Contract Employment as a Worker Discipline Device*

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Abstract: Fixed term contract employment at low wages has increasingly replaced long term regular employment as the predominant form of employment notably in developing countries. Does the introduction of contract work reinforce or disrupt worker discipline otherwise secured by long term regular employment at efficiency wage? When contract and regular employment co-exist, what factors guide employers to raise the relative intensity of contract employment instead of regular employment in response to labor demand shocks? Motivated by firm-level evidence showing nuanced patterns of co-movements of regular and contract wages, we examine these questions in a two-tiered task based model of the labor market in which firms allocate tasks to long term employees at incentive compatible wages, and to fixed term employees at acceptable wages. We then argue that there are two margins of hiring distortions – task assignment and total employment – against which the effectiveness of a suite of oft proposed labor market flexibility policies should be assessed.

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'Unlike the 3,178 pourakarmikas who are permanent employees ... the rest of the 18,000 sanitary workers are employed by solid waste management contractors. "My wife and I have been contract pourakamikas for 22 years."' *Times of India*, August 1, 2016.

1 Introduction

Contract labor, often referred to also as fixed-term contract work, temporary employment, or subcontracted work, is a global phenomenon. These are workers hired at a fixed-term basis with no guarantee, either contractual or legal, of permanent employment. Unlike regular workers, contract laborers are not entitled to the same level of employment protection. Contract employee status typically carries a wage penalty as well, and offers less job security (ILO 2015). Globally, there is a great deal of disagreement concerning how best to regulate contract work, and related national legislations are not at all uniform. About 40% of all countries world wide do not impose any limitation on contract employment (Doing Business 2016). The other 60% either impose a ban on contract work in permanent tasks, restrict the maximal time duration of contract work, or adopt a combination of the two (Table 1).

Recent labor market reforms in a number of European countries have facilitated the emergence of a two tiered labor market, in which regular workers' wages and job security continue to be protected by law, while the market for contract work has also been allowed to flourish (OECD 2004, 2006, ILO 2012).[1] In Spain and Germany, for example, respectively 25% and 15% of all wage employees are contract workers (Alexsynska and Muller 2016).

Similar studies in the developing country context are rare. Only a few case studies with aggregate contract labor estimates are available. In Bangladesh, for example, over 50% of the knitwear factories uses contract labor (Chan 2013). In Latin America, the share of contract workers range widely with some of the highest figures recorded at around 30% in Chile and Peru for example (Alexsynska and Mueller 2016). Indian manufacturing is a notable exception in the developing country setting (e.g. Soundararajan 2015, Bertrand, Hsieh and Tsivanidis 2015). We are able to draw motivations for our analysis from a comprehensive data set in India with employment and wage records of regular and contract workers at the establishment level. Specifically, over 65% of the man days hired in Indian manufacturing is carried out by contract laborers (Ramaswamy 2013, Soundararajan 2015) in the last decade. Furthermore, large increases in contract employment in recent years and endemic wage polarization between regular and contract were seen as the catalysts

[1] See also Cahuc and Postel-Vinay (2002), Bentolila et al. (2011) and Boeri (2011) for in depth analyses for the cases of France, Spain and Italy respectively.

for a number of high profile and in some cases violent labor disputes (Seghal 2012, Gulati 2012). The Indian case thus highlights the need for understanding both the employment and distributional consequences of contract labor.

As a basic framework for analysis, the canonical task approach to the labor market (Acemoglu and Autor 2011, Autor 2013) is a natural starting point since the practice of contract employment can be seen simply as the subcontracting of production tasks and processes to supplement the work accomplished by regularly hired workers. Indeed, a parallel literature which addresses the phenomenon of international offshoring exists, where arguably the only difference compared to contract work is that subcontractors are sourced globally instead of locally.[2] In a highly influential paper, Grossman and Rossi-Hansberg (2008) demonstrate that by appropriately allocating tasks between high wage domestic and low wage foreign workers, efficiency gains will ensue, and such gains trickle down to benefit domestic workers in the form of even higher wages. Evidence of efficiency gains have indeed been observed in a developing country context as well, for example in Bertrand, Hsieh and Tsivanidis (2015) where a small increase in GDP in India is attributed to the proliferation contract labor. Interestingly, the same study shows that regular wages decreased as a consequence. Ahsan and Pagès (2007) examine the impact of lagged contract employment on average earnings per worker at the state-industry level in India, and likewise found a negative (though not significant) relationship. A first conceptual challenge of contract work thus relates to the causes of the failure of a trickle-down despite apparent efficiency gains once contract work is introduced.

A second conceptual issue concerns wage polarization between contract and regular work. Since contract workers face higher transition probability to unemployment, and are not eligible for many of the benefits enjoyed by regular workers, all else equal, these workers should demand a compensating differential in the form of higher wages (Smith 1776, Rosen 1986).[3] Yet, a two-tiered wage structure persists in which a contract work wage penalty applies. This ranges from 30 - 60 percent in developing countries, to 1 - 34% in developed countries (ILO 2015). The two-tiered wage structure adds new dimensions to the canonical task based model of the labor market. In particular, wage polarization in the context of contract work is driven by contractual heterogeneity,

[2]For that reason, in fact, contract labor has also be commonly referred to as in-contracting (Fair Wear Foundation 2004, Veritè 2012).

[3]Along similar veins, in two-tiered labor market model of Eswaran and Kotwal (1985), for example, permanent workers enjoys implicit insurance throughout the year, while casual workers are only employed in peak periods depending on demand conditions. For the implicit insurance they receive throughout the year, permanent workers willingly accepts lower pay in these contracts.

as opposed to skill heterogeneity in the canonical model.[4] What gives rise to the need for a two-tiered contractual structure within the same firm for otherwise similar workers? Equally important, what explains the failure for contract wages to catch up with regular wages despite the popularity of contract employment?

This paper formulates a model of the labor market in which the subcontracting of tasks to lower wage workers on a temporary basis coexist with the employment of regular workers at a wage premium and on a more permanent basis. To do so, we bring together a task-based model of the labor market and a two-tiered wage structure motivated by efficiency considerations. The rationale for this setup is two-fold. By incorporating contract employment as an assignment problem which allocates heterogeneous tasks of differing levels of complexity to regular and contract workers, this model reproduces a setup in which the gains from efficient task allocation can be directly passed on to workers. We then endogenize wages and employment in a setting where workers' individual effort cannot be directly monitored. Wage polarization occurs when employers account for the efficiency consequences of the promise of high wage permanent employment offered in rationed quantities for the completion of complex tasks, alongside fixed term contract employees in routine tasks at low wages. The efficiency wage approach to labor market segmentation has a long tradition (e.g. Stiglitz 1974, Shapiro and Stiglitz 1986, Saint Paul 1996), and is fitting in our context for it simultaneously accounts for the permanent nature of regular employment, the higher wage that regular workers receive, and the equilibrium co-existence of regular workers, contract workers, and involuntary unemployment.

The main findings of this paper are three-fold. First, we find that in general equilibrium, the practice of contract employment can facilitate the maintenance of regular worker discipline at strictly lower cost. Effectively, by diverting tasks previously accomplished by regular workers to contract workers, the likelihood that any job seeker will be able to find a regular job decreases. This makes it possible for employers to lower the regular wage with no perverse effort consequences. As regular workers exert equal effort at lower wages, the discounted value of regular work falls, and with it, the discounted value of all job seekers also falls. Thus, in ways orthogonal to the predictions from the task offshoring literature discussed above, but consistent with the labor disputes that broke out allegedly because of employer worker conflicts over the issue of contract labor, we find that the distributional consequences of contract employment is indeed stark, with employers being strict winners, while all workers strict losers.

[4]Indeed, there has been a wave of court rulings to regularize contract workers, both in private establishments (Business Standards 2014) as well as in government departments in India (The Hindu 2014).

Second, in our setting employers can choose contract employment, regular employment, or both in response to any increase in demand for worker effort. To date, empirical research on the determinants of contract employment has exclusively focused on how polarized wages impact contract and regular employment, where various measures of employment protection legislations are used as proxies for wage polarization between regular and contract workers.[5] We have limited understanding about the forces that drive wage polarization between regular and contract workers to begin with. Our analysis adds to this discourse and shows that in fact wage polarization is itself a byproduct of the hiring decisions of employers.

