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How Does Market Power Affect Wages? Monopsony and Collective Action in an Institutional Context

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How Does Market Power Affect Wages? Monopsony and Collective Action in an Institutional Context

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Abstract

To better understand the theoretical implications of new empirical findings which show that firms have monopsony power, we construct a monopsony-wage-model that integrates strategic interaction between workers and employers in the wage setting process into an institutional context. We show that workers' collective action and efficient contract bargaining, in this context, reduces rents to firms and increases overall social efficiency. However, such outcomes are contingent on institutional support for workers, and in an environment that does not support workers, inefficient outcomes dominate.

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1. Introduction

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How do we understand labor market outcomes like the determination of wages levels? What role does workers' collective action – like unionizing or striking – play? What role does institutional support for workers or, conversely, public embrace of employers' prerogatives in the workplace have on the determination of wages? The answers to such questions have wide ranging implications on several topics from the social efficiency of labor markets to the current rise in income inequality to racial, ethnic, and gender wage discrimination.

Social scientists have long sought to better understand such questions. The early classical political economists, such as Smith, Malthus, Ricardo, and Marx, all thought that the wage was socially determined based on the subsistence cost of reproduction.[3] The wage rate for equivalent labor could vary between countries or regions based on differences in the socially determined standard of living. However, the wage rate in any given region was relatively sticky at this lower bound subsistence wage (Foley, 2009). These ideas can be understood in a current theoretical lens as the result of all workers having the same fallback position, and thus the aggregate labor supply curve being perfectly elastic at the subsistence wage. Such an outcome could also result from employers having monopsony and discriminating powers over wages.[4] Indeed, Smith highlights the conflict of interest between masters (the employers of his day) and workmen and the wage setting power of former: "We rarely hear, it is said, of the combination of masters [to obtain power over the wage], though frequently of those of workmen. But whoever imagines, upon this account, that masters rarely combine, is as ignorant of the world as of this subject. Masters are always and everywhere in a sort of tacit and uniform combination, not to raise the wages of labour above their actual rate" (Smith, 1776; VII, pp. 94-5).

With the advent of marginalism in the late nineteenth and early twentieth century, how economists understood the determination of the wage changed dramatically. No more was the wage a fixed-socially determined value that provided labor with just enough to reproduce. Now, the equilibrium wage was the intersection of the demand for labor, which represents the marginal benefit to firms from hiring a unit of labor, with the supply for labor, which represents the

[3] Smith also thought that decline or growth of capital would depress or increase the equilibrium wage, respectively. Thus, an economy with a growing capital stock could have a wage rate above subsistence. Malthus and Ricardo called the equilibrium wage the natural wage, and Marx called the equilibrium wage the value of labor-power.

[4] Monopsony power is the idea the firms can choose the wage bounded by the labor supply curve. In *the Economics of Imperfect Competition* (1933), Joan Robinson coined the term "monopsony." While 'pure' monopsony means a single buyer in a market, in labor economics, the term is used to more broadly refer to situations where firms have some influence over the determination of the wage – i.e. firms face an upward sloping labor supply curve.

marginal cost to laborers from working.[5] In this line of thought, the underlying assumption in the construction of the demand curve is that firms' have no wage setting and discriminating powers.[6] The equilibrium wage is then equal to the value of the marginal product of labor. Assuming an upward sloping aggregate labor supply curve, this would mean that workers receive a wage that accords them substantial net benefits above the subsistence wage.[7]

In the marginalist framework, monopsony power is possible. Indeed, the intention of Robinson (1933) was to utilize the framework to reconceptualize ideas like labor exploitation and show that the optimal outcomes of perfect competition are highly dependent on the assumptions of the model. Robinson defined exploitation in this setting as when labor earns a wage less than the value of the marginal product of a unit of labor. The difference in income between the wage and value of the marginal product is an example of a rent accruing to the firm – an income not possible when the market is perfectly competitive.[8] However, since the marginalist revolution, most economists have treated monopsony power as a special case only existing in the company towns of Homestead, Pennsylvania and Pullman, Illinois of nineteenth century or in highly concentrated island economies of introductory economic textbooks (Boal and Ransom, 1997; Staiger et al., 2010; Ransom and Sims, 2010). For example, in an article on the purpose of theory and the assumptions of perfect competition, Friedman (1953) states, "The theory of monopolistic competition [a more generalized form of market power on the buying side] offers no tools for the analysis of an industry and so no stopping place between the firm at one extreme and general equilibrium at the other. It is therefore incompetent to contribute to the analysis of a host of important problems: the one extreme is too narrow to be of great interest; the other, too broad to permit meaningful generalizations" (p. 170). Indeed, the idea that firms do not have wage setting power has been accepted in some heterodox circles in economics. For

[5] The marginal cost for supply labor is both the disutility of work and the monetary value of the utility from the forgone leisure from working.

[6] Having market power may sound like a strong degree of influence for a firm. However, for purchasing labor inputs, it just means that firms can choose the wage for their labor inputs along an upward sloping supply curve. Despite the name, it doesn't refer to any ability to force other economic agents to accept non-maximizing outcomes. In contrast, no market power is a very strict assumption which greatly limits the potential strategies a firm can adopt. For hiring labor, it means that firms face a horizontal supply curve; in general, it means that firms are completely passive bodies when it comes to the price of all goods or services flowing in or out of their doors.

[7] The marginalist world would collapse into the classical political economy world when all workers have the same marginal cost to supplying their labor – i.e. when the aggregate labor supply curve is horizontal at the socially determined subsistence wage.

