

# Downstream Competition and Exclusive Dealing

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Academic Writing Course  
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# Introduction (1 of 2)

## Motivation #1: Empirical prevalence of exclusivity

- Prevalence of exclusive dealing car dealerships in the European Market
  - Regulatory attempts to encourage dealers to sell multiple brands
  - Spain: around a 78% of exclusive dealing.
- Exclusive contracts in car retail, beer distribution, mobile phones sales, computer components.

## Motivation #2: Longstanding debate in the theory literature and regulatory policy over Exclusive Dealing

1. Preserve returns from promotional investment
    - Besanko and Perry (1993), Segal and Whinston (2000a), De Meza and Selvaggi (2007), Fumagalli, Motta and Rønde (2012)
  2. Differentiate from competing retailers (e.g. Besanko and Perry (1994))
  3. Manufacturers may use ED to raise retailers' costs to offer other brands.
    - Exclusionary motives: Aghion and Bolton (1987), Rasmussen et al. (1991), Bernheim and Whinston (1998), Segal and Whinston (2000b), Calzolari and Denicolò (2015)
- Combined analysis of these aspects useful for competition authorities

## Introduction (2 of 2)

**Research Question:** exclusive dealing in the car retail sector arises as...

- a consequence from retailers' desire to differentiate from their local competitors. (Competitive motives)
  - a result of manufacturers deterring competition within dealers by increasing the costs of selling multiple brands? (Anticompetitive motives)
- **Preview of the results:** No evidence for increased costs for multi-dealers. ED in the market explained by competitive motives.

## Challenges and Innovations

1. Novel dataset on car sales registry and retailers from Spain.
2. Estimate a model of car retailing
  - Dealers' choice on offerings are endogenous (Brand, ED).
3. Identify the channels through which exclusive dealing affects competition.
  - **Demand side** (Nurski & Verboven, 2016) + **Supply side** (Asker, 2016)
  - **Market structure:** Choice of ED is affected by local retail competition.
4. New identification strategy for fixed costs.

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## Overview of the data

1. **Car sales:** Spanish Directorate-General of Traffic Summary Statistics
2. **Car characteristics:** Specialized magazines Summary Statistics
3. **Dealer locations and brands:** Collected from manufacturer's websites.
4. **Demographics:** income, geographical data. Various government agencies.

## Pattern #1: Hidden multi-dealers and classification

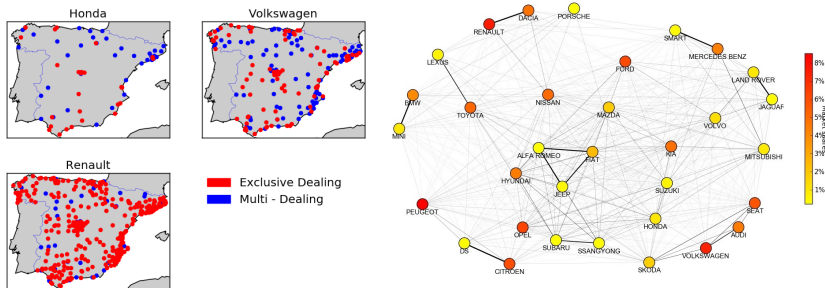


**Figure 1:** Avanti Motor Group, Armilla, Granada



**Figure 2:** Quadis Retail Group, Sant Boi de Llobregat, Barcelona

**Patterns #2, #3 and #4:** Differences in dealer , geographic distribution and intra-dealer competition across manufacturers.



- 32 Brands, 3345 Dealers.
- 21.57% are multi-dealers. 41.40% of points of sale are multi-dealers.
- Smaller brands have a higher % multi-dealers.