Specifically, we account for two possibilities. The first arises when workers view contract and regular employment as substitutes, for example, when taking up contract employment and the resulting inability to search full time negatively impacts the likelihood of subsequent regular employment (e.g. Rogerson, Shimer and Wright 2005, Chau 2016). A rise in the regular wage driven by labor market tightness accordingly prompts contract workers to demand a higher wage as compensating differential. Wage polarization between regular and contract workers thus attenuates if contract wage catches up sufficiently. By contrast, if workers view contract employment as a stepping stone to regular employment, for example, when contract workers fill entry level positions that feed into a firm's long term employment pool (e.g. Cahuc and Postel-Vinay 2002), contract workers will lower their wage demands in order to gain a short cut to regular employment in response to the same rise in the regular wage driven by labor market tightness. In this case, an increase in the demand for worker effort unambiguously give rise to more polarized wages.

We write a model that allows for both the substitutes and the stepping stone perspectives. Indeed, available evidence suggests a diverse set of possibilities. For example, in select European countries where data is available, the average likelihood of regularization of a contract worker ranges from 5 - 7% in France and Spain, to 38 to 47% in Germany and Austria (Alexander and Muller 2016). These relatively high likelihoods of regularization are consistent with a majority of the studies so far in the context these European countries that view contract work as a stepping stone to regular employment (Blanchard and Landier 2002, Belot, Boone and van Ours 2007, Boeri 2012, and Güell and Mora 2015).

Similar evidence in the developing country context is thin, and limited to a small number of select cases. For example, the report of the International Commission for Labor Rights on

[5]For example, Sapkal (2016) finds that contract labor hiring rises with stricter employment protection laws and enforcement. Chaurey (2015) examines the hiring of contract labor with respect to demand shocks depending on the strictness of employment protection legislation. Early, though with focus on total employment only, Besley and Burgess (2004) studies the role of employment regulations on employment, investment, output and productivity.

the issue of contract employment finds that even after several years of doing the same jobs as regular workers, contract workers have only a small chance of being absorbed as regular workers. The Times of India (2016) reported on cases of seemingly permanently temporary employment of contract workers in India at low wages and benefits alongside regular workers with permanent employment status and higher wages and benefits. These anecdotal evidence of low regularization likelihood among contract workers may be seen as examples of contract employment as a substitute of regular employment. In Section 2, we use firm-level data on Indian manufacturing and argue that in fact across Indian manufacturing industries, the evidence suggests a spectrum of different regularization likelihoods among contract workers.

Our third set of results provides a series of efficiency and distributional implications of contract employment. At the level of the firm, we draw attention to two types of hiring distortions: task assignment distortion, and total employment distortion. We find that an unregulated equilibrium is inefficient in the presence of an aritificially high regular wage, and pure efficiency gains can be had through government interventions that increases total employment, while at the same time allocating a greater share of tasks to be accomplished by regular workers. We then contrast these first best policy prescriptions with a suite of labor market flexibility policies: employment protection legislation, unemployment insurance, and active labor market policies. What we find is that each of these three policies can only correctly address one of the two aforementioned sources of distortions, while it reinforces the remaining distortion. The main takeaway from our policy analysis is thus the need to recognize that piecemeal policy reforms typically have ambiguous efficiency consequences, for they are not designed to correct for both sources of distortions required to achieve the first best outcome.

This paper contributes to several areas of research. The determinants of wage polarization in the labor market has been a longstanding area of research inquiry. Studies have ranged from institutional and firm-specific determinants such as contractual dualism (Eswaran and Kotwal 1985, Basu, Chau and Kanbur 2015), minimum wages (Fields 1974), efficiency wage considerations (Shapiro and Stiglitz 1986), fair wage concerns (Akerlof and Yellen 1998), and firm heterogeneity (Helpman, Itshoki and Redding 2010), to name a few. A separate literature addresses wage inequality determined by worker characteristics, such as skill (e.g. Harrison 2006), gender (Blau and Kahn 2016) and immigration status (Card and Shleifer 2009), for example. Studies on the relationship between wage polarization with contractual heterogeneity *within the firm* among similar workers is very rare, however. This paper contributes to this broad literature by singling out wage polarization

as both a determinant and an outcome of the coexistence of contract work and regular work. By doing so, our framework provides a model based on which to examine the efficiency implications of efforts to address wage inequities that exist within firms.

This paper also contributes to the literature on task offshoring, both international and domestic. In this literature, the focus has been the determinants of offshoring (Jones and Kierskowski 1990) and the impact of offshoring on output and local wages (Feenstra and Hansen 1996, Grossman and Rossi-Hansberg 2008). Few studies, however, deal with the endogeneity of the extent of relative wage advantage of contract workers. Cazes and de Laiglesia (2015) is one exception which finds a positive relationship between wage polarization and the share of temporary contract workers, using the interdecile ratio D9/D1 of wage earnings as the measure of wage inequality. To this literature, our study provides the first conceptual setting in which to examine the determinants of wage polarization as a function of contract work, and a first empirical examination of this issue with India as a case in point.

Finally, there is an important literature specifically on contract work as a response to employment protection legislation such as firing restrictions in a developed country context. Saint Paul (1996) is a pioneering study in this literature in which a model of efficiency wage is used to explain the difference in wages but contract workers are hired at an exogenously given wage. There are a number of key features of the models in this literature (e.g. Saint Paul 1996, Cahuc and Postel-Vinay 2002, Boeri 2011, Güell and Mora 2015): employers hire entry level workers via fixed term contracts that are stepping stones for subsequent regular employment; entry level workers are paid an exogenously given or a fully enforced minimum wage, and the contract employment share is bounded upwards even though employers strictly prefer low wage contract workers due to contract employment legislation.[6] In our setting, contract workers do not enjoy a fully enforced minimum wage. We show an unregulated equilibrium in which both the contract wage and contract employment are endogenously determined, as regular and contract employment co-exist. Furthermore, we provide both anecdotal and firm level evidence that, together with the predictions of the model, support the need to examine both the substitutes and stepping stones perspectives of the role of contract employment in affecting regularization likelihoods.

The next section provides narratives on contract labor employment in India and more specifics

[6]For example, Cahuc and Postel-Vinay (2002) formulates a matching model of contract work. In this model as well, employers strictly prefer hiring contract workers and actual share of contract employment is fixed by law. Boeri (2011) provides a model of contract employment as entry level work, where employers strictly prefer contract workers due to lower wage cost, but the actual level of contract employment is exogenously given due to government regulations.

on the broad features of the data that motivated our work. Section 3 formulates the model and defines the equilibrium, and explores the efficiency and distributional properties of the equilibrium. Section 4 concludes and discusses the policy implications of our findings.

2 Contract Labor Employment in India

Contract employment in Indian manufacturing is a particularly useful example for a number of reasons. First, the Indian labor market is regulated by national level labor legislations that clearly defined a firm's obligations to regular employees. The Industrial Disputes Act of 1947 governs labor relations in firms employing 100 or more workers. State governments can make amendments to central legislations, and enforcement of employment protection legislation can vary significantly across states (Sapkal 2016, Besley and Burgess 2004). In particular, the Act prohibits forced layoffs without permission from the state. Violations carry a substantial fine and prison sentence. Employees are eligible to severance pay and other benefits.

Second, contract employment is legal in India, although contract workers are not covered by the Industrial Disputes Act. These workers are defined in legal terms as temporary workers who are paid for less than 240 days in any 365 day period, and are protected under the Contract Labor Regulation and Abolition Act of India. The Act prohibits the hiring of contract workers in works that are perennial in nature. The Contract Labor Act grants the state the authority to ban the use of contract labor in any establishment, and makes provisions to protect workers in case of wage payment delays (Rajeev 2010, Deshpande et al. 2004). Enforcement of these regulations is weak, however, and the practice of contract labor has become increasingly widespread. (Bhandari and Heshmati 2008).

Third, firm level data on the regular and contract employment, as well as regular and contract wages are available from the Annual Survey of Industries (ASI) in India. The ASI contains data on both the employment and wage dimensions of firm-level hiring of regular and contract workers in 40 manufacturing industries from 1998-2011. Figure 1a presents Kernel density plots of the share of contract man days in total man days in an industry by state in 1999 and in 2009. 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. Averaging across industries and years, the share of contract man days in total man days rose from 27% in 1998 - 2005 to 38% in 2005-2011 (Table 2).

Figure 1b presents Kernel density plots of the regular and contract wages during the same time periods. Evidently, there is indeed a contract labor wage penalty, and this penalty has persisted

despite the popularity of contract work. Averaging across industries and years, the regular wage has risen from 127 rupees per man day in 1998 - 2005 to 207 rupees per man day in 2005-2011 (Table 2). Contract wages have also risen, from 85 rupees per man day in 1998-2005 to 142 rupees per man day in 2005-2011.

