Why Minimum Wage Hikes May Not Reduce Employment

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ECONOMISTS HAVE TRADITIONALLY AGREED THAT INCREASES IN THE MINIMUM WAGE HAVE ADVERSE EFFECTS ON EMPLOYMENT, PARTICULARLY AMONG YOUNG AND UNSKILLED WORKERS.[1] SEVERAL STUDIES HAVE CHALLENGED THIS CONVENTIONAL WISDOM, HOWEVER, FINDING THAT MINIMUM WAGE INCREASES DO NOT APPEAR TO LOWER EMPLOYMENT AMONG TEENS AND RETAIL WORKERS. THESE STUDIES HAVE INFLUENCED THE DEBATE ON WHETHER TO RAISE THE MINIMUM WAGE; PRESIDENT CLINTON, FOR EXAMPLE, STATED IN 1996 THAT "STUDIES SHOW THAT A MODERATE INCREASE IN THE MINIMUM WAGE, ESPECIALLY IN A STRONG ECONOMY, DOES NOT INCREASE THE UNEMPLOYMENT RATE" (PRESIDENT 1996).

Policymakers who support raising the wage floor may accept findings that minimum wage increases do not adversely affect employment, but economists question them. Critics have charged that the studies use poor data or incorrect methodologies. Some economists also argue that no convincing theoretical model predicts that minimum wage increases do not reduce employment. Many of these economists believe that low-wage labor markets are instead characterized by a competitive model that predicts that an increase in the wage floor should always reduce employment. This article describes and evaluates several alternative models that may explain the controversial recent findings and proposes avenues for future research that would help determine the validity of these models.

Recent Research

Recent studies finding that higher minimum wages do not result in lower employment have used a variety of data and methods. Several of them use long time series of data to estimate the relationship between the level of the minimum wage and the proportion of teens who are employed.[2] Other research compares employment levels before and after a specific minimum wage increase. These "difference-in-differences" studies compare the changes in employment among groups strongly affected by a minimum wage hike and relatively unaffected groups.

Several time-series studies of minimum wage effects on teen employment rates do not find that higher minimum wages are associated with significantly lower

employment rates (Neumark and Wascher 1995a; Card, Katz, and Krueger 1994; Wellington 1991). These studies use an econometric method called regression to estimate the effect of the minimum wage on the teen employment-to-population ratio. Wellington (1991) uses national data from 1954 to 1986, and the other two studies use state-level data from the 1970s and 1980s. They generally find a small negative correlation between teen employment and the minimum wage that is not statistically different from zero. Their results are in marked contrast to earlier studies summarized by Brown, Gilroy, and Kohen (1982), which typically concluded from similar methodologies that teen employment rates fell by at least 1 percent when the minimum wage rose by 10 percent. Wellington indicates that the difference in the results is due to including data from the 1980s, a period when the real (inflation-adjusted) minimum wage fell. Card and Krueger (1995), however, suggest that methodological problems biased the results in earlier studies.

Several studies that use a difference-in-differences method also find that minimum wage hikes do not significantly reduce employment. These studies compare the changes in employment between two groups, only one of which is strongly affected by the increase. Card (1992a) compares the effect of the 1990 federal minimum wage increase on teen employment in high-wage states that have a low fraction of teen workers earning less than the new minimum wage with its effect in low-wage states that have a high proportion of affected teens. Standard theory predicts that employment should fall relatively more in low-wage states, but the results indicate similar employment changes in low- and high-wage states. Card (1992b) finds that employment among teens and in retail trade in California did not fall relative to employment in other places after a $0.90 increase in the state's minimum wage in 1988.[3] Katz and Krueger (1992) examine the effects of the 1990 and 1991 federal minimum wage increases on fast-food restaurants in Texas. They find that employment growth was similar at establishments that had to raise their wages to comply with the laws and at higher-paying fast-food restaurants. Card and Krueger (1994, 1998) report that employment at fast-food restaurants in New Jersey did not decline relative to levels in neighboring Pennsylvania when New Jersey raised its minimum wage by $0.80 in 1992.

These findings appear to contradict the predicted negative effect of minimum wage increases on employment in a competitive labor market, leading some economists to question the applicability of the competitive model. Before examining the validity of alternative models, a description of the competitive model is necessary. The next section describes the effect in a simple competitive model of imposing a minimum wage, or raising an existing minimum wage, on employment. Later sections present modifications of the model to examine under what circumstances a higher minimum wage would not reduce employment and discuss whether empirical evidence supports use of these models.

Recent research has challenged the conventional wisdom among economists that increases in minimum wages lower employment among low-wage workers.

