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**Dealing with Monopsony Power: The Case for Using Employment
Subsidies**

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Abstract

We show in a monopsony model that a minimum wage may raise hours which are already too high but has ambiguous effects on the number of employees and utility. Employment subsidies, in contrast, unambiguously improve worker utility and bring the market equilibrium closer to the efficient outcome.

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Section I: Introduction

Modern monopsony models of the labour market are generally based on the idea that there are frictions in the labour market, such as search costs or firm specific preferences, resulting in an inefficient market outcome. Given that Manning (2003), for example, has shown the importance of monopsony in modern labour markets, there is thus a rationale for regulation and minimum wages tend to be the common policy response. In this paper we show that employment subsidies are a more desirable way of dealing with the distortion arising from monopsony power.

Section II: A Partial Equilibrium Monopsony Model

Workers have the following utility function $U(x, l)$ where x is consumption and l is leisure. They have a time endowment of T and satisfy the constraints $h = (T - l)$ and $x = wh$ where h is hours worked and w the hourly wage. Substituting these constraints into the utility function we get $u(h, w)$, where $u_h < 0$, $u_{hh} > 0$, $u_w > 0$ and $u_{ww} \leq 0$. Workers are identical apart from having different fixed utility opportunity costs for going to work (k). These costs generate a firm labour supply curve which increases in utility. For simplicity we assume for each firm a unit mass of workers that is distributed uniformly along a unit interval adjacent to the firm where k is the distance from the firm and $f(k)$ is the uniform density function. For the marginal worker who accepts a job at the firm given the offered wage hours combination $u(h, w) = k$. Given the above assumptions the number of workers is: $n(w, h) = u(h, w)$.

The total utility of employment is:

$$\int_0^{u(w, h)} [u(w, h) - k] f(k) dk = \frac{u(w, h)^2}{2}. \quad (1)$$

The firm is a price taker for output and has the profit function:

$$\theta_1 \Pi = \theta_1 [G(w, h) - wn(w, h)h - n(w, h)\theta_2]. \quad (2)$$

where $G[n(w, h), h]$ is a production function which depends on the number of workers and hours. We allow for the possibility of payroll taxes/subsidies, i.e., a per unit tax/subsidy on the number of workers, θ_2 , and a profits tax rate of t_1 where $\theta_1 = (1 - t_1)$. Total surplus, TS , generated by this firm is the sum of profits and

worker utility $TS = \Pi + \frac{n(w, h)^2}{2}$. The first order conditions for the choice of h and w

that maximise total surplus are:

$$TS_w(w, h) = \theta_1 [G_w(w, h) - whn_w(w, h) - n_w(w, h)\theta_2] + n_w(w, h)n(w, h) = 0. \quad (3)$$

$$TS_h(w, h) = \theta_1 [G_h(w, h) - whn_h(w, h) - n_h(w, h)\theta_2] + n_h(w, h)n(w, h) = 0. \quad (4)$$

First one should note that if one ignores the final terms on the right hand sides of equations (3) and (4) one has the first order conditions for the firm's profit maximisation problem. If there are no taxes or subsidies, since the final terms in (3) and (4) are positive and negative respectively, the firm will choose a wage below and hours above or below the optimal levels.³ More generally it is clear from the above first order conditions that starting at the market equilibrium a small per unit subsidy would move both the wage and level of hours closer to the optimal levels and increase worker utility and employment.⁴

Next we argue that the impact of a minimum wage on employment and

³ As noted in Manning (2003), workers may be working more or less than their desired hours in equilibrium. In the model above this depends on how hours and workers are combined in the production function and workers preferences.

⁴ If we impose a subsidy that is increasing in the number of workers in the above problem [$\theta_2 = n(w, h)$] we move to the first best solution although this would be difficult to implement in practice given firm heterogeneity.

welfare are difficult to anticipate.⁵ Unlike the above example, where we showed a subsidy improves welfare in a general framework, we now impose a specific simple functional form on the problem on the grounds that if the impact of a minimum wage is ambiguous in such an example, then the same is true in a general framework.

Assuming $U(x,l) = (xl)^b$ and $G(n,h) = n^c h^d$, where c and d reflect the intensity of workers and hours in the production function, then when the budget constraint ($x=wh$) is satisfied the utility function is $u = [(wh)(T-l)]^b$. This is the labour supply curve for the firm.⁶ The elasticity of labour supply with respect to worker utility is b where a small b indicates a high degree of monopsony power. The firm's profit function, where the output price is unity, is:

$$\pi = n^c h^d - whn = w^{bc} h^{bc+d} (T-h)^{bc} - (T-h)^b (wh)^{b+1}. \quad (5)$$

From the first order conditions for h and w one can solve for the optimal solutions:

$$h = T \frac{d(b+1)}{d(b+1) + bc}. \quad (6)$$

$$w = \left[\frac{bc^{c-1} h^{d-1+bc-b} (T-h)^{b(c-1)}}{b+1} \right]^{\frac{1}{1+b(1-c)}}. \quad (7)$$

where (6) can be substituted into (7) to derive the wage in terms of the exogenous parameters. Given the labour supply curve, the elasticity of employment with respect to the minimum wage evaluated at the market wage is⁷:

$$\mathcal{E}_{nw} = n_w \frac{w}{n} = b + \frac{dh}{dw} w. \quad (8)$$

⁵ An important point to bear in mind in a monopsony model is that the supply of workers is increasing in worker utility. This means that a policy that increases the number of workers employed raises the utility of all workers.

⁶ We assume that the coefficients on consumption and leisure are equal for simplicity. Not doing so only gives another potential source of ambiguity in terms of the employment effects. De Fraja (1999) shows that the employment effects of a minimum wage are small in a model with heterogeneity in workers preferences over wages and working conditions. One could also think of the relationship between hours and wages facing the firm above as an equilibrium locus across different types of workers.

