Does Regulation Drive Competition? Evidence from the Spanish Local TV Industry

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Motivation

- Studies on regulation and competition take regulation as given, and use as a constraint to an equilibrium model to obtain the effect of policy on market outcome
- What is the role of enforcement in regulation?
- We study Spanish local TV industry, where we observe obvious violations of the regulation: underwent several different regulation statuses from alegal (no regulation), regulation, and "silent" deregulation
- We infer from the data to what extent the regulation was enforced and in which way the enforcement impacted how the local TV stations compete

Literature

- Regulation and competition:
  Joskow (1973), Samprone (1979), Armstrong and Vickers (1993), Vickers (1995), Danzon and Chao (2000)
- Static entry game:
  Bresnahan and Reiss (1990,1991,1994), Mazzeo (2002), Seim (2006), Jia (2008), Bajari et al. (2010a 2010b), Grieco (2012)
- Effect of regulation on entry:
  Griffith and Harmgart (2008), Schaumans and Verboven (2008), Cohen et al. (2010), Suzuki (2012), Nishida (2012), Datta and Sudhir (2012)
- Telecommunication industries:
  Berry and Waldfogel (1999), Goolsbee and Petrin (2004), Xiao and Orazem (2011), Crawford and Yurukoglu (2012), Gil and Ruzzier (2012)

Spanish TV Industry

- Prior to 1980s, National Government-Owned: TVE and TVE2
- Early 1980s, Regional: At most two per region
- Mid 1980s, Municipals (= cities): local stations
- Late 1980s, National Privately-Run: Antena3, Tele5, Canal+

Advertising in 2001

	Market for TV Advertising			
Market for TV Content	**No Info**	**No Adv**	**Adv**	**Total**
No Info	**0**	**3**	**8**	**11**
Broadcast	**11**	**66**	**442**	**519**
Pay-per-View	**1**	**47**	**67**	**115**
Total	**12**	**116**	**517**	**645**

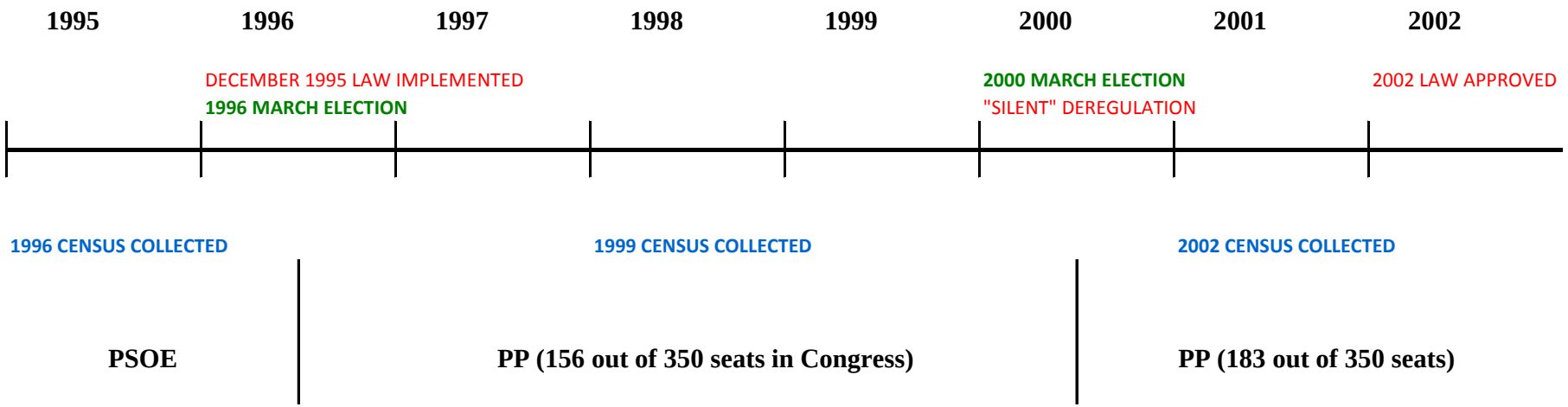
Local TV Regulation in Spain

- Mid 1980s-1995: regulation for regional stations but no regulation for local stations
- 1st regulation: December 1995 law
  - Limited to the geographical boundaries to city
  - No more than two stations allowed per city
  - No network formation
  - Need to have local government personnel on advisory and executive boards (if private)
- "Silent" deregulation accelerates in 2000 after general election results (Badillo, 2003)
- 2nd regulation: December 2002 law
  - Number of stations proportional to population
  - No restriction on station ownership or network formation
  - No need for local government personnel on advisory and executive boards

