Oligopsony and Monopsonistic Competition in Labor Markets*

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November 21, 2001

Abstract

We argue that models of oligopsony or monopsonistic competition provide insights and explanation for many empirical phenomena in labor markets. Using a simple model with job differentiation and preference heterogeneity, we illustrate how such models can be employed to explain: the existence of wage dispersion, the persistence of labor market discrimination, market failures in the provision of training, and the anomalous employment effects of minimum wages.

*The views expressed are not to be attributed to the Bureau of Labor Statistics or to the Department of Labor. We thank Alan Krueger, Michael Ransom, Dan Sullivan, Timothy Taylor, Randy Verbrugge and Mike Waldman for helpful comments and suggestions. V. Bhaskar is grateful to the Economic and Social Research Council, UK, for its support under research grant L138251029.

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Since its genesis in industrial organization and the theory of the firm, the assumption of imperfect competition has permeated many fields of economics ranging from international trade to macroeconomics to public finance. For example, in the 1980s, the introduction of product market imperfections revolutionized our understanding of trade policies and comparative advantage (Brander and Spencer, 1985; Krugman, 1979). At the same time, macroeconomists began to use models of monopolistic competition to explain how small costs of adjusting prices could give rise to business fluctuations (Akerlof and Yellen, 1985; Blanchard and Kiyotaki, 1987; Mankiw, 1985). This trend is now influencing labor economics, with a growing literature arguing that employers have some market power in the setting of wages. Indeed, the most common sources for market power—product differentiation and imperfect information—seem to apply with equal if not greater force to labor markets as compared to product markets. The advantage of an approach based on oligopsony is that it leads to more plausible and less elaborate explanations of many labor market phenomena that are otherwise regarded as puzzles. This paper provides a brief survey of a number of areas where this approach has proved fruitful in recent years.

One point should be clarified at the outset. The question of whether a labor market is "imperfectly competitive" is often equated with the question of whether an employer is a monopsony in the traditional sense—that is, the sole employer in a labor market. Traditional monopsony is clearly unrealistic, since employers obviously compete with one another to some extent. But there are a range of choices between perfect competition and monopsony where a degree of market power coexists with competition between employers. It is best to think in terms of "oligopsony" or "monopsonistic competition" as the most accurate descriptions of the labor market we envisage. Oligopsony describes a situation where employer market power persists despite competition with other employers—the number of employers does not need to be small. Monopsonistic competition is oligopsony with free entry, so that employer profits are driven to zero.

'The Law of One Wage'

We begin with an empirical example that is difficult to explain using a competitive model. One key prediction of perfectly competitive labor markets is the "law of one wage," which holds that there should be a single market wage for a given quality of worker. Even in goods markets with identical products, prices often vary. The existence of substantial wage dispersion among workers of very similar quality suggests that labor market imperfections are important and inevitably give employers some oligopsony power. A large empirical literature, dating back to the 1940s, finds evidence of substantial wage dispersion among workers that do the same job in the same city. The classic references are the case studies of Lester (1946), Reynolds (1951), and Slichter (1950). Although the data in these studies are now 50 years old, their conclusions probably remain valid today.

An informal telephone survey of fast food restaurants in Northern Virginia provides a clear and simple example of wage dispersion. The starting hourly wage among six restaurants surveyed, located within a circle of one-mile radius, ranged from $5.15 (the national minimum wage) up to $6.00 with a mean wage

of $5.78. Contrary to the competitive theory of labor markets, these low-skilled, non-unionized workers are paid different wages by different employers.

For a more formal illustration of wage dispersion, we consider the hourly wages of teenagers from the U.S. Current Population Survey for 1998–2000. After detrending wages, the teenager at the 90th percentile has an hourly wage 88 percent above the teenager at the 10th percentile. Of course, a portion of these differentials results from differences in personal characteristics, location and occupation. But, even after we control for gender, race, education, age, city, industry and occupation (a total of 903 dummy variables), substantial wage dispersion remains: the teenager at the 90th percentile still earns 63 percent more than the one at the 10th percentile.

The problem with this evidence is that teenagers undoubtedly differ in ways that are unobserved by the researcher but are likely to be relevant in explaining wages. Perhaps the most pervasive explanation of this kind is "unobserved ability" as an explanation for apparent wage dispersion. Much empirical work in this area has focused on seeking controls for unobserved ability. For example, one focus is on the existence and size of industry-wage differentials—that is, whether workers of a given skill level are paid more in some industries than in others. Krueger and Summers (1988) and Gibbons and Katz (1992) provide evidence that the change in wages for an individual is related to the change in industry affiliation. If we assume that an individual's unobserved ability is relatively constant over time, this provides an estimate of inter-industry wage differentials that cannot be attributed to unobserved individual ability. Although Murphy and Topel (1987) and Keane (1993) contest this conclusion, they also find some wage dispersion that cannot be explained.

An alternative approach to demonstrating the existence of wage dispersion is to test predictions based on this view of labor market behavior. If wages are set purely according to productivity, then high-wage workers and low-wage workers will have little reason to quit jobs at different rates; after all, the high-wage worker will just be moving to another job where high productivity leads to high wages, and the low-wage worker to another job where low productivity leads to low wages. But if considerable wage dispersion exists, then high-wage workers of a given skill level will be less likely to quit because they are less likely to find a better job elsewhere. Conversely, lower-paid workers should be more active in seeking alternative jobs, because in a world of wage dispersion, they have a better chance that the next job, even at the same low skill level, will be substantially higher-paid.

