Mergers, store revenue, and jobs: Evidence from the food retail industry

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Abstract

This article investigates the effects of a merger between food retailers on grocery store revenue and employment. One major concern with mergers is the potential increase in market power for the merging firms, which could lead to higher prices. However, merging firms and competitors might also reorganize their store locations and workforce to save costs and avoid cannibalization. We assess the implications of such mergers and look into store revenue and employment based on market dynamics. By analyzing a hypothetical merger between Albertsons and Kroger, our findings shed light on how store revenue and employment would have changed if the merger had been approved. Potential reductions in the store network lead to changes in revenue and, further, substantial job cuts resulting from the merger.[1]

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1 Introduction

Evaluating the implications of mergers on consumer welfare is a crucial area of focus for antitrust authorities, as mergers can raise concerns about increased market concentration and potential price increases that may negatively impact consumers. While previous research extensively examines the impact of price effects in assessing mergers, there is comparatively less exploration of how changing market structures due to mergers affect firms' investment incentives. Our study contributes to this area by investigating the influence of mergers on store locations and employment levels, which in turn impact consumer surplus and overall welfare. Specifically, we analyze the proposed merger between Albertsons and Kroger in the US food retail industry. Our analysis illuminates how such mergers can prompt firms to adjust their store locations and workforce, ultimately affecting consumer welfare and societal well-being as a whole.

We focus on the $24.6 billion proposed merger between Albertsons and Kroger in the United States. This merger raised questions about what might happen to the closing of stores, in turn leading to job cuts. News article headlines like "Kroger-Albertsons grocery chain merger in the US threatens job cuts as Wall Street eyes paydays" and "Rural towns fear Kroger-Albertsons merger will close stores and raise prices" echo the concerns expressed by various communities and industry observers. Beyond the immediate economic impacts, these news articles furthermore discuss the broader implications for consumers, discussing potential changes in access to quality food and a reduction in food product options within the consumer choice set post-merger. These concerns raise significant questions about antitrust implications, particularly regarding potential consumer welfare loss due to the merger. This paper undertakes a comprehensive evaluation of the effects of the Albertsons-Kroger merger, utilizing a panel dataset from the state of California. Our analysis is two-fold, first assessing the impact on store locations and subsequently exploring changes in the number of employees within the merged entity. Through this research, we aim to provide valuable insights into the consequences of such mergers, contributing to the ongoing discourse in the context of the food retail industry and its broader socioeconomic implications. This paper contributes to the literature on mergers (Fan (2013), Draganska, Mazzeo and Seim (2009), Caradonna, Miller and Sheu (2021), Wollmann (2018), Fan and Yang (2020)) as well as entry/exit in various locational markets (Bresnahan and Reiss (1991), Mazzeo (2002), Seim (2006)).

We employ the National Establishments Times Series (NETS) dataset, which offers annual data on fundamental attributes of food retailers in the United States. Our analysis concentrates on California in 2021, utilizing this dataset to investigate diverse attributes of food retail establishments, such as yearly revenue, location specifics (address, longitude, latitude), and store format. In addition, we integrate this dataset with consumer demographics data sourced from census tract information. This supplementary dataset provides valuable insights into demographic variables such as total population, income levels, household size, gender distribution, age demographics, and the geographical coordinates of a census tract's centroid. We integrate this data with the wage data from the Quarterly Census of Employment and Wages (QCEW) for this analysis.

We operate under the assumption that firms' decisions regarding entry are driven by their revenue-generating motives. When two food retailers merge, they often restructure their store location networks by either expanding or closing stores. If, post-merger, they opt to invest in expanding their networks and hiring more employees, thereby improving consumers' access to stores and staff, it would likely boost consumer welfare. Conversely, if they choose to close stores or cut jobs to reduce costs, it may result in decreased access to stores and staff, thereby diminishing consumer welfare. The ultimate outcome hinges on various factors such as market structure, revenue considerations, and the costs associated with expanding location networks and hiring employees, necessitating empirical investigation. The decision-making process for such restructuring depends on factors like market structure, expected revenue gains, employee hiring costs, fixed entry costs, and exit strategies. By employing a structural model, we uncover these underlying factors and assess consumer welfare by considering both employee restructuring and changes in store locations. This study contributes to existing literature focusing on the impact of mergers on equilibrium prices and welfare effects (Baker and Bresnahan (1985), Werden and Froeb (1994), Banal-Estañol, Macho-Stadler and Seldeslachts (2008), Nevo (2000), Hosken and Ashenfelter (2008), Houde (2012), Savelkoul (2016)). Furthermore, it aligns with recent research examining firms' decisions regarding non-price attributes, such as product portfolio choices, in response to changes in market structure (Draganska, Mazzeo and Seim (2009), Eizenberg (2014), Wollmann (2018), Fan and Yang (2021), Elena Argentesi, Paolo Buccirossi, Roberto Cervone, Tomaso Duso and Alessia Marrazzo (2021), Jorge Alé-Chilet, Cuicui Chen, Jing Li and Mathias Reynaert (2021), Reynaert (2021)).

We utilize a two-stage model that involves a complete information game. In the initial stage,

firms decide on their store locations based on shocks affecting the sunk costs associated with market entry and exit. Following this decision, they commit to their chosen locations. In the subsequent stage, firms determine the workforce size in response to shocks in consumer demand. Once the decisions regarding store locations and workforce size are finalized, consumers visit their preferred store to make their grocery purchases.

We employ a consumer expenditure model to gain insights into consumer preferences for various store attributes. This involves connecting store-level revenue data in California with consumer preferences and inferred choices, utilizing a demographic dataset from the 2020 US census at the census tract level in conjunction with the consumer expenditure model. We establish a link between consumer demographics, store attributes, and store revenues by aggregating the inferred choice of individual consumers. We calculate the revenue for each store based on the model parameters and the observed data.

