

# DIAGNOSING FORECLOSURE DUE TO EXCLUSIVE DEALING

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# Motivation

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- Exclusive vertical arrangements can cause foreclosure, in the sense of forcing competitors to use higher cost or less efficient distributors. If this is the case competition is reduced and total welfare lowered.
- But exclusive arrangements can help a firm organize distribution more efficiently, resulting in net gain for society.
- The US beer market is highly concentrated, with 3 brewers producing 77% of all beer sold, and exclusive arrangements with distributors are common.
- In 1997, the Department of Justice started an investigation into distribution practices in the industry, on the basis of the Clayton act which prohibits “any exclusive contract that substantially lessens competition between upstream firms.”

- Main Question: How do we determine if an exclusive vertical arrangement is efficiency enhancing or anti-competitive?
- Application: The Chicago Beer Market

# Overview

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- By making weak assumptions on distribution of distributors in a market, we can test whether the presence of exclusive arrangements has negative effects on other firms. If the distribution of distribution costs are ex ante identical across markets, brewers' costs in markets where competitors have exclusive arrangements should be higher, or demand lower.
- The paper will take advantage of two properties of the data: the vertical structure is exogenous and fully observable, and Anheuser-Busch uses only exclusive arrangements and thus can act as a control group.
- This test requires knowledge of firm mark ups, and thus a structural model of costs and demand (as well as good data.)
- **Result:** In the Chicago beer market, they do not find foreclosure to negatively impact other firms.

# Outline

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- Related Literature
- Description of the Beer Market
- Proposed Test for Foreclosure
- Data
- Industry Model
- Econometric Implementation
- Results

# Related Literature - Theoretical

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- Most of the literature on exclusive dealing provides theoretical support for this behavior, showing 3 reasons firms make exclusive arrangements:
- 1) Firms gain by forcing competitors to use high cost distributors
  - Rasmusen et al (1991), Bernheim and Whinston (1998)
- 2) Provides incentive to invest more in distributors
  - Besanko and Perry (1993), Segal and Whinston (2000)
- 3) Solves principle/agent incentive problems (resulting in better service)
  - Prat and Rustichini (2003), Klein and Murphy (1988), Martimort (1996)

# Related Literature – Empirical

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- Sass (2002) studies beer markets with and without exclusive dealing arrangements, and finds exclusive dealing increases productivity of the sales and promotional effort of distributors in the beer market, and argues these result from brewer incentives.
- Brenkers and Verbover (2002) study the European car market using a similar approach to this paper, studying the effects of removal of exclusive territories.
- 3 papers examine the effects of exclusive territories on beer prices, finding positive effects.
  - Sass and Saurman (1996), Culbertson and Bradford (1991), Jordan and Jaffe (1987)

# Why the Beer Market?

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- Market broken into 3 tiers: brewers, distributors, and retailers, which are required by law to be separate.
- Brewers required to assign exclusive distribution territories and report them to the Liquor Commission.
- Brewers set 1 price for each supermarket chain, and distributors deliver at that price.
- Some brewers sign arrangements with distributors to distribute only their beer. Many do not.
  
- Bottom line: the vertical structure is exogenous and observable.

# Proposed Test for Foreclosure

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- There are 2 types of markets, those with and without distributors operating with exclusive arrangements. We assume that ex ante, the distribution of distributors in these markets is identical. Thus, in the first type of market, some brewers face a distribution that is truncated from the left.
- As a result, they face higher expected costs/lower demand.
- If exclusive arrangements are desirable because they promote investment, those distributors that sign exclusive deals will become more efficient and the expected costs of competitors will be unaffected.
- Foreclosure that does not negatively impact competitors will not be detected, but this is not the case that concerns us.

