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Monopsony Power in the Labor Market: From Theory to Policy

José Azar[1] and Ioana Marinescu[2]

[1]School of Economics and Business and IESE Business School, University of Navarra, Pamplona, Spain

[2]School of Social Policy and Practice, University of Pennsylvania, Philadelphia, Pennsylvania, USA; email: ioma@upenn.edu

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Abstract

Labor markets are not perfectly competitive: Monopsony power enables employers to pay workers less than the marginal revenue product of labor. We review three theoretical frameworks explaining monopsony power. Oligopsony models attribute it to strategic interactions among a limited number of firms. Job differentiation models cite imperfect job substitution and heterogeneous worker preferences. Search-and-matching models point to search frictions hindering instantaneous access to all available jobs. We then develop a theory-informed discussion of the empirical evidence on antitrust policies, policies that reduce barriers to job switching, and policies countering monopsony's effects on workers. Preventing mergers and regulating noncompetition agreements can increase wages by preserving competition among employers. Minimum wages can mitigate the effect of monopsony power by increasing wages without reducing employment. The insights garnered from both theoretical models and empirical evidence offer a road map for crafting policies that can enhance competition in the labor market.

1. INTRODUCTION

The labor market has long been conceptualized as an arena of perfect competition, where infinitely many employers compete for workers' talents. Wages, in this view, merely reflect the marginal productivity of labor. Yet, recent empirical evidence points to a significant discrepancy between this paradigm and the realities of labor markets. An evolving body of work in monopsonistic labor market theory has underscored the consequential role of market imperfections, most notably, the monopsony power of employers. This work has shown that monopsony power leads to reduced wages and inferior job amenities.

Public policy has increasingly taken note of these findings (US Dep. Treasury 2022). In 2023, US antitrust agencies have issued merger guidelines specifically tailored to address anticompetitive mergers in labor markets (US Dep. Justice & Fed. Trade Comm. 2023). From blocking mergers (US Dep. Justice Off. Public Aff. 2022b) to proposing a ban on noncompetition agreements between employers and their workers (Fed. Trade Comm. 2023), regulators are now actively engaged in mitigating the market power of employers. This regulatory sea change builds on a more profound shift in the academic literature that has emerged over the last decade.

The intellectual lineage of labor monopsony can be traced back to Joan Robinson, who first coined the term "monopsony" in the early twentieth century [Robinson 1966 (1933)] and developed the classic theory of monopsony. More recently, scholars have expanded upon Robinson's pioneering work, with significant contributions appearing in the *Journal of Economic Literature* (Boal & Ransom 1997) and the *Handbook of Labor Economics* (Manning 2011), among others. Notably, the recurring conference on monopsony (Ashenfelter et al. 2010) in Sundance, Utah, serves as a vivid illustration of the topic's renaissance and our own engagement with it, as we participated in the second conference in 2018, with articles published in 2022 (Ashenfelter et al. 2022).

For the purposes of this review, we define monopsony power in a broad sense as employers' ability to pay workers less than their marginal revenue product. More generally, one may define monopsony power as the ability of employers to pay workers less than the competitive wage, while recognizing that the competitive wage benchmark may differ depending on model assumptions.[1]

In this review, we examine the recent developments in monopsony theory and its implications for policy interventions aimed at mitigating employer market power. We focus on a triad of modeling approaches—oligopsony, job differentiation, and search-and-matching—and assess the robustness and applicability of these frameworks across a range of policy areas. We discuss key developments in the theoretical and policy evaluation literature since approximately 2010. **Table 1** presents a comprehensive summary of the intersections between theoretical models and policies. We aim to highlight both established connections and areas ripe for further research.

We then consider how these theoretical frameworks can help us understand the way policies can weaken the forces that enable employers' monopsony power, or counteract the downstream effects of monopsony power. Specifically, we focus on three classes of policies: antitrust policy, policies that reduce barriers to job switching, and interventions that do not directly address the sources of monopsony power but can mitigate the effects of monopsony power by increasing wages or improving working conditions.

We show that each of the three modeling approaches offers unique advantages for policy analysis. Oligopsony models are often the most straightforward to use and are particularly well suited to analyzing situations in which employers' market shares change, such as mergers. Job

[1]For example, if the solution to the firms' profit maximization problem is not interior, then their level of employment may not satisfy the first-order condition that the wage equals the value of the marginal product of labor.

Table 1 Monoposony models and policies

Policy area	Model type		
	Oligopsony	Job differentiation	Search and matching
Antitrust			
No poaching	–	–	✓
Wage fixing	✓	–	–
Mergers	✓	✓	–
Information sharing	–	–	–
Barriers to switching			
Occupational licensing	–	–	✓
Non-compete agreements	✓	–	✓
Moving and commuting costs	–	✓	✓
Non-disclosure agreements	–	?	?
Salary history ban	–	–	?
Wage transparency	?	–	?
Direct interventions to increase job quality			
Minimum wage	✓	✓	✓
Wage theft prevention	✓	–	–
Floors on working conditions	–	✓	–
Unions	?	–	–

Checkmarks indicate that this class of models has been applied to this type of policy or could straightforwardly be applied. Question marks indicate that this class of model could be applied to this type of policy, but the application would need some significant elaboration (typically due to the need to model incomplete information). Dashes indicate that we do not cover an application of that model to that policy in this review, but this does not mean the application cannot be developed.

differentiation models are useful to understand policies that affect the nonwage characteristics of jobs, as well as workers' and firms' optimal strategies in choosing these characteristics. Search-and-matching models are particularly effective in understanding policies that affect the job search process. Current frameworks offer valuable insights, yet there is a need for theories that can better navigate the complexities introduced by information asymmetries in the presence of labor monopsony.

Our analysis culminates in the assessment of policies and their estimated effects on outcomes like wages and employment. Based on the empirical evidence, we find that all of the classes of policies examined—antitrust policy, reducing barriers to job switching, and direct interventions to improve job quality—can reduce the adverse effects of monopsony power on labor market outcomes. Yet, empirical papers often have only a loose connection to the most recent monopsony theories, presumably because the empirical work has been developed at the same time or even before the most recent theoretical work. By forging stronger connections between theoretical models and empirical policy evaluation, we can enhance our understanding of labor market monopsony and consequently inform more effective policy interventions.

2. MONOPSONY POWER: BRIEF OVERVIEW OF THEORY

There is a growing literature on monopsony power in labor markets, which has been reviewed by Manning (2021), Sokolova & Sorensen (2021), and Card (2022). In this article, we focus on the policy implications of monopsony power. To understand what to expect in terms of policy effects, we start by presenting three key theoretical frameworks that have been used in recent papers to model monopsony power.

2.1. Oligopsony

In a perfectly competitive labor market, infinitely many firms compete for workers, and wages are equal to the worker's marginal revenue product. At the other extreme of the perfectly competitive model is the literal case of monopsony, in which there is a single employer in a labor market. The simplest model of monopsony, the isolated firm model, goes back to Robinson [1966 (1933)]. In contrast to the perfectly competitive labor market model, where the individual firm faces a horizontal labor supply curve, in the monopsony model, the labor supply curve is upward sloping. The firm takes this into account when maximizing its profit. The firm pays the same wage to all of its workers, and it must pay more to attract more workers as the labor supply is upward sloping. Thus, a marginal increase in the number of workers the firm employs leads to a higher wage for all of its (inframarginal) employed workers. Therefore, the monopsonistic firm has a lower incentive to hire additional workers than the wage-taking firm in the perfectly competitive labor market. The monopsonist both offers lower wages and has lower employment levels compared to firms in a perfectly competitive market. This type of model is sometimes dubbed classical monopsony in the literature.

Oligopsony models extend the basic isolated firm monopsony model to allow for multiple large firms operating in a labor market. This introduces strategic interactions between firms in the labor market in addition to the upward-sloping curve of labor supply to the market. These two ingredients are the key building blocks of the oligopsony model that distinguish this model from the perfectly competitive model.

In the simplest version of the oligopsony model, several large firms compete with each other by selecting the level of employment, taking into account the anticipated employment levels of other firms. The first-order condition for a firm n in the oligopsonistic labor market is

$$R'(L_n) = w(L) + w'(L)L_n, \qquad 1.$$

where $R'(L_n)$ is the marginal revenue product of labor, L is market-level employment, $w(L)$ is the inverse labor supply curve, and L_n is the employment of firm n. In the perfectly competitive model, the employment level of the firm would not influence the equilibrium wage in the market, so the term $w'(L)L_n$ would be set to zero. As a result, we would have a wage that is equal to the marginal revenue product of labor, which is the first-order condition of the firm if the labor market is perfectly competitive. Therefore, maximum competition in this model would in fact result in wages equal to marginal productivity.