The evidence is in line with these predictions. A large established literature on the impact of wages on separation rates finds that higher wages, ceteris paribus, lead to lower quit rates (for example, Pencavel, 1972; Viscusi, 1980). Some estimates of the sensitivity of separations to wages from four data sets are presented in Table 1. For U.S. data, there is the Panel Survey of Income Dynamics (PSID) and the National Longitudinal Survey of Youth (NLSY). For U.K. data, there is the British Household Panel Survey (BHPS) (which is roughly the British equivalent of the PSID) and the Labor Force Survey (LFS) (which is roughly the British equivalent of the U.S. Current Population Survey). The first row of the table shows the mean separation rate, which varies according to the data set used. For U.S. youth in the NLSY data, 55 percent of workers leave jobs in a given year; for U.S adults in the PSID, 21 percent separate each year (the difference is largely because the NLSY sample is younger). For the

U.K. data sets, the separation rate appears much lower in the LFS because it is a quarterly rate, not an annual one.

The next row of Table 1 reports the results of a regression where the dependent variable takes on the value of 0 if the individual has not left a job over the period and a value of 1 if the individual has left a job over the period. The row headed "no controls" uses the wage as an explanatory variable. Thus, in the PSID data a 10 percent increase in wages is associated with a 9.44 percent decrease in the separation rate. In all four data sets, higher wages significantly reduce quit rates. The third row includes controls for education, race, marital status, children, region, experience, and year. The fourth row includes one more control variable, for length of job tenure. In all four data sets, the impact of wages on reducing separation rates remains substantial in magnitude and statistically significant.

Some economists doubt the importance of labor market imperfections because of high levels of labor turnover, which seems to imply an active and flexible labor market. But, it is not the *level* of labor turnover that is important; it is the *sensitivity* to the wage. One reason that employers in effect face an upward-sloping supply curve for labor, rather than a horizontal supply curve for labor, is because a higher wage retains workers more effectively.

Other evidence on this point comes from data on job search. The U.S. Current Population Survey does not contain information on job search by employed workers, but the British Labor Force Survey does. Some results are reported in Table 2. The first two columns look at those searching for another job. The dependent variable is 0 if they are not searching for another job and 1 if they are. As shown in the bottom row, 6 to 7 percent of workers are looking for another job at any given time. The second column shows the coefficient on wages as an explanatory variable; control variables for race, education, experience, job tenure, month, year, and region were also used, although the coefficients are not shown in the table. The last two columns use as an explanatory variable "number of search methods," the most common of which are going to the public employment service (more common in the United Kingdom than the United States), reading and responding to advertisements, and asking friends and relatives. Men and women as groups, including those who are not searching for jobs, use on average only about 0.22–0.26 of these methods, as shown in the bottom row (though, among those who do search, an average of about three methods is used).

All the specifications tell the same story. Those in higher-paid jobs are less likely to look for other jobs and to search less intensively (as measured by the number of search methods) when they do. This finding is consistent with there being good jobs and bad jobs for workers with the same personal characteristics. Workers in the bad jobs devote a great deal of effort to searching for good jobs; workers in good jobs already have good jobs, so they search less hard. In addition, if low-paid workers face a greater risk of being laid-off, they will expend greater effort in searching for good jobs.

Because one can always suggest factors that are difficult or impossible to observe or measure, it is difficult to rule out all alternative hypotheses and prove conclusively the existence of wage dispersion for similar workers. But a fair reading of the evidence suggests that wage dispersion among similar workers is a real phenomenon. This finding presents a significant problem for the competitive framework. The alternative to perfect competition is to consider models in which

employers have market power.

The Sources of Market Power

The model of the perfectly competitive labor market is based on the assumption that employees have a free and costless choice of a large number of employers for whom they might work. Competition among these employers then leads to a single market wage (or utility, if jobs differ in nonpecuniary aspects) for each type of worker. Any attempt by an employer to cut wages will cause all existing workers to leave the employer instantaneously. In other words, perfect competition implies that the wage elasticity of the labor supply curve facing an individual employer is infinite.

In contrast, with models of oligopsony or monopsonistic competition, the labor supply curve facing an individual firm is not perfectly elastic. The description of the perfectly competitive labor market itself suggests a number of reasons why labor supply might be less than perfectly elastic. The absence of perfect information on alternative possible jobs, as modeled in search models like Burdett and Mortensen (1998), is one reason; if workers must search for new jobs, a cut in wages will not result in the immediately resignation of all employees. Or it may be costly for workers to move between employers. Or workers may have heterogeneous preferences for different jobs; for example, a worker may have equal productivity in two jobs as measured by marginal revenue product, but the worker prefers the kind of work or working conditions in one job over the other. To keep the explanation simple we focus on this last possibility: we now sketch a model that focuses on the case of heterogeneous preferences.

Suppose that workers with identical skills and abilities have heterogeneous preferences over nonwage job characteristics. Nonwage job characteristics include the job specification, hours of work, distance of the firm from the worker's home, and the social environment in the workplace. For example, some workers are sociable and like meeting customers, while others are more retiring and prefer to work alone. Some workers find the chopping of meat a "brutal and odious business" (Smith, 1776 [1976], book 1, chapter 10), while others may not have such strong feelings and might instead have difficulty in carrying heavy boxes. A teenager might prefer working at the local McDonald's over other low-paying jobs if friends also work there.

