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Turning a Blind Eye: Costly Enforcement, Credible Commitment and Minimum Wage Laws

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Abstract: In many countries, the authorities turn a blind eye to minimum wage laws that they have themselves passed. But if they are not going to enforce a minimum wage, why have one? Or if a high minimum wage is not going to be enforced one hundred percent, why not have a lower one in the first place? Can economists make sense of such phenomena? This paper argues that we can, if a high official minimum wage acts as a credible signal of commitment to stronger enforcement of minimum wage laws. We demonstrate this as an equilibrium phenomenon in a model of a monopsonistic labor market in which enforcement is costly, and the government cannot pre-commit to enforcement intensity. In this setting we also demonstrate the paradoxical result that a government whose objective function gives greater weight to efficiency relative to distributional concerns may end up with an outcome that is less efficient. We conclude by suggesting that the explanations offered in this paper may apply to a broad range of phenomena where regulations are imperfectly enforced.

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1 Introduction

The comparative statics of a minimum wage are now covered in basic textbooks. The implications for employment and for wages are worked out for the competitive, purely monopsonistic, oligopsonistic and monopolistically competitive cases, and there is vast empirical literature and vigorous policy debate on these implications.[1] The text book theory is worked out for the case of full compliance with the minimum wage law. But it is evident that minimum wage laws are only enforced partially in many countries. An empirical literature establishes this claim (Baanante 2005, Maloney and Nunez 2004, Gindling and Terrell 2004, Ashenfelter and Smith 1979), and there is a theoretical literature which modifies the textbook predictions of the effects of a minimum wage under different specifications of the enforcement regime, typically with a competitive labor market (Yaniv 2001, 1988, Chang and Ehrlich 1985, Grenier 1982, Ashenfelter and Smith 1979). A related empirical literature finds that despite lack of perfect enforcement, so that market wages are often below the legal minimum, nevertheless these market wages are positively related to the official minimum wage (Maloney and Nunez 2004, Saget 2001, Card and Krueger 1995).

But if imperfect enforcement is the norm, a natural theoretical question that follows is how the authorities choose the degree of enforcement, and indeed how they choose the minimum wage and the enforcement intensity together. This involves specifying their objective function and the costs of enforcement, but also modeling carefully the commitment to enforce and the believability of this commitment.[2]

In this paper we develop an incentive compatible equilibrium which determines the minimum wage and degree of enforcement jointly, in the framework of a monopsonistic labor market model. We demonstrate a channel through which a higher official minimum wage can in fact

[1]Bhaskar, Manning and To (2002) examines the usefulness and empirical relevance associated respectively with the competitive, monopsonistic, oligopsonistic and monopolistically competitive frames. In particular, an employers' source of market power may be derived from a host of factors including worker heterogeneity and job differentiation.

[2]A related literature focuses interestingly on the extent to which minimum wage laws are subject to political capture, particularly in the U.S. context (Sobel 1999). However, both theory and empirical work have been silent in terms of the joint determination of enforcement intensity, the minimum wage, and the nature of the government objective function. In addition, whether the ex post lack of enforceability can affect how high the minimum wage is set, relevant particularly in developing countries and informal sector employment, continues to be an open question.

act as a credible commitment to higher enforcement. This enables us to furnish a link between the prevailing, and possibly subminimum, market wage, with the legislated minimum . In particular, depending on the weight that the government's objective function gives to *distributional* concerns relative to efficiency, the expected enforcement intensity, and accordingly the subminimum wage and the associated level of employment are shown to increase with the official wage. Thus even though the official wage is not fully enforced, it has an effect.

Put simply, a government that cares more about distribution will care more about evasion of the minimum wage. It can therefore more credibly commit to enforcing a minimum wage. Since the monopsonistic equilibrium before the intervention had too low a level of market wage and employment relative to the efficient outcome, intervention by a government that is more concerned about distribution moves the equilibrium further towards the efficient outcome. In the extreme, a government that cares only about efficiency will be less efficient than one that cares about distribution as well! On the way to deriving these equilibrium results, we also develop a number of strikingly interesting comparative static results on the joint effects of enforcement intensity and minimum wage.

Thus, contributing to the extant minimum wage literature, this paper brings to the spotlight an endogenous link between the official minimum wage and the equilibrium subminimum wage, by explicitly accounting for the ex post enforcement credibility of the official minimum. In addition, this paper takes the theory of dynamic inconsistency of government policy reforms (Kydland and Prescott 1977) one step further in a labor market setting, and shows that a government that exercises ex post discretion on enforcement can effectively bind her own hands, by appropriately manipulating the announced minimum wage. Interestingly, no amount of increases in the minimum wage can secure credible enforcement expectations, if the government's objective does not exhibit distributional concerns in a rational expectations equilibrium. Our framework thus singles out a source of complementarity between efficiency improvements and distributional concerns, in the sense that a genuine concern for wage distribution can in fact be key in the determination of the credibility of efficiency enhancing policy reforms.

The plan of the paper is as follows. Section 2 sets out the basic model, with the competitive and monopsonistic benchmarks. Section 3 presents the basic comparative statics of a minimum wage with imperfect enforcement. These results are interesting in themselves but are the building block of the equilibrium analysis to follow. Section 4 moves to a discussion of the determinants of the minimum wage and the enforcement intensity, with a government whose objective function consists of both efficiency and distributional considerations. We consider first a government that can commit to an announced enforcement intensity. We then move to our main objective, the analysis of equilibrium when the government cannot commit in advance to an enforcement level, and the market knows this, so an incentive compatibility constraint has to be added to the analysis. The section derives and discusses the results referred to above on the relationship between the official minimum wage, the market wage, and the enforcement intensity. Section 5 considers in turn two extensions of the model – heterogeneous employers, and broader penalty schemes for violation of the law. Section 6 concludes by arguing that the results derived here might apply more generally than for the specific case of minimum wage laws-they may apply to many other cases where the level of regulation and the intensity of enforcement are of joint interest for analysis and policy.

2 The Model

Consider a spatially differentiated labor market,[3] In which a population of workers is distributed uniformly along an interval of unit length, and density $\mathcal{L}$. We examine first the simplest case of a single local employer with monopsonistic control over wages and employment, located at the centre of the interval.[4] The (quadratic) revenue function of the employer is given by $R(\ell) = (a - b\ell/2)\ell$, where ℓ denotes the number of workers employed, and $a > 0$, and $b > 0$ are technological parameters respectively capturing labor productivity, and diminishing marginal product. The implied inverse labor demand schedule is of the form

$$w^d(\ell) \equiv a - b\ell.$$

Distance along the linear labor market can be interpreted straightforwardly as the geographical distance separating workers and employers. Alternatively, distance along the unit interval can parameterize the degree to which a workers' skill matches a firm's need, the length

[3] Spatial models of the labor market have also been used to study the effect of a minimum wage in, for example, Bhaskar and To (1999).

[4] The case of multiple employers with possibly heterogeneous firm-level characteristics will be a subject of discussion in section 5.

of relevant and employer-specific job experience, and / or reservation wage levels.[5] In all cases, employment in a firm at wage w, and located at distance x away from a worker, generates a level of utility equal to $u(x,w) = w - tx$, where $t \geq 0$ gives the cost of mobility / transaction cost of labor market contracting. To ensure strictly positive equilibrium employment, the reservation utility $\bar{u}$ of each worker is sufficiently small.

We focus on circumstances under which unemployment exists,[6] and as such, changes in labor demand directly contribute to the size of the local unemployment pool. For the local monopsonist in Figure 1, for example, labor supply is given by $\ell^s(w) = 2\mathcal{L}\{x|w - tx = \bar{u}\} = 2\mathcal{L}(w - \bar{u})/t$. This implies an inverse labor supply schedule of the familiar form:

$$w^s(\ell) \equiv \bar{u} + \tau\ell, \quad \tau \equiv t/(2\mathcal{L}).$$

The higher the mobility cost, t and hence τ, the steeper is the inverse labor supply schedule, and by standard reasoning, the greater the degree of monopsony power the local monopsony possesses.

