subcontractors can be shown to be unable to break even by paying the contract worker fair share to contract workers. The dual holdup problem thus creates a two-tiered labor market, in which the wage outcome is only fair to regular workers, and unfair to contract workers. Furthermore, unfair treatment to contract workers becomes the rationale for the effort deficit associated with contract worker. Thus, unproductive work and unfair treatment become endemic in subcontracting relationships.

Based on Proposition 1 and 2, the desirability of the opt out option $\epsilon_w = \bar{w}/p_r$ can also be ascertained, and is given by:

$$\epsilon_w = \frac{\int_{w\in\Omega} w dH(w)}{p_r} = 1 + \frac{\theta}{1-\theta}\ln\theta - (1-\bar{e})\frac{\theta}{1-\theta}\left(\frac{\delta_r(1-\theta)}{1-\delta_r(1-\theta)} + \ln(1-\delta_r(1-\theta))\right) < 1.$$

4.3 Equilibrium Employment Allocation and Wage Inequality

The fraction of regular workers in the economy $N_r/\bar{N}$, as well as the fraction of contract workers $N_c/\bar{N}$ are respectively given by the fraction of workers who receive wages greater the regular fair wage, and the fraction of workers who receive less than w_r^*:

$$\begin{aligned}\frac{N_r}{\bar{N}} &= 1 - H(w_r^*) = 1 - \frac{\theta}{1-\delta_r(1-\theta)}, \\ \frac{N_c}{\bar{N}} &= H(w_r^*) - H(0) = \frac{\theta}{1-\delta_r(1-\theta)} - \theta. \end{aligned} \tag{9}$$

Thus, the ratio of contract workers to regular workers in the economy can be expressed succinctly as:

$$\frac{N_c}{N_r} = \frac{\delta_r}{1-\delta_r}\frac{\theta}{1-\theta}. \tag{10}$$

Thus, the higher the fair share demand by regular workers, the lower the share of regular workers, the higher the share of contract workers, and the higher the share of contract to regular workers. In addition, since $\delta_r = \beta + (1-\beta)\epsilon_w$, a higher demand for pay commensurate with productivity β, or a more attractive opt out option ϵ_w, raises the cost of hiring regular workers, and in equilibrium increases the share of contract relative to regular workers.

As noted, the two-tiered divide based on the need for employment intermediation also gives rise to a segmented wage structure, in which the range of contract worker wages are strictly lower at $[0, \delta_r p_e \bar{e}_c(1-\theta)]$ relative to the range of regular worker wages is $[\delta_r p_e(1-\theta), p_e(1-\theta)]$ for an equilibrium effort deficit $\bar{e}_c < 1$ prevails as shown in Proposition 2. To gauge the determinants of wage inequality across as well as within the two tiers, consider first the maximal wage spread between any pair of regular workers:

$$\frac{w_r^+ - w_r^*}{w_r^+} = 1 - \delta_r. \tag{11}$$

Thus, a higher fair share demand by regular worker δ_r narrows the wage spread between the highest and the lowest paid regular workers.

Next, consider the wage spread between the highest paid contract worker, and the highest paid regular worker:

$$\frac{w_r^+ - w_c^+}{w_r^+} = 1 - \delta_r \bar{e}_c \tag{12}$$

Interestingly, all else equal, a higher fair share demand by regular workers narrows the wage spread between the highest paid contract and the highest paid regular worker as well. Intuitively, a high fair share raises regular wage cost, encourages employers to hire contract workers, and drives up the contract wage. Furthermore, since the market price of contract labor r_c depends critically on the contract worker productivity deficit, the wage spread between contract and regular work is accordingly strictly decreasing in $\bar{e}_c$.

4.4 Equilibrium Fair Share and Productivity Deficit

From (1) - (12), once the fair share demand by regular workers δ_r, and the productivity deficit of contract work $\bar{e}_c$ are determined, every one of the aforementioned market outcome variables are determined. δ_r an $\bar{e}_c$ are joint solutions to (13) and (14) respectively

$$\epsilon_w = 1 + \frac{\theta}{1-\theta}\ln\theta - (1-\bar{e})\frac{\theta}{1-\theta}\left(\frac{\delta_r(1-\theta)}{1-\delta_r(1-\theta)} + \ln(1-\delta_r(1-\theta))\right) \tag{13}$$

$$\bar{e}_c = \frac{\delta_r(1-\theta) + (1-\delta_r(1-\theta))\ln(1-\delta_r(1-\theta))}{(\delta_r - \beta(1-\bar{e}_c))(1-\theta)(1-\delta_r(1-\theta))/\bar{e}_c}. \tag{14}$$

A strictly positive $\bar{e}_c$ in solution the above implies co-existence of regular and contract work.

Proposition 3. *For all $\beta \in (0,1)$,*

$$\bar{e}_c = 0 \ \ \{\epsilon_w | \epsilon_w = 1 + \frac{\theta}{1-\theta}\ln\theta - (1-\bar{e})\frac{\theta}{1-\theta}\left(\frac{\delta_r(1-\theta)}{1-\delta_r(1-\theta)} + \ln(1-\delta_r(1-\theta))\right)\}$$

is always an equilibrium outcome. For β sufficiently large, there exists a unique pair of δ_r and $\bar{e}_c > 0$ that simultaneously solve (13) - (14). In equilibrium, co-existence of regular and contract work arises when worker demand for pay commensurate with marginal product β is sufficiently high.

Figures 5 displays (13) and (14) respectively for different combinations for β and θ. The schedule $\epsilon_w(\bar{e})$ displays (13), and the schedule $\bar{e}_c(\epsilon)$ displays (14). Note that $\epsilon\epsilon$ monotonically increasing in β, which reflects the fact that as contract worker effort rises, their average wage increases, and consequently, the overall opt out option for all workers improves. The *ee* schedule can be both positive or negatively sloped. This reflects two forces in play.. First as the opt out option improves, contract workers' fair share demand increases. All else equal, this leads to a deepening in the perception of unfair treatment, and decreases equilibrium effort. Meanwhile, as the opt out option improves, regular workers' fair share demand also increases. This encourages employers to hire contract workers. This improvement in demand tends to increase contract wages, and helps alleviate the perception of unfair wages. The overall effect shown in the *ee* scheuldes of Figure 5 displays the balance between these two forces, and shows that the relative strength of these two effects depend critically on β.

As shown in Figure 5, for each θ, there is strictly positive contract employment in equilibrium for β sufficiently large. In the Appendix, we provide an analytical proof of this observation. There are thus two types of equilibrium configurations. First, for β sufficiently small, equilibrium contract employment is equal to zero. Here, regular wage demand is relatively low, and as such contract wage offers are too low to justify strictly positive effort levels. Consequently, equilibrium is determined only by (13), evaluated at $\bar{e}_c = 0$. The equilibrium opt out option

we show that coexistence of the two forms of labor hiring arises whenever labor demand for pay commensurate with productivity is high as in Figure 1A, where $\bar{e}_c^*$ and ϵ_w^* respectively denote the average effort of contract workers and the strength of the opt out option. ϵ_w^o denotes the strength of the opt out option contract worker effort is artificially set to zero due, for example, to a ban on contract worker.

Starting from parameter values where contract worker exists in equilibrium, we note two observations. First, $\bar{e}_c < 1$ thus, indeed, perceived unfairness in contract employment is an endemic phenomenon, and workers respond by giving less than full effort. Second, the option to work as contract worker always increases the strength of the opt out option for all workers $\epsilon_w^* > \epsilon_w^o$. Consequently, regular workers demand a strictly higher *fair share* in the presence of contract employment, and will in equilibrium receive at least the fair share since they are directly employed by firms.

In what follows, we will evaluate the impact of a ban on contract work from a number of vantage points: (i) employment, with and without adjustment for effort to examine the efficiency consequences of subcontracting; (ii) wages normalized by productivity to examine how subcontracting impact workers' take home share of their full potential output in equilibrium, and (iii) wages without normalization to account for the joint aggregate employment and wage share impact of subcontracting on the take home wage of workers.