To examine the determinants of the regular wage, we follow Shapiro and Stiglitz (1984) and specify the regular wage as a function of the likelihood that an unemployment individual will find a regular job, denoted η_{skt} at time t, state s, and industry k:

$$w^r_{iskt} = \bar{w}^r_{iskt} + D_{skt}\eta_{skt}. \tag{1}$$

where $\bar{w}^r_{iskt}$ is the minimal reservation wage that regular workers in firm i would demand, to compensate for the effort cost of regular work for example, depending among other things on the turnover likelihood of regular employment. In the standard Shapiro and Stiglitz setting, η_{skt} captures the tightness of the labor market. The higher η_{skt} is, the higher the incentive compatible regular wage will need to be in order to elicit worker effort in the absence of perfect monitoring capabilities on the part of employers, and thus the term D_{skt} is predicted to be strictly positive.

While a direct measure of the labor market tightness η_{skt} is not available, for each firm i, observe from (1) that for each state s, industry k and time t, and average regular wage of all but firm i is monotonically increasing in η_{skt}. Henceforth, we use the observed log average regular wage of all but firm i, henceforth $\ln Ew^r_{-iskt}$, as a proxy for labor market tightness η_{skt} facing firm i. To ascertain responsiveness in elasticity terms, we estimate the following log regular wage equation:

$$\ln(w^r_{iskt}) = d^r_s + d^r_k + d^r_{st} + d^r_{kt} + \rho^r_\eta \ln Ew^r_{-iskt} + \rho^r_x x_{iskt} + \upsilon_{iskt}, \tag{2}$$

where d^r_s and d^r_k are respectively state and 3-digit industry level fixed effects. We also include state and industry time trends d^r_{st} and d^r_{kt} to control for policy shifts such as changes in the minimum wage or enforcement intensity, and other state level amendments to national labor regulations (e.g Besley and Burgess 2004). Also included is a list of firm level determinants including location in rural / urban areas, ownership, and capital-labor ratio. υ^r_{iskt} is a firm-specific error term with zero mean.

In symmetric fashion, we estimate the determinants of the contract wage as follows:[7]

$$\ln(w^c_{iskt}) = d^c_s + d^c_k + d^c_{st} + d^c_{kt} + \rho^c_\eta \ln Ew^r_{-iskt} + \rho^c_x x_{iskt} + \upsilon^c_{iskt}. \tag{3}$$

[7]A natural question at this point is why the average contract wage is not included in addition to the average regular wage to capture labor market tightness. We will have a chance to address this question later in Section 3, where it will be demonstrated that even in a model of worker discipline augmented with contract labor, the equilibrium wage equations for regular and contract labor follows the reduced form in (2) and (3).

Note that efficiency wage theory predicts that ρ_η^r is strictly positive, for the incentive compatible regular wage should rise with labor market tightness. Furthermore, while we have yet to present a theory on the sign and significance of the contract wage elasticity ρ_η^c, it follows from (1) and (2) that if and only if $\rho_\eta^c < \rho_\eta^r$, an increase in labor market tightness will give rise to more polarized wages between contract and regular employment as the contract to regular wage ratio decreases with labor market tightness.

Tables 3 presents two sets of results, respectively the results from a pooled regression, and results from 2 digit industry regression for the five largest industries in employment terms (15 Food products and beverages; 17 Textiles; 24 Chemical and chemical products; 26 Other non-metallic mineral products; 27 Basic metals.). Two observations are immediately evident. First, consistent with Shapiro-Stiglitz predictions, the regular wage responsiveness to labor market tightness is positive and highly significant in all specifications, with estimated ρ_η^r ranging from 0.0392 to 0.0439. This is after accounting for firm, state, industry fixed effects, state and industry time trends, as well as firm level controls[8]

Second, the estimates summarized in Tables 3 show that the contract wage elasticity with respective to labor market tightness is likewise positive and statistically significant in the pooled regression. This is supportive of the substitutes perspective discussed earlier – contract workers do demand higher wages to compensate for regular wage forgone. That said, note that regular wage elasticities with respect to labor market tightness are strictly higher than contract wage elasiticities in all cases in the pooled regressions. These suggest that while contract and regular workers are substitutes, contract and regular wages are *more* polarized when labor market tightens.

Results from industry level regressions suggests a interestingly diverse set of findings at the sector level. For example, in the Food products and beverages sector as well as the textile sector – the former being the largest 2-digit industrial sectors in our data in employment terms – both the regular and contract wage elasiticities with respect to labor market tightness are positive. In both cases, the regular wage elasticity is strictly greater than the contract wage elasiticity. This is once again consistent with the substitutes perspective, but where contract-regular wage polarization nonetheless intensifies with labor market tightness. In the other three sectors, only the regular

[8]Firm level control variables include (i) dummy to indicate firm location in rural or urban areas, (ii) dummy variables for firm size (0 =size< 50 workers, 1 =size between 50 and 100, 2 = 100 and above), (iii) capital labor ratio of the firm, (iv) dummy variables for type of organization (1 = Individual Proprietorship, 2 = Joint Family, 3 = Partnership, 4 = Public Limited Company, 5 = Private Limited Company, and t = Government departmental enterprise, Public Corporation by Special Act of Parliament or State Legislature Of PSU, Cooperatives, Khadi and village industries commission, handlooms, others.

wage respond, and does so positively, with respect to labor market tightness. The contract wage coefficient is not statistically different from zero, however. While these sectors do not conform with either the substitutes or stepping stone perspective, the lack of responsiveness of the contract wage to labor market tightness simply guarantees that wage polarization between contract and regular workers intensifies.

In summary, the Indian example highlights a number of features of the two-tiered labor market in which both regular and contract workers co-exist. First, while regular employment confer added benefits such as lower turnover, a persistent wage gap nonetheless exists between regular and contract workers. This is contrary to the prediction of a Smithian compensating differential, in which workers are willing to take a wage discount in exchange for the extra benefits such as job security.

Second, despite the wage cost savings and contractual flexibility associated with contract employment, there is not a single sector where regular employment has ceased to exist. This provides suggestive evidence that there may be productivity consequences associated with the choice of contractual forms that may not be immediately evident from this survey of the data.

Third, regular wage always rises in response to local labor market tightness, while the contract wage may respond positively or not at all. Nonetheless, in all cases, the contract wage responds at a slower pace relative to the regular wage. Importantly, this suggest that wage polarization between contract and regular workers do not improve when demand for worker effort rises.

Motivated by these salient features, we now proceed to construct a model of a two-tiered labor market of regular and contract workers, in which the underlying mechanics of each of the above observations can be fleshed out.

3 A Two-tiered Labor Market of Regular and Contract Work

We study a labor market equilibrium in which regular and contract workers coexist at the level of the firm. Regular workers receive long term employment contracts that are interrupted only by unanticipated termination. Contract workers receive fixed-term contracts. Regular workers furthermore receive incentive compatible wages generous enough to induce high effort. Contract workers, by contrast, are just high enough to induce participation. Between unemployment and contract employment, contract workers weigh the tradeoffs between receiving the contract wage or no wage at all, and the relative likelihood of regular employment at the end of the contract period.

3.1 Workers and Effort

The model is set in discrete time. At each time period, there is a constant pool of N identical workers and three employment states: regular employment (r), contract employment (c), and unemployment (u). The utility ($U(w,e)$) of a worker depends on wage income w and work effort e that period, $U(w,e) = w - e$.

Regular Employment

A worker in regular employment receives w_r and chooses between a high level of effort $e_r > 0$ required for the job to be completed, or a baseline effort level at $e_o < e_r$. $e_o \geq 0$ denotes the effort cost of showing up at work. Workers who select high effort face an exogenous probability of turnover in the following period $q > 0$, while workers who shirk may be discovered, and face a probability of separation $q + \sigma > q$ in the following period. The separation probability q is taken as given to the worker and the firm.[9]

Denote $V_r(e)$ as the steady state value function of a regular worker depending on his effort level, V_u the value function of an unemployed worker, and $\beta \in (0,1)$ the time discount factor:

$$\begin{aligned} V_r(e_r) &= w_r - e_r + \beta(qV_u + (1-q)V_r(e_r)), \\ V_r(e_o) &= w_r - e_o + \beta(qV_u + (1-q)V_r(e_o)) - \beta\sigma(V_r(e_o) - V_u)). \end{aligned} \tag{4}$$

$V_r(e_r)$ and $V_r(e_o)$ differ in two regards. Shirking naturally generate effort savings ($e_r - e_o > 0$), but it also risks a higher likelihood of job loss if discovered. In value terms, this cost of this risk is $\beta\sigma(V_r(e_o) - V_u)$.