It is worth noting that the firm is assumed to pay the same wage to all its workers. This assumption leads to lower employment levels because, to hire an additional worker, the firm has to raise the wage for all current workers. In the case of a literal monopsony with one employer, perfect wage discrimination would lead to an efficient employment level just as a perfectly discriminating monopoly would lead to an efficient output level. However, in an oligopsony, allowing firms to wage discriminate does not necessarily increase employment depending on model assumptions (for oligopoly, see, e.g., Stole 2007). Moreover, wage discrimination can lead to inefficiency by inducing misallocation of jobs among workers. This is analogous to the product market price discrimination case (Stole 2007), in which a uniform price ensures that the consumers with the highest willingness to pay get the product, whereas with price discrimination this is not guaranteed. Similarly, with monopsony and wage discrimination in the labor market, jobs will generally not go to the workers that value them the most. The issue of whether firms pay all workers the same wage is important to understand the impact of policies that change workers' or firms' information sets, as discussed below.

When jobs are undifferentiated, the firm-level inverse elasticity of labor supply is equal to the firm's market share × the market-level elasticity of labor supply. If the firm is a literal monopsonist,

the market-level elasticity of labor supply is also the firm's elasticity of labor supply, which makes sense since the firm's share is then equal to one. In an oligopsony, each firm's labor supply elasticity is larger than the monopsonist's, since each firm's share is less than one, and firms compete with each other. The equilibrium is such that the average markdown or Pigou's rate of exploitation (i.e., the difference between the marginal revenue product and the wage) is equal to the market-level inverse elasticity of labor supply × the employment Herfindahl-Hirschman Index (HHI) in the labor market (Boal & Ransom 1997). Mathematically, we have

$$\sum_{n=1}^{N} s_n \frac{R'(L_n) - w}{w} = \frac{\sum_{n=1}^{N} s_n^2}{\eta} = \frac{HHI}{\eta}, \qquad 2.$$

where $R'(L_n)$ is the marginal revenue product of labor of firm n, w is the equilibrium wage in the labor market, s_n is the employment share of firm n, and η is the market-level elasticity of labor supply. The HHI is defined as the sum of the squares of employment shares for each firm, that is, $HHI = \sum_{n=1}^{N} s_n^2$.

Based on the oligopsony model, the HHI and the market elasticity of labor supply are thus two key metrics that determine average labor market power as measured by the markdown. A firm's markdown is determined by its own firm-level elasticity of labor supply, which depends on this firm's own share of employment rather than the HHI.

The oligopsony model is arguably the first one to use to understand the impact of policies in the presence of firm monopsony power. This is because it is a simple model that is well understood and has been widely used in industrial organization to understand firms with market power and, more recently, to understand the impact of the minimum wage (Azar et al. 2023). This model is particularly useful to evaluate policies that can be understood as changing the shares of firms in a particular labor market. A prototypical example of this is merger policy.

An alternative model of oligopsony would feature firms competing in wages (i.e., the analogue of competing à la Bertrand in product markets) as opposed to firms competing in levels of employment (i.e., the analogue of competing à la Cournot in product markets). With undifferentiated jobs and symmetric firms, this leads to a Bertrand paradox in which the Nash equilibrium wage is equal to the marginal product of labor as long as there are two or more firms competing in the labor market (Bertrand 1883). The reason is that, as long as there is a gap between the marginal revenue product of labor and the wage, any firm in the market has an incentive to offer a wage infinitesimally above the prevailing wage and hire all the workers in the labor market. This implies that only the equilibrium wage is equal to the marginal product of labor, and thus the wage outcome is the same as under perfect competition. This outcome makes Bertrand competition an unattractive model of imperfect competition. Further, wage competition may be blunted when many firms do not post wages (Marinescu & Wolthoff 2020). When combined with additional features such as search frictions, Bertrand competition becomes more attractive to model imperfect competition in the labor market (Postel-Vinay & Robin 2002). A model of firms competing in wages is also more appealing when jobs are differentiated, as job differentiation can allow for equilibrium wages that are below marginal product.

2.2. Differentiated Jobs

In the Cournot oligopsony model, there is a finite labor supply elasticity to the labor market as a whole. One way to justify this assumption is that jobs in this labor market are differentiated from jobs in other markets. Therefore, at least implicitly, the Cournot model of homogeneous jobs already hints at the idea of differentiation as a source of monopsony power. However, one can also add differentiation explicitly both across markets and across jobs in the same labor market.

In a differentiated jobs model, the key source of monopsony power is not the finite number of firms as in oligopsony models, but rather the fact that workers have heterogeneous preferences over jobs that differ in wages and amenities. When a worker's job is better (in the sense that it provides higher utility) than their next best option, the firm is able to pay the worker less than the marginal revenue product of labor.

When jobs are differentiated and workers' preferences are heterogeneous, a firm that increases its wage infinitesimally above the wage set by other firms in the labor market does not manage to hire all the workers in the labor market. Because workers value wages and amenities differently (heterogeneous preferences), only an infinitesimal fraction of the workers of the other firms decide to move to the firm that offers the marginally higher wage. This implies that, in equilibrium, the wage can be below the marginal product of labor even when firms compete by setting wages.

Models of differentiation fall into two categories: representative agent models (Berger et al. 2022a, Bhaskar et al. 2002) and discrete choice models of labor supply (Card et al. 2018, Azar et al. 2022).

Berger et al. (2022a) develop a tractable general equilibrium model of oligopsony based on the representative agent framework: There is one household with a utility function that represents preferences for differentiated jobs, and the household supplies some of its labor to each of the various jobs in the economy. The authors make two key contributions: explicitly integrating both oligopsony and job differentiation (which they call monopsony power) in the same model, and using the calibrated model to derive welfare implications. Berger et al. (2022a) also show theoretically that the labor share is a decreasing function of the payroll share HHI (as opposed to the employment share HHI in the homogeneous jobs oligopsony model). Based on a calibration of their model, they calculate welfare reductions due to monopsony relative to a competitive equilibrium concept. They find that welfare losses are about 8%, and that 60% of welfare losses are attributable to misallocation, that is, to more productive firms staying inefficiently small in order to exercise more labor market power.

Dube et al. (2022) extend the representative agent model to allow for preferences over both wages and workplace amenities, one of which is the job's level of workplace dignity, which is defined to include characteristics such as the level of job autonomy, coworker relations, and the quality of supervision. In their model, the wage is below the marginal product of labor because of a combination of monopsony power due to horizontal job differentiation and compensating differentials from a job's (costly) amenities. They then study the effect of an increase in the minimum wage. Since it increases the cost of labor, the minimum wage may affect the provision of amenities that are costly to the firm. In the traditional hedonic model of Rosen (1974), nonwage amenities necessarily go down in response to a minimum wage increase, as firms reduce both employment and nonwage compensation in order to adapt to the constraint on wages. However, this unambiguous result assumes that the labor market is competitive. Dube et al. (2022) show that, when firms have monopsony power, amenities could fall or rise in response to an increase in the minimum wage. How could amenities increase with the minimum wage? Firms with a binding minimum wage must increase the wage. Then, as long as amenities are sufficiently complementary to the wage, a higher wage can increase the value of amenities enough to make it profitable for the firm to offer more amenities to get more workers. Thus, if amenities are sufficiently complementary with wages from the workers' perspective, then amenities can increase with the minimum wage under monopsony, while otherwise amenities will decrease with the minimum wage.

In contrast to representative household models, workers in a discrete choice model only pick one job rather than spreading themselves across jobs (Card et al. 2018, Lamadon et al. 2019, Azar et al. 2022). Discrete choice models can be used to analyze how workers make decisions about job

choice. These models assume that workers have preferences over different jobs, and they pick the one that gives them the highest utility.

Models of job differentiation are useful to understand the impact of policies on working conditions or benefits offered by firms with monopsony power. Models like that of Azar et al. (2022) can also be used for understanding the effects of changes in firms' shares of employment (e.g., due to mergers) in contexts where job differentiation is important. However, some job differentiation models (e.g., Card et al. 2018, Lamadon et al. 2019) assume that firms do not strategically take into account the behavior of other firms in the market (zero cross-firm wage elasticity), and such models are not suitable for understanding the effects of changes in market shares, even if they can be helpful to understand an individual firm's strategy in choosing wages and amenities.

2.3. Search-and-Matching Frictions

In search-and-matching models, the key deviation from perfect competition is that workers cannot instantaneously access any and all of the available jobs, and therefore competition between jobs is limited even if there is an infinite number of employers. In a search-and-matching model, a match between a worker and a firm occurs with some probability strictly less than one. In these models (Rogerson et al. 2005), the equilibrium wage depends on workers' outside options, which themselves depend on factors like labor market tightness (i.e., the number of unemployed divided by the number of job vacancies) and job-switching costs. Intuitively, if workers' outside options are worse, firms can pay less and still succeed in hiring and retaining workers.