The Basic Competitive Model

The simplest competitive model posits a labor market with many identical firms and homogeneous workers. The model assumes that workers must be paid more to induce them to supply additional labor and that the value of the last unit of labor, or marginal product of labor, declines as labor increases. These assumptions generate an upward-sloping labor supply curve and a downward-sloping labor demand curve that together determine the market-clearing equilibrium wage. Although the market labor supply curve is positively sloped, individual firms are assumed to face a horizontal, or perfectly elastic, labor supply curve. That is, each firm is small enough that it can hire workers without affecting the equilibrium wage. The market labor demand curve is the horizontal sum of the individual firms' labor demand curves.

In this simple model, labor is the only input used in production. The number of units each firm can produce is given by a production function $f(l)$, where l is the number of workers employed. Firms pay each worker the market wage, w, and sell their output at a constant price, p, per unit. Firms choose the quantity of labor that maximizes

1. *In one survey, 90 percent of U.S. economists agreed that an increase in the wage floor would increase unemployment among young and unskilled workers (Frey and others 1984). A recent survey asked labor economists the expected percentage change in teen employment if the minimum wage were increased 10 percent (Fuchs, Krueger, and Poterba 1997). The mean response was that teen employment would fall by 2 percent, and the median response was a 1 percent decline.*
2. *Many studies of the effect of minimum wages focus on teens because a relatively high proportion of teens is affected by minimum wage increases. However, not all teens are low-wage workers, so these studies underestimate the effect of a minimum wage increase on affected workers.*
3. *Kim and Taylor (1995) find that employment in retail trade in California grew more slowly in industries and counties that experienced larger wage increases after the minimum wage hike. Card and Krueger (1995) challenge Kim and Taylor's findings.*

profits, $\pi(l)$. Each firm's profit maximization problem is then

$$\max \pi(l) = pf(l) - wl. \quad (1)$$

Each firm maximizes profits by setting the value of the marginal product of labor equal to the marginal cost of labor. Algebraically, the marginal product of labor is the derivative of $f(l)$ with respect to l, or $\partial f(l)/\partial l$. The value of this marginal product is the price of a unit of output multiplied by the marginal product of labor, and the marginal cost of labor is the wage. The profit-maximizing condition is then

$$p \times \partial f(l)/\partial l = w. \quad (2)$$

Equation (2) gives each firm's optimal quantity of labor in terms of the price and the wage. The total quantity of labor employed is simply the number of firms times the amount of labor given by equation (2) since all firms are assumed to be identical.

In the basic competitive model, imposing a binding minimum wage reduces employment. Suppose a minimum wage above w is imposed. Since price is assumed to be constant and the marginal product of labor rises as the quantity of labor hired declines, the only way a firm can satisfy equation (2) is by reducing employment. The magnitude of the employment effect depends on the slope of the labor demand curve. If the demand for labor changes little as the wage changes, or, in other words, if the market demand curve is steeply sloped, then firms' demand for labor is inelastic and the level of employment will be fairly unresponsive to changes in the wage. Conversely, the more elastic each firm's demand for labor is and the flatter the market labor demand curve is, the more employment will fall when the wage increases. Similarly, if a wage floor already exists, raising it must lower employment. This model is inconsistent with research that finds that minimum wage increases do not reduce employment since it predicts that a binding minimum wage always lowers employment by some amount, other things being equal.

The basic competitive model makes many simplifying assumptions that are unlikely to be true, even in low-wage labor markets. The model assumes that all workers have the same skill level and that the output price does not adjust even though the imposition of a minimum wage causes firms to reduce their output. The competitive model also assumes that firms can hire an unlimited number of workers at the market wage instead of having to offer a higher wage in order to attract more workers. The minimum wage is exogenously imposed in the model, so its level is assumed not to depend on the expected effect on employment. These simplifications are modified in the models discussed in the following sections. All of the modified models predict that imposing a minimum wage can reduce employment or have no effect, but some also predict that a minimum wage can increase employment.

Alternative Models

Substitution. Incorporating workers with different skill levels in the basic competitive model yields the prediction that a minimum wage will lower employment among low-wage workers but may not lower total employment. Suppose that there are two types of workers, skilled and unskilled, and firms can imperfectly substitute among the two. The market-clearing wage for unskilled workers is w_1, and the market wage for skilled workers is w_2. Each firm's profit maximization problem is then

$$\max \pi(l_1, l_2) = pf(l_1, l_2) - w_1 l_1 - w_2 l_2, \quad (3)$$

which is similar to equation (1) but now has two types of labor.