Let n_r be the likelihood that an unemployed worker finds a regular job each period – henceforth the regularization rate of the unemployed. Also let $barw_o \geq 0$ denote the per period income, if any, that workers can earn while unemployment, for example, through self-employment. It follows that:

$$V_u = \bar{w}_o + \beta(n_r \max\{V_r(e_r), V_r(e_o)\} + (1-n_r)V_u). \tag{5}$$

The minimal regular wage that elicits high effort , $w_r(n_r)$ is given by:

$$\begin{aligned} w_r(n_r) &= \min\{w_r | V_r(e_r) \geq V_r(e_o)\} \\ &= e_r + b + \frac{(1-\beta(1-q-n_r))(e_r - e_o)}{\beta\sigma} \\ &\equiv \bar{w_r} + n_r(e_r - e_o)/\sigma. \end{aligned} \tag{6}$$

[9] In the Appendix, we endogenize the separation rate as a function of the cost of firing – a policy parameter to be chosen by labor standard authorities.

Note that $w_r(n_r)$ depends on job and worker characteristics, such as the costs (both effort and opportunity) of undertaking regular employment $e_r + b$, the likelihood of separation and discovery of shirkers, q and σ, as well as the discount rate β in ways completely analogous to Shapiro and Stiglitz (1983), as well as the reduced form equation we employed earlier in (2) in Section 2. For example, as the separation rate q rises, the lure of a regular job is weakened and consequently a higher regular wage will be required to elicit high effort.

(6) also shows that the only way labor market wide considerations enter into the determination of the regular wage is through the regularization rate n_r. In this sense, n_r summarizes the influence of the tightness of the labor market on the efficiency wage.

Contract Workers

A contract worker receives w_c on a fixed-term (here, one period) basis. Fixed-term employment leaves no room for employers to incentive effort through the threat of unemployment, and consequently all contract workers supply baseline effort e_o. Once employed, contract workers may be hired during the next period as regular worker, at probability $n_r(1-\gamma)$, where $\gamma \leq 1$. If $\gamma > 0$, contract employment gives rise to a regularization likelihood deficit due, for example, to time spent at work instead of job searching. Alternatively, if $\gamma < 0$, contract employment facilitates regular employment due, for example, to proximity to and better information about job openings.
The value function of a contract worker is:

$$V_c = w_c - e_o + \beta(n_r(1-\gamma)\max\{V_r(e_r), V_r(e_o)\} + (1 - n_r(1-\gamma))V_u). \tag{7}$$

For contract employment to be at least as desirable as unemployment, the contract wage solves:

$$\begin{aligned} w_c(n_r) &= \min\{w_c | V_c \geq V_u\} \\ &= e_o + b + \gamma n_r(e_r - e_o)/\sigma \\ &\equiv \bar{w_c} + \gamma n_r(e_r - e_o)/\sigma. \end{aligned} \tag{8}$$

Thus, like the regular wage $w_r(n_r)$, the contract wage also respond to job and worker characteristics ($e_o + b$, σ), as well as to tightness in the labor market. Notably however, unlike the efficiency wage $w_r(n_r)$, the contract wage $w_c(n_r)$) rises with n_r if and only if contract employment entails a regularization likelihood deficit $\gamma > 0$. Otherwise, if $\gamma < 0$, a tighter labor market in fact incentivize workers to accept a pay cut in order to buy a higher likelihood of getting a regular job. γ thus parameterizes the sense in which contract and regular employment are substitutes or complements

from the worker's perspective. A positive γ means that contract employment is a substitute, in the sense that it comes at the price of a reduced likelihood of gaining regular employment. A negative γ means that contract employment is a complement, in the sense that it raises the likelihood of regular employment. Our theory does not put restrictions on the sign of γ. Our example of the Indian labor market discussed earlier is an case where γ takes on a positive sign.

3.2 Employers

To address the labor demand consequences of such a two-tiered effort structure, we introduce a task-based model of labor demand to incorporate potentially task-specific productivity consequences of heterogeneous effort. For example, complex tasks may require the full attention of a worker, but routine tasks may be completed simply as a function of a worker showing up.

Accordingly, we assume an increasing and strictly concave aggregate production function $f(y) = y^{\alpha}, \ \ \alpha \in (0,1)$, yielding revenue $p_o f(y)$ at constant world price p_o. y is a composite labor input produced upon the completion of a continuum of tasks $y(i)$ on the unit interval $i \in [0,1]$. y is a constant elasticity of substitution aggregator function of all tasks performed:

$$y = \left(\int_0^1 y(i)^{\frac{\eta-1}{\eta}} di \right)^{\frac{\eta}{\eta-1}}.$$

where η is the elasticity of substitution. The output of each task $y(i)$ depends on a combination of the number of regular ($\ell_r(i)$) and/or contract ($\ell_c(i)$) workers employed for the task. In particular, we normalize units so that:

$$y(i) = \ell_r(i) + \ell_c(i)/a(i)$$

and thus one unit of regular work delivers one unit of task i, while $a(i)$ is the unit contract labor requirement of task i. We assume without loss of generality that $a(i)$ is increasing in i, with $a(0) = 1$. i may be interpreted as the rank order of the complexity / effort intensity of task i in [0,1], such that higher index i tasks are much costlier to accomplish when only contract workers are employed.

Given the monotonicity of the input requirement $a(i)$ in i, let I denote threshold task beyond which it is no longer cost minimizing to employment contract workers. Thus, for $i \in [0, I^*)$, the wage cost per unit $y(i)$ is simply $w_c a(i)$. Otherwise, the wage cost per unit $y(i)$ is w_r.

The decision problem of the employer is two-fold. First, the employer chooses I to minimize the unit cost of the composite labor input y, henceforth denoted as c_y. Next, the employer maximizes profits by choice of aggregate labor input y taking as given the unit cost of production c_y,

and the output price p_o.

Task Assignment

Denote I as the threshold task such that an employer is strictly indifferent between hiring a contract or a regular worker:

$$I = \{i \in [0,1] |\ w_c a(I) = w_r\}. \tag{9}$$

For all tasks $i > I$, it is cost minimizing to employ only regular workers. For all other tasks $i \leq I$, it is cost minimizing to employ only contract workers. The unit cost function c_y of the aggregate labor input solves $c_y = \min_{y(i)} w_r(n_r) \int_I^1 y(i)di + w_c(n_r) \int_I^1 a(i)y(i)di$ subject to the constraint that $\int_0^1 y(i)di = 1$. It follows that

$$c_y(w_r, w_c) = \left(w_r(n_r)^{1-\eta}(1 - I^*) + \int_0^I (w_c(n_r)a(i))^{1-\eta} di \right)^{\frac{1}{1-\eta}}, \tag{10}$$

which is increasing in and homogeneous of degree 1 in $w_r(n_r)$ and w_c, but locally invariant to I since I is the cost minimizing threshold task.

Total Employment

Given $c_y(w_r, w_c)$, profit maximization at the firm level chooses a level of composite labor input $y(c_y, p_o)$, where

$$y(c_y, p_o) = \{y |\ p_o f_y(y) = c_y\} = (\alpha p_o / c_y)^{\frac{1}{1-\alpha}}$$

is a strictly decreasing function of c_y and increasing function of p_o. Furthermore, total regular and contract employment are given by:

$$\ell_r = \int_I^1 y(i)di \equiv \theta_r(I) y(c_y, p_o), \quad \ell_c = \int_0^I y_(i) a(i) di \equiv \theta_c(I) y(c_y, p_o) \tag{11}$$

where $\theta_r(I)$ and $\theta_c(I)$ are respectively strictly decreasing and increasing function of the fraction tasks assigned to regular and contract workers:

$$\begin{aligned} \theta_r(I) &\equiv (1 - I) \left(1 - I + \int_0^I \frac{a(i)^{1-\eta}}{a(I)^{1-\eta}} \right)^{\frac{\eta}{1-\eta}}, \\ \theta_c(I) &\equiv \int_0^I a(i)^{1-\eta} di \left(a(I)^{1-\eta}(1 - I) + \int_0^I a(i)^{1-\eta} di \right)^{\frac{\eta}{1-\eta}}. \end{aligned}$$

Henceforth, we assume that total work force N is sufficiently large so that for every level of output in the range of relevant wages and prices to be characterized in detail in the sequel, there is enough

workers to go around for all to be hired as contract workers:

$$N > \left(\int_0^1 a(i)^{1-\eta} di \right)^{1/(1-\eta)}) y(c_y, p_o). \tag{12}$$

By doing so, we work with situations where regular employment is not a consequence of an aggregate labor supply constraint which forbids a high enough number of contract workers to be hired even if it is profit maximization to do so.

