Evaluating the Competitive Effect of the Proposed Kroger-Albertsons Merger in Labor Markets

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Abstract

Leading national retail grocery chains Kroger and Albertsons announced plans to merge in the fall of 2022, a transaction that is currently under review by antitrust enforcers. This paper assesses whether the merger would harm competition in labor markets through three channels: increased employer concentration giving rise to reduced wages and working hours, reduced labor market dynamism as workers would be deprived of the ability to switch jobs to obtain improved working conditions, and the reduction in union leverage at the bargaining table. We conclude that all three channels constitute valid competitive threats, and hence the merger is likely to violate the Clayton Act by reducing labor market competition.

1 Introduction

Thanks to the ongoing consolidation of regional full-service and discount grocery chains and the spread of warehouse clubs and supercenters,[1] the retail grocery market has become highly concentrated over the last three decades (Zeballos, Dong and Islamaj, 2023). In late 2022, Kroger and Albertsons, the largest remaining traditional grocery chains with presence in most local markets, announced plans to merge, with Kroger to pay a purchase price of $24.6 billion. That merger is currently under review by the Federal Trade Commission and state antitrust enforcers.

Historically, horizontal mega-mergers in retail such as this one have been evaluated for their effect on consumer prices, with the focus of the competitive analysis on whether the merger would eliminate competition that disciplines the ability of either party, or of their competitors, to raise prices or otherwise worsen product offerings and terms of service to the detriment of consumers. However, a large body of evidence shows that labor markets are imperfectly competitive,[2] and that the concentration of employers in labor markets worsens wages and terms and conditions of work.[3] In that case, a mega-merger such as the one proposed between Kroger and Albertsons may have an anti-competitive effect in labor markets, as well as or in addition to its effect on grocery consumers.

One reason to suspect the merger would reduce competition in labor markets is that the two merging parties are differentiated relative to other retail grocery employers, not to mention employers in other industries. That is because seniority-driven employment benefits, such as health insurance and pension benefits, all accrue across employment spells at the merging parties under their union contract(s), but not across employment spells at non-signatories to collective bargaining agreements (which constitute the vast majority of retail grocery employ-

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[1]See Hortacsu and Syverson (2015) for a discussion of this market segment and its spread.

[2]See Ashenfelter et al. (2022) and Sokolova and Sorensen (2021) for reviews.

[3]Azar, Marinescu and Steinbaum (2022); Azar et al. (2020); Benmelech, Bergman and Kim (2022); Rinz (2022); Qiu and Sojourner (2022); Marinescu, Qiu and Sojourner (2020); Thoresson (2021); Prager and Schmitt (2021); Arnold (2021); Guanziroli (2022).

ment beyond the merging parties). Hence, a worker who moves from either Albertsons or Kroger to work at a non-merging party would likely have to give up important wage- and non-wage benefits, resulting in high diversion rates between the parties and low diversion to non-merging parties. A majority of workers in the bargaining units in Southern California, Colorado, and the Seattle area are vested in the superior union-negotiated health insurance plan, for example. For workers in that position, head-to-head competition between the parties is essential for setting terms and conditions of work, as this paper shows.

Well-established caselaw[4] holds that competitive effects of mergers must be evaluated antitrust-market-by-antitrust-market.[5] Applying that principle to the Kroger-Albertsons merger, the reviewing agencies should evaluate the potential for this merger to harm competition in labor markets just as much as in product markets. A recent paper about this merger by the International Center for Law and Economics (Albrecht et al. (2023)) agreed. The authors write:

> Rather than relying on proclamations from any of the parties, we need economic analysis of the relevant labor markets, asking the types of questions raised above regarding output markets.

This paper does precisely that. And further in line with the ICLE paper, the two inquiries (competitive effects in labor markets and in product markets) are conceptually separate, and the results of either would independently color the legal status of the merger. *Even if* the merger is found not to harm competition in product markets, with or without store divestitures or other merger-specific remedies, it is still illegal if it harms competition in labor markets. This paper explains why the merger likely harms competition in labor markets, and hence why the merger should be challenged on labor market competition grounds irrespective of any remedies the merging parties might assent to with an eye to curing its effect on product market competition.

The further aim of this paper is to use the Kroger-Albertsons transaction to model how that

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[4] *United States v. Philadelphia National Bank*, 374 U.S. 321, 1963.

[5] Recently, a decision by the 7th Circuit Court of Appeals interpreted *Alston v. NCAA* to mean that competitive harm in labor markets could not be offset or compensated by benefits in other (output) markets, in effect confirming the economic principle of *Philadelphia National Bank*. Easterbrook (2023).

could be done using by applying models of imperfect competition in labor markets that are widely used by labor economists, but relatively unfamiliar to Industrial Organization economists who are usually the ones evaluating the competitive effects of mergers (and staffing antitrust enforcement agencies more generally). Thus, in addition to evaluating one specific pending transaction, this paper offers a methodological framework for use in reviewing others.

Economists (and antitrust practitioners more broadly) have interpreted the rising consolidation in the retail grocery industry over the last decades as reflecting the predominance of technological innovations in production and especially distribution that equip the most advanced national chains to under-price the competition and thus attract disproportionate market share 'on the merits.' They have therefore mostly assumed that consolidation was pro-competitive and therefore legal under a consumer welfare standard.[6] What that story overlooks, however, is the race to the bottom in the labor market and the consequent ability of the few dominant employers remaining to worsen terms and conditions of work in the absence of labor market competition.[7] De-unionization and labor sweating cast the so-called technological innovation in this industry in a very different light. Insofar as retail consolidation triggers antitrust review due to mergers and exclusionary conduct as precipitating causes,[8] then, it's appropriate for enforcement agencies to take a closer look at mega-mergers in this sector as part of a renewed enforcement agenda that jettisons the ideology that governed antitrust (non-)enforcement during the era of consolidation, namely that increased market share for dominant firms signifies greater productive efficiency.

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[6]Ellickson (2007); Muris and Nuechterlein (2019); Vedder and Cox (2006); Phillips and Rozworski (2019); Furman (2005); Basker (2005); Crouzet and Eberly (2018) are widely-varying examples of this reasoning, which nonetheless agree that retail consolidation is due to technological efficiency resulting in retail price reductions. See also Autor et al. (2020) for an extension of this reasoning to the US economy as a whole. Steinbaum (2021) contains an empirical critique.

[7]Ganapati (2021); Wilmers (2018) are rare examples that do not overlook the implications of consolidation in the retail supply chain on workers and by implication on labor market competition. And Bloom et al. (2018) shows that the large-firm pay premium has declined to the point of being negative (i.e. a wage penalty for working at larger firms) in the retail sector, a finding that is confirmed by the empirical analysis in this paper.

[8]Mitchell, Smith and Holmberg (2023) contend price discrimination favoring the largest chains drives consolidation, a dynamic that is completely absent from the analysis in the previously-cited studies offering a more benign view.

This paper proceeds as follows: Section 2 briefly describes the basic models of imperfect competition in labor markets that are applied throughout the rest of the paper, as well as the legal basis for applying each model to predict the competitive effects of mergers in labor markets. Section 3 presents two different mathematical models of labor market competition, one with atomized workers and the other featuring collective bargaining. Section 4 introduces the employer-identified labor market dataset used in the rest of the paper, as well as summary statistics for the workers and occupations most directly impacted. Section 5 computes the parties' market shares of affected labor markets, as well as overall employer concentration, and estimates the effect of increased labor market concentration on workers' wages. Section 6 estimates the wage-turnover tradeoff in affected labor markets, the key outcome of interest for dynamic models of oligopsonistic competition. Section 7 addresses the possibility that the merger will weaken collective bargaining organizations that are otherwise the source of countervailing market power on the part of workers. Section 8 concludes.

2   Theoretical and Legal Overview

The essence of imperfect labor market competition is that individual firms with labor market power face upward-sloping residual labor supply curves. In layman's terms, that means employers have discretion over terms and conditions of work, as opposed to having "the market" dictate those things as is the case under perfect competition. In reality, employers can reduce wages (and/or make jobs less attractive to workers in other ways) without losing the entirety of their workforce.

In his 2022 presidential address to the American Economic Association, David Card, a pioneer in the empirical study of imperfect labor markets, said "I will try to make the case that the time has come to recognize that many—or even most—firms have some wage-setting power."[9] The speech continues by presenting and describing several different models (and correspond-

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[9]Card (2022).

ing empirical settings) through which imperfect labor market competition can be evaluated. This paper makes use of two of them: so-called static oligopsony, in which a small, finite number of employers compete for workers, and dynamic oligopsonistic competition, in which workers are able to move from one employer to another in response to better wage offers. The third setting this paper evaluates is collective bargaining: both merging parties have contracts covering their respective retail grocery workforces, and so the bargaining table is where terms and conditions of work are set.

Static oligopsony: The key determinant of labor market competition in a static oligopsony model is the market share of each employer-competitor, and the level of labor market concentration that results. Employers in more concentrated markets have more market power because in the face of wage reductions, workers have few alternatives. Static oligopsony models have an appeal in the context of merger enforcement, because market concentration is a familiar concept to antitrust enforcers and there is caselaw applying the reasoning in *Philadelphia National Bank* to labor markets (*United States v. Penguin-Random House*). Presumably that is why the framework for merger review in labor markets proposed by Berger et al. (2023) depends on Cournot competition (i.e., a form of static oligopsony). We analyze the competitive impact of the merger under a static oligopsony model in section 5 below, building on and extending the analysis already done by Zipperer (2023).

On the other hand, antitrust enforcers might believe that the number of alternative employers for any given worker is large unless that worker is highly specialized. The market definition adopted by the court in *United States v. Penguin-Random House* was very narrow and confined to the highest-paid authors. A court might believe that the predominately low-wage workforce affected by the Kroger-Albertsons merger has abundant outside options, so the merger would not meaningfully augment the market power of the parties or of other employers in the labor markets where they compete.[10]

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[10]In fact, there is very good reason to believe Kroger and Albertsons are differentiated from other retail grocery employers, let alone other employers outside that industry. As explained in the introduction, wage- and non-wage benefits are portable between the merging parties, but not to their non-union rivals inside or outside the

Dynamic oligopsonistic competition: The insight in dynamic models of labor market power is that workers switch jobs in response to obtaining better wage offers, and hence employers face a tradeoff between either paying high wages to retain workers (and attract new ones) or paying low wages at the cost of high turnover. The benefit of dynamic models is two-fold: they rationalize employer power over wage-setting in labor markets even where it may appear workers have abundant outside options (such as in low-wage industries), and they do not require defining a market to ascertain competitive effects. Indeed, there is some evidence that dynamic models better explain wage dynamics in low-wage labor markets because individual workers do not directly bargain with their employers over pay, and it is in such a bargaining context where the number of outside options matters more.[11] In low-wage labor markets, individual workers' main source of leverage probably comes from better-paying outside job offers, and enforcers need not draw a sharp boundary regarding where those offers might come from, only show that their arrival rate is likely to diminish as a result of the merger.