In the following steps, we calculate the range of fixed costs associated with the establishment of a grocery store in a specific location. The widespread presence of grocery stores operated by various retail brands throughout California serves as the primary indicator of entry barriers into local markets. This diversity allows us to estimate the range of fixed costs. To determine the total fixed cost, we adopt a revealed preference approach commonly utilized in empirical entry studies, particularly relying on the fact that the observed store network maximizes revenue in a Nash equilibrium. A food retailer opts to open a grocery store only when the expected revenue exceeds the fixed cost, while the closure of a store occurs if the fixed cost surpasses the expected revenue. Based on these principles, we derive the upper bound of fixed costs for any retail brand store in a local market (such as a census tract in California) if a store is operational within that tract. Conversely, for a brand store absent in the tract, we establish a lower bound. This analysis aligns with existing literature on entry-exit dynamics and fixed cost estimation, employing a moment inequality approach as discussed in references like Pakes et al. (2015), Houde, Newberry and Seim (2023), Berry, Eizenberg and Waldfogel (2016), Wollmann (2018), Mohapatra and Chatterjee (2020).

Using the estimated parameters derived from consumer expenditure, revenue, employment, and fixed cost bounds, we engage in counterfactual simulations to examine the welfare implications of mergers when food retailers reorganize their staff and location networks. This analytical exercise is

designed to capture the non-price effects of mergers, emphasizing the post-merger restructuring of employment and location networks. Consequently, the restructuring process is influenced solely by the economic dynamics resulting from the merger, including factors like cannibalization, business stealing, and cost-saving effects. We specifically conduct a counterfactual analysis to assess how the merger between Albertsons and Kroger influences the retailer's decisions regarding the number of employees and the opening or closing of stores post-merger.

2 Dataset

This research relies on the National Establishments Times Series (NETS), a dataset that provides yearly data on essential characteristics of food retailers in the U.S. Our focus is on California in 2019, and we utilize this dataset to examine various characteristics of food retail stores, including annual revenue, location details (address, longitude, latitude), and store format. We combine this dataset with consumer demographics information sourced from census tract data. This additional dataset provides insights into demographic variables such as total population, income, household size, male/female population, age, and the longitude/latitude of the centroid of a census tract.

Food retailers are distinguished into the following formats: Local chain groceries, National chain groceries, Regional chain groceries, Supercenters, and Warehouse clubs. Local chain grocery stores are retail outlets that belong to a small chain of supermarkets or grocery stores operating within a specific geographic area (e.g. Wegmans). While they may have multiple locations, they are usually regionally or locally owned and operated, distinguishing them from larger national or international chains. National chain grocery stores are part of large-scale retail chains with multiple locations across a country or even internationally (e.g. Kroger, Safeway, Albertsons). These stores offer a wide selection of grocery items, household goods, and often include additional services such as pharmacies and deli counters. Regional chain grocery stores are similar to national chain grocery stores but operate within a specific region or geographic area, rather than nationwide (e.g. Publix in the Southeastern US, Giant Eagle in the Mid-Atlantic region, Meijer in the Midwest). They may offer a selection of products tailored to local preferences while still benefiting from the economies of scale associated with chain operations. Specialty food stores focus on offering a specific category of food or beverage products, often of higher quality or uniqueness compared to those found in

traditional grocery stores. Examples include Whole Foods Market specializing in organic and natural foods, Trader Joe's specializing in unique and gourmet products, Sprouts Farmers Market specializing in fresh and organic produce. Supercenters are large retail stores that combine a traditional grocery store with a wide range of general merchandise offerings, including clothing, electronics, home goods, and more (e.g. Walmart, Target). They operate as one-stop shopping destinations, often with expansive parking lots and extended operating hours. Warehouse clubs are membership-based retail stores that sell a wide variety of products in bulk quantities at discounted prices. These stores often require customers to purchase a membership to access their offerings and typically cater to both individual consumers and small businesses (e.g. Costco, Sam's Club, BJ's Wholesale Club).