[8] An economic rent can be conceptualized in many ways. For example, a rent can be defined as pay not justified by a worker's marginal social product. The "social" prefix is vital because an individual can create income for her firm through rent seeking strategies - like closing an acquisition that gives the firm market power.

example, in Bowles (2009), the labor market model allows for firms to have control over the wage but also assume a perfectly elastic supply of labor curve thus recreating the situation of no wage setting power through the back door.

The basic idea that workers received the value of their marginal product has significant implications on how we understand the role of workers' collective action, the rise in inequality, and the social efficiency of labor markets in general. For example, in such a theoretical framework, many economists view the various forms of worker power, like unions, as a means by which workers extract a rent above the value of their marginal product (Bellante and Long, 1981; Stewart, 1990). This would mean that the current fall in worker power would imply a decrease in rents and thus an increase in the social efficiency of the economy. Likewise, through this theoretical lens, the rise in income inequality over the last forty years in the United States would seem to stem from cashiers in large retail outlets to the managers and chief executive officers of today's mega corporations receiving a wage closer to the value of their marginal product. Thus, the rise in inequality would seem to be justified based on differences in marginal productivity. Indeed, this basic idea is the explanation given by some (for example, see Autor and Katz, 2008). And, this same idea has been more explicitly put forward to explain changes in wages during past periods of increasing income inequality in the United States (for example, see Brown and Phillips, 1986).

While this edifice for understanding the economy has long loomed over economics and politics, recent empirical evidence suggests that monopsony power may be widespread in current labor markets. For example, Azar et al. (2017) use data on job openings to demonstrate that the average labor market in the United States is highly concentrated. Relying on geographic-occupation labor markets, they document that higher concentration in a labor market is correlated with a lower average posted wage. In a follow-up paper, Azar et al. (2018) use data from a near-universe of online job ads for the United States to calculate labor market concentration, finding 54 percent of labor markets are highly concentrated and an additional 11 percent are "modestly" concentrated.[9]

Other recent empirical findings have begun to chip away at the idea that monopsony power arises largely due to search frictions. Dube et al. (2018) analyze monopsony power in online labor markets, where search frictions should be extremely low. Despite the use of MTERK, an online platform that should be one of the real-world examples that closely mirror a

[9] This analysis is for each commuting zone by 6-digit SOC occupation.

perfectly competitive labor market, they find a high degree of market power resulting in significant declines in worker pay. In addition, Benmelech et al. (2018) find that monopsony power is ubiquitous and firm concentration results in lower wages. At the same time, Benmelech et al. find that the effect of monopsony power is even more pronounced at higher levels of concentration and in recent times.

These findings imply that employers can siphon off rents from workers through exercise of monopsony power – the complete opposite of the dynamic formulated in most current labor market models. In such a situation, how one conceptualizes workers collective action would differ dramatically. Because the starting point is a wage below the value of the marginal product, workers collective action could increase social efficiency. For example, striking for a higher wage would impose costs on employers through disrupting production. If employers take this into account and bargain with employees, contracts can be formed that increase the social efficiency of labor markets by decreasing monopsony power. Such activities would no longer be rent seeking but rent reducing. This idea is in harmony with Galbraith's conceptualization of countervailing power (1968).[10] Workers' collective action can act as an alternative to regulation of labor markets to improve social efficiency.

To better understand these ideas, in the following section, we construct a labor market model with monopsony power as the starting point and workers' collective action as a countervailing power. Our work builds on past monopsony modeling like that of Robinson (1933), Manning (2003), and others. However, we go farther the Robinson by formally modeling the interaction between workers' collective action and the employers, and we integrate this entire interaction into an institutional context. In terms of the former, taking from labor history literature, we assume that workers face a trade-off when engaging in collective action between current costs – like loss in wages or mental and physical stress – and future benefits from potentially winning increases in renumeration. From weighing these trade-offs, workers decide on the present value maximizing level of collective action. Because collective action disrupts production, firms take into account workers' utility maximizing level of collective action in deciding the wage. In terms of institutional context that encompasses worker-management conflict over the wage, we also pull from labor history literature and from

[10] Galbreath (1968) mainly focused on countervailing powers between firms. For example, the market power of a monopolist retailer could counteract the market power of a monopolist producer. However, he does mention unions as a potential countervailing power, and the concept used here can is completely parallel to his ideas.

economic literature to formalize how the state and social norms influence intrafirm power dynamics and the determination of renumeration.

As we will see, this reconceptualization of labor markets has significant implications on how we understand many important outcomes like the current rise in income inequality and the overall social efficiency of labor markets. Specifically, we demonstrate that workers collective action and efficient contract bargaining, in the context of monopsony power, reduces rents to firms and increases overall social efficiency. However, we also show that such efficiency improving outcomes are contingent on institutional support for workers, and in an environment that doesn't support workers, inefficient outcomes dominate.

