Distributional Effects of Exclusive Dealing in Commercial Real Estate

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Abstract

Exclusive dealing contracts in commercial real estate are common and designed to change where retailers locate and how households shop. This paper provides the first estimates of the effect of these exclusive dealing contracts on retail competition and consumer welfare. Novel descriptive evidence, scraped from publicly-available leases and deeds, documents the prevalence of these private contracts, the kinds of retailers that employ them, and shows evidence consistent with the retailers' stated goal of limiting business competition. With this new data, I estimate a model of consumer demand and retailer location choice where exclusives are an equilibrium outcome in the commercial real estate market. Product demand estimates show that the exclusive dealing contracts largely block the strongest substitutes. Estimates show that the greatest beneficiaries are the largest retailers, and smaller stores would benefit from a counterfactual world without exclusive dealing agreements. Consumers who live in the poorest and most sparse retail environments benefit the most from the exclusive dealing contracts.

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1 Introduction

Restrictive covenants are exclusive dealing contracts in commercial real estate which forbid certain firms from operating on specific premises. These private agreements are found in leases and deeds and exist to protect the business interests of one or both firms. For example, a Safeway in Chicago forbids its landlord from leasing property to other grocers, drug stores, liquor stores, and convenience stores. While these contracts are largely unstudied, there is a small but growing concern that these exclusive dealing contracts foreclose on competitor entry, and in doing so create food deserts. (Leslie (2021), Kang (2022), Frerick (2024)).

To my knowledge, there is no economics research analyzing the effect or documenting the prevalence of this type of exclusive dealing contract in commercial real estate. This is despite potentially large implications for consumer welfare and retail competition. The exclusive dealing contracts can change which firms enter the market, where firms locate, and what prices are set. Importantly, these exclusive dealing contracts can also change which stores co-locate, which affects spillovers across retailers. Through these channels, exclusive dealing in commercial real estate can affect consumers' choices, prices, and distances to retailers, as well as consumer welfare.

This paper establishes the prevalence, the effect on consumer welfare, the effect on firm profitability, and the distributional effects for consumers and firms. To do so, I document the prevalence of exclusive dealing contracts using a novel dataset scraped from publicly-available leases and deeds. I show evidence that exclusive dealing does limit competition: prices are 20% higher in exclusive dealing contracts and stores with exclusive dealing contracts have 30% fewer competitors nearby. To explore this further, I build a model with two markets: first, a model of retailer location choice where exclusive dealing is an equilibrium outcome in the commercial real estate market, and second, model of the consumer product market with complementarities across retailers. This model allows me to compute a counterfactual where landlords and retailers cannot explicitly contract on exclusivity. The counterfactuals show that large national grocers benefit the most from exclusive dealing contracts, and smaller stores would benefit the most from a ban on exclusive dealing. The welfare effects for consumers are depend on the location: In the poorest and most retail sparse neighborhoods, consumers benefit from this form of exclusive dealing, in poor locations near wealthier ones, consumers would benefit from a ban on exclusive dealing.

To conduct my analysis, I construct two novel data sets: data on retailer location choice and data on exclusive dealing contracts. I construct a retailer's location choice set from a dataset on planned retail, acquired from a startup

called Build Central (formerly named Planned Grocery). This startup collects and sells planned retail locations to retailers so that the retailers know where they and their competitors may enter; with this data, I do the same. Next, I build the dataset on exclusive dealing contracts: I scrape publicly available documents from the Cook County (Chicago) recorder website, digitize the pdfs, and extract the exclusive dealing contracts. From this I construct a yearly panel with the set of properties that forbid retailer entry, which retailers are forbidden from entering, and which retailers have the exclusive dealing contract in their leases.

With this data, I document prevalence of exclusive dealing contracts, the kinds of retailers that employ them, and show evidence consistent with the retailers' stated goal of limiting business competition. First, I find that all the large national grocery chains have exclusive dealing contracts in at least one store location, 36% of grocery chains have exclusive dealing contracts, and the contracts are also commonly found in drug and discount chains. Second, I find that prices are 20% higher for stores with exclusive dealing contracts, controlling for retailer and surrounding demographics. Third, I find that within retail chain, stores with exclusive dealing contracts are surrounded by fewer competitors that stores without exclusive dealing contracts within .2 mi. This .2 mi radius is the radius the literature has documented as relevant for cross- store spillovers (for recent empirical evidence on spillovers in the grocery industry, see Qian et al. (2023) and Knight (2023)).

To understand the effects of exclusive dealing on households and firms, I build and estimate a model of the commercial real estate market and the consumer product market. I estimate the model with 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 the ideal setting to study the average and distributional effects of exclusive dealing.

In the product market, households shop for bundles of retailers and have preferences over retailer prices, distances from home, and retailer-specific characteristics. To account for spillovers across firms, as well as patterns of trip-chaining documented in the data[1], the model allows for complementarities across individual retailers (following Gentzkow (2007)'s model with complementarities). This allows me to document, relative to the outside good, which stores are complements and which are substitutes. As a check to both the model validity and the effectiveness of the exclusive dealing contracts, I find that closer substitutes, as predicted by the demand estimates, are more likely to show up in more exclusive dealing contracts for that retailer.

[1]In the data, 40% of grocery store trips are to more than one retailer, and 55% of grocery store trips to a national grocery store is to a store nearby (if it is possible to shop at a nearby store with that retailer).

Complementarities in the product market create externalities between retailers. As a result, larger retailers generate demand for nearby smaller retailers. The exclusive dealing contracts exist in part to limit competition from retailers who limit the competition the retailer generates. The retailer balances the higher profits due to limited rival entry and increased probability of entry against the price of exclusivity at each location. The landlord balances higher revenues from the main retailer due to exclusivity as well as the increase probability of tenant entry with the lowered chance that a high paying co-located tenant would enter. Estimating the commercial real estate market give estimates of the marginal costs for the landlords and the fixed cost of entry, and the retailer willingness to pay for exclusivity.

I estimate the model in three steps. First, I estimate demand in the product market using maximum likelihood and use the estimates to compute the profitability of each location for each combination of retailers and consumer welfare. Next, I take the estimates from the product market and estimate the probability of entry and expected profitability from the co-locating stores. I estimate the co-locating store choice as a discrete-choice problem of location choice with no exclusive dealing. These estimates allow me to compute the expected loss in profits from exclusive dealing to the landlord. Finally, I estimate parameters in the retail market with simulated maximum likelihood, which allows me to compute the parameters that determine probability of entry and expected profitability for each retailer and locations.

Using the estimated parameters, I compute a counterfactual where retailers and landlords cannot explicitly contract on exclusivity. I estimate consumer welfare with the compensating variation, and expected landlord, retailer, and co-locating firm profitabilities to understand the effect exclusive dealing has on the commercial real estate and product markets. The counterfactuals show that large national grocers benefit the most from exclusive dealing contracts, and smaller stores would benefit the most from a ban on exclusive dealing. The welfare effects for consumers are depend on the location: In the poorest and most retail sparse neighborhoods, consumers benefit from this form of exclusive dealing, in poor locations near wealthier ones, consumers would benefit from a ban on exclusive dealing.

Related literature The primary contribution is to develop an empirical framework to evaluate the effects of exclusive dealing in the upstream commercial real estate market on firm profitability and downstream consumer welfare. Additionally, the paper estimates the distributional consequences for firms and consumers.

To my knowledge, this paper is the first to study these types of exclusive dealing contracts. Legal scholarship on these exclusive dealing contracts focuses on the existence and details of the contracts (Sturtevant (1959), Lund-

berg (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)).

The paper builds on long theoretical literature on the welfare effects of exclusive dealing. This literature focuses on the types of efficiency gains and externalities that lead to procompetitive or anticompetitive effects of exclusive dealing (Posner (1976), Bork (1978), Marvel (1982), Aghion and Bolton (1987), Klein and Murphy (1988), Klein (1988), Rasmusen et al. (1991), Besanko and Perry (1993), Bernheim and Whinston (1998), Segal and Whinston (2000), Fumagalli and Motta (2006), Simpson and Wickelgren (2007), Asker and Bar-Isaac (2014))[2], and predicts when the exclusive dealing contract can be observed (Bernheim and Whinston (1998))[3]. Empirical work has focused on whether exclusive dealing leads to gains in efficiency (from reduced double marginalization) or foreclosure of rival entry, largely focusing on settings where exclusive dealing prevents rival competition in the upstream market (see Lafontaine and Slade (2007) for a survey of the empirical literature, as well as Chipty (2001), Sass (2005), Nurski and Verboven (2016), Asker (2016), and Sinkinson (2020), Le (2024)). There are two other studies where exclusive dealing prevents business with downstream competitors, Lee (2013) studies exclusive dealing with network effects and Ater (2015) studies exclusive dealing in Israeli shopping malls, where landlords commit to renting to a single hamburger shop, finding evidence consistent with foreclosure of rival competition. Relative to the existing literature, this paper contributes four points. First, the externality that generates the need for an explicit exclusive contract is new in this setting. This 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.[4] In principle, exclusive dealing prevents the retailer's profits from being negatively affected by the demand it drives to the

[2]Early work – called the "Chicago school" – showed that absent externalities, exclusive dealing could not be anticomptitive because upstream firm has pay the downstream firm accept exclusivity (Posner (1976) and Bork (1978)). In the theoretical literature, the welfare effects of exclusive dealing are ambiguous. Broadly, exclusive dealing is considered procompetitive 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 some externality. For example Bernheim and Whinston (1998) show that when it is possible to have an exclusive deal in one market that forecloses on a rival's entry in a different market, the exclusive dealing is contract maybe anti-competitive in that second market.

[3]Bernheim and Whinston (1998) distinguishes between settings where there is an effective exclusive deal (where the upstream firm chooses to contract with only one retailer regardless) to settings where there is an explicit exclusive deal (where the contract is written and can in theory be observed). This paper's settings

[4]This is a feature of the market which is called "anchored" real estate, where one retailer drives demand for nearby retailers.

location. Second, exclusive dealing is explicitly contracted on due to asymmetric information in the commercial real estate market: the landlord cannot observe retailer profits and thus cannot choose the set of retailers that will maximize total surplus to each location.[5] Third: this is the most broad set of exclusive dealing restrictions documented in this literature, extending notions of exclusive dealing from the exact product (eg hamburgers or beer) to a wide set of firms that a retailer believe will negative affect profits. Fourth: this data provide a "revealed preference" approach to the retailers' stated competitors.

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.

Second, this paper builds on the long literature in retail on grocery demand (**?**, Smith (2004), **?**, **?**, Smith and Øyvind Thomassen (2012), **?**, Thomassen et al. (2017), Handbury (2021), **?**, Mehta and Ma (2012)), as well as the literature on food desert (Allcott et al. (2019)). While much of the prior literature takes retailer locations as given, 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 estimates househol distaste for travel. The closest paper, **?** measures preferences for retailer chain, focusing on consumer heterogeneity. This paper focuses on trip chaining and complementarities across stores. Additionally, this paper builds on the trip chaining literature (Oh and Seo (2023), Miyauchi et al. (2022), Rhodes and Zhou (2019), Relihan (2022)), as trip chaining forms reason for exclusive dealing in the model.

Third, this paper brings a different commercial real estate setting to the commercial real estate spillovers/shopping malls, (Moszkowski and Stackman (2022), Vitorino (2012), Stackman and Moszkowski (2023)).

Finally, this paper contributes to the literature on retailer location choice in commercial real estate. There is a long literature on competition in space going back to Hotelling (1929) and Salop (1979). Modern day models often build off of Bresnahan and Reiss (1990), Bresnahan and Reiss (1991), Seim

[5]If the landlord could observe total surplus, then the landlord would choose the set of entrants that achieve the highest possible total surplus, as in Bernheim and Whinston (1998) and Nurski and Verboven (2016).

(2006), Jia (2008), Caoui et al. (2022), Nishida (2015). Relative to those paper, this paper involves location choice in a much narrower setting – the precise location, instead of the brad location such as MSA or market.

2 Institutional Details

Definition 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[6] 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.

Content 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 specific retailers blocked from entering (as shown in Figure 7), to naming a narrow set of industries (as shown in Figure 8), to naming a broad set of industries (as shown in Figure 6). In each case, the contents of the exclusive dealing contract reflect – at least in part – the retailer' perceived competition. For example, Figure 6 shows an excerpt where Safeway prohibits grocers, drug stores, liquor stores, restaurants, gas stations,

[6] A major grocery chain the United States.

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 7), to while the lease is in effect (as shown in Figure 6), to many years after the retailer has left the premises (as shown in Figure 8). The radius varies as well, from the exact premises of the store (as shown in Figure 8), to the shopping center (as shown in Figure 6), to specifying a radius (as shown in Figure 7, which specifies a 1 mile radius wherever the landlord or an affiliate owns property).

Grocery Anchored Commercial Real Estate Restrictive covenants are often found in anchor store leases, or the leases of large retailers that often drive food traffic to neighboring stores (these spillovers from the anchor retailer to other retailers are documented in Relihan (2022), Knight (2023), and Qian et al. (2023))[7]. Additionally, these stores sign long leases and rarely exit. When exit is costly, the restrictive covenant is one way for the anchor retailer to co-locate with stores that are complements and not with stores that cut into their profit.

In turn, the landlord has incentives to provide the exclusive dealing contracts as well. Since anchor will drive foot traffic for the whole area the landlord owns (often a shopping center), the anchor tenant will attract co-locating tenants. Therefore, the landlord leases first to the anchor, and then the landlord leases to a set of co-locating stores near the anchor. Industry experts cite both commitment and information asymmetry as reasons why restrictive covenants exist. In the former case, tenants need a commitment device to ensure that the landlord will not bring competition into a nearby property. In the later case, the landlord does not know the tenant's profitability or the effect of competition on tenant profits. On one hand, the landlord needs to rent to co-locating stores, and it doesn't want the anchor retailer to leave, so there is an incentive to not rent to co-locating competitors. 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. Explicitly pricing the exclusive deal mitigates some of the information asymmetry.

Challenges to restrictive covenants While little policy addresses these exclusive deals, restrictive covenants are challenged through litigation. In court, the exclusive deals are held up in some instances and struck down in others. When the provision is negotiated as a legitimate business interest, the restric-

[7] In my data, 40% of grocery store trips also involve stops to another retailer (trip chains). When a national chain grocery store co-locates with another store, half of trips to this large grocer will also include a second store.

tive covenant will hold up in court. For an example, 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. Restrictive covenant can be struck down down in court if it is deemed to violate the public interest. For example, 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 8), 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)*).

Food Policy As demonstrated in the above example, in the case of the grocery industry, scholars are concerned that these exclusives cause food deserts by displacing and foreclosing upon rivals (Leslie (2021), Kang (2022), Frerick (2024)). In 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. Given the resources local, state, and federal governments spend resources on food access in order to encourage healthy eating habits, there is the concern that restrictive covenants are the supply-side reason for food deserts.

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.

Exclusive dealing: To document the context of these exclusive dealing contracts, the paper scrapes little-known but 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. The data comes from Cook County, Illinois, and spans 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 and the 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: Potential locations are gathered from Build Central, a startup that tracks new projects in commercial real estate, as well as the SNAP Retailer Locator Data and Infogroup. Build Central provides early-stage, often pre-permit project data and location analytics across retail and commercial real estate (CRE), hotels, multi-family and single-family residential, medical, and energy and mining. The data is used by firms who choose where to locate, and to understand where their competitors locate and will locate. 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 data starts in 2015 and goes till present day.

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. – 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 the other prices and lease characteristics in the market. As a result, the data is selected from the group of brokers: to ensure that the data is representative, I compare moments in the data to industry reports on rents and lease characteristics.

Panel on consumer purchases: Numerator data is a omni-channel consumer panel data available through the Kilts Center at the University of Chicago. The panel spans 2017-2022 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. Since day and time of purchase is avail-

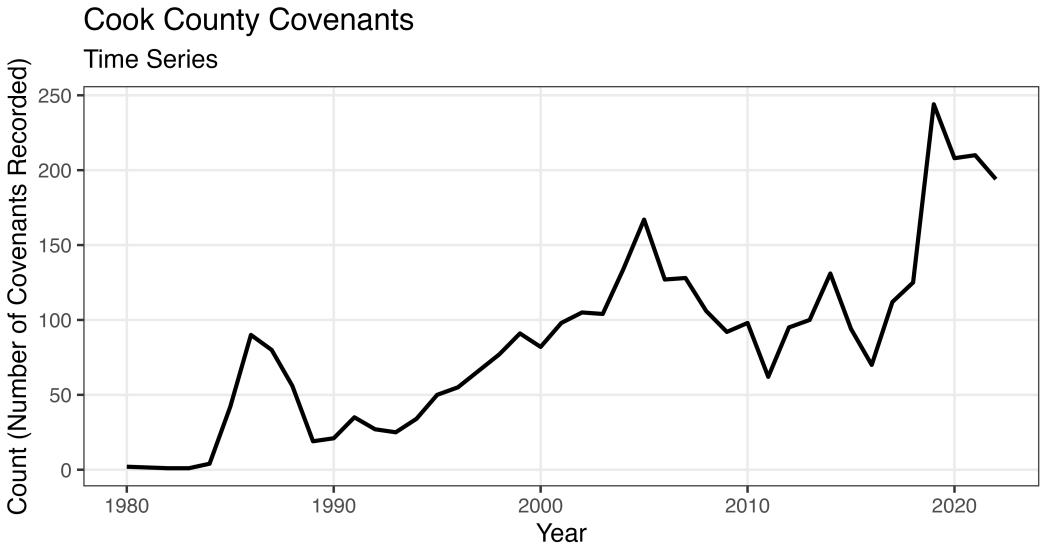
able, this data is used to compute when households trips to multiple stores. We consider a trip to be all of the stores a household shops at in person on the same day, and that the household takes the shortest route from home, to each store, and back (a trip is a unit of incurring a single distance cost). On a trip, a consumer purchases a set of individual items – Item ID's – that comprise the individual's basket of purchases for that trip. Numerator data classifies items in to several categories, broader and broader categories. Figure 9 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.