Consider two benchmarks, respectively the competitive and the monopsonistic outcomes, both unfettered by regulatory constraints on wage and hiring decisions. The competitive labor market outcome is a wage and employment pair $\{w^*, \ell^*\}$, such that

$$\ell^* = \{\ell | w^d(\ell) = w^s(\ell)\} = \frac{a - \bar{u}}{b + \tau}, \quad w^* = w^d(\ell^*) = w^s(\ell^*) = \frac{\tau a + b\bar{u}}{b + \tau}.$$

Thus, unemployment prevails despite the competitive labor market if and only if $\ell^* < \mathcal{L}$. Henceforth, we assume that it is indeed the case that $\ell^* < \mathcal{L}$.

The monopsonistic labor market outcome is a wage and employment triplet $\{w_o^d, w_o^s, \ell_o\}$, such that

$$\ell_o = argmax_\ell \left(R(\ell) - w^s(\ell)\ell\right) = \frac{a - \bar{u}}{2\tau + b} < \ell^*$$

$$w_o^d = w^d(\ell_o) = \frac{2\tau a + b\bar{u}}{2\tau + b} > w^*, \quad w_o^s = w^s(\ell_o) = \frac{\tau a + (\tau + b)\bar{u}}{2\tau + b} < w^*.$$

[5] For example, casual employment in a construction site and / or a textile factory may command similar wages, but the skills involved are nevertheless job-specific.

[6] As will become evident, this may be due to low labor productivity, high transportation costs, a high reservation wage, or simply a sufficiently small number of employers located far enough apart. As Manning (2005) argues, a number of different factors can lead to the reduced form outcome of an upward sloping supply curve of labor to an employer, once the assumption of costless recruitment and job search is relaxed.

The unemployment pool is made up of workers who are located farthest away from the employer. Economy-wide unemployment is given by $\mathcal{L} - \ell^*$ in the competitive case, and $\mathcal{L} - \ell_o$ the monopsonistic case, with $\mathcal{L} - \ell^* < \mathcal{L} - \ell^o$ (Figure 1).

Note in addition that employment ℓ_o^s and wage levels w_o^s can never improve with a minimum wage $\bar{w}$ higher than w_o^d, even if costlessly and perfectly enforced. Meanwhile, a similarly perfectly enforced minimum wage $\bar{w}$ less than w_o^s is not binding and has no impact on labor market outcomes. Henceforth, we take the interval $[w_o^s, w_o^d]$ to be the range of feasible minimum wage.

3 Minimum Wage with Imperfect Enforcement

A minimum wage policy is made up of two parts: (i) the level of the regulated minimum wage $\bar{w} \in [w_o^s, w_o^d]$ and (ii) the intensity of enforcement based on a likelihood $\lambda \in [0, 1]$ of employer inspection and thus discovery. The timing of the minimum wage policy from announcement to execution is as follows:

- the government announces $\bar{w}$;
- employer and workers form expectations about the probability of discovery $\lambda^e \in [0, 1]$;
- employment decisions are made and the regulated labor market outcomes are determined $\{w_m(\bar{w}, \lambda^e), \ell_m(\bar{w}, \lambda^e)\}$;
- employer inspections are carried out with likelihood λ. If the employer employs worker at less than $\bar{w}$, discovery requires that he pays his worker the shortfall $\bar{w} - w_m(\bar{w}, \lambda^e)$. Otherwise, the employer is unaffected.[7]

We begin with an examination of the employer's decision problem, taking as given his expectation λ^e and the regulated minimum wage. The employer is assumed to be risk neutral. Expected profit is given by:

$$\max_{\ell} \pi(\lambda^e, \ell) = \max_{\ell} R(\ell) - (1 - \lambda^e) w^s(\ell)\ell - \lambda^e \max\{\bar{w}, w^s(\ell)\}\ell \tag{1}$$

[7] In section 5, we examine an alternative penalty scheme.

where the expression $\max\{\bar{w}, w^s(\ell)\}$ reflects the per worker wage cost conditional on inspection. If the employment contract stipulates $w^s(\ell)$ to be less than the legislated minimum, $\bar{w}$, the wage cost per worker will accordingly be $w^s(\ell)$ without inspection and $\bar{w} > w^s(\ell)$ otherwise. Meanwhile, if the employment contract provides wage compensation per worker $w^s(\ell)$ that is already no less than $\bar{w}$, inspection makes no difference to the expected profit of the firm.

Equation (1) also implies that the marginal labor cost facing the employer, $\partial((1-\lambda^e)w^s(\ell)\ell + \lambda\bar{w}\ell)/\partial\ell$, is increasing and piecewise continuous. For $\bar{w} < w^s(\ell)$ or equivalently $\ell > (\bar{w} - \bar{u})/\tau$, the standard marginal labor cost schedule, $(\bar{u} + 2\tau\ell)$, applies. Otherwise, the employer faces the weighted average $(1 - \lambda^e)(\bar{u} + 2\tau\ell) + \lambda^e\bar{w}$. As λ^e tends to 1, as should be the case when enforcement is perfect, the marginal labor cost schedule becomes perfectly elastic, rendering the employer effectively a price taker in the relevant range ($\ell \leq (\bar{w} - \bar{u})/\tau$). In contrast, in the complete absence of enforcement so that $\lambda^e = 0$, the marginal labor cost schedule is independent of the minimum wage. It follows, therefore, that whenever $\lambda^e > 0$, marginal labor cost is truncated exactly at the level of labor supply corresponding to the minimum wage $w^s(\ell) = \bar{w}$.

The solution to the employer's problem is $\{\ell_m(\bar{w}, \lambda^e), w_m(\bar{w}, \lambda^e)\}$, with

$$\ell_m(\bar{w}, \lambda^e) = \ell_o + \min\{\frac{\bar{w} - w_o^s}{\tau}, \frac{\psi(\lambda^e)}{b}\left(w_o^d - \bar{w}\right)\}, \quad w_m(\bar{w}, \lambda^e) = w^s(\ell(\bar{w}, \lambda^e)) \tag{2}$$

where

$$\psi(\lambda^e) \equiv \frac{\lambda^e b}{(1 - \lambda^e)(2\tau + b) + \lambda^e b} \in [0, 1]$$

is continuously differentiable and strictly increasing and convex in λ.

Naturally, equilibrium employment depends on enforcement intensity and the minimum wage. Starting with enforcement intensity, and suppose that the probability of discovery is sufficiently low, with

$$\psi(\lambda^e) \leq \frac{b}{\tau}\frac{\bar{w} - w_o^s}{w_o^d - \bar{w}} \quad \Leftrightarrow \quad \min\{\frac{\psi(\lambda^e)}{b}\left(w_o^d - \bar{w}\right), \frac{\bar{w} - w_o^s}{\tau}\} = \frac{\psi(\lambda^e)}{b}\left(w_o^d - \bar{w}\right), \tag{3}$$

the associated employment and wage levels are

$$\begin{aligned} \ell_m(\lambda^e, \bar{w}) &= \ell_o + \frac{\psi(\lambda^e)}{b}\left(w_o^d - \bar{w}\right) < \frac{\bar{w} - \bar{u}}{\tau}, \\ w_m(\lambda^e, \bar{w}) &= w^s(\ell_m(\lambda^e, \bar{w})) = w_o^s + \frac{\psi(\lambda^e)\tau}{b}\left(w_o^d - \bar{w}\right) < \bar{w}. \end{aligned} \tag{4}$$

Here, enforcement is too lax to compel employers to emulate the minimum wage, and employment contracts are struck at a wage that is strictly less than the legislated minimum, while employment is strictly less than available labor supply at the minimum wage. Indeed, both ℓ_m and w_m can be improved upon by raising the intensity λ^e, or by *decreasing* the minimum wage $\bar{w}$. Put differently, equilibrium *sub-minimum* wages can be symptomatic of (i) a regulated minimum wage that is too high,(ii) insufficient enforcement / perception of enforcement likelihood, or a combination of both. Figure 2b illustrates this case with $\bar{u}$ set at zero.