It's important to point out the different, and apparently mutually-contradictory, status of labor market turnover in models of dynamic oligopsonistic competition, especially as they relate to mergers in general and this one in particular. Employers trade off wages against turnover, meaning higher turnover indicates a low-road employer and even the dominance of low-road employers in low-wage labor markets. However, switching jobs is also evidence that workers have outside options in the first place. One way that this merger would reduce labor market competition is by eliminating the main source of comparable job offers for workers at each of the merging parties, permitting both the parties and also their competitors to get away with paying lower wages to achieve a given level of turnover among their workforce. In economic terms, this is the distinction between movement *along* a given employer's upward-

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retail grocery industry.

[11]Section 5 of Callaci et al. (2023) contains a discussion of the empirical relevance of different models of imperfect competition in labor markets to different workforces and job descriptions, building on Hall and Krueger (2012). Of course, in this labor market unions do directly bargain with employers over pay, and we show in the model presented in subsection 3.2 that the number of employers at the bargaining table matters a great deal for the terms they eventually reach.

sloping labor supply curve and a shift or rotation of the curve if alternative sources of outside job offers are eliminated. As we show in section 6 below, that appears likely to happen in this case.

The problem with dynamic oligopsonistic competition models in merger enforcement is that unlike static oligopsony, they lack a track record in litigation. That is unfortunate for the aforementioned reason that they are likely to be more relevant for a low-wage workforce. Partly for that reason, they probably also reflect the balance of opinion among labor economists broadly as to the most relevant model for analyzing imperfect competition in labor markets.[12] They are closely related to oligopoly models with differentiated goods (as Azar, Berry and Marinescu (2022) show), and the latter have an extensive track record in the judiciary and among enforcers (indeed, they are perhaps the dominant economic models of competition used in antitrust enforcement). The theoretical model presented in subsection 3.1 is thus a combination of static oligopsony and dynamic oligopsonistic competition: employers are differentiated rather than homogeneous, but employer market share implies higher labor market power unlike dynamic oligopsonistic competition, and workers work at a single employer rather than moving between them.

Collective Bargaining: The other source of leverage for low-wage workers besides better-paid outside job offers is collective representation vis-a-vis one's current employer.[13] The pending Kroger-Albertsons merger consists of two national chains, a majority of whose retail grocery workforces are covered by collective bargaining agreements that mutually recognize the union and the employer as exclusive bargaining agent. Hence, an important merger effect is likely to increase employers' concentrated power at the bargaining table. This contrasts strongly with the argument made by Albrecht et al. (2023) to the effect that *because* the work-

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[12]See, for example, Roussille and Scuderi (2023), who test which conduct model best describes a specific labor market and conclude it is dynamic oligopsonistic competition, which is constructed to best reflect dynamics when workers are homogeneous.

[13]Dodini, Salvanes and Willén (2021); Dobbelaere et al. (2021) analyze collective bargaining as a source of countervailing worker power when employers are concentrated and wield power in the labor market to mark down wages relative to the marginal product of labor. However, both studies show that more employer concentration still worsens terms and conditions of work, even when workers are unionized.

force is unionized, anti-competitive merger effects in labor markets are unlikely.[14] The fact of collective representation means the locus of labor market competition is different, not that it is absent. The source of worker power isn't in the availability of outside job offers (by this mechanism), but rather the power of their union to negotiate a good deal on their behalf.

Under the status quo, terms and conditions of work are set in a collective bargaining context that consists of one union local representing workers at affiliates of each of the two merging parties, bargaining against the two (usually simultaneously) to set a contract governing the entire unionized workforce at both chains. The potential for diverging interests on the part of the two employers gives the union leverage by which to play one off against the other. The specific mechanism by which the union(s) representing workers would be weakened by the merger is the consolidation of negotiating power on the employer side of the bargaining table. Pre-merger, a union could identify which employer would be least able to withstand a strike and make a deal with that counterparty, then pressure the other(s) to accept that deal or else suffer from a strike and its pickets while their competitor remains fully staffed and open. That bargaining dynamic will disappear if, post-merger, the single employer-counterparty could simply issue a take-it-or-leave it offer to the union, which would have nowhere else to go. The empirical analysis in section 7 shows that where that consolidated bargaining position already exists on the employer side, pay at the merging chains is significantly lower.

Once the merger is consummated, that source of leverage at the bargaining table will disappear, likely resulting in worsened contract terms relative to a duopsony counterfactual. Moreover, some non-unionized employers in the industry probably offer terms of work that are responsive to what the union can win at the bargaining table, for fear of losing workers should the union contract provide markedly better pay. If the terms of work established by the union contract deterioriate due to monopsony rather than duopsony bargaining, then conditions at

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[14]They write (erroneously) "the existence of union bargaining power makes any monopsony case more difficult and is an important factor to consider in evaluating a merger's likely labor-market effects—particularly in this case, given the high rates of union membership at both companies."

those non-union employers will suffer as well.[15]

The implication of this theory of competitive harm is that the proper antitrust market definition for evaluating a merger of employers operating under collective bargaining agreements is the the universe of employers covered under collective bargaining agreements in the same geographic markets defined by those agreements, because that is where the terms and conditions of work are set and consequently the locus of labor market competition between the merging parties.

The idea that the union representing workers, as opposed to the workers directly, might lose power is also a novel theory of competitive harm from mergers in labor markets. But it has precedents in merger enforcement. For example, in the FTC's 2016 challenge to office supply retailers Staples and Office Depot, the relevant market was defined to be the one for major corporate office supply contracts, which are bid out via competitive auction. For the largest consumers (i.e. major national corporations), the two merging parties were the top two bidders in nearly every contract auction. Defining the antitrust market like that was responsive to competitive conditions, but it also avoided thorny and arcane problems of more traditional market definition (e.g., do retailers who sell some office supplies compete with dedicated office supply retailers?). Defining the market to be the set of employers covered by collective bargaining agreements covering the terms and conditions of work for a majority of the workforce at the two merging parties is attractive for similar reasons, namely that a court need not speculate about whether workers in retail grocery might potentially switch to some other industry. More relevant is that the employers have nowhere else to go to secure the labor necessary to their functioning.

It also highlights the fact that employer consolidation is not beneficial for workers when it eliminates their only leverage. This harkens back to the broader economic literature on retail consolidation: not driven by productive efficiency favoring the largest chains, but rather by the accretion of market power vis a vis their counterparties. The model in subsection 3.2 embodies

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[15]Rosenfeld, Denice and Laird (2016).

this dynamic.

3 Two Theories of Imperfect Competition in the Retail Grocery Labor Market

In order to inform the empirical analysis to follow, we present two mathematical theories of imperfect competition in the retail grocery labor market. In the first, atomized workers choose between differentiated employers with alternative wage offers. In the second, retail grocery workers are represented by a bargaining agent (i.e., a union), which supplies labor "in bulk" to alternative employers. The purpose in presenting these two theoretical treatments is to show that different dynamics obtain depending on whether we conceptualize the merging parties competing for *workers* (in which case, the key dynamic is the availability and potential elimination of outside options for workers), or alternatively, competing for a *union contract*, where by law—under the National Labor Relations Act—unionized employers are required to bargain with the union on a collective basis instead of with workers individually, and the union bargains with a small number of employers (having likewise recognized them as exclusive bargaining agent).

Throughout this theoretical treatment of the retail grocery labor market, we can consider the retail grocery consumer side of the market to be characterized by a Hotelling model of differentiated retailers competing on price. Firms produce by converting labor into output one-for-one. In the first labor market model (with atomized workers), we start with the assumption of only two employers in subsection 3.1, but we show in appendix A that the same logic holds with a larger number of differentiated employers. The second model also generalizes to more than two employers (as shown below), but the point of the model in subsection 3.2 is that the labor market is characterized by collective bargaining, and no other national grocery chains recognize a union bargaining agent for the majority of their retail grocery workforce.

3.1 A Hotelling Model of Labor Supply

We start by modeling labor market competition as a Hotelling model in which the two employers are located at the extremes 0 and 1, and workers are distributed uniformly along the line segment between them. The parameter that governs labor supply elasticity is τ, the cost each worker incurs in traveling to the firm where they are employed. This model is meant to combine elements of both the static oligopsony and dynamic oligopsonistic competition approaches to imperfect labor market competition described in the previous section. Like static oligopsony, employer market share bears directly on pay, and the firm with the larger market share has more market power and therefore pays less. But unlike, for example, the model in Berger et al. (2023), competition is over price (i.e., wages) and the exercise of market power does not centrally consist of strategic reduction in the demand for labor.[16] Like dynamic oligopsonistic competition, firms in this model are arranged in a hierarchy of pay, but it lacks the explicit dynamic property that workers move between jobs in equilibrium.

The worker surplus for a worker located at $x \in [0, 1]$ is given by

$$WS(x) = r_i - \tau|\ell_i - x| + w_i \tag{3.1}$$

where r_i can be thought of as the amenity value of working at employer i, w_i is the wage paid by employer i, and ℓ_i is the location of employer i (which for the purpose of this exposition will be assumed to be either 0 or 1). If $WS(\cdot) \geq 0 \ \forall x$, then there's a worker just indifferent between working for either 0 or 1.

$$r_0 - \tau\hat{x} + w_0 = r_1 - \tau(1 - \hat{x}) + w_1$$

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[16]For this analysis we are restricted to comparing posted pay rates by each company. While pay is a central component of total compensation, there are other significant non-wage elements of compensation, including healthcare and pension benefits, but which we are not able to consider in this study since they are not observed for the non-merging-parties.

$$\Rightarrow \quad \hat{x} = \frac{1}{2} + \frac{r_0 - r_1}{2\tau} + \frac{w_0 - w_1}{2\tau} \tag{3.2}$$

Equation 3.2 expresses the labor supply to firm i as an increasing function of the wage it pays. We can use this to compute the optimal wage-setting policy of firm i by solving its profit maximization problem

$$\pi_i = \max_{w_i} (p_i - w_i) \left(\frac{1}{2} + \frac{r_i - r_{-i}}{2\tau} + \frac{w_i - w_{-i}}{2\tau} \right) \tag{3.3}$$

where p_i denotes the retail price i charges for each unit of output it sells (alternatively construed as the marginal product of labor). Implicit in equation 3.3 is the assumption that wages are set in the labor market independently from price-setting in the output market. The first-order condition for this profit maximization problem gives rise to the best response function

$$w_i = \frac{1}{2} (p_i - r_i + r_{-i} + w_{-i} - \tau) \tag{3.4}$$

The intersection of the best response functions for employers i and $-i$ yields the equilibrium wage-setting expression

$$w_i = \frac{2}{3} p_i + \frac{1}{3} p_{-i} - \frac{1}{3} r_i + \frac{1}{3} r_{-i} - \tau \tag{3.5}$$

If we make the convenient assumption of equal retail prices, then this simplifies to

$$w_i = p^\star - \tau - \frac{1}{3} (r_i - r_{-i}) \tag{3.6}$$

The implication of this equation is, first, that τ determines the baseline wage markdown below marginal product: the more market power employers have in the labor market, the more they can mark down wages. Second, to the degree there's wage inequality between employers, it offsets differential amenity values. The higher-amenity employer can get away with paying lower wages, and the lower-amenity employer must offset that disadvantage with higher pay to compete in the labor market. The expression for firm 0's market share (equation 3.2) works

out to

$$\hat{x} = \frac{1}{2} + \frac{\frac{1}{3}(r_0 - r_1)}{2\tau} \tag{3.7}$$

i.e., inter-firm wage inequality to offset inequality in amenity values is not high enough to fully eliminate inequality in market shares. The employer with the advantage in amenity values has higher labor market share.