Two Major Political Parties

- PSOE (Partido Socialista Obrero Español): left-wing party, the industry needs to be regulated
- PP (Partido Popular): right-wing party, the industry needs to be deregulated
- Timeline
  - Before 1996: PSOE
  - 1996 election: PP with little support in congress (156 out of the 350 seats)
    $=>$ Chose not fully enforce the law. The enforcement of the law is laxer especially in cities ruled by PP officials.
  - 2000 election: PP with full support at congress (183 seats)

Timeline


1995
1996
1997
1998
1999
2000
2001
2002
DECEMBER 1995 LAW IMPLEMENTED
1996 MARCH ELECTION
2000 MARCH ELECTION
"SILENT" DEREGULATION
2002 LAW APPROVED
1996 CENSUS COLLECTED
1999 CENSUS COLLECTED
2002 CENSUS COLLECTED
PSOE
PP (156 out of 350 seats in Congress)
PP (183 out of 350 seats)

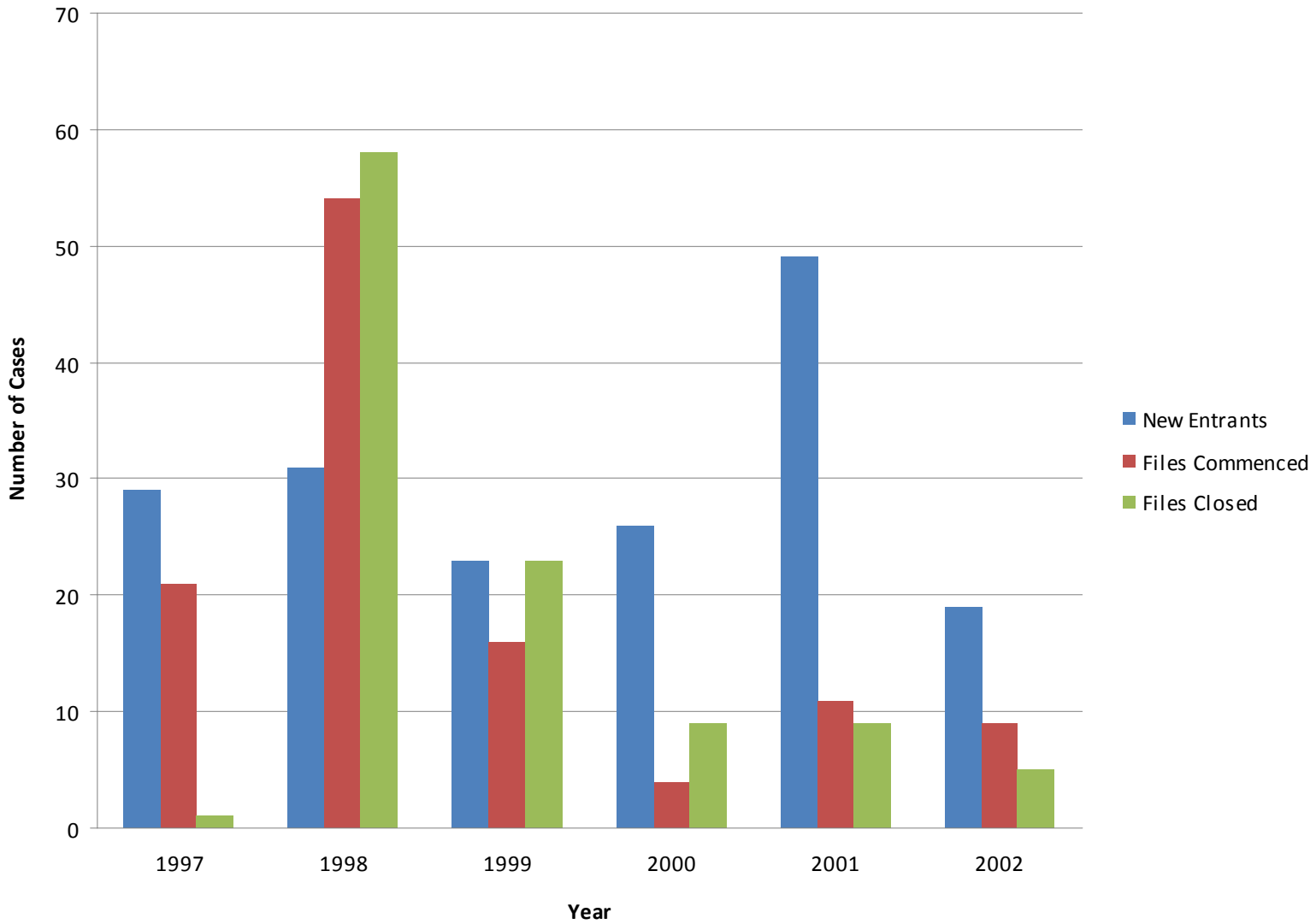
Number of Stations in 1995 and 1998

	No Stations per City Year 1998									
No Stations per City Year 1995	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**12**	**13**	**Total**
0	2,506	131	9	1	0	0	0	0	0	2,647
1	153	218	30	5	1	0	0	0	0	407
2	8	60	24	2	3	1	0	0	0	97
3	1	14	9	9	0	0	0	0	0	33
4	0	2	4	2	0	1	0	0	0	9
5	0	2	1	0	0	0	0	0	0	3
6	0	0	0	1	2	0	1	0	0	4
7	0	0	1	0	1	0	0	0	0	2
8	0	0	0	0	1	0	0	0	0	1
9	0	0	0	1	0	0	0	1	0	2
13	0	0	0	0	0	0	1	0	0	1
15	0	0	0	0	0	0	0	0	1	1
17	0	0	0	0	1	0	0	0	0	1
Total	2,668	427	78	21	9	2	2	1	1	3,209

Number of Stations in 1998 and 2001

	No Stations per City Year 2001													
No Stations per City Year 1998	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**10**	**11**	**13**	**16**	**Total**
0	2,571	93	4	0	0	0	0	0	0	0	0	0	0	2,668
1	48	328	36	11	2	2	0	0	0	0	0	0	0	427
2	3	22	35	11	4	2	0	0	0	1	0	0	0	78
3	1	0	7	6	3	3	0	0	0	0	1	0	0	21
