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ABSTRACT

In an attempt to augment the lowest wages, the U.S. and other countries utilize legal minimum wages. Their potentially adverse employment effects, however, give many economists pause.

Is there an alternative way to assist the low wage worker but avoid disemployment effects? In this paper, the effect of a wage subsidy on employment and wages (gross and net) is analyzed. The analysis reveals that a wage subsidy can elevate the lowest wages while, at the same time, leaving positive employment effects. The most efficient approach, however, turns out to be a combination wage subsidy/ minimum wage policy.

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AUGMENTING THE WAGE OF THE LOW WAGE WORKER: WAGE SUBSIDY VS. MINIMUM WAGE

R. D. Husby*

Minimum wages, traditionally, have been criticized for their potentially adverse employment effects. The competitive model suggests that a minimum wage above the competitive wage causes a reduction in employment, the magnitude depending on the elasticity of the demand for labor. The monopsony model, on the other hand, suggests that a minimum wage above the monopsony wage actually increases employment, provided that the wage floor is not set too high.¹ The analyses of the minimum wage using the competitive and monopsonistic models are well known and need not be repeated here.

A wage subsidy, under which policy makers would determine a <u>target</u> wage and then pay some percent (e.g., 50 percent) of the difference between the target wage and one's lower wage, was discussed briefly during the early 1970s, primarily as an alternative to the negative income tax.² It is the purpose of this paper to analyze the wage subsidy as an alternative not to the NIT but to the minimum wage. The conclusion is that a wage subsidy may be preferable to a minimum wage on employment grounds, but more important, a combination of the two-a minimum wage plus a wage subsidy--is preferable to either one by itself.

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Throughout this paper, it will be assumed that workers respond only to the wage that they receive and not at all to the wage that employers pay. That is to say, workers are indifferent to whether their employer shares in the benefits of a wage subsidy.³

In Section I, the notion that wage subsidies may be preferable to minimum wages in introduced. In Section II, we introduce the idea of a combined minimum wage/wage subsidy policy and its superiority over either a minimum wage or wage subsidy by itself. Then in Section III, consumer and producer surplus is used in a discussion of the pros and cons of the minimum wage vs. wage subsidies vs. a combined policy. Concluding remarks are included in Section IV.

I. Augmenting the Wage of Low-wage Workers

Suppose that policy makers wish to augment the lowest wages such that no worker receives less than od (see Figure 1). This could be accomplished with a minimum wage of W_{min} . In the competitive labor market depicted in Figure 1, workers would receive a wage equal to od from their employer, but employment would fall from N_c to N_m . Alternatively, a compensation level of od could be accomplished with a wage subsidy, target wage W_{T2} , the subsidy being 50 percent of the difference between the target wage and the competitive or going wage. In this case, rv becomes the supply curve defined as the relationship between the wage that the <u>employer pays</u> and the quantity supplied of labor (see Appendix for further detail). Employment in this case would actually increase to N_s , the employer would pay net wage W_n , and the worker would receive gross wage od. The extents to which the net

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wage of the employer would fall below and the gross wage of the employee would rise above the competitive wage depends upon the elasticity of supply (see Appendix).

In the monopsony case (see Figure 2), let us consider a 50 percent wage subsidy, target wage W_{T3} . Ironically, in this case, the employer could end up paying a zero or negative wage. As Figure 2 is drawn, the employer would pay the negative wage W_n , with the employee receiving a gross wage of W_{13} .

This author suggests, however, that public policy makers and public opinion would not accept a program in which powerful and/or wealthy firms would pay zero or negative wages. Undoubtedly, the law would initially be written or ultimately amended to prevent this from occurring. If so, there would in fact be a minimum wage in addition to the wage subsidy. Explicitly forbiding zero or negative wages would be equivalent to a minimum wage of \$0.01. The possibility of a minimum suggests that one might be able to legislate a wage subsidy along with a nontrivial minimum wage which would maintain the advantages of a minimum wage while eliminating the disadvantages.⁴

II. Combining a Minimum Wage and a Wage Subsidy

The analysis of a combined policy for the monopsony case is made with the assistance of Figure 2. In order to prevent a monopsonist from usurping most of a wage subsidy, the following policy could be implemented. The government passes a minimum wage, say, equal to the wage at which supply equals demand, that wage being W_c or W_{min} in the figure. In the absence of any public policy, the monopsonist would hire N_{M} at wage W_{M} . If the policy were to have only a wage subsidy (target wage W_{T3}), the monopsonist would hire $N_{M,s} = N_{C}$. The gross wage would then be W_{C} , and the net wage, in this case negative, would be W_{T} .