4 Stylized Facts

This section first shows that exclusive dealing is prevalent in commercial real estate. Then, this section shows multiple effects consistent with the firms' presumed goal of limiting competition: prices are higher for leases with exclusive dealing contracts, stores with exclusive dealing contracts have fewer competitors nearby, and consumer shopping patterns are different with exclusive dealing contracts.

4.1 Exclusive Dealing is Common and Increasing

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

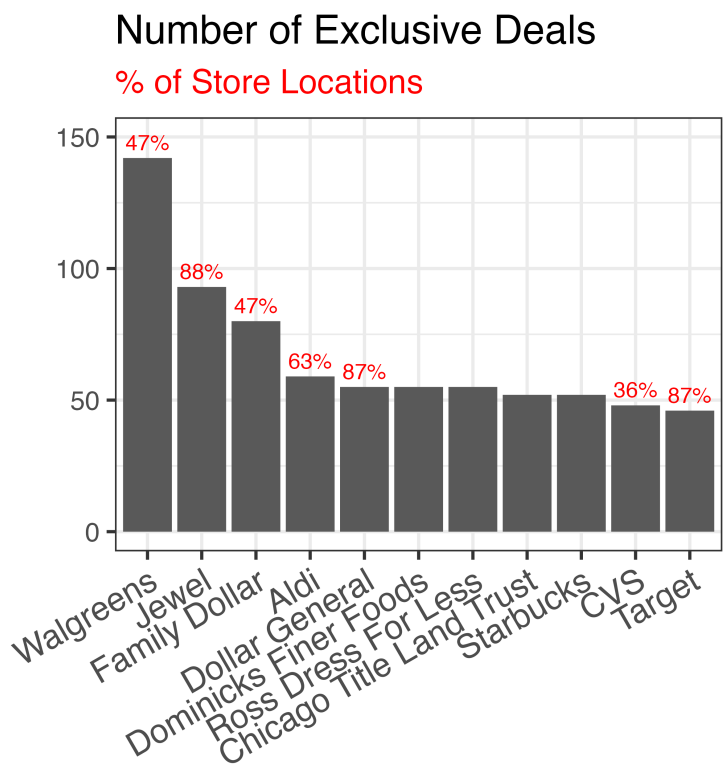


Source: Cook County Recorder Office. Figure plots a time series of exclusive dealing contracts recorded at the Cook County Recorder office, 1980-present.

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

Table 1 shows the prevalence of exclusive dealing contracts in the grocery sector in Chicago. Of the 371 exclusive dealing contracts that forbid a grocer or store that sells food from entering, 154 are found on grocery store locations, and the rest are found in similar industries such as discount stores and drug stores. Table 10 lists the grocery chain retailers that operate in Chicago with at least one exclusive dealing contract: importantly, the all of retailers with the highest market share use exclusive dealing contracts in their leases, and 30% of chain grocers have exclusive dealing contracts on premises.

Figure 3: Retailers with the Most Number of Exclusive Dealing Contracts



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

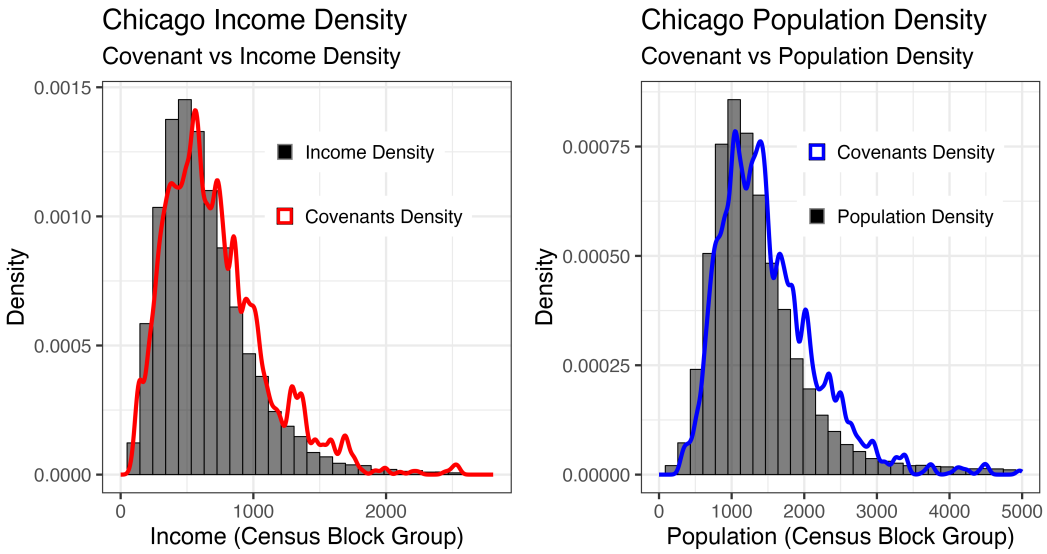
Extending the industries beyond grocery, Figure 3 and Figure 10 show the types of retailers and industries that have exclusive dealing contracts, and the fraction of the retailers' properties with exclusive dealing contracts. These figures show that a wide set of retailers have exclusive dealing contracts on their properties: exclusive dealing contracts are prevalent and commonly found in the leases of grocers, drug stores, discount stores, and dollar stores. The types of retailers use exclusive dealing contracts sell products are similar to their rivals' products; retailers with more differentiated products do not use exclusive dealing contracts. The retailers that use exclusive dealing contracts are the types of stores where price and distance matter most to consumers, and the content of the store don't matter as much: in the consumer panel data, most consumers shop close (within .25 miles) from home.

Table 1: Prevalence of Exclusive Dealing in Grocery Industry

Exclusive Dealing Contracts	Block Grocers *Total*	On A Grocer Location *Total*	*Fraction*
	371	154	0.42
Grocery Chains	Total	with Grocery Covenants *Total*	*Fraction*
by Chain	33	12	0.36
by Store	491	113	0.23

Notes: Table reports prevalence of exclusive dealing constracts amongst chains. Data is for Cook County, IL. Data comes from the Cook County office recorder.

Figure 4: 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.

4.2 Neighborhood Demographics

Figure 4 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 Table **??**. A regression of exclusive dealing contracts on demographic characteristics shows that exclusive dealing contracts are not explained by neighborhood demographics or socioeconomimc status.

4.3 Rental Prices

In a hedonic price regression, I regress rental prices on lease characteristics, demographics, and whether or not there is an exclusive on the property. I find that prices are 20% per square foot per year in properties with exclusive dealing, conditional on store retailer, time, location fixed effects and time varying demographics. Additionally, retailers pay a steeper premia for exclusivity in higher income neighborhoods. This is consistent with the idea that the landlord can extract additional rents for guaranteeing exclusivity, and that the landlord needs to be compensated more as demand at that location increases (as neighborhood income increases). Stores with larger stores and exclusive dealing contracts

$$\log y_{ijt} = \alpha_0 + \gamma cov_{ijt} + \sum_k \beta_k \log x_{kjt} + zip_j + year_t + \epsilon_{ijt}$$

Figure 5: Rental Prices as a Function of Household Income where the Store is Located, Exclusive Dealing

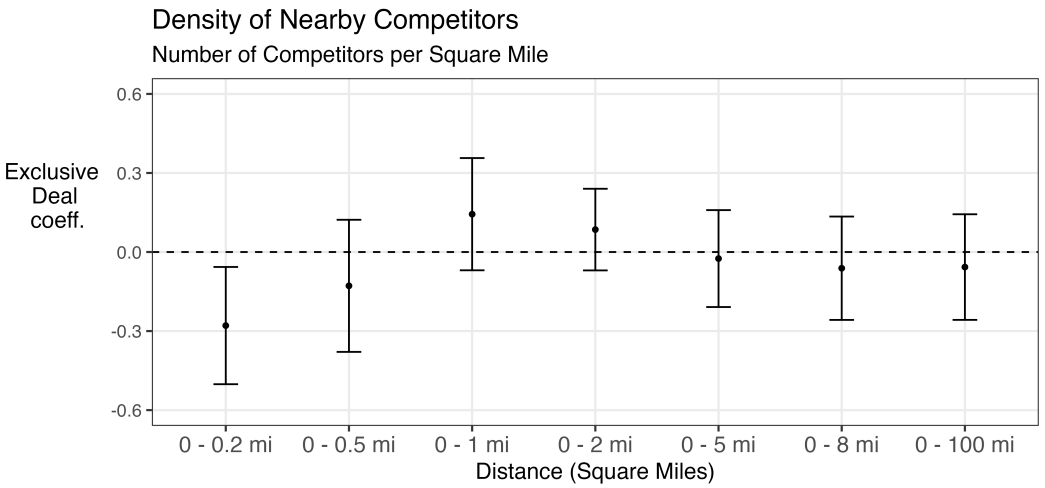
4.4 Density of Nearby Competitors

Retailers with exclusive deals have fewer competitors surround them (0-.2 mi), but more competitors farther away. This is consistent with the firms' presumed goal of limiting competition. The Table show a regression of the number of stores in the vicinity on whether or not there was a covenant on that store. The treatment group is made up of direct competitors to grocery stores. The control group are large and medium grocery stores without covenants. The regression coefficient is interpreted the additional number of stores around a grocery store if it has a covenant on the property. The results show that in the closest vicinity to the property - 0 to .2 mi -, grocery stores with covenants are surrounded by fewer medium and large grocery stores, and the result is significant. 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)). At a larger radius, expanding to 0-1 mile, the effect goes away: there are similar number of medium and large grocery stores near stores with covenants and stores without covenants. At a radius of 1-3 miles, the effect reverses. These results are consistent with the hypothesis that the covenant restrict competitions by pushing competitors farther away. When looking at the furthest radius, the effect goes away completely.

$$num\ stores_{r(i)t} = \beta \text{exclusive deal}_i + zip_i + year_t + retailer_i + \epsilon_{it}$$

where ***num stores*** is the num. of competitors / miles^2 in radius r around store i in year t, ***exclusive deal***$_i$ exclusive deal present for store i at entry, year, zip, retailer fixed effects. The retailers considered are Grocery and Big Box, and their competitors, according to the contracts, are Grocery, Big Box, and Drug stores.

Table ?? and Table 15 and Table ?? show the full specification results in the appendix.



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.

4.5 Event Study with Consumer Expenditures

In the product market, event-study evidence is presented that shows consumers reduce grocery expenditures following grocery exit only if the grocer had a restrictive covenant. As an example of how exclusive dealing contracts can affect consumers, I show the effect of grocery exit on consumers, comparing with and without covenants. To do so, I run an event study regression on consumer outcomes where the event is a grocery store exit.

I run the following event study specification,

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

where the event is a grocery exit in a chain, for those that exit with a covenant and those that exit without a covenant. The outcomes are log grocery store expenditure and log dollar store expenditure, shown respectively in Figure **??** and Figure **??**.

[OUTCOMES ARE REDACTED AT THE MOMENT UNTIL KILTS WAIT TIME ON THE PAPER ELAPSES]

A common concern with the event study strategy is grocery store exit is related to other features of the local retail environment that would affect other retailers. To test for changing patterns before grocery store entry, I estimate the treatment effect in the years leading up to the entry of a grocery store. I find a precisely estimated flat pre-trend, and a significant trend break at the time of the entry. Similarly, if grocery stores respond to changes in local demand conditions, other grocery stores would likely enter or exit even before the grocery store enters. I estimate the effect of grocery exit on other grocery stores and find precisely esimtated pretrends as well.

4.6 Resulting Ambiguity

While the stylized facts show correlation between exclusive dealing contracts and firm and consumer outcomes, the facts do not show whether these changes are good or bad. That is, descriptive evidence is both consistent with the theory that exclusive dealing encourages entry and with the theory that exclusive dealing forecloses on competition.

More broadly, the welfare effects of exclusive dealing is ambiguous. Both the theoretical economic literature, the legal literature, and the courts have deemed exclusive deals procompetitive in some cases and anticompetitive in others. Exclusive dealing can harm consumers in three cases: when (1) retailers foreclosure on rival entry, which reduces consumer options and (2) retailers displace rival entry, which increase consumer prices and distances (3) landlord extract rents for the exclusives, which is passed on to consumers in the form of higher prices. In the case of the grocery industry, scholars are concerned that these exclusives cause food deserts by displacing and foreclosing upon rivals. Exclusive dealing can benefit consumers when the retailer would not otherwise enter without the contract, benefitting the consumer through an incrased number of retailers.

5 Model

To understand which forces matter at play most, I model both the product market and real estate market. To quantify which effect matters the most for consumers, I estimate a demand model where consumers can bundle purchases across stores (consumers trip chain) and store complementarities are moderated by distance. These estimates show that the exclusives reflect consumer's preference with regards to cross-store complementarity, but that consumers show a strong distaste for distance, and so consumer welfare is harmed when the exclusives foreclose on close options.

We model how and when exclusive dealing contracts are chosen, and their impact on consumers. The goal of the model is to assess how consumer welfare, firm profitability, and firm location choice would change in a counterfactual world where landlords and tenants cannot contract on exclusivity explicitly. Because the counterfactual affects all locations and all retailers, this counterfactual is ill-suited to reduced form analysis.

Timing: The timing mimics the real-life timing of grocery-anchored commercial real estate. First, (1) each landlord posts up to two prices per firm: base price and a price for an exclusive contract r_{jma} where j is the retailer, m is the landlord, and a determines whether or not there is exclusivity. The exclusive dealing contract will forbid any competing firm from entering the landlord's land. Then, (2) each retailer chooses location and contract. Next, (3) given retailer entry decisions, the retailer paying the highest rent for each landlord enters. Exclusive dealing contracts and size constraints are enforced. Lastly in the commercial real estate market, (5) landlords set prices for fringe firms and they enter. Finally, (6) the product market clears. The product market is modeled at the retailer level, because the exclusive dealing contracts are signed at the retailer level. Prices in the product market are depend on the locations of all retailers in the market.

5.1 Consumer Demand for Bundles of retailers

In the model, the consumer take locations and characteristics of retailers as given and choose which retailers to shop at. The consumer's preference for a retailer depends on the retailer itself, the retailers' prices, distance from home, market-level demand shocks, and idiosyncratic factors. The consumer can shop at multiple retailers on the same day – a bundle –, and travels a shorter distance when shopping at the retailers together than both separately. Consumer i's utility follows the model with complementarities from Gentzkow (2007) and the model with discrete-choice demand with retailer and consumer interactions from Bayer et al. (2007) and is written as

$$u_{ibt}^{m} = -\alpha^{m} P_{bt}^{m} + \gamma^{m} d_{ib} + \Gamma_{b} + \xi_{bt}^{m} + \sigma_{i} + \lambda_{t} + \sum_{k,l} \sigma_{kl}^{m} X_{k(b)} y_{l(i)} + \epsilon_{ibt} \qquad (1)$$

where u_{ibt}^{m} is the utility household i in income group m receives from shopping at the bundle of retailers $b \in \mathcal{B}$ in market t, P_{bt}^{m} is the price of the bundle b for income group m in market t, d_{ib} is the total distance the household travels to shop at the bundle, ξ_{bt} is market-level demand shock which is unobserved to the researcher, σ_i and λ_t are area and time fixed effects, $X_{k(b)} y_{l(i)}$ capture the interaction between household demographic characteristics and retailer

characteristics, and ϵ_{ibt} is a household idiosyncratic preference for bundle b in market t.

Each product is a retailer or a bundle of retailers, $b \in \mathcal{B}$ are the retailers with the highest market share. These retailers comprise the main national chain grocery retailers, discount retailers, drug retailers (treated as one retailer), dollar retailers (treated as one retailer), liquor retailers (treated as one retailer), other grocery retailers – the independent grocers – (treated as one retailer). For categories of retailers, the consumers are assumed to shop at the closest retailer, regardless of brand (drug retailers, liquor retailers, and dollar retailers). I assume that household stop in either one or two retailers in one day, because trips to more than two retailers comprise less than .05% of the data. The outside good comprises all the other retailers that the consumers take trips to. When a "retailer" in $\mathcal{B}$ is in fact a category of retailer (drug retailers or other retailers), the consumer is choosing from their *preferred* retailer in the set. That is, the retailer represents the maximum utility the consumer can get from that retailer set (the same interpretation is taken in Cao et al. (2024)). Similarly, the outside good is the most-preferred of all of the other retailers they might shop at.