Note that if we allowed for retail price inequality between employers, it would magnify the dynamics described above: the lower-paying employer would have a cost advantage in the product market, therefore be able to charge a lower retail price and gain disproportionate market share in the consumer-facing market, which would further increase its labor market share.

We now model a merger between the two employers, which eliminates labor market competition. What would that look like? A wage parity condition that says the formerly higher-wage employer must not offer better wages than the low-wage employer. Given that constraint, the merged firm would offer equal wages between its two locations, and in the absence of labor market competition, that wage would be low—so low as to fully extract worker surplus (or nearly so), because the merged firm's labor market share is no longer increasing in the wage it offers, i.e. it faces a vertical labor supply function, at least under the assumption of full coverage.[17]

Assuming full coverage—all workers employed at one of the two employer locations post-merger—we can readily identify the post-merger wage as that which makes the most disinclined worker willing to supply labor to the most distant employer

$$r_i - \tau + w = 0$$

or

$$w^\star_{\text{post-merger}} = \tau - r_i \tag{3.8}$$

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[17]If we allow for incomplete coverage, then for all $w < \tau - r_i$, the labor supply function is $\hat{x} = w$.

where r_i is whichever firm's amenity value is higher (in order to satisfy the wage parity condition).[18] The difference between equation 3.6 and equation 3.8 is a shifting of the worker surplus to favor employers: the wage is marked down more post-merger (to subsistence level), and no longer has anything to do with p, the retail price/marginal product of labor.[19]

3.2   An Auction for Labor

In the second model, the workers are collectively represented by a single bargaining agent, which supplies a unit of labor (which can be conceptualized as all of the workers along the Hotelling line in the previous model) to the highest-bidding employer. In that case, the employer bids can be in the range $w_i \in [0, p_i]$, where p_i is the retail price/marginal product of labor. For this model, we assume that p_i is a random variable, realized independently across the employers taking part in the auction. Each employer-bidder knows its own realization, the overall distribution of the random variable, and the number of other bidders, but not their realizations.

Employers face a labor supply function defined as

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L_i^S(w_i) = \begin{cases} 0 & if \ \ w_i < w_{-i} \\ \alpha \cdot \mathbb{1} & if \ \ w_i = w_{-i}, \ \alpha \in (0,1) \\ \mathbb{1} & if \ \ w_i > w_{-i}, \ \forall -i \end{cases}
$$

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[18]The profit-maximizing monopsony wage may in fact be slightly higher, since it could be efficient to allocate a minority of workers to the lower-amenity-value location post-merger. It will be if $r_i - r_{-i}$ is small relative to τ. In the limit, if $r_i - r_{-i} = 0$, then the monopsonist will route $\frac{1}{2}$ of workers to each location, and the monopsony (subsistence) wage will be $\frac{1}{2}\tau$. If the amenity values are unequal, the monopsonist routes more workers to the higher-amenity-value location, which pays $w = \tau - r_i$ (as does the other location). In both cases, there is strictly positive worker surplus for all but the marginal worker.

[19]It is also increasing rather than decreasing in τ, because the significance of that parameter is no longer to embody competing employers' market power, but rather the cost of traveling to the monopsony employer, which must be compensated given the assumption of full coverage.

Therefore employer i's profit function can be written

$$\pi_i = \max_{w_i} (p_i - w_i) \cdot \mathbb{1} \cdot P(w_i > w_{-i})^{N-1} \tag{3.9}$$

where $P(w_i > w_{-i})^{N-1}$ denotes the probability that firm i's wage bid is greater than the bids of all the other firms in the market (and all the employers bid independently). N is the number of employers bidding in this labor market.

The probability that i bids highest is an increasing function of his bid. We assume that wage bids are a weakly increasing function of p_i, because the cost of losing the auction is greater the more foregone sales there are. Further, if we make a distributional assumption on retail prices/marginal product of labor, we can write $P(w_i > w_{-i})$ as $P(p_i > p_{-i})$. For ease of exposition, we will assume the p is uniformly distributed on $[0, 1]$.[20] In that case, the probability that i's productivity draw is higher than any one other firm's is equal to p_i. We write p_i as $w^{-1}(w_i)$, i.e. the inverse of the bid function, for the purpose of solving firm i's profit maximization problem.

Putting all of this together, we have

$$\pi_i = \max_{w_i} (p_i - w_i) \cdot \mathbb{1} \cdot w^{-1}(w_i)^{N-1} \tag{3.10}$$

$$[w_i] \quad -w^{-1}(w_i)^{N-1} + (p_i - w_i) \cdot (N-1) \cdot w^{-1}(w_i)^{N-2} \cdot \frac{\partial w^{-1}(w_i)}{\partial w_i} = 0 \tag{3.11}$$

which simplifies to

$$(p_i - w_i) \cdot (N-1) \cdot \frac{\partial w^{-1}(w_i)}{\partial w_i} = w^{-1}(w_i) \tag{3.12}$$

Conjecture a linear bid function, $w_i = b \cdot p_i$. Then $w^{-1}(w_i) = \frac{1}{b} w_i$ and $\frac{\partial w^{-1}(w_i)}{\partial w_i} = \frac{1}{b}$. Plugging

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[20]If we wanted to fully integrate the labor and retail markets in this model, then the lower bound on p would be τ in the labor market, and the upper bound would be determined by the retailers' market power in the consumer-facing market, as well as consumers' preferences—i.e. the maximum value that workers (and their bargaining agent) could extract from employers.

those values into equation 3.12 yields the bid function

$$w_i = \frac{N-1}{N} p_i \tag{3.13}$$

confirming the conjecture. Here, we see that the wage markdown directly depends on the number of bidders. The more employers there are bidding in this market, the closer is the wage to the marginal product of labor. And the anti-competitive effect of any merger of employers is straightforward: to reduce the number of independent bids, thereby making it more likely that any employer i will be victorious with a lower wage bid, and the wage markdown that prevails in this labor market gets larger in expectation.

3.3 Theoretical Discussion

Kroger is the larger employer in the retail grocery labor market, hence applying the atomized-worker model in subsection 3.1 would have Kroger offering better amenities and paying lower wages, while competition from Albertsons is what keeps wages above subsistence. As we will see in the next three sections, this is consistent with the facts: Albertsons has lower market share and pays better, and in labor markets where Kroger doesn't face competition from Albertsons, Kroger's pay is significantly worse than where it does. However, what's unappealing about that model is that the primitive parameters that result in Kroger having higher market share and paying less is that its amenity value is better. In fact, in the retail grocery labor market (as in most labor markets), there are the opposite of compensating differentials: benefits and job quality are positively correlated with wages, not negatively correlated.[21] Since Kroger has the larger geographic footprint, one could rationalize the better amenity value as resulting from shorter commute times for workers. The merging parties are differentiated from *other* retail grocery employers for workers with accrued seniority, healthcare eligibility, and pension rights. But the idea that Kroger's greater labor market power than Albertsons results from

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[21]Sockin (2022).

better amenities seems artificial.

An alternative atomized-worker model would be more like dynamic oligopsonistic competition, a frictional labor market in which workers move between employers in response to better wage offers. In those models (as in the model in subsection 3.1), each firm also has a wage policy, but there is generally a firm-size pay premium because workers gravitate toward the higher-paying employer(s). As stated earlier, each employer faces a tradeoff between wages and turnover. The anti-competitive effect of a merger in a model of dynamic oligopsonistic competition is to reduce or shut off the flow of outside job offers, leaving each employer facing a more steeply-positively-sloped residual labor supply function and thereby able to more fully mark down wages. What makes that kind of model unappealing in the Kroger-Albertsons context is that the larger employer—Kroger—pays less, rather than more,[22] and also appears to suffer from higher turnover the more overall dynamism there is in the labor market, suggesting workers gravitate away from rather than towards Kroger when the economy improves. That is more a feature of static oligopsony rather than dynamic oligopsonistic competition, hence the modeling choice made in this section.

As for the labor auction model, the notion of an exclusive bargaining agent auctioning off labor supply in bulk readily fits the collective bargaining that characterizes this labor market. The collective bargaining agreements that UFCW locals reach with Kroger, Albertsons, or their employer association all recognize the union as the exclusive bargaining agent,[23] meaning the nexus of labor market competition is at the bargaining table as opposed to in an atomized labor market. However, the model in subsection 3.2 may be too extreme, since all but the highest-bidding employer suffer a total blockade of labor supply. In reality, the way these agreements are reached is moreso that any employer that agrees to the best compensation offer has access to labor, and anyone who doesn't is struck.[24] If employers decline to bid in the

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[22]As stated earlier, this pattern is consistent with the overall retail sector, as documented by Bloom et al. (2018).

[23]This is a legal prohibition that prevents employers from hiring workers except for on the agreed-upon terms while the agreement is in force.

[24]There are unionized independent grocery chains operating in some markets, but even the largest among those employers tend to pattern the contract(s) negotiated with the two merging parties, as opposed to themselves

auction, expecting to hire on the union contract terms after a contract is reached, then they may be struck to bring them to the table. Finally, while employers actually undergoing a strike may hire replacement workers[25] (i.e., the contractual term of exclusive bargaining agent isn't in force because—presumably—the contract has expired, allowing the union to initiate a strike), that resort is extremely costly on short timescales, especially if stores are being picketed.

Equation 3.13 implies that a 2-to-1 merger such as the one between Kroger and Albertsons will result in the total collapse of competition at the bargaining table, so the wage will fall to subsistence. We can think of that as the non-collectively-bargained wage, i.e. that which would prevail under unchecked employer monopsony power. The papers by Dodini, Salvanes and Willén (2021) and Dobbelaere et al. (2021) show that collective bargaining mitigates wage markdowns in the presence of monopsony.

4   Data and Summary Statistics

The data used in this paper are online job advertisements from Burning Glass Technologies (BGT, though the company itself is now known as "Lightcast") covering the years 2015-2023. Those data constitute a near-universe of online job postings, and are broadly representative of the national labor market (albeit with incomplete coverage for some occupations/sectors). Modestino, Shoag and Ballance (2016), Hershbein and Macaluso (2018), and Azar et al. (2020) all use these data to characterize the dynamics of the national labor market, including labor market competition. For this paper, we confine attention to the following NAICS 4-digit industries: Retail Grocery, Specialty Food, General Merchandise Stores (including Warehouse Clubs and Supercenters), Retail Pharmacy, Beer Wine and Liquor, Department Stores, and Other Merchandise Stores.

About 65% of the observations in the BGT data are employer-identified, meaning the employer posting the job advertisement is named, and those names are partly standardized when

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setting the terms of a contract.