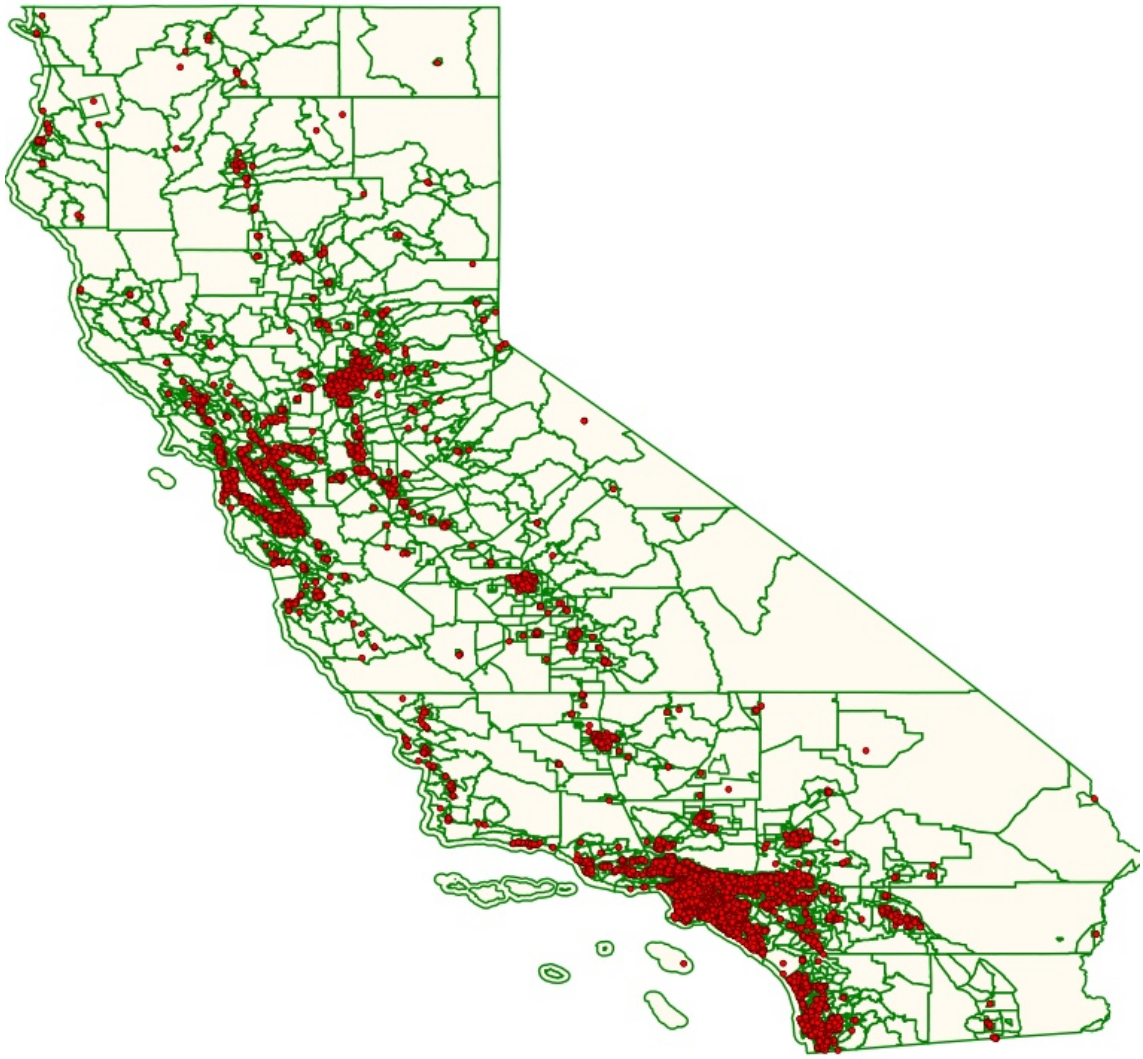
A summary of the dataset is presented in Table 1.[2] In 2019, a total of 4,098 grocery stores were in operation. These include 1,087 local chain groceries, 1,593 national chain groceries, 853 regional chains, 368 supercenters, and 215 warehouse clubs. Revenue varies widely across different store formats, with warehouse clubs and supercenters generating higher yearly revenue, as indicated in the table. In our dataset, 2,848 census tracts have at least one grocery store within their locality. The average population of these tracts is 4,778, with an average age of 38.8 and an average household size of 2.9. On average, consumers travel 1.5 miles to reach a grocery store. Figure 1 shows the grocery store network across California.

[2]We have excluded independent grocery stores, dollar stores, special food stores, and convenience stores with significantly low annual revenue, as well as those with distinct grocery formats compared to the ones listed here.

Table 1: Summary statistics

Stores	#	Avg Revenue (Million $)	Std dev
Local Chain Grocery	1,087	5.59	14.87
National Chain Grocery	1,593	17.16	13.12
Regional Chain Grocery	835	12.16	9.47
Supercenter	368	28.02	17.92
Warehouse club	215	71.31	66.22
# stores	4098	16.89	24.63
Census tract	Mean	Std. Dev.	
Per cap income ($)	40,280	21788	
Population	4,778	1820	
White population	2,058	1296	
Age	38.8	6.91	
HH size	2.9	.66	
Distance (in miles)	1.5	2.5	
# census tracts	2,848		

Figure 1: Grocery store locations in California State



3 Model and Estimation

This study utilizes a framework for assessing competition among grocery stores (Ellickson, Grieco and Khvastunov (2020). To facilitate analysis and address data constraints, several assumptions are made. Notably, price is excluded as a covariate in the choice model due to the unavailability of price data. While this limitation is acknowledged, it also presents certain advantages. Supermarkets and grocery stores set prices for numerous products, and refer to a price index used in store-level demand modeling an approximation. Recent research highlights that a generic price index may inadequately represent the diverse choice preferences of consumers (Handbury (2021)). Consequently, even if price data were accessible, its optimal inclusion remains ambiguous. Additionally, empirical findings indicate limited price variation within retail chains (DellaVigna and Gentzkow (2019); Hitsch, Hortacsu and Lin (2021); Adams and Williams (2019)), with significant variation observed across chains. Thus, incorporating chain effects, especially when interacted with income, may effectively capture key pricing disparities among firms at the operational level where pricing decisions are made.

The second simplification is that we do not include the store product-level structural errors in the indirect utility function. There are two key reasons for this. First, using chain fixed effects instead of prices helps reduce the main problem of endogeneity that this error term aims to solve. Second, adding such an error term would be very complex in our situation because it would mean treating all stores as part of one market.

Finally, we don't delve into complex supply models or detailed merger simulations as in Nevo (2000). Instead, we focus on how consumers switch between stores without defining firm behavior or strategy spaces. Our analysis uses various scenarios to assess merger impacts. Unlike traditional supply models, our method feeds directly into measuring merger effect, based on FTC's insights on store locations post-merger and their effects on employment.