The set of goods are

$$\{\underbrace{\text{Jewel Osco, Mariano's, Whole Foods}}_{\text{chain grocer}}, \underbrace{\text{Meijer, Costco,Sam's Club, Target, Walmart}}_{\text{Big Box}}$$

$$\underbrace{\text{Aldi, Food 4 Less,Trader Joe's}}_{\text{Specialty food}}, \text{Other Food}, \underbrace{\text{Drug, Liquor, Dollar,}}_{\text{remaining outside}} \underbrace{\text{Other}}_{\text{outside good}} \}$$

Preferences depend on the price of the bundle, P_{bt}^m. When a household shops at one retailer, it is simply the price of that retailer, when the household stops at multiple retailers, it is the sum of price of the good at each retailer.

$$P_{bt}^m = \sum_{j \in b} \log p_{jt}^m$$

Prices vary across markets t and retailers j, and we assume retailers set prices uniformly for all their retailers in the same city, and vary these prices weekly (evidence on uniform pricing comes from DellaVigna and Gentzkow (2019)). A market t is thus a city-week-year. In order to compare prices across different retailers, prices need to be aggregated from household purchases of individual

barcodes to a retailer-level price, p_{jt}. I aggregate from individual barcode-level prices using a Stone price index following Atkin et al. (2018). Specifically, I regress expenditure-weighted log bar code prices on retailer fixed effects and bar code fixed effects, and use the retailer fixed effects as the retailer price. The price is thus the relative price of the retailer in the market, and the comparison across retailers is based on products common to all retailers in the market.[8]

Crucial to the utility and the question of exclsuve dealing are the cross-retailer complementarities. Preference also depend on an average measure of quality of the retailer or the retailer-bundle Γ_b. When the household shops at multiple retailers, Γ_b captures both the quality of each individual retailer and the complementarity between these different retailers (this follows the definition complementarities in Gentzkow (2007)).

To capture the importance of food access in the model, $\gamma^m d_{ib}$ is the utility (or distaste) from shopping at retailers farther away, controlling for the household's zip5 code or area. When a consumer shops at a single retailer, the distance is measured as the shortest possible distance home-retailer-home, when the consumer stops at two retailers, the distance measured as the shortest possible distance home-retailer 1-retailer 2-home. The identifying assumption is that the zip5 represents an exogenous measure of neighborhood quality, and that conditional on the zip, household location choice is as-good-as-random. With regard to exclusive dealing, as γ^m becomes more negative, the distaste for distance becomes more salient, the incentive to foreclose on a rival increases, and the value of exclusivity to the firm increases, and exclusive dealing becomes more salient. In the extreme $\gamma^m \to -\infty$ a consumer effectively only shops at the closest retailer, and so an exclusive deal that blocks retailers from locating close to consumers can be extremely extremely valuable to the firm.

Higher-order terms $\sum_{kl} \sigma_{kl} x_{k(b)y_{l(i)}}$ capture the interaction between household characteristics and retailer characteristics, as in Bayer et al. (2007). In the baseline estimation, the higher order terms are the interaction between household income and distance to retailer, represented by $y_{l(i)}$ and retailer characteristics such as prices and bundle quality, represented by $x_{k(b)}$.

In addition, household preference for a specific firm are assumed to have an idiosyncratic component, represented by an additive bundle-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 at (eg a road closure).

[8]Results 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.

Household utility also depends on unobserved market-level shocks that cannot modeled but are the same for all consumers, ξ_{bt}. These shocks can represent unobserved features of the market such as unobserved quality or time-varying retailer discounts. As a result, these shocks can be correlated with price. To address the endogeneity, price is instrumented for with a measure of average retailer price, following Hausman et al. (1994). The average retailer price exploits the idea that local demand shocks are likely uncorrelated with prices in different markets. Intuitively, local pricing decisions depend on both supply and demand factors, and the average price in different markets captures the supply component without capturing the idiosyncratic demand in a market.

5.2 Product market supply

Prices are set in a static setting after entry has occurred. Retailers compete on prices and sell a composite good that is differentiated from other retailer's goods by location, quality, 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. An independent retailer sets a price for its individual retailer for each income group as well:

$$\max_{p_{jt}^m} \sum_m s_{jt}^m (p_{jt}^m - mc_{jt}) \tag{2}$$

Suppressing 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.

$$s_j^m = \sum_i \omega_i \sum_{\substack{j' \\ b \in (j,j')}} s_{ib}^m \tag{3}$$

$$= \underbrace{\sum_i \omega_i}_{\text{hhlds}} \underbrace{\sum_{j'=1}^{J}}_{\text{retailers}} \underbrace{\frac{e^{-\alpha(P_j+P_{j'})+\xi_{jj'}+\Gamma_{jj'}+zip_i+\gamma d_{ijj'}+\sum \sigma X_{jj'} y_i}}{1+\sum_{j,j'} e^{-\alpha(P_j+P_{j'})+\xi_{jj'}+\Gamma_{jj'}+zip_i+\gamma d_{ijj'}+\sum \sigma X_{jj'} y_i}}}_{\substack{\text{share bundle } jj' \text{ for hh } i \\ j' \text{ index is dropped for } j'=j}} \tag{4}$$

Consumers only shop at the closest location to home. When a retailer adds 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, and attracts fewer customers, and has to pay rent and fixed costs of entry.

Then retailers set prices according to

$$p_{jt}^m = mc_{jt} + \left[\frac{\partial s_{jt}^m}{\partial p_{jt}^m}\right]^{-1} s_{jt}^m - \frac{\partial s_{jt}^m}{\partial p_{jt}^m} \tag{5}$$

5.3 Overview of the Commercial Real Estate Market

I build a model where covenants are endogenous in the commercial real estate market. To explain the covenants, I focus on asymmetric information between landlord and tenant, which according to industry professionals is – along with commitment – one of the reasons that covenants are put in place to begin with. This asymmetric information is also a commonly given justification when speaking to leasing agents and industry experts. Faced with asymmetric information, the landlord can use the covenant to offer a menu of prices to the tenant, and in doing so extract additional rent compared with the case where the landlord can only offer one price. This is also demonstrated in a simple conceptual framework.

The set of retailers are

Category	**Retailers**
Chain Grocer	Jewel Osco Mariano's Food 4 Less Whole Foods Target
Big Box	Costco Sam's Club Walmart
Specialty Food	Aldi Trader Joe's
Other Food	Other Food
Other Industries	Drug Liquor Dollar
Outside Good	Other

Table 2: Retailers categorized by type

Retailers "other" and "other food" are the best of the outside options to the consumer.

We assume that stores with the same parent company choose locations together. The groups by size and ownership are: {Costco, Sam's Club/Walmart, Target, Other}, {Jewel, Mariano's/Food 4 Less, Whole Foods, Target, Other}, {Aldi / Trader Joe's, Other Food, Other}.

5.4 Retailer Problem

Define retailer j 's entry strategy profile as: $\boldsymbol{l_j} = (l_1, \ldots, l_L) \in \{0, 1, c\}^L \equiv \boldsymbol{\mathcal{L}}_j$. Retailers maximize profits

$$\max_{\boldsymbol{l}_j \in \mathcal{L}} \underbrace{E[\bar{\pi}_j(\boldsymbol{l}_j)] - \sum_{m \in \boldsymbol{l}_j} \bar{\mathbb{P}}_{mja}(r_{jma} + F_m - \theta_{ja} + \epsilon_{jm})}_{E[\pi_j(\boldsymbol{l})]} \tag{6}$$

where $\bar{\mathbb{P}}_{mja}$ is the probability of retailer j winning entry to spot m with contract $a = \{C, E\}$ and $\mathbb{P}_{mja}$ is the probability retailer j chooses spot m with contract a. Then, $E[\bar{\pi}_j(\boldsymbol{l}_j, \mathbb{P}_{-j})]$ are the expected variable profits in the product market, which depend on the probability of the other retailer's choices. Conditional on winning entry to location m with contract a, retailer j pays rents r_{jma}, fixed cost of entry F_m, and gains an additional benefit from exclusivity if it is in the contract, θ_{ja}. ϵ_{jm} is the idiosyncratic retailer-location match across all entered locations which is assumed to be private information to the retailer but the distribution is known and normally distributed, $\epsilon_{jm} \sim N(0, 1)$. Then

$$E[\pi_j(\boldsymbol{l_j})] \sim N\left(\boldsymbol{\mu}^{E[\pi_j(\boldsymbol{l})]}, \boldsymbol{\Sigma}^{E[\pi_j(\boldsymbol{l})]}\right)$$

where $\boldsymbol{\mu}_{\boldsymbol{l}_j}^{E[\pi_j(\boldsymbol{l})]} = E[\bar{\pi}_j(\boldsymbol{l}_j)] - \sum_{m \in \boldsymbol{l}_j} \bar{\mathbb{P}}_{mja}(r_{jma} + F_m - \theta_{ja})$, $\boldsymbol{\Sigma}_{l'm}^{E[\pi_j(\boldsymbol{l})]} = \bar{\mathbb{P}}_{mja} 1\{m \in \boldsymbol{l}_j\}$. So the means, $\boldsymbol{\mu}$, are the expected probabilities from entering, independent of retailer idiosyncratic shocks. The each element of the variance-covariance matrix captures the probability of entry into each spot given that the retailer tries to enter.

The retailer will choose entry strategy if it provides the highest profitability, or if:

$$\begin{aligned} E[\bar{\pi}_j(\boldsymbol{l}_j)] - \sum_{m \in \boldsymbol{l}_j} \bar{\mathbb{P}}_{mja}(r_{jma} + F_m - \theta_{ja} + \epsilon_{jm}) > \\ \max_{\boldsymbol{l'}_j \neq \boldsymbol{l}_j} E[\bar{\pi}_j(\boldsymbol{l'}_j)] - \sum_{m \in \boldsymbol{l'}_j} \bar{\mathbb{P}}_{mja}(r_{jma} + F_m - \theta_{ja} + \epsilon_{jm}) \end{aligned}$$

where the probability that j chooses $\boldsymbol{l}_j$ is

$$\mathbb{P}_{j\boldsymbol{l_j}} = 1 - \Phi\Big(\boldsymbol{\mu_j}, \boldsymbol{\Sigma_j}\Big) = 1 - \Phi\Big(\mathbb{P}_{jma}, \bar{\mathbb{P}}_{jma}, \bar{\pi}_j, r_{jma}, F_m, \vec{\theta}\Big)$$

The probabilities are explicitly written out in Section F.1.

The probability that the tenant wins entry is

$$\bar{\mathbb{P}}_{jma} = 1 - \prod_i \left(\underbrace{\sum_{\boldsymbol{l}_i : r_{ima_i} > r_{jma}} \mathbb{P}_{i\boldsymbol{l_i}}}_{\substack{\text{prob i chooses m} \\ \text{i enters before j}}} \right)$$

Intuitively, when then probability of entry doesn't change as a function of exclusive dealing, selecting an exclusive deal doesn't increase the entry probability given the choice to enter. In this case, the effect of the exclusive deal comes from foreclosing entry on the second firm. On the flip side, when there is no change in expected profits due to the entry of fringe stores, the exclusive deal has no effect on the change in profitability due to co-locating firm, and only serves as a barrier to entry for co-entering rivals. This would be the case, for example, when a co-locating competitor would never enter or when it is unprofitable for the co-locating store to enter near the incumbent.

Identification of Retailer Parameters: Asymmetric Information θ_j and Fixed Costs F_m

First, different retailers approach landlords. At each location, the highest-paying retailer enters. The retailer's rents are thus observed only for that retailer entry. The likelihood then, of observing a set of outcomes is the sum of all the probabilities of the feasible initial choice that could lead to that outcome. For example, a retailer might be observed with no entries if it tries to entry a specific location but is not paying the highest rent or if it has chosen to not enter anywhere.

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

We assume that $\theta_j \sim N(\mu_\theta, \sigma_\theta^2)$ and identify parameters μ_θ and σ_θ^2.

5.5 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 a higher revenues once the tenant approaches

$$\max_{r_{jma}} \sum_{j,a} \bar{\mathbb{P}}_{jma}\mathbb{P}_{jma}(r_{jma} - mc_m + \pi_m^2(a_j)) + \left(1 - \sum_{j,a} \bar{\mathbb{P}}_{jmat}\mathbb{P}_{jmat}\right)\left(u + \pi_m^2(O)\right)$$

when the property is left vacant, the landlord pays additional costs u to cover the vacancy, and when the property is full the landlord pays marginal costs mc. Given the entry of the retailer, the landlord can expect to make profits $\pi_l^2(a_1)$ as a function of the retailers' action in the first period.

The landlord's profits from the fringe firms, $\pi_l^2(a_1)$ are determined by the probability that a fringe firm will enter at this price.

Identification of marginal costs

The landlord's marginal costs can be computed as

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

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

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 FOC's to compute the rents and whether or not the firm is offering one or two prices.

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 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.

5.6 Co-Locating Store Market

Once the landlords rent to the retailers, the landlords with empty locations rent to the small retailers (the fringe). The fringe retailers are the rest of the retailers in the demand: other food, drug stores, liquor stores, dollar stores, and other stores. The fringe differs from the retailer market in three main ways: all prices are the same in the fringe market, there is no exclusive dealing in the fringe market, and when multiple retailers approach, entry is determined at random. Each fringe retailer's location choice is then determined by

$$\max_m E[\pi_j^{var}|I_j] - r_{mf} - F_{mf} + \epsilon_{jm}$$

The expected variable profits, $E[\pi_j^{var}|I_j]$, are determined by the parameters estimated in the product market, the distance to consumers, the rents, and the existing set of retailers (including if there is a retailer present at the location). Specifically, the consumers will only shop at that fringe store if it is the closet fringe store to where they locate.

Similar to the retailer market, the landlord sets prices in the fringe market balancing the probability of entry with revenues given entry. The profits are as follows

$$\max_{r_{mf}} \underbrace{\left(s_m^{drug} + s_m^{dollar} + s_m^{\text{other food}} + s_m^{other}\right)\left(p - mc_{mf}\right)}_{\pi_l^f}$$

When the landlord enters into an exclusive dealing contract with the retailer, the landlord sets the share from the industry that will decrease its profits to zero. The landlord can always rent to the "other" firm, so the probability of entry is never zero.

5.7 Equilibrium

The equilibrium is the set of landlord rents and tenant beliefs/probabilities that ex ante clear the market such that landlord and tenants both maximize profits.

6 Estimation

6.1 Product Market

Demand parameters are estimated with individual-level data from Numerator with a maximum likelihood estimator (Bayer et al. (2007)). The estimation proceeds in two steps: first, the household-specific parameters are estimated as well as an average parameter estimate. Then, instrumental variables are used to identify each of the average parameters, ie. to separate price and quality terms. The data is estimated with store information on latitude, longitude, address, retailer name, household information on demographics, and purchase information such as the bar codes scanned, and the price paid for each bar code, the stores traveled to and the time of day. This data allows us to directly measure trip chaining. Household information contains demographics such as income, employment, marital status, number of children, etc.. Household location information is provided a the zip level, and the households are placed at the centroid of their likely census block group using Bayes rule, and comparing household demographcis to ACS demographics. The household demand is estimate based on Numerator scanner data from 2017-2019 in Chicago.

[RESULTS ARE REDACTED FOR NOW DUE TO KILTS DATA WAITING PERIOD]

6.2 Commercial Real Estate Market

Markets

How to define what is a covenant? A covenant is a store that would decrease profits at that location (holding the current locations into account). So given the current existing locations, if you put a dollar general next to the grocery, would the grocery profits go down? It however does ignore the other entries that could plausibly happen at the same time in grocery.

7 Counterfactual Analysis

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A Example of Exclusive Dealing Contracts

Figure 6: 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.

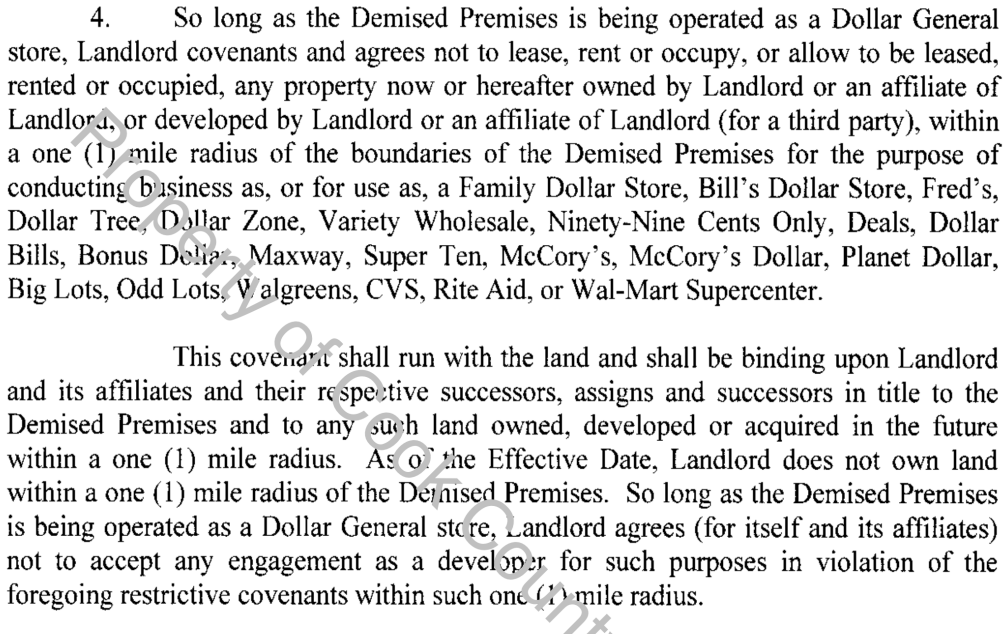
In addition to other restrictions and obligations set forth in the Lease, the Lease provides that the types of uses permitted in the Shopping Center shall be of a retail and/or commercial nature found in shopping centers of a similar size and quality in the metropolitan marketing area in which the Shopping 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 (1) 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-hand or thrift stores, stores that create a nuissance or materially increase noise.

