

Competition and Price Wars in the U.S. Brewing Industry

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I. Introduction

Purpose of the Paper:

1. Investigate how the “beer wars” affected price competition.
2. Focus on U.S. macro-brewers, 1977-2008.

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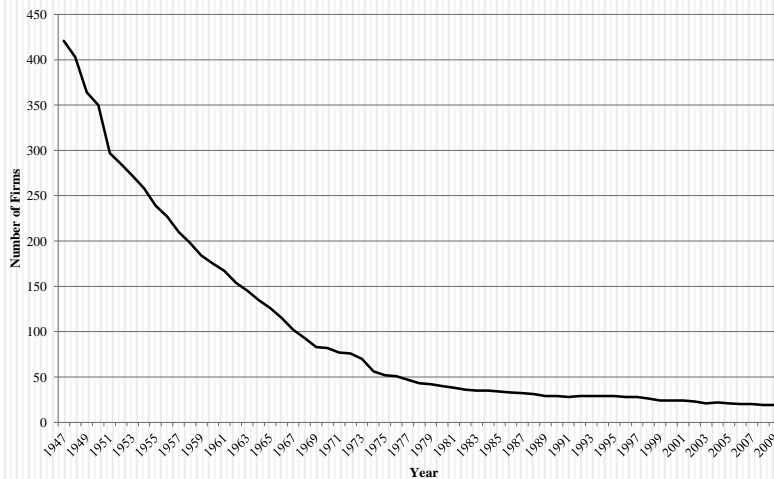
II.1 Brewing Industry Paradox

1. Decline in Number of Competitors

- Number of Firms (N): Figure 1a
- Four-Firm Concentration Ratio (CR4): Figure 1
& Herfindahl-Hirschman Index (HHI)
- Market Share of Leaders: Figure 1b
(An-Bu, Coors, Miller, Pabst)

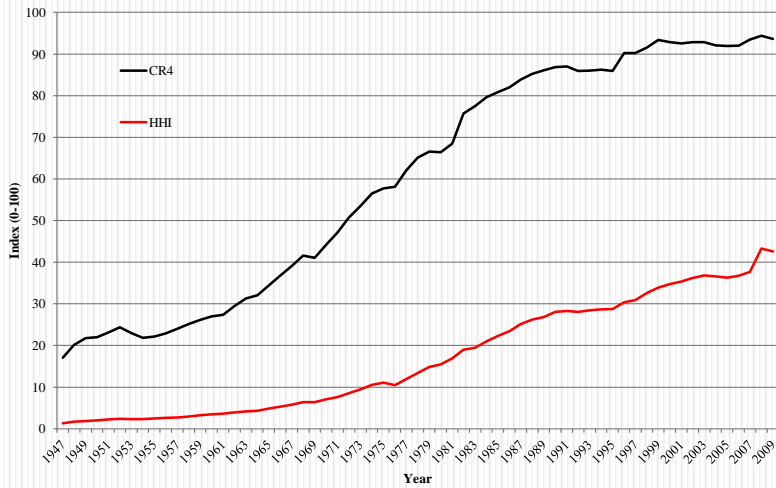
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Figure 1a Number of Independent Macro-Brewers, 1947-2009



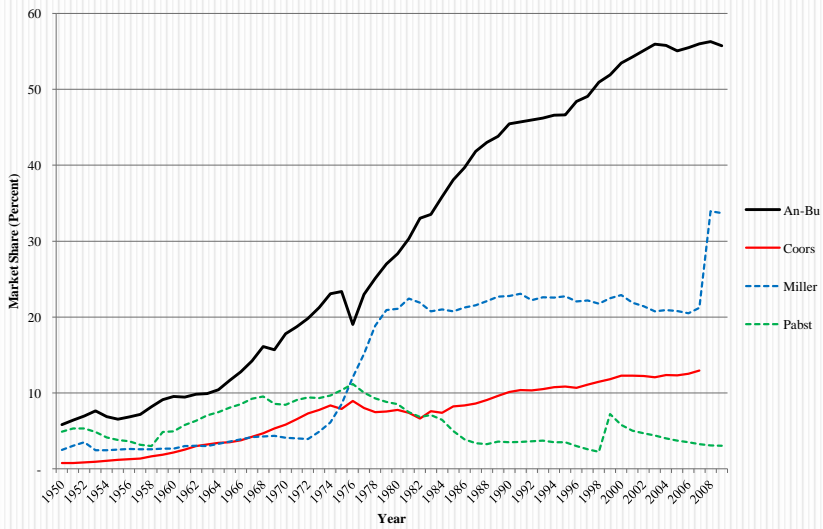
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Figure 1 Beer Industry Concentration (Four-Firm Concentration Ratio and Herfindahl-Hirschman Index), 1947-2009



