

Distributional Effects of Exclusive Dealing in Retail Real Estate

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Abstract

We study the welfare implications of exclusive dealing in the US retail sector. Using a novel dataset, we document widespread use of exclusive dealing contracts that exclude local entry by rival stores. Public officials increasingly critique such practices as anti-competitive. At the same time, the extant literature on exclusive dealing has also shown that these contracts can stimulate entry into otherwise under-served markets. Descriptive analysis suggests that stores with exclusive dealing contracts face fewer competitors and higher prices. Yet, almost all major grocers in under-served neighborhoods have exclusive dealing contracts, suggesting they might encourage entry in low-demand settings. We use a structural approach to measure the counterfactual impact of a ban on exclusive dealing. We estimate a model of household-level store choices that accounts for price sensitivity, distance sensitivity, and potential complementarities across retailers. Upstream, we estimate a static entry game between retailers and landlords that accounts for downstream variable profits and information asymmetry between retailers and landlords. We find that exclusive dealing benefits most landlords, large retailers, as well as households living in sparse retail environments. We find that banning exclusive dealing would increase welfare for some households, but would cause an increase in the number of households living in food deserts.

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1 Introduction

Restrictive covenants are exclusive dealing contracts in commercial real estate which forbid certain firms from operating on designated premises. These private agreements, commonly embedded in commercial leases and deeds, are intended to protect the business interests of one or both parties. For example, a Safeway in Chicago forbids its landlord from leasing space to competing grocers, drug stores, liquor stores, and convenience stores. While such contracts are largely unstudied, there is a rising concern that exclusive dealing forecloses on competitor entry and contributes to the creation of food deserts. ([Leslie \(2021\)](#), [Kang \(2022\)](#), [Frerick \(2024\)](#)). In fact, several U.S. cities have attempted to limit exclusive dealing contracts.¹

The economic impact of exclusive dealing contracts on market outcomes and welfare are theoretically ambiguous (e.g. [Posner \(1976\)](#), [Bork \(1978\)](#), [Rasmusen et al. \(1991\)](#), [Segal and Whinston \(2000\)](#), [Aghion and Bolton \(1987\)](#)). While exclusive dealing can limit competition by restricting entry of new competitors, it can also stimulate entry of stores into under-served neighborhoods. Therefore, the net welfare effect is an empirical question about the relative magnitudes of these costs and benefits.

Furthermore, the extant literature on exclusive dealing has studied its use primarily to increase efficiency or guarantee product quality (e.g. [Klein and Murphy \(1988\)](#)). Based on discussions with industry professionals, however, exclusive dealing in retail real estate contracts is used to solve the landlord's imperfect information about the actual profitability of a location, which depends not only on the profitability of the tenant retailer but also on potential synergies with other co-locating retail formats. Specifically, the entry of a large retailer (eg a grocer) can facilitate the entry of smaller retailers (eg an optometry shop), even competitors ([Brueckner \(1993\)](#) and [Konishi and Sandfort \(2003\)](#)). The exclusive dealing contract ensures retailers that the landlord's property will not be leased to competitors and compensates the landlords for not renting to potentially profitable tenants.

To assess the implications of exclusive dealing in retail, we conduct a detailed empirical case study of the Chicago retail market. We collect a novel database tracking the complete census of all the “potential” retail locations, including already developed and planned locations. We also manually collected the complete set of retail real estate contracts, allowing us to determine where and when exclusive dealing has been implemented. We combine these two

¹Both [Chicago](#) and [Washington DC](#) have limited exclusive dealing.

new databases with Numerator data tracking households' retail store choices and shopping behavior.

We first show the widespread use of exclusive dealing contracts and their growth in use over time. We show that each of the large national grocery chains uses exclusive dealing contracts in at least one location. Furthermore, landlords with exclusive dealing contracts charge 20% higher prices, even after controlling for retail chain and surrounding demographics. Stores with exclusive dealing contracts tend to face fewer local competitors, even after controlling for chain. At face value these facts suggest that, as believed by public officials, exclusive dealing contracts are anti-competitive.

Next, we turn to effects in the downstream consumer market. Leveraging an event study design of grocery exit in a household's zip code, we show that consumers reduce grocery expenditures when a grocer with an exclusive dealing contract exits. Once the grocery store leaves, consumers substitute away from grocery stores and increase spending at dollar stores. In contrast, consumers expenditure remains unchanged (before and after the grocer's exit) when the grocer that exits does not have an exclusive contract. These results are driven by changes in the market structure. When there is no exclusive dealing contract, an exit is replaced by a new grocers nearby, when there is an exclusive dealing contract, an exit is replaced by a new grocer further away, which increases distances for local consumers. The event study results show that the exclusive dealing contracts may have implications for consumer welfare.

Our descriptive findings suggest that exclusive dealing contracts may indeed have harmful effects on consumers. However, the analysis does not consider the counterfactual impact of exclusive dealing contracts in under-served markets and the potential to mitigate food deserts, which suggests that exclusive dealing may help some consumers. To assess the complete equilibrium implications, we conduct a structural analysis of the Chicago retail market. On the demand side, we model household store choice allowing for price sensitivity, distance sensitivity, and potential complementarities across retailers. On the supply side, we model the game between landlords and retailers allowing for information asymmetry on retailers' profitability. In a first stage, landlords post real estate prices and an incremental premium for exclusivity based on incomplete information about the profitability of retailers in these locations. In the second stage, competing retailers simultaneously select locations and contracts based on incomplete information about one another's costs and entry incentives. Once the retail entry game is realized, retailers set prices and households choose stores.

In order to quantify the effects of exclusive dealing, we first need to estimate key parameters in our model – distance sensitivity, price sensitivity, and store complementarities in the downstream market and fixed costs, marginal costs, and the information asymmetry parameters in the upstream market. We recover parameters in the commercial real estate jointly using a simulated methods of moments estimator, using variation in retailers choices, choice set, and expected variable profits. Using microdata on household trips (including multi-homing trips), we estimate household preferences that vary with observable characteristics. We identify distance sensitivity using within-zip-code variation of distance to avoid self-selection of households into markets with a more favorable retailer presence. We identify price sensitivity using an instrumental variable approach and exploit the fact that retailers' marginal costs are likely correlated across markets, but demand shocks for such retailers are likely not. We restrict the definition of cross-retailer complementarities to multi-homing and identify complementarities across retailers from the fixed effects of this regression, instrumenting for cost shocks to the correlation in taste across retailers.

The estimated downstream demand parameters highlight substantial heterogeneity in complementarities across retailers. Our descriptive evidence suggests the exclusive dealing contracts are highly asymmetric across retailers, with some retailers blocking a wide variety of stores while other retailers in the same industry narrowly blocking close competitors. Without imposing this asymmetry in the model, the predicted demand effect from an entrant, based on the demand estimates, correlates well with which retailer types are blocked in the exclusive dealing contracts, providing external validity to the model and the observed patterns.

Armed with our estimated parameters, we move onto counterfactual simulations where we simulate a ban on exclusive dealing. We find that in the long run an exclusive dealing ban would lead to an increase in food deserts in Chicago. A back of the envelope calculation suggests that a total ban on exclusive dealing would increase the percentage of people living in food deserts by 10-15 percentage points over 20 years. However, the effects of exclusive dealing on consumers are heterogeneous and vary by consumer income and by neighborhood, with some consumers in the North areas of Chicago benefiting from lower prices and increased entry of collocating stores such as drug stores, liquor stores, and dollar stores.

The counterfactual results are also heterogeneous in the upstream commercial real estate market. Under the counterfactual ban, the largest retailers (big box stores) would suffer both the greatest profit losses and the largest decrease in probability of entry. The large retailers (the grocers) do not suffer large profit losses but do decrease the probability of

entry, while the smallest retailers (liquor stores and dollar stores) gain. Most landlords profits decline after a ban on exclusive dealing, indicating that they are able to extract additional surplus from an exclusive dealing contract.

Related literature This paper contributes to the literature on exclusive dealing, grocery demand, and commercial real estate.

This paper contributes to the extant literature on exclusive dealing ([Posner \(1976\)](#), [Bork \(1978\)](#)), [Marvel \(1982\)](#), [Rasmusen et al. \(1991\)](#), [Besanko and Perry \(1993\)](#), [Aghion and Bolton \(1987\)](#), [Bernheim and Whinston \(1998\)](#), [Klein and Murphy \(1988\)](#), [Segal and Whinston \(2000\)](#), [Fumagalli and Motta \(2006\)](#), [Simpson and Wickelgren \(2007\)](#), [Asker and Bar-Isaac \(2014\)](#)).² First, we address the conceptual role of exclusive contracts as a solution to landlords' imperfect information about the externalities from nearby competition.³ To my knowledge, this externality has not yet been studied in the context of exclusive dealing.

Second, our comprehensive database on retail contracts allows us to analyze the impact of exclusive dealing *empirically*. In contrast, past work has had to infer the nature of contracts indirectly. To overcome this problem, other papers have instead developed empirical tests to diagnose foreclosure ([Asker \(2016\)](#)), and estimated product market demand to determine both whether exclusive dealing is profitable and firms' willingness to pay ([Nurski and Verboven \(2016\)](#), [Sinkinson \(2020\)](#)). The contracts observed in this setting allow us to directly model the choice of contract and distinguish when the exclusive dealing is explicitly contracted on, which is important for policymakers who seek to use regulation of (explicit) contracts to change firm actions.⁴ In addition, the exclusive dealing contracts documented here are heterogeneous and broad – the contracts vary within retailer, across retailers, and

²In the theoretical literature, the welfare effects of exclusive dealing are ambiguous and are tied to the theories of exclusive dealing (or why the exclusive dealing exists). Early work – called the “Chicago school” – showed that absent externalities, exclusive dealing could not be anti-competitive because upstream firm has to pay the downstream firm to accept exclusivity ([Posner \(1976\)](#) and [Bork \(1978\)](#)). Then, later work found many cases where externalities lead exclusive dealing contracts to be anticompetitive. To summarize the theoretical findings, exclusive dealing is considered pro-competitive when (a) it increases efficiency, for example by reducing double marginalization, (b) ensuring monopoly profits encourages investment and thus a higher-quality product and (c) ensuring monopoly profits allows for retailer entry in the first place. Exclusive dealing is considered anti-competitive when it partially or totally forecloses on another firm's entry, due to an externality.

³This externality emerges because retailers drive foot traffic to nearby firms, and do not wish to suffer losses from the retailers they attracted to the location. The imperfect information emerges because landlords cannot exactly predict the retailers' profitability. In the case of perfect information, the landlord can choose the set of retailers that will maximize total surplus to each location, as in the spirit of [Bernheim and Whinston \(1998\)](#), [Nurski and Verboven \(2016\)](#).

⁴Furthermore, this distinction also allows us to assess how exclusive dealing changes the equilibrium by estimating counterfactual where exclusive dealing contracts are banned.

across space. Prior empirical work has focused on exclusive dealing contracts in narrow markets such as beer, hamburgers, and cable television (see [Lafontaine and Slade \(2007\)](#) for a survey of the empirical literature, as well as [Chipty \(2001\)](#), [Sass \(2005\)](#), [Lee \(2013\)](#), [Ater \(2015\)](#), [Nurski and Verboven \(2016\)](#), [Asker \(2016\)](#), [Le \(2024\)](#)).⁵ In contrast, in my setting, exclusive dealing contracts affect the location of every single retailer in Chicago, affecting a wide subset of services.

Another contribution is to the retailing literature. This paper brings novel evidence of which stores retailers' view as competition (a “revealed preference/profitability” approach to profitability). This work builds on a long literature in retail on grocery demand ([Bell et al. \(1998\)](#), [Smith \(2004\)](#), [Mehta \(2007\)](#), [Song and Chintagunta \(2007\)](#), [Hartmann and Nair \(2009\)](#), [Smith and Øyvind Thomassen \(2012\)](#), [Mehta and Ma \(2012a\)](#), [Ellickson et al. \(2012\)](#), [Thomassen et al. \(2017\)](#), [Handbury \(2021\)](#), [Leung and Li \(2021\)](#), [Mehta and Ma \(2012b\)](#)), as well as interest in food access and food deserts ([Bitler and Haider \(2011\)](#), [Allcott et al. \(2019\)](#)). Relative to the existing literature, this paper endogenizes the retailer location choice by incorporating data on real estate prices, exclusive dealing contracts, and potential locations in the estimation. Additionally, this paper uses data on store locations to estimate household preferences for specific retailer as well as households distaste for travel. [Cao et al. \(2024\)](#) also estimate preferences for specific retailers, and measures preference heterogeneity, while this paper focuses on multi-homing and complementarities across stores.

Additionally, this paper also contributes to and expands the policy discussion on non-competes. In the United States, the Federal Trade Commission issued a rule banning non-competes in labor ([Federal Trade Commission \(2023\)](#)), following a nascent but growing literature on non-competes in labor economics ([Balasubramanian et al. \(2020\)](#), [Krueger and Ashenfelter \(2022\)](#), [Lipsitz and Starr \(2022\)](#), [Shi \(2023\)](#), [Johnson et al. \(2023\)](#), [Young \(2024\)](#)). Exclusive dealing in commercial real estate is a type of non-compete in a different factor input – land – and may be subject to similar scrutiny from policymakers. This paper determines the welfare effects of exclusive dealing in land, and provides a model that can be used to estimate when exclusive dealing is procompetitive or anticompetitive in other settings.

Finally, this paper is the first to study this type of exclusive dealing in economics. Legal scholarship on these exclusive dealing contracts focuses on the existence and details of

⁵ Additionally, most empirical work focuses on exclusive dealing in the upstream market, while this paper (along with [Lee \(2013\)](#) and [Ater \(2015\)](#))) study exclusive dealing in the downstream market. The closest paper is [Ater \(2015\)](#), which studies exclusive dealing in Israeli shopping malls, where landlords commit to renting to a single hamburger shop, and finds evidence consistent with foreclosure of rival competition.

the contracts ([Sturtevant \(1959\)](#), [Lundberg \(1973\)](#)), whether they encumber development ([Stubblefield \(2019\)](#)), and whether they are anti-competitive and cause food deserts in the grocery industry ([Ziff and Jiang \(2012\)](#), [Leslie \(2021\)](#), [Kang \(2022\)](#)). This paper provides an empirical answer to the question using a combination of novel data gathering, descriptive evidence, and structural estimation.

2 Exclusive Dealing In Retail Real Estate

The exclusive deals studied in this paper are called restrictive covenants. These restrictive covenants contractually forbid specific retailers from operating at specific locations. Restrictive covenants are put in place to protect the business interests of one or both parties. For example, Figure 1 shows an excerpt from a Safeway restrictive covenant, which blocks the entry of retailers that sell similar or identical products to Safeway – retailers that sell food, drugs, and liquor – in a particular shopping center. As a result, these restrictions are important considerations for retailers choosing locations both because these contracts are an opportunity to limit the retailers’ own competition, and because the set of locations they can consider may be limited by other retailers’ restrictive covenants.

Figure 1: Restrictive Covenant in a Safeway Lease Memorandum

The Lease provides, in part, that no premises (nor any part thereof) in the Shopping Center other than the Premises, shall be (i) used or occupied as a retail supermarket, drug store and combination thereof, nor (ii) used for the sale of any of the following: (a) fish or meat (except in prepared form sold by a permitted restaurant operation); (b) liquor and other alcoholic beverages in package form, including, but not limited to, beer, wine and ale; (c) produce; (d) baked goods; (e) floral items; (f)any combination of food items sufficient to be commonly known as a convenience food store or department; and (g) items requiring dispensation by or through a pharmacy or requiring dispensation by or through a registered pharmacist.

Source: Cook County Record of Deeds, Document Number 0010276527.

This figure is an example of a restrictive covenant. Here, Jewel Osco (whose parent company is Safeway) in Chicago at the intersection of Ashland and Roosevelt in 2001 limits the competitors in the shopping center.

At this location, this portion of the lease memorandums shows Safeway is blocking grocers, drug stores, and liquor stores.

The content of the restrictive covenants vary greatly across contracts in terms of the retailers blocked, timing, and radius. The language of the exclusive dealing contracts vary from naming the retailers blocked from entering (as shown in Figure 10), to naming a narrow set of industries (as shown in Figure 11), to naming a broad set of industries (as shown in

Figure 9). In each case, the contents of the exclusive dealing contract reflect – at least in part – the retailer’s perceived competition. For example, Figure 9 shows an excerpt where Safeway prohibits grocers, drug stores, liquor stores, restaurants, gas stations, offices, educational facilities, thrift stores, and funeral homes: these blocked retailers are Safeway’s direct competitors in the product market, retailers that compete for parking, and retailers that would bring a different aesthetic to the shopping center. The duration of the restriction varies greatly, from only valid while the retailer operates at the premises (as shown in Figure 10), to while the lease is in effect (as shown in Figure 9), to many years after the retailer has left the premises (as shown in Figure 11). The radius varies as well, from the exact premises of the store (as shown in Figure 11), to the shopping center (as shown in Figure 9), to specifying a radius (as shown in Figure 10, which specifies a 1 mile radius wherever the landlord or an affiliate owns property).

There is little policy on exclusive dealing in commercial real estate, and challenges are largely litigated in court. In court, the exclusive deals are held up in some instances and struck down in others. For example, the restrictive covenant usually holds when the provision is negotiated as a legitimate business interest and are struck down then they are deemed not in the public interest⁶. However, there is a growing concern that restrictive covenants cause food deserts by displacing and foreclosing upon rivals ([Leslie \(2021\)](#), [Kang \(2022\)](#), [Frerick \(2024\)](#)). In line with this thinking, several cities have attempted to limit exclusive dealing contracts⁷. Given that food access is a priority for policymakers, it is important to understand how retailers sort into locations.⁸

⁶E.g. of a restrictive covenant holding up: in *Child World, Inc. v. South Towne Centre* (1986) Child World, Inc wanted to vacate the property early but had signed a restrictive covenant limiting competitors, and the “restrictive provision was negotiated as an inducement to enter the lease and in return tenant agreed to 20 years of continuous operation.” As a result, the restrictive covenant held up in the court, and as a result Child World could not vacate the premises. E.g. of a restrictive covenant being struck down: a court struck down a restrictive covenant that forbid the operation of a grocery store on a vacant property (similar to the termination restriction in Figure 11), arguing that the covenant was not in the public interest and contributed to food deserts by limiting the availability of grocery stores (*Davidson Bros., Inc. v. D. Katz & Sons, Inc.* (1994)).

⁷In 2005, [Chicago](#) attempted to ban restrictive covenants after a Dominick’s Finer Foods put a restrictive covenant forbidding future grocery entry on a property in what became a food desert. At first, [the Chicago City Council proposed an ordinance](#) to ban restrictive covenants completely. However, the proposal was met by opposition from the Chicagoland Chamber of Commerce and the Illinois Retail Merchants Association. After some negotiation, a measure was passed that bans restrictive covenants put in place on larger (greater than 7500 square feet) when a retailer leaves the community.

⁸See here for an example of how [local, state, and federal governments spend](#) resources on improving food access.

3 Data

This paper uses data from exclusive dealing contracts themselves, commercial real estate transactions, and consumer shopping transactions. In later sections, these data allow quantification of the effect of exclusives on the commercial real estate market and consumer welfare. Details on the data construction are found in the data construction appendix.