Figure 7: Restrictive Covenant in a Dollar General Lease Memorandum

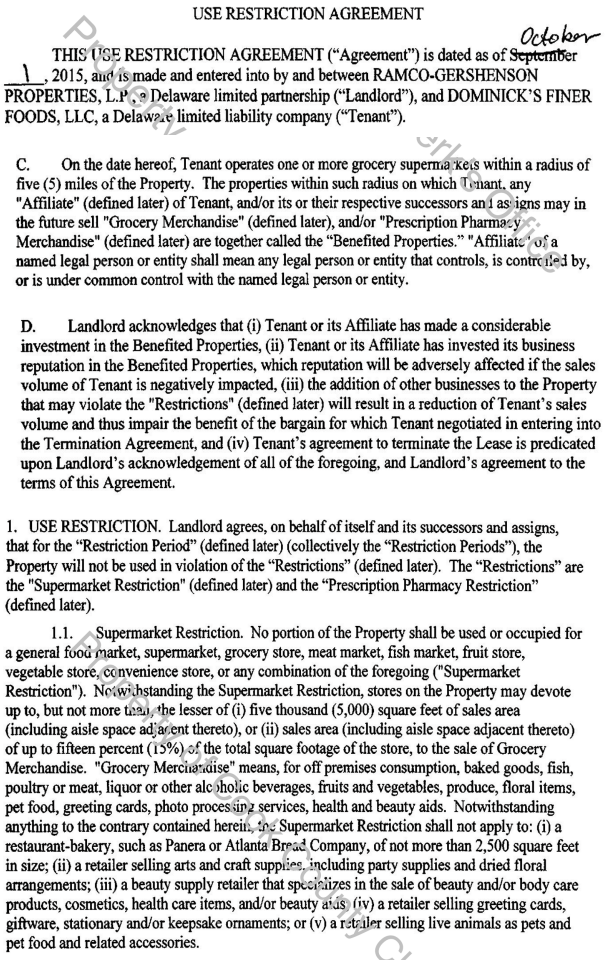


4. So long as the Demised Premises is being operated as a Dollar General store, Landlord covenants and agrees not to lease, rent or occupy, or allow to be leased, rented or occupied, any property now or hereafter owned by Landlord or an affiliate of Landlord, or developed by Landlord or an affiliate 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, Ninty-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 8: Restrictive Covenant upon Termination of Dominick's Finer Foods Lease



USE RESTRICTION AGREEMENT

THIS USE RESTRICTION AGREEMENT ("Agreement") is dated as of ~~September~~ October 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 Data Construction

This allows us to see the premises, blocking retailers, and blocked retailers across Chicago from 1980 to the present. The goal is to create the first dataset on grocery locations, their covenants, and the extent that these covenants can block competition. Covenant data is scraped from the county recorder office. For each grocery store and chain, store names are input into the county recorder website and the relevant legal documents are downloaded. Then, the legal documents are read through optimal character recognition (OCR) in order to determine which documents contain covenants. Documents that contain the world "restrictive" or "exclusive" are flagged as potential for a grocery covenant. In addition, data on the types of stores blocked (through mention of discount stores, big-box stores, dollar stores, grocery stores, conveniences) as well as specific store names (e.g. for dollar stores, dollar general, dollar tree, and family dollar) are flagged and recorded in order to document the types of stores that are blocked.

Additionally, data is scraped from the county recorders office on the parties involved (grantor and grantee), the covenant date, the address (which is additionally read from the documents).

Of the covenants that are flagged with a potential covenant, covenants are read manually. The following information are recorded: the date, address, and store name, as well as the address, covenant date, and type of covenant. Specifically, whether the covenant is from an owned or leased property, and, respectively, whether the store is being bought or sold, or leased anew or whether the lease is terminated. Furthermore, the length of the covenant is recorded, whether the covenant extends past the stay of the store, the radius of the covenant, and the length of the text: essentially whether only direct competitors are blocked or whether other store types are blocked as well.

Next, the covenant data is merged with the grocery store store SNAP data and in order to establish which grocers have covenants.

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Next, the covenant data is merged with the grocery store store SNAP data and we establish which grocers have covenants.

From reading these leases and deeds, I establish descriptive facts about covenants. There are three types of times when covenants are implemented: at the beginning of a lease (henceforth referred to as entry covenants), during the stay of the grocery store (during covenants), and covenants when the grocer exits (exit covenants).

C Data Construction

C.1 Data Coverage

Cities in the Study
Chicago
Houston
New York City
Oklahoma City

C.2 Grocery store data

Grocer location data comes from the USDA Historical Supplemental Nutrition Assistance Program (SNAP) Retailer Locator Data (SNAP data), which provides location, entry, exit, and names of all SNAP-accepting stores. The dataset spans 1990 to present. These store types are roughly classified into

Store Types in the SNAP Data		
Bakery Specialty	Combination Grocery/Other	Convenience Store
Farmers' Market	Food Buying Co-op	Fruits/Veg Specialty
Large Grocery Store	Meat/Poultry Specialty	Medium Grocery Store
Military Commissary	Seafood Specialty	Small Grocery Store
Super Store	Supermarket	Unknown
Wholesaler		

The SNAP data is cleaned according to the following steps:

C.2.1 Missing grocers are added

Missing grocery stores are added to the SNAP data. These missing stores are found by cross checking the SNAP stores with the county recorder's office and Infogroup/Data Axel.

In particular, the following stores are added and modified:

[1] Add Jewel (Large Grocery Store) at 8721 S Stony Island, 60617, Chicago. Give grocery identifier 11111111, latitude = 41.73634, longitude = -87.57786, first open 1989-01-01", last close = 1999-01-01.

[2] Grocery identifier 1353704 is modified. This is a Whole Foods at 9600 S Western Ave, 60805, in Evergreen Park, Cook County, Illinois, latitude = 41.718430, longitude = -87.682130, first open 2019-02-13, and still open as of August 2023.

[3] Add Aldi (Large Grocery Store) at 2708 Showplace Dr, 60564, Naperville, in Cook County. Give it grocery identifier 11111113, latitude 41.715180, longitude -88.207540, first open 2017-01-01, and the grocer is still open as of August 2023.

[4] Add a Dominick's Finer Food (Large Grocery Store) at 4636 S Damen Ave, 60609, Chicago. Give it grocery identifier = 11111114, latitude = 41.80887, longitude = -87.67779, first open 1990-12-19, last close 2000-03-23.

[5] Add a Pete's Fresh Market (Large Grocery Store) at 4233 Lincoln Hwy, 60443, Matteson, Il. Give it grocery identifier 11111115, latitude 41.50610247791131, longitude -87.72055520385479, first open 2021-02-03. As of August 2023, the store is still open.

[6] Modify the city of grocery identifier 856052 to be Dixmoor.

[7] Modify the address of grocery identifier 571844 to be 7515 Cermak Rd.

The relevant R code is cleaning/snap/snap.R.

C.2.2 Chains are identified

Chains are determined separately for each city.

We figure out which stores are in each city by filtering to zip codes in that city.

Chains are defined as stores that have at least four locations. To identify chains, we first remove trailing store numbers from the store name (e.g. Aldi Store No 1234 becomes Aldi Store). Then, we group stores based on store names with similar Levenshtein distance (allow a maximum difference of two). From this list, we identify remaining store names by hand. As a second check, we make sure that the grocery stores listed in industry reports of the major chains in the area and the major chains nationally are a subset of the chains found.

The relevant R code is cleaning/store_names/chicago.R,
cleaning/store_names/chicago.R, cleaning/store_names/houston.R, cleaning/store_names/nyc.R, cleaning/store_names/okc.R.

C.2.3 Store types are cleaned

The SNAP data will often include different store types for the same store name (for example an Aldi's as Supermarket and a Medium Grocery Store) as well as inaccurate store types (a Dollar General as a Supermarket).

In order to clean the store types, we automatically classify store names with the following words as the following store types:

Table 3: Store cleaning: store names with the following are assigned the following store types.

Store Type	Store Name
Bakery Specialty	bakery, baguette, Papa Murphy
Meat/Poultry Specialty	delicatessen, poultry
Convenience Store	handi stop, stop n go, stop n drive
	fuel, gas, shell, bp, citgo, phillips 66, ritestop, rite stop
	mini mart, corner, pantry, neighbor, corner store
	ez stop, 7 eleven, kwik mart, white hen pantry, waldo's 1$, circle k
Drug Store	Phar Mor, CVS, Osco Drug, Walgreens, Rite Aid, Duade Reade
	Eckerd, Pharmacy, Drug Store
Dollar Store	Dollar, 99 cent, 1$
Large Grocery Store	Costco, KMart, Sam's Club, Walmart, Target
	Hyde Park Produce, Park Slope Food Coop
Liquor Store	Contains liquor, spirits, wine, beverages
	but does not contain grocery, market, supermarket, food, deli

To further reduce misclassification of store types, we collapse the following categories:

Table 4: Store type categories: the following are the original and used store types.

Final Store Type	Original Store Type
Large Grocery	Supermarkets, Large Grocery Stores, Super Stores, Combination Stores
Small Grocery	Medium, Small, Farmer's Market, Food Buying, Fruits, and Unknown store types
Dollar Store	Dollar Store
Drug Store	Drug Store
Bakery Specialty	Removed from analysis
Meat/Poultry Specialty	Removed from analysis
Military Commissary	Removed from analysis
Seafood Specialty	Removed from analysis
Wholesaler	Removed from analysis
Delivery Route	Removed from analysis
Liquor Store	Removed from analysis
Fuel and Gas	Removed from analysis

The R code can be found in code/cleaning/snap/store_type.R

C.2.4 Duplicates are removed

The data is cleaned to remove duplicates. Store entry and exit is defined by first entry and last exit into the SNAP dataset. In this way, duplicates due to entry and exit into SNAP are removed. Additional duplicates for the same store but at marginally different addresses are filtered out. In this case, stores with the same name, latitude, and longitude but slightly different addresses are considered to be the same store. Similarly, stores with the same store name but marginally different latitude and longitude are grouped into the same store. The latitude parameter used to determine store distance is .0025, and the longitude parameter is .00194.

If stores that are found to be duplicates have different store types, the final store type is classified as follows: (1) if one of the stores is designated as a dollar store it becomes designated as a dollar store (2) else if the store is designated as a Large Grocery Store, then the store type is a large grocery store (3) else if one of the designations is a Convenience store, the designation is a convenience store (4) else if one of the stores types is a Drug Store it becomes designated as a drug store, and finally, all other stores are designated as Small Grocery Stores.

The code can be found in code/cleaning/snap/remove_duplicates.R

C.2.5 City-specific chains are identified

Grocers that have at least five locations in a city are considered grocery chains in that city. We identify the following chains:

Table 5: Chicago SNAP chains. Retailers with more than four distinct stores by the same name are considered a chain. To focus on grocery chains, only Large Grocery and Medium Grocery stores are considered as to be grocery chains.

Aldi	Big Lots	Butera Market
Carniceria Jimenez	Cermak Produce	Costco
Cub Foods	Delray Farms	Dominick's Finer Foods
Eagle Food Center	Edmar Food Inc	Fairplay Foods
Fairway Finer Foods	Food 4 Less	Gordon Food Service Store
Happy Foods	Horizon	Jewel
Joe Caputo And Sons	KMart	Mariano's
Meijer	Pete's Fresh Market	Sam's Club
Save A Lot	Shop & Save	Shop-N-Save
Target	The Egg Store Inc	Tony's Fresh Market
Trader Joe's	Treasure Island	Ultra Foods
Walmart	Whole Foods	

In Chicago, the biggest grocers by market share in the past twenty years have been Mariano's (owned by Kroger), Jewel Osco (owned by Safeway), and Dominick's Finer Foods. These stores are present in the chains gathered.

Table 6: Houston SNAP chains. Retailers with more than four distinct stores by the same name are considered a chain. To focus on grocery chains, only Large Grocery and Medium Grocery stores are considered as to be grocery chains.

Albertsons	Aldi	Appletree
Arlan's Market	Big Lots	Brookshire Brothers
Costco	Davis Food City Inc	El Ahorro Supermarket
El Rancho Supermercado	Fiesta Mart	Food Lion
Food Mart	Gerland's Food Fair	Grocery Services
HEB	Joe v Smart Shop	KMart
Kroger	La Michoacana Meat Market	La Moreliana Meat Market
Lewis Food Town	Lmmm Houston	Matamoros Meat Market
Price Buster	Price Lo	Pricebuster
Randalls	Rice Food Markets	Sam's Club
Save A Lot	Sellers Bros.	Sprouts
Supermercado Teloloapan	Target	Tortilleria Zacatecas
Vishala Grocery	Walmart	Whole Foods

In Houston, the biggest grocers by market share (in the late 2010s) were HEB (Central Mart), Kroger, and Walmart, followed by Sam's Club, Costco, Tar-

get, Food Town, Fiesta Mart, Whole Foods, Randall's Food and Drug. HEB (Central Mart) is responsible for 25% of the market share.

Table 7: NYC SNAP chains. Retailers with more than four distinct stores by the same name are considered a chain. To focus on grocery chains, only Large Grocery and Medium Grocery stores are considered as to be grocery chains.

A&P	Aldi	Almonte Grocery
Associated Supermarket	Bjs Wholesale Club	Costco
Dagostino Supermarkets	Dan's Supreme Supermarkets Inc	Durso
Food Bazaar	Food City Markets	Food Emporium
Foodtown	Genovese Drugs	Gourtmet Garage
Gristedes	Key Food	King Kullen
KMART	Man-Dell Food Stores Inc	Morton William
National Wholesale Liquidators	Net Cost Market	Pathmark
Red Apple Supermarkets	Royal Farms, Inc	Scaturro Supermarket
Shop Smart	Shoprite	Sloans Supermarkets
Stop & Shop	Supermarket Acquisition Corp	Tapps Supermarket
Target	Trader Joes	Waldbaum
Western Beef Retail	Whole Foods Market	

In New York (state), the biggest grocery stores are Stop & Shop (with 15% of the market share), Costco (with 11% of the market share), Price Rite, Shop Rite, Albersons (Acme), BJ's Wholesale Club, Trader Joe's, Walmart, Wegmans , Western Beef, Whole Foods, Aldi, Best Yet Market, Food Bazaar (Bogopa), Dollar Tree (a dollar store, so not listed here), Fairway Market, Foodtown, Price Chopper, Gristedes, HMart, King Kullen, Kings Food, Morton Williams, Sam's club, Stew Leonard, and Target. These companies capture 90% of the NYC grocer marketshare. So there will be some mismatch between the chains that I have, for example, New York City doesn't have Walmart.

Table 8: OKC SNAP chains. Retailers with more than four distinct stores by the same name are considered a chain. To focus on grocery chains, only Large Grocery and Medium Grocery stores are considered as to be grocery chains.

Albertsons	Aldi	Beachlers
Big Lots	Braum's	Buy For Less
Cash Saver	Crest Foods	Food Lion
Homeland	Kmart	La Michoacana Supermarket
Pratt Foods	Quickmart	Sam's Club
Save A Lot	Smart Saver	Superthrift
Target	Walmart	Williams Discount Foods

In OKC, Walmart and other discount stores dominate the grocery sector, with 65% of the market share. As of 2010, Among other players in the Oklahoma City market, Sam's Club, with five stores, has a 5.8% share, down slightly from 5.9% 2009; 7-Eleven, with 106 stores, has a 4.1% share in 2010, up from 4% in 2009; and Circle K with 54 stores, has a 3.9 share, the same as it had in 2009. Six Aldi stores in saw their market share remain flat at 1.2%, the same as a in 2009. Since 2010, a single Whole Foods and a single Trader Joe's has come to Oklahoma city. There are many dollar stores in Oklahoma city.

The code to is found in code/cleaning/snap/chains.R and the tables are made in
code/analysis/desc_stats/grocery_counts_desc_stats.R.

C.2.6 Consumer panel data

Prices are computed as store-week-demographic level price indices, following Thomassen et al. (2017) but aggregating up to the store level, because the focus of the paper is to understand store-level complementarities and how these store-level complementarities are moderated by distance. We only allow store-level items to vary by their variety (both in terms of how many categories they offer – store-level product breath and how many products they offer within a category – store-level product depth). We aggregate first to the department level, where products are similar and comparable enough, and then from the department level to the store level. Since some products are purchased more frequently than others, prices are weighted to reflect the information from the transaction data, and to allow for intra-category variation, we weight each department separately, and then combine to get the store level index.