4.5 Evaluating the Rationale for A Ban on Contract Work

As seen in (13) - (14), the equilibrium pair ϵ_w^* and $\bar{e}_c^*$ are functions of the fairness parameter β and the job creation cost θ. Given β and θ, our model can is fully solvable, and numerical solutions to ϵ_w^*, $\bar{e}_c^*$, as well as (i) employment and (ii) wage share, and (iii) actual wage outcomes of a ban on subcontracting can be obtained. In what follows, we evaluate the impact of a ban on contract work in term of its impact on (i) the opt out option, (ii) the employment allocation between regular and contract worker, and (iii) the wage inequality between regular workers, and between regular and contract workers. Throughout the analysis, we normalize the size of the total workforce to unity.

Opt Out Option

Figure 6a plots the relationship between the equilibrium opt out option and the fairness preference parameter β with and without a ban on contract work. For all values of θ and β, a ban on contract work always weakens the opt out option. This implies that the fair share demand by regular workers is strictly lower when a ban on contract work is in place.

Interestingly, with a ban contract work, β has a uniformly negative impact on the strength of the opt out option for all values of θ. Intuitively, an increase in the fairness preference parameter raises wage cost, induces unemployment in the absence of an alternative employment option, and in turn decreases workers' ability to demand high wages.

By contrast, in the presence of contract work, a higher β raises the demand for, and hence drives up the wage offers facing contract workers. This raises their effort, and in turn raises their wage as employers adjusts their willingness to r_c. This is shown in Figure 6b where an increase in β is always associated with an increase in contract worker productivity ρ^*.

Taken together, the strength of the opt out option can indeed by increasing with respect to β contrary to the benchmark scenario with a ban on contract work. This is shown in Figure 6a for job creation cost θ and fairness parameter β both sufficiently small.

Employment

Figure 7 plot the equilibrium relationship between regular and contract employment as a function β, once again for various values of job creation cost. As shown a ban on contract worker unambiguously increase regular employment. If such a ban is lifted, it can be seen that regular employment decreases with the fairness parameter β, while contract employment monotonically increases with β. Indeed, contract worker can exceed regular employment in equilibrium when β is suffciently high.

Total Effective Employment

We can furthermore define total effective labor employment in the economy in effort adjusted term, where $N_r + \bar{e}_c N_c$ gives the total effective labor inputs in the economy. $N_r + \bar{e} N_c$ has a maximum at unity. In Figure 8 we plot the relationship between total effective labor employment and $beta$, for various values of job creation cost. As shown, a ban on contract work strictly decreases total effective employment in the labor market. Thus, while contract workers offer lower effort in equilibrium, banning the institution to incentivize employers to hire more regular workers (Figure 7) does not increase total employment enough to compensate for the loss in effective employment.

Note that a rise in the fairness parameter β strictly decreases total effective employment in the absence of contract labor. Somewhat counterintuitively, lifting the ban on contract labor can potentially reverse this relationship. Specifically, a higher β raises the demand for contract work. This increases both the employment of contract workers, as well as the wage they command. Consequently, the effort associated with contract employment is also increasing in β (Figure 6). In Figure 8, this possibility arises in equilibrium when both β and θ are sufficiently small.

Wage Impacts

In order to ascertain the wage impact of a ban on contract work, additional assumptions will need to be made on the production function. Suppose therefore that $Y(E, K) = E^{\alpha}K^{1-\alpha}$, where α denotes the labor share. Here, α takes on the dual role as the labor share, as well as the inverse of the elasticity of demand for labor. The higher α is, the more elastic the labor demand, and as such, the less susceptible the marginal product p_e is to changes in E that arises due to a ban on contract labor. Throughout, we normalize the size of the composite input K to unituy.

Thus, assume that α is sufficiently high, and as such the effective labor demand is relative elastic. In this case, a ban on contract work strictly decreases the average wage per job seeker for all β. By contrast, if α is sufficiently low, corresponding to an increase in the sensitivity of the marginal product p_e to changes in effective employment, a ban on contract worker increases the average wage per job seeker for all values of β. Finally, for intermediate cases of α, a ban on contract work decreases the average wage per job seeker if β is furthermore sufficiently large so that the increase in contract worker demand is acute.

In summary, the overall efficiency consequences of a ban on contract work in terms of total effective employment is unambiguously negative for all values of β and θ where contract employment can exist in equilibrium. Effectively, the demand for a fair wage imposes a de facto wage floor even in the absence of any regulatory constraints, and shifts the wage distribution to the right. The limit that this imposes on total employment is partially relieved through contract employment, even accounting for the lower effort that contract workers provide.

While a ban on contract work strictly worsens the opt out option ϵ_w, the overall wage consequences of a ban on contract work is nuanced . The total wage per job seeker can either rise of fall with the ban, depending on the elasticity of labor demand, determined by the parameter α.

A ban on contract work has wage inequality consequences as well. Interestingly, since a ban on contract work strictly worsens the opt out option ϵ_w, regular workers' demand for a fair share (δ_r) strictly decreases with a ban. This allows for a strictly higher level of wage inequality between regular workers as measured by the regular worker wage spread in the presence of a ban.

A key driving force behind many of the new insights offered here is the relationship between the fair share and the strength of the opt out option. In the next section, we examine the empirical relevance of this relationship.

5 Empirical Implications

Specifically, we will examine in detail three empirical implications of the model. In each case, the role of the fair share demand, δ_r, and hence the opt out option, is paramount since $\delta_r = \beta+(1-\beta)\epsilon_w$. These three implications cover the share of contract employment to regular employment, the regular worker wage spread, and the regular to contract worker wage spread:

$$\frac{N_c}{N_r} = \frac{\delta_r}{1-\delta_r}\frac{\theta}{1-\theta}. \tag{15}$$

$$\frac{w_r^+ - w_r^*}{w_r^+} = 1-\delta_r, \tag{16}$$

$$\frac{w_r^+ - w_c^+}{w_r^+} = 1-\delta_r\bar{e}_c. \tag{17}$$

These follow directly from (10) as well as Propositions 1 and 2. In terms of the share of contract to regular employment N_c/N_r, a better opt out option ϵ_w raises the fair share demand, and skews labor hiring in favor of contract workers. This puts limits on how low regular wages can be. In turn, the regular wage spread between the highest and the lowest paid regular worker, $(w_r^+ - w_r^*)/w_r^+$, decreases. For the same reason, the regular to contract worker wage spread, $w_r^+ - w_c^+/w_r^+$, also decreases as the demand for contract laborers rises in response to an increase in the fair share demand. The rate of this latter change in wage spread is moderated by the equilibrium effort of casual workers $\bar{e}_c$.

In summary, we test three hypotheses: An increase in the strength of the opt out option ϵ_w (i) increases the share of contract to regular employment (ii) decreases the regular worker wage spread, (iii) decreases the contract to regular worker wage spread with potential non-linear effects through $\bar{e}_c$. In practice, wage inequality at the worker level might occur simply because of heterogeneous worker productivity. We show in Appendix B that the model can be readily extended to account for worker heterogeneity without changing the essence of the findings listed above. Throughout, we account for all other determinants of the share of contract to regular workers, namely β since $\delta_r = \beta + (1-\beta)\epsilon_w$ and θ by introducing state, industry and year fixed effects in the regression. We also account for the nonlinear effects of ϵ_w on the share of contract to regular workers, as well as the regular-contract worker wage spread through $\bar{e}_c$, by introducing squared terms into the regression.