[25]Unless the strike is over Unfair Labor Practices.

the data is de-duplicated. We parse the text of the employer names to tag job ads as being posted by individual grocery or other retail chains, including those that are part of the merging parties Kroger and Albertsons as well as their competitors. We then aggregate the individually-branded chains into national ones. Thus, in what follows, when we report findings for "Kroger" and "Albertsons" as such, we are referring to any and all of the constituent chains of those merging parties. Typically at most a handful of the constituent branded chains are present in any one metropolitan area market (and usually one at most), a legacy of the retail grocery industry's less nationally-concentrated past.

For the purpose of this paper, we work with six "covered" occupational classifications that are specific to the retail grocery industry, though we group job ads from all the industries listed above into those classifications. We construct a matching from the occupation and job title classifications in the BGT data to these six occupational classifications, as shown in table 1. The exact allocation of occupations and job titles to a given classification is done by trial-and-error, given knowledge of how job classifications are set up in the industry. In general, the job titles that constitute each classification are more specific to the parties than their major retail rivals (unsurprisingly, since to some degree they reflect job classifications in collective bargaining agreements). The SOC-6 occupations are more general and bring in comparable jobs at rival national retail grocery and super-center chains.

Courtesy Clerks, General Merchandise Clerks, and Food Clerks are three ranks delineated in union contracts in this industry,[26] and we have done our best to map the observed job ads to those ranks in a manner that makes them comparable across employers (as well as industries), whether the merging parties or their rivals. Pharmacists and Interns consist overwhelmingly of pharmacy aides, technicians, and managers. Even though fully-licensed pharmacists are also covered by union contracts and, more broadly, the merging parties and their rivals compete in the labor market to employ them, we have excluded them from the analysis in this paper due

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[26]Note that in one CBA, covering Colorado, General Merchandise Clerks and Food Clerks are paid on the same scale despite different job descriptions.

to the paucity of job ads in which salaries for fully-licensed pharmacists are posted.

Approximately 15-30 % of job ads include a posted salary, which is our main index of job quality. For those job ads that post an hourly wage, BGT reports the annual salary assuming full-time work (so the hourly wage is multiplied by $52 \cdot 40 = 2080$ to compute the reported annual salary). Throughout this paper, we use that reported annual salary to compare pay across occupations, chains, and time.

In addition to salary, we also use BGT's Work Hours variable, which reports whether the job ad is for a full-time or a part-time job. In the retail grocery industry, it is typical for workers to be assigned fewer hours of work than they would want.[27] Hence, if a job is advertised as being full-time, we treat that as a further indication of higher job quality.

Finally, for each chain, we sum the total job ads posted for Courtesy Clerks, General Merchandise Clerks, and Food Clerks, then compute the share of Food Clerks. As the highest-ranked occupation of the three, hiring more Food Clerks as opposed to the lower-paid classifications signifies better labor standards, i.e. filling vacancies with better-paid workers with more seniority.

Figure 1 plots the time series of the number of job ads posted in each occupational classification by the two merging chains from 2015-2023. Figure 2 does the same for average annual earnings, and figure 3 plots the share of each occupational classification that is full-time. Figure 4 plots the share of Food Clerk job ads. The time series plots reveal interesting patterns: pay has been increasing in all covered occupations since the onset of the COVID-19 pandemic in 2020, as it has throughout the low-wage labor market.[28] Albertsons generally pays better, conditional on occupational classification, than Kroger, although in the last few quarters of the data, Kroger's advertised pay has exceeded Albertsons'. The hours data tells a similar story: a

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[27]Lachowska et al. (2023) show that this pattern is typical of the low-wage labor market generally. They write "These empirical findings [that there is excess labor supply on the intensive margin at market wages] can be explained by vertical differentiation among employers; that is, the existence of a hierarchical ranking of employers based on the desirability of their jobs." That idea is strongly consistent with the approach taken in this paper, particularly in section 6.

[28]Autor, Dube and McGrew (2023).

higher share of jobs are full-time at Albertsons than at Kroger, especially among Food Clerks. The overall Food Clerk share was higher at Albertsons between 2019 and 2021; starting in 2022, Kroger started hiring relatively more Food Clerks (though at the same time the share of part-time Food Clerk jobs at Kroger increased dramatically).

The total number of job ads posted by Kroger affiliates has been high during the pandemic, while there is less variation over time in Albertsons' count of job ads. Since Kroger is the larger chain in general, we would expect it to post more job ads. However, the temporal pattern shown here has Kroger's job ad count spiking during the pandemic, whereas Albertsons shows no such pattern. That is probably due to the fact that Kroger had to recruit more in order to maintain employment levels, especially as the labor market became more dynamic, whereas Albertsons was better able to retain its workforce using the higher pay and better hours. That is one reason why the model in subsection 3.1 features the employer with larger market share paying lower wages. Furthermore, the pattern of higher recruiting at Kroger during the pandemic (in combination with the wage data from figure 2) points to one possible motivation for the merger: to cut down on labor market churn that leads to competitive bidding by the parties in the labor market, and in particular to increased pay at Kroger to retain workers in the face of tight labor markets more broadly. We return to this in section 6 below.

5 Static Oligopsony: the Effect of Labor Market Concentration on Wages and Hours of Work

In this section, we compute market shares of the merging parties and overall market concentration, then estimate the effect of variation in labor market concentration on pay and hours of work. Throughout, our market definition is at the commuting zone by occupational classification by calendar quarter level, following the basic approach to labor market definition pioneered by Azar et al. (2020) and micro-founded in observed search and substitution behavior of job applicants by Azar, Berry and Marinescu (2022).

Figure 5 reports average market shares for the merging parties across the six occupational classifications. We turn next to estimating the effect of variation in labor market concentration on pay and working hours. After computing concentration assuming the labor market is defined as above, we estimate the following job-ad-level regression:

$$y_{ijct} = \beta \log \text{HHI}_{jct} + \gamma_{jc} + \lambda_t + \epsilon_{ijct} \tag{5.1}$$

where y_{ijct} is the outcome of interest, either the log of the annual earnings or the hours of work (in fact an indicator for full-time status) associated with job i in occupation j in commuting zone c in calendar quarter t, $\log \text{HHI}_{jct}$ is the log of the Herfindahl-Hirschman Index of concentration (of job ads posted by all the employers, including the merging parties, in labor market jct), γ_{jc} is occupation-by-commuting zone fixed effects, and λ_t is a fixed effect for each calendar-quarter. ϵ_{ijct} is the residual.

The results from estimating that regression are shown in table 2 for annual earnings and table 3 for work hours (i.e. full-time status), where the four columns vary the fixed effects specification. Our preferred specification is reported in column 4, which has interacted fixed effects for occupation and commuting zone. Hence the identifying variation is within a commuting zone-occupation cell (corresponding to our assumed market definition), over time. That panel dimension eschews level differences in concentration across geography and occupations. We estimate that a 10 percent increase in labor market concentration corresponds to a 3.3 percent reduction in pay, broadly in line with previous results in this literature (e.g. Azar, Marinescu and Steinbaum (2022)). We further estimate that a 10 percent increase in concentration corresponds to a 4.1 percent decline in the probability that a given job is full-time.

Altogether, these findings can be taken as consistent with the model in subsection 3.1: more concentrated labor markets feature less competition between employers, worsening the terms and conditions of work. Since the merger will increase labor market concentration, it can reasonably be expected to worsen outcomes for workers.

For reference, there are two main conceptual differences between these results and those reported by Zipperer (2023): first, in this analysis market shares and concentration (and thus the computed change in concentration resulting from the merger) are computed directly from the job ads data, whereas the earlier analysis uses a combination of the number of stores in each local labor market and an estimate of the count of the number of workers employed at each store (taken from a detailed study of staffing at a few specific stores). Second, the earlier analysis uses independent estimates of the relationship between concentration and earnings and applies those estimates to this particular industry and labor market(s). We estimate the concentration-earnings (and concentration-hours) relationship specific to this industry.

The key econometric difficulty in interpreting these results is whether variation in labor market concentration reflects variation in employer market power. Many objections to that idea in the form of alternative explanations for variation in concentration, i.e. fluctuations in supply and/or demand for labor that might also drive concentration without being related to employer power. Moreover, the econometric estimates of the effect of variation in concentration on earnings and hours rely on all variation in concentration observed in the data (given the various fixed effects specifications employed), but the merger could give rise to labor market reallocation such that simply combining the pre-merger market shares of the parties is not a good prediction of what the merger's effect on labor market concentration will be. That is why, despite its convenience, economists tend to be skeptical that this structuralist approach to analyzing merger effects gives rise to accurate predictions out of sample. We therefore consider the two other theories of competitive harm from the merger enumerated in section 2.

6   Dynamic Oligopsonistic Competition: the Wage-Turnover Trade-off

In this section we estimate the relationship between employer-specific pay and job turnover, the key observable in dynamic monopsony models of the labor market in the spirit of Burdett

and Mortensen (1998) and Manning (2003). In those models, employers in a given labor market (in this case, for a specific occupation/commuting zone combination) are ordered in an ascending hierarchy of pay. Workers at low-wage firms seek employment at higher-wage firms, and firms face an upward-sloping residual labor supply curve. They can choose lower pay and higher turnover (because workers leave for better-paying alternatives) or high pay and low turnover (because once landing such a job, workers will be loathe to leave).

We estimate such a wage-turnover tradeoff by focusing on Southern California in 2021, for which we have data on occupation- and employer-specific turnover thanks to UFCW locals. For this purpose, we restrict the national dataset used in the analysis thus far to three commuting zones:

- Los Angeles (including Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties)

- Santa Barbara

- San Diego

For that data, we then compute occupation-level pay for the two merging parties and their local affiliates Ralphs and Vons. We have turnover for both the entire year 2021 as well as month-by-month. Thus, figure 6 includes two panels: one for 2021 as a whole, and one for each month of 2021. These figures indicate that Albertsons is on the whole a slightly higher-ranked employer, at least in this market (and that finding is broadly consistent with the wage series shown in figure 2). In other words, for a given occupation, Albertsons pays slightly better and thus enjoys lower turnover than Kroger. If that is correct, it colors the interpretation of the (national) job ad counts shown earlier in figure 1: Kroger increased job posting more during the pandemic, when it was losing workers to a tighter labor market.

In order to validate this interpretation, we look at the merging parties in relation to Target, Walmart, and Costco, large retail employers which are outside the UFCW's collective bargaining agreements, in figure 7. We lack direct turnover data for those non-covered employers, but

we can count the number of job ads they post. This figure shows that like Kroger, their job-posting activity spiked during and after the pandemic, suggesting they were losing workers to better-paying rivals.

The competitive concern is therefore that a merger of labor market competitors will shut down the labor market churn that is otherwise the most likely source of outside job offers and thus of any leverage that individual low-wage workers have on the job, especially for the younger, low-tenure workers at Kroger and Albertsons who are not vested in the health insurance or pension plan.[29] A reduction in outside job offers makes each firm's incumbent labor force more dependent on their current employer, which in turn enables worsening pay and job quality.

Moreover, if the merger results in Albertsons adopting labor market practices that are more similar to those employed by Kroger post-merger, as modeled in subsection 3.1, that would represent a movement along the combined firm's labor supply curve, reducing pay and increasing turnover.

The other source of labor market power for low-wage workers besides outside job offers is collective bargaining, to which we turn in the following section.