3.3 Equilibrium Conditions

A steady state equilibrium in this economy is a combination of regular and contract wages, an assignment of tasks I, and an allocation of workers $N_i, i = r, c, u$ such that two sets of conditions are satisfied. The first set requires that employers offer incentive compatible contracts, so that regular workers are paid the efficiency wage from (3)

$$w_r = \bar{w}_r + \frac{n_r}{\sigma}(e_r - e_o),$$

and contract workers are paid according to (4)

$$w_c = \bar{w}_c + \gamma n_r (e_r - e_o)/\sigma.$$

The ratio $w_r(n_r)/w_c(n_r)$ gauges the extent of wage polarization between regular and contract workers. Since w_r and w_c are individually functions of the regularization rate n_r, their ratio also depends on n_r:

$$\frac{w_r}{w_c} = \frac{\bar{w}_r + n_r(e_r - e_o)/\sigma}{\bar{w}_c + \gamma n_r (e_r - e_o)/\sigma}. \tag{13}$$

Notably, an increase in labor market tightness may intensify or reduce the extent of wage polarization depending on the rate at which the contract wage keeps pace with the regular wage through the parameter γ. Henceforth, we say that

Definition 1. *A rise in labor market tightness n_r is strictly wage polarizing if and only if w_r/w_c is increasing in n_r. Equivalently, if and only if*

$$\gamma < \frac{w_c}{w_r}. \tag{14}$$

where (14) follows directly from (13). In Figure 2, the PP schedules display a family of such relationships between wage polarization and regular employment likelihood as γ successively increases from P_1P to P_2P_2. Thus, when γ is sufficiently small, a higher regular employment likelihood raises

the efficiency wage for regular work, but the contract wage does not keep pace fast enough. Consequently, growth in regular employment further intensifies wage polarization in the labor market.

The second set of steady state equilibrium condition requires that inflows into regular employment from previously unemployed workers and workers in contract work $(n_r(N-\ell_r-\ell_c)+n_r(1-\gamma)\ell_c)$ equals outflows into unemployment $(q\ell_r)$ in such a way that regular employment is time invariant:

$$n_r = \frac{q\theta_r(I)}{N/y(c_y, p_o) - \theta_r(I) - \gamma\theta_c(I)}. \tag{15}$$

In figure 2, the EE schedule displays the relationship between regular employment likelihood and equilibrium wage polarization, accounting for the profit maximizing choice that the threshold task I reflects the extent of wage polarization in the economy:

$$a(I) = \frac{w_r}{w_c}.$$

As shown EE is downward sloping.[10] Intuitively, as the regular wage ratio increases, employers reassign tasks previously completed by regular workers to contract workers. This decreases the likelihood of getting a regular job.

Starting from levels of wage polarization that are not too severe, with $w_r/w_c \to 1$, we have a benchmark where almost all workers are regular workers. At the limit, the unit cost of the aggregate labor input collapses to $c_y = w_r$, and n_r uniquely solves:

$$n_r^o = \{n_r | \frac{qy(w_r, p_o)}{N - y(w_r, p_o)} = \bar{w}_r + \frac{n_r}{\sigma} e_r\}.$$

At the opposite extreme, suppose instead that wage polarization is severe enough so that w_r/w_c evaluated at $n_r = 0$, $(\bar{w}_o+e_r)/(\bar{w}_o+e_o)$ is greater than the unit labor requirement $a(1)$. In this case, there is no regular employment, and $n_r = 0$. Henceforth, we assume that $(\bar{w}_o+e_r)/(\bar{w}_o+e_o) < a(1)$, and consequently, there is a unique interior equilibrium where firms hire both types of workers.

[10] To see this, note that since I is chosen to minimize cost, $w_r\theta_r(I) + w_c\theta_c(I) = c_y$. It follows that

$$\theta_c'(I) = -\frac{w_r}{w_c}\theta_r'(I).$$

Totally differentiating the above to obtain the slope of n_r with respect to I, it can be readily verified that the sign of $\partial n_r/\partial I$ is given by the sign of the following expression:

$$-\left[N - \gamma(\theta_c(I) + \frac{w_r}{w_c}\theta_r(I))y(c_y, p_o)\right]$$

By cost minimization, $\theta_c(I) + \frac{w_r}{w_c}\theta_r(I) < \theta_c(1) \equiv= \int_0^1 a(i)^{1-\eta}di)^{1/(1-\eta)}$. Since $\gamma < 1$, it follows by assumption in (7) that the sign of $\partial n_r/\partial I$ is negative.

3.4 Employment and Wages in a Steady State Equilibrium

Contract Employment as a Worker Discipline Device

The intersection of the wage polarization PP schedule and the employment equilibrium EE schedule gives the steady state equilibrium of this model.[11] Consider therefore the first question posed at the outset of this paper. Does the introduction of fixed term contract labor at low wages reinforce or disrupt worker discipline previously secured by long term efficiency wages? To do so, we consider the impact that a ban on contract employment have on three metrics: (i) the efficiency wage (ii) the lifetime discounted utility of workers in the three employment states and (iii) the expected profits of employers.

From (15), going from a regime where contract employment is banned to one where no restrictions are placed, the regularization likelihood of unemployed workers to strictly decreases from n_r^o to n_r^*. It follows immediately from (6) that this decrease in the regularization likelihood among the unemployed lowers the efficiency wage. Effectively, the practice of contract employment allows employers to enforce worker discipline among regular workers at a strictly lower efficiency wage as unemployment now poses a greater threat when some regular jobs have been replaced by contract work.

The combined effect of a reduction in the efficiency wage and the regularization likelihood means that the discounted value of regular worker V_r, as well as the discounted value associated with unemployment is now lower from (4). Since the value of contract work is equal to unemployment is in equilibrium from (8), the value of workers who engage in country employment has also declined.

By contrast, the reduction in wage cost is strictly beneficial to employers as profits and output rise as the efficiency wage declines. In summary:

Proposition 1. *A ban on contract employment increases the efficiency wage, raises the steady state discounted expected utility of all workers, and lowers steady state output and profits.*

Proposition 1 reiterates the seminal insight of the efficiency wage literature, namely, that the wage that employers must pay to maintain worker discipline directly and positively related to labor market tightness. Does it therefore follow that an exogenously driven increase in labor demand will unambiguously raise the efficiency wage relative to the contract wage? Starting from a interior equilibrium where both contract and regular employment co-exists:

[11] Given the steady state values of n_r^* and w_r^*/w_c^*, equilibrium regular and contract can be retrieved from (6) and (8) respectively, the equilibrium marginal task assignment I^* follows from (9), and associated allocation of workers is given by (11).

Proposition 2. *An increase in demand for labor through p_o increases the regular wage. It increases the contract wage if and only if $\gamma > 0$. The share of employed workers with regular jobs decreases (increases) if and only if wage polarization w_r/w_c increases (decreases), or if and only if*

$$\gamma < (>) \frac{w_c}{w_r}.$$

Proposition 2 follows directly from (13). Since the elasticity of the regular and the contract wage with respect to labor market tightness differ depending on the magnitude and sign of the regularization likelihood deficit of contract workers γ, whether the wage polarization between regular and contract workers intensifies or not likewise depend on γ. In particular, if γ is sufficiently small, contract wages are slow to catch up to regular wages in response to an increase in labor market tightness n_r. Consequently, employers respond to an increase in labor demand by shifting to contract employment.

Returning to our analysis of the Indian manufacturing labor market in section 2, does a demand induced increase in labor market tightness give rise to an increase in thee share of contract workers? Proposition 2 finds that the answer to this question depends on the relative magnitude of the elasticity of the regular wage with respect to n_r is greater than the corresponding contract wage elasticity. In the India case from Table 3, this is true overall from our pooled regression result, as well as in the five largest sectors of employment considered there.

3.5 First-Best Policies

From Proposition 1, a ban on contract employment benefits workers but harms employers. It is thus unclear *a priori* as to whether the first best policies will favor a reduction of contract employment. Starting from an interior equilibrium, define overall welfare W as the sum of producer profits $p_o f(y(c_y, p_o)) - c_y y(c_y, p_o)$ and per period utility of workers $(w_r - e_r)\theta_r y + (w_c - e_o)\theta_c y + \bar{w}_o(N - (\theta_r + \theta_c)y)$ in all three states of employment, we have the following:

$$W = \bar{w}_o N + p_o f(y) - (\bar{w}_o + e_r)\theta_r(I)y - (\bar{w}_o + e_o)\theta_c(I)y$$

Total welfare is the sum of the baseline self-employment earning of all N workers plus production revenue, net of the cost of employment including both opportunity ($\bar{w}_r$) and effort ($e_i,\ i = r, o$) costs.

