E C O N O M I C S B U L L E T I N

Minimum wage noncompliance and the sub−minimum wage rate

Gideon Yaniv
College of Management National Insurance Institute, Israel

Abstract

The present note examines the effect of minimum wage noncompliance on the sub−minimum wage rate in a competitive labor market. The note shows that noncompliance shifts leftward the demand curve of labor and shifts rightward the supply curve of labor, unambiguously leading to a fall in the equilibrium sub−minimum wage rate. Two implications follow: first, contrary to a major result in the minimum wage literature, noncompliance must not necessarily reduce employment (as compared to the pre−law level); it may even increase employment if the deterrent effect of the expected penalty is more than offset by the inducement effect of a lower wage rate. Secondly, and more importantly, if the minimum wage law aims at improving low wages, workers are better off without a law than with one which is not accompanied with sufficient inducement to ensure compliance.

Citation: Yaniv, Gideon, (2004) "Minimum wage noncompliance and the sub−minimum wage rate." *Economics Bulletin,* Vol. 10, No. 9 pp. 1−7
Submitted: July 28, 2004. **Accepted:** September 10, 2004.
URL: http://www.economicsbulletin.com/2004/volume10/EB−04J30002A.pdf

1. INTRODUCTION

The economic literature on minimum wage noncompliance focuses mainly on the conditions under which a competitive employer would opt not to comply with the minimum wage law (henceforth, MWL) and on the effects that noncompliance may have on his optimal employment level [e.g., Ashenfelter and Smith (1979), Grenier (1982), Chang and Ehrlich (1985), Chang (1992), Yaniv (1994, 2001)]. A major result of this literature is that the optimal employment level when not complying with the MWL is not the same as the optimal level in the absence of a MWL. The reason for this is that noncompliance entails the risk of getting caught and punished. Consequently, as first pointed out by Chang and Ehrlich, noncompliance increases the marginal cost of labor for the employer, therefore inducing him to reduce employment below the level he would choose in the absence of a MWL. An implicit assumption underlying this result is that the sub-minimum wage paid by the non-complying employer is identical to the free market wage prevailing in the absence of a MWL. In other words, an implicit assumption is that noncompliance has no effect on the competitive sub-minimum wage rate.

In a recent note, Yaniv (2004) has translated Chang and Ehrlich's result into graphical terms, showing that noncompliance shifts leftwards the labor demand curve. The present note further investigates the effect of noncompliance in the labor market, demonstrating that noncompliance also shifts the supply curve rightwards, therefore unambiguously leading to a fall in the competitive sub-minimum wage rate. This surprising result implies first that noncompliance must not necessarily result in reduced employment (as compared to the pre-MWL level), and more importantly, that if the MWL is not accompanied with sufficient inducement to ensure compliance, low-wage workers are better off without a MWL. Section 2 begins with reviewing the effect of noncompliance on the demand curve of labor; section 3 examines the effect of noncompliance on the supply curve of labor; section 4 considers the labor market equilibrium, and section 5 concludes.

2. THE LABOR DEMAND CURVE

Following Yaniv (2004), consider a profit-maximizing employer who produces a single product with labor input, L, only. Suppose that the employer operates in a perfectly competitive labor market where he hires labor input at a given wage rate, w, per hour. His profits, π, are given by $V(L) - wL$, where $V(L)$ denotes the market value of output and, by assumption, $V'(L) > 0$ and $V''(L) < 0$. The first-order condition for profit maximization is $V'(L_0) - w = 0$, hence the number of hours hired by the employer is determined at the point where the value of the marginal product of labor equals the competitive wage rate. Totally differentiating the first-order condition with respect to L and w yields $dL/dw = 1/V''(L) < 0$, implying that the employer's demand curve for labor is negatively sloped: a rise in the market wage rate will decrease the number of labor hours demanded by the employer.

Suppose now that a MWL is enacted, requiring the employer to pay a minimum wage, m ($> w$), per each hour of labor employed. However, the employer may choose not to comply with the MWL, therefore paying each hour of labor the free market wage. Noncompliance exposes the employer to the risk of being detected and punished.