If, however, there is a minimum wage (equal to W_c) combined with a wage subsidy (with target wage W_{T4}), then the monopsony would hire $N_{min,s}$ (=N_c) and pay the employees a net wage of W_c . Although the monopsonist would obviously be worse off compared to a hands off policy, workers just as obviously benefit. Not only would employment rise (to $N_{min,s}$), but also the gross wage including subsidy would be W_c + S, rather than W_g .

Such a combined policy would also yield favorable results for competitive labor markets. With the assistance of Figure 1, we see that the minimum wage by itself yields employment of N_m with wage W_{min} . If, however, there were a minimum wage of W_c combined with a wage subsidy (target wage W_{T1}), then employment would rise to the competitive level (N_c), the gross wage would be $W_c + S = W_{min}$, and the net wage would be W_c . Clearly, if the wage target and minimum wage were chosen carefully, the employee wage could remain at the previous minimum wage level at the same time that employment increases to the competitive level. (With a wage subsidy by itself [target wage, W_{T2}], employment would be N_s , the gross wage would be od = W_{min} , and the net wage W_n .)

III. Wage Subsidies, Minimum Wages, and Consumer/Producer Surplus

Considering simple Marshallian consumer and producer surplus, it can be shown that surplus would be higher for the combination of a "competitive" minimum wage and a wage subsidy as compared to either a simple minimum wage or simple wage subsidy. Initially, in this discussion, it is assumed that employee to employer bribes that would, in effect, negate the wage subsidy, do not take place: they are illegal and enforcement is 100 percent effective.

Suppose that society or policy makers have decided that the lowest paid workers should not receive less than od (see Figure 1), In a perfectly competitive market (wage equal to W_), total surplus would be abo (employer surplus abc plus employee surplus cbo). Remuneration equal to od could be achieved, first, by minimum wage legislation. With minimum wage W_{min}, surplus would be ade + defo, a loss of ebf. Second, it could be achieved with a wage subsidy, target wage W_{T2} . The employer would pay ok, with a government subsidy equal to kd. The surplus here would be derived as follows. The worker surplus is dpo which can be subdivided into kfo + debfk + epb. Employer surplus is ask equal to ade + debfk + bfs. Subtracting the taxpayer loss of dpsk (equal to debfk + epb + bfs + pbs) yields aed + debfk + kfo - pbs or abo less pbs. The loss of surplus here is pbs. (As drawn, pbs = ebf, and thus the loss in surplus from the wage subsidy is identical to the loss from the minimum wage, but these losses will not, in general, be equal.)

Third, the combination of a minimum wage, but at W_c , plus a wage subsidy (target wage now W_{T1}) yields a subsidized wage of W_c + S

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(equal to od or W_{min}), with no loss of surplus. The worker surplus would be dgbo, the employer surplus would be abc, and the taxpayer loss dgbc, yielding a total surplus of abo, the same as in the laissez-faire competitive case.

With the combined policy and a subsidized wage at W_{c} + S, there would be unemployment of $N_{s} - N_{c}$. It has been suggested that, in a competitive market, the unemployed would bid the effective wage, via bribes, back down to W_{c} . The unemployed would, so the argument goes, offer bribes to potential employers in order to secure employment. The competitive solution would be a bribe equal to the subsidy (cd), resulting in an effective competitive wage at W_{c} .

This argument can be refuted, however, on the following grounds. First, if such behavior would take place with a combined minimum wage/wage subsidy policy, it would certainly also take place with a minimum wage only. The unemployed would be in even larger numbers in the latter case ($N_s - N_m$ in Figure 1). To what extent such behavior exists in the U.S. today is beyond the scope of this paper. This author, however, is unaware of any evidence that such bribes take place currently.

Second, we can say that, from a theoretical welfare point of view, the enforcement costs must be compared to the welfare losses. First, let us compare the combined minimum wage/wage subsidy policy with the laissez-faire case. The welfare loss of the combined policy would simply be the enforcement costs of insuring that no bribes take place since there are no welfare losses when enforcement costs are ignored. Second, comparing the combined policy with the minimum wage only,

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assume that the enforcement costs are the same whether it be a minimum wage or the combined policy. (If they were not equal, they would presumably be more in the case of a minimum wage due to the higher unemployment). In this case, the welfare gain from the combined policy would simply be the aforementioned area ebf. If enforcement costs were greater in the case of a minimum wage only, then the welfare gain from the combined policy would be ebf plus the reduced enforcement costs.