2. Model

Through collective action, workers seek to maximize the net benefits to laboring. Benefits accruing to workers could include an increased wage, better fringe benefits such as health care or retirement, more control over the work process, etc. Workers weigh the tradeoffs from engaging in collective action, which is costly, against the potential benefits from achieving their goals. This process can be approximated by assuming workers seek to maximize the present value of their utility from working at a job held indefinitely. For one period, workers' utility takes the following form:

$$u = u(w, \sigma)$$

w is the wage, and σ is the amount of collective action workers engage in and ranges from zero, no collective action, to one, the upper limit. u_w is greater than or equal to zero, and u_σ is less than or equal to zero over the relevant ranges. Collective action imposes a cost on workers through loss in wages, mental and physical exertions, and potentially other more negative outcomes like loss in job. Assuming the interaction is time invariant, workers choose the level of collective action, σ, such to maximize their present value, v:

$$v = \frac{u(w, \sigma) + \big(1 - s(\sigma, \theta)\big)v + s(\sigma, \theta)\,{}^{w_{MR}}/_{i}}{1 + i}$$

$s(\sigma, \theta)$ is the probability of success from engaging in σ collective action. s_σ is greater than zero. Thus, workers face a tradeoff; the more intensely they engage in collective action the more it costs them at present, but an increase in such activity increases their likelihood of success. θ denotes institutional support, or lack thereof, for workers engaging in collective action.

Institutional support for workers in the United States has ranged from judicial backing of unions in the early nineteenth century by the Massachusetts Supreme Court,[11] to statute legislation that protects workers collective activity like the National Labor Relations Act, to social norms that proscribe, at least to some degree, certain antiunion activities like the usage of permanent replacement workers during economic strikes in the mid-twentieth century. At the same time, institutional support can be on the side of firms through legislative or adjudicative decisions that make workers' collective strategies illegal or through not proffering protection to workers from anti-collective-action strategies employed by firms. A recent example of a major rollback of institutional support of unions can be seen in the Janus V. AFSCME case, where the Supreme Court ruled that public-sector unions may not charge nonmembers "agency fees" for contract negotiation and other services that affect all employees in the same workplace.[12] In terms of the model, θ ranges from zero to infinity with zero signifying complete support for employers and higher values signifying positive support for workers. At θ is equal to zero, no matter the level of collective action, the probability of success is zero. s_θ is greater than zero; increase in government support for workers increases the likelihood that a given level of collective action will be successful.

w_{MR} is the value of the marginal product of labor – the wage when employers do not have market power. As explained above, this is the starting point for most labor market theories at present. For simplicity, w_{MR} is assumed to be the goal of collective action. i is the discount rate – which represents how workers value the future in relation to the present. A high discount rate means that workers place a relatively low value on the future. A low discount rate means the opposite with a discount rate of zero signifying that workers value the future the same as the present. Thus, $w_{MR}/_i$ represents the present value from receiving w_{MR} in every period for an infinite number of periods.

[11] Commonwealth v. hunt, 1842.

[12] https://www.supremecourt.gov/opinions/17pdf/16-1466_2b3j.pdf.

The present value, v, is then the sum of the utility that workers get at the end of the first period, $\frac{u(w,\sigma)}{1+i}$, plus the expected value of winning, $\frac{s(\sigma,\theta)^{w_{MR}}/_{i}}{1+i}$, and losing, $\frac{(1-s(\sigma,\theta))v}{1+i}$, from engaging in collective action, σ. If workers do not engage in collective action, the probability that they will win a wage increase is zero, $s(\sigma = 0, \theta) = 0$. In which case, the present value simplifies to the following:

$$v = \frac{u(w, \sigma = 0)}{i}$$

The above equation is just the present value of the utility for workers receiving the wage chosen by the firm for an infinite number of periods with a discount rate i. If workers engage in collective action, the initial equation simplifies to the following:

$$v = \frac{u(w, \sigma) + s(\sigma, \theta)\, {w_{MR}}/_{i}}{i + s(\sigma, \theta)}$$

Workers have the subsequent first order condition: $v_\sigma = 0$. Through simplification, the first order equation yields the following relationship:

$$-u_\sigma = s_\sigma\left({w_{MR}}/_{i} - v\right)$$

The term on the left-hand side of the equation, $-u_\sigma$, is the marginal cost from engaging in collective action; the decrease in utility from the first period for a change in intensity of σ. The term on the right-hand side of the equation, $s_\sigma\left({w_{MR}}/_{i} - v\right)$, is the marginal benefit; the increase in probability of success from a change in intensity of collective action, s_σ, times the present value of the benefit from winning, ${w_{MR}}/_{i} - v$.

From this equation, we can map out the general form of workers' best response function, σ^* – the maximizing level of collective action given the wage, the level of government support, and workers' discount rate. First, σ_w^* is less than zero. Increases in the wage will both increase the cost of engaging in collective action by increasing utility in the first period and will reduce

the benefits by decreasing the difference between the actual wage and w_{MR}. As a result, workers seeking to maximize their present value would decrease the level of collective action as the employer increases the wage – everything else equal. Second, σ_{θ}^{*} is greater than zero. More institutional support for workers would increase the likelihood of success and thus increase the benefits to engaging in collective action.

If we assume the utility function takes the following form, $u(w, \sigma) = w\left(A - \frac{1}{1-\sigma}\right)$, we can see these results explicity. A is a constant that defines how wages transfer to utility and is greater than one. With this utility function, an increase in the intensity of collective action along the possible range (i.e. $[0, 1]$) would decrease utility. Also, for individuals unconcerned with utility in future periods, zero collective action is maximizing. Let's say the success function takes the following form: $s(\sigma, \theta) = \theta\sigma$. With this success function, if government support is completely on the side of employers (i.e. $\theta = 0$), even with high levels of collective action, workers have no chance of winning. Likewise, no matter what government support, if workers do not engage in collective action (i.e. $\sigma = 0$), the likelihood of success is zero. Plugging these functions into the present value equation, taking the derivative in terms of σ, and setting it equal to zero, yields the following best response function for workers:

$$\sigma^{*} = \frac{w_{MR}}{w_{MR} - w} - \left(\left(\frac{w_{MR}}{w_{MR} - w}\right)^{2} - \frac{w_{MR} - {iw}/{\theta}}{w_{MR} - w}\right)^{1/2}$$

