

Downstream Competition and Exclusive Dealing

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XXXIII Jornadas de Economía Industrial
September 7, 2018

Introduction

Motivation

- | What is the role of downstream competition in the presence of exclusive dealing?
 - | Can it lead to manufacturer exclusion of any kind?
 - | What are its welfare consequences?
- | Long and fruitful theoretical literature on exclusive contracts
 - | Various results when downstream firms \neq end buyers.

This Project

- | Novel dataset on car sales registry and retailers from Spain.
- | Estimate a model of car retail
 - | Manufacturers compete for dealers.
 - | Dealers' offerings are endogenous (Brand, ED).
 - | Spatial demand for cars.
- | Channels through which ED affects competition w/ lim'd mkt data.
- | New identification strategy for fixed costs.
- | C'factuals that illustrate the role of downstream competition.

Related Literature

Empirics of Exclusivity Contracts

- | Sinkinson (2014), Asker (2015), Ater (2015), Nurski and Verboven (2016), Chen (2014), Eizenberg, Pechy and Sovinsky (2016)

Empirics of Car Retailing

- | Lafontaine and Scott Morton (2010), Murry and Schneider (2016), Brenkers and Verboven (2006), Albuquerque and Bronnenberg (2012), Murry (2015), Murry and Zhu (2017)

Fixed Costs + Moment Inequalities

- | Pakes (2010), Pakes, Porter, Ho and Ishii (2015), Holmes (2011), Eizenberg (2014), Wollmann (2018)

Model

Timing of the model

Static game with three stages

1. Potential dealer $d \in E$ in a location I_d decides:
 - | Whether to open a dealership at all, and if so, whether to...
 - | Become an exclusive dealer and sell products from one brand.
 - | Become a multidealer and sell products from several brands.
2. Manufacturers see their dealer networks and set prices.
3. Consumers decide what car and from which retailer to buy it.

Incentives for exclusive dealing

- | Demand effects (Additional promotion by manufacturer).
- | Lower fixed costs.
- | Dealer differentiation vs. offering more products.

Demand

Random Coefficients Logit

Notation: Market t , Product j , Consumer i , Dealer d

$$u_{ijd} = \underbrace{x_j\beta + \alpha_i p_j + \xi_j}_{\delta_j + \mu_{ij}} + \underbrace{\gamma_1 ED_d + \gamma_2 \text{dist}(i, d)}_{\gamma_{id}} + \underbrace{\epsilon_{ijd}}_{T1EV}$$

- | x_j and p_j are observable car characteristics
 - | $v_i = \alpha_i + v_i + D_i$
- | ξ_{jt} are car characteristics that remain unobserved to the econometrician
- | $\text{dist}(i, d)$ and ED_d are dealer characteristics.
 - | Take many simulated consumer locations and assume them to have their closest dealer from each brand in their choice set.

Price Competition

- | Manufacturers set list and wholesale prices (p , and p^w) for their products conditional on their realized dealership networks.
- | Wholesale prices are set to maximize profits.
- | List prices are set to, on average, be the profit max. price for dealers.

$$\sum_{d \in E} \Delta_d \frac{\partial \pi_d(a, \hat{\theta})}{\partial p_j} = 0 \text{ for all } j \in B \text{ and } B \in \mathcal{B}.$$

$$q + \left(\sum_{d \in E} \Delta_d \frac{\partial q_d(a, \hat{\theta})}{\partial p} \right) (p - p^w) = 0,$$

Entry Game

Simultaneous Entry Game

- | Potential dealer $d \in E$ in location l_d chooses a strategy $a_d \in A_d$ to maximize profits.
- | e.g. if two brands $P(B) = f_i$, ED a, ED b, MD a & b

$$\max_{a_d \in A_d} E[\pi_d(a_d, a_{-d}) | l_d] = E \left[\underbrace{\sum_{m \in M} \sum_{j \in J_d} q_{jdm}(\theta, a) (p_j - c_j)}_{EVP_d(a)} F_d(a_d) \mid l_d \right].$$

- | Multi-dealing deterrence can happen through $F_d(a_d)$.
- | Strategic interaction between the firms comes through $q_{jdm}(\theta, a)$
- | $F_d(a_d)$ contains $\nu_d^a, \nu_d^l \in l_d$ that are unobserved to the econometrician.