3.1 Consumer Expenditure

We use a consumer expenditure model to understand consumer's preferences for different store characteristics (similar approach as in Ellickson, Grieco and Khvastunov (2020)). Our study uses store-level revenue data from all grocery stores in California. We link the store-level revenue

information to consumer preferences and implied choices by using census tract-level demographic dataset from 2020 US census, along with model of consumer expenditure. The census tract data is spatially disaggregated and we use the variation of consumer demographics across tracts for our identification. We assume a representative household in a census tract poses the average household characteristics, and travel a distance between tract centroid and a store while buying groceries. A consumer spends a fixed proportion α of his or her income on weekly grocery budget and on the outside good, where α is a parameter to be estimated. Individuals distribute their budget based on a discrete-choice random utility model across a selection of nearby stores, each possessing a location and a set of characteristics x_s (like store format, chain affiliation), alongside an external option. Our model accommodates variations in individuals' preferences for stores, as well as for the outside option, which can vary according to income levels. Hence, we can observe the empirical evidences where the share of income allocated to grocery store expenses (e.g., expenditures on groceries instead of outside goods) decreases as income levels rise. Each consumer engages in a continuous series of purchase decisions to distribute their budget among stores. For each unit of expenditure i, a consumer in tract t assesses their utility for spending at store s as follows:

$$\begin{aligned} u_{ist} &= u_{st} + \epsilon_{ist} \\ &= \tau_0 d_{st} + \tau_2 d_{st} z_t + \gamma_0 x_s + \gamma_1 (x_s \otimes z_t) + \epsilon_{ist} \end{aligned} \tag{3.1}$$

where, d_{st} refers to distance of store s from consumer i in tract t, z_t includes tract-level consumer demographics, and x_s includes store characteristics. Consumer's baseline utility from a store is denoted as u_{st}. Each purchase decision is subject to an idiosyncratic preference shock, ϵ_{ist}, that follows a Generalized Extreme Value (GEV) distribution. This framework enables the utility of a particular store to be determined by its proximity to consumers, along with store characteristics encompassing factors such as product availability, service quality, and convenience. Individuals are allowed to differ in tastes for distance and other characteristics though heterogeneity in the consumer's (tract-level) demographic variables z_t. This allows the utility of different store characteristics (including format type) to vary across observable consumer characteristics such as income.

We also incorporate chain affiliation into x_s, capturing unobserved characteristics of specific national chains like product variety and pricing strategies. Since we don't have information on actual prices or product offerings, the store's chain affiliation reflects the overall pricing, quality,

and assortment approach of the company, presumed to be determined at the chain level. For instance, some grocery stores may position themselves as budget-friendly, offering limited choices to cater to price-sensitive shoppers, while others may target rich customers who value high-end organic products. Alternatively, conventional supermarket chains often aim for a broader market segment, resulting in less differentiation and increased competition. These diverse strategies appeal to consumers in varying ways. For example, Ellickson and Misra (2008) note that supermarkets adopt different pricing and positioning tactics to target distinct consumer groups based on purchase behavior. Although our model doesn't directly include individual store pricing or quality decisions, we believe these are secondary to the overall chain policies. Considering chain effects also acknowledges that purchasing one dollar's worth of goods at Whole Foods, a high-end grocer, results in a different product assortment compared to spending the same amount at Walmart, which targets lower-income urban populations. Additionally, by combining these chain identifiers with consumer characteristics (such as income), we allow for variations in the utility trade-off between shopping at different chains, like Walmart and Whole Foods, across consumers.

A consumer's utility from the outside good is defined as the representative consumer's (tract-level) demographic characteristics and a set of physical tract characteristics w_t, such as population density, that control for the availability of alternative consumption options in the tract's vicinity,

$$u_{0ti} = \lambda_0 w_t + \lambda_1 w_t z_t + \epsilon_{0it}$$

We assume that the household's choice set consists of all stores located within D miles of their resident tract, as well as the outside option, i.e $C_t = \{s : d_{st} \leq D\} \cup 0$. We allow our model to capture the fact that similar formats offer more uniform retail experiences and therefore may compete more intensely within rather than across formats, even after controlling for store characteristics. The nested Generalized Extreme Value (GEV) framework addresses this by incorporating correlation among ϵ_{sti} terms for stores sharing the same format (i.e., within the same nest). Here, $0 \leq k \leq 1$ represents the parameter governing this correlation, where $\mu_k = 1$ signifies independent shocks within nest k (the case of multinomial logit), and $k = 0$ indicates perfect correlation of ϵ_{sti} within the nest.

We integrate over the GEV shocks, and derive the share of consumers in tract t budget on

groceries and how much they spend on store s. We express this as a function of parameter vector i.e. $\theta = (\tau, \gamma, \lambda, \mu)$. Let C_{t_k} represent all the stores within the choice set of tract t belonging to the nest k, and $k(s)$ denote the nest to which store s pertains. Subsequently, we define $C_{t,k(s)} = \{q \in C_t : k(s) = k(q)\}$ as the set of stores in the choice set of tract t that are categorized within the same nest as store s. Lastly, let ι_{ti} denote the store where consumer type t allocates expenditure unit i. The share of expenditure at store s, relative to total spending in tract t, can be broken down into the cumulative expenditure on nest $k(s)$ and the outlay at store s as a fraction of all expenditure within $k(s)$ and can be expressed as,

$$p_{st}(\theta) \equiv Pr(\iota_{ti} = s) = Pr(\iota_{ti} \in C_{t,k(s)}) Pr(\iota_{ti} = s | \iota_{ti} \in C_{t,k(s)})$$