### First Stage: Simultaneous Entry Game

- Potential dealer  $d \in E$  in location  $l_d$  chooses the set of brands it sells  $a_d \in A_d \subseteq \mathcal{P}(B)$  to maximize expected profits.

$$\max_{a_d \in A_d} \mathbb{E}[\pi_d | \mathcal{I}_d] = \mathbb{E} \left[ \sum_{m \in M} \sum_{b \in a_d} \sum_{j \in b} q_{jdm}(\theta, a_d, a_{-d})(p_j - p_j^w) \right] - F_d(a_d).$$

- $q_{jdm}$  are the quantities of product  $j$  of brand  $b$  sold by dealer  $b$  in market  $m$
- $p_j$  and  $p_j^w$ : list and wholesale prices, respectively.
  - Manufacturers set list prices conditional on their realized dealership networks and these are binding (**Second Stage**).
  - They set list prices to max. the total profits their entire network (**Third Stage**).

### Fixed Costs: $F_d(a_d)$

$$F_d(a_d) = \sum_{b \in a_d} (F_b + \nu_d^b) + \mathbb{I}\{|a_d| > 1\} \cdot C_{MD} + \nu_d^l$$

- $F_b$  brand fixed effect,  $C_{MD}$  cost of multi-dealing
- $\nu_d^b, \nu_d^l$  dealer specific disturbances - unobserved by the econometrician

### Fourth Stage: Random Coefficients Logit Demand

**Notation:** Market  $m$ , Product  $j$ , Consumer  $i$ , Dealer  $d$

$$u_{ijdm} = \delta_{jm} + \mu_{ijm} + \gamma_{idm} + \epsilon_{ijdm}$$

- $\delta_{jm}$ : base utility for product  $j$  in market  $m$

$$\delta_{jm} = x'_{jm}\beta + \alpha p_j + \xi_{jm}$$

- $\mu_{ijm}$ : individual heterogeneity for consumer  $i$

$$\mu_{ijm} = \sigma y_{im} p_j$$

- $\gamma_{idm}$ : individual-dealer heterogeneity for consumer  $i$  buying from dealer  $d$

$$\gamma_{idm} = \gamma_1 \text{ED}_d + \gamma_2 \text{dist}(i, d)$$

- Points of purchase are not observed
  - Take many simulated consumer locations and assume them to have their closest dealer from each brand in their choice set.
  - $\text{dist}(i, d)$ : distance from simulated consumer location to dealer.
  - $\text{ED}_d$ : exclusivity status from dealer

## Estimation (1 of 2)

### Estimation in **three separated stages**

1. Demand estimation (Random Coefficients Logit)
  - Instruments: BLP instruments + demographics instruments.
  - Selection of  $\xi_{jm}$  on entry? Unobserved  $\xi_{jm}$  in Entry Stage.
2. Inferring marginal costs through first order conditions.
3. Fixed Costs Estimation (Moment Inequalities)

### **Moment Inequalities and Selection**

Equilibrium play  $a^*$  implies that, cond. on  $l_d$  and  $a_{-d}$ , a dealer offering  $a_d$  would have lower  $\mathbb{E}(\pi_d|\cdot)$  if ...

- it removed a brand that is observed to offer (Upper bound).
- it added a brand that it is not observed to offer (Lower bound).
- No obs defines an upper and a lower bound.
- $\Delta \nu_d^l = 0$ , but  $\mathbb{E}[\Delta \nu_d^b | b \in a_d] \leq 0 \rightarrow$  selection problem

E.g. Upper bounds estimated with obs with low realized fixed costs.

→ Construct reasonable upper bounds simulating  $\mathbb{E}(\pi_d|\cdot)$  under alternative competition.

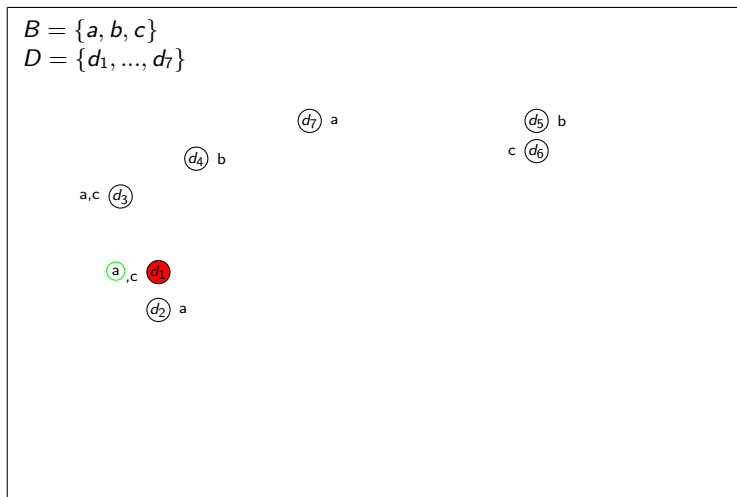
## Estimation (2 of 2)