The first-best policy is a combination of task assignment I^* and total employment y^* that maximizes aggregate welfare, W. These can be implemented by appropriate choice of subsidies to

regular and contract workers, and tax on tasks allocated to contract workers, for example, as we will demonstrate. To determine I^* and y^*, note that at given y,

$$\frac{\partial W}{\partial I} = \theta_c'(I)\bar{w}_o\left(\frac{\bar{w}_o + e_r}{\bar{w} + e_o} - a(I)\right)\frac{w_c}{w_r}. \tag{16}$$

Thus, evaluated at an interior first best marginal task (I^*), the unit societal cost (opportunity plus effort cost) of task $y(I^*)$ is the same whether contract or regular workers are used since $\bar{w}_o + e_r = (\bar{w}_o + e_o)a(I^*)$. This indifference may be broken, for example, at a corner solution, where the first best policy may prescribe a complete ban on contract employment if and only if

$$\bar{w}_o + e_r < (\bar{w}_o + e_o)a(0).$$

In the absence of policy interventions, note that since the efficiency wage is set high to incentivize effort, the market determined regular to contract wage ratio is strictly greater than the corresponding societal cost ratio of regular relative to contract workers:

$$a(I) = \frac{w_r}{w_c} = \frac{\bar{w}_o + e_r + (1 - \beta(1 - q - n_r))(e_r - e_o)/(\beta\sigma)}{\bar{w}_o + e_o + \gamma n_r)(e_r - e_o)/\sigma} > \frac{\bar{w}_o + e_r}{\bar{w}_o + e_o} = a(I^*).$$

It follows therefore that the first best policy assigns a strictly narrower range of tasks to contract workers. Turning now to total employment, evaluated at the first best task assignment I^*,

$$\frac{\partial W}{\partial y} = p_o f_y(y) - (\bar{w}_o + e_r)\theta_r(I^*) - (\bar{w}_o + e_o)\theta_c(I^*). \tag{17}$$

which requires that the marginal product of the composite labor input be equated to its marginal societal cost. Once again since the regular wage is set high to induce effort, it can be shown that the marginal societal cost of a unit of y is less than the marginal wage cost evaluated at the marginal task chosen by employers I:[12]

$$(\bar{w}_o + e_r)\theta_r(I^*) + (\bar{w}_o + e_o)\theta_c(I^*) < w_r\theta_r(I) + w_c\theta_c(I)$$

we have thus:

[12]To see this, note that

$$\begin{aligned}(\bar{w}_o + e_r)\theta_r(I^*) + (\bar{w}_o + e_o)\theta_c(I^*) &< (\bar{w}_o + e_r)\theta_r(I) + (\bar{w}_o + e_o)\theta_c(I) \\ &= w_r\theta_r(I) + w_c\theta_c(I) - \frac{(1 - \beta(1 - q - n_r))(e_r - e_o)\theta_r(I)}{\beta\sigma} - \frac{\gamma n_r(e_r - e_o)}{\sigma} \\ &< w_r\theta_r(I) + w_c\theta_c(I).\end{aligned}$$

where the second inequality follows by virtue of cost minimization, and the last inequality follows from the definition of n_r in (15), where $n_r(\theta_r(I) + \gamma\theta_c(I)) = n_r N/y(c_y, p_o) - q\theta_r(I)$. Substituting this into the expression following the equality sign above yields the desired inequality.

Proposition 3. *The social welfare maximizing first best policy has two parts, requiring respectively (i) restrictions on contract employment, and (ii) an increase in overall employment y.*

In order to implement the first best policies above, a contract employment tax τ^* leading to an after tax contract labor cost of $w_c(1+\tau^*)$, and an employment subsidy s^* leading to an after subsidy cost of $c_y(w_r, w_c(1+\tau^*))/(1+s^*)$ as shown below will accomplishment the task:

$$1+\tau^* = \frac{w_r}{w_c}\Big/\frac{\bar{w}_o+e_r}{\bar{w}_o+e_o},\ \ 1+s^* = \frac{w_r}{\bar{w}_o+e_r}.$$

Together, these reflect the task assignment and total employment distortions associated with the co-existence of contract employment and an efficiency wage.

3.6 Piecemeal Policy Alternatives

Following a longstanding literature on labor market institutions and associated policy reforms (e.g. Boeri 2011, Kahn 2010, and OECD 2006), we will consider three types of labor market policy alternatives: employment protection legislation, unemployment insurance, and active labor market policies. We will discuss the intuition behind the labor market performance and social welfare implications of each of these four policies in what follows. All proofs are relegated to the Appendix.

Employment Protection Legislation

Employment protection legislation regulates the procedures that govern how worker dismissal can proceed. In many countries, employment legislation spells out any restrictions on the firing of regular workers, and the associated costs in the form of severance payment, and / or legal fees or fines. In the case of India, for example, the Industrial Disputes Act (IDA) of 1947, and subsequently amended by individual states, describes the regulations that are related to layoffs and retrenchments. In establishments that employ at least 100 workers, no workers may be fired without the permission of the government. Furthermore, penalty for violating this regulation include prison term as well as a fine. Contract workers are not covered under the Industrial Dispute Act.

The basic model can be readily extended to account for productivity shocks that necessitate unanticipated layoffs of regular workers. Doing so add one more dimension to employers' decision problem, namely, what is the negative productivity shock that triggers the layoff of a regular worker? The answer here gives an endogenous separation rate, which depends among other things on the cost of dismissal governed by employment protection legislation.

Consider therefore an employment protection legislation that raises the cost of firing. It can be shown that such a policy decreases the separation rate, or q in our terminology. Furthermore, from (15), a reduction in q also lowers the number of regular vacancies every period, all else equal. These effects tend to lower the efficiency wage in (), as well as the wage polarization between contract and regular workers as shown in Proposition 2. Thus, if labor market tightness is wage polarizing, an increase in firing cost may shift the location of the marginal task closer to the first best benchmark.

Going in opposite direction, however, since layoffs are costly in the presence of employment protection legislation, raising the cost of firing directly raises the cost of hiring regular workers. If this increase in cost dominates any efficiency and contract wage reductions as discussed above, an increase in firing cost will shift total production away from the first best benchmark.

Based on these comparative statics responses of I and y to employment protection legislation, it follows the social welfare implications of employment protection legislation is, in general, ambiguous.

Unemployment Insurance

A longstanding debate on the effectiveness of unemployment insurance exists in which the benefits of such insurance (e.g. consumption smoothing and workers' ability to bargain for higher wages) are compared to its potential costs such as higher unemployment rate (Shapiro and Stiglitz 1984, Acemoglu and Shimer 1999). In India, the Mahatma Gandhi Rural Employment Guarantee Scheme is a national policy that aims at providing workers with at least 100 days of employment per year. More generally, any development policy that raise the income of self-employed individuals, e.g. through education, training, or the provision of credit for business start-ups, can have impact akin to unemployment insurance.

In our setting, unemployment insurance can impact both regular and contract employment. Indeed, wage polarization as measured by:

$$\frac{w_r}{w_c} = \frac{\bar{w}_o + e_r + (1 - \beta(1 - q - n_r))(e_r - e_o)/(\beta\sigma)}{\bar{w}_o + e_o + \gamma n_r (e_r - e_o)/\sigma}$$

is in fact strictly decreasing in $\bar{w}_o$. It follows that unemployment insurance disproportionately improve the ability of contract workers to bargain for higher wages. The result is a reduction in wage polarization – a shift of the PP schedule to the left – and accordingly a movement of the marginal task I closer to the first best outcome.

However, unemployment insurance directly raises employers' wage cost. Employers respond by reducing total employment y, thus in a direction away from the first best outcome.

With task assignment distortion and total employment distortion going in opposite direction relative to their respective first best levels, the social welfare implications of unemployment insurance is, once again, ambiguous.

Active Labor Market Policies

Popular in many countries for example in Western Europe, but also increasingly in many developing countries, active labor market policies are programs designed to assist workers in the job search process. Studies to date have focussed on the unemployment impact of such policies, and overall, that the impact of such policies on unemployment has been mixed (OECD 2006). In the developing country context, results from randomized control trials likely yielded mixed findings on the effectiveness of such policies on unemployment (McKenzie 2017).

A key issue that our setting brings to the table, but one which so far as received little attention, is that active labor market policies can impact the divide between employment and unemployment, as well as the divide between regular and contract employment. Furthermore, the beneficiaries of job search assistance can include contract workers as well as they search for regular employment opportunities on the job. Thus, what are the labor market and social welfare consequences of an improvement in the ability of contract workers to find regular employment?