⁷ The problem is substantially more difficult to solve at minimum wages above the market level.

From the first order conditions:

$$\frac{dh}{dw} = -\frac{\pi_{hw}}{\pi_{hh}}. \quad (9)$$

It follows that:

$$\varepsilon_{nw} = \frac{db\{-2bc-d+b^2[c^2-c(d-1)+d]\}}{b^3(c^3-c^2-2dc^2+2dc+d^2c-d^2)-b^2-dbc+2db^2c-d^2(1+b+b^2)}. \quad (10)$$

Given that the above expression depends on the combination of three exogenous parameters there are not any straightforward rules to determine its sign.⁸ For our purposes it suffices to show that under reasonable parameter assumptions the sign can be positive or negative, and we experiment in Table 1 with inputting values for the parameters in (10). Specifically, we assume $d=0.5$ and provide the critical values for c , below which ε_{nw} is negative, at different values of b . If there is a lot of monopsony power (b is small) we see that it is only in sectors where the technology is intensive in hours relative to workers (small c) that the above elasticity will be negative⁹. It should be noted that opinions on the degree of monopsony power differ. Some of the evidence in Manning(2003), for example, suggests that the elasticity of labour supply with respect to wages may be less than unity while Boal and Ransom (1997) conclude that “Monopsonistic exploitation..., is probably widespread but small on average”.

It could be argued that a combination of minimum wages and hours restrictions would be a more effective way of moving to the efficient outcome. Naylor (2002), develops a bargaining model where in terms of minimum wages and hours restrictions “..only when they are combined are they likely to raise the welfare of the

⁸ Most examples examined showed that the elasticity was falling in b the greater the degree of monopsony power.

⁹ We also report the levels of hours, number of workers and wage at the cutoff values for c .

low-paid working long hours” (p. 1).¹⁰ While this is also true in the model developed above, there are some important limitations to such a policy combination. Firstly, there are many characteristics other than hours to a job, such as effort, shift length, discipline etc., which can also be varied to the detriment of the worker even if there are regulations on wages and hours. Secondly as we discuss below, part-time workers tend to be over-represented in minimum wage employment and only a fairly small proportion of minimum wage workers work long hours. Thus any reasonable maximum hours restriction would be irrelevant for most minimum wage workers, while minimum hours restrictions would be impractical and costly.

Section III: Discussion

The objective of the analysis above is not to argue that minimum wages will either increase or decrease employment. Rather it is to illustrate the inherent difficulty of using minimum wages to improve labour market outcomes under monopsony compared to employment subsidies. The ambiguous effect on employment of a minimum wage is also mirrored in the empirical literature, where there is still no consensus on the issue of whether these effects are positive or negative (see, for example Neumark and Wascher (2000) and Card and Krueger (2000)). At best the impact appears to be small and positive indicating in a monopsony framework that the policy has little impact on worker utility.

If working conditions or hours do not vary in response to the minimum wage the objections to minimum wages outlined above would be unimportant. While there is conflicting evidence on the direction of the change in hours per worker in response to a minimum wage most of the evidence suggests considerable variation in hours per

¹⁰ Manning (2003) shows employment increases with a restriction on working conditions in a Monopsony model, a result attributed to De Meza et. Al (1998).

worker. Neumark et al.(2000b) and Couch and Wittenberg (2001) find significant reductions in hours using a panel of U.S states. The former argue that minimum wage workers are adversely affected by a minimum wage increase. Nolan et al. (2002) find a significant increase in part-time work resulting from a minimum wage in Ireland, while Strobl and Walsh (2002) find an increase in involuntary part-time working resulting from a minimum wage in Trinidad and Tobago. Zavodney (2000), in contrast, using a panel of U.S. states finds a significant increase in hours while Katz and Krueger (1992) discover a fall in part-time work.

A brief look at the mix of tax minimum wage policies currently in place in some developed economies indicates that the policy recommendations implied by the above analysis are relevant. For the US the current basic tax free exemption and federal minimum wage are \$7,700 and \$5.15, respectively. Thus, a worker who works 48 weeks pays tax if they work more than 31.1 hours a week [Neumark et al. (2000b) report average hours of about the same amount for workers close to the minimum wage].¹¹ An increase in the tax exemption (tax free allowance) would act like a per unit subsidy for the large group of workers who work close to the hours thresholds calculated above. It is straightforward to show that an increase in the profits tax accompanying an increase in the employment subsidy, that just recouped the additional profits from the subsidy, would cover the cost of the subsidy for all but the additional employees resulting from the subsidy. This ignores any profit gain if a subsidy is an alternative to a minimum wage increase. Thus using a subsidy rather than a minimum wage need not imply large deadweight losses from extra taxes to finance it. A profits tax does not affect the firm's choice of hours, wages, or output.

¹¹ Doing a similar calculation using the amount of tax free allowance and minimum wages for UK and Ireland suggests that those working at least 25 and 21 hours, respectively, would pay tax. Nolan et al (2002) report that two thirds of Irish minimum wage workers are full-time while data in Connolly and Gregory (2003) imply that 40% of women affected by the U.K. minimum wage are full-time.

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Table 1* – Basic Simulations for when $\varepsilon_{nw} < 0$

<i>b</i>	1.5	3	5	10
<i>c when $d=0.5$</i>	0.10	0.23	0.3	0.37
<i>Hours</i>	0.90	0.75	0.66	0.60
<i>Workers</i>	0.04	0.05	0.05	0.05
<i>Wage</i>	1.19	1.95	2.47	3.04

*The time endowment is set to unity for the simulations