Figure 3: Illustration of the approach



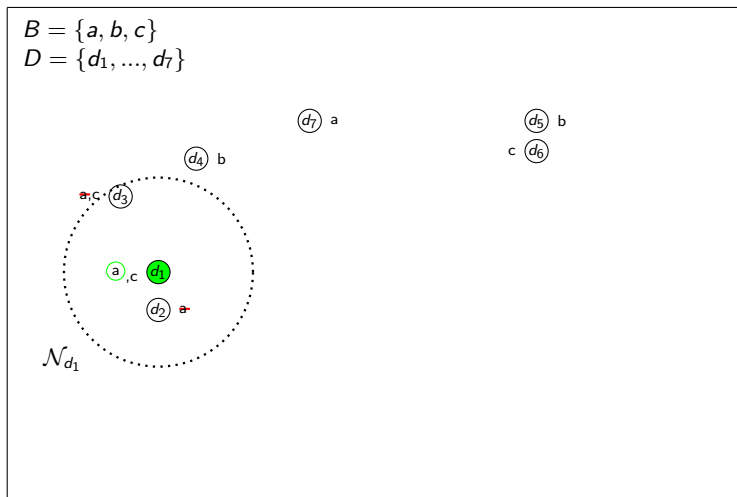
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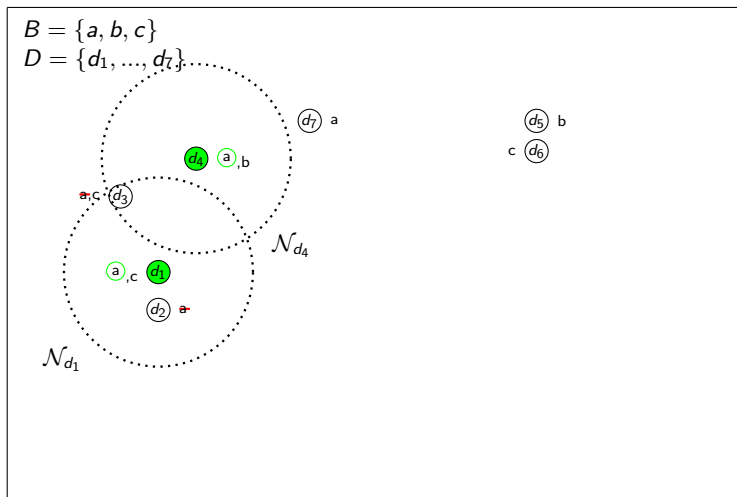
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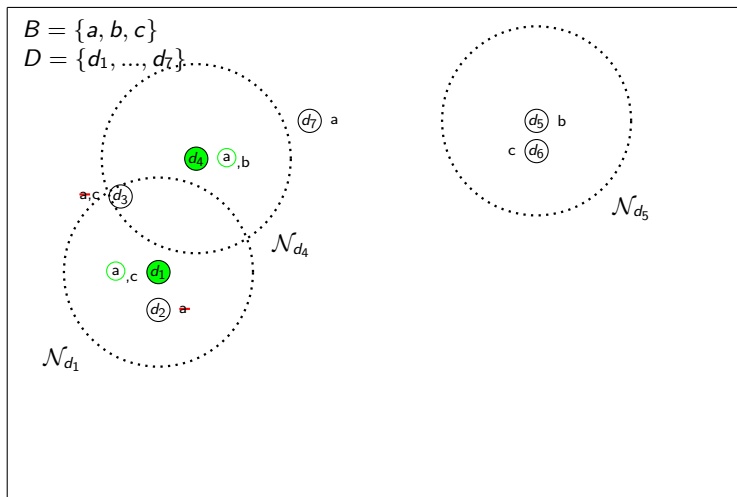
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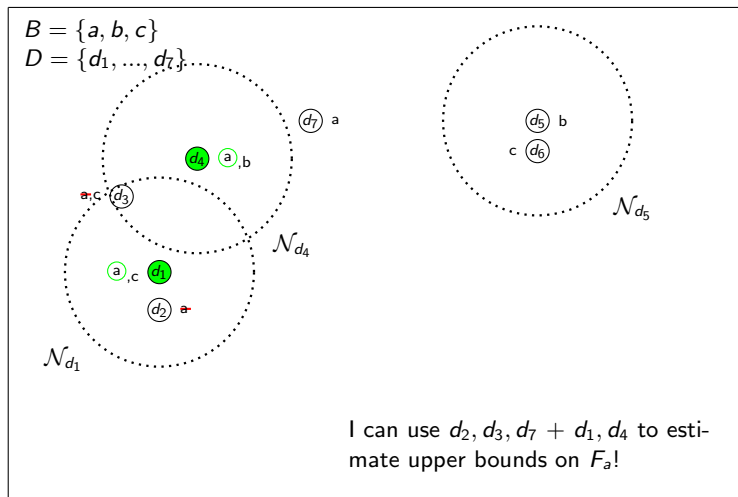
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## Results (1 of 2)