A little manipulation of the best response function shows that the following relationships hold:

$$\sigma_{w}^{*} < 0$$

$$\sigma_{\theta}^{*} > 0$$

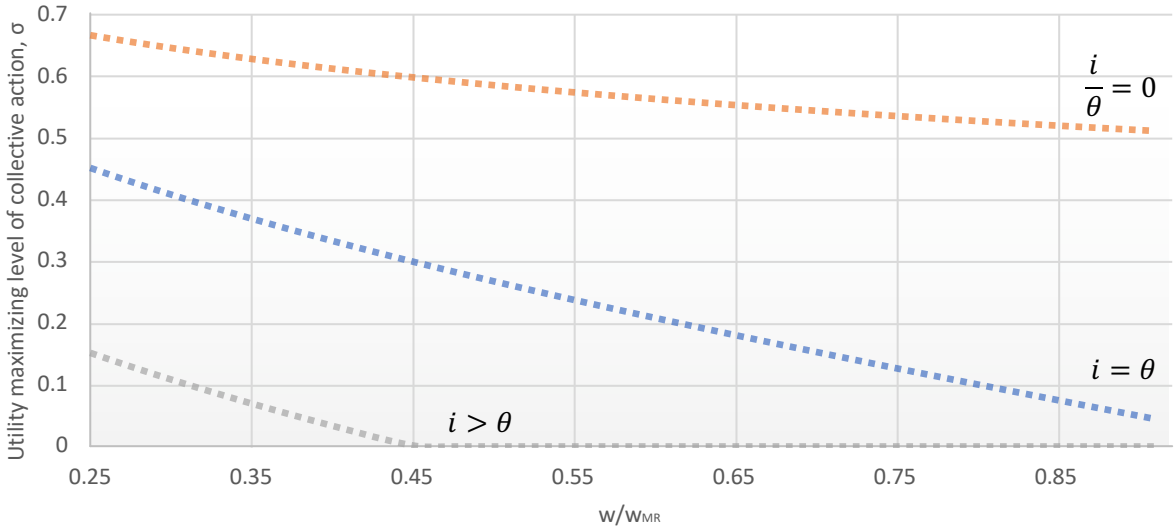
$$\sigma_{i}^{*} < 0$$

The first two relationships follow from the logic explained above. The third relationship stems from a point mentioned earlier. Collective action is costly for workers. Thus, for workers

that value the future less, i.e. their discount rate is higher, the optimal level of collective action is going to be less. Conversely, for workers that value the future more, i.e. workers with a discount rate close to zero, the benefits from engaging in collective action factor in to a greater degree in their maximizing calculation.

In Figure 1 below, we graph the workers' best response function for three different values of institutional support, θ, and discount rate, i. On the horizontal axis is the wage chosen by the employer divided by the wage that the workers want to obtain, w_{MR}. On the vertical axis is the present value maximizing level of collective action, σ^*. The blue dotted line is the best response function when the discount rate is equal to the level of government support, $i = \theta$. As we can see, the present value maximizing intensity of collective action decreases as the wage increases.

Figure 1: Collective Action as a Function the Wage and Institutional Support



Source: authors.

The orange dotted line is the best response function when $\frac{i}{\theta}$ is equal to zero. This is the case when workers value the future the same as the present (i.e. when $i = 0$), or when government support for workers is at its highest (i.e. when $\theta = \infty$). As we can see, for a given wage, the present value maximizing level of collective action is greater when the discount rate is lower or when the level of government support is higher. The grey dotted line is the best response function when workers put a very low value on the future or when government support

is tilted towards business. As we can see, over a significant range of wages, the best response for workers is to not engage in any collective action. The dotted grey line doesn't represent the lower bound for government support. Indeed, with the above best response function, whenever $\frac{iw}{\theta} \geq w_{MR}$, the maximizing response for labor is to engage in *zero* collective action. Thus, lack of government support for workers can stifle their activities to increase the wage.

For the firm, higher levels of collective action decrease output and thus total revenue. Indeed, the pain workers inflict on the firm is the leverage they wield in attempting to increase the wage. Let's say total production, Y, is a function of labor input times one minus the maximizing level of collective activity. When the wage is equal to zero, the maximizing level of collective action is one, because workers have nothing to lose. Thus, no matter the quantity of labor, total product is zero. As the wage increases, collective action decreases and leads to less interference in production. For wages equal to or greater than w_{MR}, σ^* equals zero.

Firms will take into account the strategic relationship between their choice in wage and the level of interference in production. For one period, the firm's profit function takes the following form:

$$\pi = PY(h(1-\sigma^*)) - wh$$

P is the price. Y is the production function; h is the units of labor hired. Y_h is greater than zero. $PY(h(1-\sigma^*))$ is the total revenue, and wh is the total cost. The firm is bound by the labor supply curve, $w = f(h)$, and will strategically take into account labors' reaction to the wage through collective action, $1-\sigma^*$. Finally, the supply function is upward sloping – i.e. f_h is greater than zero.