To test these hypotheses, we require a proxy for ϵ_w, the strength of the opt out option, which measures the average wage of all job seekers as a share of the marginal product of labor. The latter is given by the wage of the highest paid worker from Proposition 1, w_r^+. For the former, however, we only have information on the average wages of employed workers from the ASI, call it $\bar{w}$. Thus, the ASI only offers information on

$$\hat{\epsilon}_w = \frac{\bar{w}}{w_r^+}.$$

In order to use $\hat{\epsilon}_w$ from the data to inform the size of the opt out option ϵ_w, we note from Proposition 2 that the unemployment rate is θ. Thus,

$$\epsilon_w = \frac{\bar{w}}{w_r^+}\frac{N_c + N_r}{N} = (1-\theta)\hat{\epsilon}_w.$$

In what follows, we use the observed average wage of employed workers as a fraction of the maximal regular wage $\hat{\epsilon_w}$ as a proxy for the strength of the opt out option ϵ_w, and use industry, state, and year fixed effects to control for differences in θ, $\frac{a^+}{\bar{a}}$, in addition to β.

In what follows, we report the results of three sets of regressions corresponding to (15) - (17). Respectively, these estimations regress the share of contract to regular worker, the regular worker wage spread, and the regular-contract worker wage spread on the opt out option proxy $\hat{\epsilon_w}$. We also introduce non-linear terms for (15) and (17), as well as fixed effects capturing industry level, state level, and year specific differences. OLS estimates in Table 3 for each set of regressions. For (15) ad (16), we furthermore perform tobit regressions with fixed effects to account for the censoring at zero of the two endogenous variables.

With respect to the employment impact of a better opt out option, our findings are consistent across all specifications. The evidence supports a positive relationship between the strength of the opt out option and the share of contract to regular workers. This suggests, perhaps counterintuitively, that a higher average wage among employed workers as a share of their marginal product, the higher the share of contract workers to regular workers. In the context of our model, we reason in (10) that a better opt out option raises the fair share demand by regular workers, which in turn biases employers decision to hire contract rather than regular workers.

With respect to the wage spread impact of a better opt out option, the evidence supports a negative relationship between the strength of the opt out option and the regular wage spread, thus closing the wage gap between the lowest paid regular worker and the highest paid regular worker. This is consistent with the prediction in our model as shown in Proposition 1, that a better opt out option raises the fair share demand, which in turn narrows regular wage spread. The evidence furthermore supports a negative relationship between the strength of the opt out option and the contract to regular wage spread, thus closing the wage gap between the highest paid contract worker and the highest paid regular worker. This is consistent with Proposition 2, which shows that a better opt out option raises the fair share demand, and raises demand for contract workers. This narrows the contract to regular worker wage spread, accounting for the contract worker effort discount.

Tables 3 - 5 check the robustness of these findings in a number of ways. In Table 3, we include regressions that consider only low wage industries with regular and contract wages less than 300 rupees. As noted earlier, this retains over 90% of our observations but remove cases where regular and / or contract wages are at the extreme right tail of the wage distribution. In Table 4, we exclude observations where the number of firms at the industry level may well be too low to fully capture the range of the wage distribution.[5] The results shown in Table 4excludes observations where the number of firms at the industry level covered in the survey is less than 20. In Table 5, we attempt to exclude situations where alternative theories of two-tiered employment may apply. Specifically, the Eswaran and Kotwal (1985) model of two-tiered labor market posits that a permanent (regular) worker status confers a income smoothing function. Consequently, the wage of permanent (regular) workers is less than the wage of casual (contract) workers to reflect the risk premium. Table 5 excludes observations where the average regular wage (at the state$\times$industry$\times$year level) less than the average contract wage. These results continues to yield findings that support the three hypotheses we pose.

6 Conclusion

What explains the proliferation of contract labor? What determines the pay gap between contract and regular work? What are the efficiency consequences of this wage inequality?

In this paper, we introduce fairness preference in a canonical model of a labor market with search friction. We find that the fair wage effort hypothesis in this setting implies a wage floor for regular work, above which a dispersion of regular wages obtains. We also find the demand for high wages provides the incentives for employers to hire contract workers, even if there is indeed a contract worker productivity discount. This paper endogenizes this equilibrium contract worker effort discount, and rationalizes its existence by observing that the institution of subcontracting

[5]We used a range of other number thresholds, and all yielded consistent findings.

gives rise to a dual hold-up problem – employers cannot internalize the actual wage consequences of their payment to subcontractors, and likewise subcontractors do not realize the effort consequences of their wage decisions. This basic setting yields a very sharp set of comparative statics properties of wages, wage spreads, and employment. In particular, we find that despite the effort discount, a ban on contract work decreases total effective employment, and is thus costly in terms of overall efficiency. In addition, we find that a ban has income distributional consequences as well. In particular, a ban on contract work can either increase, decrease, or leave unchanged the average wage per job seeker. In addition, a ban on contract work increases the regular worker wage spread, as the weakening in job seeker's opt out option lowers the fair wage demand.

We estimate three empirical implications of this paper using a panel data set from the Annual Survey of Industries of India. In each case, we find evidence consistent with a fairness preference by workers, which introduces a hitherto under-appreciated link between the demand for a fair share by regular workers, equilibrium contract employment, and equilibrium wage inequality both among regular workers, and between regular and contract workers.

Appendix A

Proof of Proposition 1:

1. Firms maximize profits by paying at least the fair wage.

   Note from (7) that choosing w_r to maximize profits is equivalent to choosing w_r to minimize the cost per effective unit of regular work,

$$\frac{c(w_r)}{e_r} = \frac{w_r}{1-\theta/H(w_r)} \frac{1}{\min\{w_r/w_r^*, 1\}}.$$

   If $w_r < w_r^*$

$$\frac{c(w_r)}{e_r} = \frac{w_r}{1-\theta/H(w_r)} \frac{w_r^*}{w_r} = \frac{w_r^*}{1-\theta/H(w_r)} > \frac{w_r^*}{1-\theta/H(w_r^*)} = c(w_r^*).$$

   Thus, firms pay least the fair wage to maximize profit.

2. Wage dispersion beyond the fair wage.

   The first order conditions of (7) with respect to the share of regular workers s and the total effective labor input E gives,

$$p_e = \frac{c(w_r)}{e_r}$$

or upon rearranging as $e_r = 1$

$$H(w_r)(p_e - w_r) = p_e\theta. \tag{18}$$

Thus, firms hires workers until the expected gains from hiring one more regular worker at full effort $H(w_r)(p_e - w_r)$ is equal to the cost of creating a vacancy $p_e\theta$. This implies a dispersed distribution of regular wages of the following form:

$$H(w_r) = \frac{\theta}{1 - w_r/p_e}. \tag{19}$$

for any $w \geq w_r^* = (\beta + (1-\beta)\epsilon_w)p_e(1-\theta)$, and $H(w) = H(w_r^*)$ otherwise. The maximal wage offer of a firm w_r^+ is solving (19) evaluated at $H(w_r^+) = 1$, or

$$w_r^+ = p_e(1-\theta) \tag{20}$$

with the interpretation that the maximal offer wage offer is given by the marginal revenue associated with the effective labor input of a regular worker. The range $\Omega_r = [w_r^*, w_r^+]$ is non-empty, as long as the average wage $\bar{w}$ in the economy is no greater than the wage of the highest paid regular worker. We will show in what follows that this condition is always satisfied.

Proof of Proposition 2:

1. Subcontractors maximize profits by paying less than the fair wage. From the first order conditions of (8) with respect to the share of regular workers s and the total effective labor input E also implies that

$$p_e = \frac{r_c}{\bar{e}_c}. \tag{21}$$

Suppose that $r_c = p_e$ and firms price contract labor at the full marginal product p_e. Given the regular wage floor w_r^* and the likelihood of acceptance $H(w_r^*)$, the maximal profit of a subcontractor who pays the contract worker fair wage $\delta_c r_c = \delta_c p_e(1-\theta)$ is $H(w_r^*)(p_e - \delta_c p_e) - p_e\theta = \theta[1-\delta_r(1-\theta)]/[1-delta_c(1-\theta)] - \theta < 0$. By analogous reasoning, paying any wage more than or equal to the contract fair wage cannot be profit maximizing.