Profit maximization requires that the ratio of the value of the marginal products of the two types of workers be equal to the ratio of their wages, or

$$\frac{\partial f(l_1, l_2)/\partial l_1}{\partial f(l_1, l_2)/\partial l_2} = \frac{w_1}{w_2}. \quad (4)$$

Equation (4) yields the ratio of skilled to unskilled workers hired at each firm.

If a minimum wage above the market-clearing wage of unskilled workers but below the wage of skilled workers is imposed, the ratio of skilled to unskilled workers will rise. Firms can either reduce the number of unskilled workers and leave the number of skilled workers unchanged or substitute skilled for unskilled workers. Which outcome occurs depends on the specific form of the production function. If all firms hire more skilled workers, the market wage for skilled workers, w_2, is likely to rise, and such a wage increase will dampen the increase in the number of skilled workers employed. Employment of workers who initially earn less than the minimum wage declines and the employment of higher-paid workers may rise, but the effect on total employment is indeterminate. Under certain assumptions, the negative effect on employment of unskilled workers outweighs any positive effect on skilled workers.[4] The total employment effect cannot be positive in this model because the wages of at least one, and possibly both, types of workers increase. Similarly, employment of unskilled workers will fall, and the effect on total employment is indeterminate without further assumptions if an existing wage floor is raised to some level between w_1 and w_2.

Empirical evidence provides indirect support for the substitution model. Individuals who have lower wages or are likely to be less skilled appear to be more adversely affected by minimum wage increases than other workers. Currie and Fallick (1996) and Neumark and Wascher (1995b) find that teens who initially earned less than a

CHART 1
Individual Firm's Response to Wage Increase

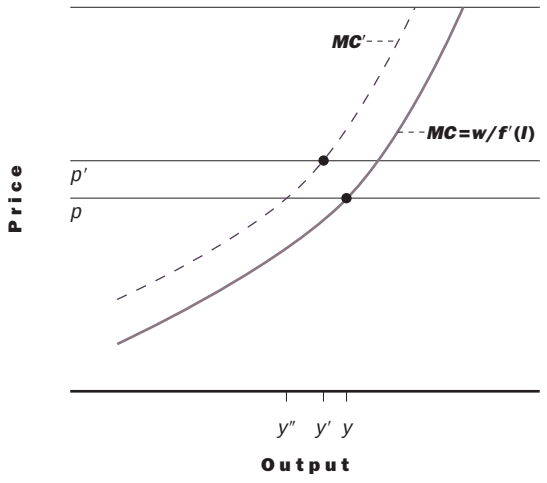
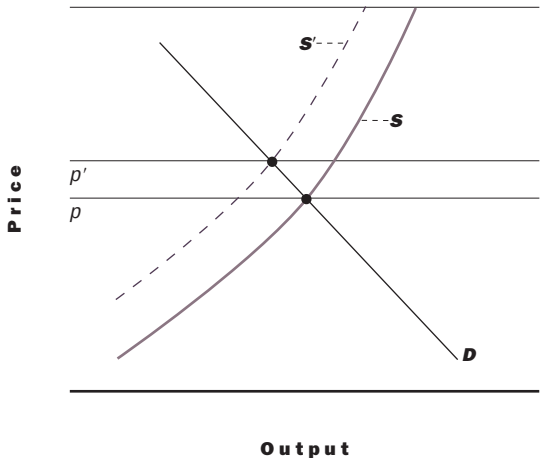


CHART 2
Industry Response to Wage Increase



subsequently imposed minimum wage are less likely to remain employed a year later than teens who initially earned more than the new minimum wage. Katz and Krueger (1992) suggest that minimum wage increases caused Texas fast-food restaurants to substitute full-time for part-time employees, who may be less skilled. Research has also documented a "ripple effect," in which the wages of workers who earn more than the minimum wage increase when the minimum wage is raised (Card and Krueger 1995). This finding is consistent with the fact that demand for higher-skilled workers increases when the wages of lower-skilled workers are forced up by the minimum wage.

There is little evidence, however, directly indicating that substituting higher-skilled workers for lower-skilled workers when the minimum wage rises leaves total employment unaffected. Currie and Fallick (1996) and Neumark and Wascher (1995b) both suggest that minimum wage increases reduce employment among low-wage teens, who presumably have low skill levels. However, total teen employment may still be unaffected by minimum wage hikes if higher-skilled teens replace lower-skilled teens. Indeed, results reported by Neumark and Wascher suggest that eighteen- and nineteen-year-olds and white teens displace sixteen- and seventeen-year-olds and minority teens from their jobs when the minimum wage increases. Further research using individual-level data is needed to confirm that there are positive employment effects among more highly skilled teens and that this substitution accounts for the failure to find overall negative effects. Research on whether firms substitute among workers of different skill levels and whether their doing so causes total employment to remain unchanged is also needed. The paucity of firm-level data and the lack of clear measures of skill levels limit research on whether firms substitute among workers when the minimum wage rises. Case studies and interviews with managers would advance the understanding of the effects of minimum wage increases.