The empirical analysis focuses on data from Chicago, one of the largest and most diverse cities in the United States. Due to its mix of wealthy and poor neighborhoods, dense and sparse neighborhoods, and variety of retail environments – from standalone stores to shopping malls, Chicago is a good setting to study the average and distributional effects of exclusive dealing.

Exclusive dealing: To document the context of these exclusive dealing contracts, we scrape publicly available county recorder pdfs, digitizes them, and extracts the parties (e.g. landlord and tenant), address, date, and details about the restrictive covenant from the document: which retailers are blocked from entering. The data come from Cook County, Illinois, and span 1980-present. The resulting dataset documents every single exclusive dealing contract in commercial real estate reported, as well as the location where the contract is in effect. The exclusive dealing contracts are between private parties. These parties are not required to report exclusive dealing contracts, but do so to prevent the contract from being broken. To the best of my knowledge, this is the first dataset that documents all the exclusive dealing contracts reported to a County Recorder Office in commercial real estate.

Potential Locations: We construct a retailer’s potential set of locations from a dataset acquired from Build Central (formerly named Planned Grocery), a startup which collects and sells planned retail locations to retailers so that the retailers know where they and their competitors may enter; with this data, we construct the retailers’ location choice set. Importantly, we observe the date the potential location becomes available, the date a retailer commits to entering the location, and the date the retailer enters the location, as well as locations which are never chosen. That is, the data includes projects from the proposal to completion, and includes failed projects as well. This data allows the set of all potential builds where the retailers might locate. The time span is 2015-2024. We supplement these data with data from [Historical Supplemental Nutrition Assistance Program \(SNAP\) Retailer Locator Data](#) and Infogroup to create a full set of potential locations.

Retailer locations, entry and exit: Store locations, entry, and exit dates are compiled

from the [Historical Supplemental Nutrition Assistance Program \(SNAP\) Retailer Locator Data](#) and from Infogroup’s Historical Database. The SNAP Retailer Location Data data spans 1990-2023 and records the date, location, and store name when each store enters and exits the SNAP database. The Infogroup historical data provides a historical, yearly directory information for U.S. companies, with address, store name, and NAICS/SIC codes.

Lease Characteristics: Lease characteristics are obtained from Compstak. We observe variables such as rent, square footage, tenant industry, location, and duration of the lease. CompStak gathers its data from a network of brokers who report lease characteristics for the properties they rent to in exchange for characteristics of the leases for nearby properties, so that they can get a sense for market prices and lease characteristics. As a result, the data is selected based on the group of brokers: to ensure that the data is representative, we compare moments in the data to industry reports on rents and lease characteristics. We compare moments in the data with [15](#) and find that the data is representative. In figure [Figure 20](#) and [Table 15](#), we plot a histogram of (CPI-deflated) net effective rents over our time period and provide summary statistics about the rental data.

Panel on consumer purchases: To estimate the demand parameters, we use household-level data on trips, with detailed information of stores shopped at and household purchases. We use data from Numerator, an omni-channel consumer panel data available through the Kilts Center at the University of Chicago. The panel spans 2017-2024 and covers a broad range of consumer purchases as a broad range of stores, including grocery, discount, dollar, convenience, and other stores. Importantly, on the retailer side, Numerator provides both store identity and store location (longitude and latitude), retailer, and store identifier. On the consumer side, Numerator provides the household zip code as well as household demographics. Information on the consumer panel includes purchase amount, product quantity, product descriptions, brand description, day and time of purchase.

We observe households shopping at all store types, and the most frequent trips are to grocery stores. Since day and time of purchase is available, these data is used to compute when households multi-home, when households take trips to multiple stores. Multi-homing has been highlighted as important in the literature and is important in this setting as well ([Oh and Seo \(2023\)](#), [Miyauchi et al. \(2022\)](#), [Rhodes and Zhou \(2019\)](#), [Relihan \(2022\)](#)). We define a trip as all the stores a household shops at in the same day, and assume that the households take the most efficient route on a trip. We find that household multi-home often, particularly with grocery purchases or when there is a grocery nearby. Concretely, we find that 40% of trips to the grocery stores are multi-homing trips, and that percentage increases when there

is a chain grocer or the chain grocer is co-located with another retailer. We focus on trips with at most two stops, because shopping at more than two stores is rare, comprising less than .05% of the data.

To compute prices, bar-code price data is aggregated to the level of retailer or retailer bundle. We construct a relative price of the retailer in the market, and the comparison across retailers is based on products common to all retailers in the market, following [Atkin et al. \(2018\)](#).⁹ Specifically, prices are the retailer fixed effects in a regression of expenditure-weighted log bar code prices on retailer fixed effects and bar code fixed effects. Prices of two stores is the sum of the prices, weighted by the expenditures for each retailer.¹⁰ In line with current findings, we assume stores price at the retailer level, but allow the retailer price index to vary by income group ([DellaVigna and Gentzkow \(2019\)](#), [Hitsch et al. \(2021\)](#), [Handbury \(2021\)](#), [Thomassen et al. \(2017\)](#), [Atkin et al. \(2018\)](#)).

To impute home locations, households are placed at the center of their most likely census block group. The most likely census block group is computed with Bayes rule using household and ACS data on household size, education, ethnicity, unemployment status, income, as well the population density of each census block group within each zip code and the overlap in area between zip codes and census block groups. Then, distance is computed in log miles. In the data, households shop close to home. Distances for each retailer and households are computed as the closest distance from home, which gives a measure of store accessibility to home, and are computed as the crow flies.

Downstream Product market We define a market as a city-week-year, and estimate the parameters with data from 2017-2019 Chicago (Cook County). The model is estimated with retailer data (store latitude, longitude, address, retailer name), household purchase data (the bar codes scanned, and the price paid for each bar code, the stores traveled to and the

⁹Results are robust to different aggregation methods, and relative prices are similar when following alternative aggregation methods, such as following [Thomassen et al. \(2017\)](#) or when considering only key purchase categories.

¹⁰Specifically, we construct prices within each retailer as

$$\log p_{jst} = \sum_{b \in j} \phi_{bj} s \log \tilde{p}_{bjst}$$

where p_{jst} is the price of product j at retailer s in market t , which is comprised of bar codes b , ϕ_b is the household's expenditure on bar code b divided by the household's total expenditures on product j within a year, and \tilde{p}_b is the price paid for bar code b . To recover $\log p_{jst}$ in a way that allows different store products to have different qualities, we regress expenditure weighted log bar code prices on store fixed effects and bar code fixed effects, and use the store fixed effects as the retailer price. We run a regression for each market, so each price is the relative price in the market, and is measured in log dollars.

time of day), and household demographic information (income, employment, marital status, number of children, ethnicity, education, zip5).

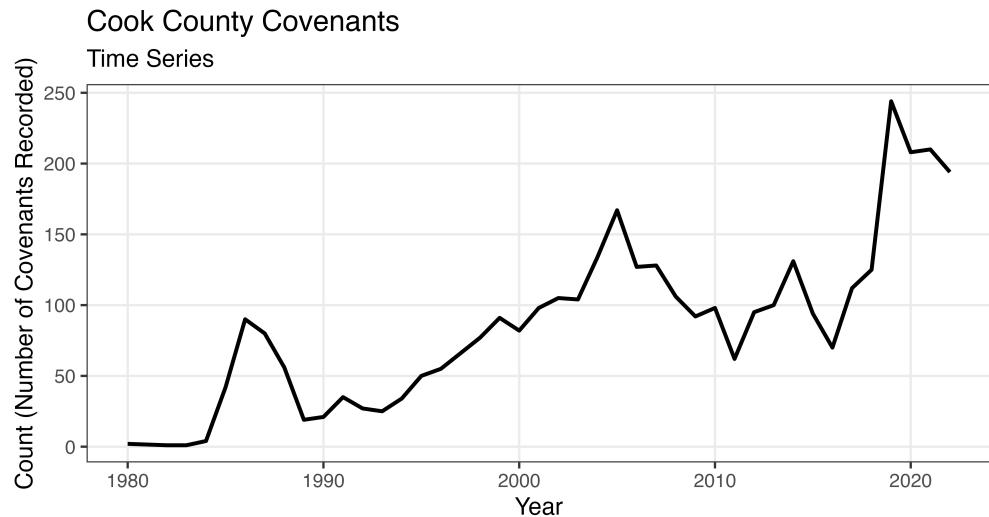
Upstream Commercial Real Estate Market Markets are defined yearly in Chicago, are defined by large and non-overlapping geographical areas, and Figure 23 shows the potential locations color-coded by market across Chicago.

In this section, we document several empirical facts about exclusive dealing. First, the practice is extensive and has been growing over time. Second, exclusive dealing is not concentrated in certain “types” of neighborhoods as the incidence of exclusive dealing is not associated with the socio-economic status of households living in the neighborhood around a given retail location. Third, retailers pay a 20% price premium for exclusive dealing. Fourth, stores with an exclusive dealing provision in their lease contract have fewer nearby competitors.

3.1 Exclusive Dealing is Common and Increasing

Figure 2 shows that the number of exclusive dealing contracts has grown steadily since the 1990s, peaking in 2005 and 2019.

Figure 2: Time Series of Exclusive Dealing Contracts in Cook County IL



Source: Cook County Recorder Office. Figure plots a time series of exclusive dealing contracts recorded at the Cook County Recorder office, 1980-present.

Table 1 shows the prevalence of exclusive dealing contracts in the grocery sector in Chicago. Of the 371 contracts that forbid retailers from selling groceries, 154 are found on grocery store locations, and the rest are found in similar industries such as discount stores and drug stores. Table 11 lists the grocery chain retailers that operate in Chicago with at least one exclusive dealing contract. Importantly, all of grocers with the highest market share use exclusive dealing contracts in their leases, and 30% of chain grocers have exclusive dealing contracts on premises. We conclude that exclusive dealing contracts are common, particularly in the leases of large national grocery chains.

Table 1: Prevalence of Exclusive Dealing in Grocery Industry

| | <i>Total</i> | <i>Total on a Grocer Location</i> | <i>Fraction on a Grocer Location</i> |
|---|--------------|---------------------------------------|--|
| Exclusive Dealing Contracts Blocking Grocers | 371 | 154 | 0.42 |
| | <i>Total</i> | <i>Total with Contracts</i> | <i>Fraction with Contracts</i> |
| Grocery Chains | 33 | 12 | 0.36 |
| Grocery Chain Stores | 491 | 113 | 0.23 |

Source: Cook County Recorder Office and SNAP database. Table reports prevalence of exclusive dealing contracts among grocery chains.

Within grocery, the content of the contracts vary significantly. Figures 15 and 16 show the asymmetry in exclusive dealing across retail locations within the same retailer, across retail locations, and across industries. All stores block their direct competitors: grocery stores block other grocers, drug stores block other drug stores, and dollar stores block other dollar store. However, across industries, there is more variation. For example, Whole Foods blocks liquor stores far more frequently than Safeway or Aldi and Safeway blocks dollar stores more frequently than Whole Foods or Aldi. We interpret this as indication that sensitivity competition is highly specific to each retailer and retailer location.

Beyond grocery, Figure 14 and Figure 13 show the retailers with the most number of contracts, and the fraction of the retailers' locations with exclusive dealing contracts. These figures show the breadth of retailers that employ these contracts, and that the most common

store types are grocery stores, drug stores, discount stores, and dollar stores. Missing are industries that sell highly differentiated products, for example flagship stores and specialty stores. The industries that have exclusive dealing contracts are industries with relatively low product differentiation, that sell similar products as their direct competitors.

Figure 14 also shows that the prevalence of exclusive dealing locations is heterogeneous across retailers. For example, while some retailers have exclusive dealing contracts on almost all locations, others have such contracts on only half of their properties (Target, Safeway, and Dollar General have exclusive dealing contracts on 90% of their properties, while Aldi, CVS, and Walgreens have exclusive dealing contracts on half their properties).

3.2 Neighborhood Demographics

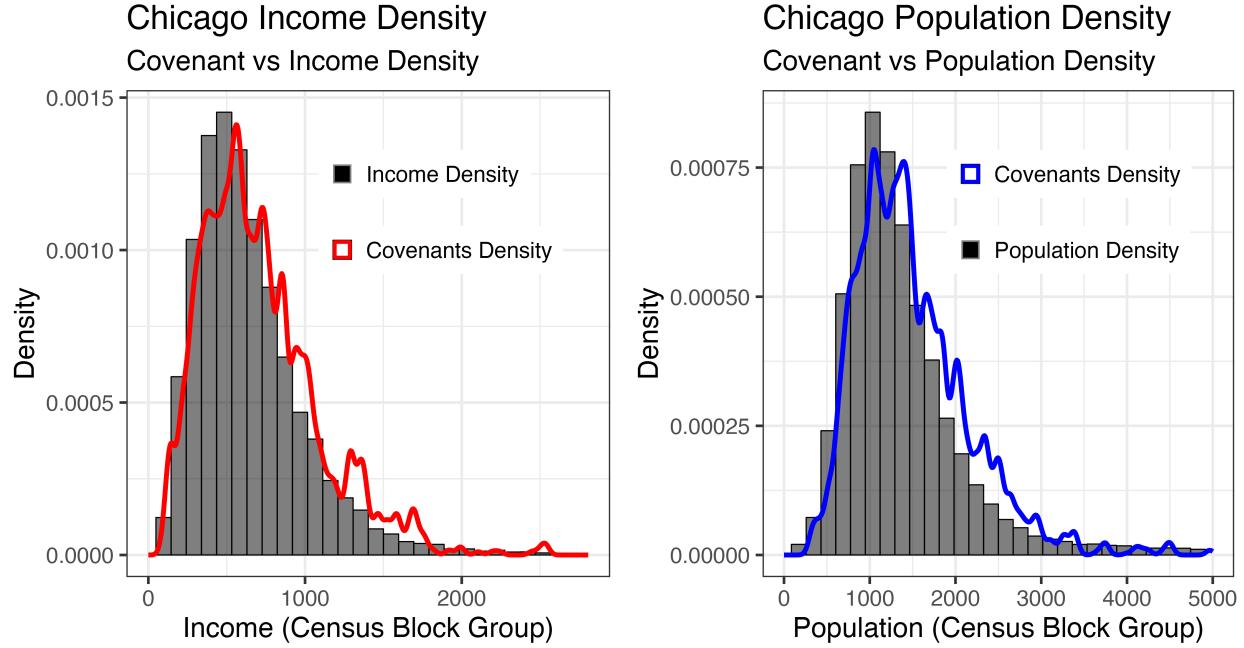
Figure 3 shows that exclusive dealing contracts exist in poor and wealthy neighborhoods, as well as low-density and high-density population neighborhoods. The figure shows that exclusive dealing contracts are slightly more prevalent in high income census block groups, and are slightly more prevalent in population dense census block groups, but exist in both high and low income and sparse and dense retail environments.

In fact, exclusive dealing contracts are not observably selected into particular neighborhoods based on demographic features. Table 16 shows a regression of exclusive dealing status on neighborhood demographics or socioeconomic status, and finds that exclusive dealing status is uncorrelated with neighborhood demographic characteristics. Specifically, Table 18 shows a regression of

$$\text{excl. deal}_{it} = \beta \mathbf{X}_{it} + \sigma_i + \lambda_t + \epsilon_{it}$$

where excl. deal is a binary indicator that is one if a contract i signed in year t has an exclusive dealing contract, and zero otherwise, and is regressed on demographic factors in the census block group (median income, population density, travel time to work, ownership of homes, vacancy status, unemployment, share of the population by gender, share of the population by race), census block group fixed effects, and year fixed effects.

Figure 3: Exclusive Dealing Contracts, Income and Population Density



Source: Cook County Recorder, ACS 2009- and Census Demographic Data 1980, 1990, 2000. Figure plots histograms of income density (left) and population density (right) in Cook County, Illinois, and overlays the density of exclusive dealing contracts.

3.3 Rental Prices

Prices are higher in leases with exclusive dealing contracts. Looking within retailer and year, we find that rental prices are 20% higher when exclusive dealing is part of the contract. This is shown by regressing rents on the presence of exclusive dealing, controlling for demographics (such as income), lease characteristics (such as store size), and property characteristics (such as building quality). Additionally, the specification includes location, time, and retailer fixed effects.

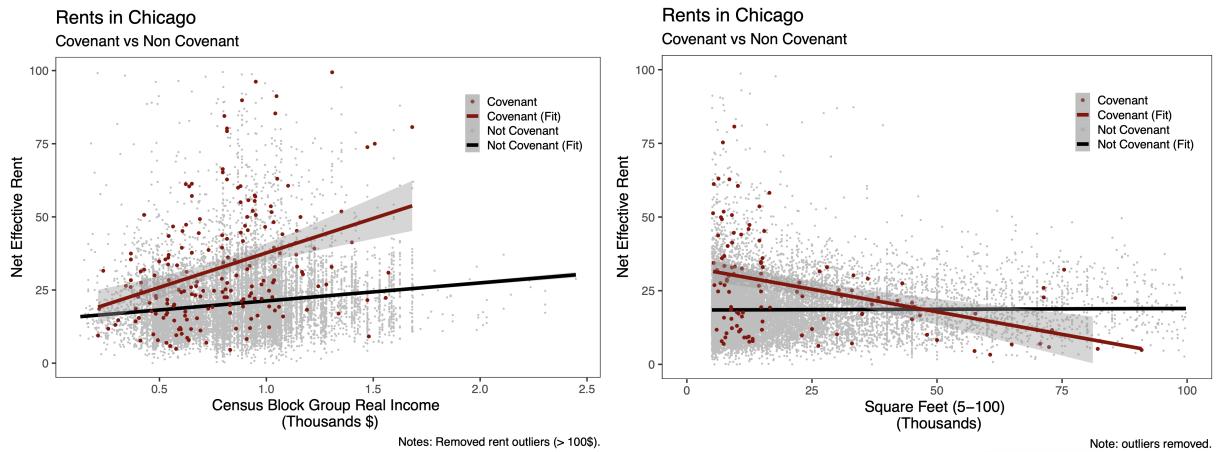
$$\log y_{ijt} = \alpha_0 + \gamma \text{exclusive deal}_{ijt} + \sum_k \beta_k \log x_{kjt} + zip_j + year_t + retailer_i + \epsilon_{ijt}$$

Table 17 shows that prices per square foot per year are 30% higher in properties with exclusive dealing, conditional on covariates. Robustness checks which vary the covariates

included report estimates between 20% and 40%. The regressions indicates that the average lease prices would be 4\$ higher per square foot per year for an exclusive dealing; for a typical grocery store, this translates to an additional 120,0000\$ per year for a lease with such a contract, or approximately .24% of average annual revenue.¹¹

Figure 4 shows how the exclusive dealing premium varies along two important dimensions: neighborhood income and store size. The literature shows that the the higher the neighborhood income, the higher downstream retail prices (for example, [Stroebel and Vavra \(2019\)](#)); this plot shows higher prices are the case in the upstream market as well. Rents with exclusive dealing contracts are higher in all neighborhoods but particularly more expensive in high-income neighborhoods. These findings are consistent both with higher demand from retailers and co-locating stores, as the landlord has to be compensated more to forgo potential profits from possible other retailers.

Figure 4: Rental Prices as a Function of Neighborhood Income, Store Size, and Exclusive Dealing



Source: Cook County Recorder, ACS 2009-2023 and Census Demographic Data 1980, 1990, 2000, and CompStak lease characteristics data. Figure net effective rents in Cook County as a function of exclusive dealing status (covenant), census block group income, and size of the space. Net effective rent is the rent per square foot per year, averaged over the course of the lease.