Overview of the data

1. Car registry data

- | Registry Data - Spanish Directorate-General of Traffic (DGT)

2. Data on dealer locations

- | Collected from manufacturer's websites.

3. Data on car characteristics

- | Collected from specialized magazines.

4. Demographics

- | National Institute of Statistics (INE).
- | Continuous Sample of Working Lives (MCVL) - Social Security.
- | Shape files for geographical data.

Car registry data (1 of 2)

Microdata - Spanish Directorate-General of Traffic (DGT)

- | Daily admin data about all car registries (Jul 2016 - Aug 2017).
- | Individual info: zipcode and municipality
- | Car characteristics: car model, VIN code, new/used, engine displacement, horsepower, number of seats, energetic propulsion.

Table 1: Aggregate market shares conditional on buying a car

	Brand	Sales	Shares		Model	Sales	Shares
1	Peugeot	73785	7.86%	1	Sandero	24227	2.58%
2	Renault	73429	7.82%	2	Ibiza	21757	2.32%
3	Volkswagen	66719	7.11%	3	Golf GTI	20933	2.23%
4	Seat	65021	6.93%	4	Qashqai	20586	2.19%
5	Opel	57174	6.09%	5	Tucson	17815	1.90%

Car registry data (2 of 2)

Some aggregation

- | Classify into car model (e.g. Ford Fiesta) and version (e.g. Ford Fiesta Coupé),
- | Match every observation to its closest trim (e.g. Ford Fiesta Coupé 1.0 EcoBoost 100CV Trend)
- | Average to create one baseline model

Table 2: Descriptive statistics of car characteristics

	Mean	Std. Dev	Min	Max	Obs
Model					
Horsepower	144.34	60.23	60	422	234
Weight (100 Kg.)	14.55	3.35	8.05	24.65	234
Size (m^2)	8.03	1.06	4.48	10.36	234
Fuel Cons. (l/km)	5.08	1.19	3.3	10.61	234
Price (10,000 EUR)	3.43	2.16	1.02	14.86	234
Markets					
Municipalities					6608
Local Mkts 50,000					243
Provinces					43

Dealer Data (1 of 3)

Classification examples



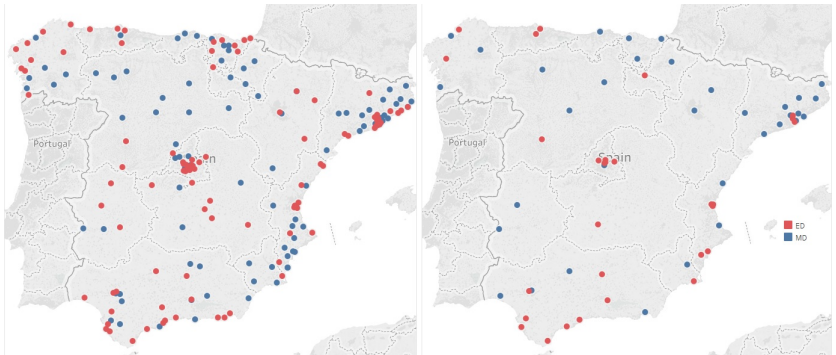
Figure 1: Avanti Motor Group, Armilla, Granada



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

Dealer Data (2 of 3)

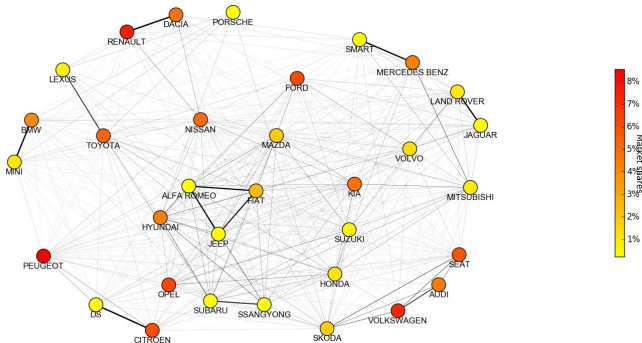
Figure 3: Location of dealers for Honda (right) and Volkswagen (left)



- | Slight tendency towards multidealing in less densely populated areas

Dealer Data (3 of 3)

Figure 4: Plot of shared dealerships



Dealers

- | Around 3370 dealers for over 30 brands in the sample.
- | 44.36% of dealers (21.57%) are multidealers
- | 66.21% of points of sale (41.40%) are multidealers
- | Smaller brands share more often dealerships.