Price Effects. The basic competitive model with one or two types of workers, outlined above, assumes that prices do not change when the minimum wage increases and firms reduce employment. However, the decline in employment is likely to cause total output to fall, and, in turn, the decrease in output will normally cause prices to rise. An increase in prices ameliorates the decline in employment but is unlikely to completely counteract it, depending on the extent to which supply and demand respond to price changes.

The effect of allowing price to change when a wage floor is imposed (or raised) is illustrated in Charts 1 and 2. Chart 1 shows the supply curve of an individual firm, where the firm's supply curve is the same as its marginal cost curve. Imposing a binding minimum wage will cause the firm's marginal cost to increase in proportion to the increase in the wage; that is, the firm's marginal cost curve shifts from MC to MC'. Chart 2 shows both the industry supply curve, which is the horizontal sum of the individual firms' supply curves, and the demand curve faced by the industry. As each firm's marginal cost increases, the industry supply curve shifts from S to S'. The decline in industry output causes the price to increase from p to p'. If the price did not increase, each firm's output would fall from y to y'' in Chart 1, but the rise in the price causes output

4. For example, Card and Krueger (1995) demonstrate that if a constant-returns-to-scale production function is assumed, total employment falls if there is also a third, nonlabor input.

to fall only from y to y'. The magnitude of the change in price will depend on the elasticities of the supply and demand curves. If demand is completely inelastic, or the demand curve is vertical in Chart 2, employment does not fall because the price increase completely offsets the tendency for the wage increase to reduce employment.

Two studies find that restaurant prices tend to rise when minimum wages increase. Research on price effects of minimum wage hikes has focused on the restaurant industry because of the prevalence of low-wage workers in the industry. Card and Krueger (1995) examine the correlations between a price index of the cost of food eaten away from home or the price of a hamburger and the fraction of restaurant workers in a city affected by the federal minimum wage increases in 1990 and 1991. They find that prices appear to have risen more quickly in cities that had a higher fraction of affected workers. Aaronson (1997) also finds that restaurant prices increase when the minimum wage rises. Both studies suggest that price increases are approximately equal to the increase in labor costs due to the minimum wage increase.

Several models can explain why employment does not appear to fall when the minimum wage increases, but further research is needed to determine their validity.

However, there is also some evidence that prices do not adjust. Katz and Krueger (1992) find no evidence of relative price increases at fast-food restaurants in Texas that were more affected by a minimum age increase. Card (1992a) finds that fast-food prices and a food-away-from-home price index rose at similar rates in California and in comparison areas after California raised its minimum wage. Even if prices rise when the minimum wage increases, price effects are unlikely to fully offset disemployment effects since demand in the restaurant industry does not appear to be completely inelastic.[5] The demand for labor would have to be unresponsive to wage changes for price effects to completely counteract the disemployment effects of a minimum wage increase, and it is not.

The "hungry teenager" theory offers another explanation for the failure to find negative employment effects in some studies (Kennan 1995). A minimum wage increase is likely to boost the earnings of some workers, and these workers may spend their extra income on low-wage goods and services, such as fast food. In effect, as one restaurant owner stated, "Our employees are our customers."[6] Such an increase in demand could offset the disemployment effect of the minimum wage hike if the demand curve shifts out enough to counteract the inward shift of the supply curve in Chart 2. Research indicates that minimum wage hikes do raise the earnings of low-wage workers on average (Neumark and Wascher 1997), but there is no direct evidence that this extra income is spent in low-wage industries.