Turning to monopsony, with no public policy, the monopsony wage would be W, and total surplus would be opr (employee surplus) + fmrp (employer surplus) = fmro (see Figure 2). If the government forced monopsonists to pay the "competitive" wage, i.e., if the minimum wage were set at $W_{\min} = W$, then surplus would be fco, a gain of mcr. If the policy goal were that the worker receive compensation equal to oa, and if achieved with minimum wage W_{min2}, then the surplus reverts back to fmro (employee surplus amro plus employer surplus fma). However, this higher wage and the highest possible surplus can be simultaneously achieved with the combination wage subsidy/minimum wage which involves a subsidy from taxpayer to low wage worker. Given target wage W_{T4} , and a minimum wage equal to W_{c} , the wage plus subsidy would be $W_{c} + S (=W_{min2})$. The employee surplus is abco, employer surplus is fck, and the combined employee/taxpayer surplus is kco for a total surplus of fco. Surprisingly, and in contrast to the competitive case, this level of total surplus is also attainable with a wage subsidy alone. By choosing the higher target wage W_{T3} , employment would be N_{c} (the point at which MFC intersects demand), the gross wage

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would be W_c , and the net wage W_n . Employee surplus is ock, employer surplus is fchi, and the taxpayer loss is kchi. Thus, the combined employer/taxpayer surplus is fck, yielding a total of fco. However, only with the combined strategy are both the higher wage (W_{min2}) and this level of surplus (fco) obtainable. In the monopsony case, the combination of a minimum wage equal to the "competitive wage" plus a wage subsidy leads to greater surplus than a minimum wage only policy. Also, the combined policy avoids the possibility, discussed in Section I, of an employer paying zero or negative wages.

IV. Conclusion

The most important conclusion of this paper is that, given the policy maker's desired wage level for low wage workers, a combined minimum wage/wage subsidy policy is preferable to a minimum wage only. If it is the policy maker's goal to assure the low wage worker remuneration equal to od (= $W_{min} = W_{c} + S$), the combined policy is clearly superior to the minimum wage: both employment and surplus is higher with the combined policy. The possibility exists that enforcement or queueing losses could occur with the combined policy, but if so, those losses would be at least as great with the minimum wage only.

The second conclusion is that wage subsidies, whether combined with a minimum wage or not, are a worthy subject for public policy discussion. In comparing the wage subsidy only with the combined policy, one would have to compare the deadweight loss (pbs in Figure 1) of the wage subsidy with the enforcement/queueing costs of the combined

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policy. If the deadweight loss of the wage subsidy exceeded the enforcement costs of the combined policy, then the combined policy would still be preferable on efficiency grounds. If, on the other hand, maximum employment were the policy goal, then the simple wage subsidy is the policy of choice. NOTES

¹And provided that the monopsony does not go out of business as a result of the higher wage.

²See Barth and Greenburg (1971), Kesselman (1969), Zeckhauser (1971), Browning (1973), and Kesselman (1973).

³In reality, this assumption may not always capture actual behavior. One can imagine, for example, that if employees of a large corporation learned of a government wage subsidy which appeared to promise, say, a \$2.50 boost in their wages, but when implemented, led to a \$1 (or perhaps no) boost, with the corporation "expropriating" the remainder, it could lead to labor/management confrontation.

⁴This is in stark contrast to the statement in Browning (1973) that "for a [wage subsidy] to function properly, it is important that the minimum wage law be repealed."

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APPENDIX

AI. Wage Subsidies and the Competitive Model

In this appendix, we discuss the effects of a wage subsidy on employment, gross wage, and net wage, and how those effects vary with the elasticity of supply.

Consider the linear model,

(1) $S_N: W = f + eN$

(2)
$$D_N: W = a - bN$$
,

where S_N and D_N refer to the supply of and demand for labor, W is the wage rate, and N is the number of workers. A simple linear model can be used without any loss of generality. Solving the model, the competitive full employment level and the competitive wage are

$$(3a)$$
 N = $(a - f)/(e + b)$ and

(3b)
$$W_{c} = a - b(\frac{a - f}{e + b}),$$

where N_c and W_c stand for the competitive employment and wage, respectively. [In the special case of a perfectly inelastic supply curve, the supply curve would be of the form $N = N_k$ where N_k is some fixed labor supply. In this case, the competitive wage would be equal to

$$(3b') W = a - bN_{k}$$
.]