7 Countervailing Power: Merger Threats to Union Leverage

In order to evaluate the third theory of anti-competitive harm, that the reduction in the number of counterparties at the bargaining table reduces the union's leverage in negotiations (as opposed to the power of individual workers), we compare jurisdictions (commuting zones, in this case) in which there are two retail grocery employers party to the union contract to those where there are fewer.

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[29]Krueger and Ashenfelter (2022) and Callaci et al. (2023) discuss a similar dynamic with franchise chain no-poaching clauses and their removal.

Specifically, we run the following regressions:

$$\log w_{ijct} = \beta \{\text{Counterparties} \geq 2\}_c \cdot \phi_k + \theta \{\text{Vacancies}\}_c + \gamma_j + \lambda_t + \epsilon_{ijct} \qquad (7.1)$$

$$\log w_{ijct} = \beta \{\text{Counterparties} \geq 2\}_{ct} \cdot \phi_k + \theta \{\text{Vacancies}\}_{ct} + \gamma_j + \delta_c + \lambda_t + \epsilon_{ijct} \qquad (7.2)$$

where most of the variables are defined analogously to equation 5.1. Counterparties $\geq 2_c$ indicates that there are multiple employers covered by the union contract in commuting zone c, and Counterparties $\geq 2_{ct}$ indicates that there are multiple employer-counterparties in commuting zone c in quarter t. ϕ_k indicates that job i was posted by one of the merging parties, either Kroger or Albertsons. We also include a regressor for the count of job ads by commuting zone (in equation 7.1) and by commuting zone-quarter (in equation 7.2) since commuting zones may have differing pay policies due to reasons other than the number of counterparties to the retail grocery union contract, e.g. urban pay premia. The count of job ads proxies for this wage effect.

Equation 7.1 utilizes solely variation between commuting zones, treating the entire study period 2015-2023 as one period for the purpose of computing the number of counterparties by commuting zone (the year-quarter fixed effect remains, to control for national wage trends). Figure 8 plots the distribution of the number of counterparties by commuting zone corresponding to equation 7.1. Equation 7.2 utilizes solely within-commuting-zone variation in the number of counterparties, over time. Hence, it includes a commuting zone fixed effect.

Figure 9 reports the results, which are very similar regardless of which source of variation is used in estimation. We show that multiple bargaining counterparties in a jurisdiction corresponds to around a 20% earnings premium for Kroger workers, and a more modest 5-9% premium for Albertsons workers. This is strong evidence that competition between the two merging parties at the bargaining table matters a great deal for worker outcomes, particularly so for Kroger workers, which is otherwise a low-wage employer. The welfare of workers at the two merging chains would suffer significantly if the merger is consummated. It also high-

lights what may be the motive behind the transaction: if Albertsons is eliminated as a rival, the competitive pressure at the bargaining table that gives rise to that 20% pay premium will go away.

8   Conclusion

The purpose of merger analysis is to evaluate whether the merger is likely to increase market power in a relevant antitrust market.[30]   This paper considers three different theories of competitive harm in the labor market associated with the proposed merger of two national retail grocery chains, Kroger and Albertsons: that increased labor market concentration will worsen pay and job quality, that a reduction in the flow of job offers resulting from the merger will limit any leverage low-wage workers have to obtain better job quality, and that concentrating employers at the bargaining table in a labor market where terms and conditions are set by collective bargaining agreement will deprive the union representing those workers of leverage, leading to worse contractual terms and outcomes for workers. All three theories centrally concern the exercise of labor market power resulting directly from the merger. We conclude that the merger is likely to harm labor market competition and thus reduce worker welfare via all three channels, and hence any and all of them constitute a valid theory of competitive harm in labor markets arising from the merger.

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[30]"Merger analysis is concerned with the possible change in the incentive and ability of market participants to exercise market power flowing from the merger, measured relative to their incentive or ability in a but-for world in which the merger did not take place (which is often reasonably proxied by the pre-merger world)." Baker et al. (2023).

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Figure 1. Count of Job Ads by Occupation, 2015-2023. This figure plots the total count of job ads posted quarterly by each of the merging parties (including all of their constituent chains) from 2015-2023.
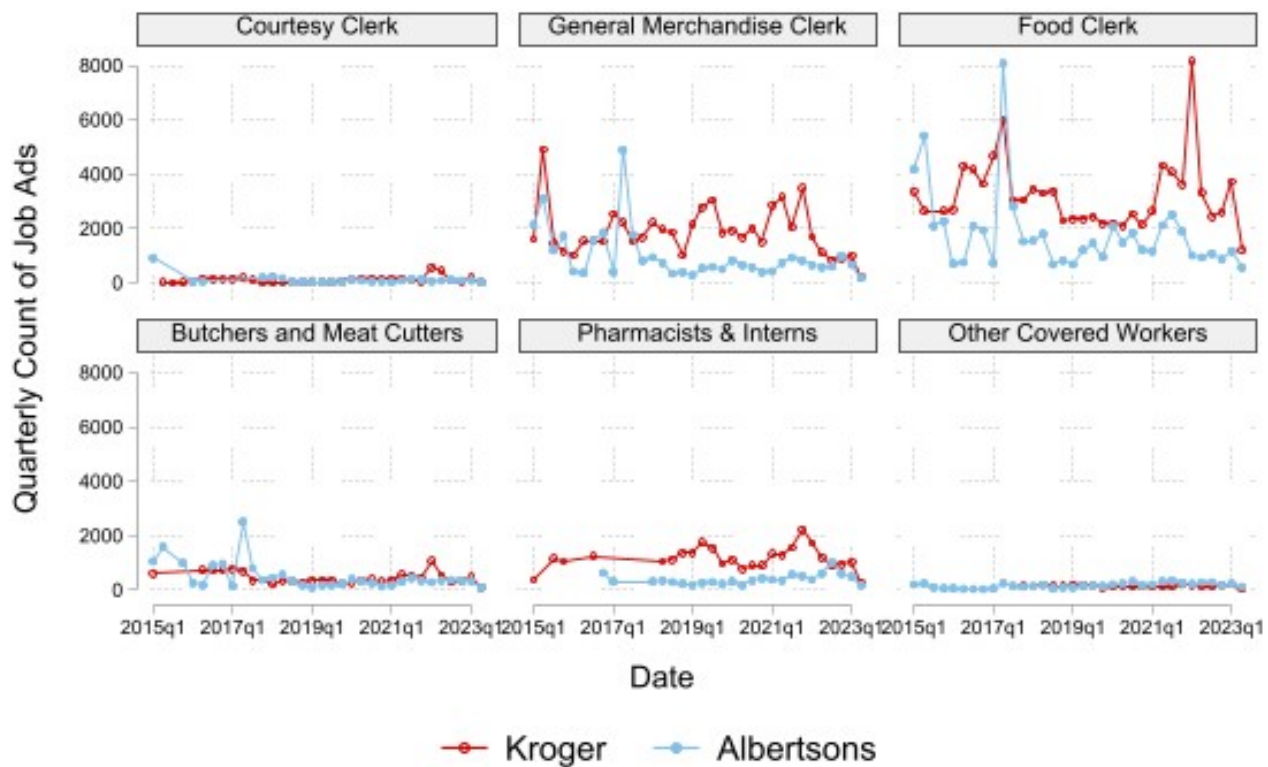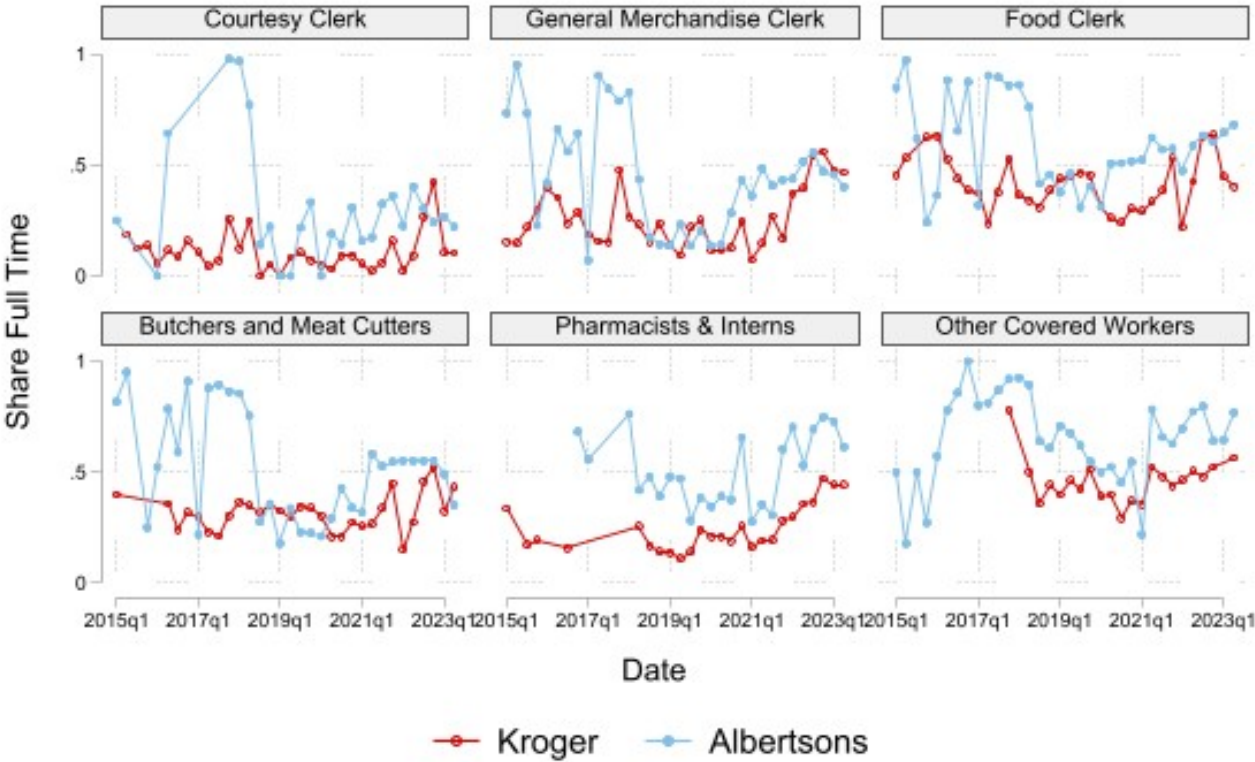