# Test Implementation

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- All Anheuser-Busch distributors are exclusive, roughly  $\frac{1}{2}$  of Miller distributors are, and no other brewers sign exclusive arrangements.
- This fact is the key to identification. The test essentially treats Anheuser-Busch as the control group and all other brewers as the treatment group, and compares the costs and demand between markets where Miller does and does not have exclusive arrangements.
- Two big assumptions: second and higher-order moments of cost distributions are identical across markets, and access of Anheuser-Busch to distributors is unaffected by the presence of a Miller exclusive (i.e. Busch gets first choice.)

# Test Implementation

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- Three reasons non-Miller beer sales may be worse in a market with a Miller exclusive:
  - 1) Market specific effect
  - 2) The Miller exclusive is a good promoter, and shifts demand to Miller.
  - 3) Other brewers are hampered by worse distributors because of foreclosure.
  
- We are interested in the third effect, and hope to use the performance of Anheuser-Busch to control for the first 2. Reason #2 is not perfectly controlled for if Miller/AB substitution is different from Miller/other substitution.

# Test Implementation

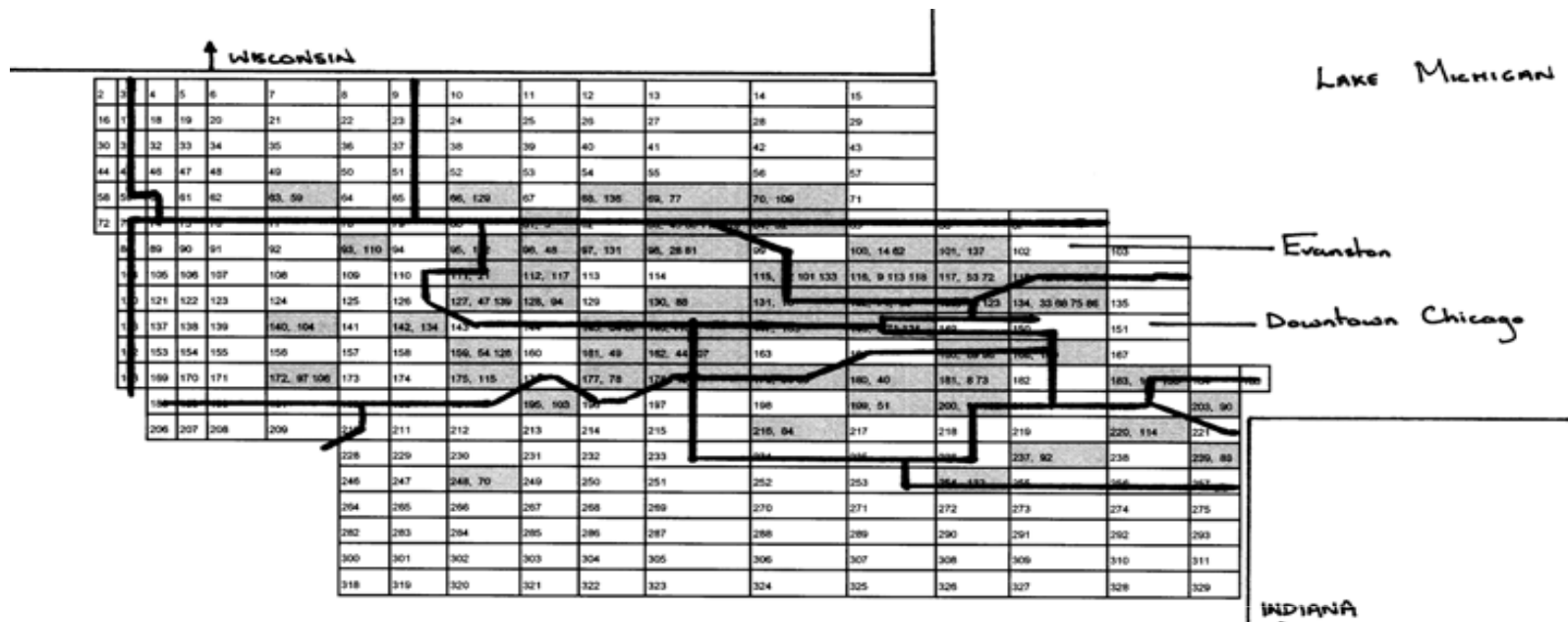
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- 3 classes of distributors:
  - Never serve a market with a Miller exclusive
  - Only serve markets with Miller exclusives
  - Serve both types of markets
  