However, if a wage subsidy were introduced in which the subsidy were

(4)
$$S = s(W_T - W),$$

where S is the subsidy, W_{T} is the target wage, and s is the subsidy rate, then the supply curve would be

(5)
$$W + s(W_{T} - W) = f + eN$$
,

since, by assumption, the workers would continue to respond to the actual wage received, i.e., the subsidized wage. Solving for W yields

(6)
$$W = (f + eN - sW_{T})/(1 - s).$$

Equation (6) is a supply curve relating the number of workers willing to work at various wage levels that the <u>employers must pay</u> (henceforth referred to as the net wage, W_n). Solving for employment and the net wage, we find

(7) N_s =
$$\frac{(1 - s)a - f + sW_T}{(1 - s)b + e}$$

and

(8)
$$W_n = a - b[\frac{(1 - s)a - f + sW_T}{(1 - s)b + e}].$$

The subsidized or gross wage is

(9)
$$W_{\sigma} = W_{p} + s(W_{T} - W_{p}).$$

What is the impact of a wage subsidy? In the special case of a <u>perfectly inelastic supply curve</u>, the supply curve would take the form, $N = N_K$, a function that would be unaffected by the wage subsidy. Hence, in this case, the <u>net</u> wage would equal a - bN_K (see 3b'), the same wage that the employer would pay in the absence of a subsidy. Thus the <u>entire</u> subsidy would accrue to the <u>employee</u>. In the case of a <u>perfectly elastic supply curve</u>, where e = 0, just the opposite happens. In this case,

(10)
$$N_c = \frac{a - f}{b} = \frac{a}{b} - \frac{f}{b}$$

and

(11)
$$W_c = a - b(\frac{a - f}{b}) = f.$$

If the wage subsidy (4) is adopted, then

(12)
$$N_s = \frac{a}{b} - \frac{f - sW_T}{b(1 - s)}$$

where N stands for the employment level after the subsidy comes into effect, and the net wage is

(13)
$$W_n = \frac{f - sW_T}{1 - s}$$
.

The wage subsidy in this case would cause the net wage paid by the firms to fall and consequently employment to rise:

$$N_s > N_c$$
.

The proof of this follows. From (10) and (12), we assert

(14)
$$\frac{a}{b} - \frac{f - sW_T}{b(1 - s)} > \frac{a}{b} - \frac{f}{b}$$

Since the first term on each side of the inequality is identical, we ask then if

$$\frac{f - sW_T}{b(1 - s)} < \frac{f}{b} ?$$

If the wage target, W_{T} , were equal to f, f being the vertical intercept of the supply curve, then the wage subsidy would be zero, and

$$\frac{f - sf}{b(1 - s)} = \frac{f}{b} .$$

If $W_{T} > f$, then

$$\frac{f - sW_{T}}{b(1 - s)} < \frac{f - sf}{b(1 - s)} = \frac{f}{b} .$$

This proves that employment would be higher with the wage subsidy.

The gross wage would be

$$W_{g} = W_{n} + s(W_{T} - W_{n})$$

= $\frac{f - sW_{T}}{1 - s} + s[W_{T} - \frac{(f - sW_{T})}{1 - s}]$
= f.

Thus, we see that the gross wage including the subsidy, W_g , is equal to the wage prior to the subsidy program. The employee is no better off. In this case, the entire subsidy would accrue to the employer.

In the intermediate case of a supply curve which is neither perfectly elastic nor perfectly inelastic, N_s , the employment with the wage subsidy, is greater than N_c : once again, we assert that

$$N > N$$
.

From (7) and (3a), we have

$$\frac{(1 - s)a - f + sW_{T}}{(1 - s)b + e} > \frac{a - f}{e + b}.$$

Rewriting,

(15)
$$\frac{(1-s)a}{(1-s)b+e} - \frac{(f-sW_T)}{(1-s)b+e} > \frac{a}{e+b} - \frac{f}{e+b}$$

We have just proved that this inequality holds for the case of e = 0(14). Adding e to the denominator does not nullify the inequality, so

Employment does increase as a result of the subsidy. In this intermediate case, the net wage is less than the pre-subsidy competitive wage (which in turn explains why employment is higher), but the gross wage is higher than the pre-subsidy competitive wage.² The proof of this is omitted.

The intermediate case is illustrated in Figure 1. The competitive solution is a wage and employment of W_c and N_c . With a minimum wage at W_{min} , employment falls to N_r . With a wage subsidy (target wage W_{T2}), firms would hire up to N_s , the point at which demand intersects the "net" supply curve, S_n . The net supply curve shows the relationship between the quantity of labor supplied and the wage <u>paid by the</u> <u>employer</u>. The gross wage received by the worker is W_g along the conventional supply curve (which shows the relationship between the quantity of labor supplied and the wage <u>received by the worker</u>). The advantage of the wage subsidy is that a remuneration level equal to W_{min} can be achieved without the disemployment effects. In fact, in this intermediate case, employment would exceed the competitive employment level. A more lengthy and formal discussion of the pros and cons of a wage subsidy can be found in Section V.