2. Wage dispersion below the fair wage: Based on the price of contract workers r_c, subcontractor entry takes place until profits are driven to zero, or

$$H(w_c)(r_c - w_c) - r_c\theta = H(w_c)(p_e\bar{e}_c - w_c) - p_c\bar{e}_c\theta = 0. \tag{22}$$

Since $\bar{e}_c \leq 1$, the marginal product of contract workers is never higher than the marginal product of regular workers $p_e > r_c$. It follows that subcontractors will never pay a wage higher than the minimal regular wage.[6] The maximum break even wage that a subcontractor can pay solves

$$H(w_c^+)(r_c - w_c^+) - r_c\theta = 0$$

Since no firms pay less than w_r^* and no subcontractors pay more than w_c^+, $H(w_c^+) = H(w_r^*)$, and thus the maximum break even contract wage is

$$H(w_r^*)(r_c - w_c^+) - r_c\theta = 0 \Leftrightarrow w_c^+ = (\beta + (1-\beta)\epsilon_w)p_e\bar{e}_c(1-\theta).$$

Interestingly, this break even wage is strictly *less* than the fair wage of contract work:

$$\frac{w_c^+}{w_c^*} = \frac{\beta + (1-\beta)\epsilon_w}{\beta + (1-\beta)\epsilon_w/\bar{e}_c}$$

since the productivity difference between regular and contract workers is equal to $\bar{e}_c/e_r = \bar{e}_c$ from Proposition 1. The break even condition also implies a dispersed range of contract wages:

$$H(w_c) = \frac{\theta}{1 - w_c/(p_e\bar{e}_c)}. \tag{23}$$

for all $w_c \in [0, w_c^+] = \Omega_c$.

3. Willingness to pay for subcontracted labor. From (8), a firm's willingness to pay for contract workers is equal to p_e adjusted appropriately to reflect contract worker effort, or

$$r_c = p_e\bar{e}_c \leq p_e$$

for $\bar{e}_c \leq 1$.

Appendix B

In this Appendix, we extend to model to account for heterogeneous workers. Let a denote the effective input endowment of a worker, in the normalized range $[1, a^+]$. Furthermore, let $\bar{N}(a)$ denote the number of workers with productivity a, and $\bar{N} = \int_0^{a^+} N(a)da$, and $N_j(a)$ the number of workers with productivity a employment in $j = r, c$. Also let $w_j^+(a)$ and $w_r^*(a)$ denote the fair wage, and the wage of the highest earning worker with productivity a in $j = r, c$.

[6] To see this, note simply that from (18) that $0 = H(w_r^*)(p_e - w_r^*) - p_e\theta \geq H(w_r^*)(r_c - w_r^*) - p_e\theta$ and as such a subcontractor will make a loss by paying w_r^*. Analogous arguments hold for any wage in the range Ω_r.

We now turn to each of the three empirical implications of the model. First, let the total number of contract workers and the total number of regular workers, aggregated over all productivity types be $\mathcal{N}_c = \int_1^{a^+} N_c(a)da$ and $\mathcal{N}_r = \int_1^{a^+} N_r(a)da$ respectively. From (10), $N_c(a)/N_r(a)$ is scale invariant at $\delta_r\theta/((1-\delta_r)(1-\theta))$, it follows that

$$\frac{\mathcal{N}_c}{\mathcal{N}_r} = \frac{\delta_r}{1-\delta_r}\frac{\theta}{1-\theta}. \tag{24}$$

Thus, amore favorable opt out option ϵ_w is associated with an increase in the share of contract to regular workers, through its impact on the fair share demand $\delta_r = \beta + (1-\beta)\epsilon_w$ as in the basic model.

Next, since the observed maximal wage in $j = r, c$ is the maximal wage of the highest productivity worker, while the minimal wage in j is the lowest wage of the lowest productivity worker, the observed regular wage spread reflects the productivity heterogeneity as

$$\frac{\max_a w_r^+(a) - \min_a w_r^*(a)}{\max_a w_r^+(a)} = 1 - \delta_r/a^+ \tag{25}$$

while the observed contract to regular wage spread is unaffected by the introduction of heterogeneity:

$$\frac{\max_a w_r^+(a) - \max_a w_c^+(a)}{\max_a w_r^+(a)} = 1 - \delta_r\bar{e}_c. \tag{26}$$

Thus, more favorable opt out option is associated with a reduction in both the between and within wage inequality measures, through the effect of ϵ_w on δ_r. This is once again consistent with the findings of the main model.

To determine the opt out option proxy with worker heterogeneity, we obtain from the ASI the average wages of employed workers as a fraction of the highest paid regular worker:

$$\hat{\epsilon}_w = \frac{1}{w^+(a^+)}(\int_1^{a^+} N_r(a)\bar{w}_r(a) + N_c(a)\bar{w}_c(a)da)/(\int_1^{a^+} N_r(a) + N_c(a)da)).$$

Rearranging,

$$\begin{aligned}
\epsilon_w &= \frac{\int_1^{a^+} N_r(a)\frac{\bar{w}_r(a)}{p_e a} + N_c(a)\frac{\bar{w}_c(a)}{p_e a}da}{\bar{N}} \\
&= (1-\theta)\frac{\left(\int_1^{a^+} N_r(a)\frac{\bar{w}_r(a)}{p_e a} + N_c(a)\frac{\bar{w}_c(a)}{p_e a}da\right)}{\int_1^{a^+} N_r(a) + N_c(a)da} \\
&= (1-\theta)\hat{\epsilon_w}\frac{a^+}{\bar{a}}
\end{aligned} \tag{27}$$

where $\bar{a}$ denotes the average productivity of the employed workers $(\int_1^{a^+} N_r(a)a + N_c(a)ada)/(\int_1^{a^+} N_r(a) + N_c(a)da))$. Thus, we use the observed average wage of employed workers as a fraction of the maximal regular wage $\hat{\epsilon_w}$ as a proxy for the strength of the opt out option ϵ_w, and use industry, state, and year fixed effects to control for differences in θ, $\frac{a^+}{\bar{a}}$, in addition to β.

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Figure 1
Kernel Density of the Share of Contract Man Days to Total
Man days 1999, 2003, 2009

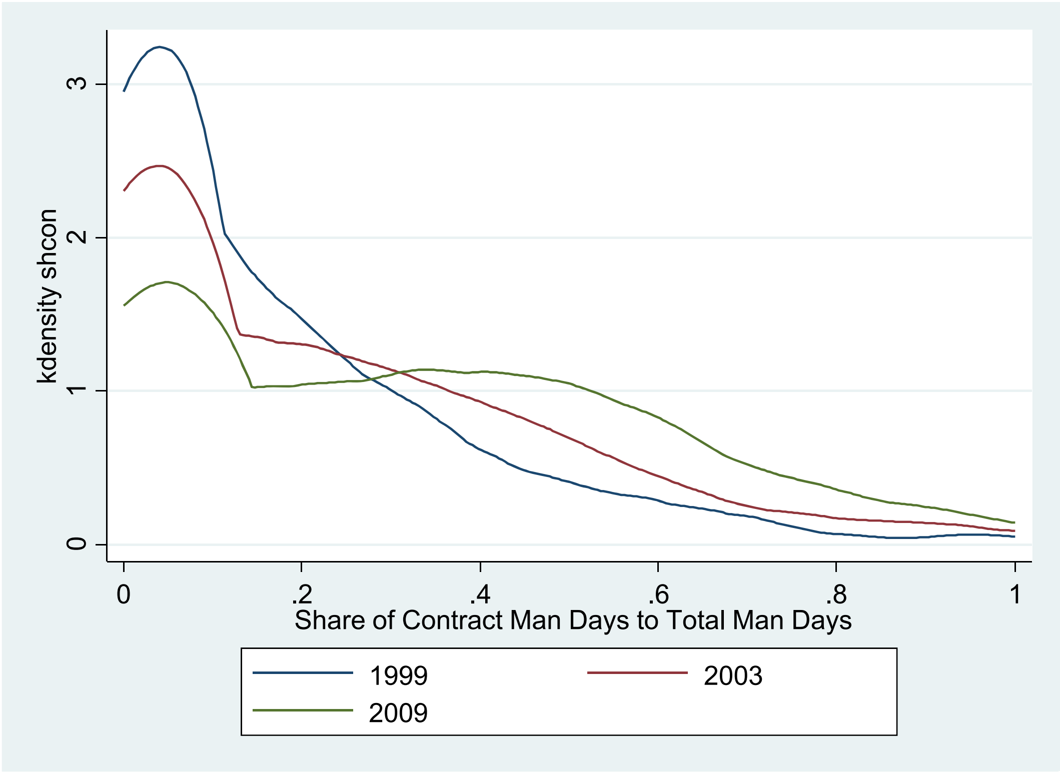

Figure 2
Kernel Density of the Share of Contract Man Days to Total
Man days (Low Wage Industries)
1999, 2003, 2009