¹¹Typical grocery stores in Chicago average 30,000 square feet and make around 50 million dollars in revenue each year.

Rents with exclusive dealing contracts are inversely related to store size. When the store is very large, retailers with exclusive dealing contracts pay less (red line) than stores without exclusive dealing (black line). Two facts explain the low rent per square foot on the high end. First, since there are relatively few retailers that can fill such a large store size, there is less demand for such large space. Second, the large retailers that do exist likely drive demand for any nearby smaller stores. As a result, the landlords likely internalize the spillovers, offer cheaper rent to large stores as an inducement to enter their locations, and charge higher rents to the co-locating stores. Rents with and without exclusive dealing are the same around 45,000 square feet, – approximately the size of a supermarket. However, most retail store fronts are smaller than 45,000 square feet, and so most stores pay a premium for an exclusive dealing. When the store is smaller, retailers pay the highest premium for exclusive dealing (red line) relative to a similar-sized store without exclusive dealing (black line). At this end, high demand from retailers and co-locating stores are consistent with higher prices for exclusive dealing contracts, as the landlord has to be compensated more to forgo potential profits from possible other retailers.

These regressions demonstrate that exclusive dealing should be considered on par with the more traditional factors (like neighborhood demographics, state of the economy, interest rates, lease length) which are thought to determine prices in the commercial real estate market ([Stanton and Wallace \(2009\)](#), [Gyourko \(2009\)](#), [Liu et al. \(2018\)](#), [Gupta et al. \(2022\)](#), [Moszkowski and Stackman \(2022\)](#), [Stackman and Moszkowski \(2023\)](#)).

3.4 Density of Nearby Competitors

Retailers with exclusive dealing contracts have fewer competitors surround them (0-.2 mi), but more competitors farther away. This is consistent with the firms' presumed goal of limiting competition, and consistent with the idea that exclusive dealing only slightly displaces competitors. Figure 5 shows a regression coefficients of the number of stores in the vicinity on whether or not there is a contract on that store.

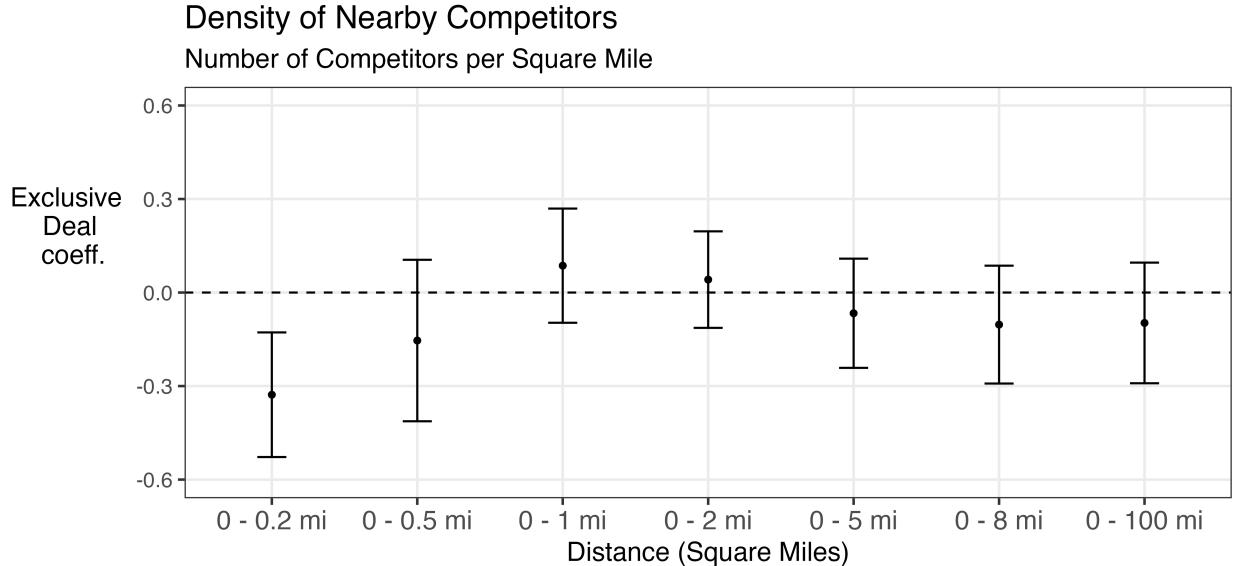
$$num\ stores_{r(i)t} = \beta_{\text{exclusive deal}_i} + \sigma_i + \lambda_t + retailer_i + \epsilon_{it}$$

where $\text{num stores}_{r(i)t}$ are the number of dollar, grocery, drug, and big box stores surrounding

a grocery or big box store (excluding the store itself) in a radius $r(i)$ in a year t , exclusive deal $_i$ indicates the presence of an exclusive dealing contract benefiting the property i , and σ_i , λ_t , and $retailer_i$ include zip, time, and retailer fixed effects.

The results in Figure 5 show that in the closest vicinity to the property – 0 to .2 mi –, grocery stores with exclusive dealing contracts are surrounded by fewer competitors. This 0-.2 mile radius is important both because it is the radius of a typical shopping mall and also because it is the radius at which the trip chaining literature has documented spillovers across stores (Qian et al. (2023), Knight (2023)). At a larger radius, expanding to 0-1 mile, the effect goes away: there are similar number of competitors. As a result, between .2 and 1 mile, the result reverses and there are more competitors surrounding stores with exclusive dealing contracts. These results are consistent with the hypothesis that the covenant restrict competitions by pushing competitors farther away. At a large radius, there is no difference between stores with and stores without exclusive dealing contracts. Tables 18 - 23 in the appendix show the full specification results.

Figure 5: Log Density of Nearby Competitors



Notes: Figure reports coefficients and 95% confidence interval from regression of number of competitors per square mile on whether or not the store has an exclusive deal, with year, zip5, and retailer fixed effects. We only use grocery chains and big box stores. Competitors are defined as grocery, big box, and drug stores. Data is based on the exclusive deal data from the Cook County recorder office and the retailer location, entry, and exit comes from the SNAP data.

3.5 Event Study with Consumer Expenditures

Since exclusive dealing is correlated with different retailer prices and locations in the upstream market, it is plausible the downstream consumer is affected as well. We thus want to understand how consumer outcomes vary with the exclusive dealing status of neighbouring retail locations. However, exclusive dealing status only changes with retailer entry and exit.¹² Furthermore, consumers are directly affected by changes in retailer composition, not by changes in contracts. We therefore focus on understanding the effect of retail composition on household outcomes. We treat exclusive dealing status as a dimension of retailer heterogeneity.

We therefore leverage an event study design of grocery exit in a household's zip code. We run the following regression

$$Y_{it} = \sum_{k=-T_1}^{-2} \delta_k \times D_{ik} + \sum_{k=0}^{T_2} \delta_k \times D_{ik} + household_i + year_t + \epsilon_{it}$$

where Y_{it} is a household i 's outcome in quarter t , D_{ik} is the quarters before or after the grocery event in the zip code of household i . We use within-household variation by conditioning on $household_i$. Standard errors are clustered by zip code.

The panel is balanced by restricting to household that appear two quarters before and after the event, and to households that eventually experience a grocery exit; as a result, the control group is the not-yet-treated group and the event study is estimated using heterogeneity-robust estimators developed by [Callaway and Sant'Anna \(2021\)](#).

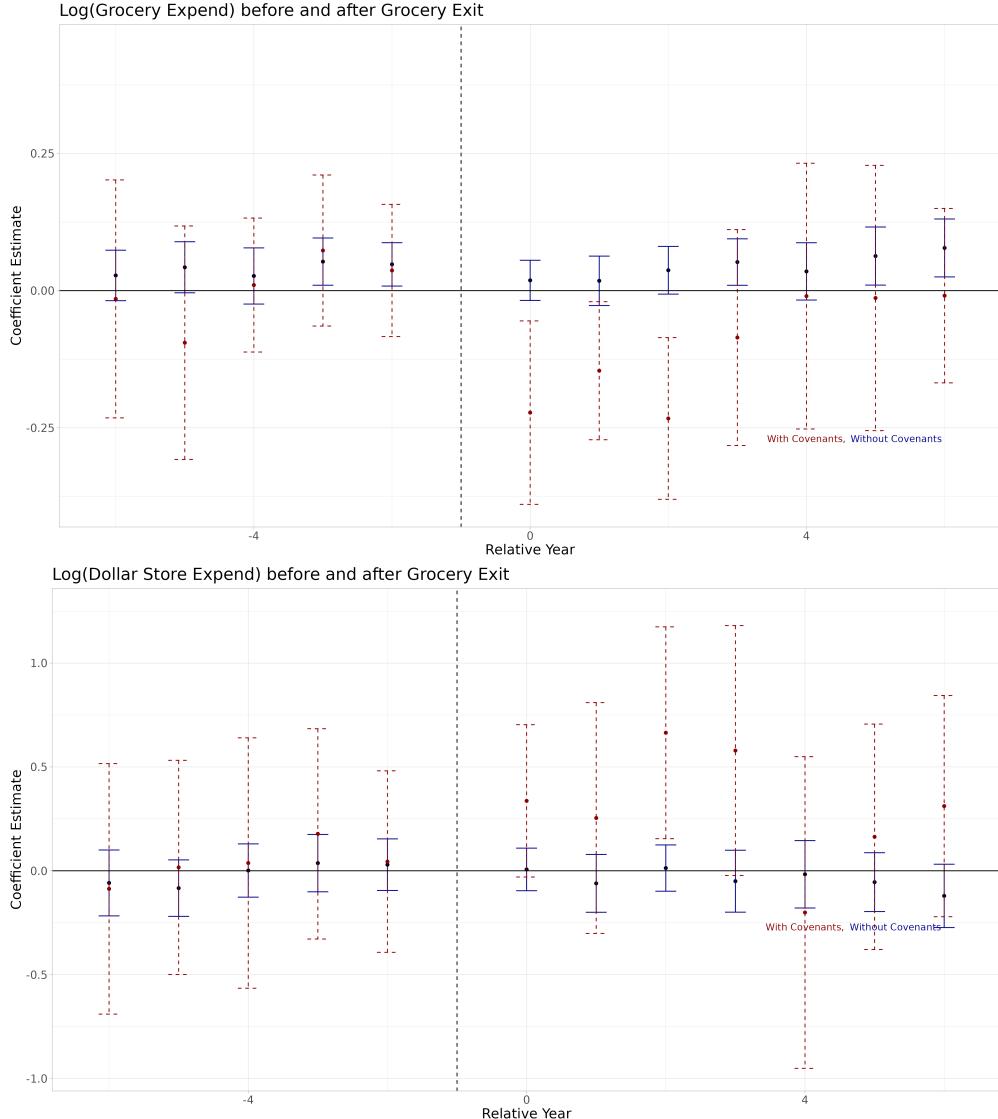
The results are shown in Figure 6, which shows consumer outcomes for household grocery expenditure and household dollar store expenditure. We present separate event studies by exclusive dealing status of the exiting grocer.

The event study shows that once the grocery store leaves, consumers substitute away from grocery stores and increase spending at dollar stores. This is consistent with the consumer partially substituting to similar options when distances to grocery stores increase. This is also consistent with consumer welfare declining due to fewer options. The consumer spending

¹²There are some cases where an exclusive dealing contract is added or changed during the lease, but it is more rare.

patterns are persistent for a few years, and after a few years, the consumer expenditure recovers almost to pre-exit levels. In contrast, consumers expenditure remain unchanged (before and after the grocer's exit) when the grocery store that exits does not have an exclusive dealing agreement with the landlord.

Figure 6: Consumer Expenditure Following Grocery Exit.



Notes: Consumer response (in terms of grocery expenditure) to grocery exit, for those with covenants and those without covenants.

Exploring the underlying market structure, we show the effect of a grocery exit on total grocery count within 0-1mi, 1-3mi, and 3-5mi in Figure 21. Grocers without exclusive

dealing contracts are replaced by another grocer within a mile, and have no correlation with grocery entry and exit farther away. Grocers with exclusive dealing are replaced by grocers 1-3 miles away, and a the mile within the old grocer stays vacant for at least six years after the exit. The difference in consumer expenditure outcomes between exits with contracts and exit without contracts is likely driven by the replacement grocer (with no contracts) and the lack of replacement (with contracts).

The event study results show not only that there is likely pass through from the commercial real estate market to the product market, but that the exclusive dealing contracts may have implications for consumer welfare.

The assumptions required for the event study are no anticipation and common trends. The identifying assumption is that grocery stores in different zip codes that have a grocery exit in different times but will eventually lose a grocery store would have followed the same pattern regardless. Furthermore, if households anticipated the grocery store exit, anticipation would likely induce a change in consumer outcomes before entry, but pre-trends in this event study are flat.

Another common concern with the event study strategy is that the changes in household expenditures are driven by a different change in the local retail environment (related to the grocery exit). If this were the case, household consumption would likely change before the grocery exit, and we would likely observe pre-trends. However, the flat pre-trend before exits and a significant break at exit indicates that this is not the case.

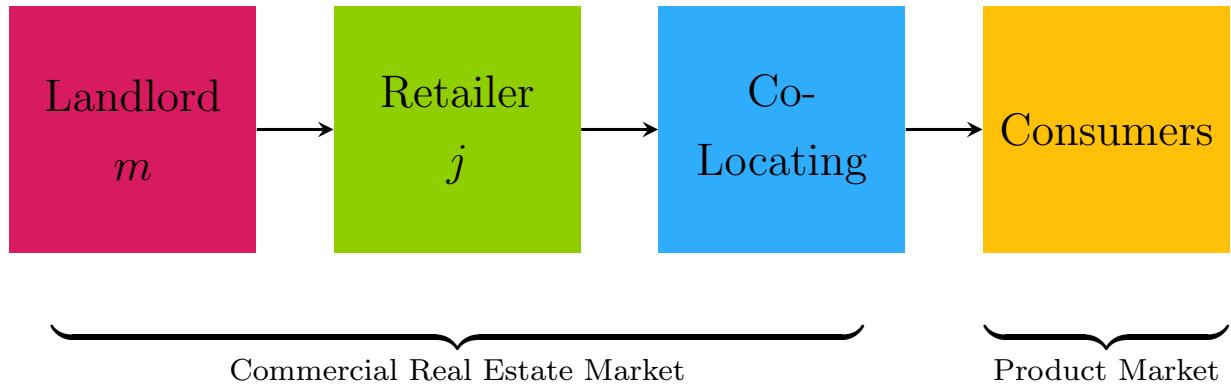
4 Model

The stylized facts show evidence that exclusive dealing contracts bind and have significant impacts on retailers, landlords and consumers. To evaluate the effect of exclusive dealing for all of Chicago, we conduct a counterfactual analysis where exclusive dealing is banned. Because the counterfactual affects all locations and all retailers, this comparison is ill-suited to reduced form analysis. We therefore answer the empirical question as to the effects of exclusive dealing through the lens of an empirical IO model.

In reality, landlords with multiple properties rent first to large retailers and next to smaller, co-locating retailers, because the large retailer facilitates co-locating retailer entry by driving demand to its location ([Benjamin et al. \(1992\)](#), [Brueckner \(1993\)](#), [Konishi and Sandfort](#)

(2003), Burayidi and Yoo (2021)). The model follows the same timing.

Figure 7: Model Timing



Notes: The commercial real estate market clears in two steps. First, the landlord rents to the retailer, next the landlord rents to co-locating stores. Given entry in the commercial real estate market, the retailers set prices in the product market, consumer shops for good, and the product market clears.

Timing:

In stage 1, each landlord posts up to two prices per firm: a base price and a price for an exclusive contract. Landlord m offers retailer j contracts $a \in \{\text{exclusive, non-exclusive}\}$ at rental price r_{jma} . The effect of the exclusive dealing contract is to forbid any competing firm from entering the landlord's land, as measured by the profitability estimated from the demand.

In stage 2, each retailer chooses locations and contracts. Entry is simultaneous and retailers form beliefs over the other retailer's strategies. We focus on Bayesian Nash equilibria: retailers take landlord's prices as given but form beliefs other retailer entry strategies.

In stage 3, the final locations of retailers are determined. In the case of size or contract conflicts – due to exclusive dealing, the retailer paying the highest rent for each landlord enters.

In stage 4, Given retailer entry, landlords set prices for co-locating firms and the co-locating firms enter. In this market, landlords set a single price and do not offer exclusive dealing contracts.

In stage 5, Given entry decisions, retailers set prices in the product market, consumers shop, and the product market clears.

The model is estimated in reverse order.

4.1 Consumer Demand for Retailers

We model the product market at the level of aggregation of the exclusive dealing contracts, the retailer level. We follow [McFadden \(1978\)](#), [Berry \(1994\)](#), [Berry et al. \(1995\)](#), where household make a discrete choice over bundles of stores given by

$$u_{ib}^m = -\alpha^m P_b^m + \gamma^m d_{ib} + \Gamma_b + \xi_b^m + \sum_{k,l} \sigma_{kl}^m X_{k(b)} y_{l(i)} + \epsilon_{ib} \quad (1)$$

where u_{ib}^m is the utility household i in income group m receives from shopping at the retailers $b \in \mathcal{B}$ in market t , P_b^m is the total price paid, d_{ib} is the total distance traveled, Γ_b is the complementarity (following [Gentzkow \(2007\)](#)), ξ_b is market-level unobserved demand shock, σ_{kl}^m captures the effect of the interaction between household demographic characteristics $y_{l(i)}$ and retailer characteristics $X_{k(b)}$, and ϵ_{ib} is a household idiosyncratic preference for retailers b in market t . For example, ϵ_{ib} may represent daily preferences for a specific meal, which require a set of ingredients across stores.

The products, retailers listed in Table 2, are the retailers with the largest market shares and most consumer trips: national chain grocers, discount stores, club stores, as well as categories of retailers such as drug stores, dollar stores, and liquor stores. The remaining stores comprise the outside group.¹³

Consumer preferences for prices, distance, retailers, and retailer complementarities determine the effects of exclusive dealing. As consumers multi-home, high relative complementarity across retailers can soften price competition within retail pairs. Consumers that multi-home travel to multiple stores in the same trip, saving on distance costs.¹⁴ With regard

¹³The outside group is interpreted as the most preferred of all of the other stores in the market, the same interpretation as in [Cao et al. \(2024\)](#)

¹⁴This model of multi-homing or trip chaining is modeled this way in [Relihan \(2022\)](#) and departs from most grocery demand literature that assumes households pay the total trip costs to each retailer (for example [Thomassen et al. \(2017\)](#)).

Table 2: Most Frequent Retailers

| Retailer | Type |
|----------------------|--------------|
| Jewel Osco (Safeway) | Supermarket |
| Mariano's (Kroger) | Supermarket |
| Whole Foods | Supermarket |
| Aldi | Specialty |
| Food 4 Less (Kroger) | Specialty |
| Trader Joe's (Aldi) | Specialty |
| Costco | Big Box |
| Meijer | Big Box |
| Sam's Club (Walmart) | Big Box |
| Target | Big Box |
| Walmart | Big Box |
| Drug | Drug Store |
| Dollar | Dollar Store |
| Liquor | Liquor |
| Other Food | Other Food |
| All Other | Outside Good |

The retailers (and parent company, if retailers share a common parent company) included in the analysis are those with the largest market shares and most frequent trips.

to exclusive dealing, as γ^m becomes more negative, the distaste for distance becomes more salient, exclusive dealing becomes more effective, and the value of exclusivity to the firm increases. Complementarities are moderated by distance in the sense that as the distance between the stores changes, the preferences for consumers bundles change as well.