Figure 9: Numerator Definitions

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

We compute store-level price indices by aggregating up to the week-store-demographic group level. We compute two price indices, one for food and one for all goods.

For stores, we consider the major chains and then label the remaining stores as "other type" for that type, for example, "other food" for non-major-retailer groceries.

There are items that are purchased that have no category description. These

account for 50% of the analysis and must be excluded, because we don't know how to aggregate them.

Next, establish categories where there is missing data. Missing aggregation level one is replaced by the higher level of aggregation.

Next, very small departments are dropped (departments that account for less than 5% of consumer expenditure).

Within each department there are many item id's. For each firm select products that appear at least six times per year. This gives a set of products for each firm for each department.

For each of these products, compute the store level price as the median price of product h for week t for retailer f: p_{jht}.

For weeks where there is no observed price, impute using median of firm prices for that quarter year upon which that week falls.

Obtain a firm-level price for each item and each week, and one for each of the major chains and the "other" category.

To allow for taste variations within and across category, aggregate from each category, weighting the price to reflect the importance of the item. Each price is aggregated to a higher level using a revenue-weighted average of product group price ratios, p^m_{jgt}/p^m_{bg}:

Then, the Hausman instrument is computed as the average price of that retailer in other markets.

Store-level quantity q is obtained by dividing store-level expenditures by the store-level price index.

The outside good is the set of stores that don't have locations attached to them.

(a) Numerator	(b) Analysis
Beauty	Other
Bodega	Other
Club	Big_Box
Dollar	Dollar
Drug	Drug
Food	Food
Health	Other
Liquor	Liquor
Mass	Big_Box
Military	Other
Online	Online
Pet	Other
Specialty Food Retailer	Food

Table 9: Store types (Channels) in Numerator data. Column (a) Store Type in Numerator, called a Channel, (b) Corresponding Store Type in Analysis.

D Descriptive Statistics

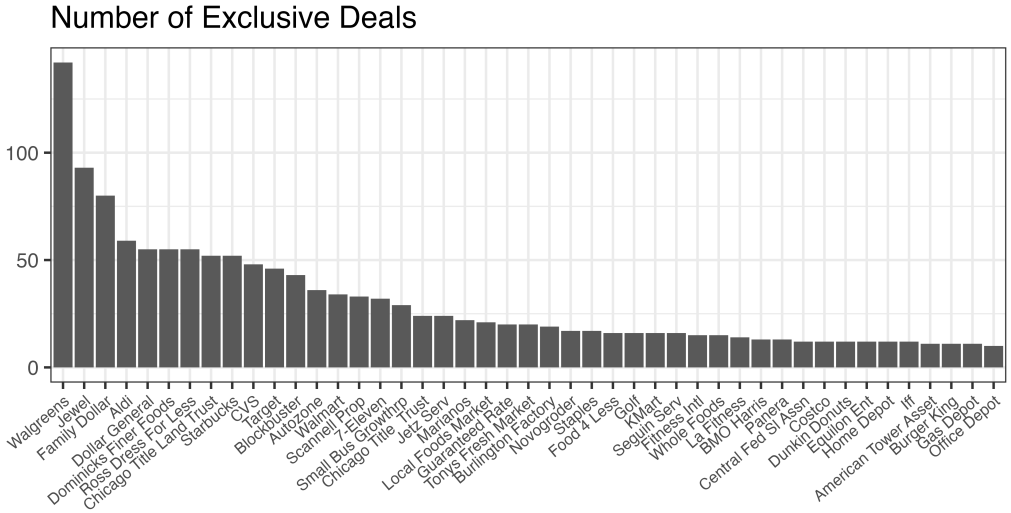
D.1 Grocery Sector

Table 10: 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	

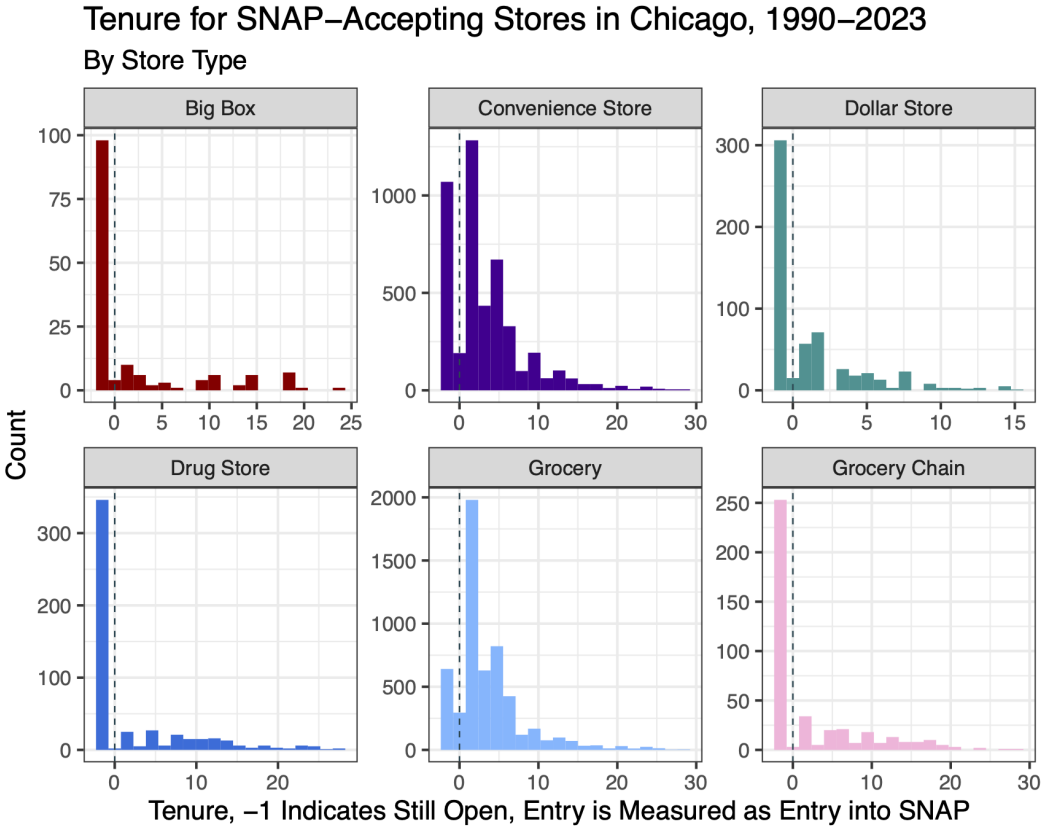
Notes: Table reports retailers in Chicago which have exclusive contracts. Data is for Cook County, IL. Data comes from the Cook County office recorder and the SNAP database.

Figure 10: Retailers with Exclusive Dealing Contracts



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

Figure 11: 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.

			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 11: Covenants 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 12: Covenants Restrictions Observed in Chicago

			Num	*Frac*
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 12 shows both entry dates and covenants for the grocery stores with covenants in Chicago. The figure shows both variation in chain covenants and entry stores, demonstrating significant variation in covenants within and across chains. In purple are entries without covenants, in other colors, are the date and time of openings and covenants.

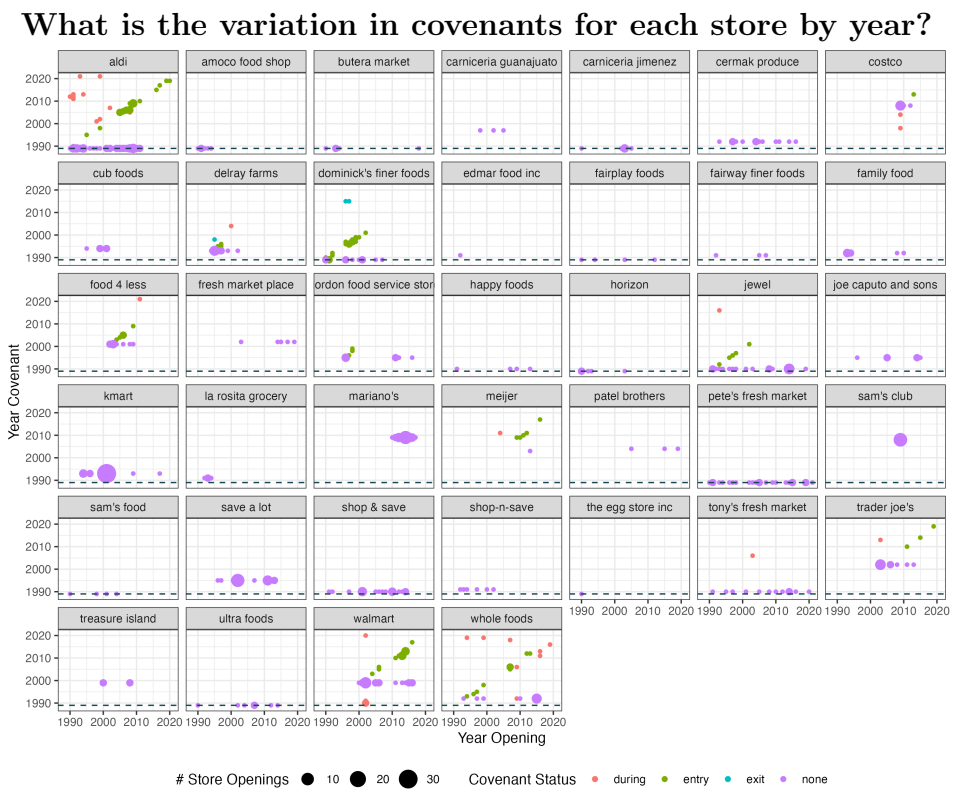


Figure 12: *Notes:* Figure reports the year of grocery chain entry (x axis) and the year of restrictions imposed associated with the property (y axis). Chains without restrictions are labeled in purple and assigned the "covenant year" as the year before grocery store entry. Data is based on cook county recorder data and SNAP grocery data.

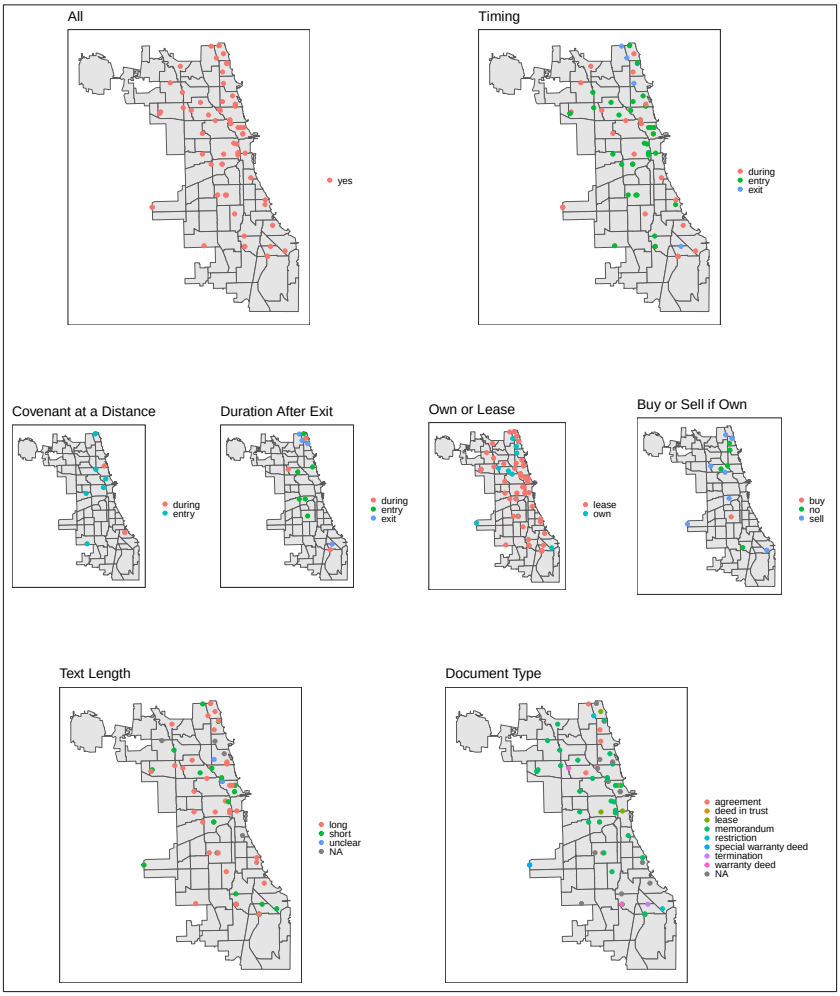


Figure 13: *Notes:* Figure reports a map of present and past Chicago covenants, by type.

Do covenants co-move with business cycles? What sort of legal documents have covenants? To investigate this we can look at when covenants are placed on properties. In Figure 14 we find that covenants are enacted pretty uniformly over time, and are not obviously related to business cycles.

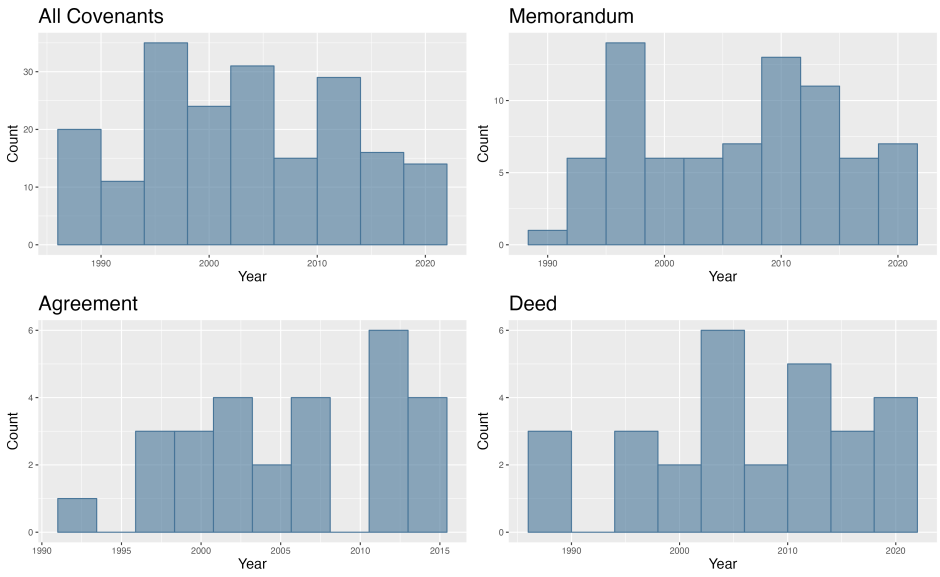


Figure 14: Number of covenant document types as a function of year in Chicago.

Can we abstract from moves? If firms move from location to location, this might be another important aspect of firm dynamics. In this case we should see exit followed by re-entry. Focusing on the Chicago chain stores, we do not see this much in the data in Figure 17. Maybe Pete's Fresh Market and Save a Lot (these stores do not put covenants on the property).

This plot also gives us a sense that there is good variation of entry and exit in the data, around a wide swath of chains

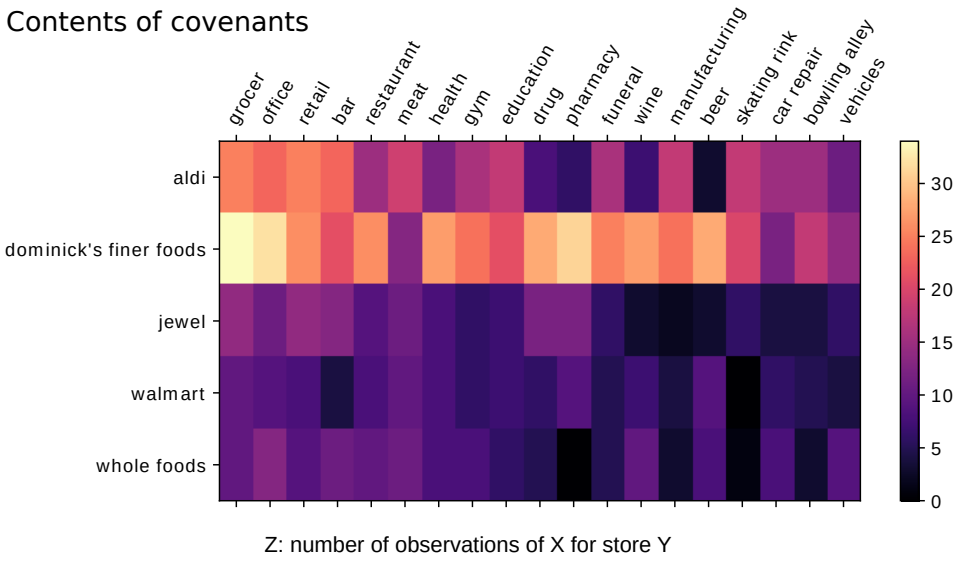


Figure 15: Time series of chain entry and exit in Chicago.