Monopsony. Another model that almost invariably appears in textbook discussions on the minimum wage is the traditional monopsony model, which predicts that minimum wages can raise employment over a limited range. A monopsonist is a firm that faces an upward-sloping labor supply curve; a firm that is a perfect competitor in the labor market faces a horizontal labor supply curve and can hire an unlimited number of workers at the market-clearing wage. A monopsonistic firm, in contrast, must raise the wage it offers in order to hire additional workers. The monopsonist has to pay $w(l)$ to each worker to hire l workers, and $\partial w(l)/\partial l$ is positive because the labor supply curve for the firm is positively sloped. If workers are homogeneous and the output price is constant, the firm's profit-maximization problem is

$$\max \pi(l) = pf(l) - w(l)l. \qquad (5)$$

The monopsonist determines the quantity of labor to hire by setting the value of the marginal product equal to the marginal cost of labor, or

$$p \times \partial f(l)/\partial l = w(l)\left[1 + \frac{l \times \partial w(l)/\partial l}{w(l)}\right]. \qquad (6)$$

The marginal cost of labor is no longer equal to the wage, as in equation (2). Instead, the cost of hiring an additional worker is the wage paid to that worker plus the increase in the wages of all current workers. The monopsonist determines the quantity of labor to hire by setting the value of the marginal product equal to the marginal cost, as given by equation (6). The wage paid to each worker is determined from the labor supply schedule $w(l)$, as shown in Chart 3. The equilibrium outcome is given by w and l in Chart 3.

The gap between the marginal cost of labor and the wage allows a minimum wage to potentially increase employment. Suppose a minimum wage of w' is imposed in Chart 3. The firm has to raise the wages of current workers to w' and can also hire some additional workers at the minimum wage; the firm increases employment to l' because the value of the marginal product exceeds the marginal cost of labor for up to l' workers. In Chart 3 the minimum wage acts as the marginal cost curve up to the point where the wage floor intersects the labor supply curve; the dashed horizontal line at w' effectively replaces the marginal cost curve MC up to l'. Beyond that point, the marginal cost curve reverts to the original, upward-sloping curve given by MC. It is unprofitable for the firm to hire more than l' workers because the cost of hiring each additional worker beyond l' exceeds the value of that worker's marginal product.

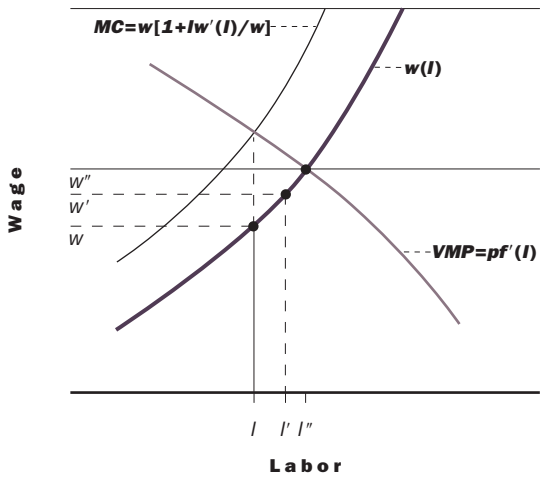
A minimum wage of w'' maximizes employment in Chart 3. Setting the minimum wage at the point at which the labor supply schedule and the value of the marginal product are equal replicates the competitive model's outcome. If the minimum wage rises above w'', employment falls because the monopsonist now determines employment from the intersection of the wage floor and the value of the marginal product curve. Imposition of a minimum wage or an increase in an existing wage floor can thus cause employment at a monopsonistic firm to rise, fall, or remain constant, depending on the level of the minimum wage.

Many economists doubt that the monopsony model explains recent research on the effects of minimum wage increases.[7] The model is generally believed to apply to firms that hire a large proportion of the workers in a labor market and seems unlikely to describe the low-wage labor market, which is usually characterized by a large number of small firms. In particular, it seems unlikely to apply to the fast-food restaurants that Card, Katz, and Krueger focus on in several studies. In addition, research on prices is inconsistent with the monopsony model's result that a minimum wage hike raises employment. If a minimum wage increase raises total employment, output should also increase. An increase in output should lower prices, and there is no clear evidence that prices fall as the minimum wage increases.

Another difficulty with the monopsony model is that its predictions for an industry may differ from its predictions for a firm. The traditional monopsony model is designed to describe a single firm that has power in the labor market, not an industry. Total employment may not increase after a minimum wage is imposed even if every firm in a labor market is a monopsonist that experiences an increase in employment. Indeed, total employment must fall in the model if each monopsonistic firm in an industry earns zero profits before a minimum wage is imposed. Suppose each firm faces a fixed cost equal to the difference between the value of the marginal product and the wage w in Chart 3. If a minimum wage is imposed, the cost of labor and the fixed cost exceed a firm's revenue. The only way a firm can return to zero losses at the higher employment level is for the price to increase. The industry price increases only if total output falls, as it does if total employment falls. If each firm in a perfectly competitive industry has monopsony power in the labor market, imposing a minimum wage raises employment at each remaining firm but lowers total employment because some firms leave the industry.