4	0	0	1	1	2	2	2	1	0	0	0	0	0	9
5	0	0	0	0	0	1	0	0	1	0	0	0	0	2
6	0	0	0	0	0	0	2	0	0	0	0	0	0	2
12	0	0	0	0	0	0	0	0	0	0	0	1	0	1
13	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	2,623	443	83	29	11	10	4	1	1	1	1	1	1	3,209

Figure 1. Station Entry vs. Regulatory Activity 1997 to 2002



Violations by Year and Political Parties

% Violations per Year	Cities Ruled by PP	Cities Ruled by PSOE
1995	18%	7%
1998	15%	4%
2001	27%	26%

Note: A violation here is more than two TV stations per city

Data Source

- Local TV station census from AIMC (Asociación para la Investigación de Medios de Comunicación)
  - Census published in 1996, 1999, and 2002
  - Data collected during 1995, 1998, and 2001
  - Two parts: (1) Listing of all active local TV stations (881, 740 and 898 stations respectively)
    (2) Responses to questionnaire with station level information (183, 457 and 645 responses)
- City level information from business activity and population census of "La Caixa"
- Electoral outcomes from municipal elections in May 1995 and June 1999

Variable	Obs	Mean	Std. Dev.	Min	Max
Stations HQ per City	9627	0.26	0.77	0	17
Monopoly?	9627	0.133	0.339	0	1
Duopoly?	9627	0.027	0.162	0	1
Triopoly?	9627	0.009	0.092	0	1
Quadropoly?	9627	0.003	0.055	0	1
Five Stations or More?	9627	0.004	0.065	0	1
Stations not HQ per City	9627	1.407	1.885	0	13
City Population (000)	9627	12.17	67.73	0.32	3016.79
City Growth	9627	0.04	0.11	-0.78	5.73
Province Population (000)	9627	1223.66	1363.04	56.93	5527.15
Province Growth	9627	0.03	0.03	-0.05	0.22
Unemployment Rate per City	9627	3.89	1.90	0	25
Cars per capita and City	9627	0.37	0.15	0.04	7.08
Bank Office per capita and City	9627	0.41	0.43	0	4.01
Province on the Coast?	9627	0.56	0.50	0	1