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Figure 1b Market Share of Leading Macro-Brewers, 1950-2009



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II.2 Brewing Paradox

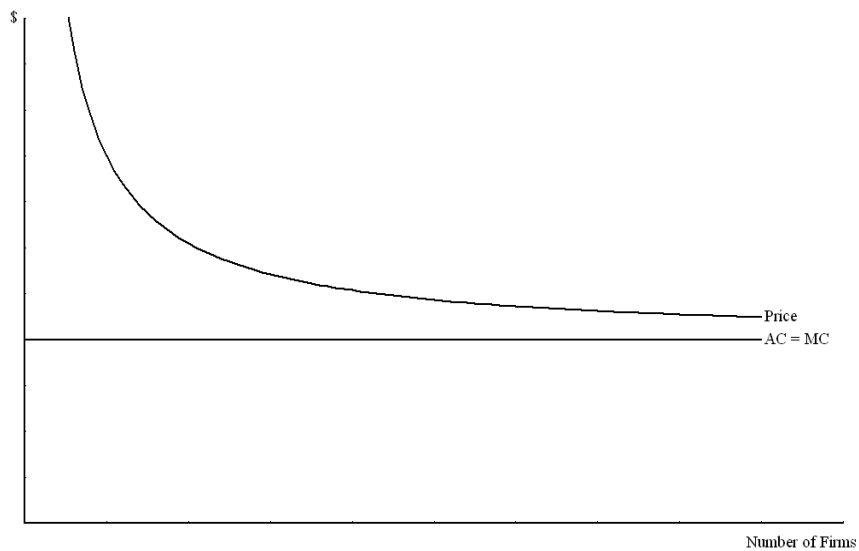
3. Simple Theory: N and Profitability

$\downarrow N \rightarrow \uparrow \text{Profits (prices)}$

Cournot (1838) Model: output (q) competition

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Figure 1c Number of Firms and Price Competition in the Cournot Model



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II.3 Brewing Paradox

3. Simple Theory: $\downarrow N \rightarrow \uparrow \text{Profits (prices)}$

4. Paradox:

- Profits have remained low! Figures 1d, 1e
- Market Power Indices:

$$\text{Lerner Index: } \quad \mathcal{L} = \frac{\text{price} - \text{marginal cost}}{\text{price}}$$

$$\text{Price-Cost Margin: } \text{PCM} = \frac{\text{price} - \text{average cost}}{\text{price}}$$

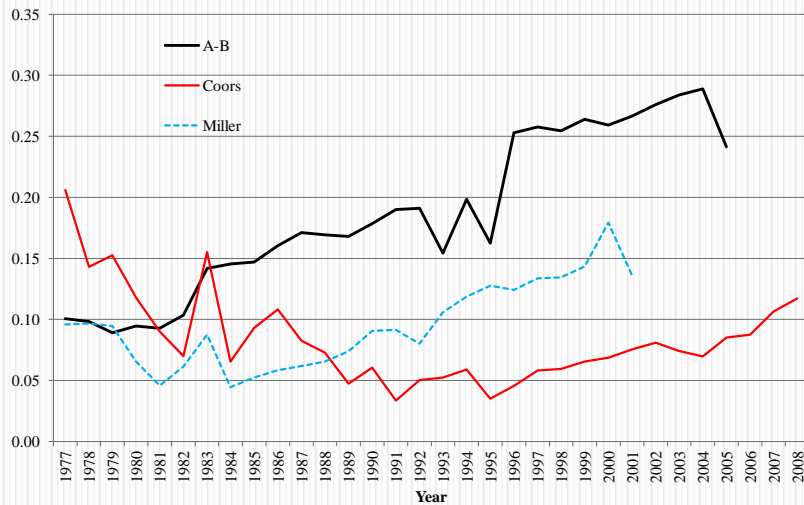
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Figure 1d Beer Industry PCM and the “Beer Wars”, 1950-2003