In contrast, if λ^e is sufficiently high, and the inequality in (3) violated,

$$\ell_m(\bar{w}, \lambda^e) = \ell_o + \frac{\bar{w} - w_o^s}{\tau} = \frac{\bar{w} - \bar{u}}{\tau} = \ell^s(\bar{w}), \quad w_m(\bar{w}, \lambda^e) = w^s(\ell(\bar{w}, \lambda^e)) = \bar{w}.$$

Intuitively, the deterrence effect of the minimum wage policy, backed by a high probability of inspection, is strong enough so that each employer pays exactly the minimum wage. Meanwhile, there is no involuntary unemployment at the minimum wage. Interestingly, further raising the inspection likelihood λ^e will have no further impact on employment or wage level. Figure 2 a illustrates this case, again with $\bar{u}$ set at zero.

We now turn to an examination of the relationship between the minimum wage $\bar{w}$, employment $\ell_m(\lambda^e, \bar{w})$ and the wage paid by the monopsonist, $w_m(\lambda^e, \bar{w})$. By inspection of (2), employment first rises, reaches a maximum at $\ell_m(\bar{w}, \lambda^e) = \ell^s(\bar{w})$, and then falls with the minimum wage $\bar{w}$ at given λ^e. In addition, the same employment level ℓ_o^s is achieved at the start, with $\bar{w} = w_o^s$, and towards the end $\bar{w} = w_o^d$ regardless of λ^e. Figure 3a illustrates the relationship between employment and the minimum wage for successively higher probabilities of employer inspection, from L_0 to L_2. Similarly, Figure 3b illustrates the relationship between the contracted wage and the minimum wage for successively higher probabilities of employer inspection, from W_0 to W_2.

Two notable observations can be made from the foregoing, and both will be relevant to subsequent development of the argument In the following sections. First, and perhaps most apparent, for every given $\lambda^e \in (0, 1]$, there exists a unique minimum wage $\bar{W}(\lambda^e) \in (w_o^s, w^*]$ that maximizes employment and wage levels respectively. This occurs exactly at the turning point with

$$\bar{W}(\lambda^e) \quad = \quad \{\bar{w} | \frac{\psi(\lambda^e)}{b} \left(w_o^d - \bar{w}\right) = \frac{\bar{w} - w_o^s}{\tau}\}$$

$$= \quad \phi(\lambda^e)w_o^d + (1-\phi(\lambda^e))w_o^s \tag{5}$$

where $\phi(\lambda) = [\tau\psi(\lambda)/b]/[1 + (\tau\psi(\lambda)/b)]$ is strictly increasing and concave in λ, with $\phi(0) = 0$ and $\phi(1) = \tau/(\tau + b) < 1$. In other words, the higher the perceived enforcement likelihood, the higher will be the maximum wage and employment levels that the $\bar{W}(\lambda^e)$ and λ^e combination can jointly (and maximally) achieve.

In particular, if enforcement is perceived to be perfect, with $\lambda^e = 1$, the employment maximizing minimum wage is $\bar{W}(1) = \phi(1)w_o^d + (1-\phi(1))w_o^s = w^*$, the competitive benchmark. At the other extreme, as enforcement approaches zero, the best that one can hope to accomplish is a minimum wage $\bar{W}(\lambda^e)$ that approaches w_o^s.[8]

As a dual observation, fix any level of employment $\hat{\ell} \in [\ell_o^s, \ell^*]$, and the corresponding wage level $w^s(\hat{\ell})$ as in Figures 3a and b. The minimum enforcement intensity, $\Lambda(\hat{\ell})$, required to persuade the monopsonist to employ $\hat{\ell}$ at wage $w^s(\hat{\ell})$ can be found by adjusting $\bar{w}$ and λ until $\hat{\ell}$ and $w^s\hat{(\ell)}$ coincides with one of the kink points. Intuitively, the minimum wage must set just high enough so that it coincides with the desired take home wage $\bar{w} = w^s(\hat{\ell})$. Meanwhile, since the minimum occurs at a kink point where $w^s(\hat{\ell}) = \bar{w} = \bar{W}(\lambda)$ from equation (4), we have

Lemma 1 *For any given employment level $\ell \in [\ell_o, \ell^*]$, the unique minimum wage $\bar{w}$ that minimizes the enforcement intensity required to elicit $\ell_m(\bar{w}, \lambda^e) = \ell$ is*

$$\bar{w} = w^s(\ell).$$

The corresponding minimal enforcement intensity is given by

$$\Lambda(\ell) = \{\lambda \in [0,1] | w^s(\ell) = \bar{W}(\lambda)\}\bar{W}^{-1}(w^s(\ell)).$$

Recall from (5) that $\bar{W}(\lambda)$ is increasing in λ, while the labor supply schedule $w^s(\ell)$ slopes upwards. It follows naturally that both the minimal enforcement intensity $\Lambda(\ell)$ and the associated minimum wage $w^s(\ell)$ are increasing in the level of employment desired.

These observations underscore the complementarity between the minimum wage and the perceived likelihood of discovery in generating employment and raising wages. In particular,

[8] Of course, when $\lambda^e = 0$, and enforcement is plainly non-existent, any minimum wage in the range $[w_o^s, w_o^d]$ will generate the same employment level ℓ_o.

a higher minimum wage raises employment only if there is a corresponding increase in the likelihood of inspection. Otherwise, and even in our monopsonistic setting, blindly raising the minimum wage can lower employment *and* the equilibrium take home wage.

Of course, it is precisely this complementarity between the minimum wage and the likelihood of discovery that poses important tradeoffs for the government, as the benefits of high employment and high wages, in labor markets characterized by monopsonistic control, can only be achieved if the perception of a high likelihood of discovery through employer inspection can be credibly instilled in the minds of the employers. In what follows, we illustrate the difficulties associated with this exercise of perception formation, particularly as they relate to the dynamic consistency of the minimum wage policy.

4 A Minimum Wage Policy

Consider therefore a government with an objective function $\Omega_m(\bar{w}, \lambda^e, \lambda)$ which is made up of three parts. The first part is simply the sum of the profit of the local monopsonist, and the utility of all workers along the $[0, 1]$ interval.[9]

$$\left[R(\ell_m) - w_m \ell_m + \bar{u}(\mathcal{L} - \ell_m) + \int_{1/2-\ell_m/2\mathcal{L}}^{1/2+\ell_m/2\mathcal{L}} (w - t|x - \frac{1}{2}|)\mathcal{L}dx \right].$$

This can be simplified as:

$$R(\ell_m) - \left(\bar{u} + \frac{\tau \ell_m}{2} \right) \ell_m + \bar{u}\mathcal{L}.$$

The second part of the government's objective function has to do with a strictly increasing and convex cost of employer inspection $C(\lambda)\ell_m = c\ell_m\lambda/(1-\lambda)$, where $c > 0$ denotes the marginal cost of raising inspection intensity evaluated at $\lambda = 0$. The cost of employer inspection is also increasing in the scale of enforcement activities ℓ_m.[10]

The first two components of the government's objective function thus capture efficiency in the standard manner. The third component indicates the government's distributional concerns.

[9] Whenever there is no risk of confusion, ℓ_m denotes the profit maximization solution $\ell_m(\bar{w}, \lambda^e))$ and w_m the associated wage $w_m(\bar{w}, \lambda^e)$.

[10] We assume that the government finance enforcement activities through lump sum taxation. Any transaction costs incurred in the process are subsumed in the enforcement cost function $C(\lambda)$.