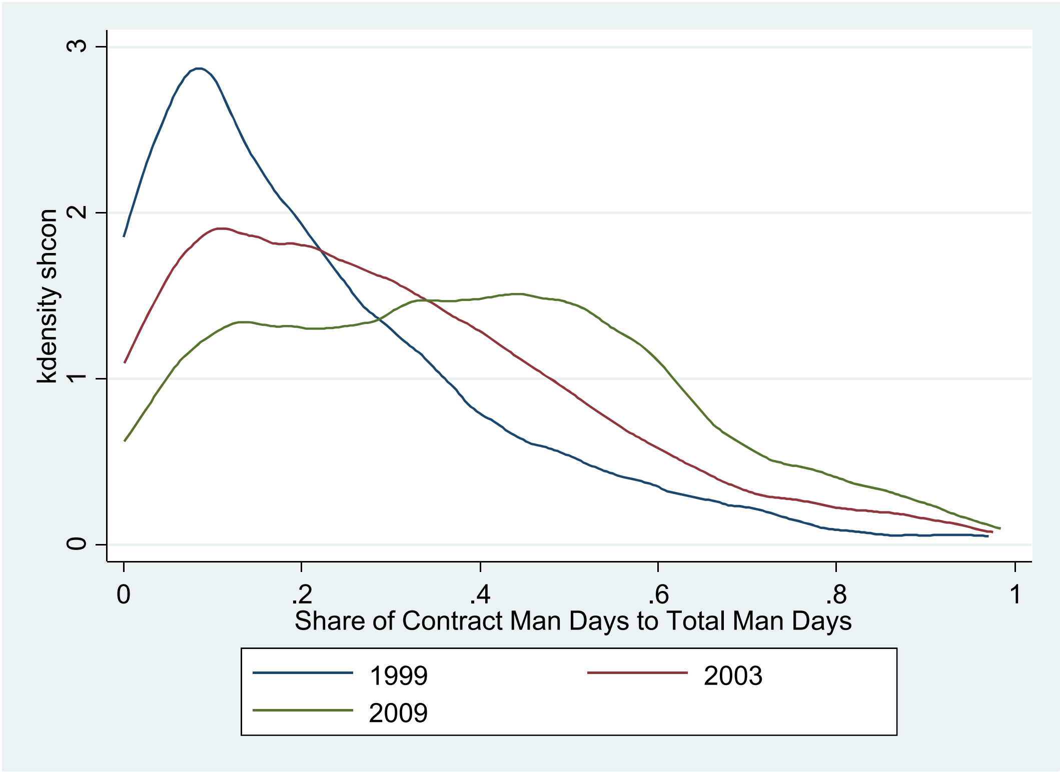

Figure 3
Kernel Density of Regular and Contract Wages
1999, 2009

Figure 4
Kernel Density of Regular and Contract Wages
(Low Wage Industries)
1999, 2009