Assuming the interaction is time invariant, the firm chooses a wage-quantity pair along the labor supply curve such to maximize its present value from profits for all periods, γ:

$$\gamma = \frac{\pi(w) + \big(1 - s(\sigma^*, \theta)\big)\gamma + s(\sigma^*, \theta)\,{\pi(w_{MR})}/{r}}{1+r}$$

r is the discount rate for the firm. $\frac{\pi(w)}{1+r}$ is the present value from the profits realized at the end of the first period. $\frac{(1-s(\sigma^*,\theta))\gamma}{1+r} + \frac{s(\sigma^*,\theta)^{\pi(w_{MR})/r}}{1+r}$ is the expected present value for the firm from its choice of wage and the resulting level of collective action. The first term is the product of the probability that labor loses, $\big(1 - s(\sigma^*, \theta)\big)$, times the present value for the firm when the wage stays at w, $\frac{\gamma}{1+r}$. The second term is the product of the probability that labor wins, $s(\sigma^*, \theta)$, times the present value for the firm when labor earns the value of the value of their marginal product, $\frac{\pi(w_{MR})/r}{1+r}$. This latter term is the outcome when the firm earns zero economic profit. With zero economic profit as the baseline, we can drop the term from the present value.

If workers do not engage in collective action, the firm's present value simplifies to the following:

$$\gamma = \frac{\pi(w)}{r}$$

The above equation is just the present value from profits for the firm paying workers wage, w, for an infinite number of periods when the firm has a discount rate r. If workers engage in collective action, the initial equation simplifies to the following:

$$\gamma = \frac{\pi(w)}{r + s(\sigma^*, \theta)}$$

The value above is the rent a firm receives from paying workers less than the value of their marginal product. Here, the firm is receiving profits above the baseline by pushing the wage below the value of the marginal product of a unit of labor, w_{MR}, and workers' collective activity is pushing back reducing, to some degree, that rent.

The firm has one first order condition: $\gamma_h = 0$. Through simplification, the first order condition yields the following equation:

$$PY'(1 - \sigma^*) - PY'h\sigma_w^* f_h - S_\sigma \sigma_w^* f_h \gamma = f(h) + f_h h$$

The terms on the left-hand side of the equation are the marginal benefit from hiring one more unit of labor. $PY'(1-\sigma^*)$ is the increase in total revenue from the increase in output from the marginal unit of labor. $-PY'h\sigma_w^* f_h$ is the increase in output from all units of labor from the decrease in collective activity as a result of an increase in the wage from moving up the supply curve when hiring one more unit of labor. $-PY'h\sigma_w^* f_h$ is greater than or equal to zero; because σ_w^* is less than zero, and all the other terms are positive. $-S_\sigma \sigma_w^* f_h \gamma$ is the decrease in the probability of worker success from the decrease in collective activity as a result of an increase in the wage from moving up the supply curve when hiring one more unit of labor. $-S_\sigma \sigma_w^* f_h \gamma$ is also greater than or equal to zero; because σ_w^* is less than zero, and all the other terms are positive. The terms on the right-hand side of the equation are the marginal cost from hiring one more unit of labor. The supply curve, $f(h)$, is the wage of the next unit of labor brought in to work, and $f_h h$ is the change in the wage for all other workers from moving up the supply curve. The assumption for this later condition is that the firm cannot wage discriminate.

As we can see, the marginal cost of a unit of labor is not affected by collective action. The monopsony firm hiring workers that cannot engage in collective action would face the same marginal cost as a monopsonist firm in a world where collective action is possible. In this model, workers collective activity only affects the total and marginal benefit to the firm from hiring one more unit of labor. To get an idea of the marginal benefit lets focus on the first two terms, $PY'(1-\sigma^*) - PY'h\sigma_w^* f_h$, which would also denote the marginal revenue of the h unit of labor for the firm in one period. Three characteristics allow us to map out the general contours of the firms maximizing response. First, when h equals zero, the marginal revenue curve equals $PY'(1-\sigma^*)$. The second term, $-PY'h\sigma_w^* f_h$, drops out because of the h. Since the wage that yields a labor supply of zero is very low, collective action is high and thus $1-\sigma^*$ is closer to zero. As a result, the marginal revenue when h equals zero is equal is less than $PY'(h=0)$ – the marginal revenue when $h=0$ and collective action is not possible.

Second, when the wage is equal to w_{MR}, collective action is equal to zero; there is no interference in production, and total revenue is equal to $PY(h)$ – the same as when collective action is not possible. As a result, we know that the marginal revenue must be increasing as the firm hirers more units of labor between h is equal to zero and the value of h that yields w_{MR} as the wage, (i.e. when $f(h_{@w=MR}) = w_{MR}$). Third, the marginal revenue for the firm faced with collective action must be greater than marginal revenue for the firm where collective action is