Burdett & Mortensen (1998) build a random search model in which firms post wages and have monopsony power despite being infinitesimal in the labor market. The key assumption of the model is that job seekers can receive an offer while employed, that is, there is on-the-job search. Given this assumption, Burdett & Mortensen (1998) show there is a nondegenerate wage distribution (more than one wage) even when workers and firms are respectively identical, as long as the arrival rate of job offers is finite. If the arrival rate of job offers is infinite, the wage converges to productivity, which is the competitive outcome. Without on-the-job search, and with a finite offer arrival rate, we have what the authors call monopsony, that is, wages are set to the level where workers are exactly indifferent between working or not, and employers get all of the surplus.[2] Interestingly, as the offer arrival rate increases, the equilibrium wage goes from the monopsony wage to the competitive wage. This nicely illustrates the role of frictions in keeping wages below worker productivity in this search-and-matching model.

Burdett & Mortensen (1998) extend their basic setup in several ways. In particular, they show that, if workers differ in their opportunity costs of employment, then unemployment is inefficiently high (in a constrained efficiency sense; unemployment is always inefficient in an unconstrained sense). Some workers get offered less than their reservation wage, even though their productivity is above their opportunity cost of employment. The basic mechanism here is the same as in the monopsony and oligopsony models: The dispersion in workers' opportunity costs of employment generates an upward-sloping elasticity of labor supply. Search frictions—the finite arrival rate of job offers—give employers monopsony power, and employers choose to pay lower wages even though this reduces the number of workers they are able to hire. In this model, Burdett & Mortensen (1998) show that the minimum wage increases employment when set below workers' productivity.

[2]Burdett & Mortensen (1998) define monopsony as the extreme case in which all the surplus goes to the firm, while under our monopsony definition from the introduction, all cases in which the wage is below the competitive wage would show monopsony power.

Postel-Vinay & Robin (2002) consider a version of Burdett & Mortensen's (1998) model where firms are able to counteroffer when employed workers receive an outside offer. Indeed, in Burdett & Mortensen's (1988) model, firms are passive, and workers leave when they receive a higher offer than their current wage. In Postel-Vinay & Robin's (2002) model, when an employed worker receives an offer from another firm, the two firms engage in Bertrand competition. When all workers have the same opportunity cost of employment and all firms are also identical, there are only two wages in this economy: the monopsony wage offered to the unemployed, and the competitive wage offered to the employed who receives an outside job offer and who benefits from the all-out Bertrand competition between the two firms. When introducing firm productivity dispersion, there is further wage dispersion, because more productive firms are able to offer higher wages to poach already employed workers. Offers and counteroffers for employed workers thus play an important role in wage growth for workers, allowing workers to escape the monopsony wage.

Postel-Vinay & Robin (2002) also allow us to understand wage discrimination in the sense of firms being able to tailor wages to workers' opportunity cost of employment. Postel-Vinay & Robin (2002) compare the equilibrium outcomes in two economies in the case in which workers are homogeneous, but firms differ in their exogenous productivity, following Burdett & Mortensen (1998) and Postel-Vinay & Robin (2002). In Burdett & Mortensen's (1998) model, firms cannot tailor their wage offers to the specific worker they meet, while in Postel-Vinay & Robin's (2002) model, firms know the worker's outside option but must Bertrand-compete with other firms when their employed workers randomly meet another firm. Total employment and output are the same in both economies. However, employers make a higher profit in Postel-Vinay & Robin's (2002) model because of their ability to wage discriminate. Further, there is more inequality in Postel-Vinay & Robin's model: While employed workers get higher wages than in Burdett & Mortensen's (1998) model, unemployed workers fare worse than in Burdett & Mortensen's model, getting zero rents.

In the Burdett & Mortensen (1998) and Postel-Vinay & Robin (2002) models, all firms are infinitesimal, and each firm hires only one worker. Yet, firms are able to pay workers less than their productivity due to search frictions. Several recent papers have sought to introduce labor market concentration in a search-theoretic framework by incorporating multi-vacancy firms.

Jarosch et al. (2019) develop a random search model with multi-vacancy firms, based on the Diamond-Mortensen-Pissarides wage bargaining framework. Firms do not post wages as in Burdett & Mortensen's (1998) model, and instead they bargain over wages with workers after meeting them. The key difference between Jarosch et al.'s (2019) model and the standard random search and bargaining model is that, in Jarosch et al.'s (2019) model, firms are not atomistic, and there is a positive probability that a worker will encounter the same firm in the future. This reduces the bargaining position of the worker relative to the firm, since the outside option is partly controlled by the same firm. Specifically, employers exercise market power by committing not to rehire the worker if wage bargaining breaks down.[3] In the model, the HHI measures how often a worker who searches randomly encounters a job vacancy from their current employer: Intuitively, the higher an employer's market share, the more likely the worker is to meet the employer again and thus not be rehired. As a result, wages are negatively related to the HHI of the labor market, something the authors also corroborate empirically using Austrian data.

Jarosch et al. (2019) demonstrate that HHI can measure market power not only in an oligopsony model but also in a search-and-matching model. In both models, firms with higher market

[3] Even if firms cannot commit, the firm's threat not to rehire the worker is operative as long as it is more costly to the worker than to the firm, which occurs when the firm can find a close-enough substitute for the worker.

shares have more market power. In the oligopsony model, larger firms face higher wage costs when hiring an additional worker, because they have to increase the wages of their existing inframarginal workers. Therefore, larger firms keep wages low. In Jarosch et al.'s (2019) model, larger firms can keep wages low because they can prevent job seekers from accessing their future vacancies. In this paper, the distribution of firm size is taken as given, and therefore the model is not helpful to understand the impact of monopsony power on employment or the firm size distribution. In contrast, it is a useful model to understand workers' bargaining leverage in wage negotiations with firms of different sizes, as well as how this bargaining leverage may be affected if firms collude (or if they merge).

Rudanko (2023) explores wage setting in a directed search model of multi-worker firms facing within-firm equalizing constraints on wages. The paper builds a model of directed search as done by Moen (1997) but with multi-vacancy firms. When firms have multiple vacancies and equality constraints that require them to pay the same wage to their existing workers as they offer new hires, this reduces wages through a mechanism similar to that in the oligopsony model. However, in contrast to the oligopsony model, paying lower wages leads equality-constrained firms to hire more workers, and employment is higher than without equality constraints. The surprising positive employment effect of equality constraints can be explained as follows: Lower equilibrium wages encourage firms to post more vacancies, and workers are willing to apply as long as posted wages are higher than the reservation wage.

There are two opposing forces at play in these models. One is the upward-sloping market-level labor supply, which implies that when wages are lower, workers supply less labor to the market. The other force is firms' incentives to invest in costly hiring efforts: When firms have a hiring intensity (Davis et al. 2012) or vacancy margin, lower wages imply a higher incentive to invest in hiring. This second force can sometimes dominate the first one, leading to an increase in employment when wages are lower. In the case of Rudanko (2023), the first force is shut down by the fact that the market-level labor supply is vertical in the relevant wage range. Therefore, in that model, the second force always dominates, and employment is higher when there is a wage equality constraint and monopsony power.[4]

A positive employment effect of monopsony power is an interesting theoretical finding because (*a*) it helps rationalize some empirical results that find greater concentration leading to lower wages without lower employment, and (*b*) it has different implications for the effects of monopsony power on efficiency compared to the classical model. In the oligopsony model, equilibrium employment is below the efficient level, while in Rudanko's (2023) model, equilibrium employment is above the efficient level. But what exactly constitutes excessive employment? In this atypical equilibrium, the labor market experiences high levels of employment paired with suppressed wages. The average worker's expected income in this excessive employment state is inferior to that in the constrained efficient equilibrium, with the latter offering fewer employment opportunities but higher wages. The implication here is counterintuitive yet crucial: Workers could theoretically benefit from a labor market that features more spells of unemployment, if such a dynamic serves to uphold higher equilibrium wages.

Search-and-matching models are particularly useful to understand policies that affect job search and job transitions. In search-and-matching models, the equilibrium wage depends on workers' income when unemployed and on the probability of matching. In models where firms

[4]The rationale for a positive equilibrium employment effect is thus similar to that in the generalized oligopsony model of Azar et al. (2021): The firm has two decisions, a wage decision and a hiring intensity decision. The lower equilibrium wage from monopsony raises the incentive to increase employment, by increasing hiring effort as in Azar et al.'s (2021) or by increasing the number of vacancies as in Rudanko's (2023) model.

have multiple vacancies, firms' market share (Jarosch et al. 2019) and firms' commitment to pay equal wages to all workers (Rudanko 2023) can also affect equilibrium wages. Search-and-matching models are thus particularly helpful to understand policies that affect workers' matching probability, their income when unemployed, and the cost of switching jobs. Jarosch et al. (2019) can be helpful to understand monopsony power exercised by larger firms and the impact of exogenous changes in firms' shares in a context where modeling the job search process is important. In addition, Rudanko (2023) can help us understand the effects of policies related to firms' ability to wage discriminate when they have monopsony power.

2.4. Monopsony Power Models and Policies

The theoretical frameworks developed above can help us understand the effects of policies on the labor market. In **Table 1**, we indicate which theories may be most straightforward to understand the policies we discuss below.