Suppose that the probability of being detected violating the MWL is independent of the employer's activity level, given exogenously at the rate of p (<1). Suppose further that in case of detection the employer will be obliged to pay back, for each hour of labor he has employed, a multiple λ(>1) of the wage underpayment, $m - w$. The expected profits of the employer, if not complying with the MWL, will be

$$E\pi = (1-p)[V(L) - wL] + p[V(L) - wL - \lambda(m-w)L]. \qquad (1)$$

The first-order condition for the maximization of expected profits is

$$\frac{d(E\pi)}{dL} = V'(L) - [w + p\lambda(m-w)] = 0, \qquad (2)$$

implying that employment will be determined at the point where the value of the marginal product of labor equals the *expected* wage rate, $w + p\lambda(m - w)$. As first pointed out by Chang and Ehrlich (1985), a MWL will reduce employment not just in case of compliance but in case of noncompliance as well: by increasing the marginal cost of labor, the expected penalty, $p\lambda(m-w)$, acts as a deterrent to labor employment.

Because profits vary inversely with the wage rate, the profit-maximizing employer would choose not to comply with the MWL if the expected wage when not complying, $w + p\lambda(m - w)$, is lower than the statutory minimum, m. It immediately follows that the employer would not comply if $p\lambda < 1$ and comply otherwise. That is, the employer would comply with the MWL only if the level of enforcement (represented by $p\lambda$) is sufficiently high. Totally differentiating the first-order condition (2) with respect to L and w reveals now that for any $w < m$

$$\frac{dL}{dw} = \frac{1-p\lambda}{V''(L)}, \qquad (3)$$

which is negative as long as the employer is not complying with the MWL. This means that a fall in the market wage rate below the statutory minimum will still increase the quantity of labor demanded by the employer, yet by a lesser amount than it would in the absence of a MWL. Hence, the labor demand curve, in its part below the statutory minimum, becomes dependent on the level of enforcement and steeper than the labor demand curve in the absence of a MWL. Noncompliance will therefore shift the labor demand curve clockwise below the statutory minimum. The greater the level of enforcement, the steeper will be the labor demand curve, hence the stronger its clockwise shift. When $p\lambda$ is raised to unity, the labor demand curve will become vertical below the statutory minimum (its slope with respect to the vertical axis will fall to zero). The employer, who will now be complying with the MWL, will employ the quantity of labor demanded at the statutory minimum regardless of the market wage rate.

3. THE LABOR SUPPLY CURVE

Consider now a utility-maximizing individual who offers her labor services, L, in a perfectly competitive market where she faces a given wage rate, w, per hour of labor.

Suppose that her utility function is given by $U = -\phi(L) + wL$, where $\phi(L)$ denotes the disutility of labor (reflecting forgone utility of leisure) and, by assumption, $\phi'(L) > 0$ and $\phi''(L) > 0$. The first-order condition for utility maximization is $-\phi'(L) + w = 0$, hence the number of labor hours offered by the individual is determined at the point where the marginal disutility of labor equals the competitive wage rate. Totally differentiating the first-order condition with respect to L and w yields $dL/dw = 1/\phi''(L) > 0$, revealing that the individual's supply curve of labor is positively sloped: a rise in the market wage rate will increase the number of labor hours supplied by the individual.

Suppose now that a MWL is enacted, requiring employers to pay a minimum wage, m ($> w$) per each hour of labor employed. Suppose, however, that $p\lambda < 1$. Consequently, employers opt not to comply with the law, therefore paying each hour of labor the free market wage. Still, with probability p, the individual's employer will be detected and obliged to pay her back, for each hour of labor employed, a multiple λ (>1) of the wage underpayment, $m - w$. The individual's expected utility is thus given by

$$EU = (1-p)[-\phi(L) + wL] + p[-\phi(L) + wL + \lambda(m-w)L]. \qquad (4)$$

The first-order condition for the maximization of expected utility is

$$\frac{d(EU)}{dL} = -\phi'(L) + [w + p\lambda(m-w)] = 0, \qquad (5)$$

implying that the individual will supply labor up to the point where its marginal disutility equals her expected wage rate, $w + p\lambda(m - w)$. Totally differentiating the first-order condition (5) with respect to L and w reveals now that for any $w < m$

$$\frac{dL}{dw} = \frac{1-p\lambda}{\phi''(L)}, \qquad (6)$$

which is positive as long as the employer is not complying with the MWL. This means that a fall in the market wage rate below the statutory minimum will still decrease the quantity of labor supplied by the individual, yet by a lesser amount than it would in the absence of a MWL. Hence, the labor supply curve, in its part below the statutory minimum, becomes dependent on the level of enforcement and steeper than the labor supply curve in the absence of a MWL. Noncompliance will therefore shift the labor supply curve counter-clockwise below the statutory minimum. The greater the level of enforcement, the steeper will be the labor supply curve, hence the greater its counter-clockwise shift. When $p\lambda$ is raised to unity, the labor supply curve will become vertical below the statutory minimum.