Consumer preferences are heterogeneous across demographics and retailer characteristics, as captured by $\sum_{kl} \sigma_{kl} X_{k(b)y_{l(i)}}$. Each household has an idiosyncratic preference for a product (a group of stores), ϵ_{ib} , modeled by an additive product-specific Type 1 Extreme Value shock. The shock represents the day-of preference for a specific bundle, and represents an idiosyncratic preference for a specific set of retailers on that day, or idiosyncratic shocks that change the set of retailers shopped.

4.2 Product market supply

Retailers set prices in the downstream market once all the locations of retailers are determined. Retailers compete on prices and sell a composite good that is differentiated from

other retailers' goods by location, a store fixed effect, and exogenous demand shocks. A chain retailer chooses a price for all of its retailer locations in market j each week, and sets separate prices for each income group m ¹⁵. An independent retailer sets a price for its individual retailer for each income group as well:

$$\max_{p_j^m} \sum_m s_j^m (p_j^m - mc_j) \quad (2)$$

When a retailer adds a location it increases shares (and thus profits) by lowering distances a customer travels to get to the closest bundle, but new locations cannibalize existing locations because each retailer location generates less revenue, attracts fewer customers, and has to pay rent and fixed costs of entry.¹⁶

Then retailers set prices according to

$$p_{jt}^m = mc_{jt} + \left[\frac{\partial s_{jt}^m}{\partial p_{jt}^m} \right]^{-1} s_{jt}^m - \frac{\partial s_{jt}^m}{\partial p_{jt}^m} \quad (4)$$

4.3 Co-Locating Retailer Entry

The co-locating retailers are the products in the demand estimation that aren't considered anchor retailers: other food, drug stores, liquor stores, dollar stores, and other stores. Once the landlords rent to the retailers, the landlords with empty locations rent to the small

¹⁵In this literature, demand is often estimated for separately for different income groups ([Allcott et al. \(2019\)](#), [Handbury \(2021\)](#), [Atkin et al. \(2018\)](#)). In reality, the retailers internalize different elasticities across the income distribution and set prices accordingly. For example, Dominick's Finer Foods had higher priced stores and lower priced stores in different locations. Also, grocers sell a wider variety of similar products at different prices to discriminate across consumers. In the model, this is approximated as three separate prices for different income groups at each retailer.

¹⁶Suppressing market indices for clarity, firm j 's share of the market is sum over all shares of bundles with firm j , $b \in j$, summed over the shares from all households in the market.

$$s_j = \underbrace{\sum_i \omega_i}_{\text{hhlds}} \underbrace{\sum_{j'=1}^J \frac{e^{-\alpha(P_j+P_{j'})+\xi_{jj'}+\Gamma_{jj'}+\gamma d_{ijj'}+\sum \sigma X_{jj'} y_i}}{1 + \sum_{j,j'} e^{-\alpha(P_j+P_{j'})+\xi_{jj'}+\Gamma_{jj'}+\gamma d_{ijj'}+\sum \sigma X_{jj'} y_i}}}_{\substack{\text{share bundle } jj' \text{ for hh } i \\ j' \text{ index is dropped for } j'=j}} \quad (3)$$

retailers (the stores that will co-locate with large retailers). The location choice problem for co-locating retailers differs from the large retailers in three main ways: landlords set a single price for all tenants, there is no exclusive dealing, and when multiple retailers approach, entry is determined at random. These assumptions reflect the large number of potential locations available to these retailers, and the few exclusive dealing contracts signed in this market. Each co-locating retailer k 's location choice is determined by

$$\max_m E[\bar{\pi}_k] - r_m^{co} - F_m^{co} + \epsilon_{km}$$

The expected variable profits, $E[\pi_k^{var}]$, the distance to consumers, the rents, and the existing set of retailers (including if there is a retailer present at the location).

Landlords set prices in the co-locating market that balance the probability of entry, s_m , with revenues given entry, $p_m^{co} - mc_{mc}^{co}$. The landlord's profits from the co-locating market are

$$\max_{r^{co}} \underbrace{(s_m^{drug} + s_m^{dollar} + s_m^{other food} + s_m^{other}) (p_m^{co} - mc_m^{co})}_{\pi_l^{co}}$$

Exclusive dealing changes the probability of entry of specific co-locating retailers. For example, a landlord that signs an exclusive dealing contract that forbids dollar stores from entering sets $s_m^{dollar} = 0$, regardless of dollar store demand for that location. When determining prices for an exclusive dealing contract, the landlord balances the expected gains from the retailer market with the expected losses from the co-locating tenant market.

4.4 Retailer Entry

In the commercial real estate market, landlords set prices for contracts and then retailers simultaneously choose where to enter and whether to enter with an exclusive contract or not. If there are conflicts – if an exclusive dealing contract forbids another retailer from entering or there are size constraints – the highest-paying retailer enters. When choosing locations, retailers consider rental prices, fixed costs of entry, and the expected variable profits from the product market. A retailer j chooses across landlords m and contracts a to maximize

$$\max_{m,a} E[\bar{\pi}_{jm}(\mathbf{l}_{-j})] - \bar{\mathbb{P}}_{mja}(r_{jma} + F_m - \theta_j + \epsilon_{jm}) + (1 - \bar{\mathbb{P}}_{mja})\epsilon_{j0} \quad (5)$$

where $E[\bar{\pi}_j(\mathbf{l}_{-j})]$ are the expected variable profits in the product market, \mathbf{l}_{-j} are the other retailers entry strategies, $\bar{\mathbb{P}}_{mja}$ is the probability the retailer wins entry given that it tries to enter, r_{jma} are the rents paid to landlord m for entering with contract a , F_m is the fixed cost of entry, θ_j is the additional profitability of an exclusive dealing contract, and ϵ_{jm} is the retailer-location idiosyncratic match.

The retailer expected profits from the product market depend on the retailer entry decisions, existing locations, the simultaneous entry decisions of all other retailers, and the future decisions of co-locating retailers. A retailer that does not win entry still receives revenues from preexisting locations. Variable profits can then be written as $E[\bar{\pi}_{jma}(\mathbf{l}_{-j})] = \prod_{j' \neq j} \left(\sum_{l'_j=(m',a')} \mathbb{P}(l'_j) \bar{\mathbb{P}}(l'_j) \right) \pi_{jma}(\mathbf{l}'_j)$.

Industry professionals cite information asymmetry as a reason exclusive dealing exists in retail real estate: the landlord does not know the retailer's profits. We model information asymmetry from two sources: location, ϵ_{jm} , and competition θ_j . Following standard practices, the landlord does not know the idiosyncratic profitability of its location for each retailer, ϵ_{jm} . ϵ_{jm} captures elements such as layout or square footage but whose effect on profitability are only known to the retailer. Also, the landlord cannot measure the effect of competitor competition on the retailers' profit. In other words, the landlord cannot exactly estimate the profitability of an exclusive dealing agreement, which is

$$\underbrace{E[\pi_{jm}(E)] - E[\pi_{jm}(B)]}_{\begin{array}{l} \text{exp. var. prof.} \\ \text{excl. deal.} \end{array}} + \underbrace{\theta_j}_{\begin{array}{l} \text{profits} \\ \text{excl. deal.} \\ \text{private info} \end{array}}$$

Therefore θ_j is a dummy variable which is one with exclusive dealing and zero otherwise. θ_j represents the additional expected profits for retailer j for guaranteeing exclusivity at that location.

The exclusive dealing contract blocks both retailers and co-locating firms from entering the same location. The contract varies for each retailer in each location, and is determined by whether profits are expected to fall with the second retailer. As a result, exclusive dealing contracts can be heterogeneous within retailers across locations and across retailers at the

same location.

An exclusive dealing agreement affects a retailer's competitors in two ways. First, the retailer pushes its competitor away from certain consumers and towards other consumers. Second, exclusive dealing increases the total trip distance for multi-homing trips between that retailer and its competitor. As a result, the retailer can reduce the number of trips to its competitor and to both stores together, either of which can increase retailer profits.

The retailer balances higher prices of an exclusive dealing contract with its benefits: increased profitability from restricting retailer entry, increased profitability from restricting co-locating firm entry, and a higher probability of winning entry if the retailer purchases a more expensive contract. When the retailer chooses whether or not to enter, it balances higher costs due to fixed costs and rents, as well as business stealing from its existing locations with shorter distances to consumers and other retailers.

The model pairs commercial real estate market aspects (such as prices, exclusive dealing, landlords, and exact potential locations) with more traditional factors which are thought to determine the retailer entry game (such as business stealing, fixed costs of entry, variable profits) that have been determined important in a long literature in industrial organization on firm entry and location choice (e.g. [Hotelling \(1929\)](#), [Salop \(1979\)](#), [Bresnahan and Reiss \(1990\)](#), [Bresnahan and Reiss \(1991\)](#), [Seim \(2006\)](#), [Jia \(2008\)](#), [Vitorino \(2012\)](#), [Nishida \(2015\)](#), [Caoui et al. \(2022\)](#)).

4.5 Landlord problem

Each landlord m can set up to two prices – an exclusive and a baseline/common price for each firm j : r_{jma} . The landlord balances the probability of a tenant approaching with revenue once the tenant approaches

$$\max_{r_{jma}} \sum_{j,a} \underbrace{\bar{\mathbb{P}}_{jma}}_{\text{prob. win prob. approach}} \underbrace{\mathbb{P}_{jma}}_{\text{approach}} \underbrace{(r_{jma} - mc_m + \pi_m^{co}(a_j))}_{\text{retailer}} \underbrace{+ \left(1 - \sum_{j,a} \bar{\mathbb{P}}_{jmat} \mathbb{P}_{jmat}\right) \pi_m^{co}(O)}_{\text{profits without retailer entry}}$$

where the landlord's profit are the probability-weighted sum of the profits from each retailer entering successfully with contract $a \in \{\text{Baseline}, \text{Exclusive}\}$. The profit depends on the

probability retailer j approaches and wins entry with contract a , \mathbb{P}_{jma}

Given the entry of the retailer, the landlord expected profits are $\pi_l^{co}(a_1)$ from the co-locating market. Because the landlord cannot observe the effect of competition on retailer profitability or the retailer's idiosyncratic match, the landlord cannot tell the combination of retailers that maximize total surplus.

The landlord has incentives to maximize demand to its properties (often a shopping center), and seeks complementary retailers to enter to property. On one hand, when the landlord does not know the tenant's profitability or the effect of competition on tenant profits, the exclusive dealing contract can increase the probability of a retailer entering. Explicitly pricing the exclusive deal mitigates some of the information asymmetry. On the other hand, if the landlord limits which co-locating retailers can enter, it might be hard to find additional tenants. When setting prices, the landlord balances a higher probability of retailer entry and a higher price from the restrictive covenants with the lower probability of attracting a high-paying co-locating store.

5 Estimation and Identification

5.1 Estimation and Identification Demand Parameters

Given that we observe store choices at the trip level, we estimate household's preference parameters in two steps following Berry et al. (1995), Berry et al. (2004), Bayer et al. (2007)).

The likelihood of observing bundle b under the specified preferences is

$$\mathcal{L}(b|\theta) = \prod_i \prod_b \underbrace{\sum_{i \text{ chooses } b} 1\{b_i\}}_{\text{prob. } i \text{ chooses } b} \frac{e^{\delta_{bt} + \gamma_b d_{ib}^m + \phi_i + \sum_{k(b),l} \sigma_{k(b)l(i)} X_{k(l')} y_{l(i)}}}{1 + \sum_{b'} e^{\delta_{b't} + \gamma_{b'} d_{ib'}^m + \phi_i + \sum_{k(b'),l} \sigma_{k(b')l(i)} X_{k(b')} y_{l(i)}}}$$

$$\underbrace{\delta_{bt}^m}_{\text{mean util.}} = -\alpha P_{bt}^m + \Gamma_b + \xi_{bt} + u_{ibt}$$

The parameters important for exclusive dealing are price sensitivity, distance sensitivity,

and retailer complementarity, α^m, γ^m , and Γ_b . Parameters are identified from variation in observable characteristics and trip frequency. Prices are likely correlated with unobservable retailer quality and market demand shocks that bias estimates upwards. Following [Hausman et al. \(1994\)](#), we instrument prices with the average prices of goods in other markets. The intuition for the validity of this instrument is that price in other markets picks up common retailer costs across markets but does not reflect unobserved demand shocks.

Distances are measured as the total length of the trip: home and back when the household shops at a single retailer, and home - store 1 - store 2 - home when the household stops at two retailers. Like prices, distances are also endogenous: households choose locations based on amenities and retailers choose locations based on where households are located. We address the distance endogeneity by controlling for household zip5. The identifying assumption is that household location within a zip code is as-good-as random and variation in household locations within the household zip code identifies the distaste for distance.^{[17](#)} Specifically, limited supply of housing and the location distribution of other amenities will cause households to locate across the zip code, regardless of their preference for groceries or other specific retailers in the demand estimation.

The complementarity term, Γ_b is defined as the additional utility of shopping at two stores together in the same day, or as the additional utility of making a single trip to both stores (controlling for total trip distance). The higher the value of Γ_b , the greater the complementarity between two retailers relative to the outside good. Complementarities are identified as the bundle fixed effects in the regression of average preference for a bundle on instrumented prices.^{[18](#)}

One challenge with identifying the complementarity term is that the complementarity term may be identifying preference for shopping in a shopping center or that tastes are correlated across nearby retailers: that shopping at one retailer leads to shopping at another retailer. To control for this form of endogeneity, we directly control for whether retailers are co-located. The identifying assumption is that spillovers across retailers are in large part local (the literature finds that spillover are between 0-.2 miles, roughly the shopping mall distance). Additionally, controlling for co-locating stores controls for preferences for shopping at a shopping center.^{[19](#)}

¹⁷As robustness, we control for Chicago area instead of distance, a broader measure that controls for the neighborhood.

¹⁸To identify complementarities and not correlated tastes, following [Gentzkow \(2007\)](#), can use variation in instrumented prices. As the price of one good changes, bundle shares will change if there are true complementarities and not if shopping together is instead driven by correlated tastes.

¹⁹Additionally, the demand specification includes further controls that interact household demographics

5.2 Product Market Estimates

Price and distance estimates are reported in Table 3. Results from the estimation show disutility for prices and distance, and that low-income consumers are the most elastic with respect to price and high-income consumers are the most inelastic with respect to price. The price coefficient is interpreted as the disutility of a 1% increase in retail prices. Estimates for distance are salient: each income group is willing to travel only an additional .007, .005, and .003 mi to for a 1% price increase at a retailer half a mile away.

Table 3: Price and Distance Demand Estimates

| Variable | Estimates | | |
|----------------------------|----------------------|----------------------|----------------------|
| | Low Income Group | Middle Income Group | High Income Group |
| α^m (price) | -1.569*** (0.156) | -1.262*** (0.325) | -1.001*** (0.248) |
| γ^m (distance) (mi) | -2.22*** (0.394) | -2.58*** (0.391) | -3.03*** (0.559) |

Source: Numerator, Chicago, 2017-2022. Standard errors are constructed by bootstrapping a 1,000 times.

Table 4 reports some of the complementarity terms, Γ_b , showing a large heterogeneity in complementarities across retailers. Estimates which are more negative indicate that the two goods are relatively large substitutes, or the least preferred combinations for consumers. For example, consumers' least preferred shopping combination is Safeway and drug stores together, likely because Safeway has its own pharmacy and sells almost all products available at the drug store. Similarly, consumers are less likely to shop at Safeway and Aldi together, two grocers, or at dollar stores and Aldi together. Consumers are relatively more likely to shop at Safeway and dollar stores together, or at drug stores and Aldi together.

with retailer characteristics. The identifying assumption is that further controls – such as household income, education, unemployment status, ethnicity, as well as the interaction of these terms with distance fully control for the relevant variables that determine shopping patterns.

Table 4: Select Demand Estimates from Cross-Store Complementarities

| <i>Retailer</i> | Safeway (Jewel Osco) | Aldi | Drug | Dollar | Liquor |
|----------------------|----------------------|-------|-------|--------|--------|
| Safeway (Jewel Osco) | | -1.2* | -2.3* | .8* | .4 |
| Aldi | -1.2* | | 1.2* | -1.4* | -.6 |
| Drug | -2.3* | 1.2* | | -.3 | .2 |
| Dollar | .8* | -1.4* | -.3 | | -1.7* |
| Liquor | .4 | -.6 | .2 | -1.7* | |

Table 5: *Source:* Numerator. Table shows estimates for cross store complementarities relative to the outside good. Current standard errors mark as significant at the 5% level

Both the retail demand estimates and the exclusive dealing contracts show significant heterogeneity across firms. With the retail demand estimates, we can compute variable profits and therefore the retailers' value of displacing competitors. We can then test whether the exclusive dealing contracts are more likely to block retailer substitutes.

Figure 22 shows an example of how the more consumers dislike shopping at stores together, the greater the fraction of exclusive dealing contracts. The figure plots the fraction of addresses with exclusive dealing contracts overlayed with the complementarity estimates. In general, the more consumers dislike shopping at the stores together, the greater the fraction of retailer locations blocked. For example, Safeway (Jewel Osco), Whole Foods, and Aldi all block grocers. Stores with positive complementarities are blocked less often, an example of which is Safeway vs liquor stores vs Whole Foods and Liquor Stores. One exception is Aldi, which blocks drug stores in the sense that it blocks any drug store that dedicates a certain square footage to food.

5.3 Commercial Real Estate Market

This section covers the identification and estimation of the marginal costs, fixed costs, and information asymmetry parameters in the commercial real estate market. We estimate the model using simulated method of moments. We identify the parameters by matching micro moments in the retailer location choice data and landlord problem.

The model-implied likelihood of observing firm entry and the landlord's first order conditions

are

$$\log L = \underbrace{\sum_t}_{\text{markets}} \underbrace{\sum_j}_{\text{firms}} \log \left(\sum_{l_j \text{ feasible}} \mathbb{P}_j(l_j) \right)$$

$$[\text{foc: } r_{kmb}] \sum_{j,a} \left(r_{jma} - mc_m + \pi_m^2(a_j) - \pi_m^2(O) \right) \left(\frac{d\bar{\mathbb{P}}_{jma}}{dr_{kmb}} \mathbb{P}_{jma} + \frac{d\mathbb{P}_{jma}}{dr_{kmb}} \bar{\mathbb{P}}_{jma} \right) + \bar{\mathbb{P}}_{knb} \mathbb{P}_{knb} = 0$$

$$mc_m = \frac{\bar{\mathbb{P}}_{knb} \mathbb{P}_{knb} + \sum_{j,a} \left(r_{jma} + \pi_m^2(a_j) - \pi_m^2(O_j) \right) \left(\frac{d\bar{\mathbb{P}}_{jma}}{dr_{kmb}} \mathbb{P}_{jma} + \frac{d\mathbb{P}_{jma}}{dr_{kmb}} \bar{\mathbb{P}}_{jma} \right)}{\sum_{j,a} \left(\frac{d\bar{\mathbb{P}}_{jma}}{dr_{kmb}} \mathbb{P}_{jma} + \frac{d\mathbb{P}_{jma}}{dr_{kmb}} \bar{\mathbb{P}}_{jma} \right)}$$

We assume $\theta_{aj} \sim N(\mu_\theta, \sigma_\theta^2)$, $\epsilon_{jm} \sim N(0, 1)$. The likelihood and landlord first order condition are:

In each market, we observe data on potential locations, retailer entry and exit, lease prices (rents) and exclusive dealing contracts. At each potential new location we observe square footage and the possibility for co-locating firms. In the data, there are typically between zero and five potential locations in each market. We observe retailer entry, retailer exit, parent company and store sizes, the later of which allows us to construct the retailer's choice set. We assume that parent companies can make entry and exit decisions for any brands of retailers they own; we consider the location choice at the parent level. We group retailers from the demand estimation by their size and ownership in Table 10,²⁰ and use the size and ownership to guide where the retailers can enter and which parent company chooses locations. Additionally, we assume that there are other retailers – other and outside food – and include them as other potential entrants in the market. These other retailers are less frequently shopped at. From the demand estimates, we compute the expected profitability of each possible combination of locations.