Graphs by Occupational Classification

Figure 2. Average annual earnings by occupation, 2015-2023. This figure plots the average earnings over time for each occupational classification, for the merging parties from 2015-2023.
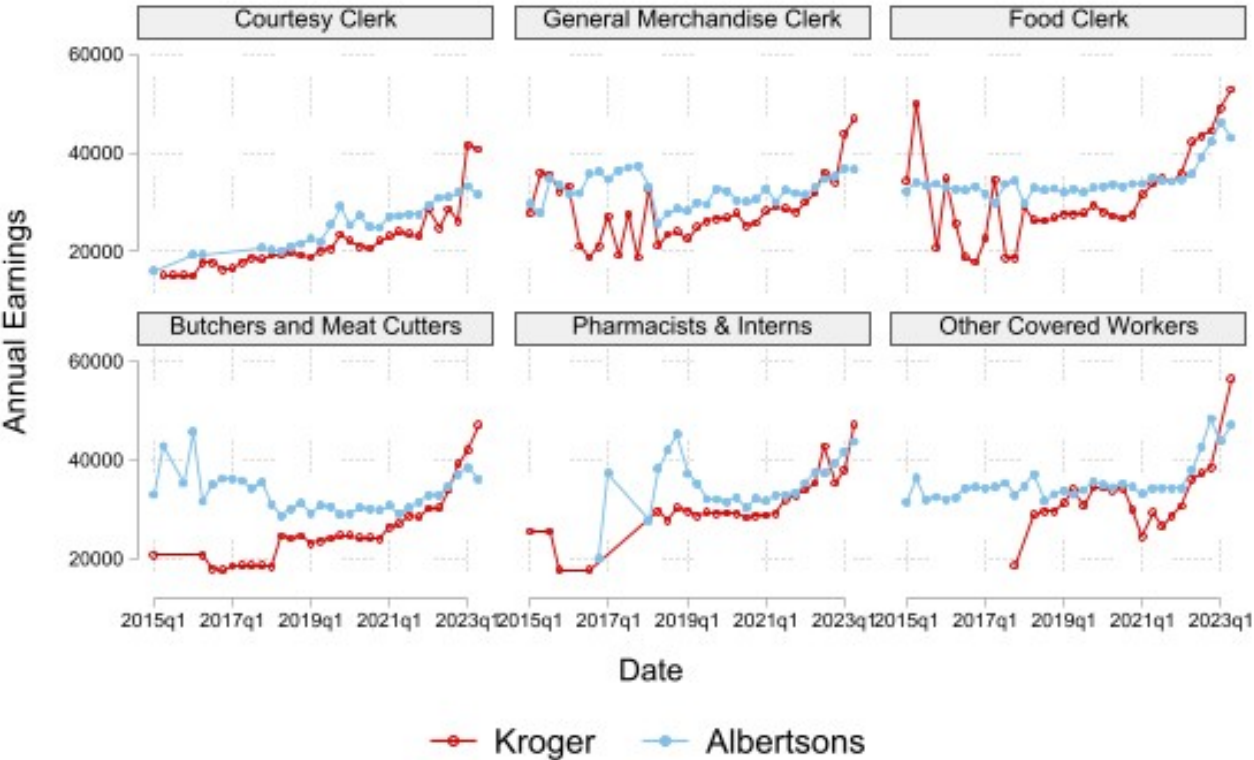
Graphs by Occupational Classification

Figure 3. Share of full-time jobs, 2015-2023. This figure plots each chain's share of full-time jobs over time for each occupational classification from 2015-2023.

Graphs by Occupational Classification

Figure 4. Food Clerks as Share of All Clerks, 2015-2023. This figure plots each chain's food clerk share of total clerk hires from 2015-2023. Food Clerk is the best-paid classification with the most seniority, so a higher share of hiring in that category reflects overall chain-level job quality.
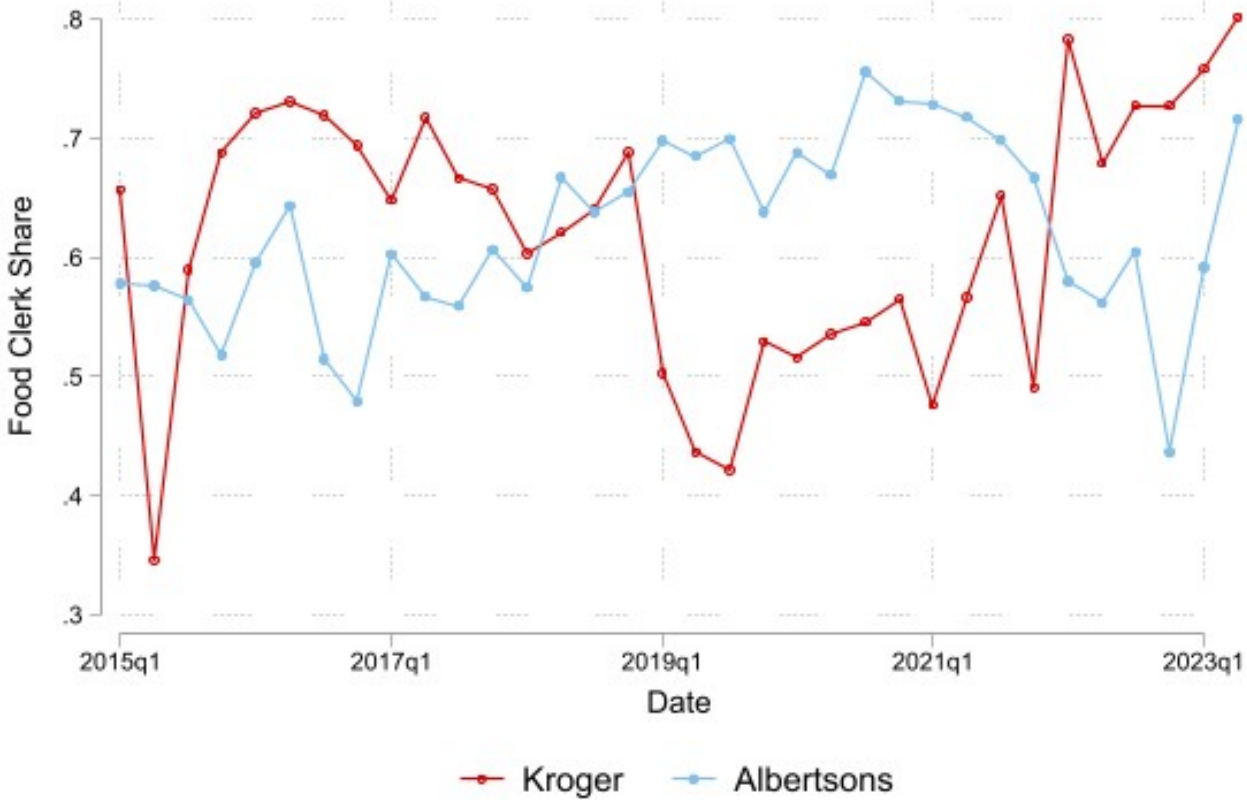
Figure 5. Average market shares of the merging parties by occupation, 2021-2023. This figure plots the occupation-level average market share of the two merging parties. Throughout, the market definition is commuting zone by occupational classification by calendar quarter. For this chart, the market shares are computed for 2021-2023.
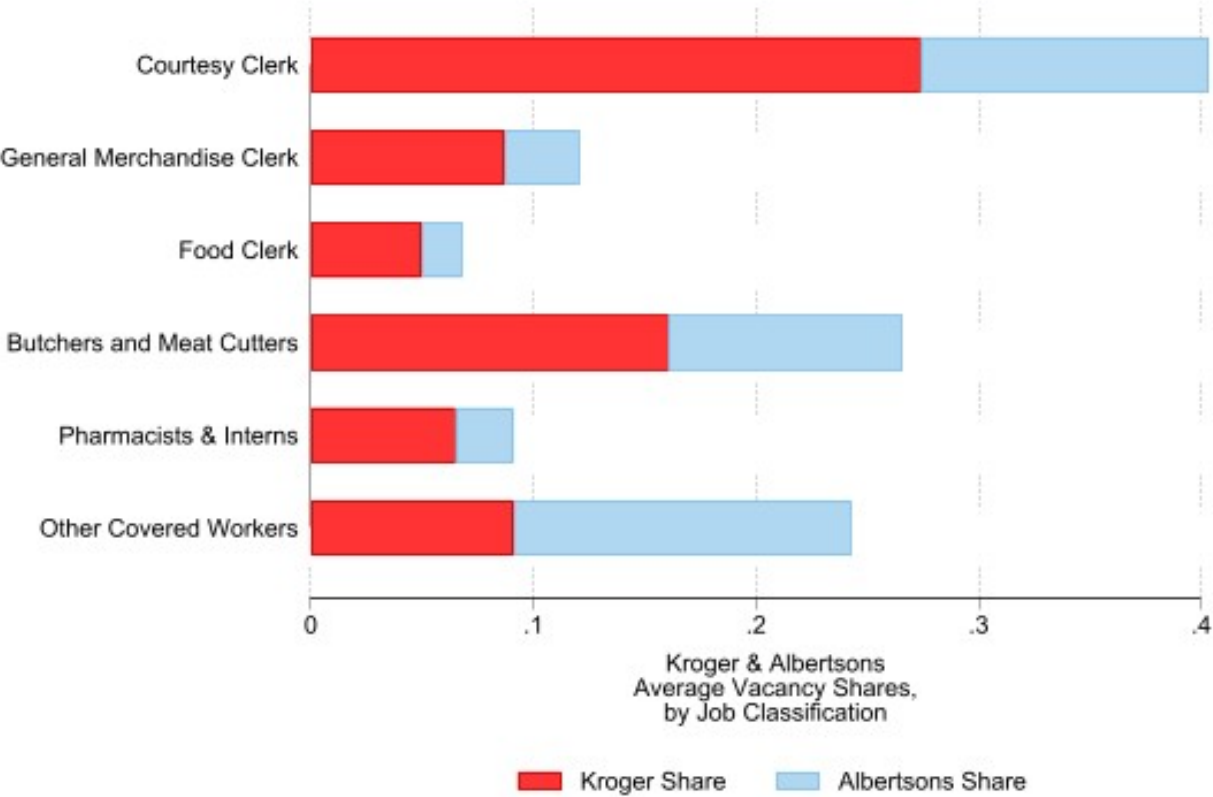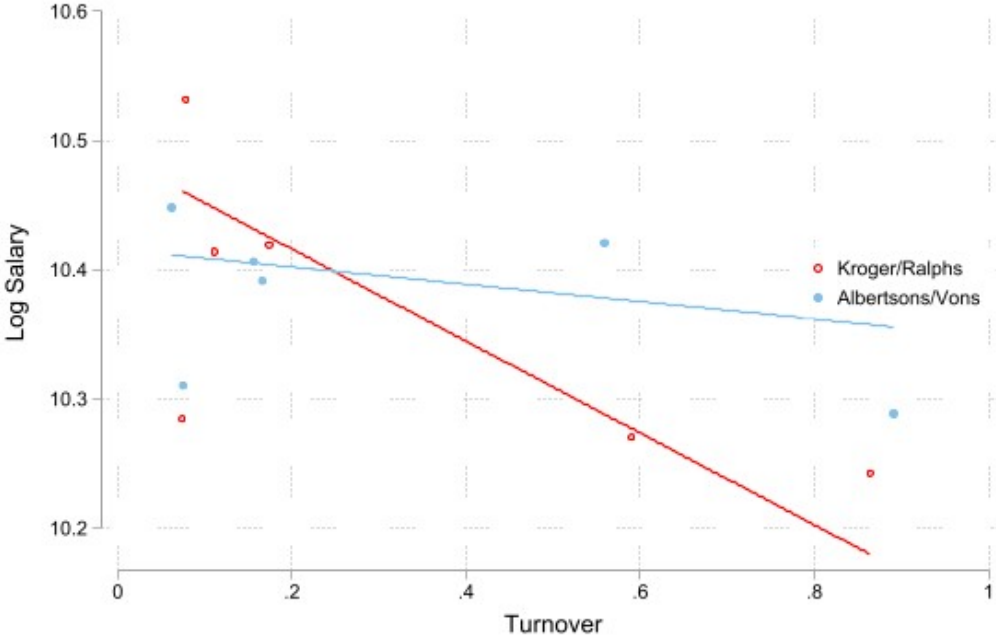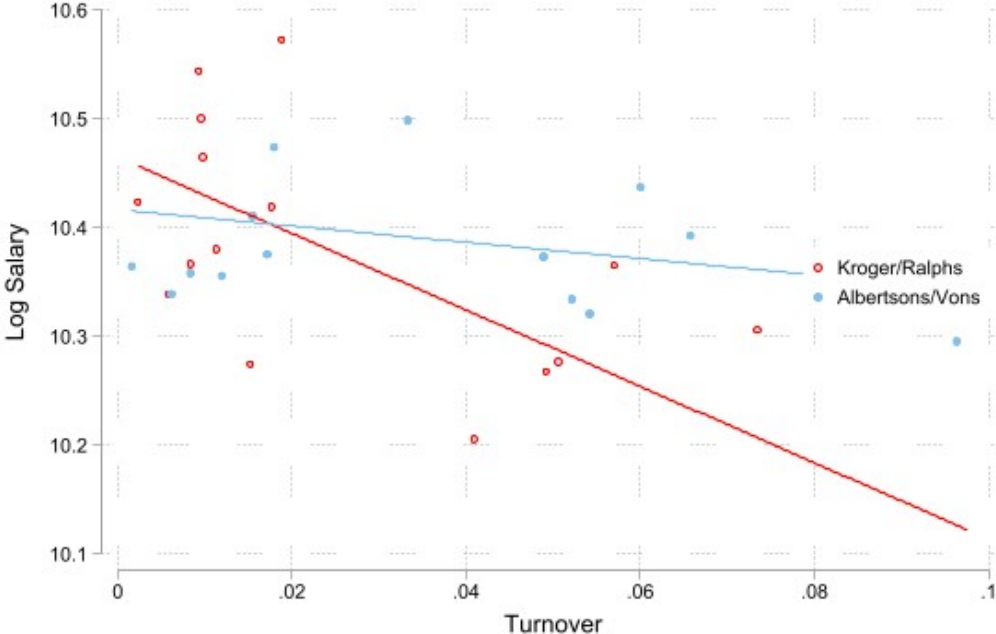
Figure 6. Relationship between pay and turnover for each of the merging parties in Southern California, 2021. This plots the estimated relationship between occupation- and employer-specific pay and job turnover in the Southern California coverage area in 2021.