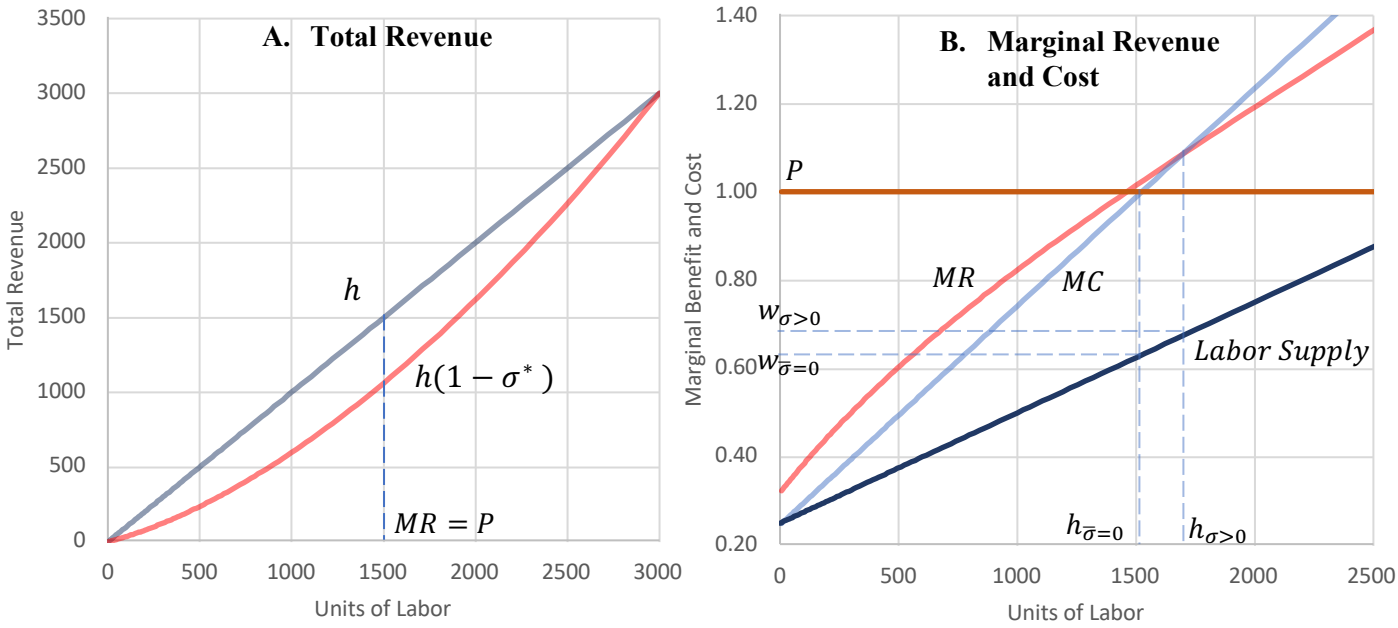
not possible over some range between zero units of labor and when the wage is equal to w_{MR}. Otherwise, the above condition of total revenue being the same with and without collective action when the wage is equal to w_{MR} would not hold. As a result of these conditions, the profit maximizing intersection of the marginal revenue and marginal costs curves will be at a quantity of labor and wage higher than if there was no collective action. Or else, like before, the general conditions on total and marginal revenue outlined above would not hold.

The last term in the marginal revenue equation, $-S_\sigma \sigma_w^* f_h \gamma$, which we have been ignoring in the previous analysis, is positive and decreasing. At the quantity of labor that yields the wage, w_{MR}, $-S_\sigma \sigma_w^* f_h \gamma$ is zero because γ go to $\pi(w_{MR})/\gamma$ – i.e. to zero economic profits. Adding in this term to the analysis would just shift up the marginal revenue curve, as analyzed above, leading to an intersection with the marginal cost curve at a higher quantity of labor and thus a higher wage. Hence, increasing the wage yields future benefits for the firm because it reduces collective action and thus reduces labor's chance of achieving its goal. As a result, the firm is motivated to set the wage a little higher. The degree to which this factor affects a firm's decision is a function of its discount rate. If the firm has a low discount rate, i.e. it values the future highly, this third term will have a greater upward effect on the wage. However, if the firm doesn't value the future, i.e. its discount rate is zero, this factor will have no effect on the wage.

To increase our conceptualization of these ideas, in Figure 2A, we depict total revenue for a firm where collective action is possible and the workers' best response function is defined by $\sigma^* = \frac{w_{MR}}{w_{MR}-w} - \left(\left(\frac{w_{MR}}{w_{MR}-w}\right)^2 - \frac{w_{MR}-iw/\theta}{w_{MR}-w}\right)^{1/2}$ in red and total revenue for a firm were collective action is not possible in blue. For both, we assume a simplified production function, $Y(h(1-\sigma^*)) = h(1-\sigma^*)$ with collective action and $Y(h) = h$ without collective action. And we assume that the price of a unit of output is equal to one. In 2A, the marginal revenue is the slope of each curve.[13] At the quantity of labor where the slope of the red total revenue curve is equal to the slope of the blue total revenue curve, the marginal revenue of each firm is the same. After that point until 3000 units of labor, when the wage is equal to w_{MR} for this specific setup, the marginal revenue for the firm faced by collective action is larger than the firm where collective action is not possible.

[13] This depiction ignores the present value of future benefits to the firm from increasing the wage, $-S_\sigma \sigma_w^* f_h \gamma$.

Figure 2: Maximizing Behavior with and without Collective Action



Source: authors.