In our model, this is captured by the parameter γ – the regularization deficit of contract work. Consider therefore an active labor market policy that decrease the regularization deficit. In terms of task assignment, a reduction in γ decreases the reservation wage of contract work w_c from (8), since the opportunity cost of contract employment in terms of regular employment opportunities forgone decreases with a lower γ. It follows that wage polarization w_r/w_c is intensified. This increases the share of tasks performed by contract workers, and as such, the task assignment distortion relative to the first best is also increased.

In terms of total employment distortion, however, since γ directly reduces the contract wage cost, the unit cost $c_y(w_r, w_c)$ likewise decreases, all else equal. It follows that the total employment distorion relative to the first best is attenuated in the presence of an active labor market policy that targets the regularization deficit of contract workers γ.

In summary, all three policies yield ambiguous social welfare implications in our setting where contract and regular workers coexists, and where worker discipline drives the two-tier structure of

employment. The overall lesson is that the first best outcome requires not just that more jobs be created through an increase in the labor input y, but more good jobs should be created through a reduction in the share of contract tasks I. This juxtaposition of both an improved quantity as well as quality of employment forms the basis for policy proposals.

4 Conclusion

Does the practice of fixed term contract employment at low wages facilitate the maintenance worker discipline otherwise secured by long term regular employment at efficiency wages? Will employers favor contract employment at low wages, or long term employment at efficiency wages in response to rising demand for worker effort?

In this paper, we examine these questions in the context of a two-tiered labor market where regular and contract workers co-exist. The model highlights the simultaneity of the share of contract workers and the extent of wage polarization in a labor market, in a setting where regular workers are given long term employment at the incentive compatible efficiency wage, while contract workers receive acceptable wages.

We show that while the practice of contract employment may raise efficiency relative to a regime in which such employment is banned by lowering the cost of maintaining worker discipline, the general equilibrium consequence of contract employment implies stark distributional tradeoffs that divorce the interests of employers and workers.

We show that whether workers see contract employment as a substitute for or a stepping stone to regular employment determines how and the extent to which wage polarization responds to labor market tightness. In turn, the employment consequences of labor market tightness is thus linked to these same factors. In the Indian case, we find that overall in our pooled regression results, contract wage responds slower relative to the regular wage in the event of an increase in labor market tightness. The predictions of the model are consistent with decades of wage improvements in the Indian labor market due for example to force of globalization, which coincided with an ever rising share of low wage contract workers instead of longer term regular workers at high wages.

Finally, we conducted a policy analysis in which we seek to determine the nature of the first best policies. We find that such policies correct for two types of distortions in the labor market, including task assignment distortions, and total employment distortions. We argue that these two types of distortions can be used to show that the ambiguous effectiveness of a suite of labor market flexibility policies, including employment protection legislation, unemployment insurance,

and active labor market policies.

Appendix

In this appendix, we outline an extension of the model in which we incorporate endogenous separation rates and firing cost into the model. Formally, we endogenize the separation rate by introducing worker-specific and unanticipated productivity shocks: for each regular worker, a negative productivity shock occurs with probability q_o at the beginning of each time period. Otherwise, no productivity shocks occur.

Conditional on a negative shock, the firm faces two choices. First, the firm may fire the worker and hire a new regular worker, but in so doing it must also incur a fraction τ of the regular wage as firing cost, $w_r(n_r)\tau \geq 0$. τ parameterizes the strictness of employment protection legislation, and gives the penalty that a firm pays whenever a regular worker is dismissed.

Alternatively, the firm may choose to keep the worker and incur a cost to maintain productivity at planned level depending on the size of the productivity shock, σ. We assume that the cost of the productivity shock is proportional to wage cost $w_r(n_r)$. Specifically, the cost parameter $\sigma \in [0, \infty]$ is assumed to be a random variable with cumulative distribution function $\phi(\sigma)$. Since the cost of the productivity shock, $w_r(n_r)\sigma$, is increasing in σ, while the firing cost is given at $w_r(n_r)\tau$, henceforth, let σ^* denote the threshold cost of the productivity shock, to be determined endogenously in what follows, beyond which the firm strictly prefers firing the existing worker and hiring a new worker. Given σ^*, the realized separation rate q of a regular worker is

$$q = q_o(1 - \phi(\sigma^*)).$$

Accounting for the possibility of negative productivity shocks and firing costs, let $\omega_r(n_r, \sigma^*)$ denote the expected cost of hiring a regular worker. At any time period, $\omega_r(n_r, \sigma^*)$ solves the following recursive problem:

$$\begin{aligned} W_r(n_r, \sigma^*) &= (1 - q_o)w_r(n_r) + q_o(1 - \phi(\sigma^*))(W_r(n_r, \sigma^*) + w_r(n_r)\tau)) \\ &\quad + q_o \int_0^{\sigma^*} (w_r(n_r)(1 + \sigma))d\phi(\sigma) \qquad (18) \\ &= \frac{w_r(n_r)(1 + (q_o[(1 - \phi(\sigma^*))\tau + \int_0^{\sigma^*} \sigma d\phi(\sigma)]}{1 - q_o(1 - \phi(\sigma^*))}. \qquad (19) \end{aligned}$$

Thus, the expected cost of hiring a regular worker includes both the wage cost, the cost associated with negative productivity shocks when these shocks are sufficiently low, as well as the first cost when the productivity shocks are large enough.

Taken together the unit cost of task i is simply:

$$W_r(n_r, \sigma^*)\ell_r(i) + w_c\ell_c(i).$$

The decision problem of the firm is accordingly revised to include the choice of σ^*, I^*, and y^* to maximize profits. Starting with σ^*, it follows that the expected regular wage cost minimizing threshold x^* solves the following:

$$\sigma^* = \left(T + q_o(e_r - e_o)/\sigma\right)/(1 - q_o\psi(x^*)). \tag{20}$$

where $\psi(\sigma^*) \equiv 1 - \int_0^{\sigma^*}(\sigma^* - \sigma)/\sigma^* d\phi(\sigma) \in (0, 1)$. Intuitively, T is the firing cost savings when the firm delays firing work by raising $\phi(\sigma^*)$, while $q_o(e_r - e_o)/\sigma$ is the associated savings in efficiency wage as turnover rate declines. Meanwhile, the cost of a delay in firing workers by raising $\phi(\sigma^*)$ is equal to

$$\sigma^*(1 - q_o\phi(\sigma^*)).$$

Note that this is strictly less than x^*, since the minimization problem factors in the fact that raising x^* also lowers the probability of firing subsequent replacement workers if negative productivity shocks once again occur.

Since the right hand side of (20) is monotonically decreasing in σ^*, it is straightforward to confirm that a unique solution to (20) exists, and that the solution σ^* is a monotonically increasing function of the firing cost τ. Quite intuitively, as the government raises the cost of firing, firms adjust downward the turnover rate $q = q_o(1 - \phi(\sigma^*))$. Naturally, W_r is strictly increase in τ, meaning that the cost of hiring a regular worker is strictly increasing in the cost of firing.

Thus, even in the absence of a government imposed firing cost $\tau = 0$, employers do not automatically fire workers whenever a negative shock occurs, for

$$q = q_o(1 - \phi(\sigma^*)).$$

Interestingly, the separation rate is linked to the parameters of the efficiency wage in a intuitive way. Specifically, the increase in the efficiency wage required to elicit effort when q rises is proportional to the ratio e_r/σ. The higher the ratio of unobservable effort to the likelihood of discovery a shirking worker, the more salient efficiency wage considerations are. Consequently, employers minimize cost by showing a willingness to tolerate more negative productivity shocks, and thus a lower separation rate.

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Table 1: Number of countries with legal prohibitions on permanent tasks, and /or maximum duration on fixed term contracts (FTC). Source: Doing Business (2016).

	FTC Prohibited for Permanent Tasks	FTC Not Prohibited
Max. Duration on FTC	28	43
No Limit on Duration of FTC	42	78

Table 2: Summary of Statistics

Year: 1999-2004					
Variables	Obs	Mean	Std. Dev.	Min	Max
Share of Contract Workers (%)	2,319	0.267	0.213	0	1
Average Regular Wage (rupees per man day)	2,310	127.482	83.657	38.754	1820.341
Average Contract Wage (rupees per man day)	2,319	84.610	27.513	14.118	275.000
Contract Labor Intensity	2,310	0.767	3.0154	0	82.6
Wage Polarization (contract wage / regular wage)	2,310	0.729	0.184	0.078	0.999
Year: 2005-2011					
Variables	Obs	Mean	Std. Dev.	Min	Max
Share of Contract Workers (%)	3,208	0.377	0.239	0	1
Average Regular Wage (rupees per man day)	3,142	207.332	185.793	44.046	4829.13
Average Contract Wage (rupees per man day)	3,208	142.132	175.757	0.000	7945.804
Contract Labor Intensity	3,142	1.086	2.860	0.000	63.772
Wage Polarization (contract wage / regular wage)	3,142	0.745	0.187	0.000	0.999

Notes: 1. Contract Labor Intensity measures the ratio of contract to regular man days; 2. Data include all observations where regular wage is greater than contract wage to rule out contract employment in professions with specialized skills.