(A) Annual Data

(B) Monthly Data

Figure 7. Job posting by the merging parties and their rivals in Southern California. These figures compute the count of job postings for the two merging parties and three rivals: Target, Walmart, and Costco, in the Southern California market.
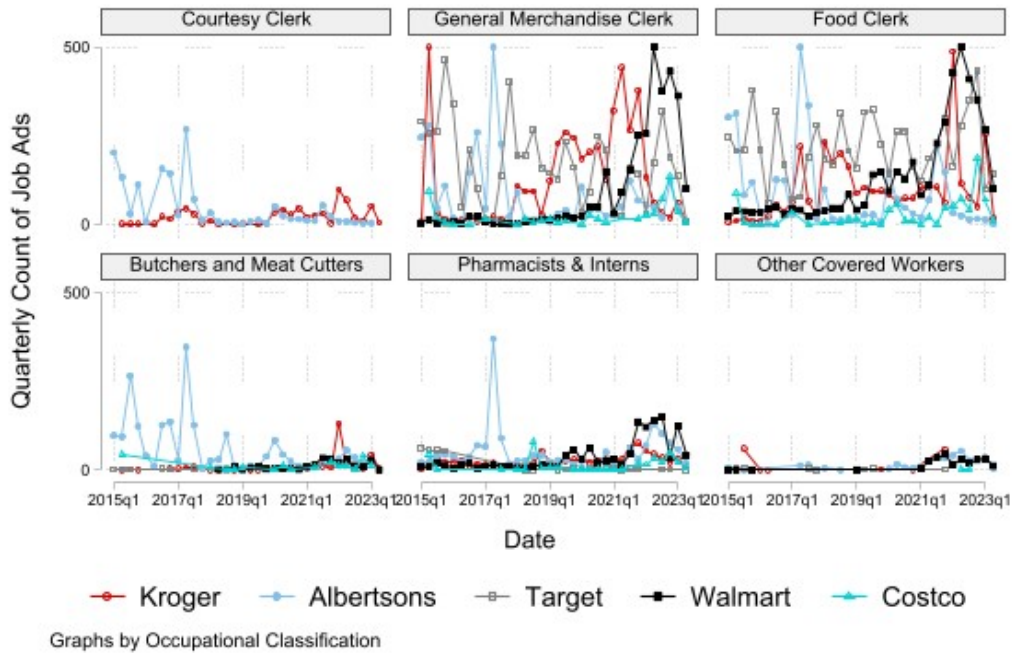

Graphs by Occupational Classification

Figure 8. Count of the Number of Employer-Counterparties by Commuting Zone. This histogram plots the distribution of the number of employer counterparties to collective bargaining by commuting zone, where that is determined over the entire 2015-2023 study period. Hence, it depicts the identifying variation in equation 7.1.
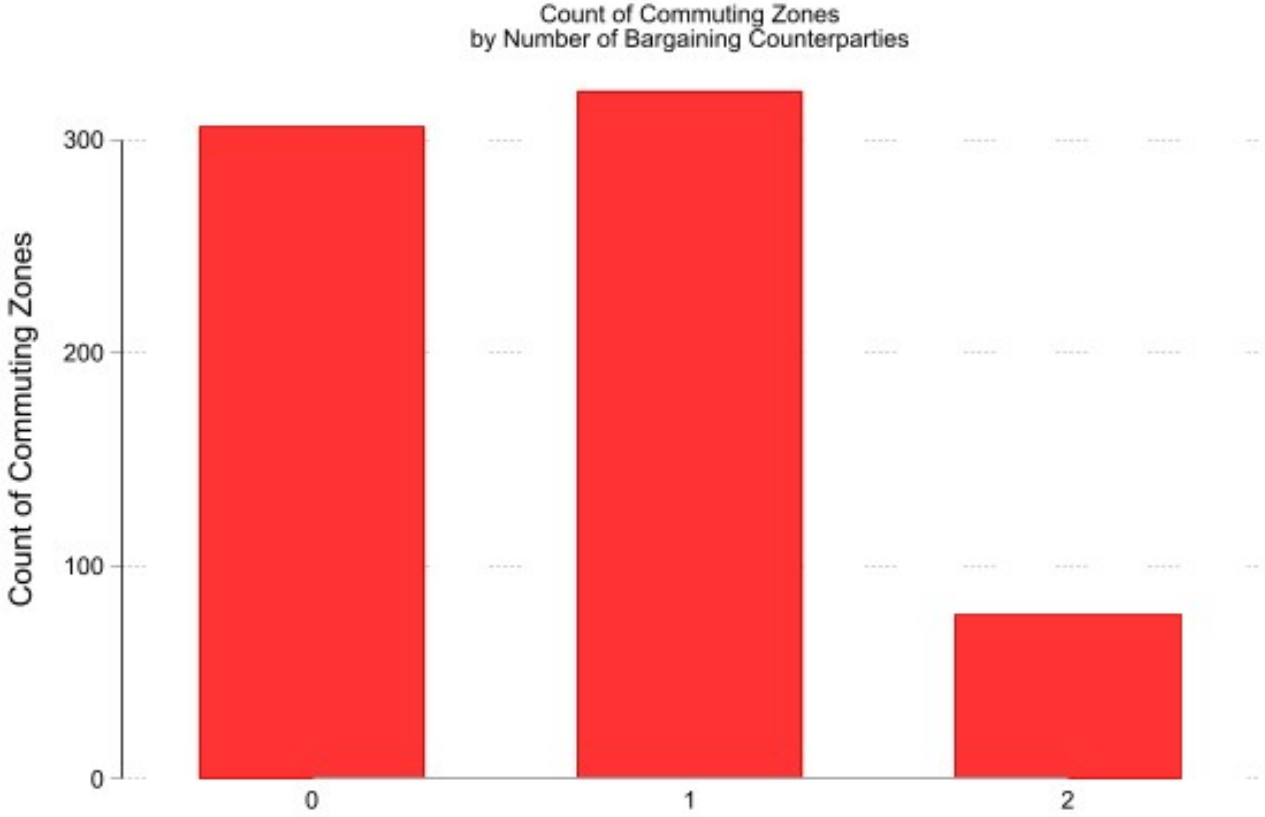