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Figure 1e PCM for Anheuser-Busch (A-B), Coors, and Miller, 1977-2008



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II.3 Brewing Paradox

5. **Why the Paradox?** $\downarrow N \rightarrow \uparrow \text{Profits (price)}$ is not true!

- PCM data are inconsistent with “simple theory”
- Alternative Theories:
 - Bertrand Model (1883): p-competition
 - Cournot-Bertrand Model (2011): p/q-competition
 - War of Attrition Model (1999)

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III. Beer Wars

1. War of Attrition (Bulow and Klemperer, 1999):

- N firms compete in a market that will profitably support $N^* < N$ firms. ($K = N - N^* > 0$)

2. Industry Evolution (Tremblay and Tremblay, 2005):

- $\downarrow N^*$ and $\uparrow K$, why?
 - 1) Advent of TV, 1950s and 1960s
(Homes with TV: 1950-9%, 1960-87%, 1970-95%)
 - 2) Technological Change, 1970s – 1990s
→ \uparrow MES, size needed to minimize unit cost
- \uparrow MES → $\uparrow K$

Table 1

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Table 1 The Market Share of the National Brewers, Minimum Efficient Scale (MES), the Number of Brewers (N), and the Cost-Minimizing Number of Competitors (N^*) in the U.S. Brewing Industry

Year	Market Share of National Brewers (Percent)	MES-Output (Million Barrels)	MES-MS (Percent)	N	N^*	K
1950	16	0.1	0.1	350	840	0
1960	21	1.0	1.5	175	87	88
1970	45	8.0	6.4	82	16	66
1980	59	16.0	9.0	40	11	29
1990	79	16.0	8.4	29	12	17
2000	89	23.0	14.0	24	7	17
2009	93	23.0	14.0	20	7	13

Sources: Steinberg (1980), the *Statistical Abstract of the United States*, Tremblay et al. (2005), and Tremblay and Tremblay (2005).

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III. Strategic Weapons During the Beer Wars