Given our distributional assumption, the share of expenditure on stores in $C_{t,k(s)}$ (a grocery store close to tract t) is

$$Pr(\iota_{ti} \in C_{t,k(s)}) = \frac{(\sum_{q \in C_{t,k(s)}} e^{u_{qt}/\mu_{k(s)}})^{\mu_{k(s)}}}{\sum_{v=0}^{K} (\sum_{q \in C_{t,v}} e^{u_{qt}/\mu_v})^{\mu_v}}$$

where u_{st} is the baseline utility that consumers in tract t obtain from visiting store s (a function of model parameters defined above). The probability of choosing a particular store s from the set of options included in $C_{t,k(s)}$ is,

$$Pr(\iota_{ti} = s | \iota_{ti} \in C_{t,k(s)}) = \frac{e^{u_{qt}/\mu_{k(s)}}}{\sum_{q \in C_{t,k(s)}} e^{u_{qt}/\mu_{k(s)}}}$$

The unconditional share can be written as

$$p_{st}(\theta) = \frac{e^{u_{qt}/\mu_{k(s)}} (\sum_{q \in C_{t,k(s)}} e^{u_{qt}/\mu_{k(s)}})^{\mu_{k(s)-1}}}{\sum_{v=0}^{K} (\sum_{q \in C_{t,v}} e^{u_{qt}/\mu_v})^{\mu_v}}$$

In theory, we have the option to incorporate further layers of unobserved diversity that rely on store or tract attributes, akin to permitting random coefficients within our utility framework as discussed in Berry, Levinsohn and Pakes (1995). However, by integrating the combined distribution of income and location, we account for a considerable portion of observed heterogeneity. This approach helps in looking into extensive substitution patterns across chains, while maintaining a

streamlined analytical framework.

3.2 Store Revenues and Employment

We establish a link between consumer demographics, store attributes, and store revenues by aggregating the inferred choice of individual consumers. We calculate the revenue for each store based on the model parameters and the observed data. The revenue generated in store s from expenditures in tract t is essentially the total budget of all consumers in tract t multiplied by the fraction of those expenditures allocated to store s.

$$\hat{R_{st}}(\theta, \alpha) = \alpha \; inc_t \; . \; n_t \; . \; p_{st}(\theta)$$

Here, inc_t represents the per capita income in tract t, and n_t signifies the total population residing in tract t. The model parameter, α, reflects the share of income that consumers allocate to overall grocery expenses, encompassing purchases from both the store and outside alternatives. Store s generates revenue from all tracts where it is included in the choice set, which typically includes tracts within a 10-mile radius of its location.

The predicted total revenue of a store from multiple tracts, within D miles can be expressed as

$$\hat{R_s}(\theta, \alpha, \kappa) = \sum_{t \in L_s} \hat{R_{st}}(\theta, \alpha) + \kappa_1 w_{st} + \kappa_2 w_{st}^2 \; - \omega_{st} w_{st}$$

where the stores generate revenue through employees and has an expenditure for employee salaries. Here ω_{st} is the wage rate of the employees in a census tract t, and w_t is the number of employees in a given store. The estimated total revenue for store s is given by:

$$\hat{R_s}(\theta, \alpha, \kappa) = \sum_{t \in L_s} R_{st}(\theta, \alpha)$$

Here, $L_s = \{t : s \in C_t\} = \{t : d_{st} \leq D\}$ represents the set of tracts where store s is included in the choice set. An important aspect of this modeling approach is that it avoids imposing arbitrary geographic market boundaries. Instead, each store is positioned at the center of its own service area. Stores situated in close proximity to one another will have service areas with significant overlap. Consequently, they will exert a stronger competitive influence on each other compared

to stores located farther apart, and will compete most intensely for customers in their immediate vicinity.

To estimate the model parameters, we compare the revenue prediction generated by the model with the actual revenues observed in the data, selecting the parameters that minimize the discrepancy between the two. To accommodate potential measurement errors in the revenue data, we presume that the observed revenues for each store undergo a multiplicative shock, which is independent of the exogenous variables and consistent across stores.

$$R_s = e^{\eta_s} \hat{R}_s(\theta_0, \alpha_0, \kappa_0)$$

In this context, $(\theta_0, \alpha_0, \kappa_0)$ represent the true parameters, and ϵ_s symbolizes the store-level measurement shock. Given these premises, the parameters can be inferred using nonlinear least squares estimation techniques.

$$(\hat{\theta}, \hat{\alpha}, \hat{\kappa}) = \underset{\theta,\alpha}{\operatorname{argmin}} \sum_s (log(\hat{R}_s(\theta, \alpha)) - log(R_s))^2$$

Demonstrating the consistency and asymptotic normality of this estimator is relatively simple. The standard variance-covariance matrix is inferred directly from the nonlinear least squares objective function.

The firms endogenously choose the number of employees in a store. At equilibrium, the store choose optimal number of employees such that it satisfies the equilibrium condition of marginal revenue to marginal cost such that,

$$\frac{\delta R_{st}}{\delta \eta_{slt}} = \kappa_1 + 2\kappa_2 w_{st} - \omega_t$$

where w_{st} is number of employees in store s, tract t and ω_t is wage rate in tract t.

3.3 Identification

After presenting our model and estimation approach, we will now discuss the data variation and necessary assumptions essential for identifying the model parameters. The identification of these parameters stems from observing the geographic diversity in population demographics, store loca-

tions, and store revenues. We initially assume that ϵ_{its} and ϵ_{st} are independent of stores' decisions regarding residential location and size, as well as consumers' selected locations and observed incomes. Specifically, we assume that consumers perceive store locations as fixed and form opinions about stores' pricing, quality, and product variety at the chain level rather than the individual store level. This allows us to mitigate the endogeneity of these policies using chain fixed effects. While it's plausible that chains may adjust pricing policies store by store based on local demographics (Ellickson and Misra (2008), Hoch et al. (1995)), we consider this concern as less significant for two reasons. Firstly, supermarket firms set prices for numerous products per store, making it impractical for consumers to compute price indices for each outlet. Instead, they likely have a general perception of price differences across chains and use this as a heuristic in selecting their primary store. Secondly, grocery stores typically set prices at the level of broader "pricing zones" rather than individual stores. This strategy allows stores to collectively market their products to a wider area while minimizing costs. Consequently, we assume that it is not efficient for chains to set policies at the individual store level. Although these pricing zones are not typically nationwide, we believe that within-chain variation in pricing and product offerings across a pricing zone is less significant than across-chain variation within the same zone. This latter variation is captured in our framework via chain fixed effects.