AII. Wage Subsidies and the Monopsonistic Model

Consider the same linear model,

- (1) $S_{N}: W = f + eN$
- (2) D_{N} : W = a bN.

Total factor cost would be

$$TFC_{N} = W \cdot N = fN + eN^{2}$$
,

so the marginal factor cost would be

$$MFC_N = f + 2eN$$

The monopsonist would hire the number of workers at which

$$VMP_N = MFC_N$$
,

i.e.,

$$a - bN = f + 2eN.$$

Solving for N,

(16)
$$N_{M} = \frac{a - f}{2e + b}$$
,

where N_{M} is the monopsony employment. The wage is then determined by the supply curve since the monopsonist would pay "the least that the traffic would bear":

$$W_{M} = f + eN = f + e(\frac{a - f}{2e + b})$$

$$(17) = \frac{ef + bf + ae}{2e + b}$$

where ${\tt W}_{\!\!M}$ is the monopsony wage.

If a wage subsidy were passed in which the subsidy were $S = s(W_T - W)$, then the supply curve would be

$$W + s(W_{T} - W) = f + eN,$$

since we are still assuming the worker would respond to the subsidized wage. Solving for W:

(18)
$$W = (f + eN - sW_{\pi})/(1 - s).$$

With the subsidized wage, the marginal factor cost would be $(f + 2eN - sW_T)/(1 - s)$. The monopsonist would hire at

$$VMP_N = MFC_N$$
,

i.e.,

$$a - bN = (f + 2eN - sW_{T})/(1 - s).$$

Solving for N, the number of workers would be

(19) N_{MS} =
$$\frac{a(1 - s) - f + sW_T}{b(1 - s) + 2e}$$

where N_{MS} is the "subsidized" monopsony employment. The <u>net</u> wage that the monopsonist would have to pay to attract this number of workers would be

$$W_{M,n} = (f + eN - sW_T)/(1 - s),$$

the gross wage (including subsidy) being

$$W_{M,g} = f + eN.$$

Employment increases, because of the subsidy, in the monopsony case, also.

$$\frac{A(1 - s) - f + sW_{T}}{b(1 - s) + 2e} > \frac{a - f}{2e + b}.$$

The proof of this is as follows.

For e = 0 (perfectly elastic supply),

$$\frac{a(1 - s)}{b(1 - s)} - \frac{f(1 - sW_T)}{b(1 - s)} > \frac{a}{b} - \frac{f}{b}$$

For $W_{T} = f$ (zero subsidy),

$$\frac{a}{b} - \frac{f(1-s)}{b(1-s)} = \frac{a}{b} - \frac{f}{b}$$

If $W_{T} > f$, then

$$N_{MS} > N_{M}$$

Adding 2e to the denominator for the case in which $e \neq 0$, does not change this result.

The monopsony case is diagrammed in Figure 2. Given a government's hands off policy, the monopsonist would hire N_M of wage W_M . A minimum wage equal to W_c would increase employment to N_{min} , s. A wage subsidy in which the worker would end up with a gross wage equal to W_c would

necessitate a target wage of W_{T3} . The "net" marginal factor cost curve would be MFC ret. Employment would be the same (N) as with minimum wage, W_{min} . The net wage, W_n , as drawn, is negative.

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APPENDIX NOTES

Workers benefit, however, in the sense that more of them would be employed at the competitive wage.

²The case of a backward bending supply curve is not treated here. In Michael Barth (1974), he points out that if labor supply is backward bending over the relevant range, "post subsidy equilibrium market wage rates would be higher and hours worked lower than their presubsidy values" (p. 576), opposite of the positively sloped case.

NOTES

¹And provided that the monopsony does not go out of business as a result of the higher wage.

²See Barth and Greenburg (1971), Kesselman (1969), Zeckhauser (1971), Browning (1973), and Kesselman (1973).

³In reality, this assumption may not always capture actual behavior. One can imagine, for example, that if employees of a large corporation learned of a government wage subsidy which appeared to promise, say, a \$2.50 boost in their wages, but when implemented, led to a \$1 (or perhaps no) boost, with the corporation "expropriating" the remainder, it could lead to labor/management confrontation.

⁴This is in stark contrast to the statement in Browning (1973) that "for a [wage subsidy] to function properly, it is important that the minimum wage law be repeated."

repealed





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