Noncompliance will also push down the individual's reservation wage. To see this notice that a prerequisite for the individual to supply a positive number of hours in the labor market is that $d(EU)/dL > 0$ at $L = 0$. In the absence of a MWL, this requires that the market wage rate, w, exceed $\phi'(0)$. However, when employers do not comply with the MWL, it is sufficient for w to exceed $[\phi'(0) - p\lambda m] / [1 - p\lambda]$, which is less than $\phi'(0)$, as $\phi'(0) < w < m$. Because the individual expects a raise in case of

detection, she will be willing to join the labor market at a lower wage rate. The greater the level of enforcement, the lower will be the reservation wage. When $p\lambda = \phi'(0)/m$, the individual will be willing to work for no pay at all (i.e., accept a zero wage) and as enforcement increases further, she will even be willing to pay (i.e., accept a negative wage) for the opportunity to work. When $p\lambda$ is raised to unity, the reservation wage will drop to minus infinity, hence the labor supply curve will become vertical below the statutory minimum.

4. LABOR MARKET EQUILIBRIUM

Figure 1 now depicts the equilibrium wage rate in the labor market before and after the introduction of a MWL. In the absence of a MWL, the aggregate demand curve, D_0, and the aggregate supply curve, S_0, intersect each other at the wage rate of w_0 per hour (point a). The introduction of a MWL, which requires employers to pay workers at least m ($> w_0$) per hour, shifts the labor demand and supply curves clockwise and counter-clockwise, respectively, below the statutory minimum. Given that enforcement is insufficient to induce compliance ($p\lambda < 1$), the labor demand curve would maintain its negative slope whereas the labor supply curve would maintain its positive slope, shifting to $\hat{D}$ and $\hat{S}$, respectively. Consequently, and contrary to an implicit assumption in the noncompliance literature, the equilibrium sub-minimum wage rate would not remain at its pre-MWL level, but would rather drop to $\hat{w}$ (point b). The greater the level of enforcement, the stronger would be the shift of each curve, thus the greater the fall in the sub-minimum wage rate.

When $p\lambda$ is raised to unity, which is the level of enforcement sufficient to induce compliance, the labor demand and supply curves would become vertical below the statutory minimum at the level of employment demanded and supplied at the statutory minimum, respectively (curves $\overline{D}$ and $\overline{S}$). Consequently, an equilibrium at a sub-minimum wage rate would no longer be possible. Employers would now be complying with the MWL, demanding less than the amount of labor supplied at the statutory minimum. The market would stabilize at the statutory (non-equilibrium) wage rate, m, implying that $\overline{S} - \overline{D}$ hours of labor remain unemployed.

5. CONCLUSIONS

Examining the effect of minimum wage noncompliance on the sub-minimum wage rate, the present note has shown that noncompliance shifts leftward the labor demand curve of the non-complying employer and shifts rightward the labor supply curve of the underpaid worker. As long as enforcement is insufficient to induce compliance, these shifts will lead to a fall in the equilibrium sub-minimum wage rate. Two important implications follow: first, if the MWL aims at improving wages, workers are better off without a MWL than with one which is not accompanied with sufficient inducement to ensure compliance. Secondly, contrary to a major result in the minimum wage literature, which implicitly assumes that the free-market wage rate is not affected by the introduction of a MWL, noncompliance must not necessarily reduce employment; it may even increase employment if the deterrent effect of the