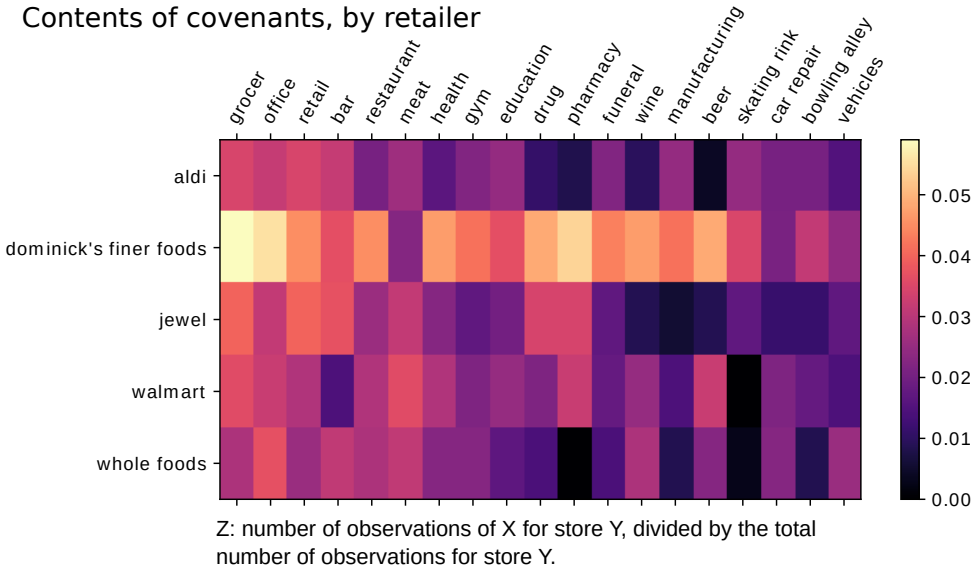


Figure 16: Time series of chain entry and exit in Chicago.

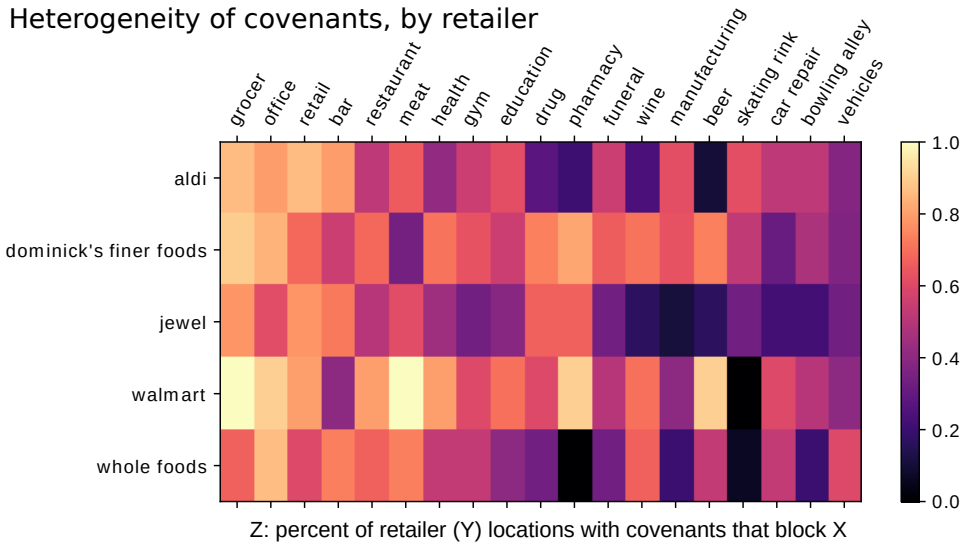


Figure 17: Time series of chain entry and exit in Chicago.

D.2 Grocery store exit

To empirically investigate the extent to which exits are prevalent, I looked into grocery store tenure and grocery store exits in the data. The intuition is that if all stores seem to exit after their lease is up, I might not worry about grocers breaking the lease. Specifically, if it seems that grocer exit around numbers divisible by 5, or grocers stay in locations for a long time, then this is an indication that he grocers will wait out the lease to exit.

I plot grocery tenure in Figure **??**. Each row represents a different city in the data, 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.

Many stores exited in the great recession, in 2008 (column 6), but besides that exit, there isn't really any other major cyclical pattern in exits (exit is somewhere between uniform and sinusoidal).

E Stylized Facts

E.1 Retail prices

	log(Net Effective Rent)
	OLS
1{Covenant}	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
Fixed Effects	
Submarket	✓
Year Start	✓
Tract	✓
Space Type	✓
Building Class	✓

E.2 Density of Nearby Competitors

Table 14: Density of Nearby Competitors

	Log Density of Competitors (Count Per Square Mile)						
	0-.2 mi	0-.5 mi	0-1 mi	0-2 mi	0-5 mi	0-8 mi	All mi
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
midrule Exclusive Deals	-0.2792**	-0.1283	0.1436	0.0852	-0.0248	-0.0615	-0.0571
	(0.1135)	(0.1279)	(0.1087)	(0.0790)	(0.0938)	(0.1001)	(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 fixed effects	✓	✓	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓	✓	✓	✓
Retailer fixed effects	✓	✓	✓	✓	✓	✓	✓

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 15: Density of Nearby Competitors

	log(density)						
	0-.2mi	0-.5mi	0-1mi	0-2mi	0-5mi	0-8mi	Allmi
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
entry_covenants	-0.2787***	0.0750	0.1448	0.0650	0.0473	0.0172	0.0393
	(0.0963)	(0.1481)	(0.1087)	(0.0625)	(0.0704)	(0.0698)	(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
RHS_zip5 fixed effects	✓	✓	✓	✓	✓	✓	✓
RHS_year_open fixed effects	✓	✓	✓	✓	✓	✓	✓

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.

E.3 Retailer Density: Entry and Exit

The change in the consumer responses is almost certainly driven by changes in market structure. Ultimately, the goal is to understand how covenant affects entry, exit, and the density of grocery store locations. As an example of how covenants might affect consumers through changes at market structure, I look at the effect of grocery exit on market structure (to compare with the consumer results above). Specifically, I compare grocery exit with and without covenants. Since covenants are all chains, the control group are chain stores that also exit in Cook county, but those that do not enter with a covenant. The goal is then to compare the market structure within a radius after a grocery store exits with a covenant as opposed to when a grocery store enters without a covenant. The specification run is then the two-way fixed effect difference-in-difference-in-difference:

$$y_{r(i)t} = \sum_{k=-T, k\neq 1}^{T} \delta_k D_{it} + zip_i + year_t + \epsilon_{it}$$

$$y_{r(i)t} = \sum_{k=-T, k\neq 1}^{T} \beta_k cov_i D_{it} + cov_i + zip_i + year_t + cov_i year_t + cov_i zip_i + zip_i year_t + \epsilon_{it}$$

Figure 18 shows the results of these event studies. The outcome, $y_{r(i)t}$, is the number of grocery stores within radius $r(i) = 1$ mile of the grocery store entry. The coefficient of interest are β_k and δ_k. The results show that the loss of a grocery store is mechanical in both cases: both coefficients fall to -1 in the first year. However, there is recovery in locations without covenants as compared to locations with covenants.

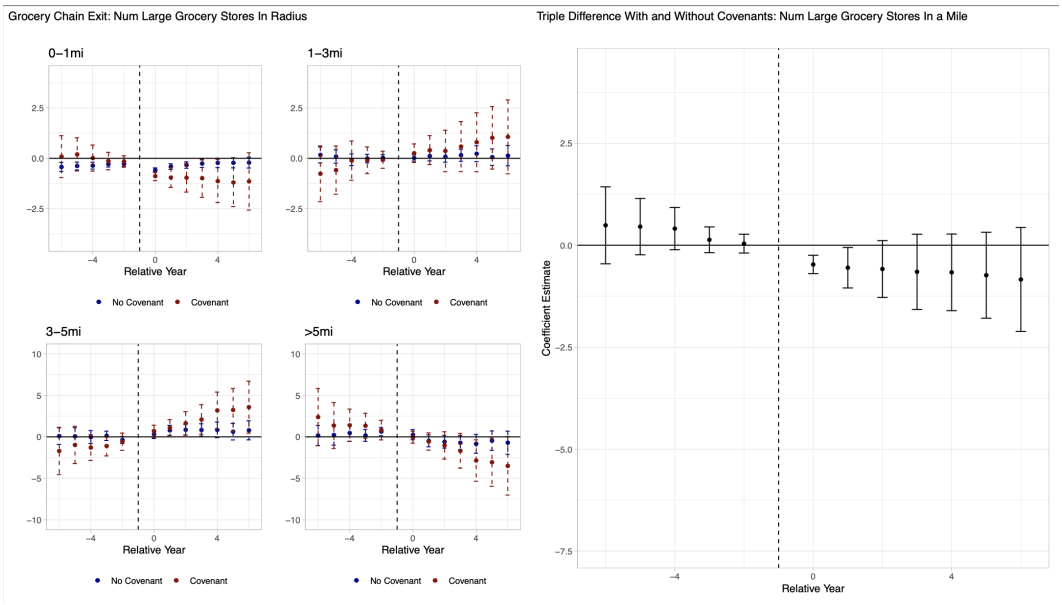


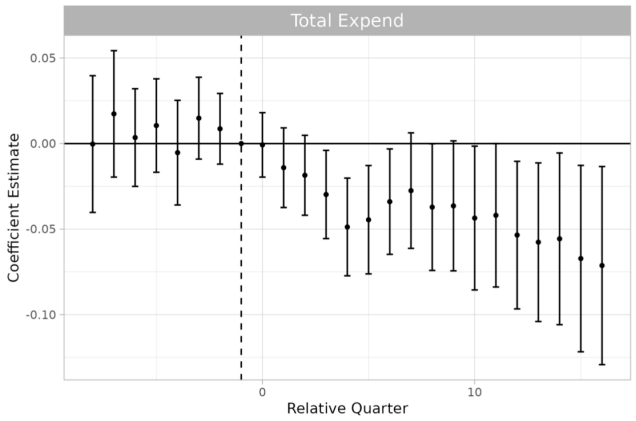
Figure 18: Number of grocers response to grocery store exit.

E.4 Exclusive Deals Predict whether Stores are Substitutes or Complements

Evidence from the dollar store:

$$\log y_{jt} = \alpha + \beta_{j'} 1\{t \in t^*\} 1\{j' \in J\} + \phi_{j'} + \sigma_t + \sum_{k,\tau,r} \beta_{k\tau r} x_{kr_j\tau} + \epsilon_{ijt} \tag{7}$$

where y_{jt} (approx) revenue store j in market t, or consumer expenditures, and j' is the competing/complementary store.



F Model

F.1 Retailer Choice Probabilities

For example, the retailer will pick strategy profile $\boldsymbol{l}_j$ over $\boldsymbol{l'}_j$. $E[\pi_j(\boldsymbol{l_j})] > E[\pi_j(\boldsymbol{l'_j})]$ with probability

$$\begin{aligned}
&\mathbb{P}\left(E[\pi_j(\boldsymbol{l_j})] - E[\pi_j(\boldsymbol{l'_j})] > 0\right) \\
&= \mathbb{P}\Bigg(\begin{pmatrix}1 & -1\end{pmatrix}\begin{pmatrix} E[\bar{\pi}_j(\boldsymbol{l}_j)] - \sum_{m\in\boldsymbol{l}_j}\bar{\mathbb{P}}_{mja}(r_{jma}+F_m-\theta_{ja}) \\ E[\bar{\pi}_j(\boldsymbol{l'}_j)] - \sum_{m'\in\boldsymbol{l'}_j}\bar{\mathbb{P}}_{m'ja'}(r_{jm'a'}+F_{m'}+\theta_{ja'})\end{pmatrix} \\
&\qquad + \begin{pmatrix}1 & -1\end{pmatrix}\begin{pmatrix}\bar{\mathbb{P}}_{1ja}1\{1\in\boldsymbol{l_j}\} & \dots & \bar{\mathbb{P}}_{Mja}1\{M\in\boldsymbol{l_j}\} \\ \bar{\mathbb{P}}_{1ja}1\{1\in\boldsymbol{l'_j}\} & \dots & \bar{\mathbb{P}}_{Mja}1\{M\in\boldsymbol{l'_j}\}\end{pmatrix}\begin{pmatrix}\epsilon_{j1}\\ \dots \\ \epsilon_{jM}\end{pmatrix}\Bigg)
\end{aligned}$$

The probability the retailer then chooses strategy profile $\boldsymbol{l}_j$ is the multivariate normal distribution evaluated at $\boldsymbol{x} = \boldsymbol{0}$ with mean $\boldsymbol{\mu}_{\boldsymbol{l}_j}$ and variance-covariance matrix $\boldsymbol{\Sigma}_j$:

$$\boldsymbol{\mu}_{\boldsymbol{l}_j} = \Omega^{\boldsymbol{l}_j}\left(E[\bar{\pi}_j(\boldsymbol{l}_j)] - \sum_{m\in\boldsymbol{l}_j}\bar{\mathbb{P}}_{mja}(r_{jma}+F_m-\theta_{ja})\right) \tag{8}$$

$$\boldsymbol{\Sigma}^{\boldsymbol{l}_j}_{ii'} = \sum_{l,l',m}\Omega^{\boldsymbol{l}_j}_{il}\underbrace{\bar{\mathbb{P}}_{jma}(\boldsymbol{l_j})}_{\substack{\text{L x M}\\ \text{prob. firm j wins}\\ \text{m with choice } a}}\Omega^{\boldsymbol{l}_j}_{i'l'}\underbrace{\bar{\mathbb{P}}_{jma}(\boldsymbol{l'_j})}_{\substack{\text{L x M}\\ \text{prob. firm j wins}\\ \text{m with choice } a}} \tag{9}$$

$\boldsymbol{\Omega}^{\boldsymbol{l}_j}$ is an $(\mathcal{L}_j - 1)$ x $\mathcal{L}_j$ matrix that for $\boldsymbol{l} = 1$ might look something like: $\begin{pmatrix} 1 & -1 & 0 & 0 \\ 1 & 0 & -1 & 0 \\ 1 & 0 & 0 & -1 \end{pmatrix}$, because it picks out the relevant row (here 1) and then each column that 1 needs to be compared to

$$\boldsymbol{\Omega}^{\boldsymbol{l}_j}_{lm} = \begin{cases} 1 & l = \boldsymbol{l}_j \\ -1 & l = m \underbrace{\left[\boldsymbol{\Omega}_{\boldsymbol{l}_j}/\{\boldsymbol{l}_j\}\right]_{lm}}_{\substack{-\text{identity matrix} \\ \boldsymbol{l}_j \text{ col. removed} \\ \mathcal{L}\text{x}\mathcal{L}}} \\ 0 & l \neq m \underbrace{\left[\boldsymbol{\Omega}_{\boldsymbol{l}_j}/\{\boldsymbol{l}_j\}\right]_{lm}}_{\text{off-diagonal}} \end{cases} \tag{10}$$

Intuition: Retailer Location Choice

F.2 Intuition: Retailer Choice at a Single Location: Exclusive Entry, Non-Exclusive Entry, or No Entry

Let retailer j chooses strategy profile $\boldsymbol{l}$ when it yields the highest expected profits. Let retailer decide between strategy profile $\boldsymbol{l}$ and $\boldsymbol{l}'$ where these choices are identical except for at location m where $\boldsymbol{l}(m) = \boxed{E^D}, \boldsymbol{l}'(m) = \boxed{E}$. Then, the retailer will choose $\boxed{E^D}$ over $\boxed{E}$ where

$$\pi_j(\underbrace{a}_{\substack{\text{j's choice at m}}}, \underbrace{b}_{\substack{\text{co-locating competitor} \\ \text{choice at m}}}, \underbrace{:}_{\text{all other choices}})$$

Then Choose $\boxed{E^D}$ over $\boxed{E}$ when

$$\bar{P}\bar{\pi}_j(E,O,:) + (1-\bar{P})\bar{\pi}_j(O,:) - \bar{P}r^c - \tilde{P}\tilde{r} - \bar{P}F_m - \bar{P}\tilde{F} + \bar{P}\epsilon_m - (1-\bar{P})\epsilon_{\not m} >$$
$$\underline{P}\bar{\pi}_j(E,:,:) + (1-\underline{P})\underline{\pi}_j(O,:) - \underline{P}r^b - \tilde{P}\tilde{r} - \underline{P}F_m - \underline{P}\tilde{F} + \underline{P}\epsilon_m - (1-\underline{P})\epsilon_{\not m}$$

$$\Longleftrightarrow$$

$$\bar{P}\bar{\pi}_j(E,O,:) - \underline{P}\bar{\pi}_j(E,:) + (\bar{P}-\underline{P})(-\bar{\pi}_j(O,:) - F_m + \epsilon_m - \epsilon_{\not m}) - \bar{P}r^c + \underline{P}r^b > 0$$

$$\Longleftrightarrow$$

$$\boxed{\epsilon_m - \epsilon_{\not m} > \underbrace{\frac{\bar{P}r^c - \underline{P}r^b - \bar{P}\bar{\pi}_j(E,O,:) + \underline{P}\bar{\pi}_j(E,:)}{\bar{P} - \underline{P}} + F_m + \pi_j(O,:)}_{\boldsymbol{A}}}$$

where $\bar{P}$ is the probability of winning entry into m when j picks $\boxed{E^D}$, and $\underline{P}$ is the probability of winning entry into m with j picks $\boxed{E}$. $\bar{\pi}_j(a,b,c)$ are the product market (variable) profits for firm j if they pick action a at location m, if rival co-locating firms pick option b at location m, and c are all other actions from all other players at all other locations. r^b, r^c are common and exclusive rents, and F_m is the fixed cost of entry to location m. ϵ_m, $\epsilon_{\not m}$ are the retailer-landlord idiosyncratic shocks which are private to the retailer for their entry decision including m and not including m, respectively.