- A reformulated version of the test compares distributors in classes 2 and 3 in markets where Miller is not exclusive. Because distributors in class 3 are chosen even in the absence of “foreclosure,” when comparing their performance in markets with a Miller exclusive these distributors should be more effective.

# Data

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- We know the sales territories of 12 major brewers, covering 90% of the beer sold in the markets studied during the period we have data, 1994.
- Data on exclusive sales territories is collected by the Illinois Liquor Control Commission. Registration specifies brand, precise geographic region, and time period of exclusive agreement.
- The Chicago GSB Market Department collects weekly scanner data on consumer purchases from Dominick's Finer Foods, the 2<sup>nd</sup> largest grocery chain in the region, with 20% market share.
- Brand, store, week, price and promotional activity are all recorded, as well as retailer price



Map Grid

### Exclusive Sales Territories: Miller

— territory boundary

- Each square is a page in Rand-McNally  
 Top = 3.5 miles  
 Side = 4.5 miles
- Shaded squares contain at least one DFF Store.

**Table 2: Descriptive Statistics drawn from DFF Data**

Number of Obs				138213
Number of Stores				71
Number of Beers				73
Number of Brewers / Importers				12
<hr/>				
<b>A. Prices [\$ per 12oz]<sup>1</sup></b>	$p^c$	$p^r$	$p^c - p^r$	
mean	0.6001	0.5033	0.0968	
stdev	0.1777	0.1345	0.0906	
min	0.1983	0.1533	2.4866	
max	2.9683	1.1073	-0.3375	
<hr/>				
<b>B. Other Characteristic</b>	Shares <sup>2</sup>	Serving Size <sup>3</sup>	ABV <sup>4</sup>	Calories <sup>5</sup>
mean	0.054	132.0	4.41	130.8
stdev	0.094	88.8	1.02	25.0
min	0.003	21.0	0.25	58.0
max	3.710	661.0	6.94	200.0
<hr/>				
<b>C. Promotional Activity</b>				
% of Obs with Promotional Activity Tagged				31.3%
% of Obs with $p^c - p^r$ Negative				17.6%
% of Obs overlapping <sup>6</sup>				15.0%

# Industry Model

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Brewers set retail and distributor prices, subject to distributor participation constraint.

Brewer's problem:

$$\begin{aligned} \Pi^b &= \max_{p^r, p^d} \sum_j \sum_k (p_{jd(k)}^d - c_j^b) M_k s_{jk} \\ \text{s. t. } & p_j^r - (c_{jd(k)}^d + r_{jd(k)}^d) - p_{jd(k)}^d = 0 \quad \forall d(k) \end{aligned}$$

Where  $s_{jk}$  is market share of product  $j$  in store  $k$  and  $M_k$  is market size of store  $k$  (the number of customers that make purchases during that week.)

Retailer's problem:

$$\max_{p_j^c} \sum_k \sum_j (p_j^c - p_j^r - c^r) [M_k s_{jk}(p^c, x | \theta)]$$

# Econometric Implementation

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But those marginal costs/mark ups are unobservable, so we must model demand.

Two demand specifications are used, simple logit demand nested into BLP random coefficients logit, where utility is modeled as:

$$U_{ijkt} = x_j \beta_i - \alpha_i p_{jt}^c + \xi_{jkt} + \varepsilon_{ijkt}$$

$$\begin{bmatrix} \alpha_i \\ \beta_i \end{bmatrix} = \begin{bmatrix} \alpha \\ \beta \end{bmatrix} + \Gamma D_i + \Upsilon v_i$$

Where  $D_i$  represent observable demographic characteristics,  $\Gamma$  represent interaction parameters to be estimated, and  $v_i$  are unobservable consumer characteristics distributed  $N(0,1)$ .