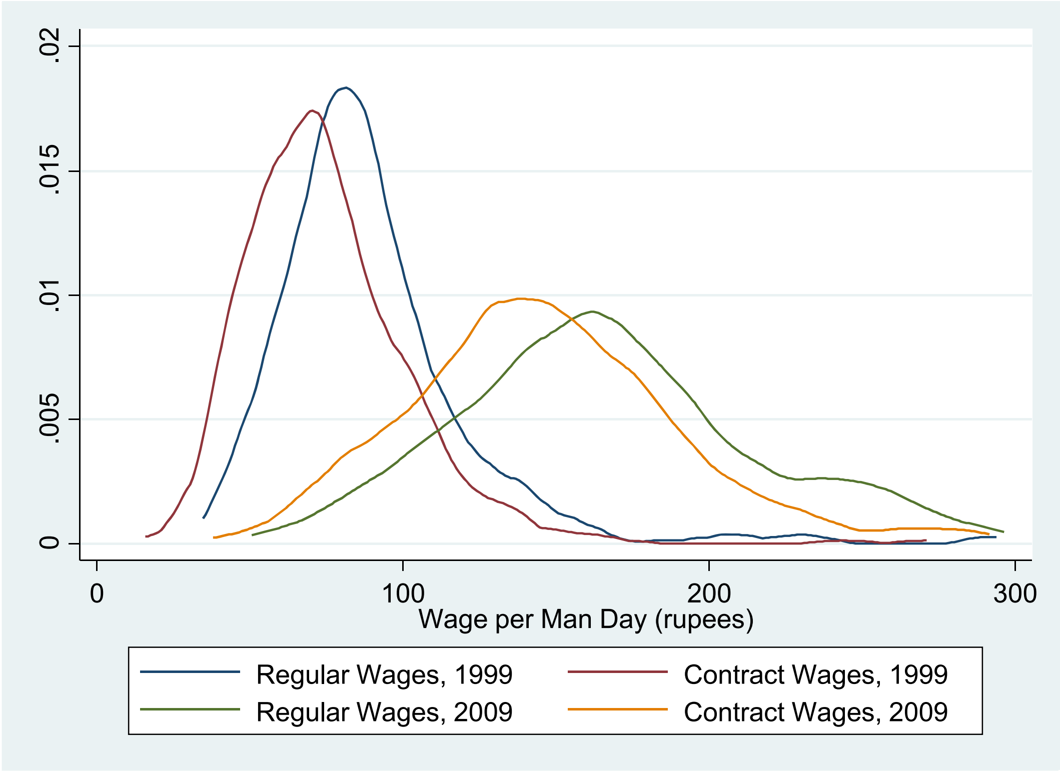

Figure 5
Equilibrium Opt Out Option and Contract Worker Effort

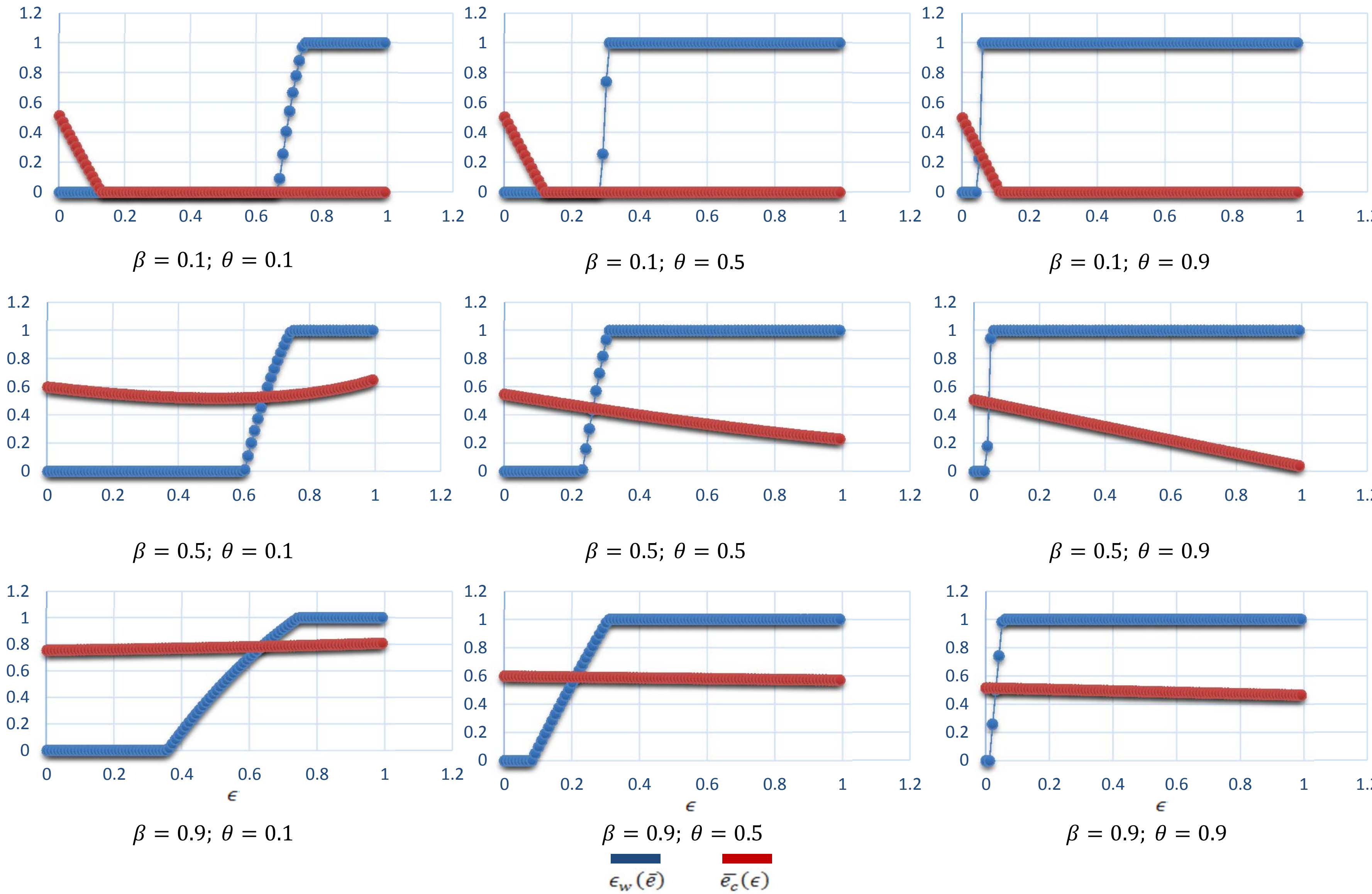

Figure 6A
Equilibrium Strength of the Opt Out Option, ϵ_w

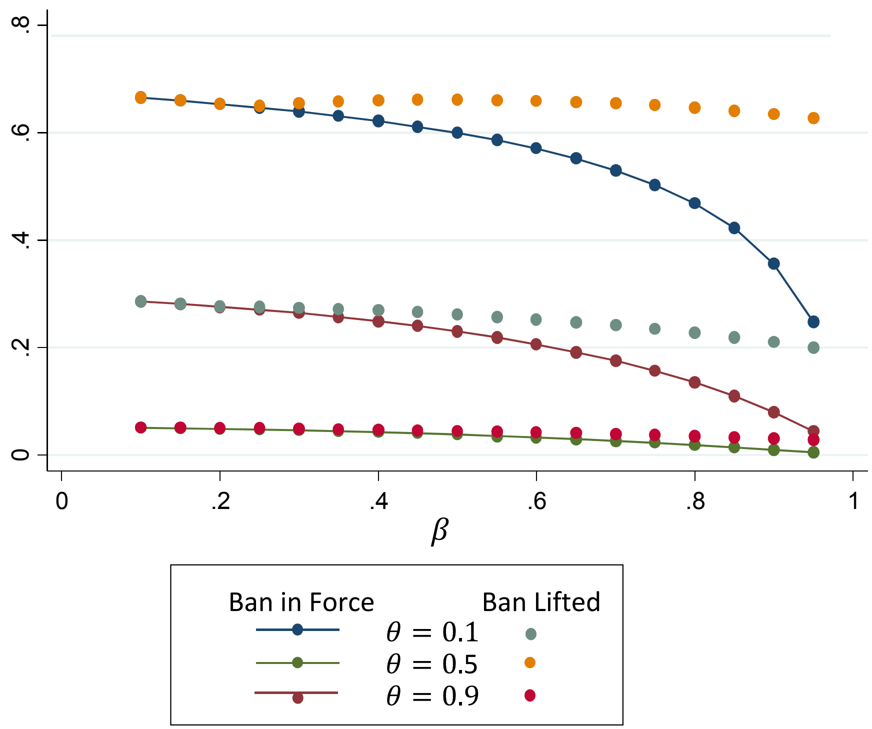

Figure 6B
Equilibrium Contract Worker Effort, $\bar{e}_c$

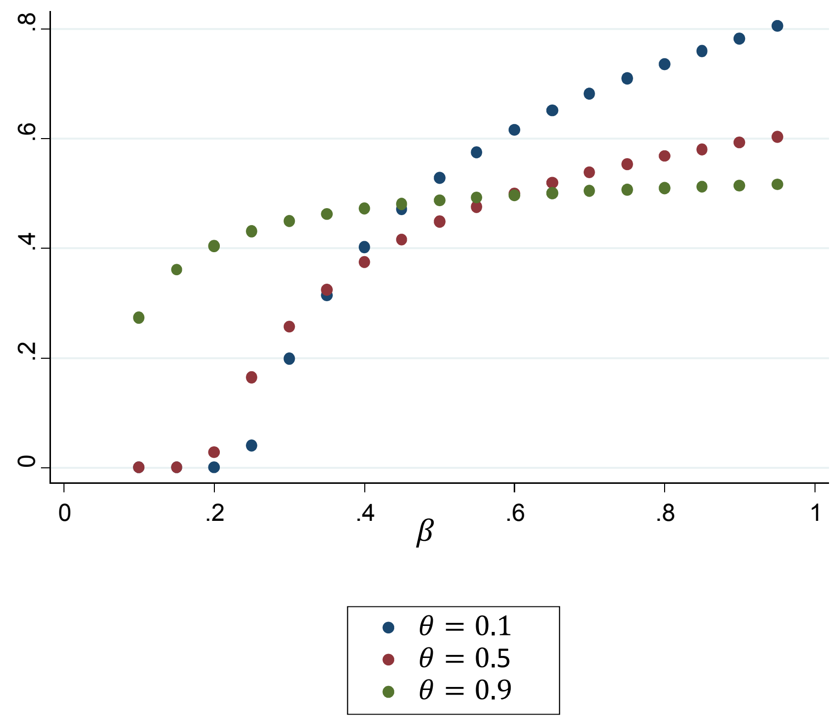

Figure 7A
Equilibrium Regular Employment

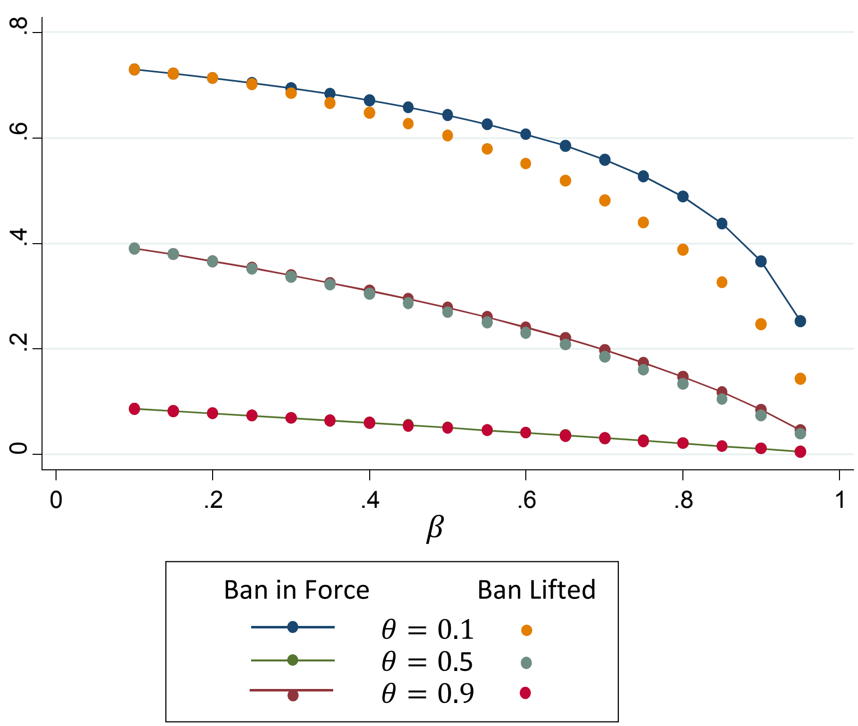

Figure 7B
Equilibrium Contract Employment

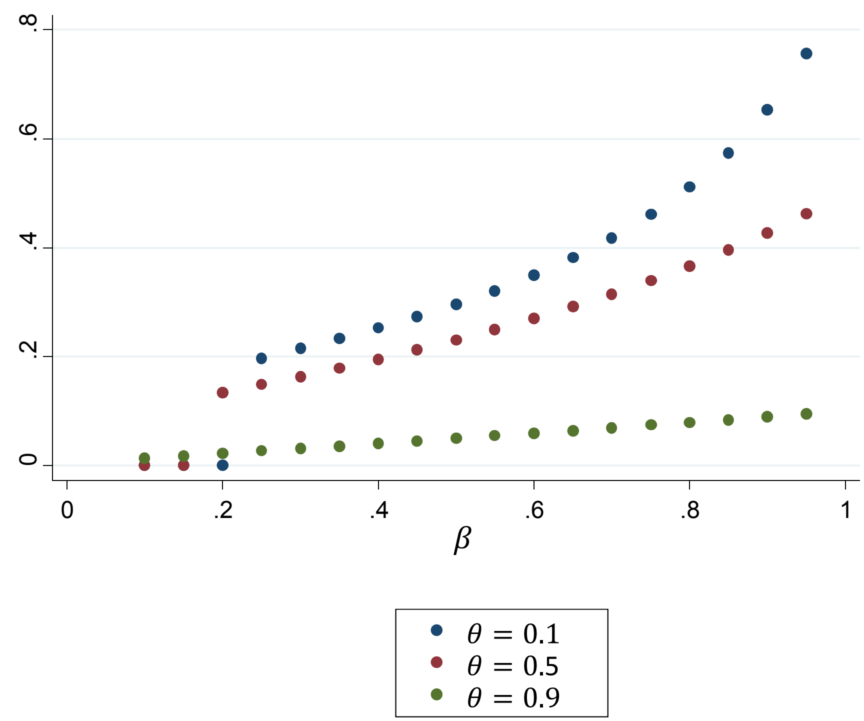

Figure 8
Total Effective Employment

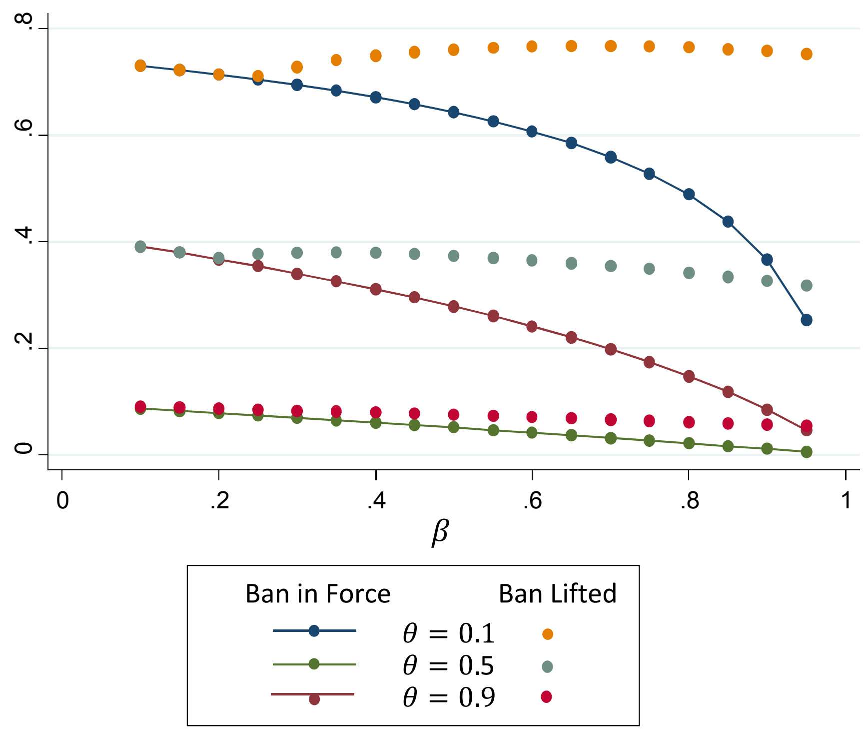

Figure 9
The Impact of A Ban on the Average Wage of a Job Seeker

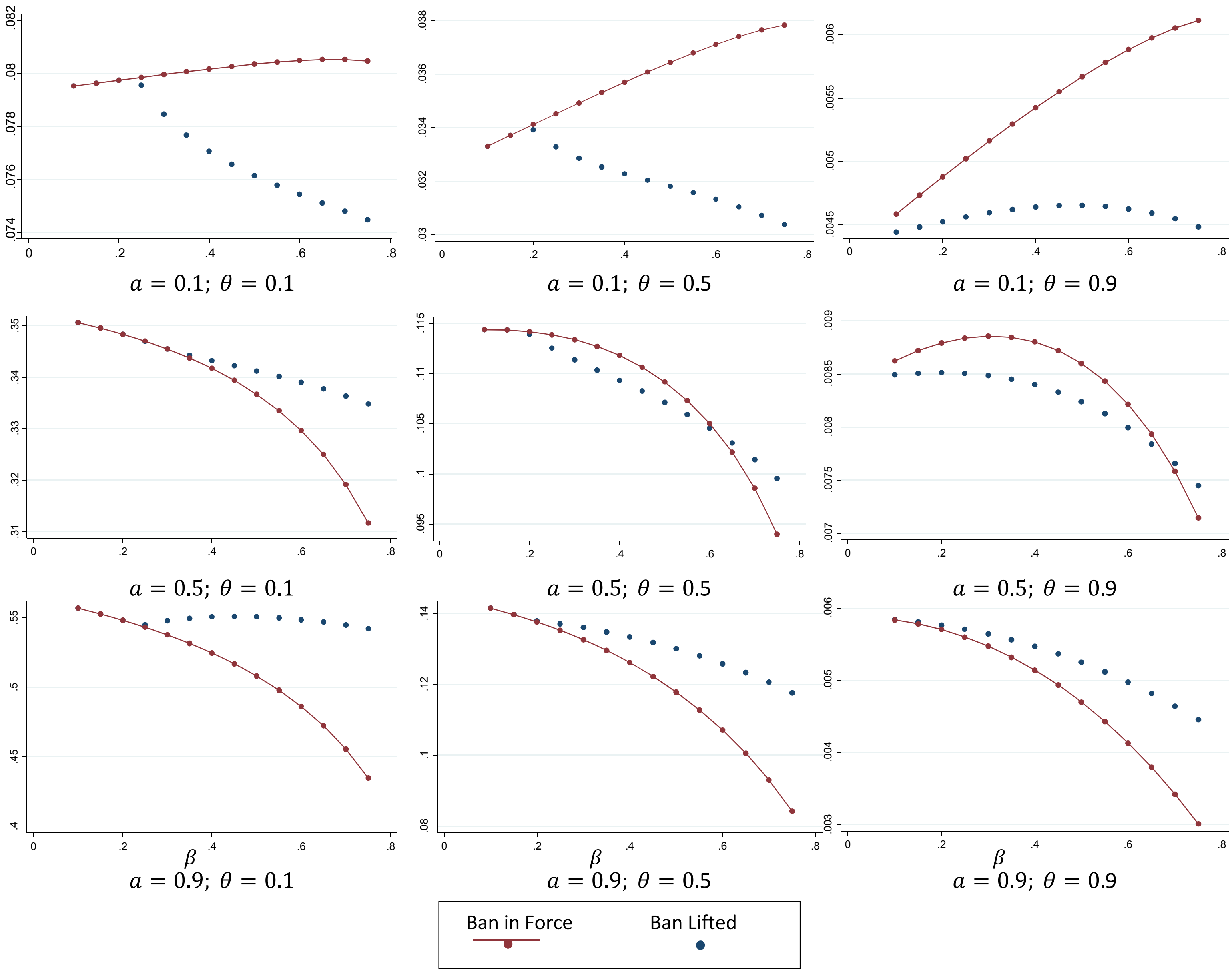

Table 1: Summary of Statistics

Year: 1999-2004					
Variables	Obs	Mean	Std. Dev.	Min	Max
Share of Contract Workers (%)	3,873	0.202	0.215	0	1
Share of Contract Wages in Total Wages (%)	3,875	0.158	0.192	0	1
Regular Worker Wage Spread	3,864	0.740	0.249	0	1
Contract Worker Wage Spread	3,022	0.499	0.321	0	1
Average Regular Wage (rupees per man day)	3,864	121.796	78.782	26.449	1820.341
Average Contract Wage (rupees per man day)	3,022	94.413	61.599	14.118	1905.896
Year: 2005-2011					
Variables	Obs	Mean	Std. Dev.	Min	Max
Share of Contract Workers (%)	5,398	0.297	0.259	0	1
Share of Contract Wages in Total Wages (%)	5,413	0.248	0.242	0	1
Regular Worker Wage Spread	5,332	0.671	0.314	0	1
Contract Worker Wage Spread	4,272	0.511	0.333	0	1
Average Regular Wage (rupees per man day)	5,332	195.029	189.674	36.436	6509.816
Average Contract Wage (rupees per man day)	4,338	162.809	274.214	0	10947.360

Table 2: Summary of Statistics
(Low Wage Sample)

Year: 1999-2004					
Variables	Obs	Mean	Std. Dev.	Min	Max
Share of Contract Workers (%)	2,933	0.254	0.205	0	0.988
Share of Contract Wages in Total Wages (%)	2,933	0.199	0.191	0	0.980
Regular Worker Wage Spread	2,933	0.804	0.190	0	1
Contract Worker Wage Spread	2,933	0.500	0.320	0	1