A useful metaphor for heterogeneous preferences is in terms of the costs of travel to work (Hotelling, 1929; Salop, 1979). This notion of transportation cost can be interpreted literally as the actual cost of traveling to and from work. However, it can also be interpreted as a subjective measure of the extent to which a worker prefers one set of job characteristics over another set. Whether it involves physical distance or psychic distance, a worker may be willing to "travel" to the further, less preferred, employer for a sufficient wage premium.[1] The key insight here is that a worker in a preferred job may not immediately

[1]That is, a worker is willing to take a less preferred job if there is a sufficient "compensating differential." The traditional theory of compensating differentials is one of *vertical job differentiation*—some jobs are good while other jobs are bad and wage differentials compensate workers who take bad jobs. Ours is a theory of *horizontal job differentiation*—jobs are neither inherently good nor inherently bad, but workers' preferences over them differ.

choose to leave an employer that slightly reduces its wage rate.

To illustrate the idea of heterogeneous worker preferences concretely, consider the following model. Suppose that workers' houses are uniformly distributed along a straight, mile-long stretch of road with firm 0 located at one end and firm 1 located at the other end. If workers incur a transportation cost of t for each mile they travel, then a worker located x miles from firm 0 incurs a cost of tx if she is employed by firm 0 and $t(1-x)$ if she is employed by firm 1.[2] Transportation costs give rise to heterogeneous preferences—whether the worker prefers employer 0 or employer 1 and the intensity of this preference depends upon the worker's location, x.

Let us suppose that firm 0 offers wage w_0 and firm 1 offers w_1.[3] Figure 1 illustrates the workers' situation. The horizontal axis represents the mile-long road on which workers live with employers 0 and 1 located at either end. The vertical axis measures workers' utility, from work—in this model, her wage net of transportation costs. A worker who lives at point 0 and works at firm 0 pays no transportation costs and will therefore receive a net utility of w_0. A worker who lives at location 1 and works for employer 0, will receive a net utility of only $w_0 - t$. For each worker located between 0 and 1, the line sloping down from left to right represents the net compensation for working for firm 0 at wage w_0. Similarly, the line sloping down from right to left represents the net utility for working for firm 1 at wage w_1. The marginal worker who is indifferent between working for firm 0 and firm 1 is located at the point where the net compensation lines intersect, x^*. All workers to the left of x^* prefer to work for firm 0 and all workers to the right prefer to work for firm 1. Hence firm 0's labor supply is x^* and firm 1's labor supply is $1 - x^*$.

Now suppose that firm 0 reduces its wage slightly, say from w_0 to w_0'. If firm 1 continues to pay w_1, firm 0 will lose some workers, since the point of intersection, x^*, shifts towards the left to $x^{*\prime}$. However, it does not lose all its workers. In fact, its labor supply varies continuously with its wage rate. This is illustrated in the upward-sloping labor supply curves in Figure 2. If the transport cost parameter t is larger, the net utility curves will be steeper, and hence the elasticity of firm labor supply will be smaller.

When an employer cannot offer different wages to different workers depending upon their location, a firm that wishes to hire more labor must not only offer higher wages to attract new employees but must also pay existing employees the same higher wage. As illustrated in Figure 2, this implies that the marginal cost of labor, MC_0, lies above the labor supply curve, LS_0. Firm 0 maximizes profits at the point where the marginal cost of labor is equal to the marginal revenue product of labor, ϕ_0, hiring L_0^* workers. In order for L_0^* workers to be willing to work for firm 0, it must pay them wage w_0^*, as determined by the labor supply curve.

Because of the wedge between the labor supply curve and the marginal cost of labor to the firm, the marginal product of labor, ϕ_0, is higher than the wage paid. If the labor supply curve for the employer were perfectly elastic, this gap would not exist. In general, the more inelastic the labor supply curve to the

[2]Since we are interested in heterogeneous preferences, it would be natural to assume that the cost of travel, t, is also heterogeneous over workers. For simplicity, we do not consider such extensions.

[3]We assume that employers cannot offer different wages to different workers, depending upon their location.

employer, the wider the gap between the marginal product of labor and the wage.[4]

Note that the labor supply curve faced by an individual firm (and thus the marginal cost of labor) depends on the wages offered by rival firms. In the basic travel cost example presented in Figure 1, the labor supply curve faced by an individual firm depends on the rival wage offered its sole competitor. What happens if the rival firm, which we will continue to call firm 1, raises its wages? The labor supply curve for our firm of interest, firm 0, shifts to the left and as a result, the marginal cost of labor to the employer also shifts to the left. This is illustrated in Figure 2 where following an increase in firm 1's wage, the labor supply faced by firm 0 shifts from LS_0 to LS_0' and marginal cost shifts from MC_0 to MC_0'.[5] Again, the intersection of the marginal revenue product of labor with the marginal cost of labor will determine the profit-maximizing quantity of labor, and the labor supply curve will determine the wage that the firm needs to pay to hire that quantity of labor. This analysis demonstrates that firm 0 will find it optimal to also raise its wages from w_0 to w_0' and reduce employment from L_0 to L_0'. The wage increase will not be as great as the rise in firm 1's wages. Furthermore, the rise in rival wages reduces firm 0's profits.