Count of Commuting Zones
by Number of Bargaining Counterparties

Figure 9. Effect of multiple counterparties on pay. These figures estimate the marginal effect of multiple employer-counterparties on pay at each of the merging parties during 2015-2023. The first set of estimates utilize only cross-sectional variation in the number of counterparties across commuting zones. The second utilize only time series variation in the number of counterparties within commuting zones.
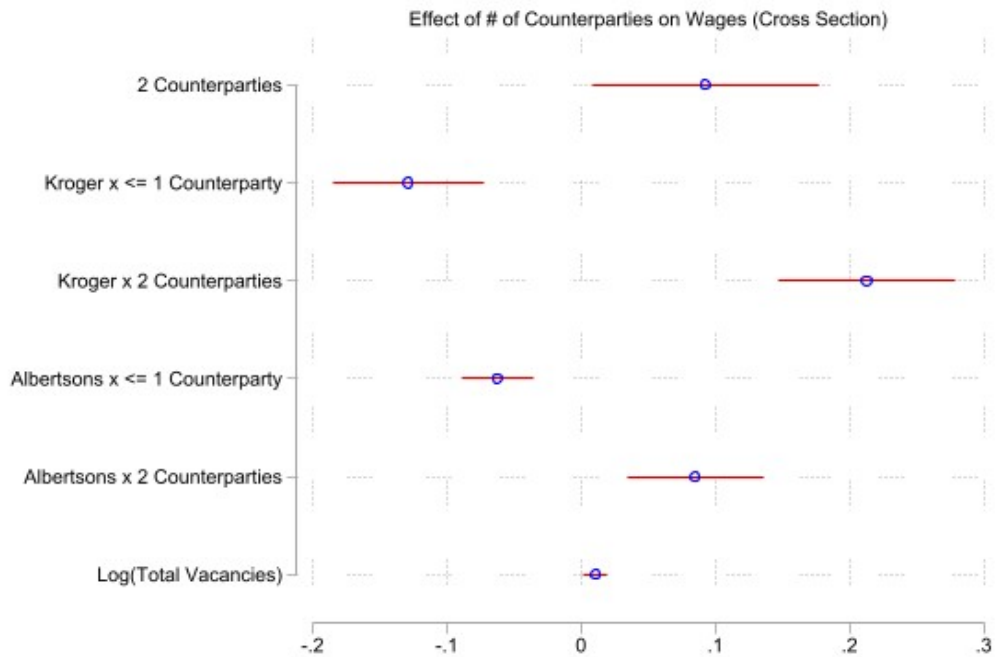
(A) Cross-section
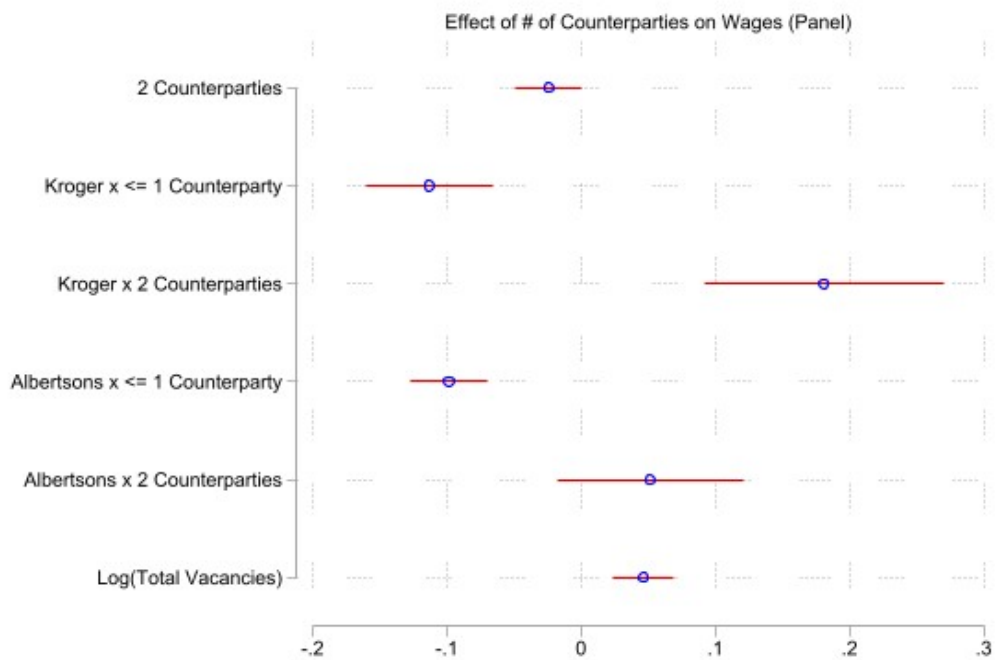
(B) Panel

Table 1. Directory of Occupational Classifications This table explains how the six occupational classifications used in the analysis of labor market competition are constructed from constituent SOC-6 occupations and BGT's standardized job titles.

Occupational Classification	6-digit SOC Occupations	Job Titles
Courtesy Clerks		· Courtesy Clerk · Cart Clerk · Utility Clerk
General Merchandise Clerks	· Stock Clerks & Order Fillers · Food Preparation Workers	· Retail Clerk · Deli Clerk · Order Filler · Stock Clerk · Bakery Clerk · Rx Clerk
Food Clerks	· First Line Supervisors of Food Preparation Workers · Cashiers	· Dairy Clerk · Frozen Food Clerk · Grocery Clerk · Foods Clerk · General Clerk · Cashier · Produce Clerk · Perishable Clerk
Butchers and Meat Cutters	· Butchers and Meat Cutters	· Meat Clerk · Meat Cutter · Butcher · Seafood Clerk
Pharmacists and Interns	· Pharmacy Aides · Pharmacy Technicians	· Pharmacy Technician · Pharmacy Manager
Other Covered Occupations	· Food Service Managers · Sales and Related Workers, All Other	

Table 2. HHI-Earnings Regression Results This table reports the results from estimating equation 5.1 with alternative fixed effects specifications, where the outcome of interest is the log of the annual salary posted in the job ad.

VARIABLES	(1) Log(Salary)	(2) Log(Salary)	(3) Log(Salary)	(4) Log(Salary)
Log(HHI)	-0.0531***	-0.0738***	-0.0163**	-0.0330***
	(0.00619)	(0.00455)	(0.00818)	(0.0116)
Constant	10.36***	10.31***	10.45***	10.41***
	(0.0133)	(0.0122)	(0.0174)	(0.0271)
Observations	700,427	700,413	700,427	700,083
R-squared	0.122	0.150	0.032	0.083
Year-Quarter FE	YES	YES	YES	YES
Commuting Zone FE	NO	YES	NO	NO
Occupation FE	NO	NO	YES	NO
Occupation-by-Commuting Zone FE	NO	NO	NO	YES

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3. HHI-Work Hours Regression Results This table reports the results from estimating equation 5.1 with alternative fixed effects specifications. The outcome of interest is an indicator for whether the job advertises full-time hours.

VARIABLES	(1) Full Time	(2) Full Time	(3) Full Time	(4) Full Time
Log(HHI)	-0.0927***	-0.136***	-0.0279***	-0.0411***
	(0.00517)	(0.00637)	(0.00522)	(0.00600)
Constant	0.405***	0.312***	0.544***	0.516***
	(0.0123)	(0.0173)	(0.0112)	(0.0129)
Observations	2,288,327	2,288,321	2,288,327	2,288,134
R-squared	0.029	0.053	0.075	0.106
Year-Quarter FE	YES	YES	YES	YES
Commuting Zone FE	NO	YES	NO	NO
Occupation FE	NO	NO	YES	NO
Occupation-by-Commuting Zone FE	NO	NO	NO	YES

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix

A A Model of Labor Supply on a Salop Circle

This appendix presents an oligopsony model of labor market competition, extending the model in subsection 3.1 to more than two (pre-merger) employers.[31] In this extension, the merger of two employers does not result in the total collapse of labor market competition, but does increase the wage markdown paid by the merging parties.

There are $N > 2$ employers equally spaced around the perimeter of a circle, with workers distributed uniformly around the circle. We will model the merger of adjacent employers 1 and 2,[32] where employer 1 enjoys the higher amenity value $r_1 > r_2$. All the other employers $i > 2$ have amenity value r^* and pay equal wage w^* by assumption.[33]

Under a Salop circle model, the labor market share/labor supply function of firm 1 is given by

$$Q_1(\{w\}, \{r\}) = \frac{1}{N} + \frac{2w_1 - w_2 - w^*}{2\tau} + \frac{2r_1 - r_2 - r^*}{2\tau} \tag{A.1}$$

As before, we can use this to solve firm 1's profit maximization problem.

$$\pi_1 = \max_{w_1} (p_1 - w_1) \left(\frac{1}{N} + \frac{2w_1 - w_2 - w^*}{2\tau} + \frac{2r_1 - r_2 - r^*}{2\tau} \right) \tag{A.2}$$

$$[w_1] \quad \frac{1}{N} + \frac{2w_1 - w_2 - w^*}{2\tau} + \frac{2r_1 - r_2 - r^*}{2\tau} = \frac{1}{\tau}(p_1 - w_1) \tag{A.3}$$

$$w_1^\star = \frac{1}{2} \left(p_1 - \frac{\tau}{N} + \frac{1}{2}w_2 + \frac{1}{2}w^* - r_1 + \frac{1}{2}r_2 + \frac{1}{2}r^* \right) \tag{A.4}$$

Equation A.4 is the best response function for firm 1. The best response function for firm 2 is

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[31]Salop (1979)

[32]The idea that Kroger and Albertsons are proximate in the labor market is supported by the transfer-ability of seniority, qualification for health insurance, and pension rights across employers subject to the union contract, but are not transferable to employers not subject to the contract.

[33]Given equal amenity values, there will still be some wage inequality among the non-merging parties given proximity to the merging parties with different amenity values. For the purpose of this exposition, we do not model that.

given by

$$w_2^\star = \frac{1}{2}\left(p_2 - \frac{\tau}{N} + \frac{1}{2}w_1 + \frac{1}{2}w^* - r_2 + \frac{1}{2}r_1 + \frac{1}{2}r^*\right) \tag{A.5}$$

The intersection of the best response functions yields the equilibrium wage formula

$$w_i^\star = \frac{8}{15}p_i + \frac{2}{15}p_{-i} - \frac{2\tau}{3N} + \frac{1}{3}w^* + \frac{2}{15}r_{-i} - \frac{7}{15}r_i + \frac{1}{3}r^* \tag{A.6}$$

where i and $-i$ refer to firms 1 and 2, or vice versa. If we assume equal retail prices/marginal products, this simplifies to

$$w_i^\star = \frac{2}{3}p^\star - \frac{2\tau}{3N} + \frac{1}{3}w^* + \frac{2}{15}r_{-i} - \frac{7}{15}r_i + \frac{1}{3}r^* \tag{A.7}$$

which is the equivalent of equation 3.6.

As before, we model a merger of firms 1 and 2 by assuming a wage parity condition is the result: the firm with the lower amenity value of the merging parties is prevented from competing in the labor market by paying a higher wage. The notation that follows assumes the lower-amenity-value merging party is firm 2, and we solve firm 1's post-merger profit maximization function with $\tilde{w}$ as the shared post-merger wage. N stays constant because we assume the merged firm keeps the former location of firm 2 open, as in the Hotelling case.

$$Q_1(\{w\}, \{r\}) = \frac{1}{N} + \frac{\tilde{w} - w^*}{2\tau} + \frac{2r_1 - r_2 - r^*}{2\tau} \tag{A.8}$$

$$\pi_1 = \max_{\tilde{w}} (p^* - \tilde{w})\left(\frac{1}{N} + \frac{\tilde{w} - w^*}{2\tau} + \frac{2r_1 - r_2 - r^*}{2\tau}\right) \tag{A.9}$$

$$[\tilde{w}] \quad \frac{1}{N} + \frac{\tilde{w} - w^*}{2\tau} + \frac{2r_1 - r_2 - r^*}{2\tau} = \frac{1}{2\tau}(p^* - \tilde{w}) \tag{A.10}$$

$$\tilde{w}^\star = \frac{1}{2}p^* - \frac{\tau}{N} + \frac{1}{2}w^* - r_1 + \frac{1}{2}r_2 + \frac{1}{2}r^* \tag{A.11}$$

Comparing equation A.11 with equation A.7, we see that wage share of MPL (the coefficient on p^*) is lower post-merger, and the market power markdown term $\frac{a\tau}{bN}$ is also larger in magnitude

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for $N \geq 2$ post-merger. Both effects are partly offset by higher weights on w^* and r^*, because the other firms become the more relevant sources of labor market competition for firm 1 post-merger. However, it should be noted that if firms 1 and 2 collectively form a non-trivial share of the labor market, then in a full equilibrium of the model w^* will also adjust downward post-merger since wages are strategic complements. That would constitute a coordinated effect of the merger. Altogether, the merger exerts downward pressure on wages, but does not drive them to subsistence as in subsection 3.1.

One appealing feature of this model is that the non-merging parties will gain market share as a result of firm 1 gaining labor market power. That result reflects the intuition that worsened competitive outcomes following the merger redistribute market share to the non-merging firms, so combining their ex ante market share overstates the competitive effect of the merger. In the case of a merger of two retail employers like Kroger and Albertsons, any post-merger store closures and layoffs could be interpreted through that lens.