This is captured by introducing a loss function of the form:

$$\begin{aligned}\gamma D_m(\bar{w}, \lambda^e, \lambda) &= \gamma[(\frac{\bar{w}-\bar{w}}{\bar{w}})^\alpha \lambda \ell_m + (\frac{\bar{w}-w^s(\ell_m)}{\bar{w}})^\alpha (1-\lambda)\ell_m + (\frac{\bar{w}-0}{\bar{w}})^\alpha (\mathcal{L}-\ell_m)] \\ &= \gamma[(\frac{\bar{w}-w^s(\ell_m)}{\bar{w}})^\alpha (1-\lambda)\ell_m + (\mathcal{L}-\ell_m)].\end{aligned}$$

where $\bar{w}$ is simply the wage target as laid down by the announced minimum wage policy. The parameter $\gamma > 0$ measures the government's concern for distribution relative to efficiency, overall. Within the distributional realm, the parameter α indicates the degree of concern for wages below the minimum wage. For example, if $\alpha = 1$, $D_m(\cdot)$ gives the number of workers receiving less than the minimum wage target, weighted by the corresponding proportional income shortfall. If the minimum wage is thought of as a poverty line, then the parameter α may be interpreted analogously to the Foster, Greer Thorbecke (1984) measure of "poverty aversion".[11]

Note that the loss function also makes a distinction between the perceived likelihood of discovery λ^e and the actual intensity of enforcement λ. The latter sets a lower bound on the number of workers that ultimately receive the minimum wage thanks directly to enforcement and inspection, while λ^e is critical in the determination of equilibrium employment $\ell_m = \ell_m(\bar{w}, \lambda^e)$ and wage levels $w_m = w_m(\bar{w}, \lambda^e)$.

4.1 Commitment

The ex ante minimum wage policy problem of the government entails the choice of enforcement intensity λ and a minimum wage $\bar{w}$ that maximizes

$$\Omega_m(\bar{w}, \lambda^e, \lambda) = \left[R(\ell_m) - (\bar{u} + \frac{\tau \ell_m}{2})\ell_m + \bar{u}\mathcal{L} - C(\lambda)\ell_m\right] - \gamma D_m(\bar{w}, \lambda^e, \lambda).$$

This leaves the expectation λ^e to be determined. To this end, we suppose to begin with that the government does not exercise discretion ex post, and instead can credibly commit in some way to carrying out any policies already announced. Assume in addition that employers and workers have rational expectations. Thus, $\lambda^e = \lambda$, and we can simplify and denote $\Omega_m(\bar{w}, \lambda^e, \lambda) \equiv \Omega^c_m(\bar{w}, \lambda)$ and $D_m(\bar{w}, \lambda^e, \lambda) \equiv D^c_m(\bar{w}, \lambda)$.

[11] If the poverty line is given exogenously, then several cases arise depending on its value relative to the minimum wage. The analysis is then more complicated but our basic results to be discussed in the sequel – the (lack of) credibility of the minimum wage policy, and the announcement effect of the legislated minimum wage – stand.

To solve the government's maximization problem, we first note from Lemma 1 that $C(\Lambda(\ell))$ is the minimal cost of enforcement required to elicit $\ell_m = \ell$. Meanwhile, the corresponding cost minimizing minimum wage $\bar{w} = w^s(\ell)$ eliminates the class of workers earning subminimum wages. Thus, setting $\bar{w} = w^s(\ell)$ minimizes the policy costs to the government measured in terms of the loss function as well, for any given desired level of employment ℓ_m,

$$\begin{aligned}
\gamma D_m^c(\bar{w}, \lambda) &= \gamma[(\frac{\bar{w} - w^s(\ell_m)}{\bar{w}})^\alpha (1-\lambda)\ell_m + (\mathcal{L} - \ell_m)] \\
&\geq \gamma[(\frac{w^s(\ell_m) - w^s(\ell_m)}{w^s(\ell_m)})^\alpha (1-\lambda)\ell_m + (\mathcal{L} - \ell_m)] \\
&= \gamma(\mathcal{L} - \ell_m). \qquad (6)
\end{aligned}$$

Taken together, given any desired employment level ℓ_m, simply choosing a minimum wage $\bar{w} = w^s(\ell_m)$ along the labor supply schedule fulfills two simultaneous goals: minimizing enforcement cost (Lemma 1) and minimizing the loss function (Equation (6)). The maximizing problem of the government can therefore be conveniently rewritten via a change of variable (replacing $\bar{w}$ by $w^s(\ell_m)$), with

$$\max_{\ell_m \in [\ell_o, \ell^*]} R(\ell_m) - (\bar{u} + \frac{\tau \ell_m}{2})\ell_m + \bar{u}\mathcal{L} - \gamma(\mathcal{L} - \ell_m) - C(\Lambda(\ell_m))\ell_m.$$

The first order condition for an interior optimum requires:

$$w^d(\ell_m^c) - w^s(\ell_m^c) + \gamma = C(\Lambda(\ell_m^c)) + C'(\Lambda(\ell_m^c))\ell_m^c \Lambda'(\ell_m^c).$$

This gives

Proposition 1 *For a government that can credibly commit to policy announcements, the welfare maximizing minimum wage $\bar{w}^c$ strictly exceeds the monopsonistic wage w_o^s), and the associated enforcement intensity λ^c is strictly positive if and only if*

$$w_o^d - w_o^s + \gamma > \frac{c(2\tau + b)}{\tau} \Leftrightarrow a > \left(c\frac{2\tau + b}{\tau} - \gamma\right)\frac{2\tau + b}{\tau} \equiv A_m^c. \qquad (7)$$

In addition, λ^c and $\bar{w}^c$ are both strictly increasing in the productivity parameter a, the equity concern parameter γ, the cost of mobility τ and decreasing in the marginal cost of enforcement c.

Thus, announcing a minimum wage (higher than the ruling monopsonistic wage) with policy commitment is optimal if and only if the degree of monopsonistic labor market distortion $w_o^d - w_o^s$ is sufficiently acute. Since $w_o^d - w_o^s = (a - \bar{u})\tau/(2\tau + t)$ rises with the productivity parameter a, other things equal, a minimum wage policy will be much less likely to be optimal in labor markets where labor productivity is low. Intuitively, the efficiency gains generated through the minimum wage legislation is too small to justify the cost of doing so. A_m^c denotes the critical threshold productivity, such that minimum wage policy is feasible if and only if $a > A_m^c$.

Equilibrium wage and employment outcomes associated with the optimal minimum wage policy depend additionally on the (i) mobility costs (τ), and (ii) the strength of distributional relative to efficiency concerns (γ). Interestingly, inequality amongst the employed is a non-issue when the government exercises commitment since no worker earns a wage lower than the minimum $\bar{w}$. As such, the parameter α – which charts policy performance by distinguishing between the prevalence of open unemployment, and those earning subminimum wages – does not play a role in determination of the optimal minimum wage.