Table 1: Estimates for the demand model

	(1) Logit	(2) RC Logit	(3) RC Logit	(4) RC Logit
Price	-2.232** (0.220)	-1.130** (0.118)	-1.163** (0.115)	-2.291** (0.618)
Fuel Cons.	-0.344** (0.041)	-0.342** (0.048)	-0.332** (0.048)	-0.214** (0.067)
HP / Weight	-0.113** (0.037)	-0.028 (0.039)	-0.020 (0.039)	0.070 (0.074)
Size	1.276** (0.118)	1.291** (0.132)	1.325** (0.130)	2.066** (0.429)
Cons.	-15.200** (0.978)	-13.548** (1.074)	-13.914** (1.051)	-17.706** (2.461)
Distance		-0.556** (0.060)	-0.546** (0.060)	-0.353** (0.110)
ED			0.200** (0.100)	-0.021 (0.154)
Price × Income				0.073** (0.023)
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- Price 1,000€ ↑ =
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## Results (2 of 2)

**Table 2:** Fixed Cost Estimates (in 10,000 €)

	Lower	Upper		Lower	Upper
Alfa Romeo	10.3750	112.3477	Mini	31.0048	233.3680
Audi	248.9550	967.3268	Mitsubishi	57.6487	253.7285
BMW	240.7112	1427.9737	Nissan	105.1268	453.3960
Citroen	158.1234	409.9916	Opel	112.3373	473.0761
Fiat	31.8118	199.4893	Peugeot	232.2222	982.2118
Ford	109.0567	382.4699	Porsche	1049.9087	5929.1565
Honda	35.2027	221.0466	Renault	314.3647	950.5661
Hyundai	110.0356	515.8113	Seat	243.6576	840.3873
Infiniti	43.2850	299.4948	Skoda	63.6640	367.2605
Jaguar	90.1613	601.0930	Smart	-9.9428	60.6519
Jeep	37.5273	266.4081	SsangYong	17.8420	118.3771
KIA	114.6440	580.4779	Subaru	1.9487	78.3876
Land Rover	116.1576	623.2758	Suzuki	15.3060	98.6510
Lexus	20.3505	35.8169	Toyota	117.6452	443.0447
Mazda	86.8278	440.2257	Volkswagen	213.7001	746.6376
Mercedes	248.3775	906.8245	Volvo	92.0989	499.0274
			Multi-Dealing	-62.5631	1.1340



# Conclusion

## Concluding Remarks

- Constructed a new dataset.
- Model of retail with endogenous branding.
- Presented demand and supply estimates.
  - Competition downstream pushes dealers to differentiate from each other → ED for different brands
  - No evidence of demand effects from ED.
  - Slight tendency towards cost benefits from ED.
- Implications for competition policy: ED in the car market follows competitive motives.
- Introduced a methodological contribution how to deal practically with selection in geographical markets.