1. Price Competition

2. Advertising, 1950s and 1960s

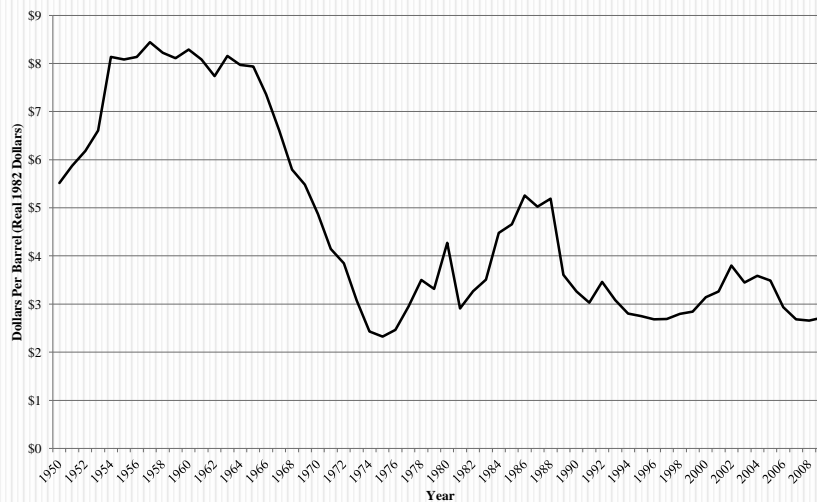
Figures 2, 2a

3. New Brands (1974-):

Table 2

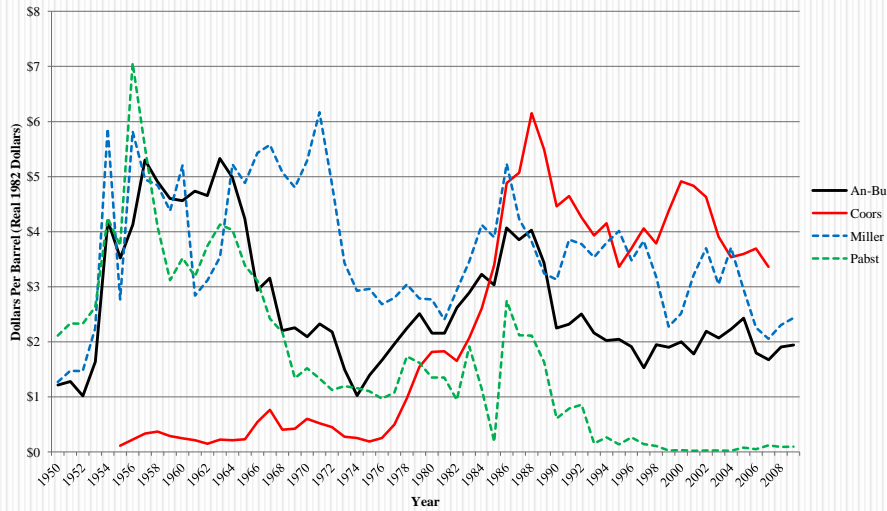
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Figure 2a Advertising Per Barrel for the U.S. Brewing Industry, 1950-2009



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Figure 2 Advertising Per Barrel of Leading U.S. Brewers, 1950-2009



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Table 2 Major Domestic Beer Brands of the Anheuser-Busch, Coors, Miller, and Pabst Brewing Companies

Year	Anheuser-Busch	Coors	Miller	Pabst
1950	2	1	1	1
1960	4	1	1	9
1970	3	1	4	5
1980	5	2	3	10
1990	10	10	9	17
2000	29	14	21	54
2010	55	-	61*	33

* This reflects the brands for both Miller and Coors, as the companies formed a joint venture in 2008 to form MillerCoors.

Sources: Tremblay and Tremblay (2005) for 1950-2000 and company web pages for 2010.

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IV. Consequences of the Beer Wars

1. **Iwasaki et al. (2008):**
 - War kept prices and profits low, 1960s-1990s.
2. **Questions: Has market power begun to rise as the war winds down, 1997-2008?**
 - Continued Consolidation:
 - Heileman-1996, Stroh-1999, Pabst-2001
 - SABMiller-2002, InBev-AnBu-2008, MillerCoors-2008
 - Remaining macros – retreated to craft niche.

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V.1 Empirical Tests

1. **Main Hypothesis:**
 - Has market power increased since 1997?
1. **Methods:**
 - 1) Regression Analysis: New Empirical IO (1970s).
 - 2) Change in Relative Profit Difference (Boone, 2008).

$$RPD \equiv \frac{\pi_1^v - \pi_2^v}{\pi_2^v - \pi_3^v}$$

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V.2 Empirical Tests

Method 2:

Change in Relative Profit Difference

$$RPD \equiv \frac{\pi_1^v - \pi_2^v}{\pi_2^v - \pi_3^v}$$

$$\pi_1^v > \pi_2^v > \pi_3^v$$

↑Competition → harms most efficient firms the least.

→ ↑RPD

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VI.3 Empirical Results

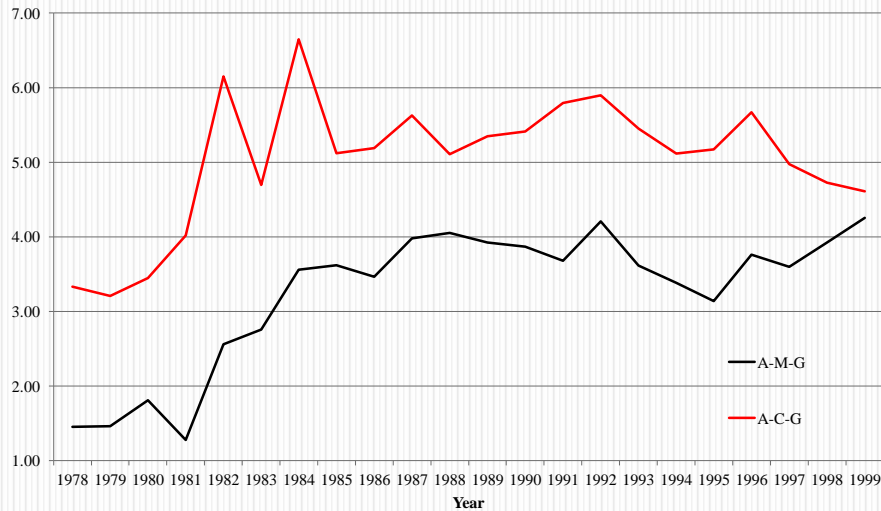
2. RPD:

- Data limitations (1978-1999)
- Two Cases
 - 1) An-Bu – Miller – Genesee
 - 2) An-Bu – Coors – Genesee

Figure 3

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Figure 3 RPD for Anheuser-Busch (A), Miller (M), Coors (C), and Genesee Brewing Companies, 1978-1999



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VI.4 Empirical Results

1. New Empirical IO Regression Results:

- Regression Results:

Firm data, 11 firms, 1977-2008

Table 5

- Lerner Index of Market Power (ϵ):

$\epsilon \in [0, 1]$, $\epsilon = 0 \rightarrow$ a competitive market

1) 1977-1986

□ 2) 1987-1996

□ 3) 1997-2008

Table 6

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Table 5 Parameter Estimates and Standard Errors (in parentheses) of the Optimal Price Equation

Variable	M1	M2	M3	M4	M5	M6	M7	M8
MC	1.0388 ^a (0.009)	1.0374 ^a (0.011)	1.0466 ^a (0.010)	1.0474 ^a (0.010)	1.0689 ^a (0.008)	1.0474 ^a (0.009)	1.0723 ^a (0.008)	1.0630 ^a (0.009)
q	0.9759 ^a (0.167)	0.2230 (0.229)	-0.4290 ^b (0.203)	-0.3971 ^c (0.204)				
q·War			3.5955 ^a (0.268)	3.8357 ^a (0.355)				
q ₈₇₋₉₆					0.2781 (0.335)	-0.1484 (0.365)	-0.9443 ^b (0.380)	-0.9243 ^b (0.380)
q ₉₇₋₀₈					0.8557 ^a (0.176)	0.1986 (0.213)	-0.6955 ^a (0.245)	-0.8438 ^a (0.251)
q ₈₇₋₉₆ ·War							2.8567 ^a (0.397)	2.3587 ^a (0.442)
q ₉₇₋₀₈ ·War							4.3037 ^a (0.453)	3.9444 ^a (0.474)
D _N		4.5913 ^a (0.657)		-0.7671 (0.75)		4.6324 ^a (0.708)		1.9566 ^b (0.777)

Standard errors are in parentheses. The sample size is 176.

^aSignificant at 1 percent.

^bSignificant at 5 percent.

^cSignificant at 10 percent.

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Table 6 Lerner Index Estimates

Time Period	Model	
	M7	M8
1987-1996	0.0021	0.0104
1997-2008	0.0113	0.0179

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VII Conclusion

1. **War of attrition explains why price and profits have remained low in brewing.**
2. **Market power has increased in the last decade but remains low.**