Exclusive deals can increase retailer profitability on two margin: it can increase the probability of entry: $\bar{P} > \underline{P}$ and it ensures that a competing co-locating firm will not enter, ensuring profits $\bar{\pi}_j(E,O,:)$ instead of $\bar{\pi}_j(E,:)$.

When $\bar{P} = \underline{P} = 1$, selecting an exclusive deal doesn't increase the entry probability given the choice to enter. In this case, the effect of the exclusive deal comes from foreclosing entry on the second firm.

$$\bar{\pi}_j(E,O,:) - \bar{\pi}_j(E,:) > r^c - r^b$$

When $\bar{\pi}_j(E,O,:) = \bar{\pi}_j(E,:)$, the exclusive deal has no effect on the change in profitability due to co-locating firm, and only serves as a barrier to entry for co-entering rivals. This would be the case, for example, when a co-locating competitor would never enter or when it is unprofitable for the co-locating store to enter near the incumbent. Here:

$$\epsilon_m - \epsilon_{\not m} > \frac{\bar{P}r^c - \underline{P}r^b}{\bar{P} - \underline{P}} + F_m + \bar{\pi}_j(O,:) - \bar{\pi}_j(E,:)$$

When the exclusive deals increases the probability of retailer entry

Then $\boxed{E^D} > \boxed{O}$ when:

$$E[\pi_j(O,:)] = \bar{\pi}_j(O,:) - \tilde{P}\tilde{r} - \tilde{P}\tilde{F} + \epsilon_{\not m}$$

$$\bar{P}\Big(\bar{\pi}_j(E,O,:) - \bar{\pi}_j(O,:) - r^c - F_m + \epsilon_m - \epsilon_{\not m}\Big) > 0$$

$$\boxed{\epsilon_m - \epsilon_{\not m} > \underbrace{-\bar{\pi}_j(E,O,:) + \bar{\pi}_j(O,:) + r^c + F_m}_{\boldsymbol{B}}}$$

In this vein, $\boxed{E} > \boxed{O}$ when:

$$\boxed{\epsilon_m - \epsilon_{\not m} > \underbrace{-\bar{\pi}_j(E,:) + \bar{\pi}_j(O,:) + r^b + F_m}_{\boldsymbol{C}}}$$

For the retailer to pick $\boxed{E^D}$, $\Delta\epsilon > \max\{\boldsymbol{A}, \boldsymbol{B}\}$. For the retailer to pick $\boxed{E}$, $\boldsymbol{B} < \Delta\epsilon < \boldsymbol{A}$, which only occurs when $\boldsymbol{A} > \boldsymbol{B}$. For the retailer to pick $\boxed{O}$, $\Delta\epsilon < \min\{\boldsymbol{B}, \boldsymbol{C}\}$.

Similar to the sequential problem alone, there are two cases.

$$r^c - r^b > \bar{\pi}_j(E,O,:) - \bar{\pi}_j(E,:) \iff \boldsymbol{A} > \boldsymbol{B} > \boldsymbol{C} \ (\boxed{E^D} \text{ only if } \bar{P} > \underline{P})$$
$$r^c - r^b < \bar{\pi}_j(E,O,:) - \bar{\pi}_j(E,:) \iff \boldsymbol{C} > \boldsymbol{B} > \boldsymbol{A} \ (\text{no } \boxed{E})$$

In the first case, the threat of a co-locating firm entering is not worth the loss in profits from higher rents due to exclusive deals. In the single retailer case, the retailer will choose $\boxed{E}$ over $\boxed{E^D}$. Absent the exclusive meaningfully changing the probability of entry, the retailer will choose $\boxed{E}$ over $\boxed{E^D}$ here as well.

In the second case, retailer j loss in profits from the threat of competitor competitor entry on the landlord's property is significant enough to choose the exclusive deal. In this setting, the retailer chooses between the exclusive deal $\boxed{E^D}$ and not entering m at all, $\boxed{O}$.

This formula applies in general when the retailer is only choosing one location to the whole problem. When the retailer can choose multiple locations, this only hold conditioning on the retailer choosing the same other options.

The probability choices are non-deterministic (to the landlord) only when changing from entering alone to with a covenant changes the probability of winning given entry: $\bar{P} - \underline{P} \neq 0$.

F.3 Illustrative Example: Asymmetric Information with of Sequential Entry

Industry professionals list several reasons for why covenants exist. On the extensive margin, covenants can encourage retailer entry, which can increase profits. This can be because landlords cannot commit to not leasing to competitors without the legally binding agreement – which points to a commitment mechanism – and because landlords do not necessarily know the extent

to which firms compete with one other – which points to an asymmetric information mechanism. Additionally, the landlord can use the exclusive price to extract additional profit from the location.

F.3.1 Model Parameters

Parameters in the model: $\underline{u}, \bar{u}$, mc, FC (here zero), $\underline{\theta}, \bar{\theta}$, $\underline{\epsilon}, \bar{\epsilon}$. Thus , the effect of the covenants depend on the extent to which vacancies hamper profits, which we model as a vacancy cost u. This vacancy costs can both lead to more covenants in order to encourage entry as well as fewer covenants in order to ensure the greatest possible chance of finding other tenants. Additionally, landlords have marginal costs of maintaining the property. Firms have idiosyncratic profitabilities associated with each location, which is captured by ϵ. Firms' profitabilities is harmed by competitors to varying degrees – unknown to the landlord – which is captured by θ.

F.3.2 Commitment

Sequential entry:

Let $\epsilon_i \in U([\underline{\epsilon}_i, \bar{\epsilon}_i])$. The firm's outside option is 0.

Let $-u \in [-\underline{u}, -\bar{u}]$, landlord cost of maintenance on a vacancy. $-u \sim F(\mu_u, \sigma_u^2)$.

One firm approaches at a time.

In the second stage, the firm choose between options $\boldsymbol{l}_2 = \{E, O\}$, the landlord solves:

$$\max_{r_2} \ \mathbb{P}(E_2)(r_2 - mc) + (1 - \mathbb{P}(E_2))u \tag{11}$$

$$\max_{r_2} \ \mathbb{P}(E_2)(r_2 - mc - u) + u \tag{12}$$

$$\max_{r_2} \ \mathbb{P}(E_2)(r_2 - \tilde{mc}) \tag{13}$$

where $\tilde{mc} = mc + u$, where the marginal cost is adjusted to account for the possibility of a vacancy.

$$\pi_2 = \bar{\pi}_2(\boldsymbol{l}_1) - r_2 + \epsilon \tag{14}$$

$$\mathbb{P}(E_2|\boldsymbol{l}_1) = \frac{\bar{\epsilon}_2 + \bar{\pi}_2(\boldsymbol{l}_1) - r_2}{\bar{\epsilon}_2 - \bar{\epsilon}_1} \tag{15}$$

so then the landlord sets prices at

$$r_2^* = \frac{\bar{\epsilon}_2 + \bar{\pi}_2(\boldsymbol{l}_1) + \tilde{mc}}{2} \tag{16}$$

Landlord expected profits are

$$\pi_l^2(\boldsymbol{l}_1) = \frac{\bar{\epsilon}_2 + \bar{\pi}_2(\boldsymbol{l}_1) - r_2}{\bar{\epsilon}_2 - \underline{\epsilon}_2} \frac{\bar{\epsilon}_2 + \bar{\pi}_2(\boldsymbol{l}_1) - \tilde{mc}}{2} + u \tag{17}$$

$$= \underbrace{\frac{\bar{\epsilon}_2 + \bar{\pi}_2(\boldsymbol{l}_1) - \tilde{mc}}{2(\bar{\epsilon}_2 - \underline{\epsilon}_2)}}_{\mathbb{P}(E_2|\boldsymbol{l}_j)} \frac{\bar{\epsilon}_2 + \bar{\pi}_2(\boldsymbol{l}_1) - \tilde{mc}}{2} + u \tag{18}$$

$$= \frac{(\bar{\epsilon}_2 + \bar{\pi}_2(\boldsymbol{l}_1) - \tilde{mc})^2}{4(\bar{\epsilon}_2 - \underline{\epsilon}_2)} + u \tag{19}$$

In the first period, the landlord sets baseline and exclusive (covenant) rents for the first firm, r_1^b, r_1^c to maximize profits.

$$\pi_l = \mathbb{P}(C_1)(r^c - mc + u) + \mathbb{P}(E_1)(r^b - mc + \pi_l^2(E_1)) + \mathbb{P}(O_1)(\pi_l^2(O_1) + u) \tag{20}$$

$$= \mathbb{P}(C_1)(r^c - \tilde{mc} + u - \pi_l^2(O_1)) + \mathbb{P}(E_1)(r^b - \tilde{mc} + \pi_l^2(E_1) - \pi_l^2(O_1)) + \pi_l^2(O_1) + u \tag{21}$$

Given rents, the tenant chooses $\boxed{C}$ when $E[\pi_1(C_1)] > E[\pi_1(E_1)], E[\pi_1(C_1)] > E[\pi_1(O_1)]$ or when

$$
\begin{aligned}
\pi_1(C) &> \pi_1(O_1) \\
\bar{\pi}_1(O_2) - r^c + \epsilon &> \pi_1(O_1) \\
\epsilon &> \pi_1(O_1) - \bar{\pi}_1(O_2) + r^c \text{ and}
\end{aligned}
$$

$$
\begin{aligned}
\pi_1(C) &> \pi_1(E) \\
\bar{\pi}_1(O_2) - r^c &> \mathbb{P}(E_2)\bar{\pi}_1(E_2) + (1 - \mathbb{P}(E_2))\bar{\pi}_1(O_2) - r^b \\
r^c - r^b &< \mathbb{P}(E_2)\big(\bar{\pi}_1(O_2) - \bar{\pi}_1(E_2)\big)
\end{aligned}
$$

This leads to the following tenant entry probabilities.

$$
\mathbb{P}(C_1) = \begin{cases} \frac{\bar{\epsilon}_1 + \bar{\pi}_1(O_2) - \pi_1(O_1) - r^c}{\bar{\epsilon}_1 - \underline{\epsilon}_1} & \underbrace{\mathbb{P}\Delta}_{\mathbb{P}(E_2)(\bar{\pi}_1(O_2) - \bar{\pi}_1(E_2))} > r^c - r^b \\ 0 & \text{else} \end{cases}
$$

$$
\mathbb{P}(E_1) = \begin{cases} \frac{\bar{\epsilon}_1 + \bar{\pi}_1(O_2) - \pi_1(O_1) - r^b - \mathbb{P}\Delta}{\bar{\epsilon}_1 - \underline{\epsilon}_2} & \mathbb{P}\Delta < r^c - r^b \\ 0 & \text{else} \end{cases}
$$

A landlord with full information except for the idiosyncratic match ϵ takes the probabilities as given and solves for optimal covenant and base rents:

$$
\begin{aligned}
\max_{r^c, r^b} \; & 1\{r^c < \mathbb{P}\Delta + r^b\} \left(\frac{\bar{\epsilon}_1 + \pi_1(O_2) - r^C}{\bar{\epsilon}_1 - \underline{\epsilon}_1} \right) \left(r^c - \tilde{mc} + u - \pi_l^2(O_1) \right) && (22) \\
& + 1\{r^c > \mathbb{P}\Delta + r^b\} \left(\frac{\bar{\epsilon}_1 + \pi_1(O_2) - \mathbb{P}\Delta - r^b}{\bar{\epsilon}_1 - \underline{\epsilon}_1} \right) \left(r^b - \tilde{mc} + \pi_l^2(E_1) - \pi_l^2(O_1) \right) && (23) \\
& + \pi_l^2(O_1) + u && (24)
\end{aligned}
$$

$$
\boxed{(r^c)^* = \frac{1}{2} \left(\tilde{mc} + u - \pi_l^2(O_1) + \pi_1(O_2) + \bar{\epsilon}_1 \right)} \qquad (25)
$$

$$
\boxed{(r^b)^* = \frac{1}{2} \left(\tilde{mc} + \bar{\epsilon}_1 + \pi_1(O_2) - \mathbb{P}\Delta + \pi_l^2(O_1) - \pi_l^2(E_1) \right)} \qquad (26)
$$

Landlord expected profits are

$$E[\pi_l] = \frac{1\{r^c < \mathbb{P}\Delta + r^b\}}{4(\bar{\epsilon}_1 - \underline{\epsilon}_1)}\left(\bar{\epsilon}_1 + \pi_1(O_2) - \tilde{mc} - u + \pi_l^2(O_1)\right)^2 + \frac{1\{r^c > \mathbb{P}\Delta + r^b\}}{4(\bar{\epsilon}_1 - \underline{\epsilon}_1)}\left(\bar{\epsilon}_1 + \pi_1(O_2) - \tilde{mc} - \pi_l^2(O_1) + \pi_l^2(E_1) - \mathbb{P}\Delta\right)^2 + u + \pi_l^2(O_1)$$

The landlord can choose to offer either $(r^b)^*$, $(r^c)^*$, or both for the first firm. The landlord will only offer $\boxed{C}$ when $E[\pi_1(r^c)] > E[\pi_1(r^b)]$, or when $\boxed{\mathbb{P}\Delta > \pi_l^2(E_1) - u}$. The landlord offers a covenant with probability $F(\mathbb{P}\Delta - \pi_l^2(E_1))$, where $u \sim F$.

$$E[\pi_1(r^c)] > E[\pi_1(r^b)] \tag{27}$$

$$\bar{\epsilon}_1 + \pi_1(O_2) - \tilde{mc} - \tilde{\pi}_l^2(O_1) > \bar{\epsilon}_1 + \pi_1(O_2) - \tilde{mc} - \pi_l^2(O_1) + \pi_l^2(E_1) - \mathbb{P}\Delta \tag{28}$$

$$-\pi_l^2(O_1) + u > -\pi_l^2(O_1) + \pi_l^2(E_1) - \mathbb{P}\Delta \tag{29}$$

$$\boxed{\mathbb{P}\Delta > \pi_l^2(E_1) - u} \tag{30}$$

When given both options, tenant chooses C when $r^c - r^b < \mathbb{P}\Delta$. The landlord sets prices such that $(r^c)^* - (r^b)^* = \frac{1}{2}\left(\mathbb{P}\Delta + \pi_l^2(E_1) - u\right)$. The tenant would want to pick C when:

$$(r^c)^* - (r^b)^* = \frac{1}{2}\left(\mathbb{P}\Delta + \pi_l^2(E_1) - u\right) < \mathbb{P}\Delta \tag{31}$$

$$\iff \pi_l^2(E_1) - u < \mathbb{P}\Delta \tag{32}$$

That is, the tenant's and landlord's profitabilities are always at odds with each other; the landlord will only offer C so that it is the tenant's only choice, because given the option, the tenant would pick E in this situation.

F.3.3 Commitment and Asymmetric Information

Sequential entry with unknown tenant profitability

A landlord realistically doesn't know the effect of competition on profits. We model this as the landlord not knowing the first tenant's profit if the second tenant enters.

Let $\theta \in \Theta$, the cross-store complementarity that determines the effect of covenants on profits. Let $\theta = \mathbb{P}\Delta$. Assume a uniform distribution, with $\theta \sim U[\underline{\theta}, \bar{\theta}]$. Let $\bar{\pi}_1(E_2) \to \bar{\pi}_1(E_2) + \phi$ so that $\mathbb{P}(E_2)(\bar{\pi}_1(O_2) - \bar{\pi}_1(E_2) - \phi) = \theta$.

Now, the tenant chooses $\boxed{C}$ over $\boxed{E}$ when

$$\pi_1(O_2) - r^c + \epsilon > \pi_1(O_2) - \theta - r^b + \epsilon \tag{33}$$
$$\theta > r^c - r^b \tag{34}$$

The tenant chooses $\boxed{C}$ over $\boxed{O}$ when

$$\pi_1(O_2) - r^c + \epsilon > 0 \tag{35}$$
$$\epsilon > r^c - \pi_1(O_2) \tag{36}$$

The tenant chooses $\boxed{E}$ over $\boxed{O}$ when

$$\pi_1(O_2) - \theta - r^b + \epsilon > 0 \tag{37}$$
$$\epsilon - \theta > r^b - \pi_1(O_2) \tag{38}$$

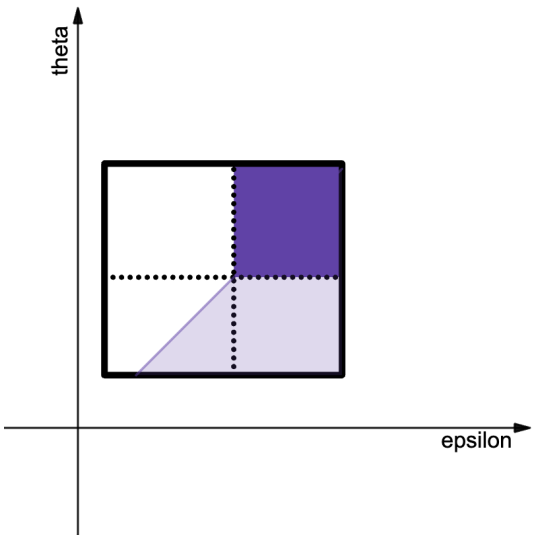


Figure 19: Figure shows action taken by tenant given draws of (ϵ, θ) and rents (r^b, r^c). Black box: $\epsilon \in [\underline{\epsilon}, \bar{\epsilon}], \theta \in [\underline{\theta}, \bar{\theta}]$. Lighter-shaded lilac: tenant chooses $\boxed{E}$. Darker-shaded purple: tenant chooses $\boxed{C}$. White: tenant chooses outside option $\boxed{O}$. The purple box plots $\theta = 1\{\epsilon \in ([r^c - \pi_1(O_2), \bar{\epsilon}], [r^c - r^b, \bar{\theta}])$. The lilac line plots $\theta \leq \epsilon - r^b + \pi_1(O_2)$.