3. ANTITRUST POLICY

Antitrust agencies enforce against anticompetitive behavior, typically targeting large firms. This may suggest that the overall impact on workers is limited, especially because the agencies litigate a limited number of cases each year. However, the effect of such enforcement can be far-reaching. Because of deterrence effects, the impact of antitrust policy can be much greater than the direct impact on the firms involved in the litigated cases. Empirically, a working paper by Babina et al. (2023) uses a difference-in-differences strategy to show that US Department of Justice enforcement against anticompetitive conduct (excluding mergers) leads to significant and persistent increases in employment (by 5.4%) and average wages in affected industries.[5]

3.1. No-Poaching and Wage-Fixing Agreements

A no-poaching agreement is an agreement between employers not to hire each other's employees. There are different types of no-poaching agreements. For example, the agreement could be one way, whereby only one of the employers agrees not to poach the other employer's employees; or there could be a nonsolicitation agreement where the agreement is not to solicit employees at the competing firm, but hiring the employees would not be a violation of the agreement in the absence of solicitation. No-poaching agreements straightforwardly reduce competition between employers since they are restricted from hiring their competitors' employees.

Legally speaking, naked no-poaching agreements are per se illegal under the antitrust laws. This is because no-poaching agreements are a form of horizontal market allocation among buyers of labor services. Market allocation is an agreement among competitors to divide or allocate a market by geographic area, product, customer, or other criteria. In the case of a no-poaching agreement, market allocation is based on which employer workers currently work for. Courts have acknowledged that such agreements are per se illegal—that is, illegal without any inquiry into actual anticompetitive effects—unless the no-poaching agreement meets the requirements of the ancillary-restraints defense [see, e.g., *Deslandes v. McDonald's USA, LLC* (2023)]. According to this defense, a no-poaching agreement can be considered lawful if it is subordinate to a separate, legitimate business transaction and if it is reasonably necessary to make that transaction more effective.

[5] Babina et al. (2023) do not distinguish effects on firms targeted by the Department of Justice and other firms in the same industry.

Theoretically, no-poaching agreements could most straightforwardly be modeled using a search-and-matching framework like that of Jarosch et al. (2019), assuming employees are aware of the agreement. In this case, the searching employee would be barred not only from other jobs at their current employer but also from jobs at other employers who are part of the agreement. This would increase the effective HHI in the market, since the agreeing employers can now be counted as a single employer that has a higher market share. The wage would also decrease as a result of the no-poaching agreement, because workers would understand that their outside options are worse. The no-poaching agreement could also be modeled in an oligopsony framework under the assumption that these firms act jointly in setting employment or wages and therefore have combined market shares. In this case, the elasticity of labor supply to these firms decreases, and their markdown increases. However, using an oligopsony model in this way would amount to treating a no-poaching agreement the same way as a wage-fixing (or employment coordination) agreement, which does not seem fully correct, because wage fixing does not distinguish between the agreeing firms' workers and other workers. The search framework may be more appropriate than the oligopsony model to understand no-poaching agreements, because it can distinguish between job seekers and workers currently employed at agreeing firms.

Lafontaine et al. (2023) provide a more detailed explanation and derive the effects of no-poaching agreements for either an oligopsony model or a search-and-matching model of the labor market. They point out that no-poaching could either increase concentration (oligopsony) or decrease the number of offers job searchers get. Both of these mechanisms would reduce wages. In their partial equilibrium job search model, workers are assumed to be aware of the no-poaching agreement and to adapt their search strategy in response. However, workers are typically unaware of such agreements and are therefore unable to adapt their strategies in terms of either searching for jobs or asking for a higher wage to compensate for the restriction (compensating differentials).

In a full search-and-matching model that incorporates both firms' and workers' strategies (e.g., Postel-Vinay & Robin 2002), one could derive the impact of no-poaching agreements on wage growth. In a labor market free from no-poaching agreements, firms vying for employees usually offer higher wages, prompting current employers to counter by raising wages to retain talent. No-poaching agreements undermine this dynamic by removing the upward pressure exerted by competing wage offers and counteroffers (Postel-Vinay & Robin 2002). Consequently, without the stimulus of competitive offers, wage growth for workers is likely to stall. In an extreme case, all firms are engaging in fully enforced no-poaching agreements with each other: This would mean that there is no longer any on-the-job search, which, according to Burdett & Mortensen (1998), would lead to firms paying the monopsony wage, that is, the wage that makes workers exactly indifferent between working and not.

Wage fixing is an agreement between employers about the wages they pay their employees. In the simplest case, employers explicitly agree on specific wage levels, but wage fixing can include an array of agreements, such as agreements on a wage cap or setting the level of benefits. This collusion reduces wage competition among employers by putting limits on how much employers are able to bid up wages or other conditions of employment in order to hire more employees at the expense of competing employers.

Theoretically, wage-fixing agreements are easiest to understand using an oligopsony model, where agreeing firms would cooperate to determine their wages as if they were a single firm. In this case, we can analyze the wage-fixing agreement as if it were a merger among the agreeing firms, so that wage fixing increases the markdown for each of these firms and thus decreases wages.

Empirically, no-poaching and wage-fixing agreements are difficult to study because they are agreements between firms that are typically not public. Further, these agreements in their simplest,

naked form are a criminal violation of the antitrust laws,[6] which adds to their secrecy. These agreements can nevertheless come to light [for example, due to the Department of Justice Antitrust Division's Leniency Program and the Occupational Safety and Health Administration's (OSHA) Whistleblower Protection Program] (Occup. Saf. Health Adm. 2022, US Dep. Justice Antitrust Div. 2022). The Leniency Program is an antitrust enforcement tool that incentivizes individuals and corporations to self-report violations of antitrust laws in exchange for reduced penalties and immunity from potential criminal prosecution. Similarly, the OSHA program protects employees from retaliation for reporting their employers' criminal antitrust violations.

Empirically, there are just a few papers on no-poaching agreements. First, there are three papers on no-poaching agreements in franchise chains (Krueger & Ashenfelter 2022, Callaci et al. 2023, Lafontaine et al. 2023). While no-poaching agreements are usually not public, these no-poaching agreements came to light because they were part of public franchise disclosure documents (Krueger & Ashenfelter 2022). These agreements were found to reduce wages by about 1% to 5% (Callaci et al. 2023, Lafontaine et al. 2023). The wage effects of no-poaching agreements are measured relative to firms that do not have no-poaching agreements. This may underestimate the full impacts of these agreements to the extent that there are spillover effects to employers without no-poaching agreements. In Silicon Valley, major tech companies agreed not to poach each others' employees between 2005 and 2009. The result was an approximately 5% wage reduction for affected employees (Gibson 2021).

There is even less evidence about the empirical effects of wage-fixing agreements. One exception is offered by Delabastita & Rubens (2023), who examine the effect of wage-fixing cartels in Belgian coal mines at the turn of the twentieth century. In this historical example, the industry-wide cartel reduced both wages and employment by 6% to 17% relative to the industry equilibrium in the absence of the cartel.

More recently, the US Department of Justice Antitrust Division has taken multiple enforcement actions against employers fixing wages or agreeing to not solicit or hire each other's employees. As an example, in *US v. VDA* (2022), the healthcare company VDA pleaded guilty to a conspiracy to fix the wages of Nevada school nurses. The company was sentenced to pay both a criminal fine and restitution to the affected nurses.

3.2. Mergers

In reviewing whether a merger should be allowed, the antitrust authorities consider, among other things, the impact of the merger on labor market concentration, that is, the HHI. As a reminder, the HHI is the sum of the squares of each firm's share in the labor market. In order to calculate shares, it is necessary to define a labor market. The methods for doing so in the context of an antitrust merger investigation are explained in the 2023 Merger Guidelines, Section 4.3 and specifically Section 4.3.D.8 for labor markets (US Dep. Justice & Fed. Trade Comm. 2023). Broadly, a market is defined so that jobs are reasonably interchangeable from the point of view of workers: "Depending on the occupation, alternative job opportunities might include the same occupation with alternative employers, or alternative occupations. Geographic market definition may involve considering workers' willingness or ability to commute, including the availability of public transportation."

A merger of competing employers increases labor market concentration, which, as we discussed above, is expected to decrease wages either in an oligopsony model [potentially with job

[6]In *US v. VDA* (2022), for example, two contract nursing companies pled guilty to agreeing to fix wages and not to hire each other's nurses (see US Dep. Justice Off. Public Aff. 2022a).

differentiation, as in work by Berger et al. (2022a) or Azar et al. (2022)] or in a search-and-matching model that has the HHI as a measure of market power (Jarosch et al. 2019).