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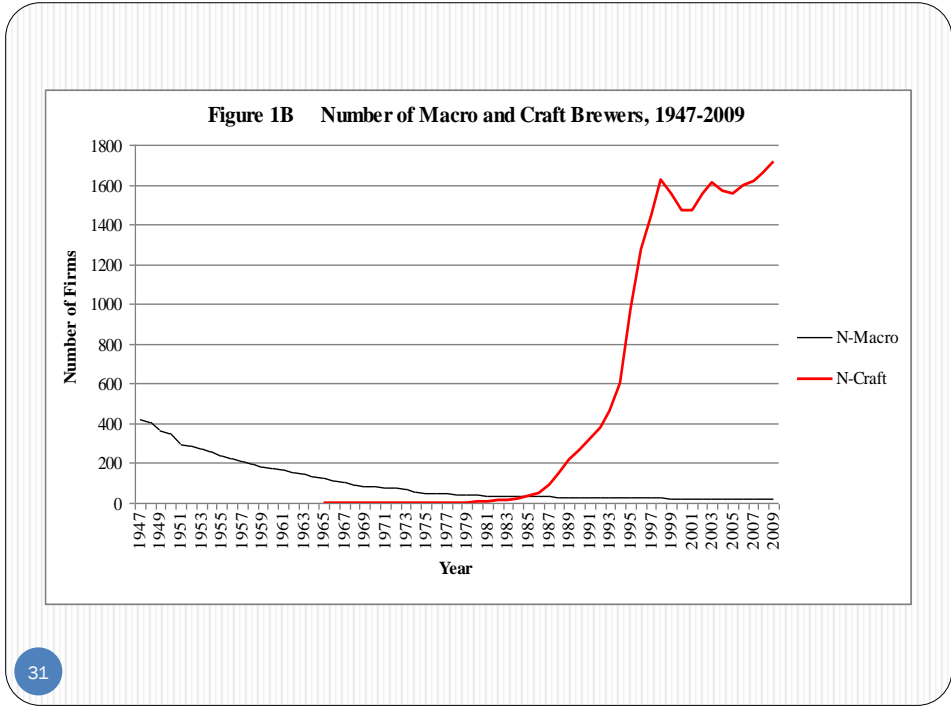
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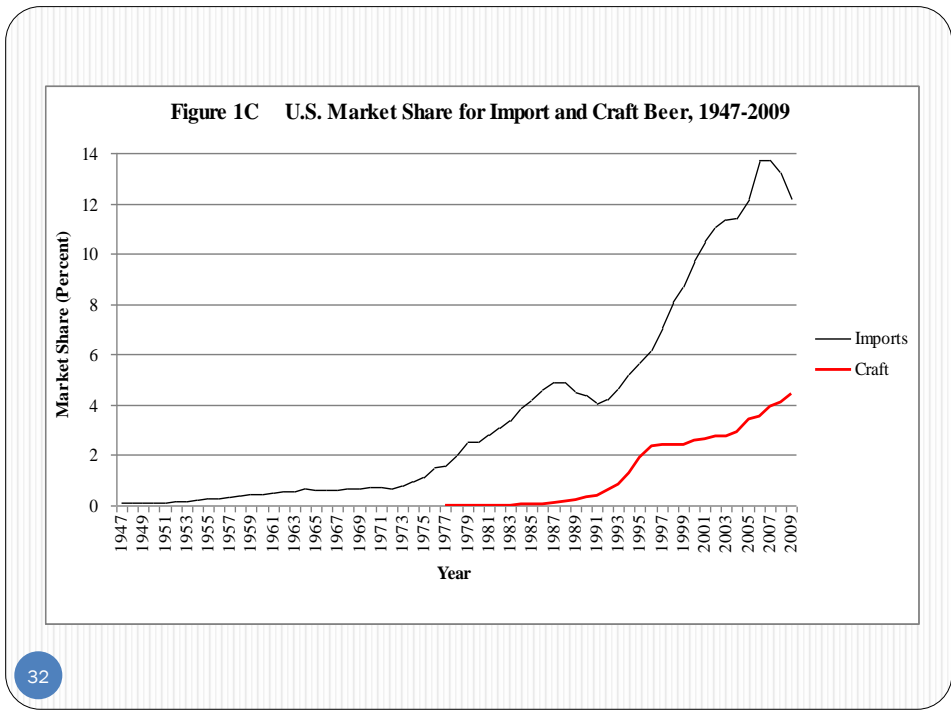
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Table 6 Lerner Index Estimates

Time Period	Model	
	M7	M8
1987-1996	0.0021	0.0104
1997-2009	0.0113	0.0179
	M5	M6
1987-1996	0.0042	0.0234
1997-2009	0.0110	0.0266
	M3	M4
All periods	0.0341	-0.0056
	M1	M2
All periods	0.0446	0.0102



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Figure 1d Markup of Price over Average Cost, 1977-2008