An exclusive dealing contract is defined as a contract that reduces expected profits in that

²⁰Grocery chain exit is rare: as shown in Figure 19, 70% of grocery chain stores that have opened since 1990 have remained open to present day. Since it is so rare, we don't explicitly model the exit choice.

location, taking to account all existing locations but no future locations. The exclusive deal is assumed to bind across all stores that would decrease profits at that location. That is, given the current set of stores, the condition is that expected variable profits do not decrease for co-locating stores.

The moments of the distribution of the asymmetric information parameter, θ_j , are identified by the score of the log likelihood function, as are the fixed costs of entry F_m . We assume that $\theta_j \sim N(\mu_\theta, \sigma_\theta^2)$ and identify parameters μ_θ and σ_θ^2 . The private information is therefore a random coefficient term on the firm's profitability. Similarly, the landlord's marginal cost are computed by taking the first order condition of the profit function. We use the observed rents and marginal costs to compute the remaining costs.

Note, the marginal costs are the cost per square foot, and don't vary across product sold (or store leased to), because the stores are leasing the same space. This gives us the marginal costs, which we can then plug into the other first order conditions to compute the rents and whether or not the firm is offering one or two prices. That is, the first order condition for the observed rents give the marginal costs, the first order conditions for the other rents give the remaining other optimal rents. This setting is similar to multi-product firms but in that case the full vector of prices is observable and the first order condition recovers the full set of marginal costs; here, there is a single marginal cost and a single observable rent, and the first order condition (conduct assumption) recovers the remaining unobservable rents.

We estimate the model with simulated method of moments, comparing model in the simulated model to the data. Marginal costs are computed at the same time as fixed costs and asymmetry parameters, because the marginal costs are needed to compute the unobserved rents, the rents the landlords set for the other tenants and for the contract not taken. For any given value of parameters, we compute an inner loop to solve for optimal rents and an inner-inner loop to solve for tenant probabilities within optimal rents. While Bayesian Nash equilibrium and the landlord market will shrink the possible set of equilibria, one challenge in the entry literature and in this paper is addressing the multiple equilibria possible in model. To address this, we test for multiple equilibria by trying many starting points and find similar results in terms of the probabilities of entry and the rents.

Results for the fixed costs and marginal costs for the retailer and co-locating markets are shown in Figures 24- 25. The estimates show that fixed costs vary between 10 and 50 dollars per square foot for year, and the average cost of opening a new retail store front for a 3,000 sqft store is around 50,000\$, which is in line with industry estimates. Marginal costs are low,

and average around 13\$ per square food, or approximately half of the average rent. Marginal and fixed costs (per square foot) are similar in the retailer market as the co-locating market. We find that the mean of the information asymmetry parameter is 3.2 \$ per square foot per year, and the variance is 10\$ per square foot per year. For the average retailer which pays around 20% in rent for each square foot and year, the exclusivity contract increases profits by 15% of rent.

6 Effects of Exclusive Dealing

6.1 Effect of Exclusive Dealing on Retailers and Landlords

With the estimated parameters, we compute counterfactual prices and entry probabilities limiting the landlords to set one price. We recompute the equilibrium separately for each market.

Counterfactual results show that exclusive dealing contracts encourage entry in Chicago. Table 6 shows the difference in entry probabilities for retailers in each geographic area, averaged over retailers and over years. The results show that in all areas except West Cook County, exclusive dealing increases the probability of entry for (large) retailers. The effect is most pronounced in the poorest and least population dense market, South Chicago, where probability of entry goes from 10% to 0% without exclusive dealing. The interpretation is that exclusive dealing contracts are necessary to ensure entry in the most under-served markets. Suburban areas see the second largest drop in probability of entry in the counterfactual without exclusive dealing. This is likely explained by the retail environment of suburban neighborhoods: suburban areas tend to have a few shopping malls surrounded by many houses, and when the shopping mall is often owned by a single landlord, there are relatively few locations. Without the exclusive contract, the probability of competitor entry decreases the probability of retailers entering in the first place. Finally, CBD and North Chicago have the lowest difference in entry without exclusive dealing. These neighborhoods are dense both in terms of retail and population, and retail often exists in stand alone locations. As a result, the exclusive dealing contracts were least effective in these neighborhoods, and so the difference is relatively small.

Following entry, all major grocery stores reduce entry probabilities in each market. Table 7 shows difference in entry probabilities (computed in percentage points) and difference

Table 6: Entry Probabilities by Geography for Retailers

| Geographic Area | Difference (Percentage Points) | Counterfactual Percent | Observed Percent |
|--------------------|-----------------------------------|---------------------------|---------------------|
| West Cook County | 9.61 | 16.7 | 7.09 |
| North Chicago | -6.91 | 8.76 | 15.7 |
| CBD | -6.96 | 15.8 | 22.8 |
| North Suburban | -8.97 | 3.09 | 12.1 |
| Northwest Suburban | -9.95 | 13.8 | 23.7 |
| South Chicago | -10.0 | 0.00 | 10.0 |

Notes: Counterfactual: average probability of a particular retailer entry into a market, under the current pricing (Observed) and counterfactual pricing (Counterfactual). Table shows Counterfactual - Observed.

in profits (computed in percent) for each major retailer and each major co-locating store industry. Big Box stores Costco and Walmart have both a large loss in profits and also decrease the probability of entry substantially. The retailers' change in entry strategy is not able to offset the loss in profits from competing retailers entering nearby. In fact, in the case of large retailers such as big box stores – Costco, Walmart, Target –, the landlord is already likely internalizing the spillovers to nearby stores. Since, as shown in Figure 4, big box store rents are already quite low (relative to marginal costs) for in the observed equilibrium, a counterfactual without exclusive dealing results in fewer big box stores and fewer profits. The decline in profits is likely due to the fact that the landlord cannot commit to an implicit exclusive dealing contract. In contrast, retailers like Jewel Osco (Safeway), Mariano's (Kroger), and Aldi, are able on average to change retail entry strategies to mitigate the loss in profits. These grocers enter less and change which locations they enter in response to the exclusive dealing ban. Co-locating stores see have slightly higher profits and increase their probability of entry when exclusive dealing is banned. These retailers benefit from a counterfactual world where landlords cannot contract one exclusivity. The intuition is that in locations where retailers enter, the co-locating stores will enter as well. In locations where retailers no longer enter, there still may be some demand for the smaller and cheaper co-locating stores.

The percentage change in landlord profitability is shown in Table 8. The effects of a ban on exclusive dealing are heterogeneous across landlords, but most landlords benefit from exclusive dealing, with only 8% of landlords see profits increase as a result of a ban on exclusive dealing. The intuition, thus, is that the exclusive dealing contract allows landlords to monetize their properties.

Table 7: Counterfactual Profitability and Probabilities by Retailer

| Store Names | Diff. | Prob. | Entry | Profits |
|-------------|------------|--------|-------|----------------|
| | Percentage | Points | | Percent Change |
| Costco | -10.0 | | | -6.01 |
| Walmart | -10.0 | | | -6.17 |
| Whole Foods | -7.82 | | | -7.24 |
| Target | -7.41 | | | -13.1 |
| Jewel | -7.36 | | | 0.139 |
| Mariano's | -7.34 | | | -0.459 |
| Aldi | -6.05 | | | -0.513 |
| Drug | 3.01 | | | .048 |
| Liquor | 5.43 | | | 1.34 |
| Dollar | 8.23 | | | 2.85 |

Notes: Counterfactual: average change in probability of entry into a market for each retailer across all markets, as well as average percent change in profits for retailers, averaged across each markets. Table shows Counterfactual - Observed.

Table 8: Counterfactual Profitability For Landlords (Percent)

| Quantile | 5th | 25th | 50th | 75th | 95th |
|----------|-------|-------|-------|-------|------|
| | -.095 | -.090 | -.087 | -.086 | .041 |

Notes: Counterfactual: average percent change in profits for landlords, averaged across each markets. Table shows Counterfactual - Observed.

6.2 Effect of Exclusive Dealing on Consumers

Consumer surplus is measured as the compensating variation, the compensation required for a household in the observable world to be indifferent with the distribution of retail location and prices in the counterfactual world (no exclusive dealing). Specifically, we compute

$$\mathbb{E}_{\epsilon_{ib}} [CV_i] = \frac{1}{I} \sum_i \left(\frac{1}{\alpha^m} \left[\ln \left(\sum_{b \in \mathcal{B}} \exp(u_{ib}(P_b^0, d_{ib}^0, \phi)) \right) - \ln \left(\sum_{b \in \mathcal{B}} \exp(u_{ib}(P_b^{cf}, d_{ib}^{cf}, \phi)) \right) \right] \right) \quad (6)$$

where u_{ib} is the utility from Equation 1 and ϕ are all the other non-price and non-distance parameters that are assumed to remain unchanged in the counterfactual where 0 denotes the observed world and cf denotes the counterfactual. \mathcal{B} are the set of bundles computed in

the demand estimation.

Table 9: Consumer Welfare

| Geography | % Change in CV |
|--------------------|----------------|
| CBD | -.911 |
| North Chicago | -.799 |
| Northwest Suburban | -.555 |
| North Suburban | .330 |
| West Cook County | .645 |
| South Chicago | .754 |

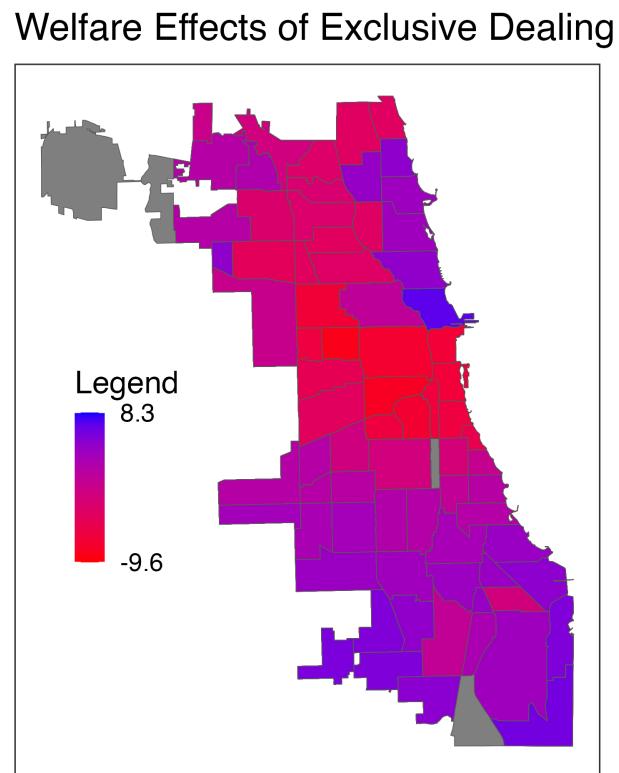
Notes: Average compensating variation across all households, weighting each household equally. Observed - Counterfactual.

Table 9 shows the welfare effects of exclusive dealing in each market in Chicago, computed as the percent change from year to year, holding the market fixed. In the table, a positive value indicates that welfare is higher in the observed data with exclusive dealing. The Table shows welfare losses from banning exclusive dealing in North Suburban Chicago, West Cook County, and South Chicago, and gains in the Central Business District and North Chicago.

This distribution masks heterogeneity at the neighborhood level, as well as the long run effects of banning exclusive dealing. To explore the welfare effects in more spatial detail, we compute the welfare effects for a representative household living at the center of a census tract in Chicago. We can then compute the average welfare effect for each Chicago area (e.g., a large neighborhood). To understand the long-run effects of an exclusive dealing ban, we set a baseline year for 2000, and compute the aggregate effects of exclusive dealing for each household in each census tract, updating from year to year and using the estimated probabilities from the previous section; the outputs of one year's counterfactuals are the existing locations to the next year's counterfactuals. Additionally, we assume that 10% of chain grocers exit every 20 years, in order to account for exit as well. We then plot the observed reality today subtracted from the counterfactual welfare over a period of 20 years.

We show the long run effects of an exclusive dealing ban across Chicago in Figure 8. Variation in the consumer welfare is a result of variation in the distances to retailers, prices that change for each income group, and consumer demographics. The effects vary within and across neighborhoods, with the most negative effects of exclusive dealing in Chicago in wealthier areas around the downtown, and the most positive effects of exclusive dealing in South Chicago, an undeserved area. Key to the effect is that in South Chicago, there is essentially no entry and there is some exit, which eventually leads to food deserts. In a back-of-the-

Figure 8: Percent Change in Consumer Welfare without Exclusive Dealing



Notes: Plot shows the average long-run welfare effects across households in different Chicago areas, observed - counterfactual. The map restricts to areas in the city of Chicago. The plot shows that exclusive dealing is welfare-improving in the lowest-income areas (towards the bottom of the map), as well as directly north of the central business district, and welfare decreasing in the central business district.

envelope calculation, we find that the percentage of people living in food deserts would increase by 10-15 percentage points as a result of a total long-run ban on exclusive dealing.

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A Example of Exclusive Dealing Contracts

Figure 9: Restrictive Covenant in a Safeway Lease Memorandum

2. Restrictions. By virtue of the Lease, Tenant, its subtenants, invitees, customers and employees and parties holding possessory rights in the Premises shall have, and are hereby granted, the use in common with Landlord and other tenants of Landlord and their respective invitees, customers, employees and parties holding possessory rights in the Shopping Center, of "Building Areas" and those portions of Building Areas upon which buildings are not constructed (all of which are referred to as the "Common Areas"). "Building Areas" shall refer to the areas designated as "Jewel/Osco", "Retail Bld'g A", Retail Bld'g B", "Retail Bld'g C" and "Bank" on the Site Plan. The Common Areas are required by the terms of the Lease to be devoted to the purposes of driving and parking motor vehicles, loading and unloading of motor vehicles and vehicular and pedestrian ingress and egress to and from and within the Shopping Center. Additional rights are granted by the Lease to such parties in connection with the construction and maintenance of utility facilities necessary to the Shopping Center. All buildings constructed in the Shopping Center shall be located wholly within the "Building Areas". Additional use and development restrictions and maintenance, development and performance obligations with regard to the Premises and the Shopping Center are specified in the Lease.

In addition to other restrictions and obligations set forth in the Lease, the Lease provides that the types of uses permitted in the Shopping Center shall be of a retail and/or commercial nature found in shopping centers of a similar size and quality in the metropolitan marketing area in which the Shopping Center is located.

The Lease provides, in part, that no premises (nor any part thereof) in the Shopping Center other than the Premises, shall be (i) used or occupied as a retail supermarket, drug store and combination thereof, nor (ii) used for the sale of any of the following: (a) fish or meat (except in prepared form sold by a permitted restaurant operation); (b) liquor and other alcoholic beverages in package form, including, but not limited to, beer, wine and ale; (c) produce; (d) baked goods; (e) floral items; (f)any combination of food items sufficient to be commonly known as a convenience food store or department; and (g) items requiring dispensation by or through a pharmacy or requiring dispensation by or through a registered pharmacist.

In addition, except as expressly permitted in the Lease, none of the following uses shall be conducted in the Shopping Center: (a) offices; (b) funeral homes; (c) any production, manufacturing, industrial, or storage use of any kind or nature; (d) entertainment or recreational facilities; (e) training or educational facilities; (f) restaurants; (g) car washes, gasoline or service stations, or the displaying, repairing, renting, leasing, or sale of any motor vehicle, boat or trailer; (b) dry cleaner with on-premises cleaning; (i) any use which creates a nuisance or materially increases noise or the emission of dust, odor, smoke, gases, or materially increases fire, explosion or radioactive hazards in the Shopping Center; (i) any business with drive-up or drive-through lanes; *(k) second-hand or thrift stores, or flea markets; and (l) any use involving any Hazardous Material (as defined in the Lease).

Source: Cook County Record of Deeds, Document Number 0010276527. This figure is an example of a restrictive covenant. Here, Jewel Osco (parent company Safeway) in Chicago at the Intersection of Ashland and Roosevelt in 2001 limits the competitors in the shopping center. At this location, this portion of the lease memorandums shows Safeway is blocking (a) stores that sell similar products: grocers, drug stores, and liquor stores, (b) stores that also compete for food: restaurants and gas stations, (c) stores that compete for parking: offices, educational facilities, and (d) stores that would bring a different aesthetic to the shopping center: funeral homes, second-hand¹⁹or thrift stores, stores that create a nuisance or materially increase noise.

Figure 10: Restrictive Covenant in a Dollar General Lease Memorandum

4. So long as the Demised Premises is being operated as a Dollar General store, Landlord covenants and agrees not to lease, rent or occupy, or allow to be leased, rented or occupied, any property now or hereafter owned by Landlord or an affiliate of Landlord, or developed by Landlord or an affiliate of Landlord (for a third party), within a one (1) mile radius of the boundaries of the Demised Premises for the purpose of conducting business as, or for use as, a Family Dollar Store, Bill's Dollar Store, Fred's, Dollar Tree, Dollar Zone, Variety Wholesale, Ninety-Nine Cents Only, Deals, Dollar Bills, Bonus Dollar, Maxway, Super Ten, McCory's, McCory's Dollar, Planet Dollar, Big Lots, Odd Lots, Walgreens, CVS, Rite Aid, or Wal-Mart Supercenter.

This covenant shall run with the land and shall be binding upon Landlord and its affiliates and their respective successors, assigns and successors in title to the Demised Premises and to any such land owned, developed or acquired in the future within a one (1) mile radius. As of the Effective Date, Landlord does not own land within a one (1) mile radius of the Demised Premises. So long as the Demised Premises is being operated as a Dollar General store, Landlord agrees (for itself and its affiliates) not to accept any engagement as a developer for such purposes in violation of the foregoing restrictive covenants within such one (1) mile radius.