Empirical Model

- Profit function

$$\Pi_N = V_N * S(Y, \lambda) - F_N(W, \gamma) + u,$$

where S: city population, province population, population growth

- Per-capita variable profits

$$V_N = \alpha_1 + X\beta - \sum_{n=2}^{N} \alpha_n,$$

where X: unemployment rate, # of cars per person, # of bank offices per person

- Fixed costs

$$F_N = \gamma_1 + W_L\gamma_L + \sum_{n=2}^{N} \gamma_n,$$

where W: coastal province, geographical area, violation in 1995 law, violation and PP interaction, violation and PSOE interaction

Estimation

- Probability of observing markets with no firms

$$\Pr(\Pi_1 < 0) = 1 - \Phi(\overline{\Pi}_1),$$

where $\Phi(.)$ is cdf of u and $\Pi_1 = \overline{\Pi}_1 + u$.

- Assuming $(\overline{\Pi}_1 \geq \overline{\Pi}_2 \geq \overline{\Pi}_3 \geq ...)$, probability of observing N in equilibrium

$$\Pr(\Pi_N \geq 0 \text{ and } \Pi_{N+1} < 0) = \Phi(\overline{\Pi}_N) - \Phi(\overline{\Pi}_{N+1}).$$

Entry Threshold

- Population entry threshold

$$\hat{S}_N = \frac{\hat{F}_N}{\hat{V}_N} = \frac{\widehat{\gamma}_1 + \overline{W}\widehat{\gamma_L} + \sum_{n=2}^{N} \widehat{\gamma}_n}{\widehat{\alpha}_1 + \overline{X}\widehat{\beta} - \sum_{n=2}^{N} \widehat{\alpha}_n},$$

- Per-station entry threshold

$$\hat{s}_N = \hat{S}_N / N.$$

Variables	1995	1998	2001
province population (λ_1)	0.000745	0.000251	-0.000619
	(0.000607)	(0.000771)	(0.000779)
city population growth (λ_2)	0.00236	0.000558	0.00225**
	(0.00226)	(0.000842)	(0.00105)
province population growth (λ_3)	0.0454***	0.00925***	0.00944***
	(0.0116)	(0.00302)	(0.00309)
unemployment	-16.83***	-9.655*	-4.724
	(5.215)	(5.586)	(5.550)
cars	-226.5*	-56.57	-153.5*
	(133.3)	(123.6)	(87.68)
banks	-53.78	63.70	128.1**
	(52.12)	(53.18)	(51.21)
α_1	603.5***	343.5***	331.8***
	(71.94)	(61.00)	(53.96)
α_2	164.1***	164.5***	65.97***
	(26.90)	(24.20)	(23.75)
α_3	65.44***	27.98	62.96***
	(18.63)	(19.50)	(21.00)
α_4	15.17	20.51	20.88
	(19.73)	(24.87)	(19.58)
α_5	6.304	59.59**	14.48
	(17.08)	(24.81)	(20.32)
α_6		21.01	
		(38.30)	

Variables	1995	1998	2001
γ_1	2.643***	2.636***	2.792***
	(0.146)	(0.147)	(0.149)
γ_2	0.722***	0.896***	1.061***
	(0.0680)	(0.0723)	(0.0764)
γ_3	0.462***	0.705***	0.510***
	(0.0936)	(0.137)	(0.124)
γ_4	0.569***	0.509**	0.491***
	(0.182)	(0.240)	(0.190)
γ_5	0.384*	0.0617	0.287
	(0.232)	(0.185)	(0.265)
γ_6	0.201	0.183	0.893***
	(0.139)	(0.452)	(0.334)
$\gamma_{\text{violate\_ppmax}}$		-0.205	0.529
		(0.419)	(0.411)
$\gamma_{\text{violate\_psoemax}}$		0.274	0.920**
		(0.436)	(0.427)
γ_{violate}		-1.194***	-1.450***
		(0.350)	(0.341)
γ_{coast}	-0.468***	-0.458***	-0.487***
	(0.0675)	(0.0648)	(0.0627)
γ_{1km2}	-0.196***	-0.225***	-0.266***
	(0.0275)	(0.0280)	(0.0277)
Log likelihood	3,142	3,146	3,146
Observations	-1507	-1396	-1509