## Current Work: Counterfactuals

- Is there any chance for ED reducing the access to points of sale for smaller manufacturers?
- If so, what are the effects of this exclusion in terms of welfare?

# Downstream Competition and Exclusive Dealing

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# Car registry data

## Microdata - Spanish Directorate-General of Traffic (DGT)

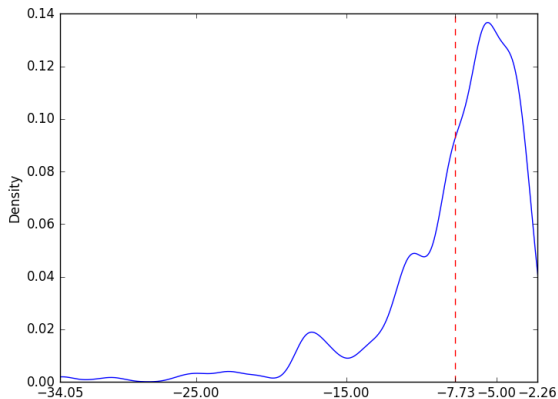
- Daily admin data about all car registries (Jul 2016 - Aug 2017).
- Merged with data from car magazines to complete car characteristics.

Table 3: Descriptive Statistics

	Brand	Sales	Shares		$\mu$	$\sigma$	Min	Max	Obs
1	Peugeot	73785	7.86%	<b>Model</b>					
2	Renault	73429	7.82%	Horsepower	144.34	60.23	60	422	234
3	Volkswagen	66719	7.11%	Weight (100 Kg.)	14.55	3.35	8.05	24.65	234
4	Seat	65021	6.93%	Size ( $m^2$ )	8.03	1.06	4.48	10.36	234
5	Opel	57174	6.09%	Fuel Cons. (l/km)	5.08	1.19	3.3	10.61	234
				Price (10,000 €)	3.43	2.16	1.02	14.86	234
	Model	Sales	Shares	<b>Markets</b>					
1	Sandero	24227	2.58%	Municipalities					6608
2	Ibiza	21757	2.32%	Provinces					43
3	Golf GTI	20933	2.23%						
4	Qashqai	20586	2.19%						
5	Tucson	17815	1.90%						

## Elasticities (1 of 2)

Figure 4: Distribution of Price elasticities



## Elasticities (2 of 2)

Table 4: Top 5 Highest and Lowest Elasticities

Brand	Model	Elasticity
<b>Highest 5 Elasticities</b>		
Land Rover	Range Rover	-33.78
Porsche	Panamera	-30.70
BMW	Serie 6	-25.75
Mercedes Benz	Clase S	-24.62
BMW	Serie 7	-23.05
<b>Median</b>		
Volkswagen	Beetle	-6.39
Mini	Paceman	-6.30
<b>Lowest 5 Elasticities</b>		
Dacia	Dokker	-2.56
Ford	Ka	-2.48
Dacia	Logan	-2.33
Dacia	Sandero	-2.30
Skoda	Citigo	-2.30