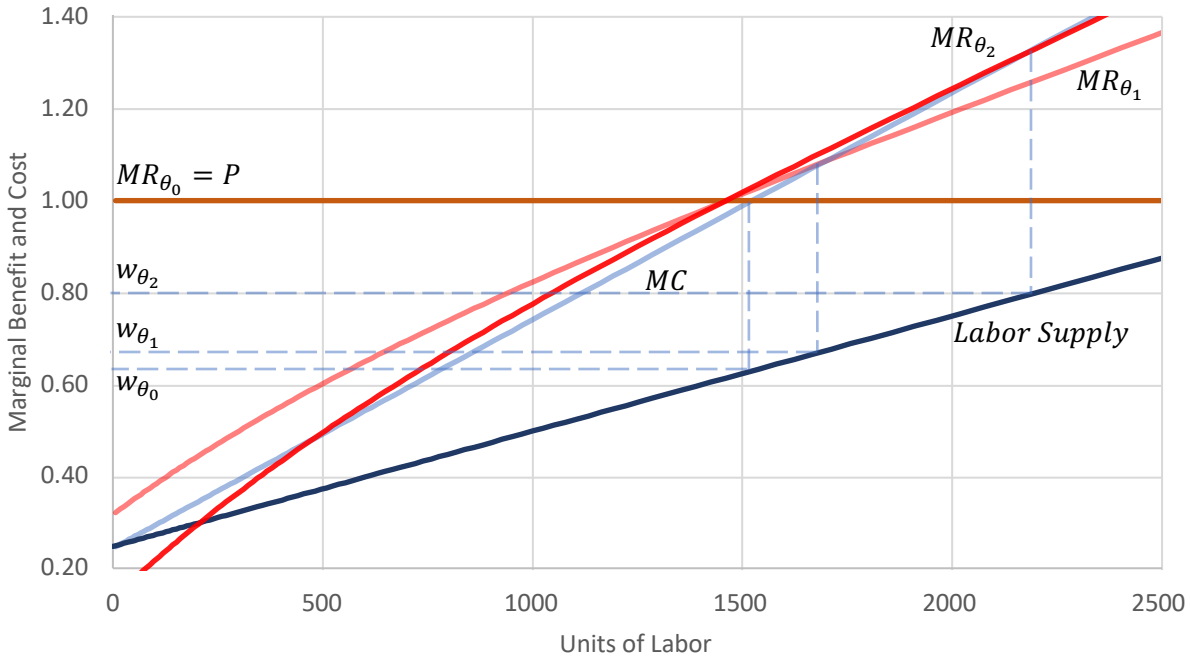
In Figure 2B, we depict the marginal revenue and marginal costs curves. The red line at one is the marginal revenue for the firm where collective action is not possible. The upward sloping red line is the marginal revenue curve for the firm where collective action is possible. As explained above, the marginal cost, the light blue curve, is the same for both firms. Also, the supply curve, the dark blue curve, is the same for both firms. As we can see, the wage picked by the firm where collective action is possible, $w_{\sigma>0}$, is greater than the wage chosen by the firm where collective action is not possible, $w_{\bar{\sigma}=0}$. If we were to add in the present value of the future benefits from increasing the wage (i.e. the term, $-S_\sigma \sigma_w^* f_h \gamma$), the intersection would be even higher.

Essentially, collective action neutralizes, to some degree, the wage setting power of the firm reducing the rent firms siphon from workers. Increases in the wage which reduce profits decrease that rent. Notice, this result is completely counter to the normal conception of workers' collective action. As outlined above, this outcome is contingent on the starting point. Here we have started from assumption that firms have wage setting power. This starting point completely recenters the role of collective action from one of rent seeking to rent reducing.

Higher levels of institutional support for workers will lead to further neutralization of wages setting power, higher wages, and the firm hiring more units of labor. In Figure 3, we

graph the profit maximizing wage for the firm for three different levels of government support.[14] θ_0 is when government support is completely on the side of employers (i.e. when $\theta = 0$). θ_1 is greater than θ_0, and θ_2 is greater than θ_1. MR_{θ_0}, MR_{θ_1}, and MR_{θ_2} are the corresponding marginal revenue curves, and the light and dark blue lines are the marginal cost and supply curve, respectively. As we can see, higher levels of government support for collective activity shifts up the intersection of the marginal revenue and marginal cost curve leading to a higher profit maximizing wage chosen by the firm. Greater government support for labor increases the probability of winning from collective action and thus leads to more such activity. As a result, the firm has more of an incentive to raise the wage such to reduce interference in production.

Figure 3: Institutional Support and the Wage



Source: authors.

3. Efficient Contract Bargaining

As we can see, if the institutional support is present, there is some level of collective action at the profit maximizing wage chosen by the firm. For workers, collective action via

[14] This depiction also ignores the present value of future benefits to the firm from increasing the wage, $-S_\sigma \sigma_w^* f_h \gamma$.

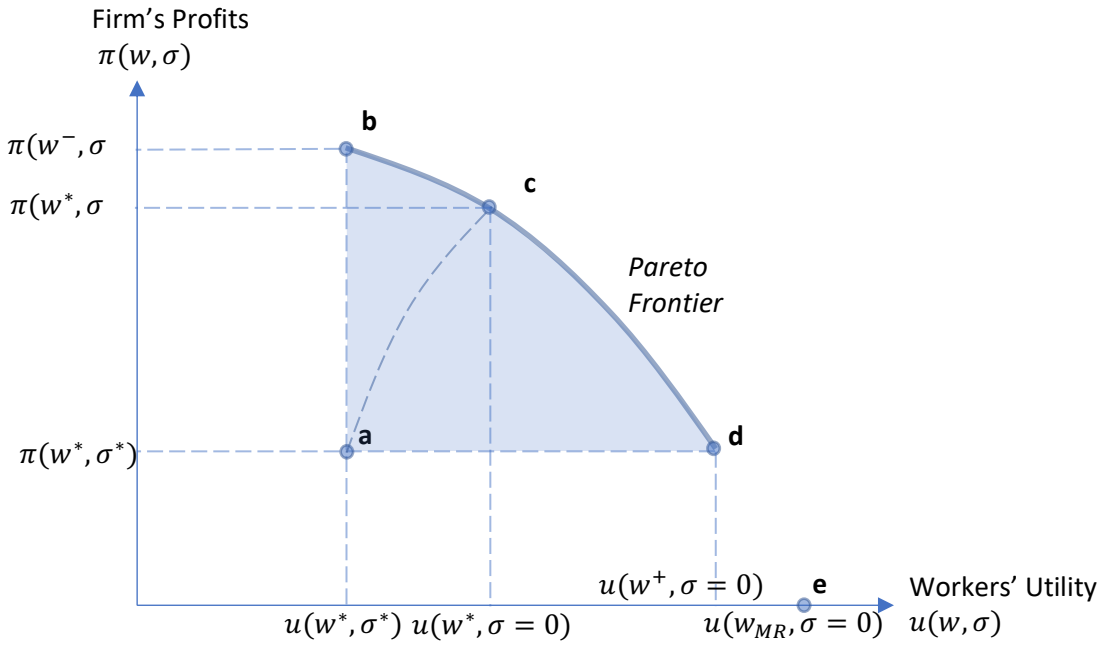
conformance to their best response function is necessary to counterpose employers' wage setting power. If workers' planned collective activity, as outlined in their best response function, was viewed as a bluff, employers would have no reason to increase in the wage. Thus, in this noncooperative setting (i.e. binding agreements cannot be made between parties), preemptive wage increases by the employer are dependent on labor engaging in collective action, and the increased wage motivates labor to reduce, but not eliminate, collective action in most cases.

