Asymmetric Information Renders Minimum Wages Less Harmful

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CESIFO WORKING PAPER NO. 2623
CATEGORY 4: LABOUR MARKETS
APRIL 2009

CESifo *Working Paper No. 2623*

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Abstract

We show that a minimum wage introduced in the presence of asymmetric information about worker productivities will lead to lower unemployment levels than predicted by the standard labour market model with heterogeneous labour and symmetric information.

JEL Code: J2, J3, H5, L5.

Keywords: minimum wages, unemployment, asymmetric information, labour market regulation.

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March 2009

1. Introduction

The minimum wage is a costly redistributive tool when it causes unemployment among the least productive workers. Despite the clear-cut predictions from the standard labour market theory that minimum wages above market-clearing wage level cause unemployment, many cross country studies differ widely on the labour market effects of minimum wages.[1] We argue that complementary regulatory measures in the labour market may influence the magnitude of minimum wage effects. Already existing distortions such as job protection can counteract the distortive effects of minimum wages. Job protection makes it more difficult for firms to exploit what they have learnt about workers' productivities and thus creates asymmetric information. When employers can only imperfectly distinguish *ex ante* between high- and low- ability workers, they are not able to pay different wages. This implies that they do not compare the marginal productivity of a low-ability worker with the minimum wage but the higher expected marginal productivity. This change in the firms' hiring pattern renders the minimum wage less harmful when complementary labour market policies are at work.

To develop the argument we set up a simple model with two types of labour that differ with respect to their abilities (or productivities). In the scenario with symmetric information, firms can observe individual abilities and pay wages accordingly. In the scenario with asymmetric information, firms cannot distinguish ability types and, therefore, have to pay a uniform wage. This set-up is similar to the framework chosen by Blumkin and Sadka (2005). Different to Blumkin and Sadka (2005) optimal taxation approach, however, we abstract from the possibility of workers to provide some costly signal about their respective productivities and focus on a positive analysis, asking whether *existing* complementary regulatory measures that change the informational framework in the labour market might render a minimum wage less harmful. Thereby, we show how the impact of a statutory minimum wage hinges on productivity differences and on the initial distribution of the workers' abilities.

The paper is organized as follows. In Section 2, we set up the model and describe the equilibrium with symmetric information. Section 3 introduces the asymmetric information

[1] See Neumark and Wascher (2008) for a comprehensive survey on the labour market impact of minimum wages.

scenario. We compare the outcomes in the two scenarios with respect to employment in Section 4. Section 5 concludes.

2. A standard labour market model with symmetric information

There are two types of workers, low- and high-ability workers who are endowed with q_l and q_h efficiency units of labour ($q_l < q_h$). The total number of workers is normalized to unity. The share of high-ability workers in the population is given by *h*. L_l and L_h denote actual employment of low- and high-ability workers, respectively.

Without loss of generality, we normalize the total number of firms to unity. High- and low-ability workers are substitutes in the production process where each firm produces according to $f(q_h L_h + q_l L_l)$ with $f' > 0$ and $f'' < 0$. Different productivities are not due to differences in (observable) education but rather due to *ex ante* unobservable ability differences. All firms behave competitively and take the output price $p = 1$ and the wage rates w_l and w_h for the low- and high-ability workers as given. Profit maximization yields the first-order conditions

$$\frac{\partial \pi}{\partial L_j} = f'(q_h L_h + q_l L_l) q_j - w_j = 0 \qquad \text{for } j = h, l,$$

which define the labour demand for high- and low-ability workers. In equilibrium, all workers have to be paid at least the legal minimum wage b ($w_j \geq b$, $j = h, l$). Depending on the magnitude of the minimum wage, we can distinguish four cases.

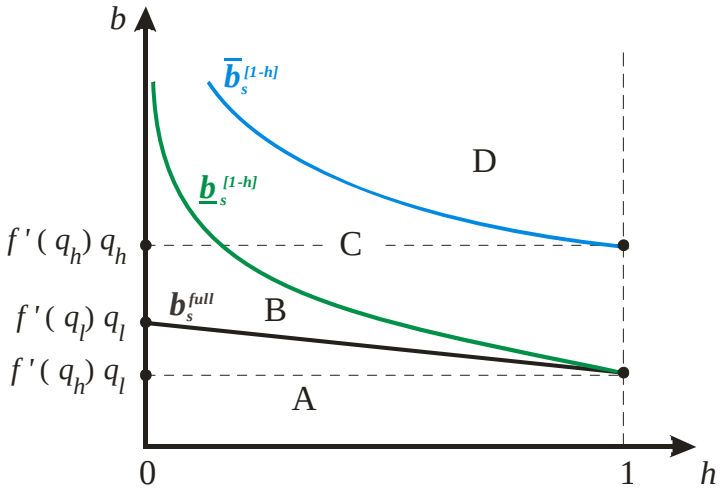
Case A: If the minimum wage is below $b_s^{full} \equiv f'\big(q_h \cdot h + q_l \cdot (1-h)\big) q_l$, all workers will be employed and we have $L_h = h$ and $L_l = 1 - h$. This critical level above which a statutory minimum wage becomes binding depends on the productivities of both low- and high-ability workers and their respective shares. A larger share of high-ability workers reduces the marginal productivity of the last worker and thus the maximum non-binding minimum wage. Figure 1 depicts the outcome in the labour market with the share of the high-ability workers *h* on the horizontal axis and the minimum wage *b* on the vertical axis. All points below the declining b_s^{full}-curve are characterized by full employment (area A), all points above are associated with unemployment. The b_s^{full}-curve is downward sloping, i.e. the critical minimum wage will be lower the larger the fraction *h* of high-ability workers. An increase in *h* reduces marginal productivity as more efficiency units of labour are employed. This leads to