Figure 19 shows that compared to the case where the landlord knows θ exactly, having two prices in theory allows the landlord to capture a larger share of the (ϵ, θ) draws. Compared with only offering r^b, the landlord now gains access to

the top right triangle in dark purple but not covered by lilac. Compared with only offering r^c, the landlord now gains access to the bottom quadrilateral.

When the landlord chooses to provide only $\boxed{C}$, the expected rents and profits remain the same as in the full information case because there is no additional private information past tenant match quality.

$$\boxed{E[\pi_l] = \frac{\left(\bar{\epsilon}_1 + \pi_1(O_2) - \tilde{mc} - \tilde{\pi}_l^2(O_1)\right)^2}{4(\bar{\epsilon}_1 - \underline{\epsilon}_1)}}$$

When the landlord chooses to provide only $\boxed{E}$, the landlord problem changes to:

$$\begin{aligned}
&\max_{r^b} \ \mathbb{P}(E_1)(r^b - mc + \pi_l^2(E_1)) + (1 - \mathbb{P}(E_1))(u + \pi_l^2(O_1)) \\
&\max_{r^b} \ \mathbb{P}(E_1)(r^b - mc - u + \pi_l^2(E_1) - \pi_l^2(O_1)) \\
&\max_{r^b} \ \mathbb{P}(E_1)(r^b - \tilde{c}) \\
[\text{foc: } r^b] \quad &0 = \mathbb{P}'(E_1)(r^b - \tilde{c}) + \mathbb{P}(E_1) \\
&\mathbb{P}(E_1) = \frac{(\bar{\epsilon} + \pi_1(O_2) - r^b - \underline{\theta})(\pi_1(O_2) - r^b + \bar{\epsilon} - \underline{\theta})}{2(\bar{\theta} - \underline{\theta})(\bar{\epsilon} - \underline{\epsilon})}
\end{aligned}$$

$$\begin{aligned}
[\text{foc}] \quad \Rightarrow 0 &= -2(r^b - \tilde{c}) + (\bar{\epsilon} + \pi_1(O_2) - r^b - \underline{\theta}) \\
r^{b*} &= \frac{\pi_1(O_2) + \bar{\epsilon} - \underline{\theta} + 2(mc + u + \pi_l^2(O_1) - \pi_l^2(E_1))}{3} \text{ or} \\
r^{b*} &= \pi_1(O_2) + \bar{\epsilon} - \underline{\theta}
\end{aligned}$$

$$\mathbb{P}(E_1)(r^{b*}) = \begin{cases} \frac{2}{9}\frac{\left(\pi_1(O_2) + \bar{\epsilon} - \underline{\theta} - \tilde{mc} - \Delta_l\right)^2}{(\bar{\theta} - \underline{\theta})(\bar{\epsilon} - \underline{\epsilon})} & r^{b*} = \frac{\pi_1(O_2) + \bar{\epsilon} - \underline{\theta} + 2(\tilde{mc} + \Delta_l)}{3} \\ 0 & r^{b*} = \pi_1(O_2) + \bar{\epsilon} - \underline{\theta} \end{cases}$$

$$E[\pi_l(r^{b*})] = \begin{cases} \frac{2\left(\pi_1(O_2) + \bar{\epsilon} - \underline{\theta} - \tilde{mc} - \Delta_l\right)^3}{27(\bar{\theta} - \underline{\theta})(\bar{\epsilon} - \underline{\epsilon})} + \pi_l^2(O_1) + u & \mathbb{P}(E_1) \neq 0 \\ \pi_l^2(O_1) + u & \mathbb{P}(E_1) = 0 \end{cases},$$

Where $\Delta_l = \pi_l^2(O_1) + \pi_l^2(E_1)$ and $\tilde{mc} = mc + u$. Implicit here is the assumption that the tenant will not enter at the lowest value of $\underline{\epsilon}$. In this case, the optimal may be the boundary, when $r^{b*} = \pi_1(O_2) + \bar{\epsilon} - \underline{\theta}$.

$$\boxed{E[\pi_l(r^{b*})] = \frac{2\big(\pi_1(O_2) + \bar{\epsilon} - \underline{\theta} - \tilde{mc} - \Delta_l\big)^3}{27(\bar{\theta} - \underline{\theta})(\bar{\epsilon} - \underline{\epsilon})} + \pi_l^2(O_1) + u}$$

When the landlord offers both prices, it sets r^c and r^b to maximize

$$\begin{aligned}
\max_{r^b, r^c} \;& \mathbb{P}(C_1)(r^c - mc + u) + \mathbb{P}(E_1)(r^b - mc + \pi_l^2(E_1)) \\
& + (1 - \mathbb{P}(C_1) - \mathbb{P}(E_1))(u + \pi_l^2(O_1)) \\
\max_{r^b, r^c} \;& \mathbb{P}(C_1)(r^c - mc + u - u - \pi_l^2(O_1)) + \mathbb{P}(E_1)(r^b - mc - u + \pi_l^2(E_1) - \pi_l^2(O_1))
\end{aligned}$$

The FOC are

$$\begin{aligned}
[\text{foc } r^c] \;\; 0 &= \frac{d\mathbb{P}(C_1)}{dr^c}(r^c - c) + \mathbb{P}(C_1) + \frac{d\mathbb{P}(E_1)}{dr^c}(r^b - b) \\
[\text{foc } r^b] \;\; 0 &= \frac{d\mathbb{P}(C_1)}{dr^b}(r^c - c) + \frac{d\mathbb{P}(E_1)}{dr^b}(r^b - b) + \mathbb{P}(E_1)
\end{aligned}$$

The probabilities are

$$\begin{aligned}
\mathbb{P}(C_1) &= \frac{(\pi_1(O_2) + \bar{\epsilon} - r^c)(\bar{\theta} - \Delta r)}{(\bar{\theta} - \underline{\theta})(\bar{\epsilon} - \underline{\epsilon})} \\
\mathbb{P}(E_1) &= \frac{(\Delta r - \underline{\theta})^2}{2\Delta\theta\Delta\epsilon} + \frac{(\pi_1(O_2) + \bar{\epsilon} - r^c)(\Delta r - \underline{\theta})}{\Delta\theta\Delta\epsilon} \\
&= \frac{(\Delta r - \underline{\theta})^2}{2\Delta\theta\Delta\epsilon} - \mathbb{P}(C_1) + \frac{(\pi_1(O_2) + \bar{\epsilon} - r^c)(\bar{\theta} - \underline{\theta})}{\Delta\theta\Delta\epsilon}
\end{aligned}$$

$$\begin{aligned}
\frac{d\mathbb{P}(C_1)}{dr^c} &= r^c + \Delta r - \pi_1(O_2) - \bar{\epsilon} - \bar{\theta} \\
\frac{d\mathbb{P}(C_1)}{r^b} &= \pi_1(O_2) + \bar{\epsilon} - r^c = \Delta r - \bar{\theta} - \frac{d\mathbb{P}(C_1)}{dr^c} \\
\frac{d\mathbb{P}(E_1)}{dr^c} &= \Delta r - \bar{\theta} - \frac{d\mathbb{P}(C_1)}{dr^c} \\
\frac{d\mathbb{P}(E_1)}{dr^b} &= -\Delta r + \underline{\theta} - \frac{d\mathbb{P}(C_1)}{dr^b} = \frac{d\mathbb{P}(C_1)}{dr^c} - (\Delta r - \bar{\theta}) - (\Delta r - \underline{\theta})
\end{aligned}$$

Which means the optimal prices are set according to

$$\begin{aligned}
0 &= \frac{d\mathbb{P}(C_1)}{dr^c}(r^c - c - b) + \mathbb{P}(C_1) + (\Delta r - \bar{\theta})(r^b - b) \\
0 &= (-\frac{d\mathbb{P}(C_1)}{dr^c} - r^c + \underline{\theta})(r^c - c) + \frac{d\mathbb{P}(E_1)}{dr^b}(r^b - b) + \mathbb{P}(E_1)
\end{aligned}$$

F.3.4 Notes on Firm Choices

$\boxed{\textit{Aside}}$ Is there ever a situation where the tenant has different preferences for different values of ϵ? For example, tenant prefers C over E for low values of ϵ but E over C for high values of ϵ? No. This is shown here. This example assumes the landlord knows everything except the idiosyncratic firm-location match ϵ.

The tenant chooses $\boxed{C}$ when $\boxed{C} > \boxed{O}$ and $\boxed{C} > \boxed{E}$:
$\boxed{C} > \boxed{O}$

$$\begin{aligned} \pi^C - r^c + \epsilon &> 0 \\ \pi^C + \epsilon &> r^c \\ r^c &= \pi^C + \epsilon^C \\ \pi^C + \epsilon &> \pi^C + \epsilon^C \\ \Rightarrow \boxed{r^c \equiv \pi^C + \epsilon^C} & \\ \boxed{\epsilon > \epsilon^C} & \end{aligned}$$

$\boxed{C} > \boxed{E}$

$$\begin{aligned} \pi^C - r^c + \epsilon &> \pi^C - \tilde{\mathbb{P}}(\pi^C - \pi^E) - r^b + \epsilon \\ \tilde{\mathbb{P}}(\pi^C - \pi^E) &> r^c - r^b \\ r^b &> \pi^C + \epsilon^C - \tilde{\mathbb{P}}(\pi^C - \pi^E) \\ \Rightarrow \boxed{r^b \equiv \pi^C + \epsilon^E - \tilde{\mathbb{P}}(\pi^C - \pi^E)} & \end{aligned}$$

$$\begin{aligned} r^c - r^b &= \pi^C + \epsilon^C - \pi^C - \epsilon^E + \tilde{\mathbb{P}}(\pi^C - \pi^E) \\ \Rightarrow \boxed{r^c - r^b = \epsilon^C - \epsilon^E + \tilde{\mathbb{P}}(\pi^C - \pi^E)} & \end{aligned}$$

Now choose $\boxed{C}$ if $r^c - r^b < \tilde{\mathbb{P}}(\pi^C - \pi^E)$. That is if

$$r^c - r^b = \epsilon^C - \epsilon^E + \tilde{\mathbb{P}}(\pi^C - \pi^E) < \tilde{\mathbb{P}}(\pi^C - \pi^E) \tag{39}$$

$$\epsilon^C - \epsilon^E < 0 \tag{40}$$

$$\Rightarrow \boxed{\epsilon^C < \epsilon^E} \tag{41}$$

To sum up: the tenant will choose $\boxed{C}$ when $\epsilon^C < \epsilon^E$ and $\epsilon > \epsilon^C$.

Is it possible to choose C in some instances and E in others? For example, if there exist some combination such that for different ϵ, ϵ', $C < E$, $E < O$, $O < C$. Look for ϵ'.

$$\pi_1^C - r^c - \epsilon' > 0 \tag{42}$$
$$\epsilon' > -\pi^C + \pi^C + \epsilon^C \tag{43}$$
$$\epsilon' > \epsilon^C \tag{44}$$

$$\pi^C - \mathbb{P}\Delta - r^b + \epsilon' < 0 \tag{45}$$
$$\pi^C - \mathbb{P}\Delta - \pi^C - \epsilon^E - \mathbb{P}\Delta + \epsilon' < 0 \tag{46}$$
$$\epsilon' < \epsilon^E \tag{47}$$

Now $\epsilon' \in (\epsilon^C, \epsilon^E)$ to have C be profitable but E not be profitable. This condition is the exact same condition required to pick C over E:

$$r^c - r^b < \mathbb{P}\Delta \tag{48}$$
$$\pi^C + \epsilon^C - \pi^C - \epsilon^E + \mathbb{P}\Delta < \mathbb{P}\Delta \tag{49}$$
$$\epsilon^C < \epsilon^E \tag{50}$$

Now check back with the condition to pick C over E. That is, if C is profitable but E is unprofitable, always pick C over E. There isn't some middle ground where E is generally more profitable for the tenant, but for low values of ϵ its worth it. For the tenant, its not more or less worth it for different values of ϵ.

End aside.

$\boxed{\textit{Aside}}$ Note that in the case where $\mathbb{P}\Delta = \theta$ is unknown, there is never a case where $\boxed{C} > \boxed{E}$, $\boxed{O} > \boxed{C}$ and $\boxed{E} > \boxed{O}$. Equivalent, dotted and purple lines in Figure 19 coincide. This is because for $\boxed{C}$, this is the point on the x axis where $\epsilon = r^c - \pi_1(O_2)$ and the point on the y axis where $\theta = r^c - r^b$. For $\boxed{E}$, this is the point where $\theta = r^c - r^b$ and $\epsilon - \theta = r^b - \pi_1(O_2)$ or where $\epsilon = \theta + r^b - \pi_1(O_2) = r^c - \pi_1(O_2)$. So these lines intersect at the same point. End aside.

F.3.5 Alternative Contracts: Set Prices for Entry without Competition, Entry with Competition

For commitment, prices cannot achieve the optimal profits for the landlord. Consider the setting where instead of offering a covenant, the landlord a contract where the rent can change based on whether the second store enters:

the tenant pays one rent for entry alone and a different rent for entry with a competitor (in the spirit of the contract in Aghion and Bolton (1987)). In this way, the landlord commits to a lower rent if a competitor enters. However, this allocation has lower profits than the one with the exclusive binding agreement.

A tenant now chooses between $\boxed{E}$ (with two prices) and $\boxed{O}$, and here enters if $E[\pi] > 0$.

$$\begin{aligned} E[\pi] &= \mathbb{P}(E_2)(\pi_1(E_2) - r^b) + (1 - \mathbb{P}(E_2))(\pi_1(O_2) - r^c) + \epsilon \\ \iff \epsilon &> -\pi_1(O_2) + r^c + \mathbb{P}(E_2|E_1)(\pi_1(E_2) - \pi_1(O_2) + r^c - r^b] \end{aligned}$$

This establishes the probability of entry for the tenant:

$$\mathbb{P}(E_1) = \frac{\bar{\epsilon}_1 + \pi_1(O_2) - r^c - \mathbb{P}(E_2)(\Delta - r^c + r^b)}{\bar{\epsilon}_1 - \underline{\epsilon}_1}$$

The landlord problem is then

$$\begin{aligned} \max_{r^c, r^b} \; & \big(\bar{\epsilon}_1 + \pi_1(O_2) - \mathbb{P}\Delta \underbrace{+\mathbb{P}(r^c - r^b) - r^c}_{r}\big)\big(r - mc - \tilde{\Delta}_l\big) \\ r &= \frac{\bar{\epsilon} + \pi_1(O_2) - \mathbb{P}\Delta + mc + \tilde{\Delta}_l}{2} \\ \Rightarrow E[\pi_l] &= \frac{(\bar{\epsilon}_1 + \pi_1(O_2) - \mathbb{P}\Delta - mc - \tilde{\Delta}_l)^2}{4(\bar{\epsilon}_1 - \underline{\epsilon}_1)} \end{aligned}$$

where $\tilde{\Delta}_l = \pi_l^2(O_1) - \pi_l^2(E_1) + u$.

We can compare these profits under this two-price setting to the profits from covenants: if $r^c - r^b < \mathbb{P}\Delta$

$$\Delta[\pi_l] = \mathbb{P}\Delta - \pi_l^2(E_1) + u > 0$$

since $\mathbb{P}\Delta > \pi_l^2(E_1) + u$ which is true when there are covenants.

If $r^c - r^b > \mathbb{P}\Delta$, then $E[\pi_l] = 0$ (no difference).

Thus, it is more profitable for the landlords to implement covenants instead of this two-price mechanism. This is because its more profitable for the landlord to do always exclusive or never exclusive, then its more advantageous for the landlord to offer one or the other. Offering two prices is the same as offering both. One difference is that in the commitment story, the covenant doesn't

affect entry probabilities: the landlord picks a covenant when the retailer can compensate the landlord for foreclosing on entry.

In the data, the types of stores that have this two-part contract are the nonanchor store: the stores that agree to pay more rent once the anchor enters or once sales go up. These are the stores for which the landlord wouldn't offer covenants anyways. We see this two -tiered promise for profits for smaller colocating stores (seen for example appendix). int his model, that would imply that $\pi(O)$ is low and that its worth adding the store to fill the vacancy. but that the covenant is not worth it. in the case of ties, maybe choose the two tiered system because its less work.

For asymmetric information, the best the landlord can do is target the average.