As a result, if labor and management can make binding agreements on the wage and level of collective activity, there is plenty of space for Pareto improving contracts between labor and management.[15] Management could increase the wage, and labor could decrease collective action both reaping gains. Reduction in collective activity would benefit management through an increase in production without an increase in cost, and if management was contractually bound to a certain wage, workers would also benefit through eliminating the disutility of engaging in collective action without any negative repercussions on their wage. In Figure 4, we demonstrate the space for Pareto improving contracts on the wage and collective action. Point **a** represents the noncooperative outcome where the employer preemptively increases the wage. The Pareto frontier represents all points that are Pareto-efficient. From each of the points on the Pareto frontier, no other outcome exists which could increase the profit of the firm or utility of workers without decreasing either.

At all points along the Pareto frontier, the level of collective action is zero. This is because it both hurts workers and employers. If workers can make a binding agreement with management for a specific wage, it is in their best interest to eliminate collective action. Point **b** is the combination of wage and collective action where the employer's profits are highest out of all potential Pareto frontier outcomes. At point **b**, the wage, w^-, is the value that yields the same utility for workers as the noncooperative outcome, $u(w^*, \sigma^*)$, but when collective action is zero. Thus, w^- is less than w^*. Point **d** is the combination of wage and collective action where workers' utility is the highest out of all potential points on the Pareto frontier. At point **d**, the wage, w^+, is the value that yields the same profits for the firm as the noncooperative outcome, $\pi(w^*, \sigma^*)$, but when collective action is zero. Thus, w^+ is greater than w^*.

Figure 4: Opportunity for Pareto Improving Contracts

[15] An outcome is a Pareto improvement over another outcome if it increases the payoffs of at least one player and doesn't decrease the payoff of any.



Source: authors.

Point **d** is the most socially efficient outcome on the Pareto frontier, because the rent employers siphon from workers is at its least. However, at point **d**, there are still possibilities to increase social efficiency. Point **e** – the outcome assumed in perfectly competitive labor market models – is socially efficient, because it maximizes the net benefits to workers and the firm through eliminating the rent to employers. This outcome highlights the limitations of Pareto evaluations which ignore overall payoff and focus on individual payoffs. Thus, the social planning optimal outcome is most often different than the range of efficient contract outcomes. However, in this model it is only possible with a high level of government intervention.

4. Conclusion

While wage setting power has long been thought of as an exception rather than the norm, as we have highlighted in the introduction, current evidence shows that monopsony power is ubiquitous. In this paper, we take wage-setting power as the starting point and formulate a general labor market model that incorporates workers' collective action into an institutional context. As we have seen, the integration of these new findings significantly changes how we conceptualize labor markets. Workers collective activity goes from rent seeking to rent reducing, and institutional support for workers is central in achieving more socially efficient

labor market outcomes. Indeed, we show that low levels of institutional support for workers stifles collective action and, as a result, inefficient outcomes dominate.

These ideas have significant implications on how we understand current changes in the economy. Since the early 1980s, the National Labor Relations Act (NLRA) – the main federal labor law in the United States - has been reinterpreted to the benefit of employers. The National Labor Relations Board – the body charged with administering the NLRA – has dramatically increased the time it takes to process claims decreasing its effectiveness to the detriment of labor. As a result, strike activity in the United States has plummeted (Stelzner, 2017). In the context of the theory laid out above, current changes in institutional support for workers would mean that employers are better able to extract rents from their employees. Labor market outcomes are less socially efficient. And some part of the current rise in income inequality in the United States over the last four decades probably stems from the wage for many workers being pushed below the value of the marginal product. Indeed, at present, the largest employer in the United States is Wal-Mart which is famously anti-worker-collective-activity (Lichtenstein, 2009). Several studies have demonstrated that a Wal-Mart moving into an area decreases wages (for example, see Dube et al., 2007). Like with General Motors of the mid-twentieth century, the Wal-Mart model now defines much of current labor market interactions across firms.

In terms of policy implications, the model laid out above implies that to achieve more socially efficient outcomes and for pay to be commensurate with productivity, we must increase institutional support for workers' collective activity. This result mirrors that of other situations where the real world diverges from perfect competition. For example, a Piguovian tax makes a firm feel as if the negative externality it is creating was internalized. Likewise, in this case, increasing support from workers would reduce firms' wage setting powers bringing us closer to the outcome in perfect competition where firms don't have monopsony power and the wage is equal to the value of the marginal product. While such change is difficult politically, social benefits for the economy as a whole and overall fairness of economic outcomes are stake.

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