Shifting our focus to identifying specific parameters, we first concentrate on α, which represents the proportion of total income allocated to grocery expenditures. We identify this parameter by varying the total number of stores in otherwise identical markets and observing the resultant change in total revenue across all stores. Intuitively, adding multiple stores to a market should reduce the share of the outside good towards zero. Eventually, additional stores may not increase total revenue but only redistribute revenue across stores. In this context, α is simply the ratio of total revenue of all stores to the total income of the associated population of consumers. Generally, the change in total revenue in response to altering the number of stores reveals the trade-off between the outside good and the new store while maintaining regional income constant. This allows us to determine the share of the outside good and subsequently identify α.

Once we have identified α, parameters governing store utility are determined by varying observable characteristics of both stores and consumers and observing the resulting changes in the share of total expenditure of consumers within the catchment area, L_s, allocated to each store. For

example, consider the impact of distance on store choice. Varying the distance between a tract and a store affects the share of expenditures at that store relative to others in the tract's choice set, which is reflected in the store's revenue relative to others in the same choice set. In conclusion, this framework allows us to compute various statistics revealing the impact of distance and demographics on each firm's revenue. These statistics aid in assessing the model's performance and provide valuable insights for merger analysis, particularly regarding grocery competition's localization, both geographically and by firm and format type. Identification of the fixed cost parameters rely on the variation of locational entry by the food retailers.

4 Results

	Coeffcient	Std err
Income (γ)	0.10	0.069
Distance	-0.56	0.019
Distance*White pop	0.07	0.359
Distance*Income	-2.43	0.034
Distance*Age	1.80	0.01
Distance*HHsize	0.49	0.036
Distance*Female	0.78	0.007
Store age	1.22	0.180
Local chain	-2.12	0.172
National chain	1.52	0.075
Regional chain	-1.10	0.215
Supercenter	0.94	0.732
Warehouse club	0.99	0.959
Constant	-0.46	0.069

The findings derived from the demand model offer a comprehensive understanding of the intricate dynamics that shape consumer behavior and preferences within the context of grocery stores. Each coefficient in the table signifies the magnitude and direction of influence that specific variables exert on the overall demand for grocery stores. On average, consumers allocate approximately 10%

of their income towards grocery expenses. A negative coefficient, such as that observed for Distance (-0.56), suggests that as the distance to a store increases, there is a corresponding decrease in consumer demand. Conversely, negative coefficients, exemplified by store types like National chain (1.52), Supercenter (0.94), and Warehouse (0.99), indicate a notably higher demand for these particular store formats compared to others. These insights are crucial for retailers and policymakers alike, as they illuminate the factors driving consumer choices and enable strategic decision-making regarding store locations, assortment offerings, and marketing strategies. Moreover, the interaction terms such as Distance * Income (-2.43) and Age * Distance (1.80) shed light on the nuanced interplay between demographic factors like income and age with the influence of distance on consumer demand, highlighting the multifaceted nature of consumer decision-making processes. In particular, high-income consumers are more sensitive to distance. The coefficient for store age shows that older stores generally generate higher revenue than newer establishments. Overall, these regression results not only provide valuable insights into consumer preferences but also serve as a foundation for optimizing store operations and enhancing the overall consumer experience within the grocery retail landscape.

5 Counterfactual analysis

In the counterfactual world, we look into the potential merger between Albertsons and Kroger. This merger has significant implications in the grocery retail sector, particularly in terms of market concentration and competition. If approved, the merger could create one of the largest grocery chains in the United States, with a substantial market share. This consolidation raises concerns about reduced competition, potential price increases for consumers, and impacts on suppliers and employees. From an economic standpoint, the merger's analysis would likely focus on market structure, pricing behavior, and the extent of market power the combined entity would possess. Economists and antitrust regulators would assess factors such as market share, entry barriers, product differentiation, and the likelihood of coordinated behavior post-merger. The status of the Albertsons and Kroger merger would depend on various factors, including regulatory scrutiny by antitrust authorities such as the Federal Trade Commission (FTC) or the Department of Justice (DOJ). These agencies would evaluate the merger's potential impact on competition within the

grocery industry and may require divestitures or impose conditions to address anti-competitive concerns before approving the merger.

The Albertsons and Kroger merger raises several important questions regarding its potential impact. Specifically, this paper aims to address three research questions. Firstly, How will store revenues change? Second, what will happen to number of employees? And finally, what happens if stores close, especially for local economies and job opportunities?

5.1 Post-merger store revenue

The impact on store revenue following the merger can be analyzed by using the estimated parameters to compute the post-merger revenue in the updated scenario. The table 2 shows that, despite an overall 15% decline in average industry revenue, the Albertsons-Kroger merger experiences a significant 29% increase in average revenue. This indicates that the merger has likely resulted in operational efficiencies, enhanced market presence, or other synergies that have positively impacted their financial performance, setting them apart from the broader industry trend.