## Inferred margins

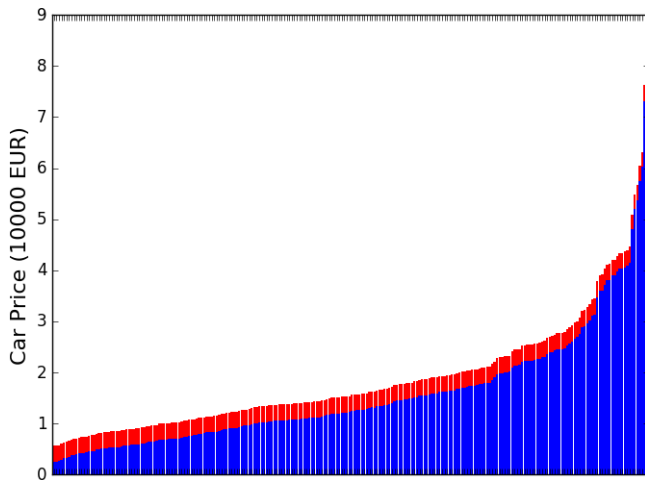


Figure 5: Distribution of Dealers' expected margin by car

# Overcoming Selection: Eventual Profitability

## Overcoming Selection

- If  $b \notin a_d$ ,  $d$  prefers  $a_d$  over  $a_d^{b+}$  given  $a_{-d}$
- In areas with high demand for  $j \in b$ , there is some  $a'_{-d}$  for which  $d$  would have incentives to deal for  $a_d^{b+}$  over  $a_d$
- Let  $a'_{-d}$  subtract all  $b$  locally, so that  $d$  would be a local monopolist retailer for  $b$ , then I assume  $\mathbb{E}[\Delta\pi_d(a_d, a_d^{b+}; a_{-d})|\mathcal{I}_d] \leq 0$

### Assumption: Eventual (Un)Profitability

Let  $d, \tilde{d}$  be two observed dealerships with  $a_d$  and  $a_{\tilde{d}}$  respectively, and suppose  $b \in a_{\tilde{d}}$ . Then, if  $\text{dist}(d, \tilde{d}) < L$  there exists at least one  $i_d \in \{0, 1\}^{|-d|}$  with  $a'_{-d} = i_d \cdot a_{-d} + (1 - i_d) \cdot a_{-d}^{b-}$  such that

$$\mathbb{E}[\pi_d(a_d^{b+}, a'_{-d})|\mathcal{I}_d] \geq \mathbb{E}[\pi_d(a_d, a'_{-d})|\mathcal{I}_d].$$

Conversely, let  $b \in a_d$ , then there exists at least one  $i_d \in \{0, 1\}^{|-d|}$  with  $a'_{-d} = i_d \cdot a_{-d} + (1 - i_d) \cdot a_{-d}^{b+}$  such that

$$\mathbb{E}[\pi_d(a_d^{b-}, a'_{-d})|\mathcal{I}_d] \geq \mathbb{E}[\pi_d(a_d, a'_{-d})|\mathcal{I}_d].$$

# Moment Inequalities (1 of 4)

## Moment Inequalities

I define functions...

**“Subtract the brand whenever possible, if not add the brand to the counterfactual monopolist”**

$$\Delta r_b^u(a_d, a_d^{b-}, a_{-d}) = \begin{cases} \mathbb{E} \left[ \Delta \text{VP}_d(a_d, a_d^{b-}; a_{-d}) \right] - F_b - \mathbb{I}\{|a_d| \neq 2\} \cdot C_{MD}, & \text{if } b \in a_d, \\ \mathbb{E} \left[ \Delta \text{VP}_d(a_d^{b+}, a_d; a'_{-d}) \right] - F_b - \mathbb{I}\{|a_d^{b+}| \neq 2\} \cdot C_{MD}, & \text{if } b \notin a_d, \end{cases}$$

**“Add the brand whenever possible, if not subtract the brand in the counterfactual competitive market”**

$$\Delta r_b^l(a_d, a_d^{b+}, a_{-d}) = \begin{cases} \mathbb{E} \left[ \Delta \text{VP}_d(a_d^{b-}, a_d; a'_{-d}) \right] + F_b + \mathbb{I}\{|a_d^{b-}| > 1\} \cdot C_{MD}, & \text{if } b \in a_d, \\ \mathbb{E} \left[ \Delta \text{VP}_d(a_d, a_d^{b+}; a_{-d}) \right] + F_b + \mathbb{I}\{|a_d| > 1\} \cdot C_{MD}, & \text{if } b \notin a_d, \end{cases}$$



## Moment Inequalities (2 of 4)

### Moment Inequalities (continued)

... and select those observations that fulfill the requirements in the illustration (and assumption)...