One low-wage industry that might be characterized by monopsony is restaurants with tipped workers. Wessels

CHART 3
Monopsonistic Firm's Response to Wage Floor



(1997) posits that if a restaurant hires an additional worker, average tips per worker fall and the restaurant has to make up the loss in each worker's wages. This dynamic creates the gap between the marginal cost of labor and the wage that characterizes monopsony. Wessels also shows that employment in the restaurant industry first rises and then falls as the minimum wage for tipped workers increases, matching the prediction of the monopsony model. The possibility of monopsonistic effects among tipped workers may explain findings that minimum wage increases do not reduce employment among teens since a large portion of teens work in the restaurant industry; positive effects among some tipped workers may counteract employment losses in other industries. Further research comparing employment effects among tipped workers and other workers is needed before accepting this theory as the explanation for recent findings. In addition, Wessels's theory cannot explain the recent findings on fast-food establishments, which do not have tipped workers.

Dynamic Monopsony. Some models that focus on firms' search for workers and workers' search for jobs imply that a minimum wage increase may not reduce employment. These search models are like the traditional monopsony model in that firms set wages instead of acting as price takers in the labor market, but they are considerably more complex. Firms' ability to hire or retain workers depends on their wages and on the wages offered by other firms. Firms that offer relatively higher wages attract and keep more workers, and if workers are of varying quality, firms that offer higher wages have higher-quality workers.

5. D. Brown (1990) estimates that the elasticity of demand for the restaurant industry is –0.2 and the elasticity of demand for the fast-food industry is –1. Demand is completely inelastic if its elasticity is zero, in which case the demand curve is vertical.

6. See Wall Street Journal, *November 20, 1996.*

7. For further discussion, see, for example, C. Brown (1995), Hamermesh (1995), and Welch (1995).

Imposing a minimum wage or raising an existing wage floor can raise the wages offered by some firms and, under certain assumptions, will not lower employment at those firms.

The dynamic monopsony model most commonly cited in the minimum wage literature is Burdett and Mortensen (1989).[8] In the model, employed individuals accept any job offer that exceeds their current wage, and unemployed individuals accept any offer that exceeds their reservation wage (the lowest wage at which they are willing to work). Under the assumption that firms are identical and workers are equally productive, Burdett and Mortensen show that there is a distribution of wages across firms, with larger firms paying higher wages. All firms earn equal profits. If all unemployed workers have the same reservation wage, the lowest wage offered is the reservation wage. A minimum wage above the reservation wage has no effect on employment in the model because all offers were already acceptable to unemployed workers. A minimum wage merely transfers profits from firms to workers. If reservation wages differ across workers, a minimum wage can raise employment because it increases the likelihood that unemployed workers receive offers above their reservation wages. A wage floor can lower employment, however, if it is set too high relative to workers' productivity.

Dynamic monopsony, or imperfect search, models seem more applicable than the traditional monopsony model to low-wage labor markets. As Machin and Manning (1992) explain, a key feature of dynamic monopsony models is that workers have imperfect information about the job opportunities offered by different firms. Such models often assume that workers' knowledge about the wage distribution is limited to the offers they receive. An employer that offers a lower wage than other firms loses workers slowly over time as workers receive better offers. In the perfect competition model, in contrast, workers have perfect information, and a firm that offers a wage below the market level will lose all of its workers instantly. The dynamic monopsony model seems relevant for markets with a large number of small employers, which characterizes many low-wage industries.

Search models are also appealing to many economists because they can explain many empirical regularities observed in the labor market. Wages differ substantially across workers with similar characteristics and similar jobs, and turnover is lower in industries that pay higher wages (Krueger and Summers 1988). Larger firms tend to pay higher wages (Brown and Medoff 1989). Low-wage firms appear to have a substantial number of vacancies; for example, more than 40 percent of surveyed restaurant operators reported they had at least one position vacant for more than two weeks in December 1989 (National Restaurant Association 1990). Vacancies should not occur in perfectly competitive labor markets because wages adjust to equilibrate labor demand and supply. In the monopsony framework, firms with vacancies do not offer a higher wage because they would also have to pay the higher wage to current employees. A minimum wage increase that forces firms to raise wages may attract more workers to fill vacancies, causing employment to rise.

Dynamic monopsony models may explain some of the recent research findings. However, additional evidence is necessary. Empirical work has not tested whether hires increase and vacancies and quits fall as the minimum wage increases. Establishment-level data on vacancies, hires, and quits as well as wages and employment before and after a minimum wage hike need to be collected in order to test the dynamic monopsony model. Further research on prices is also needed if dynamic monopsony models are invoked to explain positive employment effects of minimum wage increases. Like the traditional monopsony model, these models imply that output increases when employment increases, and there is little evidence of the expected accompanying fall in prices.