The empirical literature shows that higher labor market concentration is indeed associated with lower wages (Jarosch et al. 2019, Azar et al. 2020, Berger et al. 2022a). Focusing on mergers specifically, the literature shows that mergers that greatly increase labor market concentration decrease wages (Arnold 2019, Prager & Schmitt 2021). Prager & Schmitt (2021) focus on hospital mergers, and Arnold (2019) considers mergers in all industries. Prager & Schmitt (2021) construct a measure of hospital concentration in each commuting zone using data from the American Hospital Association on hospital mergers and acquisitions. They use the HHI to capture the market share of each hospital system in a commuting zone. They find that mergers decrease wage growth when concentration (HHI) increases greatly and workers are skilled: For these workers, mergers reduce wage growth by more than 25%. By contrast, they find no effects for hospital mergers that occur across commuting zones, suggesting that effects are not due to firm-wide policies aimed at reducing labor costs. Arnold (2019) finds that mergers that greatly increase labor market concentration (top quartile) in already concentrated markets (above median) reduce earnings by more than 2%. If the effects were driven by increased product market power and output reductions that lead to decreased labor demand, one would expect more negative wage effects for nontradable industries whose product market is also local. However, Arnold (2019) finds no difference in effects between industries with tradable and nontradable goods, implying that the adverse wage effect of mergers is not due to changes in product market power.

Merger effects in the labor market can help identify models that best fit the facts. In oligopsony models, mergers decrease both wages and employment. However, in search-and-matching models, mergers could decrease wages due to a worsening of outside options (e.g., Jarosch et al. 2019), but employment may not decrease (Rudanko 2023). Prager & Schmitt (2021) find that hospital mergers do not reduce employment even when they decrease wages, suggesting that a search-and-bargaining model may be more appropriate in their specific setting. By contrast, Arnold (2019) uses a sample of all industries and finds a negative employment impact of mergers that greatly increases labor market concentration, which is compatible with the simple oligopsony model.

Arnold et al. (2023) investigate the impact of numerous mergers and acquisitions involving Canadian firms. While these transactions minimally affected labor market concentration, they negatively impacted workers in acquired companies by increasing their likelihood of job loss. This job loss led to reduced wages, largely attributable to a deterioration in match quality between workers and firms. The decline in match quality can arise from various factors, such as workers changing occupations or industries post-merger or the loss of employer-specific amenities. The negative effects of mergers on wages in this paper may not fall under the scope of antitrust law to the extent that they are not generated by an increase in labor market power.

Until recently, antitrust enforcement has been focused on competition in the product market, with limited attention to mergers affecting the labor market (Marinescu & Hovenkamp 2019, Marinescu & Posner 2019). In a significant development, the US Department of Justice Antitrust Division successfully sued to block a publisher merger that would have reduced the compensation for labor. The merger between two major book publishers, Penguin/Random House and Simon & Schuster, was blocked in October 2022. The Antitrust Division predicted authors would have seen lower pay as a result of the merger, as the merger would lead to reduced competition in bidding for authors' manuscripts. This was the first time a merger was blocked in the United States on the grounds of labor monopsony.

The merger guidelines are a set of rules that explain how the US Department of Justice and the Federal Trade Commission ("the Agencies") identify and challenge mergers that may violate the antitrust laws. They are designed to help the public, business community, practitioners, and

courts understand the factors and frameworks the Agencies consider when investigating mergers (Fed. Trade Comm. 2022). The merger guidelines have been revised several times over the years to reflect the changes in economic theory and practice. The latest draft of the merger guidelines was released for public comment in July 2023 (US Dep. Justice & Fed. Trade Comm. 2023).

The merger guidelines have long recognized the importance of protecting competition among buyers. As early as 1982, merger guidelines have mentioned this issue, and the 2010 guidelines had a whole section on powerful buyers. Employers are buyers of labor services. Thus, the draft of the 2023 Merger Guidelines contains a guideline devoted specifically to mergers that affect competition in the labor market. The guidelines acknowledge that labor markets have specific characteristics that can make them especially narrow, such as high switching costs and search frictions for workers. The guidelines also clarify that the Agencies will evaluate the impact of mergers on labor as a standalone basis to challenge a transaction, regardless of the effects on product markets. The guidelines use the same set of economics tools to analyze competition in labor markets as in product markets, including the extensive set of tools in the 2010 Horizontal Merger Guidelines (US Dep. Justice & Fed. Trade Comm. 2010).

3.3. Information Sharing Among Employers

The theoretical frameworks we discussed above cannot be straightforwardly applied to study information sharing. This is because these models assume firms are perfectly informed. To address this gap in the theoretical framework, Cullen et al. (2022) model salary benchmarking as part of an auction (i.e., employers bidding for workers) with imperfect information and heterogeneous workers: Information sharing about wages in an auction gives firms a better idea about workers' outside options, which erodes informational rents and sharpens competition. Information sharing mitigates the winners' curse, reducing bid shading and increasing competition. Thus, information sharing may raise wages.

However, a limitation of this model is that it does not allow for collusion. For a collusive equilibrium to be sustainable, firms must find that it is in their interest not to deviate[7] from it (Abreu et al. 1990). However, because collusive equilibria are not unique, communication could be useful for firms to solve their coordination problems and reach the collusive equilibrium (Fabra et al. 2018). Thus, in labor markets, firms may share information on wages not as a way to figure out market realities but as a tool to coordinate such that they reach a collusive equilibrium instead of a competitive one. Experimental evidence shows that coordinated outcomes are easier to sustain when communication between firms is possible, even when such communication is "cheap talk" (Blume & Ortmann 2007, Cooper & Kühn 2014). Sharing information on wages could also help firms collude by making it easier to monitor deviations from the collusive equilibrium (Vives 2007).

There is limited empirical work on information sharing across employers. One exception is the practice of salary benchmarking, that is, firms' use of market pay data to set their wages. The effects of salary benchmarking are nuanced (Cullen et al. 2022): High wages are reduced toward the benchmark, but at the same time low wages are raised toward the benchmark. The average effect on wages is close to zero.

[7] In a collusive equilibrium, firms have an incentive to deviate unilaterally to increase their individual profits by, for example, paying a higher wage than the agreed-upon level. However, they choose not to do so because of an explicit (like a cartel agreement) or implicit understanding that maintaining the agreed-upon wages is beneficial for the collective profits of the firms involved. While a unilateral deviation could be momentarily beneficial for a single firm, the long-term benefits of adhering to the collusive agreement typically outweigh the short-term gains from deviation, when considering the potential for punitive actions or the breakdown of the collusion leading to a return to competitive outcomes.

On the policy side, the 2016 Antitrust Guidance for Human Resources Professionals by the Department of Justice and the Federal Trade Commission recommends that employers "avoid sharing sensitive information with competitors" (US Dep. Justice Antitrust Div. & Fed. Trade Comm. 2016). In 2022 and 2023,[8] the US Department of Justice Antitrust Division sued poultry processors and their consultants for sharing information about the wages and benefits of poultry workers. The processors agreed to pay millions of dollars in restitution to workers for lost wages.

4. REDUCING BARRIERS TO JOB SWITCHING

4.1. Occupational Licensing

Occupational licensing is the requirement by a government that individuals obtain a license in order to legally practice a particular occupation. There is a growing body of literature on the impact of occupational licensing on wages.

Theoretically, occupational licensing can be seen as a combination of training, certification, and job-switching costs. On the one hand, the training required for occupational licensing can increase worker productivity, including through an increase in the quality of services provided. Further, certification could facilitate job finding by guaranteeing employers a certain level of skill, especially for workers who may be disadvantaged by statistical discrimination. On the other hand, since training and taking steps to get the license are costly, occupational licensing also limits workers' ability to switch jobs. Occupational licensing could thus be understood in a search framework, where the switching cost lowers the value of unlicensed workers' outside options and can thus reduce wages through this mechanism.

One of the most consistent findings in the literature is that occupational licensing increases wages, which may be explained either by productivity effects or by a restriction in labor supply. Kleiner & Krueger (2009) found that licensing was associated with a 14% increase in wages based on a national survey of employed adults. Gittleman et al. (2015) found that occupational licenses and certifications in the United States were associated with 6.5% higher wages within certified or partially licensed occupations. This means that licensed workers tend to earn higher wages compared to their unlicensed counterparts.

Blair & Chung (2019) provide evidence of occupational licensing restricting labor supply to the licensed occupation. They examine the labor market impacts of occupational licensing reform. Focusing on border counties located in states with different licensing requirements, they found that occupational licensing had a substantial negative effect on employment (between 17% and 27%). These results are consistent with the idea that occupational licensing restricts workers' outside options.

Consistent with occupational licensing acting as a job-switching cost, Johnson & Kleiner (2020) show that state-level occupational licensing reduces interstate migration. In particular, workers with state-level licensing are 7% less likely to move across states than those with national-level licensing.

4.2. Non-Compete Agreements

Non-compete agreements are contracts that restrict employees from working for a competitor for a certain period of time after leaving their job. Theoretically, non-competes can be justified

[8]The press releases can be found at **https://www.justice.gov/opa/pr/justice-department-files-lawsuit-and-proposed-consent-decrees-end-long-running-conspiracy** and **https://www.justice.gov/opa/pr/justice-department-files-proposed-amended-complaint-and-consent-decree-fourth-poultry**, respectively.

as a solution to the employer's holdup problem (Hart & Moore 1990). Firms will be reluctant to invest in training and/or in sharing valuable information with employees if the latter can easily take that value to a competitor (Acemoglu & Pischke 1999, Barron et al. 1999). If non-competes are enforceable, then they help reduce this holdup problem (Rubin & Shedd 1981, Posner et al. 2004). However, while non-competes increase incentives to provide general training, they reduce incentives to provide firm-specific training (Meccheri 2009).