4.2 Discretion

So far, the expectation λ^e simply takes the minimum wage policy announcement for granted. Of particular interest at this point is thus whether there may be justifiable reasons why employers and workers should perceive the credibility of the government's policy announcement to be in doubt. To see that the answer is indeed in the affirmative, note that once the expectation λ^e is formed, and employment contracts signed, the government's ex post objective function is given by:

$$\begin{aligned}\Omega(\bar{w}, \lambda^e, \lambda) &= R(\ell_m(\bar{w}, \lambda^e)) - (\bar{u} + \frac{\tau \ell_m(\bar{w}, \lambda^e)}{2})\ell_m(\bar{w}, \lambda^e) - C(\lambda)\ell_m(\bar{w}, \lambda^e) \\ &\quad -\gamma D(\bar{w}, \lambda^e, \lambda) + \bar{u}\mathcal{L}.\end{aligned}$$

Thus, taking as given the announcement of the minimum wage policy $\bar{w}^c = w^s(\ell_m(\bar{w}^c, \lambda^c))$, the associated employment level $\ell_m(\bar{w}^c, \lambda^e)$ and expectations such that $\lambda^e = \lambda^c$,

$$\begin{aligned}\frac{\partial \Omega(\bar{w}, \lambda^e, \lambda)}{\partial \lambda}|_{\bar{w}=\bar{w}^c,\ \lambda^e=\lambda^c} &= -\frac{c}{(1-\lambda)^2}\ell_m(\bar{w}^c, \lambda^c) + \gamma\left(\frac{\bar{w}^c - w^s(\ell_m(\bar{w}^c, \lambda^c))}{\bar{w}^c}\right)^\alpha \ell_m(\bar{w}^c, \lambda^c) \\ &= -\frac{c}{(1-\lambda)^2}\ell_m(\bar{w}^c, \lambda^c) < 0\end{aligned}$$

where the second equality follows from lemma 1. Put simply, since the legislated minimum wage $\bar{w}^c$ coincides with the prevailing market wage $w^s(\ell_m(\bar{w}^c, \lambda^c))$, any expense on enforcement will be fruitless, and the government has every incentive to completely refrain from employer inspection. Inducing backwards, the expectation $\lambda^e = \lambda^c > 0$ is in error. Henceforth, we study the nature of the optimal wage policy when the government exercises discretion in the execution of labor enforcement, and when the public is endowed with rational expectations.

Given a legislated minimum wage $\bar{w}$, a rational expectation inspection probability $\lambda^D(\bar{w})$ is a fixed point to the following equation:

$$\lambda^D(\bar{w}) = argmax_{\lambda \in [0,1]} \Omega(\bar{w}, \lambda^e, \lambda)|_{\lambda^e \lambda^D(\bar{w})}.$$

This requires that the enforcement intensity is ex post optimal. A second equality $\lambda^e = \lambda^D(\bar{w})$ requires that expectations are rational and coincide with the ex post optimal intensity of enforcement. Equivalently, any $\lambda^D(\bar{w}) > 0$ implicitly solves the following

$$\begin{aligned} C'(\lambda^D) &= \gamma \left(\frac{\bar{w} - w(\bar{w}, \lambda^D)}{\bar{w}} \right)^{\alpha} \\ \Leftrightarrow \quad w(\bar{w}, \lambda^D) &= \bar{w} \left(1 - \left(\frac{c}{\gamma (1 - \lambda^D)^2} \right)^{\frac{1}{\alpha}} \right) < \bar{w} \end{aligned} \tag{8}$$

Note that with a sufficiently high cost of enforcement, $c > \gamma$, the right hand side of equation (8) is always negative. Accordingly, there does not exist a $\lambda^D > 0$ that solves the equality required for ex post optimality above. In addition, if $w_o^s > w_o^d(1 - (c/\gamma)^{1/\alpha})$ or $c > \gamma(1/2)^{\alpha} (< \gamma)$, there does not exist a minimum wage $\bar{w} \in [w_o^s, w_o^d]$ large enough that can guarantee ex post optimality and strictly positive enforcement $\lambda^D > 0$. Finally, at an interior optimum, if it exists, the prevailing equilibrium take home wage $w(\bar{w}, \lambda^D)$ must be less than the legislated minimum wage – the threat of enforcement cannot be credible if there is nothing to enforce, or equivalently, when all employed workers are already paid the minimum wage. In the context of equation (8), this implies that for λ^D to be positive, the minimum wage must be artificially set high enough that at least some workers are paid a subminimum wage. Thus,

Proposition 2 *With ex post policy discretion,*

1. *the expected intensity of employer inspection is positive if* $c < \gamma(1/2)^{\alpha}$*,*

2. *a strictly positive expected intensity of employer inspection* $\lambda^D(\bar{w}) > 0$ *is increasing in the legislated minimum wage,* $\bar{w}$*,*

3. *the prevailing market wage* $w_m(\bar{w}, \lambda^D(\bar{w}))$ *is only a fraction the size of the legislated minimum wage* $\bar{w}$*, and in addition, is strictly increasing in the minimum wage* $\bar{w}$ *if either the poverty aversion parameter* α *is sufficiently large, or if* $\bar{w}$ *is sufficiently close to* w_o^s*.*

In other words, for governments that possess some degree of distributional concern, the legislated minimum wage $\bar{w}$ now serves two distinct purposes. First, $\bar{w}$ gives the wage earnings of workers directly protected through employer inspection. With a strictly positive gap between the legislated minimum wage and the prevailing market wage, however, a further increase in the minimum wage can only lower employment, as well as the prevailing market wage (Equation (4)). Second, and running contrary to the first in terms of wage and employment effects, an artificially high minimum wage binds the government's hands, and instills credibility in the minds of employers and workers that the probability of inspection will be nonzero. This is particularly true when the government exhibits accountability towards the relatively poor $\alpha > 0$, or when the minimum wage is not too high to begin with. Accordingly, if the latter of these two opposing effects dominate, raising the minimum wage can increase the prevailing subminimum market wage by a fraction of the announced increase in the regulated minimum, and ultimately, increase employment as well.

Of course, intentionally driving a wedge between the announced minimum wage and the prevailing wage creates its own distortion. In terms of efficiency, we know from lemma 1 that employment is not maximized unless the size of the wedge $\bar{w} - w_m$ is closed for any given λ. In terms of inequality, we know from the definition of the loss function that by creating a group of workers earning a subminimum wage,

$$\gamma D(\bar{w}, \lambda^D(\bar{w}), \lambda^D(\bar{w})) = \gamma \left((\mathcal{L} - \ell_m) + \left(\frac{\bar{w} - w_m}{\bar{w}} \right)^{\alpha} (1 - \lambda^D(\bar{w}))\ell_m \right) > \gamma \left((\mathcal{L} - \ell_m) \right).$$

It follows that discretion can be costly to the government, and may be expected to challenge the feasibility of a minimum wage policy. Indeed, taking as given the expectation formed through

$\lambda^D(\bar{w})$, the government's problem involves maximizing $\Omega(\bar{w}, \lambda^D(\bar{w}), \lambda^D(\bar{w}))$ by choice of an appropriate minimum wage $\bar{w}^D$. We have

Proposition 3 *For a government that exercises ex post discretion to announced policy reforms, the government welfare maximizing minimum wage $\bar{w}^D$ strictly exceeds the monopsonistic wage (w_o^s), and the associated enforcement intensity λ^D is strictly positive if and only if*

$$\begin{aligned} w_o^d - w_o^s + \gamma &> c + \frac{2c(2\tau + b)}{\tau}\frac{1-\delta}{1-2\delta} \\ \Leftrightarrow a &> \left(c + \frac{2c(2\tau + b)}{\tau}\frac{1-\delta}{1-2\delta} - \gamma\right)\frac{2\tau + b}{\tau} \equiv A_m^D > A_m^c, \end{aligned} \tag{9}$$

where $\delta = (c/\gamma)^{1/\alpha}$. If (9) is satisfied, λ^D and $\bar{w}^D$ are both strictly increasing in the productivity parameter a, the distributional concern parameter γ, the poverty aversion parameter α and the cost of transportation τ, and decreasing in the marginal cost of enforcement c.

Our analysis puts (i) the announcement effect and (ii) the endogeneity of minimum wage policies in the spotlight. In particular, it unveils how expectations are revised subsequent to the announcement of a minimum wage, depending on whether and how exactly governments tradeoff distributional concerns against efficiency. In addition, even in a simplest possible basic setup, the incentives that govern the launch and enforcement of minimum wage legislations are shown to include *observables* such as labor demand and supply factors (such as a, b and τ), and the costs associated with enforcement (c).