Table 2: Post-merger revenue

	Premerger revenue	Postmerger revenue	Δ revenue	Δ%age
All stores	16.89	14.39	-2.5	-15
Albertsons-Kroger	18.55	23.90	5.35	29

5.2 Post-merger Number of employees

To understand how the number of employees changes after the merger, we perform a regression of observed revenue over the number of employees and the square of the number of employees. Using the estimated coefficients from this regression, we can predict the number of employees based on the post-merger revenue. Despite an overall average job cut of 12% in the industry, the Albertsons-Kroger merger results in a significant 26.6% increase in employment (3). Notably, this increase in employment occurs without any change in the number of stores, suggesting that the merger has led to increased operational demands or efficiencies that require a larger workforce.

Table 3: Pos-merger employment

	Premerger #Employee	Postmerger #Employee	Δ #Employee	Δ%age
All stores	74	66	-8.8	-12
Albertsons-Kroger	78	99	20.8	26.6

5.3 Post-merger Store closure

To use the demand parameters to analyze the merger between Albertsons and Kroger and study the impact of store closures under five different scenarios. In each scenario, we decide which stores will be closed, with employees in these stores consequently losing their jobs. A post-closure analysis is conducted for each scenario to evaluate the number of stores expected to close, the impact on revenue for the merging brand stores, the effect on the revenue of competing stores, and the changes in employment. This analysis helps identify which scenarios policymakers should be cautious about, ensuring that the decisions made are informed by a comprehensive understanding of the potential economic and social impacts.

To explore counterfactual scenarios following the merger between Albertsons and Kroger, we consider five different approaches for closing stores. The first scenario involves closing stores with low sales revenue. The second targets stores in census tracts with small populations, such as rural areas and small towns. The third scenario focuses on stores in census tracts with low-income populations. The fourth scenario involves selecting census tracts with multiple Albertsons-Kroger stores and closing those with the lowest sales. Finally, the fifth scenario identifies census tracts with multiple Albertsons-Kroger stores and closes the least revenue-generating store in each location. These scenarios help in understanding the potential impacts of store closures on different communities and the overall business performance.

5.3.1 Scenario I

In the first counterfactual scenario of store closures, we consider closing Albertsons-Kroger stores with low sales revenue. With the average sales of Albertsons-Kroger (AK) stores amounting to $17.2 million annually, we eliminate stores falling below the 10th percentile in sales. This results in a premerger revenue of $20.29 million and a postmerger revenue of $23.85 million for Albertsons-Kroger, indicating an increase of $3.56 million in revenue. However, this action leads to a job cut

of 3,562 positions and the closure of 142 stores (88 Albertsons and 54 Kroger). While the average revenue of an Albertsons-Kroger store increases, competing stores experience a decrease in revenue, with overall premerger revenue for all stores at $17.33 million dropping to $13.78 million postmerger. Specifically, stores similar to Albertsons-Kroger show a significant decline, with premerger revenue of $16.14 million decreasing to $9.71 million postmerger, highlighting a $6.42 million reduction. This scenario underscores the trade-offs between improving individual store performance and the broader economic impact on employment and competition.

	Premerger rev	Postmerger rev	ΔRevenue	ΔEmployment	Δ # Stores
Albertsons-Kroger	20.29	23.85	3.56	-3,562	-142
All stores	17.33	13.78	-3.55	-	-
All stores ∼AK	16.14	9.71	-6.42	-	-

5.3.2 Scenario II

In the second counterfactual scenario of store closures, Albertsons-Kroger stores are removed from regions with low populations. The average population of census tracts with at least one Albertsons or Kroger store is 4,680. Stores are eliminated from regions with populations below the 10th percentile. This results in a premerger revenue of $16.09 million and a postmerger revenue of $14.18 million for Albertsons-Kroger, indicating a decrease of $1.91 million in revenue. Additionally, this action leads to a significant job cut of 10,838 positions and the closure of 138 stores (97 Albertsons and 41 Kroger). The average revenue of stores decreases for both the merging brands and competitors. The overall premerger revenue for all stores at $16.83 million drops to $13.61 million postmerger, while stores similar to Albertsons-Kroger show a decline from $17.14 million premerger to $13.39 million postmerger, a reduction of $3.75 million. This scenario highlights the negative impact on revenue and employment when closing stores in low-population areas.

	Premerger rev	Postmerger rev	Δ Revenue	ΔEmployment	Δ # Stores
Albertsons-Kroger	16.09	14.18	-1.91	-10,838	-138
All stores	16.83	13.61	-3.22	-	-
All stores ∼AK	17.14	13.39	-3.75	-	-