While the holdup problem provides a rationale for firms to use non-compete agreements, non-competes can also have anticompetitive effects. Non-competes can be harmful to workers and reduce wages (Krueger & Posner 2018, Marx 2018). This damaging effect can be understood through the lens of the search model of Jarosch et al. (2019), in which non-compete agreements would increase the effective level of concentration in the labor market faced by workers, because the agreements limit the set of competitors that workers can accept offers from. Alternatively, one can assess the effects of non-competes on labor market competition using a standard oligopsony model and assuming that each firm that uses the non-compete is a monopsonist, at least for its current workers. However, the interpretation of this oligopsony theory of non-competes is complicated by the fact that the effects of the non-compete could be different for workers who are already subject to a non-compete versus job applicants who are not currently subject to a non-compete and who therefore face greater competition for their labor. Despite this, if there are constraints on wages across workers within firms, as in the search model by Rudanko (2023) (or in the oligopsony model), then even workers who are not yet subject to a non-compete may experience negative wage effects from non-competes.

In January 2023, the Federal Trade Commission released a notice of proposed rulemaking (Fed. Trade Comm. 2023). The notice[9] proposes that noncompetition clauses are an unfair method of competition and therefore prohibited by Section 5 of the Federal Trade Commission Act. It also contains an extensive review of the empirical literature on the impacts of noncompetition agreements.

One of the most consistent findings in the empirical literature is that non-compete agreements reduce wages. When talking about non-compete agreements, enforceability refers to whether a court will enforce the terms of the agreement that restrict the employee's ability to work for a competitor or start a competing business after leaving the employer. The enforceability of non-compete agreements may vary depending on the state laws and the specific circumstances of each case. Some states, such as California, have banned non-compete agreements altogether, while others have imposed limitations or exceptions on their use. Starr (2019) finds that an increase in the enforceability of non-compete agreements at the state level led to an increase in training but a 4% decrease in wages.

Starr et al. (2021) find that non-compete agreements are prevalent in the United States, affecting 18.1% of workers. Non-competes are more prevalent in high-skill jobs but are common in low-skill jobs as well. A very small fraction of employees negotiates over non-competes. Starr et al. (2021) find that stronger enforceability of non-competes is associated with lower wages (1.7% to 2.5%). Interestingly, non-competes presented to employees before a job offer is made are

[9]After the Federal Trade Commission releases a notice of proposed rulemaking, the public has an opportunity to submit comments on the proposed rule (see the Federal Trade Commission website at **https://www.ftc.gov/enforcement/rulemaking/public-participation-rulemaking-process**). The Federal Trade Commission reads and considers all comments when deciding what to do next; then it may publish a final rule, which explains the agency's reasoning and responds to the comments and any hearings. The final rule becomes effective after a specified period of time, unless it is challenged in court or modified by the Federal Trade Commission.

associated with better outcomes for workers, consistent with the idea that workers can sometimes be compensated for signing a non-compete (Starr et al. 2021).

Johnson et al. (2020) examined the effect of state-level changes in the enforceability of non-compete agreements. This paper collects new data on changes in non-compete enforceability across states and over time. Using these data, they show that noncompetition agreements disproportionately decrease wages for women and non-White workers. Johnson et al. (2020) identify a potential mechanism for how non-competes lower wages: Non-compete enforceability limits workers' ability to negotiate for higher wages when labor market conditions improve. Further, they show that non-compete enforceability has a negative externality on workers who are not bound by a non-compete: Stricter enforceability of non-competes in a state decreases earnings for workers who live in a different state but operate within the same local labor market. This result serves as a critical argument against the freedom of contract argument for non-competes: One could argue that if workers agree to non-competes, there must be a benefit to them, but this argument ignores the negative externality on other workers who did not agree to a non-compete term.

Balasubramanian et al. (2022) examined the effect of a ban on non-compete agreements on tech workers in Hawaii and found that it led to a 4% increase in wages and an 11% increase in worker mobility. Overall, workers in Hawaii had cumulative earnings that were 4.6% higher than in states with average levels of non-compete enforceability.

Non-competes can also be harmful to business growth and creation. Lipsitz & Tremblay (2021) theoretically demonstrate that non-compete agreements inflict more significant harm on consumers in industries where the benefits of investments are high, yet the transfer of these benefits to consumers is minimal. This detrimental effect arises from the agreements' role in stifling the emergence of spin-off companies. Shi (2023) models non-competes in a random search model with on-the-job search that builds on the model by Postel-Vinay & Robin (2002) we discussed above. She uses calibration to come up with an optimal policy on noncompetition agreements for CEOs and concludes that a quasi-ban (in the form of a cap on the duration of the non-compete agreements that are allowed, with a duration of approximately one month) is essentially optimal. The quasi-ban is optimal because the adverse effects on firms that are not able to poach workers are larger than the investment incentives for the incumbent firms.

Overall, the literature suggests that non-compete agreements can have a negative impact on wages, especially for low-wage workers. These agreements can shift bargaining power away from workers, making it harder to negotiate higher wages. In the case of low-wage workers, the traditional rationale of protecting investments in training, valuable information, and trade secrets is less likely to be applicable. Non-competes can also reduce job mobility and hinder wage growth, leading to wage stagnation and reduced job opportunities. To the extent that some employers—especially those of specialized and executive-level employees—have interests in the post-employment conduct of certain employees, these interests can often be protected by less restrictive alternatives to non-compete agreements. For example, non-disclosure agreements (NDAs) and trade secret laws can be used to protect trade secrets. Consistent with the existence of alternatives, the average employer does not seem to value the ability to enforce non-compete agreements (Hiraiwa et al. 2023).

4.3. Moving and Commuting

Moving and commuting costs can increase monopsony power by making it more difficult for workers to switch jobs. When workers face high moving costs, they are less likely to move to a new job that offers better pay or amenities. This is because they have to weigh the potential benefits of

a new job against the costs of moving. One way to model this is through a search-and-matching framework, where the moving and commuting costs act to reduce the value of the outside option.[10]

The literature suggests that moving and commuting costs may reduce wages by reducing mobility and increasing unemployment (Marinescu & Rathelot 2018). As many as 81% of job applications are sent within a worker's commuting zone, and job seekers are 35% less likely to apply to a job 10 miles away from their zip code of residence. Since workers are less likely to apply to distant jobs, they are less likely to be able to take advantage of higher-paying jobs that are far away and more likely to remain unemployed.

Using a job differentiation framework, Azar et al. (2022) found that distance is an important component of workers' preferences for jobs and therefore an important factor in job differentiation. They find that 18% of the variance in the total utility of a job is explained by the geographic distance between the job and the job seeker. This job differentiation increases firms' ability to pay workers less than their marginal revenue product. Overall, the literature suggests that reducing the costs of moving and commuting could help to reduce monopsony power and improve job mobility and wages.

4.4. Providing Information to Workers and Reducing Informational Asymmetries

This section addresses the potential impact of information on monopsony power. The theory in this area is not yet highly developed: The main theoretical frameworks we discussed above all assume symmetric information and do not explicitly model how information may affect monopsony power. Strategic interactions that involve asymmetric information can give rise to complex models involving beliefs, which may explain why this area is not well developed from a theoretical perspective.

4.4.1. Salary history ban. Salary history bans are policies that prohibit employers from asking job candidates about their previous salaries or benefits. This reduces employers' ability to wage discriminate against workers. The policy may for example be understood through a search-and-bargaining framework. Assume the workers' salary history captures their outside option. If so, the salary history ban prevents wages from depending on individual workers' outside options. Without other information, employers will have to rely on, for example, the average outside option of workers. Thus, a salary history ban may lead to wage increases for workers with lower-than-average outside options. It is unclear how a salary history ban affects the overall level of wages and thus monopsony power: As discussed above, assuming workers have the same productivity but different outside options, disallowing wage discrimination may increase worker welfare in search-and-matching models but not necessarily in oligopsony models.

The empirical literature on salary history bans suggests that they can reduce gender and racial wage gaps. However, their effects on workers' wages and employment outcomes are ambiguous. Bessen et al. (2020) found that city- and state-level salary history bans led to increased wages for job changers, especially for women and non-Whites. Similarly, Sinha (2019) found that salary history bans help reduce the gender pay gap and reduce auto-correlation of earnings across jobs for a given worker. Women reduce their voluntary disclosure of pay history more than men do. Hansen & McNichols (2020) also find that salary history bans reduce the gender pay gap. In addition, they

[10]There is an industrial organization literature showing that, with product differentiation, price posting, and sequential search, an increase in search costs can decrease prices rather than increase them (Choi et al. 2018). It would be interesting to explore to what extent this insight could apply to labor market search as well.

show that the effect is driven by households with children over 5 years old and by workers over 35. They find no significant effect on overall wages.