# Econometric Implementation Continued

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- Price is likely correlated with unobserved product characteristics, and a variety of instruments are used to handle endogeneity, including distributor/brand dummies, packaging, promotion dummies and lagged and lead prices .
- Demographic data is taken from zip code level Census data, specifically household income and age.
- These demand estimates are used in the firm FOC's to find costs for brewer/distributor pairs, but when brewers set their retail price they need to take into account the costs of all their distributors.

# Results - Demand

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**Table 3: Logit and Random Coefficient (BLP) Demand Models**

Specification: Instruments:	<b>A</b>		<b>B</b>		<b>C</b>		<b>D</b>	
	None		Lagged and Lead Mean Prices		Lagged and Lead Mean Prices		Lagged and Lead Mean Prices	
	<b>Coeff.</b>	<b>Std. Err.</b>	<b>Coeff.</b>	<b>Std. Err.</b>	<b>Coeff.</b>	<b>Std. Err.</b>	<b>Coeff.</b>	<b>Std. Err.</b>
<b>Interacted with (1/Income)*2500</b>								
Constant	-	-	-	-	0.029	0.129	-	-
Price (per 12oz)	-	-	-	-	0.293	0.283	-	-
<b>Interacted with draws from N(0,1)</b>								
Constant	-	-	-	-	-	-	-0.177	3.134
Price (per 12oz)	-	-	-	-	-	-	0.063	3.093
<b>Not interacted</b>								
Price (per 12oz)	-4.648	0.106	-6.509	0.112	-6.590	1.341	-5.966	0.744
Promo	0.260	0.013	0.059	0.013	0.104	0.081	0.118	0.062
Serving Size <sup>1</sup> (div by 10)	-0.052	0.002	-0.071	0.002	-0.066	0.010	-0.064	0.009
Serving Size <sup>2</sup> (div by 10000)	0.097	0.005	0.119	0.005	0.011	0.001	0.011	0.001
Holiday <sup>2</sup>	0.364	0.006	0.360	0.006	0.364	0.009	0.361	0.016
Temperature (°C, div by 10)	0.084	0.002	0.083	0.002	0.085	0.003	0.085	0.008
Distributor-Brand Dummies	+	+	+	+	+	+	+	+
r <sup>2</sup>	0.436		0.431		0.438		0.433	
SSR	98527		99501		105800		99031	
SER	0.846		0.850		0.877		0.848	
N	138213		138213		138213		138213	

Notes: Note that in specifications B, C and D the r-squared statistics are merely indicative of goodness of fit due to the presence of instrumental variables

<sup>1</sup> Serving size is always in oz.

<sup>2</sup> The Holiday variable is a dummy for weeks in the fortnight leading up to Superbowl Sunday, the 4th of July, Labor Day and Christmas

## Results - Demand

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- We see the expected positive bias in price coefficients, unless instrumented. The price coefficient of 6.5 corresponds to a price elasticity of around 3.4.
- Promotions have almost no effect, controlling for price.
- Higher income doesn't change price sensitivity very much.
- The null hypothesis that the interaction terms are zero is not rejected at any reasonable significance level, thus the logit specification cannot be rejected.