Several aspects of the comparative statics presented in Proposition 3 are interesting. Consider for example the productivity parameter a. Comparing (7) and (9), it should be apparent that the legislation of a binding minimum wage becomes all the more difficult when the credibility of the government's policy announcement is in doubt. While propositions (1) and (3) both require that a must exceed a critical threshold for a binding minimum wage policy to raise the welfare of the benevolent government, the threshold is higher for governments that exercise discretion $A_m^D > A_m^c$. For all local labor markets with productivity lower than the specified thresholds, the corresponding optimal policy of the government is one of non-intervention.

Consider now the crucial role played by the distributional parameters in the objective function. To see this, consider a government that is concerned purely with efficiency, with $\gamma = 0$. We have thus $c > \gamma(1/2)^\alpha = 0$ if and only if the cost of enforcement is strictly positive.

From Proposition 2, the employer and workers alike rationally expect the complete absence of ex post employer inspections ($\lambda^D = 0$). As such, minimum wage announcements have no impact on equilibrium employment and wages. In turn, if the government exercises discretion, a time consistent and credible minimum wage policy that raises wage level beyond the monopsonistic outcome does not exist.

In contrast, suppose instead that $\gamma > 0$, but $\alpha = 0$. In other words, the a *"poverty head count"* is used in the loss function. From equation (7), the ex post optimal enforcement intensity is given simply by equating

$$C'(\lambda^D) = \gamma \Leftrightarrow \lambda^D = 1 - \left(\frac{c}{\gamma}\right)^{1/2}.$$

Thus, λ^D is independent of the legislated minimum wage. Here again, announcing a higher minimum wage $\bar{w}$ should have no impact on the expected enforcement intensity λ^D. As such, depending on whether the status quo is to the left or the right hand side of the kink points in Figures 3a and 3b, raising the minimum wage can either increase or decrease employment and wage levels. It is now a simple matter to see that the minimum wage $\bar{W}(\lambda^D)$ (equation 5) defined exactly at the kink point serves two distinct roles. From lemma 1,$\bar{W}(\lambda^D)$ maximizes both the employment level and take home wage beyond their monopsonistic levels whenever $\gamma > c$, and given the rational expectation λ^D. In addition, setting the minimum wage at $\bar{W}(\lambda^D)$ also minimizes the loss function, since (i) the associated population earning a subminimum wage is nil, and (ii) it maximizes employment ℓ_m given λ^D.

Interestingly, these observations imply that a government that is only concerned with efficiency ($\gamma = 0$), and hence $\lambda^D = 0$, is guaranteed the *least* efficient (monopsonistic) labor market outcome. Meanwhile, a government that is simultaneously concerned with efficiency and inequality ($\gamma > 0$), is far more likely to attain a more *efficient* labor market outcome, as enforcement intensity and γ goes hand in hand. This is indeed striking-government's espousing only efficiency will be less efficient than those who give efficiency less weight relative to distribution!

5 Two Extensions

Heterogeneous employers and clustering around the minimum wage

We have so far assumed an economy with a single monopsonistic employer. As such, all employed workers earn the same (legislated minimum, or subminimum) wage. More realistically, suppose instead that the economy is made up of $i = 1, ..., N$ number of local monopsonistic employers, each with some degree of wage setting power. These employers may be different in any number of regards. Henceforth, let us assume that they have differential access to production technologies, so that the productivity of labor a_i is increasing in i. In the context of our spatial model of the labor market, these four employers can be thought of as located at four different locations along the linear city, each with local market power.[12]

Figure 4 illustrates the profit maximizing decisions of four heterogeneous employers with successively higher labor productivity from a_1 to a_4, when the enforcement of the minimum wage is imperfect $\lambda \in (0, 1)$. The equilibrium behavior of these employers can be classified under three categories. Those with sufficiently high labor productivity finds the minimum wage to be not binding (a_4). All else equal, these firms pay the highest wage, and employ the largest number of workers. Meanwhile, those with sufficiently low labor productivity pay less than the minimum wage despite the positive likelihood of getting caught (a_1). These are the smallest firms, and paying the lowest wages. Finally, employers with intermediate levels of labor productivity cluster (a_2 and a_3). These firms pay exactly the same minimum wage, and employ the same number of workers given identical labor supply conditions. Such clustering around the minimum wage has been documented in the empirical literature (Card and Krueger 1995, Neumark and Wascher 2000, Maloney and Nunez 2004). Meanwhile, the positive association between establishment size, profitability and wage offers is likewise demonstrated in Idson and Oi (1999) and Blanchflower, Oswald and Sanfey (1996).

Consider now an increase in the minimum wage, at constant λ^e, large enough to do two things: (i) for the most productive firm, say a_4, the new minimum wage is now binding, and (ii) for some of the firms originally clustering at the old minimum wage, say a_2, the minimum wage is now too high. It should now be apparent that the effect of minimum wage on aggregate

[12]While there are multiple employers, each employer can nevertheless continue to effectively enjoy monopsonistic power in their respective local labor markets, due to (i) sufficiently low labor productivity, (ii) sufficiently high reservation wage and / or (iii) significant transportation costs. The case we illustrate directly delivers our message in a world where neighboring labor markets do not interact, and the pool of unemployed workers are those who are literally *in between* jobs. The alternative scenario where at least some neighboring labor markets do interact, while unemployment continues to prevail as workers have differential reservation wages as in Bhaskar and To (1999), can likewise be worked out to show a qualitatively similar set of results.

employment and average wage income is, in general, ambiguous for two reasons. First, as high productivity firms are subject to the minimum wage, their employment and wage offer increase (Figures 3a and 3b). Meanwhile, as lower productivity firms face higher wage cost (if discovered upon inspection), their employment and wage offers decline. In our example, employers 3 and 4 belong to the first category, while employers 1 and 2 the second.

We leave it to the interested reader to work out the government's decision-making problem. We note simply that the main thrust of our discussions on policy commitment and discretion remains. Namely, that the accountability / inequality aversion parameters will continue to dictate whether enforcement of any minimum wage laws will be deemed credible. But additionally, explicitly acknowledging heterogeneity yields an additional finding. To begin with, the burden (both in terms of employment and wage losses) of any announcement effect that justifies an artificially high minimum wage will disproportionately fall on the poorest workers, while higher wage workers are either indifferent, or made better off.

A Penalty Scheme

Given the difficulties associated with establishing enforcement credibility, a natural question is whether economic incentives that encourage compliance can be designed into the minimum wage policy. To this end, consider the imposition of fines on a firm found paying less than the minimum wage. A possible argument goes that since a penalty makes noncompliance more costly, the combination of enforcement and penalty, rather than enforcement alone, is likely a superior alternative from the government's standpoint.

A complete treatment of the design of an optimal penalty scheme is beyond the scope of this paper.[13] In this extension, we show simply that on closer examination, the validity of the intuition concerning penalty and the labor market outcome of a minimum wage law is not at all clear cut.