Sran et al. (2020) use a difference-in-differences approach to show that, although salary history bans reduce the gender pay gap, they also increase the fraction of vacancies posting wages, reduce average posted wages, and lead to fewer hires. It is possible that the lower posted wages are due to the increased probability that a vacancy will post a wage. This is consistent with the idea that salary history bans increase information asymmetry and lead to employers inferring adverse selection in the worker pool.

4.4.2. Wage transparency. Wage transparency refers to a situation in which workers know the wages of other workers. Under wage transparency, workers may not tolerate pay inequality. Therefore, pay transparency may help microfound the equality constraints in both the oligopsony model and Rudanko's (2023) search-and-matching model.[11] In monopsony and oligopsony models, having to pay the marginal worker the same as incumbents is a key mechanism for wages and employment being lower than in the perfectly competitive model. Therefore, in both models, wage transparency can be an ingredient that preserves firms' monopsony power and lowers wages (although through different mechanisms). In addition, Jäger et al. (2024) found that workers' beliefs about outside wage opportunities are anchored to their current wage. Thus, workers in low-paying firms tend to underestimate potential wages elsewhere, which allows employers to exercise monopsony power.

Rosenfeld (2017) looked at data from the Institute for Women's Policy Research/Rockefeller Foundation Survey of Economic Security and found that pay secrecy policies are more common in workplaces where workers are not unionized, in the private sector, and where managers are more punitive and less accommodating of employees.

Sun et al. (2021) found that pay transparency legislation can reduce the number of workers affected by pay secrecy policies in their workplace. Cullen & Pakzad-Hurson (2023), however, suggest that pay transparency laws do not help raise wages. They find a negative effect on wages, except in unionized workplaces where transparency was already high. Specifically, states that enacted transparency reforms saw a 2% decline in wages. A plausible explanation for this might be that, with pay transparency, employers are more reluctant to increase a worker's wage because this would induce pressure to increase employees' wages across the board. Pay transparency can thus explain the wage equality constraint that leads to lower wages under oligopsony and search-and-matching models.

Overall, the literature indicates that pay transparency policies can have complex effects on worker outcomes. While they may help address pay disparities, the specific outcomes may vary depending on factors such as sector and implementation. Further research is needed to fully understand the implications of pay transparency on employers' monopsony power.

4.4.3. Non-disclosure agreements. NDAs are legal contracts that prevent an employee from sharing certain confidential information or trade secrets of their employer with unauthorized parties. From the employers' perspective, NDAs protect the employer's intellectual property and reputation. At the same time, when NDAs prevent workers from disclosing poor working conditions, they act as an impediment to workers' ability to make informed job choices. Therefore, NDAs may be understood in a model of job differentiation à la Dube et al. (2022), where a job's amenities are obscured by NDAs. NDAs may also be understood through a search-and-matching framework, where information about outside options is incomplete. Asymmetric information due

[11] In Rudanko's (2023) static version of the search-and-matching model, wage equality constraints reduce wages but increase employment.

to NDAs can also lead to moral hazard on the firm side, resulting in underinvestment in job quality [Belleflamme & Peitz (2015) develop this argument for product markets].

Sockin et al. (2021) examined empirically the effect of state-level bans on NDAs. They found that the ban led to 5% lower average Glassdoor ratings of firms and higher ratings dispersion. These results suggest that NDAs could harm workers by worsening the accuracy of the information about job quality. The result that NDAs increase average firm ratings is a double-edged sword from the perspective of firms. On the one hand, NDAs may be helpful to firms that are trying to recruit and have something to hide. On the other hand, NDAs may impair an average firm's ability to pay their incumbent workers less, because NDAs make it look like the expected value of the outside option is higher than it really is. This points to the difficulty in fully understanding how information affects firms' monopsony power.

5. INCREASING WAGES AND IMPROVING WORKING CONDITIONS IN THE PRESENCE OF MONOPSONY POWER

5.1. Minimum Wage

Economic theory predicts that the minimum wage reduces employment in competitive labor markets where the wage is equal to the marginal product of labor. However, in monopsonistic labor markets, the effect is ambiguous (Robinson 1966; Manning 2013, 2021), and the minimum wage could increase employment.

The minimum wage could be modeled using either a random search model with posting and on-the-job search (Burdett & Mortensen 1998) or an oligopsony framework. As explained in the theory section above, under oligopsony, wages and employment are lower than under perfect competition. A profit-maximizing firm chooses a wage that will induce a level of labor input (i.e., employment) such that the marginal cost of that labor input (i.e., the wage of the new employee, plus the increase in the wage bill for all incumbents) is equal to its marginal productivity. When a wage floor is introduced, the same profit-maximizing logic applies, with one key difference. Assume the minimum wage is introduced at a level higher than the equilibrium wage under monopsony but equal to or lower than the equilibrium wage under perfect competition. Now, the profit-maximizing firm will still choose to hire additional workers only if the productivity of the marginal worker is equal to their marginal cost. Critically, however, the existence of a minimum wage means that the marginal cost of hiring a worker (starting from the equilibrium level of employment under monopsony) is just the minimum wage and does not include wage increases given to incumbents (who must already be paid the minimum wage by law). The monopsonist, then, faces a reduced marginal cost (relative to the premium-wage status quo) of increasing employment beyond the prior equilibrium level and can hire additional workers until the productivity of the marginal worker is equal to the minimum wage (Bhaskar et al. 2002). To summarize, when the minimum wage increases while staying below the competitive level, employment increases in a monopsonistic labor market.

Azar et al. (2023) show theoretically that the employment effect of a local minimum wage should be less negative (or even positive) in more concentrated labor markets. They develop and numerically solve a simple oligopsony model with Cournot competition among employers. In the model, labor markets differ only by the number of employers. Fewer employers yield a higher HHI, lower competition for workers, and lower wages. Consistent with their focus on local minimum wage changes, they assume that the minimum wage is set as a proportion of the prevailing equilibrium wage in each labor market before the minimum wage increase. In this model, the employment effect of the minimum wage becomes more positive with increasing labor market concentration. The intuition is simple: The more concentrated a market is, the lower prevailing wages are relative to marginal productivity, and the more room there is to increase wages without

reducing employment. They also examine evidence from local labor market increases in the minimum wage and find that this prediction is supported by the empirical evidence. This suggests that monopsony power is a factor that can explain the variation in minimum wage employment effects.

Berger et al. (2022b) calibrate a general equilibrium oligopsony model and show that minimum wages can increase welfare, due to both efficiency gains and distribution. Assuming a social welfare function with utilitarian social welfare weights, which takes distributional effects into account, the optimal minimum wage is $15 per hour (but it could be between $0 and $31, depending on the social welfare function weights). On the other hand, an analysis based on efficiency gains alone implies an optimal minimum wage of around $8 per hour, which they also show generates only small efficiency gains.

Okudaira et al. (2019) measure the level of monopsony power across labor markets in Japan using a production function approach. They find that the employment effect of the minimum wage is negative when the wage is close to the marginal product of labor, but they find no employment effects in labor markets where monopsony power is high.

Dube et al. (2022) take their differentiated jobs model to the data and measure preferences for wages and nonwage amenities among Walmart workers. Using survey experiments, they find that workers have an economically significant willingness to pay for "dignity at work." They also find that there are significant complementarities between wage and nonwage amenities. They examine the effect of an increase in the corporate minimum wage by Walmart in 2014 and find no evidence that amenities decline after the increase in the corporate minimum wage. This implies that the minimum wage increases the overall value of the job, as firms do not offset wage increases with a decline in job amenities. These results are inconsistent with the classical model of compensating differentials, in which firms would respond to a minimum wage increase by adjusting amenities downwards. Instead, Dube et al. (2022) conclude that this empirical finding could be accounted for by a monopsonistic labor market model in which wages and amenities are not highly substitutable from the worker's point of view.[12]

Derenoncourt & Montialoux (2021) examine the effects of the minimum wage on Black workers and its impact on racial inequality in earnings. The study shows that the expansion of the minimum wage played a critical role in reducing the earnings difference between White and Black workers in the United States in the late 1960s and early 1970s. The 1966 Fair Labor Standards Act extended federal minimum wage coverage to previously uncovered industries, including agriculture, restaurants, nursing homes, and other services where nearly a third of Black workers were employed. Within treated industries, the racial gap adjusted for observables fell from 25 log points pre-reform to 0 afterward. The study finds no significant disemployment effects for Black workers and no aggregate effects of the reform on employment. These findings suggest that the minimum wage can be an effective policy lever to reduce racial inequality in earnings and improve the economic well-being of Black workers. These effects are likely enabled by employers' monopsony power; if the labor market were competitive, increases in the minimum wage would likely reduce employment and hurt Black workers.

The literature shows that the impact of minimum wage policies in the presence of monopsony power is different from that in competitive labor markets. In a competitive market, an increase in the minimum wage reduces employment. However, in a monopsonistic labor market, the effects are more complex, and a minimum wage could increase employment at the same time it increases wages.