Source: Cook County Record of Deeds, Document Number 1532115028. This figure is an example of a restrictive covenant from a Dollar General Lease Memorandum in 2015, for a store at the intersection of 79th and Marquette Avenue. This restrictive covenant limits the landlord and affiliates from leasing to competitors within a mile radius for as long as the Dollar General is in operation on the premises. The restrictive covenant runs with the land, which means that it binds even if the landlord stays the same. The competitors are listed explicitly, and are largely other dollar stores, but also include discount stores and drug stores that sell similar snacks: Family Dollar Store, Bill's Dollar Store, Fred's, Dollar Tree, Dollar Zone, Variety Wholesale, Ninety-Nine Cents Only, Deals, Dollar Bills, Bonus Dollar, Maxway, Super Ten, McCory's Dollar, Planet Dollar, Big Lots, Odd Lots, Walgreens, CVS, Rite Aid, or Wal-Mart Supercenter.

Figure 11: Restrictive Covenant upon Termination of Dominick's Finer Foods Lease

USE RESTRICTION AGREEMENT
October

THIS USE RESTRICTION AGREEMENT ("Agreement") is dated as of September 1, 2015, and is made and entered into by and between RAMCO-GERSHENSON PROPERTIES, L.P., a Delaware limited partnership ("Landlord"), and DOMINICK'S FINER FOODS, LLC, a Delaware limited liability company ("Tenant").

C. On the date hereof, Tenant operates one or more grocery supermarkets within a radius of five (5) miles of the Property. The properties within such radius on which Tenant, any "Affiliate" (defined later) of Tenant, and/or its or their respective successors and assigns may in the future sell "Grocery Merchandise" (defined later), and/or "Prescription Pharmacy Merchandise" (defined later) are together called the "Benefited Properties." "Affiliate" of a named legal person or entity shall mean any legal person or entity that controls, is controlled by, or is under common control with the named legal person or entity.

D. Landlord acknowledges that (i) Tenant or its Affiliate has made a considerable investment in the Benefited Properties, (ii) Tenant or its Affiliate has invested its business reputation in the Benefited Properties, which reputation will be adversely affected if the sales volume of Tenant is negatively impacted, (iii) the addition of other businesses to the Property that may violate the "Restrictions" (defined later) will result in a reduction of Tenant's sales volume and thus impair the benefit of the bargain for which Tenant negotiated in entering into the Termination Agreement, and (iv) Tenant's agreement to terminate the Lease is predicated upon Landlord's acknowledgement of all of the foregoing, and Landlord's agreement to the terms of this Agreement.

1. USE RESTRICTION. Landlord agrees, on behalf of itself and its successors and assigns, that for the "Restriction Period" (defined later) (collectively the "Restriction Periods"), the Property will not be used in violation of the "Restrictions" (defined later). The "Restrictions" are the "Supermarket Restriction" (defined later) and the "Prescription Pharmacy Restriction" (defined later).

1.1. Supermarket Restriction. No portion of the Property shall be used or occupied for a general food market, supermarket, grocery store, meat market, fish market, fruit store, vegetable store, convenience store, or any combination of the foregoing ("Supermarket Restriction"). Notwithstanding the Supermarket Restriction, stores on the Property may devote up to, but not more than, the lesser of (i) five thousand (5,000) square feet of sales area (including aisle space adjacent thereto), or (ii) sales area (including aisle space adjacent thereto) of up to fifteen percent (15%) of the total square footage of the store, to the sale of Grocery Merchandise. "Grocery Merchandise" means, for off premises consumption, baked goods, fish, poultry or meat, liquor or other alcoholic beverages, fruits and vegetables, produce, floral items, pet food, greeting cards, photo processing services, health and beauty aids. Notwithstanding anything to the contrary contained herein, the Supermarket Restriction shall not apply to: (i) a restaurant-bakery, such as Panera or Atlanta Bread Company, of not more than 2,500 square feet in size; (ii) a retailer selling arts and craft supplies, including party supplies and dried floral arrangements; (iii) a beauty supply retailer that specializes in the sale of beauty and/or body care products, cosmetics, health care items, and/or beauty aids; (iv) a retailer selling greeting cards, giftware, stationary and/or keepsake ornaments; or (v) a retailer selling live animals as pets and pet food and related accessories.

Source: Cook County Record of Deeds, Document Number 1527955057. This figure is an excerpt from a Dominick's Finer Foods Lease Termination in 2015. In 1998, Safeway purchases Dominick's Finer Foods. In 2013, Safeway is in the process of closing all of Dominick's Finer Foods stores. Then, in 2015, Safeway acquires Jewel Osco. At this Dominick's location in 2015, Safeway and landlord agree to put a restrictive covenant on the property to prevent the entry of a grocery store for five years after Safeway leaves the premises ("no portion of the property shall be used as a grocery store"). The restrictive covenant specifies the motivation for the restrictive covenants: the tenant made investments to the property which benefited the landlord ("landlord acknowledges tenant has made considerable investment in the property"), and the tenant would stand to lose business if a competitor opened ("tenant operates a grocery store within 5 miles of the property").

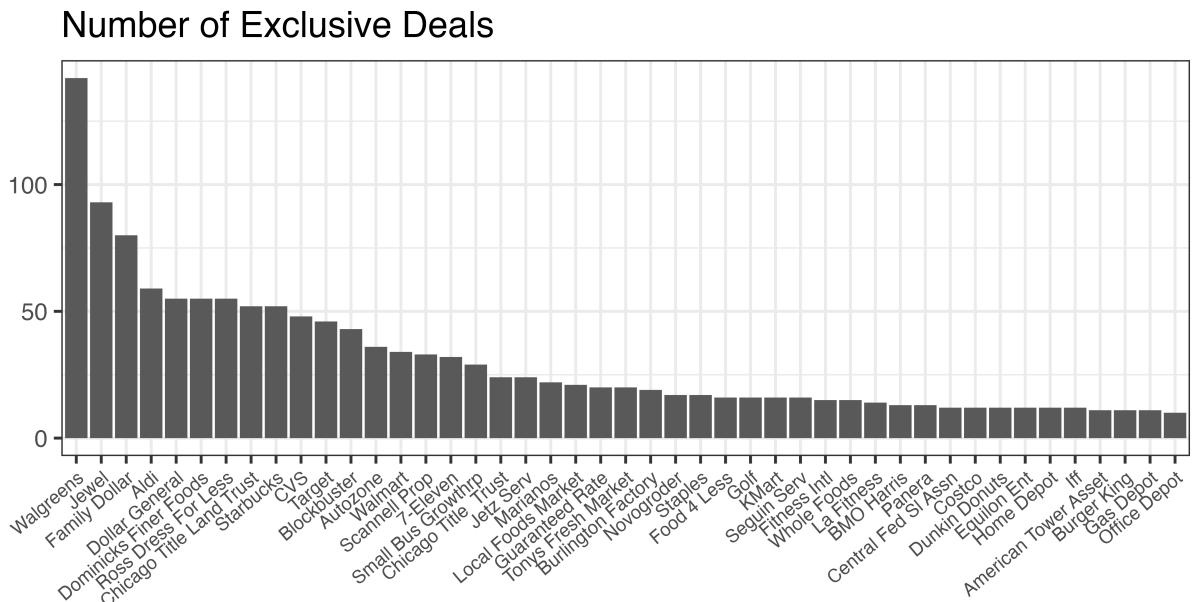
B Figures

Figure 12: Numerator Definitions

| Item ID | Department | Sector |
|--|------------|------------------|
| (ex: French's Crispy Fried Jalapenos 5 oz) | \subset | (ex: Condiments) |
| n = 13,589,708 | n = 312 | n = 23 |

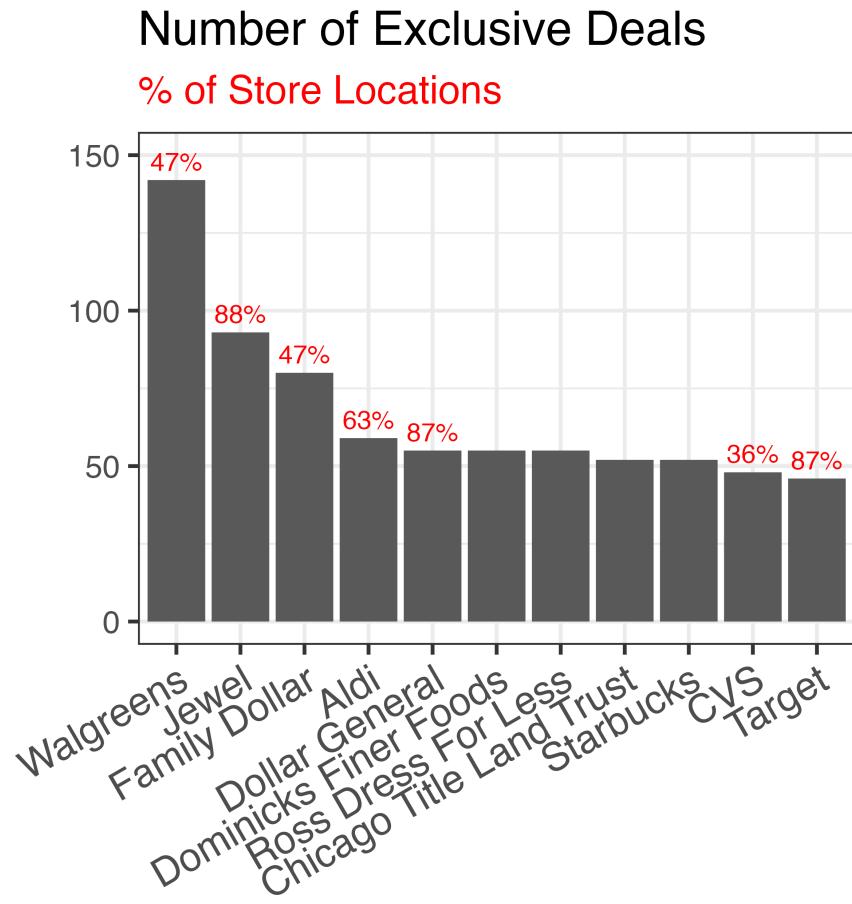
Figure shows three of the levels of aggregation in the Numerator data. This figure follows a similar figure in [Handbury \(2021\)](#). On a trip, a consumer purchases a set of individual items recorded at the barcode level, called Item ID's, that comprise the individual's basket of purchases for that trip. Numerator data classifies items into several categories, broader and broader categories. Figure 12 shows these categories. For example, a single item “French’s Crispy Fried Jalapenos 5oz”, belongs to a larger category of goods that are similar to the consumer but might be quite different in terms of content. These categories are then grouped into larger departments, which are itself grouped into larger groceries.

Figure 13: Retailers with Exclusive Dealing Contracts



Source: Cook County Recorder Office. Figure plots the top retailers by exclusive dealing contracts use recorded at the Cook County Recorder office. Time span 1980-present.

Figure 14: Retailers with the Most Number of Exclusive Dealing Contracts



Source: Cook County Recorder Office. Figure plots the top retailers by exclusive dealing contracts use recorded at the Cook County Recorder office. Time span 1980-present.

Figure 15: Contents of Exclusive Dealing Contracts

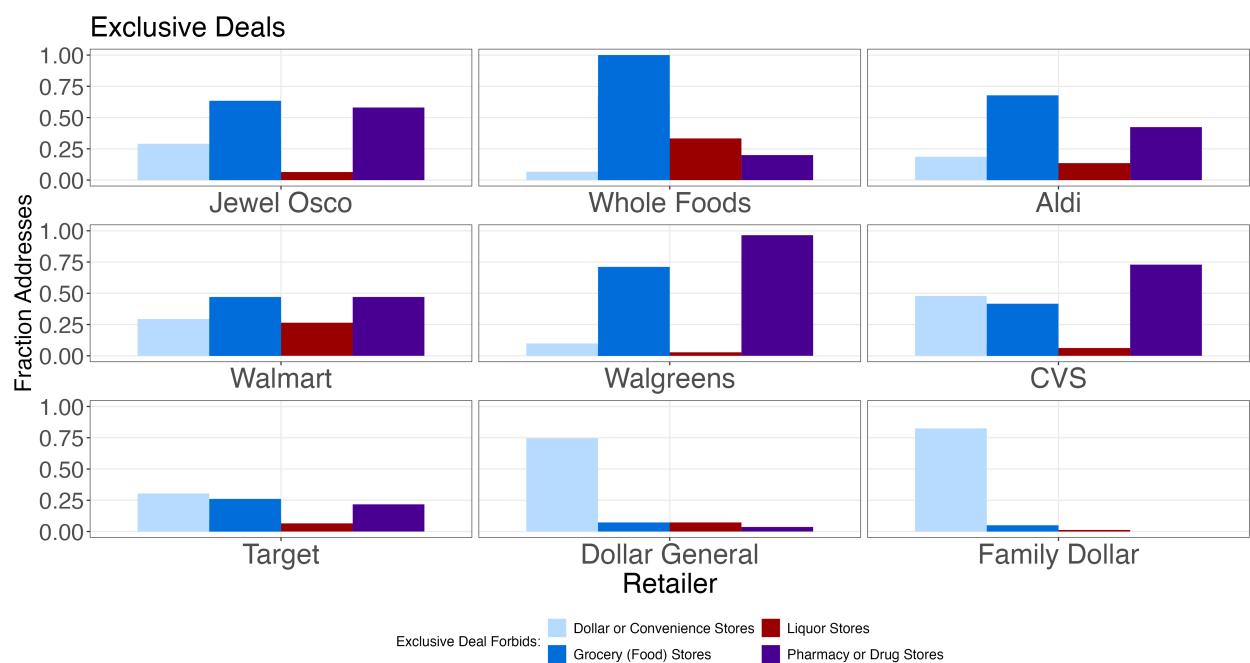


Figure 16

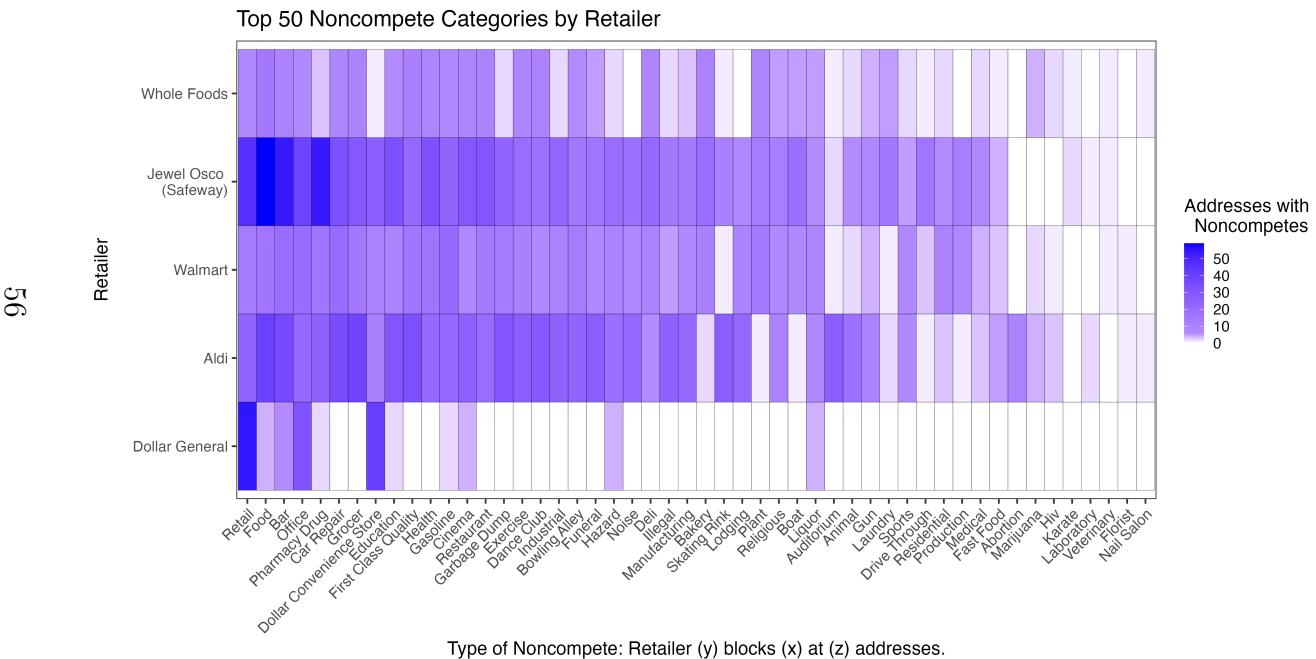


Figure 17: Contents of Exclusive Dealing Contracts: Variation Across Drug Store Chains



Figure 18: Contents of Exclusive Dealing Contracts: Variation Across Drug Store Chains