Endogeneity. All of the above models simply assume that a wage floor is imposed or raised, ignoring how the minimum wage is determined. However, the level of the minimum wage may depend on the expected effect on employment. Federal and state minimum wages in the United States are primarily set by politicians, who are likely to be concerned about the potential negative effects of a minimum wage increase and its effects on their reelection chances. Politicians may opt not to raise the minimum wage if the disemployment effect will be large or if it will substantially erode businesses' profits. If any negative effects are likely to be minimal, perhaps because the economy is doing well and average wages are rising, politicians may raise the minimum wage in an effort to appeal to low-wage voters without losing too much support from businesses.

Lawmakers' statements suggest that the timing of minimum wage increases depends on economic conditions and on the likely impact. For example, the governor of Connecticut, approving an $0.88 increase in the state's minimum wage in 1987, observed that "the state with the best economy in the nation can afford this minimum wage."[9] The commission that determines state minimum wages in California refused to increase the state's wage floor in 1993 because "any increase would further damage the state's ailing business climate."[10] The New Jersey state legislature and governor approved in 1990 a $0.90 minimum wage increase to take place in 1992; when the state's economy slipped into a recession during the intervening period, the legislature tried to delay part of the scheduled increase.[11]

If minimum wage increases are designed to occur when they will have minimal impact, it is not surprising that researchers have had difficulty finding negative employment effects. If the level of the minimum wage depends on its effect on employment, the minimum wage is endogenous with respect to employment. Traditional

techniques that measure the effect of the minimum wage on employment that do not account for this endogeneity will yield incorrect results. As discussed earlier, the typical time-series model regresses the teen employment rate on a measure of the minimum wage and other variables. This estimation technique requires that the minimum wage variable be uncorrelated with the error term in the regression, or that shocks to teen employment do not affect the minimum wage. But if minimum wage increases occur when teen employment is high, the minimum wage is likely to be positively correlated with the error term. The estimated effect of the minimum wage will then be positively biased. Failure to control for endogeneity bias causes the disemployment effect to be underestimated. Similarly, difference-in-differences comparisons between employment changes in states that raise their minimum wage and states that do not may be biased if teen employment is initially growing faster in the states that raise their minimum wage and this growth prompts the hike. These cross-state comparisons are particularly susceptible to endogeneity bias since there must be some differences between the states that lead some but not others to raise their minimum wage.

One method of controlling for endogeneity bias is finding a source of variation in minimum wages that is unrelated to economic conditions. More formally, at least one variable that is strongly correlated with the minimum wage but uncorrelated with the error term in the employment regression is needed to identify the true effect of the minimum wage on employment. This econometric technique is termed instrumental variables estimation. In effect, an instrumental variable (which is uncorrelated with the residual in the employment regression) is substituted for the endogenous variable. Neumark and Wascher (1992) attempt to identify the effect of minimum wage increases by using the average minimum wage in neighboring states as an instrument for state minimum wage levels. They obtain more negative estimates of the effect of the minimum wage on employment among teens and young adults, a finding that is consistent with endogeneity bias, but the estimates are imprecise. In addition, the average minimum wage of neighboring states may be a problematic instrument if contiguous states move together in business cycles. Further research using more powerful instruments that are uncorrelated with economic conditions is necessary to support the claim that endogeneity bias causes nonnegative estimates of the employment effect of the minimum wage.

An alternative method of controlling for endogeneity bias is to find a minimum wage increase that is plausibly unrelated to economic conditions. Card (1992a) offers an example of such research. Cross-state comparison of the effects of the 1990 federal minimum wage hike should be immune from endogeneity bias since the minimum wage increase was imposed on the states by the federal government. In addition, the states most affected by the federal minimum wage increases were those that had opted to keep their state minimum wages at low levels, and the states that were least affected had already increased their state minimum wages above the federal level; the endogeneity hypothesis implies that these high-wage states were growing faster than low-wage states before the minimum wage hike. Card finds no evidence of negative employment effects in low-wage states relative to high-wage states; this lack of evidence does not support the possibility that endogeneity underlies the failure to find negative effects in other studies.

Recent findings that minimum wage increases do not appear to affect employment adversely should be taken as the starting point for a larger examination of the effects of the minimum wage level.