[12]However, a self-imposed minimum wage could have different implications than an externally imposed one. Walmart may have decided it makes good business sense to increase total worker compensation. If so, there is not necessarily a reason for amenities to decrease, even in the absence of monopsony power.

5.2. Wage Theft Prevention

Wage theft is the illegal practice of not paying workers for all of their work or the benefits they are entitled to by contract or law. Wage theft can take many forms, such as paying workers less than the minimum wage, failing to pay 1.5 times the regular rate for hours in excess of 40 hours a week, forcing workers to work off the clock without compensation, and more. Wage theft is a prevalent issue in the United States, and several studies have attempted to quantify its impact. Assessing the full impact of all forms of wage theft is challenging, as violations are not always recognized or reported, and suitable public data sources are limited.

Wage theft is a way for employers to reduce wages at some cost, which is the expected cost of not complying with contracts or the law. Obviously, this cost will only be incurred if there is a large enough benefit of doing so (Becker 1968). If workers had full information about which firms engage in wage theft, firms would have to promise to pay higher wages in order to equalize the expected wage due to the probability of wage theft. That said, when wage theft of particular firms is not widely known, it allows firms to pay workers less ex post. This would be another example of imperfect information about total compensation, similar to what we discussed above with the case of NDAs. In addition, and most straightforwardly, wage theft is a way to evade a binding minimum wage. In this case, wage theft can be modeled in an oligopsony framework like that of Berger et al. (2022b) and Azar et al. (2023), where a minimum wage is imposed.

Cooper & Kroeger (2017) examined data from the Current Population Survey on the prevalence of wage theft in the 10 most populous US states and found that 2.4 million workers were affected by wage theft, with employers stealing $8 billion from workers' paychecks each year. Thus, they estimate that wage theft affects 17% of low-wage workers. Workers who experience wage theft are more likely to be women, to be non-White or Hispanic, and to have less education. This is partly due to the fact that these demographic groups are more likely to work in low-wage jobs, which are affected by the minimum wage. Workers covered by a union are half as likely to be the victims of minimum wage violations.

5.3. Floors on Working Conditions

We can use the model of Dube et al. (2022) to think about the effect of a floor on worker conditions on employment. We can think of working conditions as amenities or affecting the level of dignity at work. Suppose the firm faces a labor supply that is increasing in the level of amenities provided; then a monopsonistic firm might reduce employment in order to provide less costly amenities. For this reason, if there was a floor on amenities, it may have the counterintuitive effect of increasing equilibrium employment, in a way similar to the effect of the minimum wage under monopsony.

Levine et al. (2012) examine the effect of OSHA inspections on firms' and workers' outcomes. They identify the causal effect of these inspections using quasi-random inspections matched to a control group of firms in California. Consistent with a monopsonistic labor market with amenities as modeled by Dube et al. (2022), they find that inspections do not reduce employment, while they significantly reduce injury costs by 26%. They also find no significant effect of inspections on sales or firm survival.

OSHA inspections not only have direct effects on the inspected firms but also have important deterrent effects on other firms. Johnson (2020) identifies the causal deterrence effects using a regression discontinuity design: The paper exploits a cutoff in fines above which an OSHA violation triggers the issuance of a press release. Johnson (2020) finds that a press release reduces violations by 73% at other companies that are similar to the company being fined.

Johnson & Grittner (2020) show that stricter immigration enforcement reduced complaints about worker safety at workplaces with Hispanic workers. However, at the same time as the

number of complaints decreased, injuries increased. This suggests that employers reduced safety measures due to workers' lower willingness to complain. This is broadly consistent with the idea that a decrease in workers' bargaining leverage increases labor violations. Therefore, this suggests that labor violations can be understood similarly to wages: When workers' bargaining leverage decreases, employers may reduce wages or increase labor violations. This interpretation is consistent with the negative association between wages and labor violations documented by Marinescu et al. (2020).

5.4. Unions

Theoretically, when unions act as a wage-setting monopoly while firms decide on employment levels, unionization has a negative effect on employment, as firms decide to hire fewer workers in response to the high wages set by unions (Lindbeck & Snower 1986). However, if nonunionized firms set wages below marginal productivity, the union effect on employment is ambiguous, and it could be positive when unions negotiate wages that are still below the marginal product of labor. The effect of unions could be similar to that of a minimum wage as modeled in oligopsony models (Berger et al. 2022b, Azar et al. 2023).

Union membership has historically been associated with higher wages. For example, Farber et al. (2021) show that the household union premium has been stable over time at between 10 and 20 log points. They also show that increasing union membership helps explain a substantial share of the fall in inequality between the mid-1930s and the 1940s.

To identify the causal effect of new unionization on wages and employment, some articles rely on a regression discontinuity design around the 50% union vote share. These papers find no positive effect of new unionization on wages. DiNardo & Lee (2004) also find no effect on employment, while Frandsen (2021) finds a decrease in employment. In Frandsen's (2021) work, higher-paid workers leave the newly unionized firm, while lower-paid workers stay and are more likely to be hired, and, on net, employment decreases. Composition effects lead to lower average wages, with no wage changes for stayers. The results of this regression discontinuity design are inconsistent with the simple union monopoly model, which predicts that unions cause wage increases. Even though Frandsen (2021) finds a decrease in employment, the union monopoly model cannot explain this because wages do not increase in this study. Speculatively, these puzzling results showing no union effect on wages might be explained by unobserved changes in amenities.

A number of papers show that unions can attenuate the negative effect of concentration on wages (Marinescu et al. 2021, Prager & Schmitt 2021, Benmelech et al. 2022). When labor markets become less competitive, unions are able to protect workers and keep their wages high, even though outside options are dwindling. Dodini et al. (2021) use a change in taxes on union dues as an exogenous shifter of union density in Norway. When taxes decrease the cost of unionization, more workers join the union, and disproportionately so in more concentrated labor markets. Further, unionization increases wages disproportionately in more concentrated labor markets. Finally, they find suggestive evidence that unions increase hours worked in the most concentrated labor markets, while they decrease hours worked in the less concentrated labor markets, a result that is consistent with an oligopsony model[13] and reminiscent of the minimum wage employment effects estimated by Azar et al. (2023).

While there are some puzzling results about the causal effects of new unionization on wages in general, the recent literature suggests that the interaction between unionization and labor market concentration is consistent with a monopsony model of the labor market. Specifically, increases

[13] Dodini et al. (2023) extend this analysis by examining firms' responses to union-driven wage increases. They find that firms adjust in part by charging higher prices.

in concentration have smaller negative wage effects when unionization is higher, and conversely, unionization increases wages more in more concentrated labor markets. An interesting issue for further research is whether monopsonistic aspects of the labor market may explain some of the puzzles in the union effects literature, for example, by considering amenities.

6. CONCLUSION

This literature review has endeavored to map the contours of recent advancements in monopsony theory and their applications to the landscape of public policy. We have summarized insights from oligopsony models, job differentiation models, and search-and-matching models. With the aid of our comprehensive summary presented in **Table 1**, we have established a dialogue between theory and empirical estimates of policy outcomes.

Oligopsony models serve as a fundamental architecture for conceptualizing monopsony power and stand out for their analytical tractability, with strong applicability in contexts where labor market shares are especially relevant, such as mergers. Yet, oligopsony models are just the starting point of our inquiry. Job differentiation models enrich our understanding by providing microfoundations for the upward-sloping labor supply curves assumed in oligopsony models. They shine a light on desirable job characteristics, like geography or workplace dignity, that can amplify firms' monopsony power. Search-and-matching models, meanwhile, prove particularly illuminating for analyzing a variety of policies such as no-poaching and non-compete agreements and to account for job-switching costs.

The existing literature finds that antitrust policy, reducing barriers to job switching, and increasing wages and amenities can reduce the effects of employer market power. Minimum wages now have a well-established positive wage effect while having minimal employment effects. Similarly, although there is less evidence than for the minimum wage, it is well understood that mergers can decrease wages. However, the effects of some other policies are not as well understood. The literature has made some progress in understanding no-poaching agreements, but most wage-fixing and no-poaching agreements still fly under the radar. The role of information—both among employers and for workers—stands as a frontier yet to be fully explored.

In conclusion, we advocate for a balanced dialogue between theory and empirical policy evaluation. While cutting-edge theoretical frameworks can offer invaluable lenses through which to scrutinize policy, they are not an end in themselves. Often, empirical analyses can gain meaningful insights by selectively incorporating aspects of advanced models. Acknowledging the multifaceted nature of labor markets, we advocate for empirical studies that are both aware of the latest theoretical insights and attuned to the particularities of the policies and labor markets under investigation. This nuanced approach allows us to pinpoint the assumptions in theoretical models that are most pertinent to the real-world issues at hand. Thanks to a stronger analytical tool kit, policymakers are better equipped to design interventions that uplift the welfare of workers and, by extension, of society at large.

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