Demand estimates (1/4)

Estimates

- | Aggregate the markets to the province level.
- | Identification assumption: choice set are models available <80 km.
- | Instruments: BLP Instruments + Demographics instruments
 - | Distance of consumers to d 's rivals / rivals' ED
 - | Income of consumers with d 's rivals in their choice set, but not d
- | Distance and ED: 2000 simulated customer locations per market.
- | Endogeneity of characteristics? Selection?
 - | Unobserved ϵ_{jt} in Entry Stage

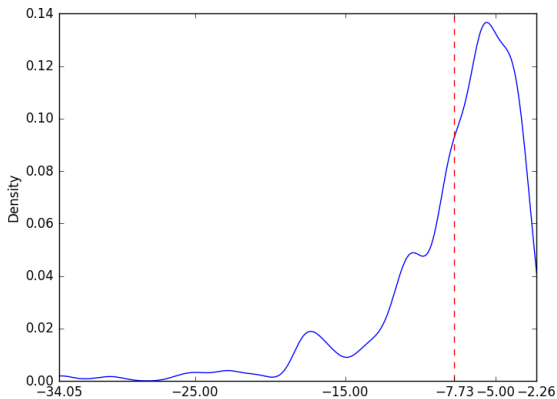
Demand estimates (2/4)

Table 3: Estimates for the demand model

	(1)	(2)	(3)	(4)
	Logit	RC Logit	RC Logit	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)
Origin f.e.	Yes	Yes	Yes	Yes
Province f.e.	Yes	Yes	Yes	Yes

Demand estimates (3/4)

Figure 5: Distribution of Price elasticities



Demand estimates (4/4)

Table 4: Top 5 Highest and Lowest Elasticities

Brand	Model	Elasticity
Highest 5 Elasticities		
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
Median		
Volkswagen	Beetle	-6.39
Mini	Paceman	-6.30
Lowest 5 Elasticities		
Dacia	Dokker	-2.56
Ford	Ka	-2.48
Dacia	Logan	-2.33
Dacia	Sandero	-2.30
Skoda	Citigo	-2.30

Fixed Cost Estimation (Under Construction)

Functional Form

$$F_d(a_d) = \sum_{b \in a_d} F_b + I_{\{f_j a_{dj} > 1\}} C_{MD} + \nu_d^a + \nu_d^l$$

- | Fixed component F_b per brand
- | C_{MD} cost of exclusive dealing if more than one brand sold
- | ν_d^a, ν_d^l dealer specific disturbances - unobserved by the econometrician

Notation

- | $a_d^{b+} = a_d [fbg]$ and $a_d^b = a_d nfbg$
- | $E[\Delta \pi_d(a_d, a_d^b; a_d) | a_d] = E[\pi_d(a_d, a_d) - \pi_d(a_d^b, a_d) | a_d]$

Fixed Cost Estimation

Selection

- | Equilibrium implies: $E[\Delta\pi_d(a_d, a_d^b; a_d) | a_d] = 0$ if $b \geq a_d$ and $E[\Delta\pi_d(a_d, a_d^{b+}; a_d) | a_d] = 0$ if $b \not\geq a_d$
- | $\Delta\nu_d^l = 0$, but $E[\Delta\nu_d^a | b \geq a_d] \neq 0$! selection problem

Overcoming Selection

- | Under certain conditions, I assume there is some a_d^0 for which $E[\Delta\pi_d(a_d, a_d^{b+}; a_d^0) | a_d] = 0$ if $b \not\geq a_d$