Average Regular Wage (rupees per man day)	2,933	111.560	40.791	34.659	294.034
Average Contract Wage (rupees per man day)	2,933	91.039	32.458	14.118	275.895
Year: 2005-2011					
Variables	Obs	Mean	Std. Dev.	Min	Max
Share of Contract Workers (%)	3,805	0.351	0.223	0	1
Share of Contract Wages in Total Wages (%)	3,805	0.295	0.216	0	1
Regular Worker Wage Spread	3,805	0.760	0.347	0	1
Contract Worker Wage Spread	3,805	0.517	0.325	0	1
Average Regular Wage (rupees per man day)	3,805	158.456	53.119	44.046	299.896
Average Contract Wage (rupees per man day)	3,805	135.881	46.849	0	299.041

Table 3: The Effect of a Stronger Opt Out Option

On the Share of Contract to Regular Workers				
	OLS		Tobit	
Explanatory Variables	**(Full Sample)** [1]	**(Low Wage Sample)** [2]	**(Full Sample)** [3]	**(Low Wage Sample)** [4]
ϵ_w	1.413	1.411	1.494	1.411
	(0.157)***	(0.182)***	(0.181)***	(0.181)***
ϵ_w squared	-0.038	0.745	-0.476	0.745
	(0.008)***	(0.433)*	(0.219)**	(0.430)*
N	9,196	6.738	9,196	6,738

On the Regular Worker Wage Spread				
	OLS		Tobit	
Explanatory Variables	**(Full Sample)** [1]	**(Low Wage Sample)** [2]	**(Full Sample)** [3]	**(Low Wage Sample)** [4]
ϵ_w	-0.042	-0.036	-0.058	-0.038
	(0.002)***	(0.002)***	(0.003)***	(0.002)***
N	9,196	6.738	9,196	6,738

On the Regular to Contract Worker Wage Spread		
	OLS	
Explanatory Variables	**(Full Sample)** [1]	**(Low Wage Sample)** [2]
ϵ_w	-0.053	-0.046
	(0.030)*	(0.016)**
ϵ_w squared	-0.203	-0.251
	(0.040)***	(0.039)***
N	7,285	6.738

Notes: 1., All estimations include state fixed effects, industry fixed effects and year fixed effects; 2. Standard errors are provided in parenthesis; 3. *** p<0.01; ** p<0.05; * p<0.1.

Table 4: The Effect of a Stronger Opt Out Option
(Sample with greater than 20 firm-level obs.)

On the Share of Contract to Regular Workers				
	OLS		Tobit	
	(Full Sample)	**(Low Wage Sample)**	**(Full Sample)**	**(Low Wage Sample)**
Explanatory Variables	[1]	[2]	[3]	[4]
ϵ_w	1.257	1.223	1.262	1.222