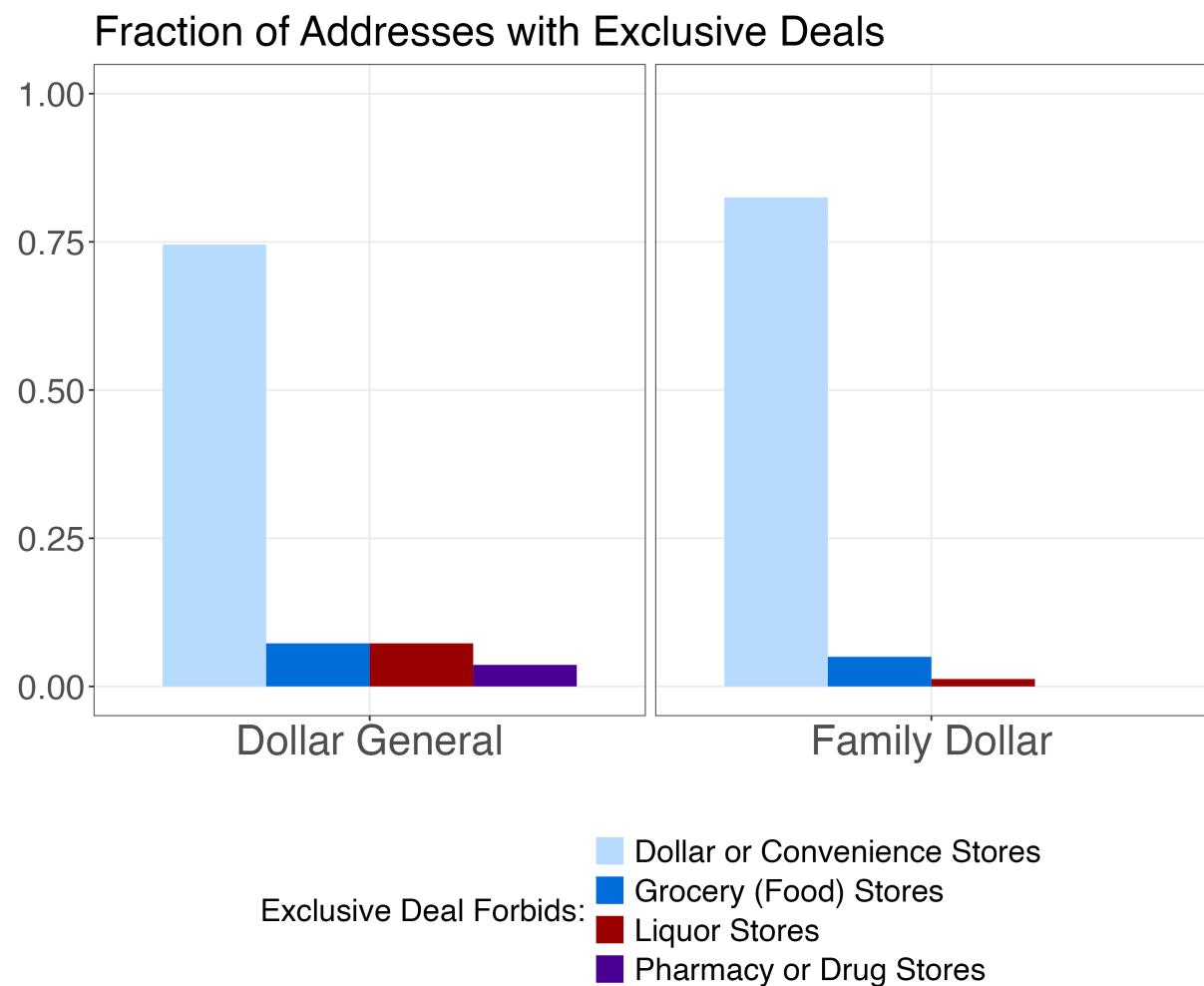
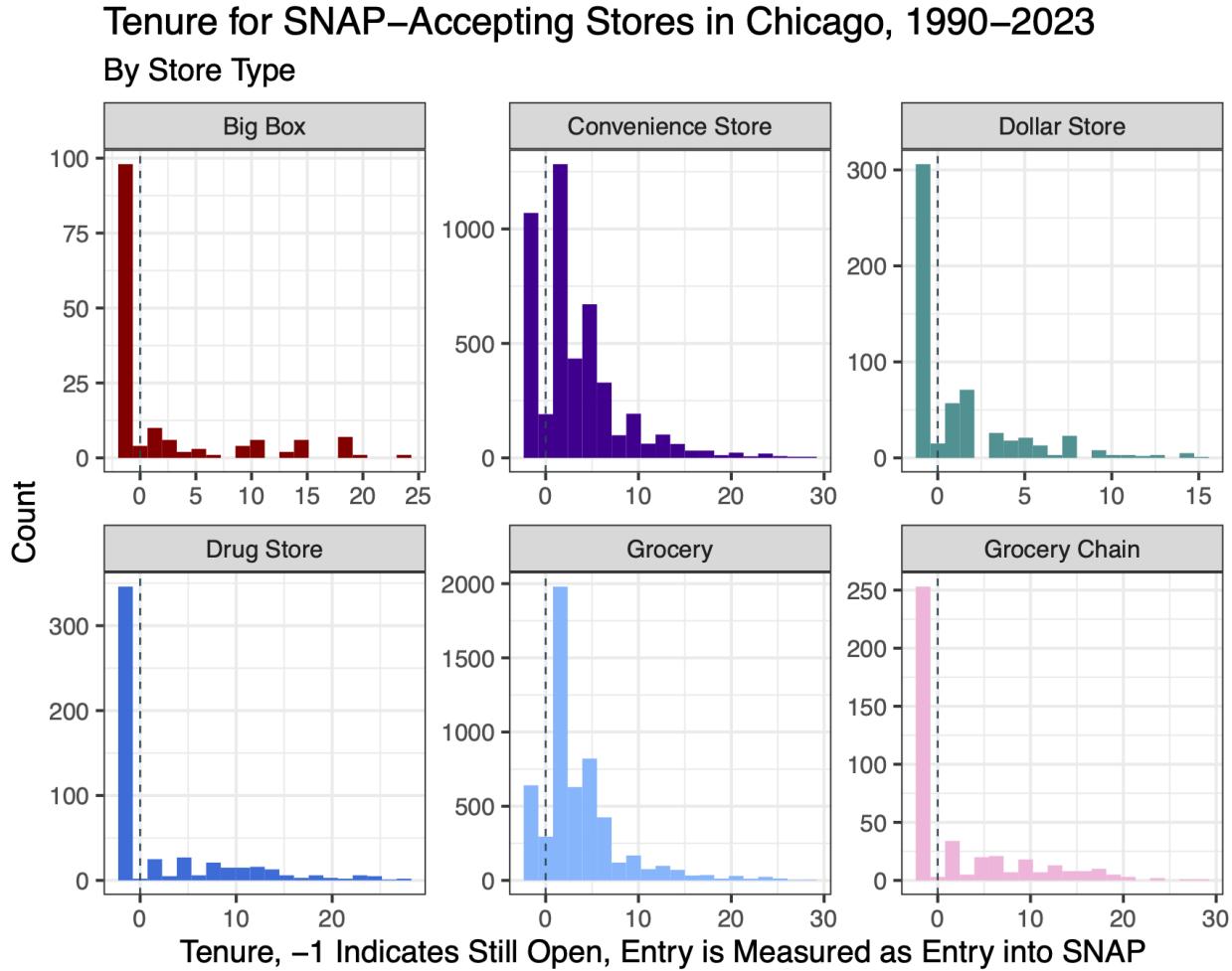
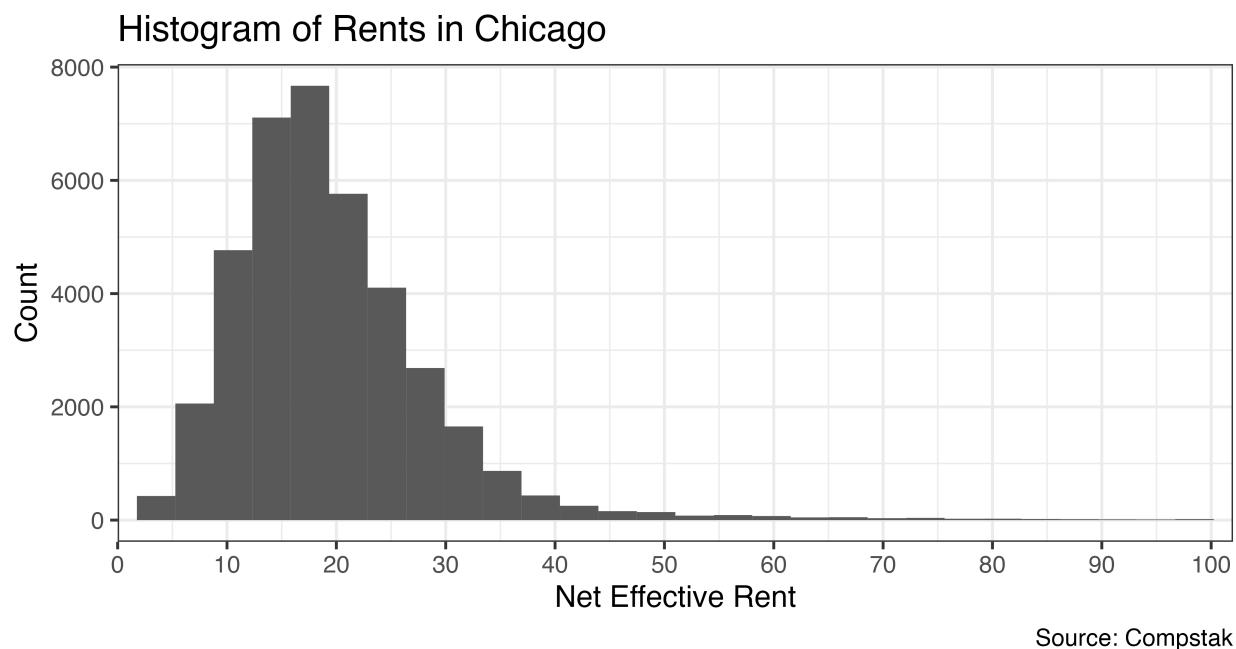


Figure 19: Grocery Store Tenure: Age of the Retailer Location When it Closes



Source: SNAP Retailer Database. Figure plots the number of years each store stays open by store type. At $x = -1$ is the mass of stores that has not yet closed. The vast majority of chain grocery stores or big box stores do not close over the time period. Each row represents a different city, and each column represents a different variable. Most stores do not exit (column 5), and grocery chains have even fewer exits (column 4). Conditional on there being an exit, the grocery tenure doesn't follow super clear patterns, however there are spikes at 5, 15 and 25 years. Exit is especially common in NYC and for small grocers, and so I expect these all have a good guy guarantee and can leave beforehand. In NYC, these tenures are actually on the upper end of the distribution of lease ages at exit compared other types of commercial space in NYC ([Moszkowski and Stackman \(2022\)](#)), even if the NYC grocers exit at a much younger lease age than grocers in other cities. Large grocers tend to have longer tenures than small grocers and convenience stores.

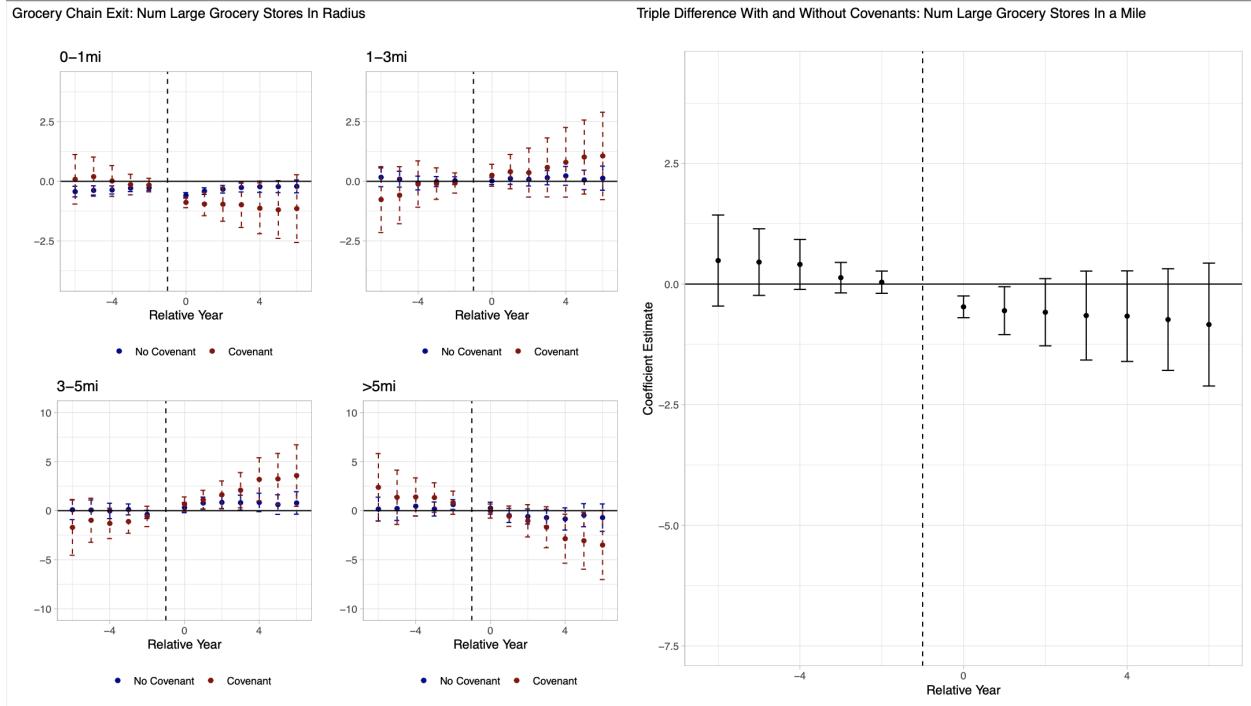
Figure 20: Rental Prices in the Data



Source: Compstak

Source: Compstak. Histogram of rental prices in the Compstak data.

Figure 21: Number of Grocers



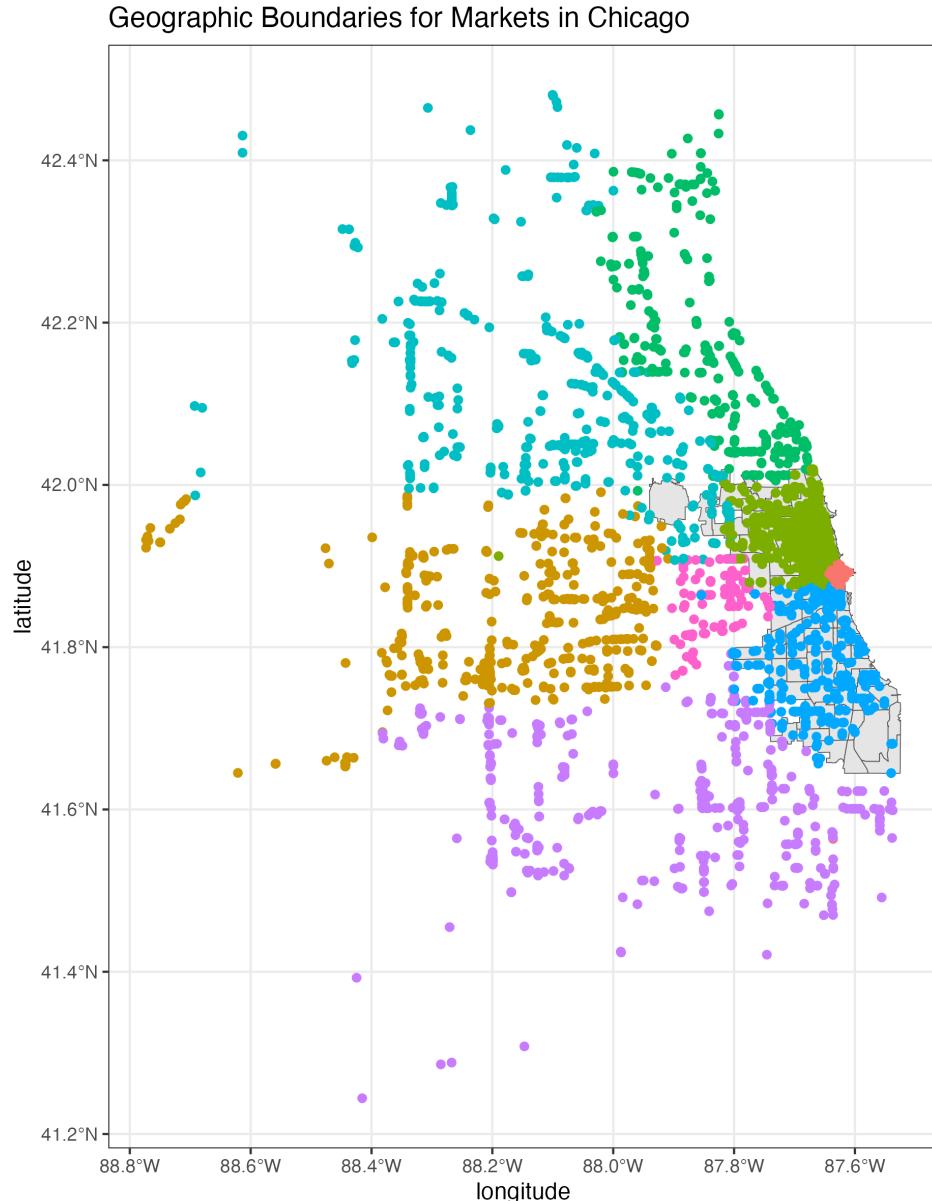
Notes: Figure shows an event study regression where the event is grocery exit and the outcome is grocery count, by exclusive dealing status. The grocer did not have an exclusive dealing contract (blue) and did have an exclusive dealing contract (red). The control group are chain stores that also exit in Cook county, but those that do not enter with a exclusive dealing. The left hand size specification is $y_{r(i)t} = \sum_{k=-T, k \neq 1}^T \delta_k D_{it} + \text{zip}_i + \text{year}_t + \epsilon_{it}$. The right hand size specification is $y_{r(i)t} = \sum_{k=-T, k \neq 1}^T \beta_k \text{excl. deal}_{it} + \text{excl. deal}_i + \text{zip}_i + \text{year}_t + \text{excl. deal}_i \text{year}_t + \text{excl. deal}_i \text{zip}_i + \text{zip}_i \text{year}_t + \epsilon_{it}$.

Figure 22: Exclusive Dealing Contracts and Demand Estimate Complementarities



Source: Numerator and Cook County Recorder of deeds. Figure overlays blocking patterns from exclusive dealing contract and product demand estimates.

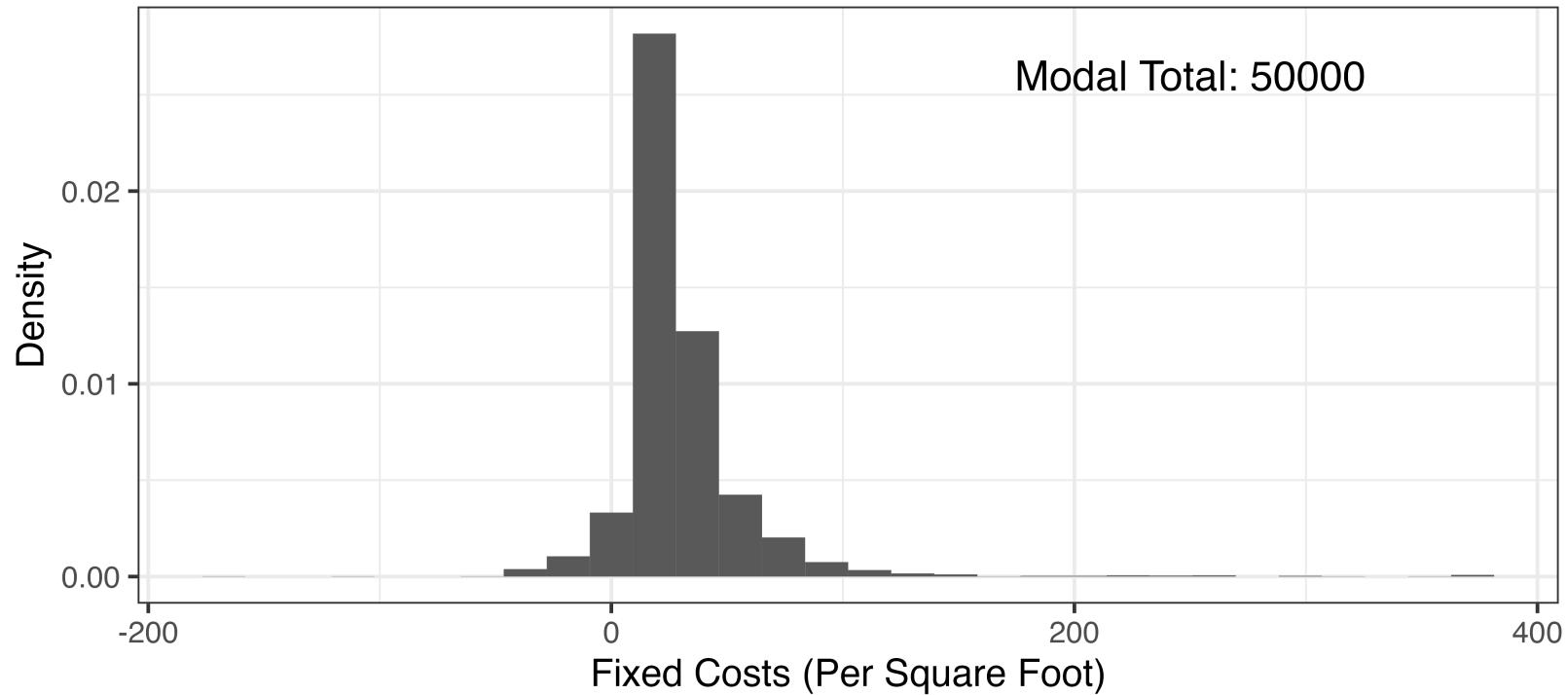
Figure 23: Markets in Chicago: Available Retailer Locations 2000-present



Source: Compstak. Data shows the total potential locations for all retailers (retailers and co-locating stores) in the analysis. The potential locations are colored by different markets. The boundaries are defined to minimize the probability a consumer shops across boundaries, from data and conversations industry professionals.