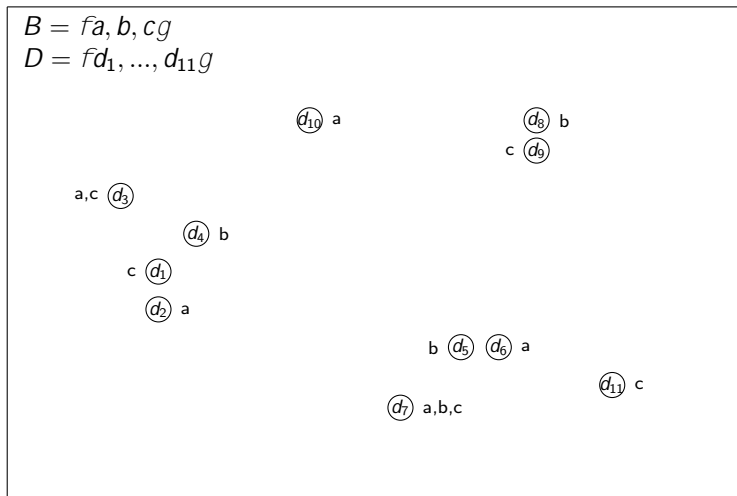
- | Define

$$\Delta r_b(a_d, a_d^b, a_d) = \begin{cases} E[\Delta\pi(a_d, a_d^b; a_d) | a_d] + \Delta\nu_d^a, & \text{if } b \geq a_d \\ E[\Delta\pi(a_d^{b+}, a_d; a_d^0) | a_d] + \Delta\nu_d^a, & \text{if } b \not\geq a_d. \end{cases}$$

- ! Moment condition $m_{1,b} = \sum_{d \geq D} \mathbb{1}_{\{b \geq a_d\}} \Delta r_b(a_d, a_d^b, a_d) = 0$
- | $\min_{k,m} km(F, C)k^2$