lower employment levels for a given wage. As the wage for the low productivity workers cannot be adjusted downwards, they are the first to be laid off.

Case B: If the minimum wage is slightly above the b_s^{full}-curve, unemployment occurs but affects only low-ability workers up to the point where the last low-ability worker is laid off. In the interval $b_s^{full} < b \le f'(q_h \cdot h) q_l \equiv \underline{b}_s^{[1-h]}$, high-ability workers are fully employed, but there is unemployment among low-ability workers:

$$L_h = h \text{ and } 0 < L_l = f'^{-1}\left(\frac{b}{q_l}\right)\frac{1}{q_l} - \frac{q_h}{q_l} \cdot h < 1 - h. \tag{1}$$

Figure 1: Employment with symmetric information



Case C: Above the $\underline{b}_s^{[1-h]}$-curve, the minimum wage becomes so high that no low-ability worker will be employed. As long as the marginal productivity of the last high-ability worker is above the minimum wage, the firm will not lay off this type of worker. Thus, within the range $\underline{b}_s^{[1-h]} < b \le f'(q_h \cdot h) q_h \equiv \bar{b}_s^{[1-h]}$, it pays to employ all high-ability workers but it is not profitable to hire any low-ability worker:

$$L_h = h \text{ and } L_l = 0. \tag{2}$$

Case D: For $b \ge \bar{b}_s^{[1-h]}$, even the high-ability workers face unemployment. The employment levels fall to

$$L_h = f'^{-1}\left(\frac{b}{q_h}\right)\frac{1}{q_h} < h \text{ and } L_l = 0. \tag{3}$$

3. Asymmetric information

Now we turn to the case of asymmetric information. Firms can only detect an individual's ability after having hired a new worker. Employment protection laws prevent firms from firing workers once they have learned about the productivities or from rewriting wage contracts. All firms decide simultaneously on the size of their workforce. From the point of view of an individual firm, the distribution of productivities follows a binomial distribution.

As we are interested in the impact of pooling heterogeneous workers and not so much in the stochastic process itself, we facilitate the analysis by assuming that each firm is sufficiently large and gets a share of high-ability workers for sure. The average productivity amounts to $q_a = q_h h + q_l(1-h)$ and the representative firm maximizes $\pi = f(q_a L) - wL$ with respect to employment. The first-order condition immediately yields the labour demand $L = f'^{-1}(w/q_a)q_a^{-1}$. We define the minimum wage that just ensures full employment ($L=1$) with asymmetric information as $b_a \equiv f'(q_a)q_a$. For $b > b_a$, the minimum wage employment falls to

$$L_a = f'^{-1}\left(\frac{b}{q_a}\right)\frac{1}{q_a}. \tag{4}$$

4. Comparing employment levels

Do minimum wages generate the same unemployment patterns in the two informational scenarios? Comparing b_a and b_s^{full} yields $b_a = q_a/q_l \cdot b_s^{full}$ with $q_a/q_l > 1$. Thus we have

> *Proposition 1. The level at which the minimum wage becomes harmful with asymmetric information always exceeds the respective level with symmetric information by the factor* $q_a/q_l > 1$.

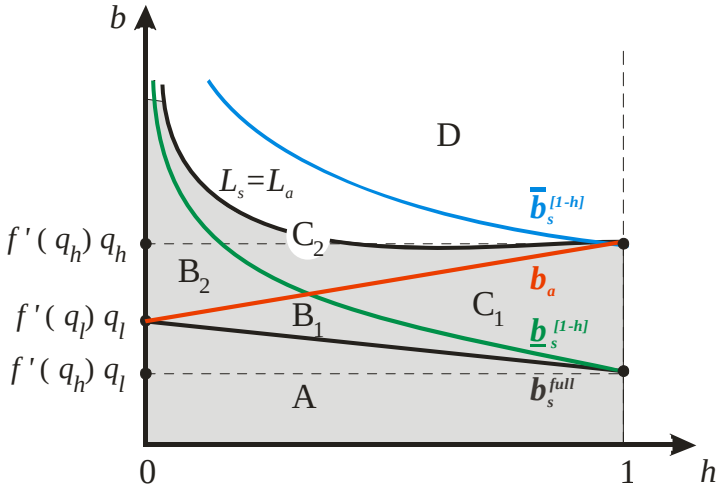
It follows from Proposition 1 that, if the minimum wage does not cause unemployment with symmetric information, it will never cause unemployment with asymmetric information. If the minimum wage is so low that it does not even prevent the employment of the last low-ability worker, it also cannot distort the allocation of labour with asymmetric information. Moreover, if the minimum wage is between the marginal productivity of the last low-ability worker and the expected marginal productivity at full employment, firms have no incentive to hire low-

ability workers in the symmetric information scenario but would still hire a worker when the individual ability is unknown.