Specifically, suppose that an noncompliant monopsonistic employer, discovered upon inspection, is required to incur two types of expenditures: (i) the shortfall in wages $\bar{w} - w_m(\bar{w}, \lambda^e)$ that the employer owes his workers, and (ii) a additional penalty of f per employee. With this single modification, it is straightforward to verify that equilibrium employment and wage income

[13]Ideally, one seeks an optimal menu of fines, which provides just enough incentives for firms of any productivity type to comply. As should be clear from Proposition 3, employers have little incentive to truthfully report their labor productivity, as doing so would provide the government with the justification for a high minimum wage.

for a noncompliant employer is

$$\ell_m(\bar{w},\lambda^e,f) = \ell_o + \frac{\psi(\lambda^e)}{b}\left(w_o^d - \bar{w} - f\right) < \ell^s(\bar{w}), \quad (10)$$

$$w_m(\bar{w},\lambda^e,f) = w_o^s + \frac{\tau\psi(\lambda^e)}{b}\left(w_o^d - \bar{w} - f\right) < \bar{w}, \quad (11)$$

whereas a compliant employer pays $\bar{w}$ (w_o^s) and hires $\ell^s(\bar{w})$ (ℓ_o^s) number of workers whenever $\bar{w} \geq (<) w_o^s$. To recall, $\psi(\lambda^e) \in [0,1]$ is continuously increasing with respect to λ^e. Finally, noncompliance generates higher expected profits if and only if the difference in profits $\Delta\pi(\bar{w},\lambda^e,f)$

$$\Delta\pi(\bar{w},\lambda^e,f) \equiv R(\ell_m) - (1-\lambda^e)w^s(\ell_m)\ell - \lambda^e(\bar{w}+f)\ell_m - [R(\ell^s(\bar{w})) - \bar{w}\ell^s(\bar{w})] < 0. \quad (12)$$

A number of remarks are in order. Since $\ell_m < \ell^s(\bar{w})$, and $R(\ell) = (a - b\ell/2)\ell$ is monotonically increasing in labor productivity a, it follows straightforwardly from equation (12) and the envelope theorem that noncompliance is more likely amongst low productivity employers. In addition, raising the penalty associated with noncompliance lowers the difference in profits $\Delta\pi(\bar{w},\lambda^e,f)$. Thus, raising f has the expected effect of encouraging employers with low labor productivity to comply. Once compliance is achieved, employers are no longer affected by the possibility of a penalty. As such, they behave as though the minimum wage policy is perfectly enforced, by raising their workers' pay to the minimum wage, and hiring a *higher* number of workers along the labor supply curve.

The second effect runs in the opposite direction. In particular, as long as at least some firms remain noncompliant, the threat of a penalty raises the marginal labor cost of hiring, while employment and wage offers by these employers accordingly decline (equations 10 and 11). In the end, the distribution of labor productivity amongst these heterogeneous employers will determine whether the first or the second effect dominates, and accordingly, whether this simple penalty scheme can in fact improve aggregate wage and employment outcomes.

Finally, we note that a penalty can never be a perfect substitute for credible enforcement. At one extreme, equation (12) shows that for a government concerned purely with efficiency, so that $\gamma = 0$ and hence $\lambda^D = 0$, no amount of penalty can impact employers decision to comply as $\psi(\lambda^D) = \psi(0) = 0$ in a rational expectations equilibrium. Meanwhile, the higher the expectation of inspection intensity λ^D and hence $\psi(\lambda^D)$ (due either to a large γ, or a low c, for example), a relatively small fine, aimed at mitigating the negative employment and wage impacts of the penalty scheme, can nevertheless yield a sizeable shift in employer compliance. We leave the full derivation of endogenous penalties for further work.

6 Conclusion

This paper has presented a theory of the simultaneous endogenous determination of the minimum wage and the intensity of its enforcement, in a monopsonistic labor market. It has highlighted the central role of credibility, and demonstrated an equilibrium outcome where governments turn a (partial) blind eye to violations of the very regulation that they have passed, in the sense that market contracts set wages below the legislated minimum wage, in rational anticipation of an enforcement that is less than one hundred percent.

The comparative static properties of this equilibrium are consistent with many empirical observations. For example, even though the market wage is less than the official wage, the two nevertheless move together. But the model also provides other testable predictions that define an interesting empirical agenda-observables like productivity, inter-firm mobility costs and the cost of enforcement are all shown to affect the endogenously determined minimum wage and enforcement intensity in systematic fashion.

As interesting as the positive implications of the analysis are its normative implications. In particular, distributional concerns are shown to interact in very interesting ways with the problem of credible commitment on enforcement intensity. Simply put, a government that cares more about distribution will care more about violations of the minimum wage and can therefore signal commitment to enforcement by having a higher official minimum wage. This will in turn induce a higher wage contracted in the market. In this monopolistic world, such a movement is also a movement in the direction of greater efficiency. By the same token, a government that does not care at all about distribution cannot improve efficiency. A concern for distribution is thus good for efficiency in this second best world.

Many extensions of this work come to mind, and two such extensions were discussed in the previous section. An obvious line of research is to consider the issue of enforcement and credibility in competitive labor markets. It has been argued by Manning (2005) that because of various frictions, labor markets are "pervasively monopsonistic" (see also Card and Krueger, 1995). But the alternative interpretation of the evidence, that labor markets are better described by the competitive model, also has strong support. The simple theory of non-compliance with a given minimum wage in a competitive labor market has been worked on extensively in the literature (see for example (Yaniv 2001, Chang and Ehrlich 1985, Ashenfelter and Smith 1979), but the theory of endogenous determination of the minimum wage and enforcement intensity still needs to be developed fully. Analysis in this case also have to take into account the fact that since the market equilibrium is efficient, the rationale for intervention has to primarily distributional (Freeman 1996, Fields and Kanbur 2005).

More generally, the framework we have developed here can, in the broadest sense, be applied to a wide range of situations where regulations need to be enforced, and both the level of regulation and it's the intensity of its enforcement are choice variables of the government. Examples that come to mind are regulations involving price floors or ceilings in product and input markets, minimum consumer standards in product markets and , returning to labor markets, minimum labor standards. The exploration of these areas awaits further research.

Appendix

Proof of Proposition 1: Let $\{\bar{w}^c, \lambda^c\}$ be the optimum minimum wage policy with commitment. Suppose contrary to proposition 1 that $\bar{w}^c \neq \bar{w}(\lambda^c)$. There are two possibilities (i) $\bar{w}^c > \bar{w}(\lambda^c)$, and (ii) $\bar{w}^c < \bar{w}(\lambda^c)$. For (i), we know from equation (2) that there exists an alternative minimum wage policy $\{\bar{w}', \lambda^c\}$, with $\bar{w}' < \bar{w}(\lambda^c)$ that yields exactly the same employment levels as the pair $\{\bar{w}^c, \lambda^c\}$. But since $\bar{w}' < \bar{w}(\lambda^c)$, $w_m(\bar{w}', \lambda^c) = \bar{w}'$ and $w_m(\bar{w}^c, \lambda^c) < \bar{w}^c$ again from equation (2). By definition of $\Omega^c(\cdot)$, $\Omega(\bar{w}', \lambda^c) > \Omega(\bar{w}^c, \lambda^c)$, a contradiction.

For (ii), since $\bar{w}^c < \bar{w}(\lambda^c)$, we know from equation (2) once again that there exists an alternative minimum wage policy $\{\bar{w}^c, \lambda'\}$, with $\lambda' < \lambda^c$ that also yields exactly the same employment and wage levels as the pair $\{\bar{w}^c, \lambda^c\}$. Thus, $\Omega(\bar{w}^c, \lambda') > \Omega(\bar{w}^c, \lambda^c)$, a contradiction.