**“Select the observations for which  $\Delta r_b^u \geq 0$ ”**

$$\begin{aligned} g_d^1(b, a_d, a_{-d}) &= \mathbb{I}\{b \in a_d\} \cdot \mathbb{I}\{|a_d| \neq 2\} + \mathbb{I}\{b \notin a_d\} \cdot \mathbb{I}\{d \in \mathcal{N}_b^L\} \cdot \mathbb{I}\{|a_d^{b+}| \neq 2\}, & \text{and} \\ g_d^2(b, a_d, a_{-d}) &= \mathbb{I}\{b \in a_d\} \cdot \mathbb{I}\{|a_d| = 2\} + \mathbb{I}\{b \notin a_d\} \cdot \mathbb{I}\{d \in \mathcal{N}_b^L\} \cdot \mathbb{I}\{|a_d^{b+}| = 2\}. \end{aligned}$$

**“Select the observations for which  $\Delta r_b^l \geq 0$ ”**

$$\begin{aligned} g_d^3(b, a_d, a_{-d}) &= \mathbb{I}\{b \in a_d\} \cdot \mathbb{I}\{d \notin \mathcal{N}_b^L\} \cdot \mathbb{I}\{|a_d^{b-}| > 1\} + \mathbb{I}\{b \notin a_d\} \cdot \mathbb{I}\{|a_d| > 1\}, & \text{and} \\ g_d^4(b, a_d, a_{-d}) &= \mathbb{I}\{b \in a_d\} \cdot \mathbb{I}\{d \notin \mathcal{N}_b^L\} \cdot \mathbb{I}\{|a_d^{b-}| = 1\} + \mathbb{I}\{b \notin a_d\} \cdot \mathbb{I}\{|a_d| = 1\}. \end{aligned}$$

where  $\mathcal{N}_b^L$  denotes the neighboring areas defined as in the illustration.

## Moment Inequalities (3 of 4)

### Moment Inequalities (continued)

... to create the following moment conditions that satisfy inequalities...

#### MI for Upper Bounds

$$m_b^1 = |D|^{-1} \sum_{d \in D} g_d^1(b, a_d, a_{-d}) \Delta r_b^u(a_d, a_d^{b-}, a_{-d}) \geq 0, \quad \text{and}$$

$$m_b^2 = |D|^{-1} \sum_{d \in D} g_d^2(b, a_d, a_{-d}) \Delta r_b^u(a_d, a_d^{b-}, a_{-d}) \geq 0,$$

#### MI for Lower Bounds

$$m_b^3 = |D|^{-1} \sum_{d \in D} g_d^3(b, a_d, a_{-d}) \Delta r_b^l(a_d, a_d^{b-}, a_{-d}) \geq 0, \quad \text{and}$$

$$m_b^4 = |D|^{-1} \sum_{d \in D} g_d^4(b, a_d, a_{-d}) \Delta r_b^l(a_d, a_d^{b-}, a_{-d}) \geq 0.$$

- Provided that  $|D|^{-1} \sum_{d \in D} g_d^i \cdot \nu_d^b \rightarrow 0$  for  $i \in \{1, 2, 3, 4\}$
- This is true if  $\nu_d^b$  are i.i.d

## Moment Inequalities (4 of 4)

### And Yet More Moment Inequalities

Based on Ho and Pakes (2014) match couples of dealers

$$\Delta w(d_1, d_2, b) = \Delta r_b^u(a_{d_1}, a_{d_1}^{b-}, a_{-d_1}) + \Delta r_b^l(a_{d_2}, a_{d_2}^{b+}, a_{-d_2}).$$

#### Moment conditions

$$m^5 = NM^{-1} \sum_{b \in B} \sum_{d_1 \in D} \sum_{d_2 \neq d_1} g_{d_1}^2(b, a_{d_1}, a_{-d_1}) g_{d_2}^3(b, a_{d_2}, a_{-d_2}) \Delta w(d_1, d_2, b) \geq 0, \quad \text{and}$$

$$m^6 = NM^{-1} \sum_{b \in B} \sum_{d_1 \in D} \sum_{d_2 \neq d_1} g_{d_1}^1(b, a_{d_1}, a_{-d_1}) g_{d_2}^4(b, a_{d_2}, a_{-d_2}) \Delta w(d_1, d_2, b) \geq 0,$$

Objective function:  $\left[ m(F)_- \right]' \Sigma(F)^{-1} \left[ m(F)_- \right]$

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