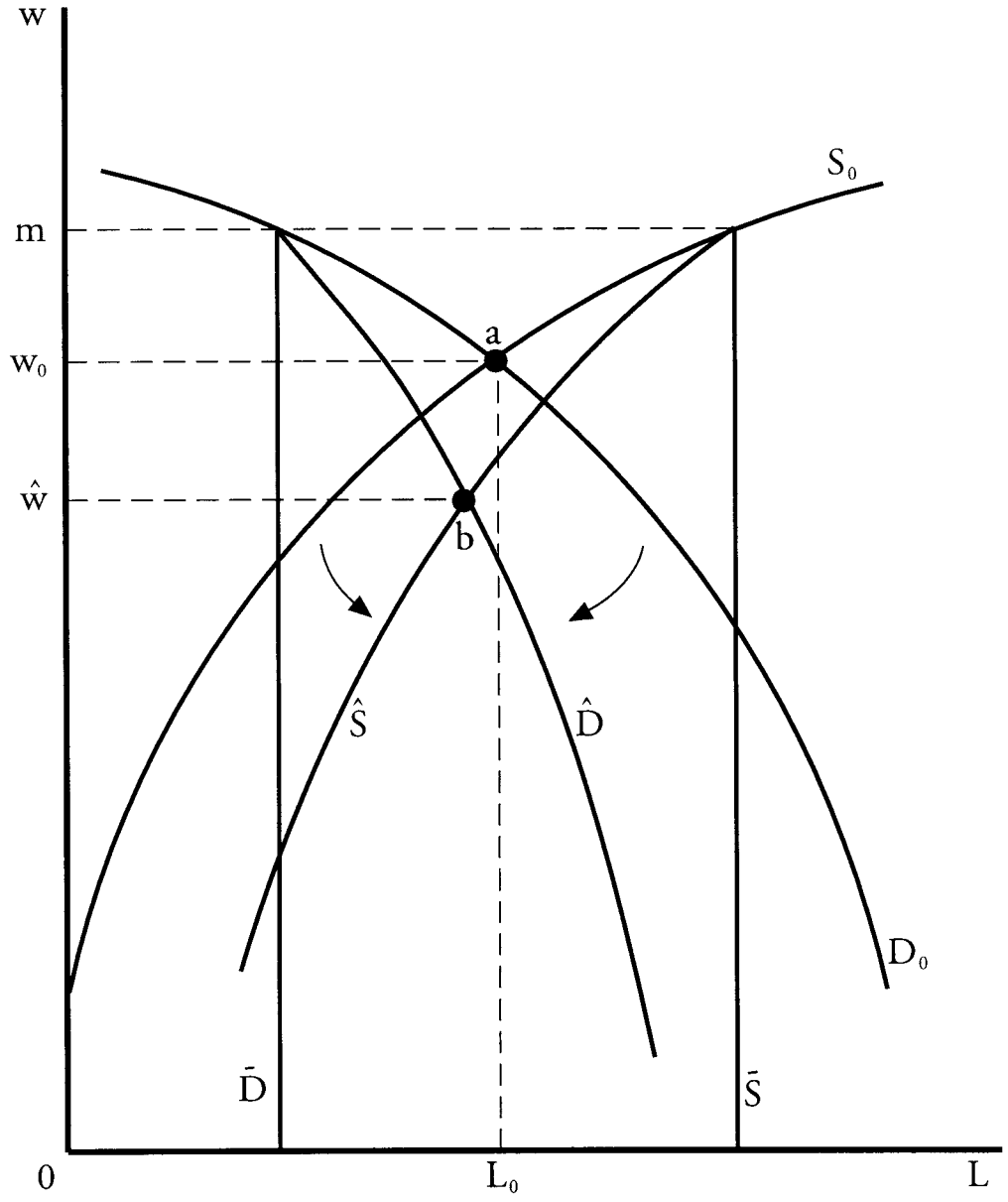

Figure 1: Sub-minimum wage equilibrium

expected penalty is more than offset by the inducement effect of a lower free-market wage rate.

R E F E R E N C E S

Ashenfelter, O., and R.S. Smith. 1979. Compliance with the minimum wage law. *Journal of Political Economy* 87: 333-350.

Chang, Y-M, and I. Ehrlich. 1985. On the economics of compliance with the minimum wage law. *Journal of Political* Economy 93: 84-91.

Chang, Y-M. 1992. Noncompliance behavior of risk-averse firms under the minimum wage law, *Public Finance Quarterly* 20: 390-401.

Grenier, G. 1982. On compliance with the minimum wage law. *Journal of Political Economy* 90: 184-187.

Yaniv, G. 1994. Complaining about noncompliance with the minimum wage law, *International Review of Law and Economics* 14: 351-62.

Yaniv, G. 2001. Minimum wage noncompliance and the employment decision. *Journal of Labor Economics* 19: 596-603.

Yaniv, G. 2004. Minimum wage compliance and the labor demand curve. *Journal of Economic Education* 35: 290-294.