	(0.080)***	(0.083)***	(0.080)***	(0.082)***
ϵ_w squared	-0.027	1.517	-0.087	1.517
	(0.123)	(0.451)***	(0.154)	(0.447)***
N	4,801	4,513	4,801	4,513

On the Regular Worker Wage Spread				
	OLS		Tobit	
	(Full Sample)	**(Low Wage Sample)**	**(Full Sample)**	**(Low Wage Sample)**
Explanatory Variables	[1]	[2]	[3]	[4]
ϵ_w	-0.029	-0.028	-0.029	-0.028
	(0.002)***	(0.002)***	(0.002)***	(0.002)***
N	4,801	4,513	4,801	4,513

On the Regular to Contract Worker Wage Spread		
	OLS	
	(Full Sample)	**(Low Wage Sample)**
Explanatory Variables	[1]	[2]
ϵ_w	-0.054	-0.052
	(0.055)	(0.030)*
ϵ_w squared	-0.914	-0.878
	(0.295)**	(0.164)***
N	4,700	4,513

Notes: 1., All estimations include state fixed effects, industry fixed effects and year fixed effects; 2. Standard errors are provided in parenthesis; 3. *** p<0.01; ** p<0.05; * p<0.1.

Table 5: The Effect of a Stronger Opt Out Option
(Sample with Contract Wage Discount)

On the Share of Contract to Regular Workers				
	OLS		Tobit	
Explanatory Variables	**(Full Sample)** [1]	**(Low Wage Sample)** [2]	**(Full Sample)** [3]	**(Low Wage Sample)** [4]
ϵ_w	1.732	1.737	1.732	1.737
	(0.040)***	(0.040)***	(0.040)***	(0.039)***
ϵ_w squared	-0.752	-0.683	-0.752	-0.683
	(0.094)***	(0.092)***	(0.093)***	(0.092)***
N	5,452	5,044	5,452	5,044

On the Regular Worker Wage Spread				
	OLS		Tobit	
Explanatory Variables	**(Full Sample)** [1]	**(Low Wage Sample)** [2]	**(Full Sample)** [3]	**(Low Wage Sample)** [4]
ϵ_w	-0.040	-0.038	-0.041	-0.040
	(0.003)***	(0.002)***	(0.003)***	(0.003)***
N	5,452	5,044	5,452	5,044

On the Regular to Contract Worker Wage Spread		
	OLS	
Explanatory Variables	**(Full Sample)** [1]	**(Low Wage Sample)** [2]
ϵ_w	-0.056	-0.052
	(0.005)***	(0.006)***
ϵ_w	-0.116	-0.107
	(0.013)***	(0.013)***
N	5,452	5,044

Notes: 1., All estimations include state fixed effects, industry fixed effects and year fixed effects; 2. Standard errors are provided in parenthesis; 3. *** p<0.01; ** p<0.05; * p<0.1.