Figure 3 graphs each firm's optimal wage, as a function of the wage offered by its competitor—this is also sometimes called a firm's "reaction function." R_0 maps firm 0's optimal wage as a best response to wages offered by firm 1. Similarly, R_1 maps firm 1's optimal wage to wages offered by firm 0. Equilibrium in this labor market is given by the intersection of these reaction functions, R_0 and R_1. Since we assume that both employers are equally productive, the equilibrium will be symmetric, with both employers offering the same wage. The equilibrium wage will be less than the marginal product of the worker. The greater the degree of preference heterogeneity—or more generally, the greater the degree of imperfect competition in the labor market—the greater will be the gap between the marginal revenue product and the wage. This situation need not imply that firms are making extra-normal profits. If there is free entry and exit and if fixed costs matter in production, then any extra-normal profits will be competed away. Wages will equal the average product of labor, although they will be lower than marginal product. While this divergence between wages and marginal product has no immediate normative implication that workers are exploited, it does imply that, in general, market equilibrium need not be fully efficient.[6] In consequence, redistributive policies such as a minimum wage, which would be distortionary in a competitive labor market, need not be necessarily so in an imperfectly competitive labor market.

Employers have good reasons to try and wage discriminate, by offering higher wages to more choosy workers, because of the wedge between the marginal revenue product of the worker and the wage. In Figure 1, firm 0 could profit by offering higher wages to those workers who are located further away than x^*,

[4]The basic formula is that the wage as a function of the marginal product of labor is given by: $W = \frac{\varepsilon}{1+\varepsilon} MP_L$ where ε is the elasticity of the supply of labor to the employer with respect to the wage.

[5]More generally, the labor supply of a firm may depend on all rival wages, some subset of them, or some aggregate measure of them such as the mean of rival wages. An increase in rival wages will generally reduce a firm's profits by reducing its labor supply.

[6]Indeed, as literature on monopolistic competition in product markets (Salop, 1979; Dixit and Stiglitz, 1977) demonstrates, market equilibrium need not be even constrained efficient.

while not altering the wage offered to its existing workers (those located to the left of x^*). Such wage discrimination may not be feasible—after all, "location" in our model is really a metaphor for a worker's subjective preferences regarding nonwage job characteristics, many of which are not readily observable. Nevertheless, firms do appear to follow strategies similar to wage discrimination. Sometimes employers hiring workers will offer signing bonuses for new employees. Universities seem to bid more aggressively for outside professors, offering them higher salaries than equivalent existing faculty. Such wage discrimination strategies may increase the efficiency of hiring decisions, although even perfect wage discrimination need not deliver full efficiency (Bhaskar and To, 2001b).

What Empirical Findings Can Market Power Explain?

The theoretical arguments concerning imperfect competition in the labor market are largely straightforward and undisputed. However, the value of the oligopsony approach to labor markets must ultimately be judged by its use in understanding labor markets. Here, we suggest a number of areas where a model of labor market oligopsony has helped to improve understanding.

Wage Dispersion

In a competitive labor market, employer characteristics should be irrelevant in the determination of wages, once one has adequately controlled for labor quality and non-wage aspects of the job. However, as mentioned earlier, there is considerable evidence that wages show consistent, significant differences across employers. Moreover, larger, more productive employers consistently pay higher wages, as do employers in certain industries.

Oligopsony can explain wage dispersion easily. Let us return to our two-firm example, and suppose that the firms differ in their level of productivity so that, at every level of employment, firm 0's marginal revenue product is lower than firm 1's (perhaps due to the latter's superior technology). Hence workers are less valuable for firm 0 than for firm 1, and its optimal wage, as a function of its rival's wage will be smaller than firm 1's optimal wage. This is shown in Figure 3, where the line labeled R_0' represents firm 0's optimal wage when it has lower productivity. In equilibrium, firm 0 will set the lower wage and also have a smaller payroll than firm 1, although competition between the firms makes the wage differential smaller than the productivity differential. This demonstration, that equally able employees are paid different wages, holds quite generally for arbitrary numbers of employers and for arbitrary distributions over employer marginal products (Bhaskar and To, 2001c).

Notice that the employer offering the higher wage also employs more workers. In Figure 1, $w_1 > w_0'$. If firm 0 offers wage w_0' and firm 1 offers w_1 then firm 0 employs fewer workers (that is, $x^{*\prime} < 1/2$). This model thus provides a simple explanation for the well-documented positive relationship between wages and establishment size, recently reviewed by Idson and Oi (1999). Although the empirical correlation between employer sizes and wages is very robust, explaining it has proved surprisingly difficult. But since the employer size wage effect is a positive relationship between a price (the wage) and a quantity (employment),

one of the first (and simplest) hypotheses labor economists should consider is that it represents an upward-sloping labor supply curve to individual establishments. Here, as in other areas, oligopsony provides a simple and plausible explanation. Similarly, since the employer with higher productivity offers higher wages it must necessarily earn greater profits. Again, this is in line with the evidence that more profitable employers tend to offer higher wages (Blanchflower et al., 1996).

The Market Provision of General Training

The human capital approach to training suggests that workers should pay for the acquisition of general skills while employers should pay for the acquisition of firm-specific skills. In contrast, the oligopsony approach predicts that since workers are not paid their marginal product, they may not have sufficient incentives to invest in training. In addition, employers may have an incentive to pay for general training because they can expect a return on this investment as they pay wages below marginal product and workers take time to find other jobs (see Stevens, 1994; Acemoglu and Pischke, 1999, for elaboration of this argument).