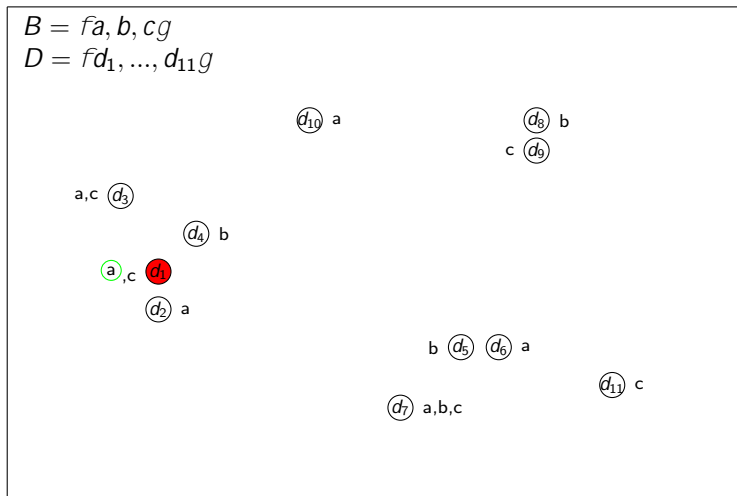
Fixed Cost Estimation

Figure 6: Illustration of the assumption



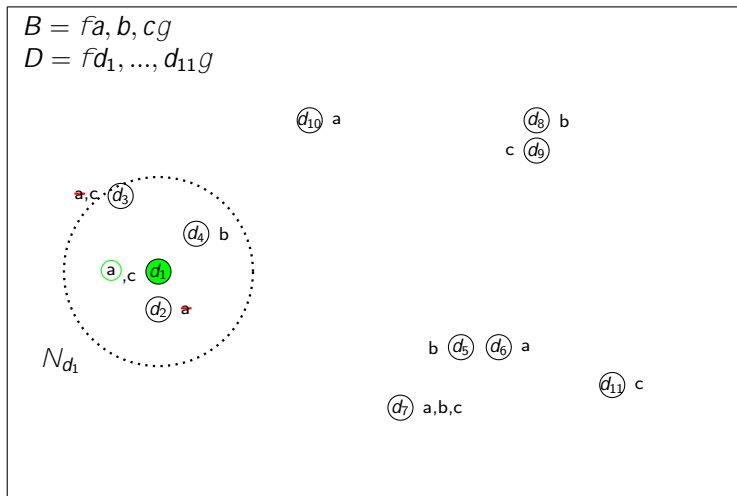
Fixed Cost Estimation

Figure 6: Illustration of the assumption



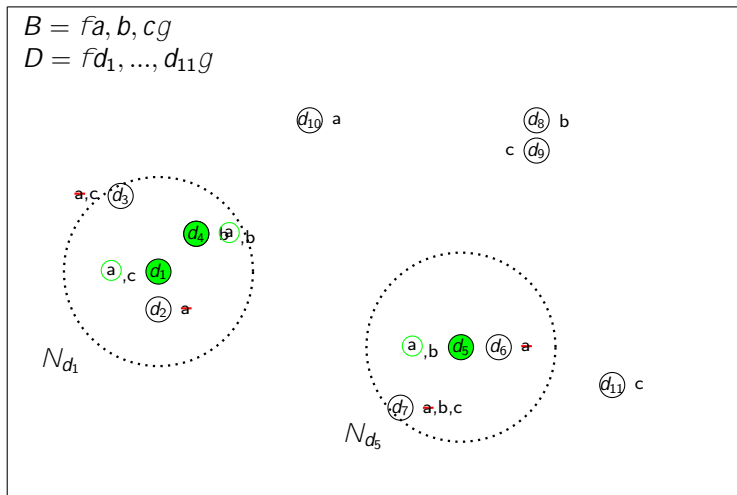
Fixed Cost Estimation

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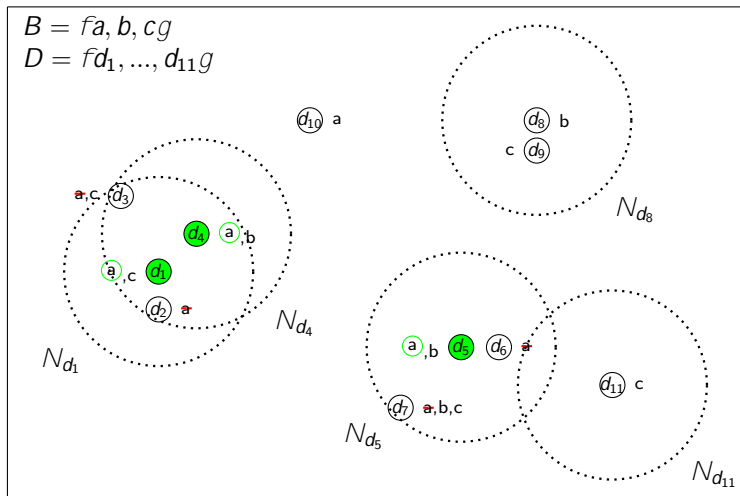
Fixed Cost Estimation

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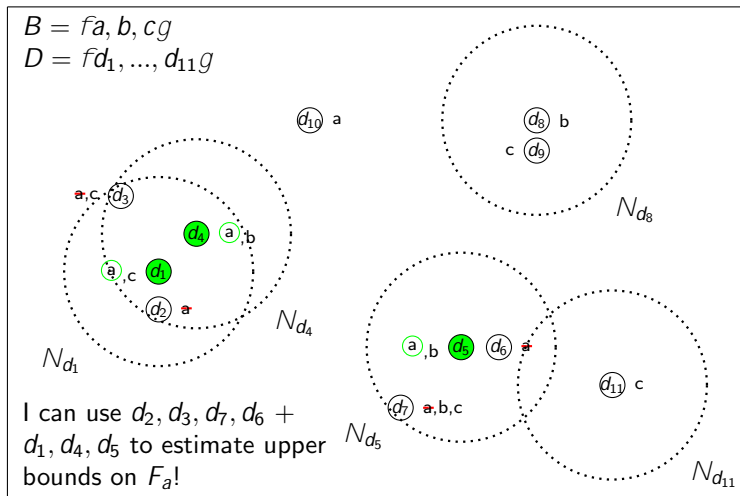
Fixed Cost Estimation

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Fixed Cost Estimation

Figure 6: Illustration of the assumption



I can use $d_2, d_3, d_7, d_6 + d_1, d_4, d_5$ to estimate upper bounds on F_a !

Conclusion

Next Steps

- | Get fixed cost estimates
- | Counterfactuals
 - | Eliminate C_{MD} and MD
 - | Relax geographical competition.

Summarizing

- | Constructed a new dataset.
- | Model of retail with endogenous branding.
- | Presented reasonable demand estimates.
 - | 80% exclusive dealing must come from supply.
- | Introduced a methodological contribution how to deal practically with selection in geographical markets.

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Inferred Margins

Figure 7: Distribution of Dealers' expected margin by car