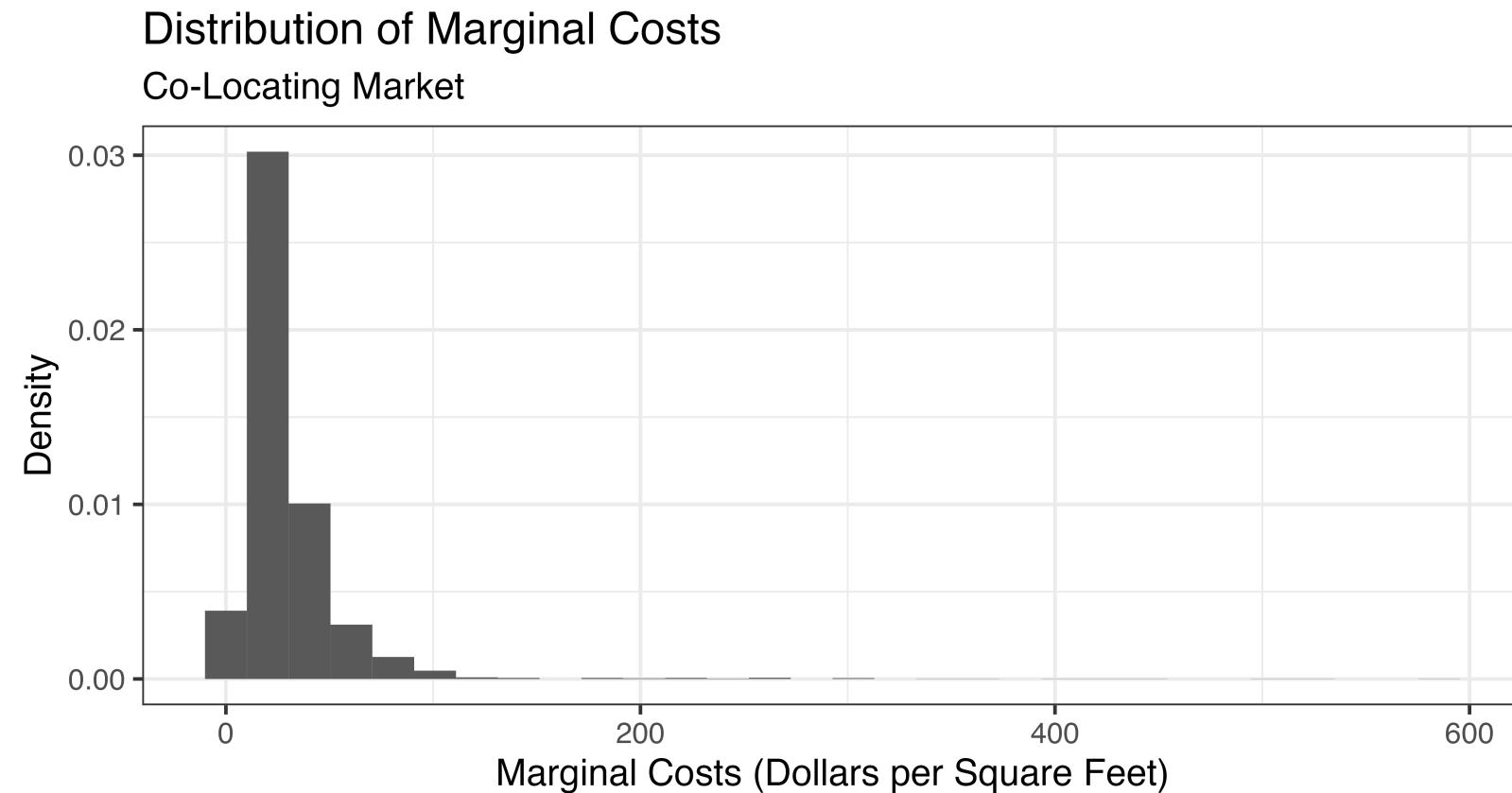
Figure 24: Fixed Costs, Co-Locating Market

Distribution of Fixed Costs Co-Locating Market



Notes: Estimates of the fixed costs of entry in the co-locating market.

Figure 25: Marginal Costs, Co-Locating Market



Notes: Estimates of landlord marginal costs for co-locating stores.

C Tables

Table 10: Most Frequent Retailers by Size and Parent Company

| Parent | Retailer | Size |
|---------|--------------------|----------------|
| Amazon | Whole Foods | Large |
| Safeway | Jewel Osco | Large |
| Kroger | Mariano's (Kroger) | Large |
| Kroger | Food 4 Less | Large |
| Aldi | Aldi | Medium |
| Aldi | Trader Joe's | Medium |
| Costco | Costco | Very Large |
| Meijer | Meijer | Very Large |
| Walmart | Sam's Club | Very Large |
| Walmart | Walmart | Very Large |
| Target | Target | Large |
| | Drug Store | Medium / Small |
| | Dollar | Medium / Small |
| | Liquor | Small |
| | Other Food | Medium / Small |
| | All Other | Medium / Small |

Notes The retailers (and parent company, if retailers share a common parent company) included in the analysis are those with the largest market share and most frequent trips. Retailers and potential locations are categorized into coarse location size groups.

Table 11: Chicago Grocery Chains with Exclusive Dealing Contracts

| | | |
|---------------------------------|----------------------|--------------|
| Aldi | Jewel Osco (Safeway) | Trader Joe's |
| Delray Farms | Mariano's (Kroger) | Whole Foods |
| Dominicks Finer Foods (Safeway) | Meijer | |
| Food 4 Less (Kroger) | Save a Lot | |
| Gordon Food Service Store | Tony's Fresh Market | |

Notes: Table reports retailers in Chicago which have exclusive contracts. Data is for Cook County, IL. Data comes from the Cook County office recorder and the SNAP database.

Table 12: Subset of Exclusive Dealing Data

| | | | Num | Frac |
|-----------------|---|-------------|-----|------|
| Total | → | | 196 | |
| Own/Lease | → | Own | 64 | 0.33 |
| | | Lease | 131 | 0.67 |
| Buy/Sell | → | Buy | 8 | 0.21 |
| | | Sell | 30 | 0.79 |
| Type | → | Deed | 28 | 0.19 |
| | | Agreement | 27 | 0.19 |
| | | Memorandum | 77 | 0.53 |
| | | Restriction | 11 | 0.08 |
| | | Termination | 2 | 0.01 |
| Grocery Grantor | → | Yes | 80 | 0.5 |
| | | No | 72 | 0.54 |
| Covenant Timing | → | Enter | 94 | 0.48 |
| | | During | 74 | 0.38 |
| | | Exit | 13 | 0.07 |
| | | Not Grocery | 15 | 0.08 |

Table 13: Exclusive Dealing Observed in Chicago

Notes: Source: Cook County Recorder and SNAP. Subsetting to 196 grocery covenants in Chicago, and characterizing the restrictions. The majority of the covenants from leasing agreements between a landlord and a grocery store tenant, the majority of which are entry covenants (half of the covenants overall are entry covenants). Amongst the covenants for properties that are owned by the grocery store, 80% are established when the property is sold: after the grocery store presence is gone from that specific location (whether there was a grocery store to begin with is unclear). These covenants are found in a variety of legal documents: lease memoranda, deeds, agreements, restrictions, easements, and terminations.

Table 14: Exclusive Dealing Observed in Chicago: Subset of Data

| | | | <i>Num</i> | <i>Frac</i> |
|-----------------|---|--------------------|------------|-------------|
| Total | → | | 196 | |
| Text Length | → | Short | 72 | 0.39 |
| | | Long | 113 | 0.61 |
| Radius | → | Property | 104 | 0.58 |
| | | Adjacent Property | 44 | 0.25 |
| | | Miles (median 0.5) | 30 | 0.17 |
| Duration After | → | Years (median 8) | 62 | 0.46 |
| | | No | 72 | 0.54 |
| Covenant Timing | → | Enter | 94 | 0.48 |
| | | During | 74 | 0.38 |
| | | Exit | 13 | 0.07 |
| | | Not Grocery | 15 | 0.08 |

Notes: Source: Cook County Recorder. Detail of the extent to which the covenants might restrict competition. Covenants that are longer restrict more store types, and constitutes 60% of the observed covenants. Shorter covenants typically only block the same store type. Next, the covenant can bind at a variety of different radii: the property (typically the shopping center), within a certain mile radius (the median is .5), and the adjacent property. The vast majority of covenants bind at that specific shopping center. Finally, covenants can last even when a grocery store is not present at that location. The median duration is 8 years, and 62 explicitly detail a duration after exit.

Table 15: Summary Statistics of the rental data

| Rents (Dollars/sqft/month) | |
|----------------------------|-------|
| Mean Rents | 20.02 |
| 5th percentile | 8.10 |
| 25th percentile | 13.65 |
| Median | 18.07 |
| 75th percentile | 23.80 |
| 95th percentile | 35.32 |

Notes: Source: Compstak. Summary statistics of the rental data.

Table 16: Regression of Exclusive Dealing Status on Demographics

| | Exclusive Dealing Balance (1) |
|------------------------------|-------------------------------------|
| log(Real Income) | 0.0153 (0.0466) |
| log(Pop Density) | -0.0017 (0.0067) |
| Share Unemployed | 0.0242 (0.0622) |
| Poverty | -0.0703 (227,876.7) |
| Share Women | 0.0062 (5,607.7) |
| Share Black | -0.1409 (0.2889) |
| Share White | 0.0046 (0.0819) |
| Share Hispanic | -0.0267 (0.0321) |
| Share Asian | -0.0054 (0.1143) |
| Share Travel Less 30 | -0.0002 (1,097.3) |
| Share Travel 30 to 60 | 0.0039 (4,216.7) |
| Share Travel 60 to 90 | -0.0007 (1,174.7) |
| log(Housing Rent) | 0.0005 (5,496.0) |
| Housing Occupied | 3.28×10^{-6} (21.19) |
| Housing Vacant | -0.0010 (2,878.2) |
| Observations | 6,252 |
| R ² | 0.96883 |
| submarket fixed effects | ✓ |
| year start fixed effects | ✓ |
| tract fixed effects | ✓ |
| space type fixed effects | ✓ |
| building class fixed effects | ✓ |
| tenant id fixed effects | ✓ |

Source ACS 2009-2023, Census 1990, 2000, SNAP, Cook County Recorder Office, and Compstak.

Table 17: Hedonic Price Regression

| | log(Net Effective Rent) |
|---------------------------------------|-----------------------------------|
| | OLS |
| Exclusive Dealing | 0.3221*** (0.0811) |
| 1{Grocer} | 0.0458 (0.0533) |
| log(Transaction Sqft) | -0.0579*** (0.0072) |
| log(Lease Term) | 0.0008 (0.0186) |
| log(Real Income) | -0.0823 (0.0480) |
| log(Pop Density) | 0.0402* (0.0179) |
| Share Unemployed | 0.1379* (0.0705) |
| Poverty | 0.4996 (489,924.0) |
| Share Women | -1.331 (304,593.8) |
| Share Black | -0.4683 (0.4032) |
| Share White | 0.3861 (0.3181) |
| Share Hispanic | 0.3058* (0.1410) |
| Share Asian | 0.4250 (0.3330) |
| Share Advanced Degree | 0.1095 (2,976.9) |
| Share Travel Time to Work: < 30 mins | -0.0474 (4,862.6) |
| Share Travel Time to Work: 30-60 mins | 5.43×10^{-7} (0.0037) |
| Housing Occupied | 0.1405 (15,739.9) |
| 1{Covenant} 1{Grocer} | -0.4604 (0.5900) |
| Observations | 6,478 |
| R ² | 0.41514 |
| <i>Fixed Effects</i> | |
| Submarket | ✓ |
| Year Start | ✓ |
| Tract | ✓ |
| Space Type | ✓ |
| Building Class | ✓ |

Source ACS 2009-present, Census 1990, 2000, SNAP, Cook County Recorder Office, and Compstak.

Table 18: Log Density of Nearby Competitors with Chain Fixed Effects

| | log(Density) | | | | | | |
|-------------------|-----------------------|---------------------|--------------------|--------------------|---------------------|---------------------|---------------------|
| | 0-.2mi (1) | 0-.5mi (2) | 0-1mi (3) | 0-2mi (4) | 0-5mi (5) | 0-8mi (6) | Allmi (7) |
| Exclusive Dealing | -0.2792** (0.1135) | -0.1283 (0.1279) | 0.1436 (0.1087) | 0.0852 (0.0790) | -0.0248 (0.0938) | -0.0615 (0.1001) | -0.0571 (0.1023) |
| Observations | 1,846 | 2,609 | 2,932 | 3,167 | 3,193 | 3,193 | 3,193 |
| R ² | 0.65702 | 0.65095 | 0.77363 | 0.83512 | 0.84039 | 0.82224 | 0.54131 |
| zip5 FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| year open FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| store name FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Notes: Table reports coefficients and 95% confidence interval from regression of number of competitors per square mile on whether or not the store has an exclusive deal, with year, zip5, and retailer fixed effects. We only use grocery chains and big box stores. Competitors are defined as grocery, big box, and drug stores. Data is based on the exclusive deal data from the Cook County recorder office and the retailer location, entry, and exit comes from the SNAP data.

Table 19: Log Density of Nearby Competitors without Chain Fixed Effects

| | log(Density) | | | | | | |
|-------------------|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 0-.2mi (1) | 0-.5mi (2) | 0-1mi (3) | 0-2mi (4) | 0-5mi (5) | 0-8mi (6) | Allmi (7) |
| Exclusive Dealing | -0.2787*** (0.0963) | 0.0750 (0.1481) | 0.1448 (0.1087) | 0.0650 (0.0625) | 0.0473 (0.0704) | 0.0172 (0.0698) | 0.0393 (0.0725) |
| Observations | 1,846 | 2,609 | 2,932 | 3,167 | 3,193 | 3,193 | 3,193 |
| R ² | 0.57742 | 0.59761 | 0.75900 | 0.82751 | 0.82982 | 0.80714 | 0.47704 |
| zip5 FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| year open FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Notes: Table reports coefficients and 95% confidence interval from regression of number of competitors per square mile on whether or not the store has an exclusive deal, with year and zip5 fixed effects. We only use grocery chains and big box stores. Competitors are defined as grocery, big box, and drug stores. Data is based on the exclusive deal data from the Cook County recorder office and the retailer location, entry, and exit comes from the SNAP data.

Table 20: Density of Nearby Competitors with Chain Fixed Effects

| | log(Density) | | | | | | |
|-------------------|-----------------------|---------------------|--------------------|--------------------|---------------------|---------------------|---------------------|
| | 0-.2mi (1) | 0-.5mi (2) | 0-1mi (3) | 0-2mi (4) | 0-5mi (5) | 0-8mi (6) | Allmi (7) |
| Exclusive Dealing | -0.2792** (0.1135) | -0.1283 (0.1279) | 0.1436 (0.1087) | 0.0852 (0.0790) | -0.0248 (0.0938) | -0.0615 (0.1001) | -0.0571 (0.1023) |
| Observations | 1,846 | 2,609 | 2,932 | 3,167 | 3,193 | 3,193 | 3,193 |
| R ² | 0.65702 | 0.65095 | 0.77363 | 0.83512 | 0.84039 | 0.82224 | 0.54131 |
| zip5 FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| year open FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| store name FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Notes: Table reports coefficients and 95% confidence interval from regression of number of competitors per square mile on whether or not the store has an exclusive deal, with year, zip5, and retailer fixed effects. We only use grocery chains and big box stores. Competitors are defined as grocery, big box, and drug stores. Data is based on the exclusive deal data from the Cook County recorder office and the retailer location, entry, and exit comes from the SNAP data.

Table 21: Density of Nearby Competitors without Chain Fixed Effects

| | log(Density) | | | | | | |
|-------------------|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 0-.2mi (1) | 0-.5mi (2) | 0-1mi (3) | 0-2mi (4) | 0-5mi (5) | 0-8mi (6) | Allmi (7) |
| Exclusive Dealing | -0.2787*** (0.0963) | 0.0750 (0.1481) | 0.1448 (0.1087) | 0.0650 (0.0625) | 0.0473 (0.0704) | 0.0172 (0.0698) | 0.0393 (0.0725) |
| Observations | 1,846 | 2,609 | 2,932 | 3,167 | 3,193 | 3,193 | 3,193 |
| R ² | 0.57742 | 0.59761 | 0.75900 | 0.82751 | 0.82982 | 0.80714 | 0.47704 |
| zip5 FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| year open FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Notes: Table reports coefficients and 95% confidence interval from regression of number of competitors per square mile on whether or not the store has an exclusive deal, with year and zip5 fixed effects. We only use grocery chains and big box stores. Competitors are defined as grocery, big box, and drug stores. Data is based on the exclusive deal data from the Cook County recorder office and the retailer location, entry, and exit comes from the SNAP data.

Table 22: Count of Nearby Competitors without Chain Fixed Effects

| | Store Count | | | | | | |
|-------------------|-----------------------|---------------------|------------------|-------------------|------------------|------------------|-------------------|
| | 0-.2mi (1) | 0-.5mi (2) | 0-1mi (3) | 0-2mi (4) | 0-5mi (5) | 0-8mi (6) | Allmi (7) |
| Exclusive Dealing | -0.5004** (0.2076) | -0.4309 (0.5227) | 1.688 (1.655) | 6.277* (3.435) | 11.01 (15.82) | 8.232 (25.76) | -20.94 (21.30) |
| Observations | 1,846 | 2,609 | 2,932 | 3,167 | 3,193 | 3,193 | 3,193 |
| R ² | 0.76783 | 0.80325 | 0.84795 | 0.89228 | 0.91316 | 0.92475 | 0.99443 |
| zip5 FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| year open FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| store name FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Notes: Table reports coefficients and 95% confidence interval from regression of number of competitors per square mile on whether or not the store has an exclusive deal, with year and zip5 fixed effects. We only use grocery chains and big box stores. Competitors are defined as grocery, big box, and drug stores. Data is based on the exclusive deal data from the Cook County recorder office and the retailer location, entry, and exit comes from the SNAP data.

Table 23: Count of Nearby Competitors without Chain Fixed Effects

| | Store Count | | | | | | |
|-------------------|-----------------------|--------------------|------------------|-------------------|------------------|------------------|------------------|
| | 0-.2mi (1) | 0-.5mi (2) | 0-1mi (3) | 0-2mi (4) | 0-5mi (5) | 0-8mi (6) | Allmi (7) |
| Exclusive Dealing | -0.5341** (0.2509) | 0.3280 (0.6708) | 2.247 (1.701) | 5.403* (3.115) | 16.59 (16.61) | 21.97 (29.76) | 21.57 (47.00) |
| Observations | 1,846 | 2,609 | 2,932 | 3,167 | 3,193 | 3,193 | 3,193 |
| R ² | 0.57259 | 0.65761 | 0.72608 | 0.78435 | 0.79091 | 0.76903 | 0.32289 |
| zip5 FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| year open FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Notes: Table reports coefficients and 95% confidence interval from regression of number of competitors per square mile on whether or not the store has an exclusive deal, with year and zip5 fixed effects. We only use grocery chains and big box stores. Competitors are defined as grocery, big box, and drug stores. Data is based on the exclusive deal data from the Cook County recorder office and the retailer location, entry, and exit comes from the SNAP data.