This prediction is in line with the empirical evidence suggesting that firms do pay for general training they give their workers. As one example, it is not uncommon for business school students to have their tuition paid for by their employers. Indeed, Becker (1965) also pointed out that in an imperfect labor market, general skills come to have some firm-specific component. However, the efficient level of investment in skills is difficult to attain in this context because future employers of workers are also likely to appropriate some of the return on the investment as they pay wages below marginal product; however, it is difficult to identify and internalize these future employers in current decision-making about the level of training.

Racial Pay Gaps

Racial wage differentials are very persistent. Altonji and Blank (1999) provide a comprehensive survey of the evidence and recent literature on this subject (see also the *Journal of Economic Perspectives* symposium in Spring 1998). Perfectly competitive labor markets should provide strong pressure against discrimination carried out by biased employers for several reasons. First, in a competitive labor market, a small number of discriminatory employers will have no effect upon the market wages of minority groups, since such groups can easily be absorbed by nondiscriminatory employers. Secondly, even if there are many discriminatory employers and this has effects on minority wages, the pressure imposed by competitive markets select in favor of nondiscriminating employers in the long run (Becker, 1957).

In contrast, in oligopsonistic markets, even a small number of discriminatory employers can have significant effects on minority wages, since different jobs are not perfect substitutes for each other. Furthermore, discrimination can persist and even enhance employer profits, rather than being competed away. Let us make the argument in the context of race, using our travel cost model. Suppose that white workers and black workers are identical in all respects. We assume that firm 1 is a profit maximizer, while firm 0 has discriminatory preferences, and suffers a disutility d for each black employee. The optimal wage setting

functions are depicted in Figure 3. Firm 1's optimal wage, as a function of firm 0's offered wage, will not differ between white and black workers; that is, its reaction function is identical for both types of workers. On the other hand, firm 0 will offer a lower wage to black workers as compared to white workers, that is, its reaction function for black workers (labeled R_0') lies below its reaction function for white workers (labeled R_0). In equilibrium, both firms will offer lower wages to black workers than white workers, although the wage differential is lower in firm 1 than in firm 0. In other words, the profit-maximizing firm will optimally choose to pay black workers less, since discrimination reduces the alternative opportunities of black workers.

What are the implications of discrimination upon equilibrium profits in firm 0? Clearly, the firm with discriminatory preferences (firm 0) will make less profit than firm 1.[7] However, discrimination by firm 0 could raise profits in both firms, provided that discriminatory preferences are not too extreme. Discrimination reduces the equilibrium wage of black workers paid by firm 1, and this raises firm 0's profits. This will offset the negative effect on firm 0's profits caused by its distorted (non-profit maximizing) choice of black wages, provided that such distortion is not too large. This insight implies that there is little incentive for a profit-maximizing entrepreneur to buy out the discriminatory firm 0—a profit maximizer in place of firm 0 would drive up the wages of black workers in both firms, reducing both their profits![8]

Minimum Wages

In a competitive labor market where workers are paid their marginal product, a minimum wage set above the market wage causes employment to fall—workers whose marginal products fall below the minimum wage will be let go. Recent empirical work has called into question this long-accepted belief. Card and Krueger (1995) offer a comprehensive discussion of this literature, including a review of many studies that suggest that minimum wages need not reduce employment and may in fact raise employment. The study that received the most attention (and also fostered the most controversy) was Card and Krueger (1994). They found that New Jersey's 1992 minimum wage increase did not result in a fall in fast-food employment and may even have resulted in an increase in New Jersey's employment relative to Pennsylvania (for a detailed critique of the study and a reply, see Neumark and Wascher, 2000; Card and Krueger, 2000).

One of the reasons that Card and Krueger (1994) was initially met with skepticism was the lack of a convincing theory that could explain their results. Indeed, the discussion of minimum wages in any introductory course in economics concludes that a minimum wage must reduce employment. The fundamental question that must be asked is: "How can a price floor lead to no decrease and possibly to an increase in quantity employed?" While difficult to explain in the conventional competitive setting, Card and Krueger's findings

[7] The difference in profits will be small unless discriminatory preferences are extreme—by the envelope theorem the loss of profits suffered by firm 0 is second order in the parameter d.

[8] On the other hand, as is known in the literature on environmental externalities, if firm 1 (the profit maximizer) bought out firm 0, the wage setting externality would be internalized and both black and white workers would be paid equally low wages. While this possibility eliminates discrimination (at a depressed common wage), in a more general model with many employers, it is impractical.

are easy to understand in an oligopsonistic labor market, even if there are many small employers and free entry and exit of employers. When firms have market power—due to heterogeneous worker preferences, for example—minimum wages cause changes in employment through two distinct channels: an "oligopsony" effect and an "entry/exit" effect.

It is well known that a minimum wage can increase employment under monopsony (Stigler (1946) appears to have been the first to demonstrate this). This is for the same reason that a price ceiling in a monopoly product market can lead to an increase in output—a price ceiling prevents the monopolist from reducing output and raising price to the full extent that the monopolist desires. In the labor market, the argument is that a price floor like a minimum wage can prevent a profit-maximizing monopsonist from reducing the quantity of labor hired and cutting the wage as much as it desires. Without a minimum wage, the equilibrium wage and employment are shown by w_i and L_i in Figure 4. If minimum wage w^m is imposed, the marginal cost of labor is now w^m until employment reaches L_i', after which it coincides with the original marginal cost of labor curve. Thus, the employer maximizes profit by employing L_i' workers so that employment rises by $L_i' - L_i$.