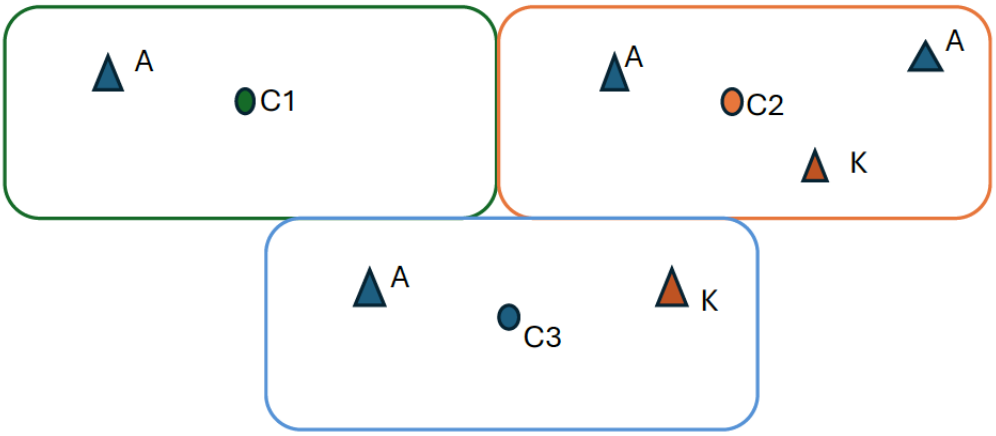
5.3.3 Scenario III

In the third counterfactual scenario of store closures, Albertsons-Kroger stores are closed in low-income regions. The average income of census tracts with at least one Albertsons or Kroger store is $39,052. Stores are excluded from regions with incomes below the 10th percentile. This results in a premerger revenue of $18.66 million and a postmerger revenue of $24.66 million for Albertsons-Kroger, indicating a significant increase of $6 million in revenue. However, this action leads to the closure of 147 stores (63 Albertsons and 84 Kroger) and expected job cuts of 10,718 positions. The overall premerger revenue for all stores at $16.86 million drops to $14 million postmerger, while stores similar to Albertsons-Kroger show a substantial decline from $16.13 million premerger to $9.71 million postmerger, a reduction of $6.42 million. Although Albertsons-Kroger's revenue increases, the revenue for competing stores decreases, highlighting the contrasting impacts on different market segments.

	Premerger rev	Postmerger rev	Δ Revenue	ΔEmployment	Δ # Stores
Albertsons-Kroger	18.66	24.66	6.00	-10,718	-147
All stores	16.86	14	-2.86	-	-
All stores ∼AK	16.13	9.71	-6.42	-	-

5.3.4 Scenario IV

In the scenario where Albertsons-Kroger stores with multiple locations and low sales are targeted, we examine specific census tracts. Census tract C1 has one Albertsons, C2 has two Albertsons and one Kroger, and C3 has one Albertsons and one Kroger. We select the Albertsons and Kroger stores in C2 and C3 and remove the ones with the lowest sales among these five stores. This approach focuses on optimizing store performance by eliminating underperforming locations within regions that have multiple stores, thereby potentially enhancing overall revenue efficiency for the remaining stores.



In this scenario, Albertsons-Kroger stores are eliminated from areas with multiple stores of the merged brand and low sales. There are 216 stores located close to another store within the same census tract, with each store averaging sales of $17 million per year. We keep the stores with higher percentile sales and drop the others if there are multiple entries. This leads to a premerger revenue of $19.31 million and a postmerger revenue of $31.51 million for Albertsons-Kroger, indicating a substantial increase of $12.2 million in revenue. However, this action results in the removal of 135 stores (113 Albertsons and 22 Kroger) and an expected job cut of 7,671 positions. Overall, revenue increases for both the merging brands and competitors, showcasing the potential benefits of consolidating stores in high-sales areas while addressing underperforming locations.

	Premerger rev	Postmerger rev	Δ Revenue	ΔEmployment	Δ # Stores
Albertsons-Kroger	19.31	31.51	12.2	-7,671	-135
All stores	17.05	20.81	3.76	-	-
All stores ∼AK	16.13	16.48	0.35	-	-

5.3.5 Scenario V

In this scenario involving Albertsons-Kroger stores with multiple locations and low sales by each town, we examine specific census tracts. In figure 5.3.4 Census tract C1 has one Albertsons, C2 has two Albertsons and one Kroger, and C3 has one Albertsons and one Kroger. We select the Albertsons and Kroger stores in C2 and C3 and remove the ones with the three lowest sales in C2 and the two stores with the lowest sales in C3. This targeted approach aims to streamline operations by retaining higher-performing stores while addressing underperforming locations within areas with multiple stores, potentially improving overall revenue and efficiency for the merged brand.

	Premerger rev	Postmerger rev	Δ Revenue	ΔEmployment	Δ # Stores
Albertsons-Kroger	20	31.6	11.6	-5,574	-107
All stores	17.04	21	3.96	-	-
All stores ∼AK	16.13	16.59	0.46	-	-

The Albertsons-Kroger stores are removed from locations where there are multiple stores of the merged brand, and the store with the lowest sales in that location is shut down. This strategic approach leads to a premerger revenue of $20 million and a postmerger revenue of $31.6 million for Albertsons-Kroger, indicating a notable increase of $11.6 million in revenue. However, this action results in the closure of 107 stores (82 Albertsons and 25 Kroger) and an expected job cut of 5,574 positions. Overall, revenue increases for both the merging brands and competitors, showcasing the potential benefits of consolidating stores in high-sales areas while addressing underperforming locations, albeit with a reduction in employment.

6 Conclusion

Our study looks into the evaluation of mergers within the food retail sector and their consequential impacts on grocery store closure and employment levels. The primary focus of our investigation is to unravel the potential repercussions of a merger, particularly concerning the consolidation of market power among the merging firms. The concern over increased market power often raises apprehensions about potential price escalations, which can negatively impact consumer welfare. However, we also acknowledge the strategic reorganization that merging firms and competitors might undertake, aiming to streamline operations, save costs, and avoid cannibalization within the market.

Our analytical approach, centered on a structural model of California's food retail sector, enabled us to scrutinize the implications of a hypothetical merger scenario between Albertsons and Kroger. Through our analysis, we were able to illuminate how such a merger could have influenced store locations and employment patterns had it been approved. The results gleaned from our investigation underscored the critical role played by grocery store locations and workforce size in shaping the dynamics of the food retail sector. Notably, our findings indicate a potential significant job cut resulting from the merger, indicating profound implications for the industry's landscape

and workforce dynamics.

Overall, our study contributes valuable insights into the multifaceted impacts of mergers in the food retail sector, emphasizing the intricate balance between market consolidation and cost-saving strategies. The implications drawn from our research underscore the importance of conducting thorough evaluations of mergers, particularly in terms of their non-price effects, such as changes in store placement and employment levels. Such evaluations are paramount for antitrust authorities to make informed decisions, ensuring competition remains robust, consumer interests are protected, and the food retail market thrives in a healthy and competitive environment.

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