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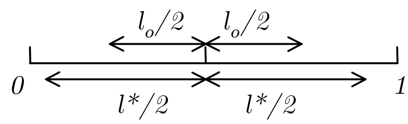

Figure 1
The Monopsonistic Labor Market

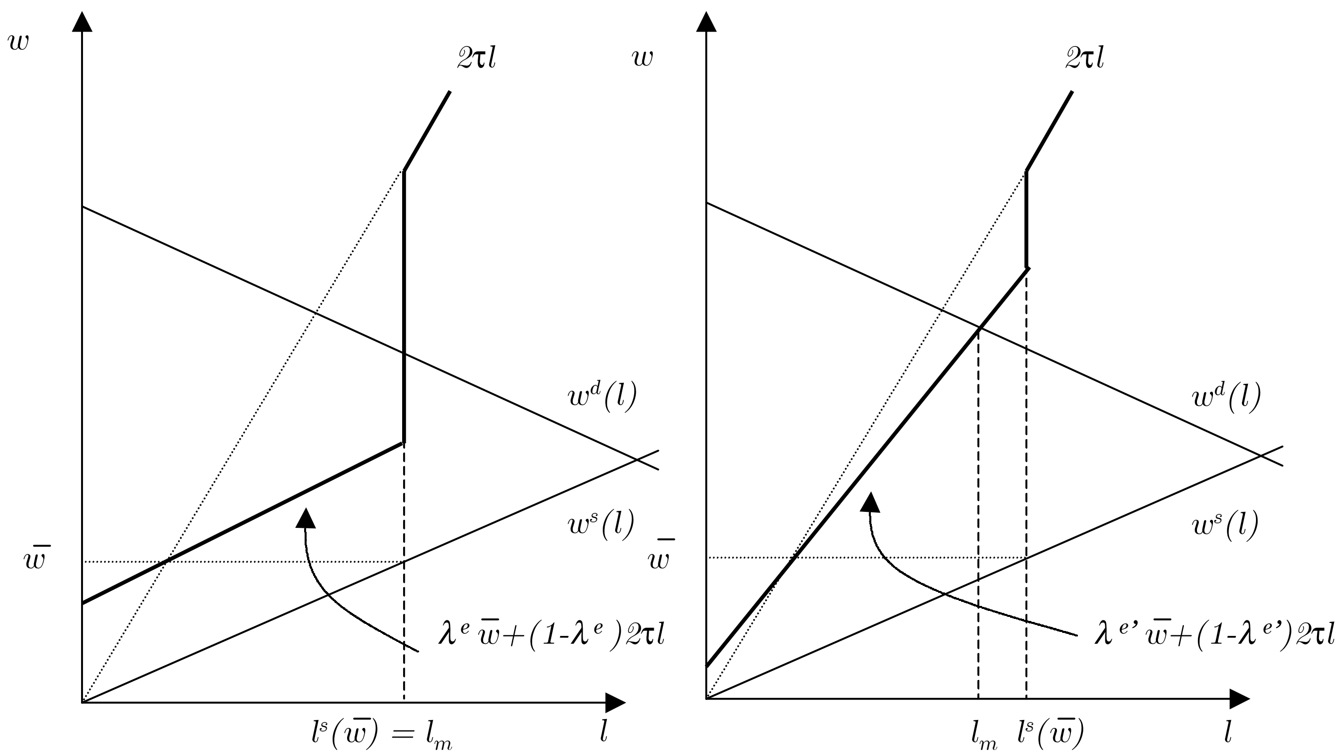

Figure 2
Minimum Wage with
Imperfect Enforcement
($\lambda^e > \lambda^{e'}$)

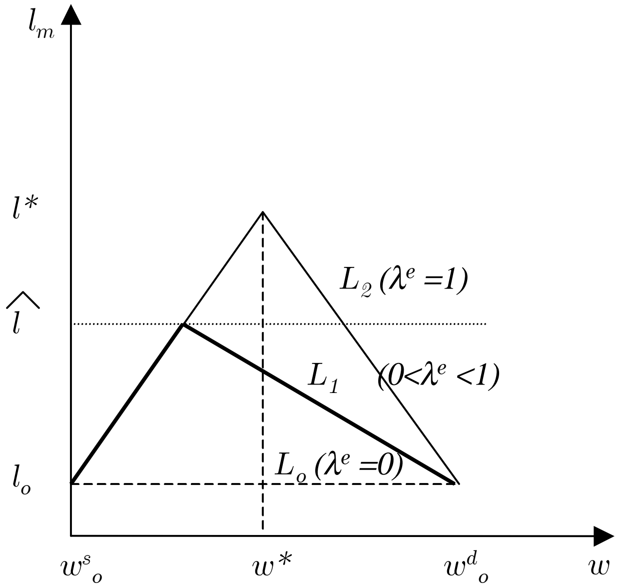

Figure 3 a
Employment and the
Minimum Wage

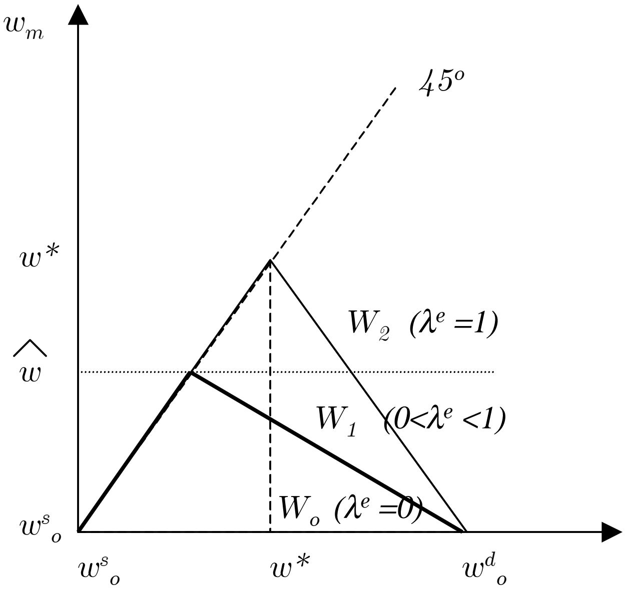

Figure 3 a
Wage Income and the
Minimum Wage

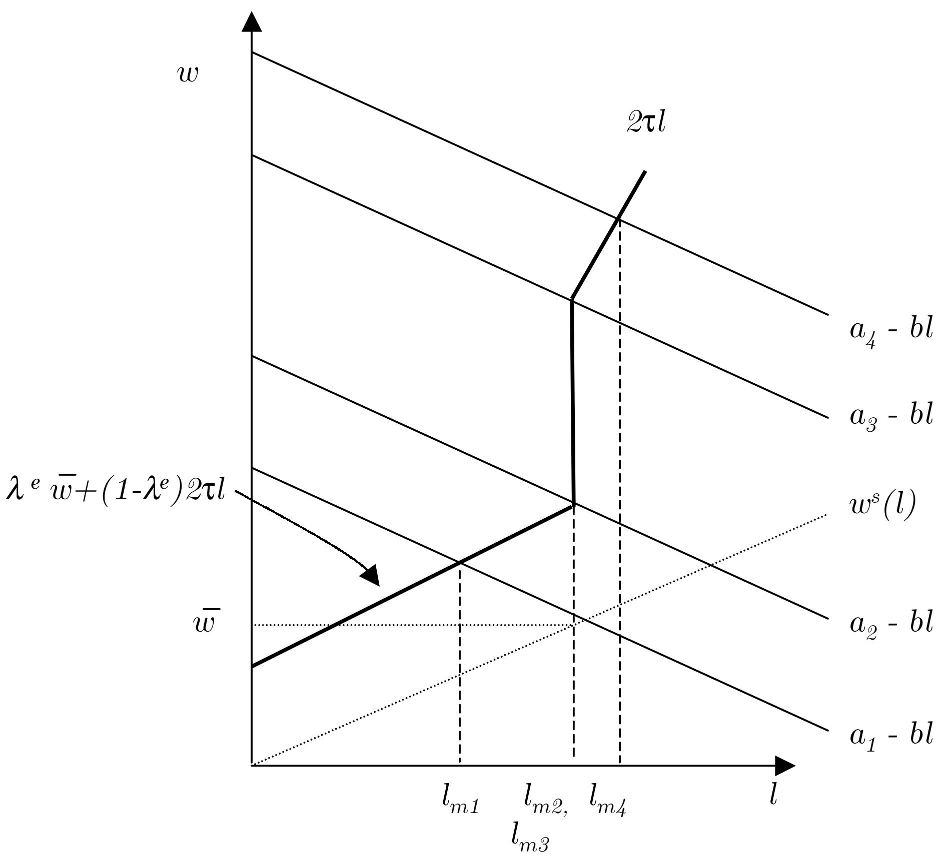

Figure 4
Heterogeneous Employers and
Clustering

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