Table 3: OLS regression of log regular and contract wage on labor market tightness

	Pooled regression			
	Regular Wage		Contract Wage	
Labor market tightness	0.167***	0.133***	0.0685***	0.0555***
	(0.00888)	(0.00798)	(0.00621)	(0.00599)
R^2	0.438	0.535	0.414	0.442
N	99,120	97,579	99,120	97,579
	Industry code 15			
Labor market tightness	0.216***	0.152***	0.0806***	0.0653***
	(0.0173)	(0.0160)	(0.0133)	(0.0134)
R^2	0.491	0.575	0.416	0.447
N	25,087	24,225	25,087	24,225
	Industry code 17			
Labor market tightness	0.0392***	0.0439***	0.0268**	0.0252**
	(0.0131)	(0.0129)	(0.0112)	(0.0113)
R^2	0.388	0.441	0.382	0.410
N	7,474	7,436	7,474	7,436
	Industry code 24			
Labor market tightness	0.0686**	0.0503*	-0.0146	-0.0175
	(0.0349)	(0.0296)	(0.0278)	(0.0290)
R^2	0.304	0.455	0.375	0.410
N	10,802	10,733	10,802	10,733
	Industry code 26			
Labor market tightness	0.0445*	0.0419*	0.0470*	0.0422
	(0.0233)	(0.0248)	(0.0279)	(0.0308)
R^2	0.429	0.575	0.442	0.480
N	7,779	7,635	7,779	7,635
	Industry code 27			
Labor market tightness	0.0897**	0.0640*	0.0172	2.99e-05
	(0.0418)	(0.0367)	(0.0250)	(0.0243)
R^2	0.360	0.499	0.384	0.430
N	7,329	7,304	7,329	7,304
State, Year and 3-digit Industry FE	Yes	Yes	Yes	Yes
State-time Trend, 3-digit industry time trend	No	Yes	No	Yes
Firm Level Control variables	No	Yes	No	Yes

Note: Robust standard errors clustered at the factory level in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Firm level control variables include rural/urban dummy, firm size dummy, capital labor ratio, and dummies for type of organization. Labor market tightness is measured as log of average regular wage in all firms in the year-state-3-digit industry, except the current firm.

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

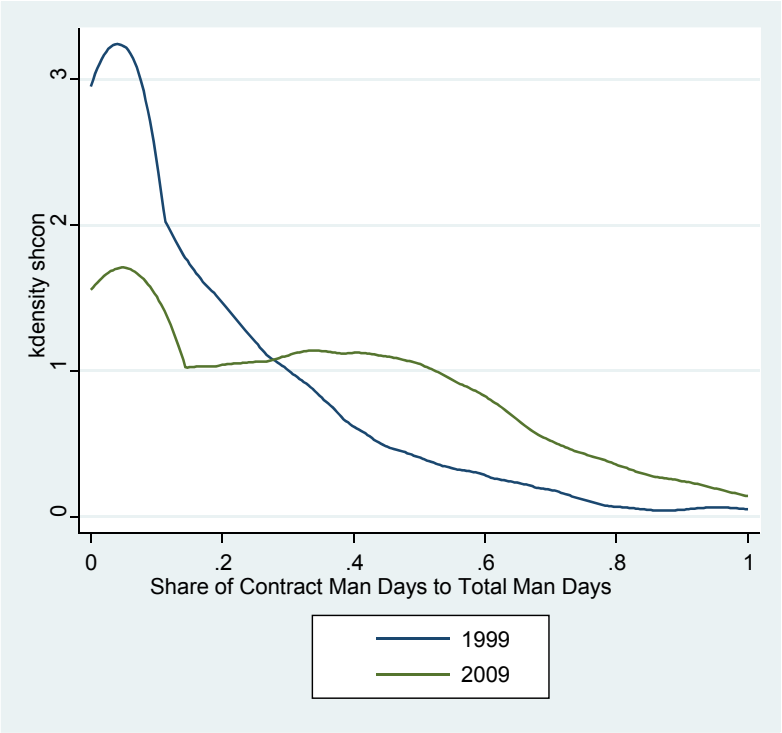

Figure 1b
Kernel Density of Regular and Contract Wages (1999, 2009)

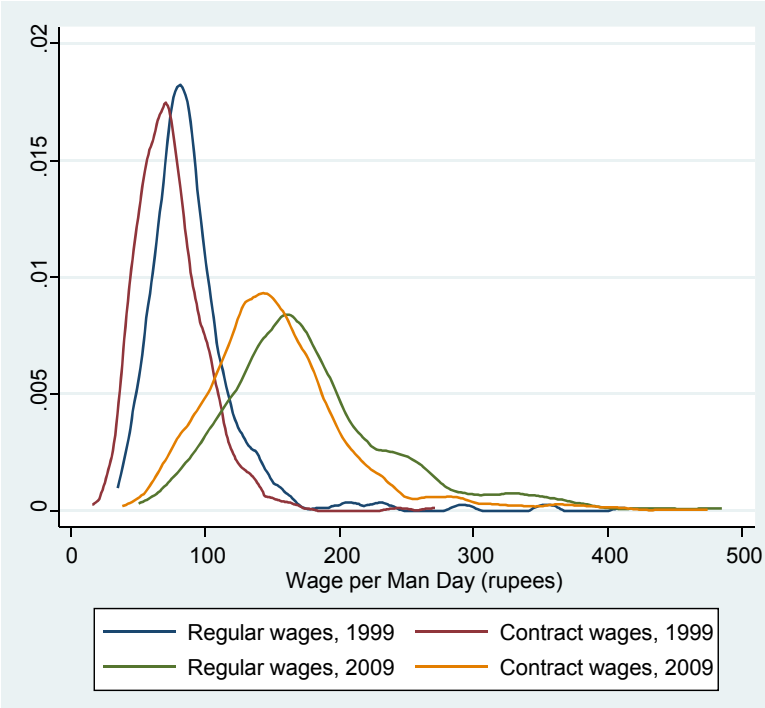

Figure 2
The PP Schedule

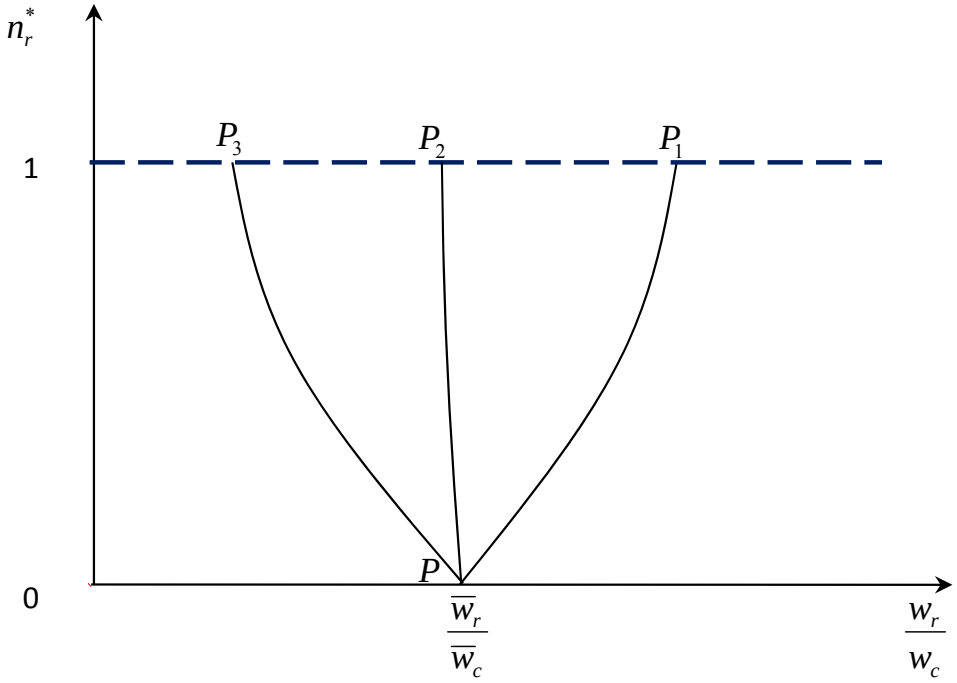

Figure 3
The EE and the Steady State Equilibrium