However, a model with just a single, monopsonistic employer is rarely applicable in the real world. It is more likely that an oligopsonistic model would apply in the labor market, where multiple employers compete with one another for workers. Under oligopsony, our analysis of the effect of a minimum wage differs. In particular, if multiple employers compete for workers, the labor supply curve faced by firm i also depends on rival wage rates. Since rival employers must also increase their wage to the minimum, labor market competition increases so that the labor supply curve faced by firm i shifts to the left. This is illustrated in Figure 4 where the labor supply curve shifts to LS_i' and consequently the marginal cost of labor shifts to MC_i'. The new profit maximizing level of employment occurs at L_i''. Despite the reduction in establishment level labor supply, a minimum wage set moderately above the market wage still causes establishment-level employment to increase because if all employers offer higher wages, the labor participation rate must also rise. Thus, even in the case of multiple employers, a minimum wage set moderately above the market wage can increase employment through greater labor market participation. Intuitively, by setting the minimum wage above the market wage, employers find it easier to fill their vacancies. Of course, employers could have chosen to raise pay on their own, but to do so would cut into their profits, because payroll for inframarginal workers rises when wages increase.[9]

Notice also that because a binding minimum wage reduces employers' profits when there is free entry into and exit out of the labor market, some employers will be forced to exit. Employer exit has a negative effect on total employment through the loss of exiting employer payrolls. That is, although establishments that remain after the imposition of a minimum wage increase their employment, some employers are forced out of business.

Thus, minimum wages have two opposing effects: the employment increasing "oligopsony" effect and the employment reducing "exit" effect. The overall

[9]Notice that oligopsony provides an explanation for the persistence of vacancies, even in times of recession. Under oligopsony, employers are faced with a dilemma—they would like to hire more workers since the equilibrium wage rate is strictly less than marginal revenue product.

effect of a minimum wage depends on which effect dominates. In a more flexible transportation cost model similar to the one here, the net effect has been shown to be positive (Bhaskar and To, 1999; Walsh, 2001). On the other hand, Bhaskar and To (2001a) set out a different model of worker preferences and find an unambiguously negative employment effect. The general conclusion that one should draw is therefore that a minimum wage set moderately above the market wage may have a positive effect or a negative effect on employment, but the size of this effect will generally be small because of the two countervailing forces. Indeed, even when employment falls, it is possible to show that the employment effect will be smaller under monopsonistic competition than under perfect competition. Under perfect competition, marginal revenue equals the wage (marginal cost), so that employment must fall with a minimum wage until marginal revenue rises to equal the new wage. Under monopsonistic competition, free entry implies that the *average* cost of labor (wage plus average fixed cost) must equal the *average* revenue product of labor. With firm exit, average employment levels rise in surviving firms, reducing the average fixed cost of labor. In consequence, the marginal revenue of the worker has to rise less, as compared to perfect competition. Hence, employment need not fall as much, and may even rise. This theoretical prediction is in line with the mixed evidence on the employment effect of minimum wages. Furthermore, these examples highlight one way in which oligopsony (or in this case, monopsonistic competition) differs from textbook monopsony. Under monopsony, a small enough rise in the minimum wage must raise employment. Under monopsonistic competition, it is possible that even the smallest rise in the minimum wage reduces employment.

Direct Evidence of Labor Market Power

The evidence discussed above in favor of the view that employers have some oligopsony power has all been indirect, comparing the predictions of perfect competition and oligopsony. But one can also take a more direct approach to measuring the labor market power of employers.

The classic study of Bunting (1962), for example, examined whether wages are lower in labor markets with fewer employers. Little evidence for this is found, but this is actually a test of classic monopsony; oligopsonistic competition does not necessarily rely on "large" employers. For example, models which emphasize the costs of job search typically assume each employer is infinitesimally small in relation to the market, so employer concentration is irrelevant.

An alternative direct approach is to estimate the elasticity of the labor supply curve to an individual establishment. The literature on estimating supply curves to individual employers is small. This is in stark contrast to the voluminous literature on the labor demand curves of individual employers—or on the supply of labor by individuals to the market as a whole.[10]

As noted earlier, one could interpret the numerous studies of the employer-size wage effect as studies of the labor supply curve facing establishments. Boal

[10]One might wonder how one reconciles oligopsony with the empirical evidence on the existence of labor demand curves; that is, if the employer is choosing a profit-maximizing point on a labor supply curve, then what does labor demand even look like? But, as the earlier discussion makes clear, we would observe a negative relationship between wages and employment if the elasticity of the labor supply curve facing the firm is constant.

(1995) takes this approach in a study about the elasticity in labor supply to coal mines in West Virginia in the early twentieth century. He finds only weak evidence for long-run market power, but his data are at county rather than establishment level. However, studies of employer-size wage effects do not make much attempt to deal with the fact that, in the theory of imperfect competition in labor markets, both wages and employment are simultaneously determined by the employers' choice of a profit-maximizing combination of employment and wage. Thus, one needs to find another way of identifying the labor supply curve. Finding a suitable instrumental variable is the obvious approach and a few studies have taken this route.[11]

Sullivan (1989) tries to estimate the wage elasticity of the supply of nurses to individual hospitals using panel data. Essentially, he estimates an employer size wage effect for nurses, after controlling for other factors (for example, he includes individual hospital effects). As an instrument for the level of demand, he uses measures of the hospital caseload.[12] With this approach, Sullivan estimates the wage elasticity of labor supply to be 1.26 in the short-run by estimating the relationship between changes in wages and changes in employment over a year. He estimates the wage elasticity of labor supply to be 3.86 in the longer run by estimating the relationship between changes in wages and changes in employment over several years. Are these elasticities large or not? Using the larger long-run elasticity and the formula in note 4, Sullivan's estimates imply that wages will be 79 percent of marginal product. The implied gap between the wage and marginal product is not enormous, but is, for example, comparable in size to estimates of the union wage mark-up in the United States.