A standard argument why the minimum wage may not be as harmful refers to monopsonistic structures in the labour market [Manning (2003)]. Proposition 1 provides an additional argument: asymmetric information has a softening effect on the detrimental impact of minimum wages in otherwise functioning labour markets because firms focus on expected marginal productivity rather than the lower marginal productivity of the low-ability type.

In Figure 2 we add the b_a-curve to the lines introduced in Figure 1. We can distinguish six different outcomes. Proposition 1 describes the outcomes in the areas A, B_1 and C_1. In area A we have non-binding minimum wages in both scenarios. In areas B_1 and C_1, the minimum wage will destroy some (B_1) or all jobs (C_1) for low-ability workers with symmetric information while still ensuring full employment with asymmetric information.

Figure 2: Employment levels – symmetric vs. asymmetric information



In Figure 2, we assume that b_a is upward sloping, which is the case for $\partial b_a / \partial h = (q_h - q_l)(f''(q_a)q_a + f'(q_a)) > 0$.[2] An increase in h raises *expected* marginal productivity. This effect is not outweighed by the increase in efficiency units of labour so that the firms will hire more workers if h increases. This is in contrast to the symmetric information scenario where an increase in h always lowers marginal productivity of the low-ability workers.

[2] This assumption, for instance, always holds for the Cobb-Douglas production technology.

Proposition 2. With asymmetric information, raising the share of high-ability workers h allows the government to raise the minimum wage without harming employment if $f''(q_a)q_a + f'(q_a) > 0$.

Unemployment occurs in both scenarios above the b_a-curve but employment will be higher in the asymmetric information scenario along the b_a-curve (and slightly above). Thus, the $L_s = L_a$-curve, on which employment levels (with $L < 1$) are the same, must be in the areas B_2, C_2 and D in Figure 2. To determine the location of the $L_s = L_a$-curve, consider the following thought experiment. If the firms hire exactly *h* workers in the asymmetric information scenario, marginal productivity will be $f'(hq_a)q_a$. In the symmetric case, the marginal productivities amount to $f'(q_h \cdot h)q_l$ and $f'(q_h \cdot h)q_h$ on the $\underline{b}_s^{[1-h]}$-curve and the $\overline{b}_s^{[1-h]}$-curve, respectively. Along the two curves and in-between, employment also amounts to *h*. As employment falls monotonically with *b* in the symmetric information scenario, the $L_s = L_a$-curve must be in area C_2, if $f'(q_h \cdot h)q_l < f'(hq_a)q_a < f'(q_h \cdot h)q_h$. This is the case for $f''(x)x + f'(x) > 0$. In the alternative case ($f''(x)x + f'(x) < 0$), we get $f'(hq_a)q_a > f'(q_l \cdot h)q_l$, which implies that on the $\underline{b}_s^{[1-h]}$-curve employment is still higher with asymmetric information. Thus, for $f''(x)x + f'(x) < 0$, the $L_s = L_a$-curve must be located in area D.

Below the $L_s = L_a$-curve, employment is always larger in the asymmetric information scenario.[3] For moderate minimum wages, which only affect the low-ability workers, asymmetric information renders a statutory minimum wage less harmful. Only with very high minimum wages, the economy may achieve higher employment levels when firms operate under symmetric information. Thus, the negative employment effects of a minimum wage can be alleviated in the presence of complementary regulatory measures such as job protection that *de facto* introduces asymmetric information about workers' abilities. Above the $L_s = L_a$-curve, the minimum wage is more harmful in the asymmetric information setting. This can be summarized in

[3] Along the $L_s = L_a$-curve, output is higher in the symmetric information scenario because only high-ability workers are employed. It is straightforward to show that the iso-output curve is also in area C_2 and below the $L_s = L_a$-curve.

Proposition 3. If the minimum wage affects high-ability workers in the symmetric information scenario, asymmetric information renders the impact of a statutory minimum wage always more harmful for $f''(x)x + f'(x) > 0$.

5. Conclusion

The standard economic analysis shows that a minimum wage above the full employment wage for low-ability workers causes unemployment. Our analysis has shown that this may not be true in the presence of complementary regulatory measures such as job protection that affect the informational structure in the labour market. Generating asymmetric information forces firms to focus on average rather than marginal productivities when hiring workers. A statutory minimum wage below the average productivity at full employment allows the government to raise the wage of low-ability workers without distorting the labour market. High minimum wages, however, also cause unemployment with asymmetric information. Eventually, the existence of complementary policy measures becomes detrimental.

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