# Results – Testing Foreclosure in Promotional Aptitude

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Table 4: Testing for Promotional Foreclosure

Specification: Instruments:	A		B		C	
	Lagged and Lead Mean Prices		Lagged and Lead Mean Prices		Lagged and Lead Mean Prices	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Price (per 12oz)	-6.323	0.115	-7.130	0.246	-6.730	0.193
Promo	0.064	0.014	-0.069	0.030	-0.061	0.023
Serving Size <sup>1</sup> (div by 10)	-0.067	0.002	-0.048	0.005	-0.046	0.004
Serving Size <sup>2</sup> (div by 1000)	0.011	0.001	0.009	0.001	0.009	0.001
Holiday	0.359	0.006	0.337	0.013	0.335	0.010
Temperature	0.008	0.000	0.007	0.000	0.007	0.000
Brand Dummies	+	+	+	+	+	+
"Foreclosed" Stores - Potentially Foreclosed	0.129	0.010	-	-	-	-
"Foreclosed" Stores - AB	0.117	0.008	-	-	-	-
All Exclusive Markets	-	-	0.255	0.012	0.300	0.011
r <sup>2</sup>	0.377		0.399		0.388	
SSR	108836		22678		35040	
SER	0.888		0.840		0.841	
N	138213		32174		49555	

## Results – Testing Foreclosure in Promotional Aptitude

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- Dummies measuring demand response to Miller exclusive competition are positive and of the same magnitude for Anheuser-Busch and for potentially foreclosed brewers, indicating no foreclosure in promotional ability.
- A reformulated test examines the performance of class 2 distributors – those serving both types of markets – and finds it to be positive, indicating no foreclosure.

# Results – Testing Foreclosure in Costs

**Table 5: Testing for Cost-Based Foreclosure**

Dependant Variable:		Price to Retail - Estimated Markup							
Specification:		1		2		3		4	
Estimation Procedure		OLS, as second step		IV, as second step		OLS, as second step		IV, as second step	
		Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Constant (per unit/SKU)		0.1461	0.0096	0.1451	0.0096	0.0958	0.0078	0.0948	0.0078
Light		0.0183	0.0031	0.0189	0.0031	-	-	-	-
Ice		0.0435	0.0050	0.0435	0.0050	-	-	-	-
NA		-0.4757	0.0785	-0.4764	0.0786	-	-	-	-
Import		0.2757	0.0063	0.2757	0.0063	-	-	-	-
ABV		-0.1785	0.0410	-0.1793	0.0410	-	-	-	-
ABV <sup>2</sup>		0.0128	0.0045	0.0128	0.0045	-	-	-	-
Calories		-0.0086	0.0006	-0.0086	0.0006	-	-	-	-
Calories <sup>2</sup> (div by 1000)		0.0425	0.0022	0.0425	0.0022	-	-	-	-
A "Foreclosed" Stores - Potentially Foreclosed		0.0113	0.0029	0.0007	0.0030	0.0021	0.0020	-0.0094	0.0020
B "Foreclosed" Stores - AB		0.0273	0.0035	0.0133	0.0035	0.0090	0.0037	-0.0059	0.0038
Brand Dummies:		-	-	-	-	Full Set	-	Full Set	-
Brewer Dummies:		Full Set	-	Full Set	-	-	-	-	-
A - B		-0.0160	0.0045	-0.0127	0.0046	-0.0070	0.0036	-0.0035	0.0037
r <sup>2</sup>		0.7883	-	0.7878	-	0.9480	-	0.9475	-
SSR		43.49	-	43.59	-	10.68	-	10.78	-
SER		0.0662	-	0.0663	-	0.0329	-	0.0331	-
N		9935	-	9935	-	9935	-	9935	-

Notes: The instrument is the proportion of stores that a product is going to that are also served by an exclusive Miller distributor

# Conclusion

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- This paper formulates a test for whether exclusive arrangements harm competition through foreclosure. The test relies on somewhat strong assumptions regarding the distribution of distributors and how exclusive arrangements come about.
- Using a structural model of demand to back out costs, it is possible to test for whether brewers are foreclosed from cheaper or more effective distributors.
- The test is performed on the Chicago beer market, using scanner data on consumer purchases and observable vertical structure.
- No evidence is found of negative foreclosure effects in this market.