More persuasive in its choice of instrument, in our view, is the recent study by Staiger et al. (1999). They investigate the impact on employment of an exogenous, legislated change in wages for registered nurses in hospitals run by the Veterans Administration (VA) in 1991. Prior to 1991, VA hospitals paid registered nurses based on a national scale; in 1991, the Nurse Pay Act (1990) required that VA hospitals set wages based on a survey of local hospitals. The basic model they estimate relates the change in employment at individual VA and non-VA hospitals to changes in wages relative to competitors and other relevant factors. They use a measure of the impact of the legislative change as an instrument for the relative wage. Their estimate of the short-run wage-elasticity of labor supply is quite low, around 0.1, and they conclude that hospitals have a significant degree of wage-setting power in the market for nurses.

Their approach seems a good one for several reasons. First, the change in wages can reasonably be thought of as exogenous. Second, initial wages in VA hospitals were low relative to the prevailing level of market wages for nurses. For these reasons, this study seems to come closest to the ideal experiment one would like to conduct. But because it is difficult to find examples of exogenous firm-specific wage changes, estimates of the wage elasticity facing an individual firm may remain few and far between.

[11] A couple of older studies on the subject of the elasticity in the labor supply curve facing an individual firm include Reynolds (1946) and Nelson (1972).

[12] Sullivan's caseload variables are in-patient days and length of stay. One might debate whether this is a good instrument but that is not our main purpose here. One problem is that caseloads are probably endogenous to the model, too. Indeed, the oligopsony model predicts that wages, employment and output are all endogenous and correlated in equilibrium. In this situation, the estimate of the elasticity of labor supply will most likely be biased upward.

An alternative approach to measuring the market power of employers, used by Card and Krueger (1995) is to note that in a steady-state, the level of employment in a firm, denoted by N, can be written as the flow of recruits, R, divided by the separation rate, s, according to the formula $N = R/s$. For example, in each year, if a firm recruits 10 new employees and 10 percent of its existing employees quit, its steady state employment will be 100 employees. The elasticity of employment with respect to wages may then be decomposed as the elasticity of recruits with respect to wages minus the elasticity of separations with respect to wages. Estimates of the wage elasticity of separations have already been presented in Table 1: these and other estimates are rarely above one. Estimates of the wage elasticity of recruits are harder to find but Card and Krueger (1995) survey a number of studies and conclude that 4 seems to be an upper bound. An upper bound for the overall wage elasticity is then 5, which, using the formula in note 4, predicts that wages are 17 percent below marginal products—a finding not far from that implied by Sullivan's (1989) long-run estimate.

Conclusion

This paper has reviewed recent developments in labor economics that are based on the premise that employers have nonnegligible market power over their workers. The primary advantage of this approach is that it leads to a more natural view of the workings of labor markets and can readily explain apparently anomalous empirical findings like the existence of wage dispersion, why employers pay for general training, why wages are related to employer characteristics and the impact of minimum wages on employment. Manning (2002) provides a more extensive review of the areas where oligopsony can help us to a better understanding of labor markets.

The main sources of oligopsony power are likely to be preference heterogeneity over jobs, mobility costs, and imperfect information. We have chosen to motivate much of the paper using a particular model of preference heterogeneity using travel costs, though we could have used the other approaches as well. Direct evidence on the extent of oligopsony power is still rare (and deserves further future research) but the evidence we have suggests that it is not negligible.

For some, the claim that employers have some oligopsony power has normative connotations about the ability of employers to exploit workers. We have tried to emphasize the positive aspects of oligopsony, without taking a normative position on whether this is good or bad. In fact, we think it is inevitable that employers have some oligopsony power, because the sources of that market power in labor markets are so universal.

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Table 1: Estimates of the Elasticity of Separations with Respect to the Wage

	PSID (US)	NLSY (US)	BHPS (UK)	LFS (UK)
mean separation rate	0.21	0.55	0.19	0.058
no controls	−0.944	−0.515	−0.798	−0.646
	(0.030)	(0.019)	(0.032)	(0.021)
with controls	−0.973	−0.536	−0.720	−0.500
	(0.041)	(0.032)	(0.041)	(0.028)
tenure controls	−0.575	−0.340	−0.503	−0.343
	(0.037)	(0.026)	(0.064)	(0.032)

Notes.

This Table reports the elasticities of separations with respect to the wage with standard errors in parentheses. The dependent variable is a zero-one dummy taking the value one if the individual left the job over the period (a year for all data sets except the LFS which uses a quarter). We model the instantaneous separation rate as $s = e^{\beta x}$ so that the probability of still being in a job after a period of time τ is given by $S = e^{-st}$. The elasticity of the quit rate with respect to the wage is then given by the coefficient on the log wage. The row headed 'no controls' simply includes the wage. The rows marked 'with control' include education, race, marital status, children, region, a quartic in experience and year dummies. The row headed 'tenure control' includes a quartic in tenure in addition to the usual controls. Standard errors are in parentheses.