Additional Theories. Firms could attempt to offset an increase in their wage bill due to a minimum wage hike by reducing other labor costs, such as fringe benefits and training. If firms can completely offset a minimum wage increase by cutting other costs, they might not reduce employment. Although this theory is plausible, it is unlikely that low-wage employers have been able to substantially reduce nonwage labor costs because they provide relatively little in fringe benefits and training. Alpert (1986) notes that restaurant workers, for example, received about 20 percent of the fringe benefits income received by other workers. Alpert finds that restaurants slightly reduced fringe benefits when the minimum wage rose during the 1970s, but Katz and Krueger (1992) find no evidence that fast-food restaurants that were more affected by minimum wage increases cut fringe benefits relative to higher-wage establishments. The prevalence of on-the-job training also appears to be low in low-wage, entry-level jobs; Lynch (1992) reports that only 4.2 percent

8. Other papers include Lang (1994), who develops a bilateral search model in which a minimum wage can raise total employment but cause employment among low-wage workers to fall, and Rebitzer and Taylor (1995), who present an efficiency wage model in the context of a minimum wage that has implications similar to a monopsony model.

9. Bureau of National Affairs, Daily Labor Report, *August 17, 1987, A2.*

10. Ibid., August 31, 1993, A9.

11. Ibid., March 25, 1992, A3.

of young adults who did not complete college reported receiving on-the-job training.

Another potential reason why employment might not fall when the minimum wage increases is that employers might not comply with the new law. For example, Card and Krueger (1995) find that the noncompliance rate, or the percentage of workers earning less than the minimum wage who should be paid at least the wage floor, rose from 31 percent to 46 percent in California after the state's 1988 minimum wage hike. However, of the studies finding that minimum wage increases did not reduce employment that also investigate the effect on wages, all find that the increases had a substantial effect on the distribution of wages, indicating that most employers complied with the law.

Some employers do not have to comply with minimum wage laws, and economists have posited that displaced workers might move to these firms when the minimum wage increases. The federal minimum wage law does not apply to some very small firms and to some agricultural establishments. Workers who are laid off from jobs covered by the minimum wage might find jobs in the uncovered sector, explaining why total employment appears unaffected. However, the uncovered sector composes only a small percentage of employment, making it unlikely that it could absorb many displaced workers. This theory also cannot account for the finding that employment at specific restaurants does not fall when the minimum wage increases.

Conclusion

Recent research has challenged the conventional wisdom among economists that increases in minimum wages lower employment among low-wage workers. Previous research generally found small but significant negative effects of higher minimum wages on low-wage workers, particularly teenagers. Although some studies, such as Deere, Murphy, and Welch (1995), continue to find negative effects, the findings of Card, Katz, and Krueger and others raise the question of whether the minimum wage can be raised moderately without reducing employment. If these findings are correct, economists may need to reconsider their views of how labor markets work.

Two of the models explored here seem unlikely to explain why minimum wage increases do not reduce employment: price effects and traditional monopsony. Price increases can ameliorate the disemployment effects of a minimum wage hike in the competitive model, and some studies find that prices in the restaurant industry rise when the minimum wage increases. However, demand must be completely inelastic—and it is not likely to be—for price changes to completely offset the negative employment effects. Most economists are unwilling to accept the monopsony model because they believe that few low-wage employers are large enough to face an upward-sloping labor supply curve.

Several models can explain why employment does not appear to fall when the minimum wage increases, but further research is needed to determine their validity. The substitution model, which posits that employers replace lower-skilled workers with higher-skilled workers when the minimum wage increases, can predict that total employment is unchanged. Some studies find results consistent with this model, but research with establishment-level data on whether employers substitute among workers with different skill levels and leave total employment unchanged when the minimum wage increases is needed. Dynamic monopsony models with frictions in search processes can predict that employment increases, decreases, or is unaffected by a minimum wage hike. These models are appealing because they can explain many stylized facts about the labor market. However, their ambiguous predictions of the effect of a minimum wage increase make them difficult to test. Research that examines the effect of minimum wage increases on vacancies, quits, and hires is needed. The endogeneity hypothesis that minimum wage increases occur when disemployment effects are minimal also requires further research to establish its validity.

Employment is not the only area worthy of further research on the effects of minimum wage increases. The distributional consequences of minimum wage increases are at least as important as the employment effects, particularly if higher-skilled workers displace lower-skilled workers when the minimum wage rises.[12] Minimum wage increases may also slow the rate of small business formation, a possibility that has not received much attention in the economics literature. The recent findings that minimum wage increases do not appear to affect employment adversely should be taken as the starting point for a larger examination of the effects of the minimum wage level rather than an end to the debate.

12. For research on the distributional effects of minimum wage increases, see Burkhauser, Couch, and Wittenburg (1996), Addison and Blackburn (1997), and Neumark and Wascher (1997) .

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