Table 2: Low-Wage Workers Search for Other Jobs: UK Labor Force Survey

dependent variable	looking for another job	looking for another job	number of search methods	number of search methods
sample	men	women	men	Women
log (wage)	−0.032 (0.001)	−0.014 (0.001)	−0.464 (0.014)	−0.273 (0.021)
number of obs	167390	173858	167398	173866
mean of dep variable	0.076	0.065	0.26	0.22

Notes.

1. The sample period is March 1993 to December 2000. The other controls included are race, education, experience, job tenure, month, year and region dummies.

2. When the dependent variable is 'looking for another job,' a probit model is estimated. When the dependent variable is 'number of search methods,' a poisson model is estimated: those who are not looking are assigned zero search methods. Standard errors are in parentheses.

Figure 1: Illustration of Worker Job Choice with Transportation Costs

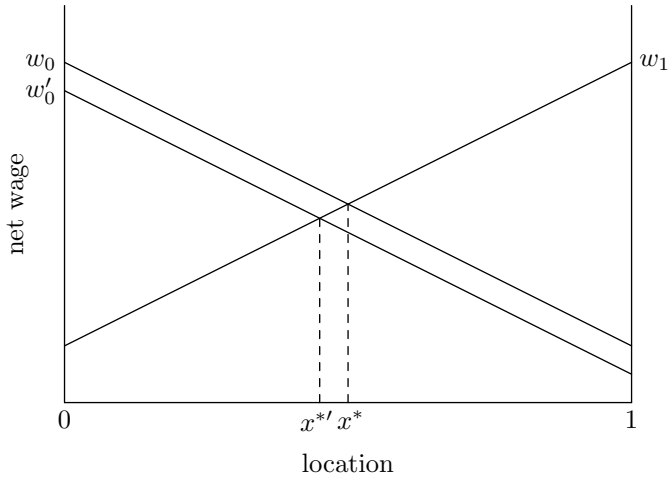

Figure 2: Profit Maximization Under Oligopsony

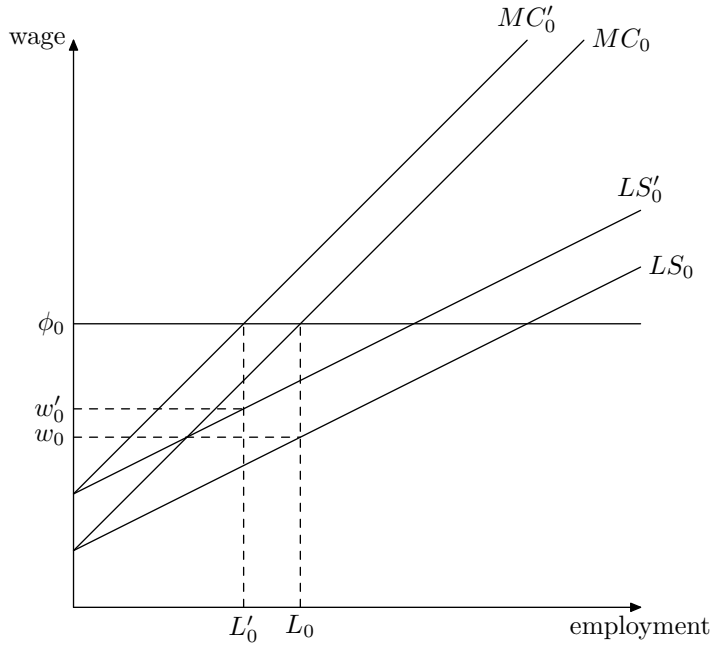

Figure 3: Illustration of Duopsony Equilibrium Using Employer Wage Reaction functions

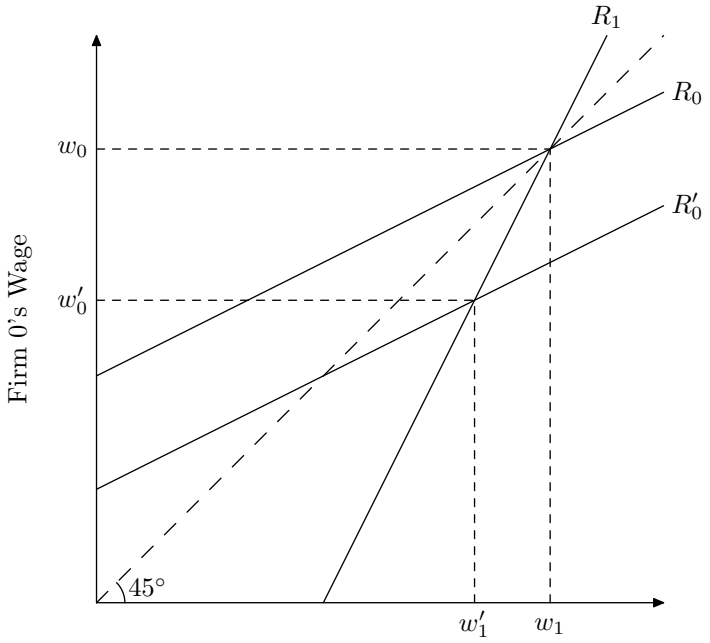

Figure 4: Minimum Wages and Employment Under Oligopsony