Figure 4. Entry Threshold Estimates S_N

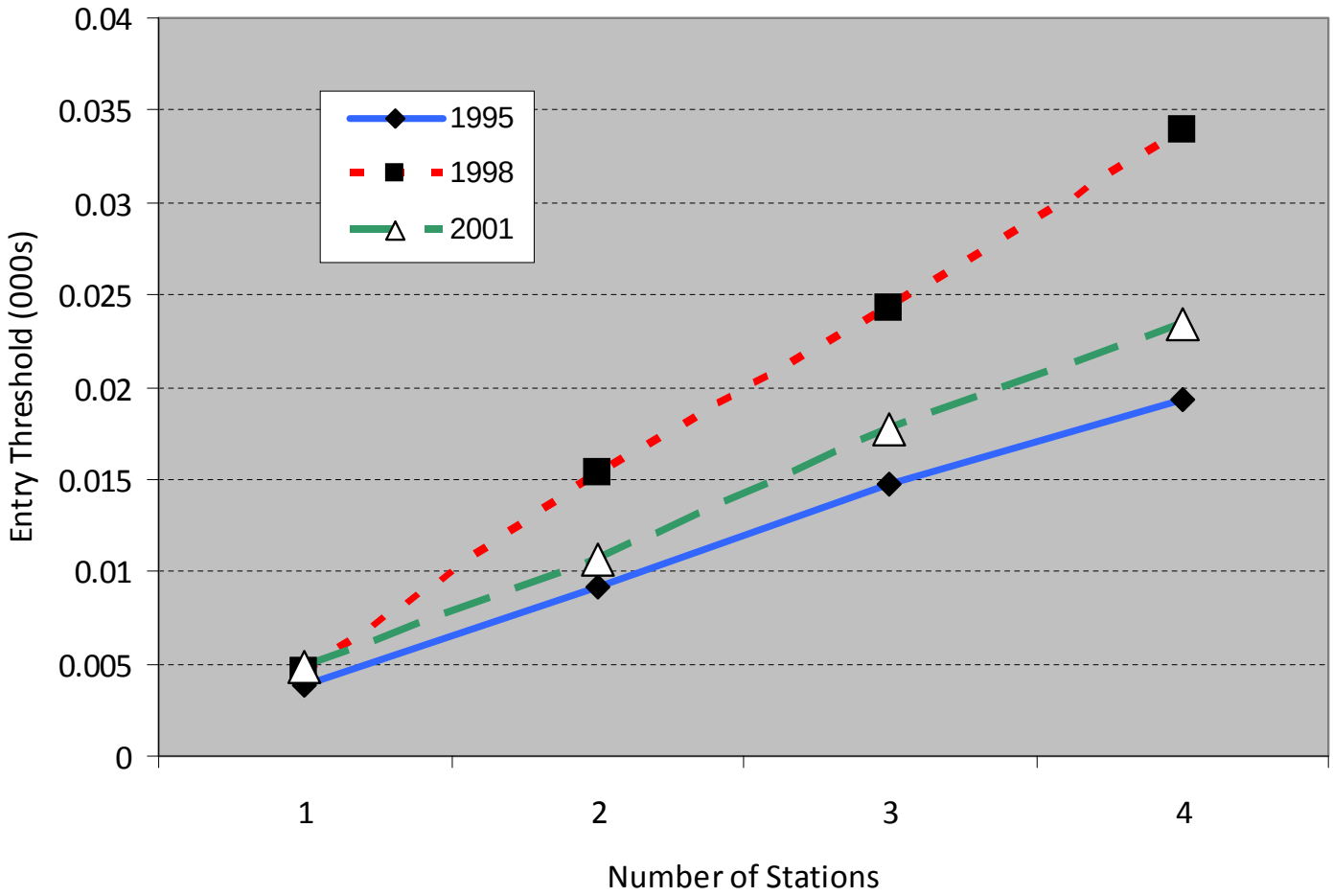
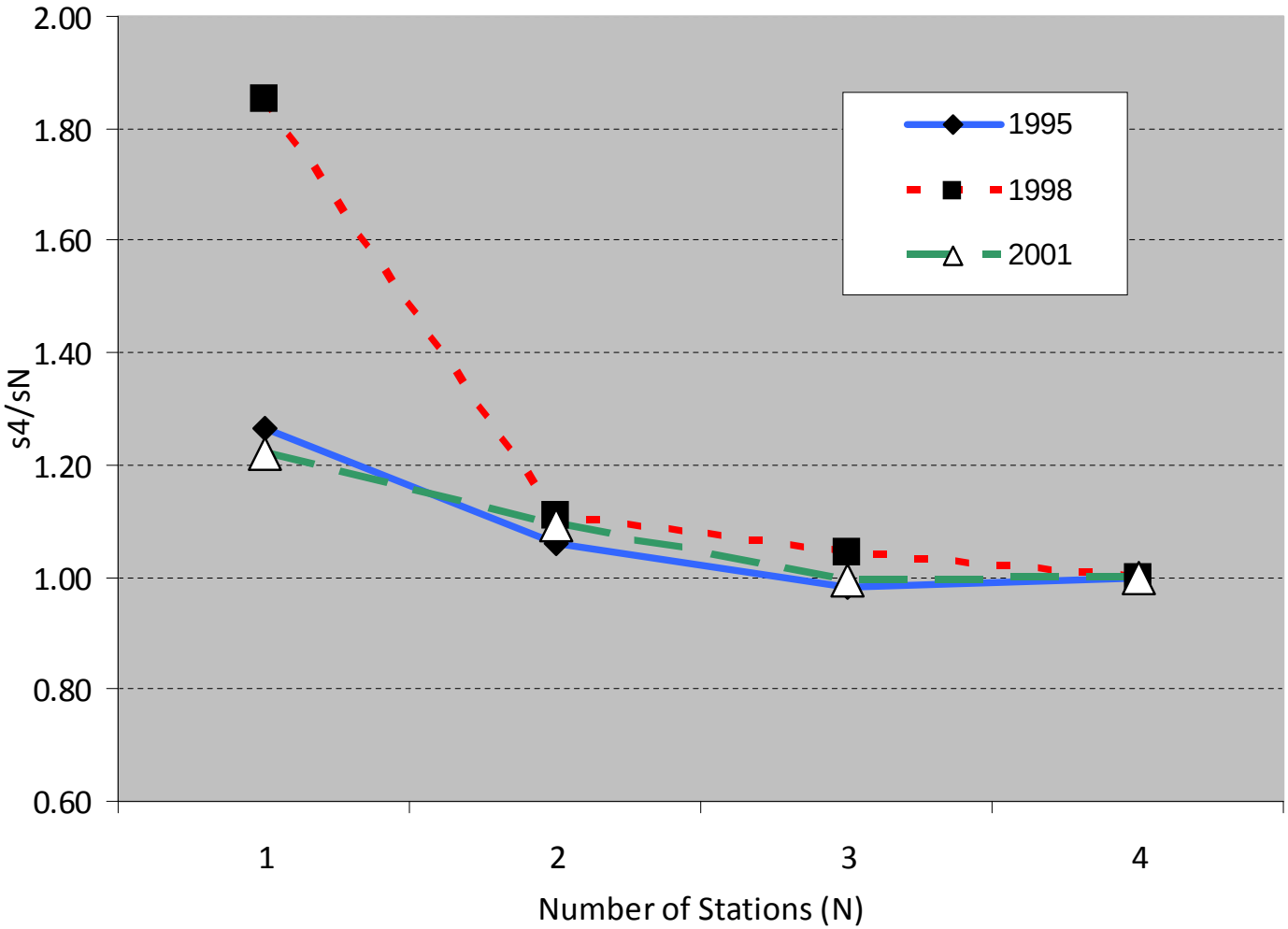


Figure 3. Relative Entry Threshold Ratio s4/sN



S_N = F_N/V_N

Figure 5. Fixed Costs Ratio F_N/F_1, 1995-2001

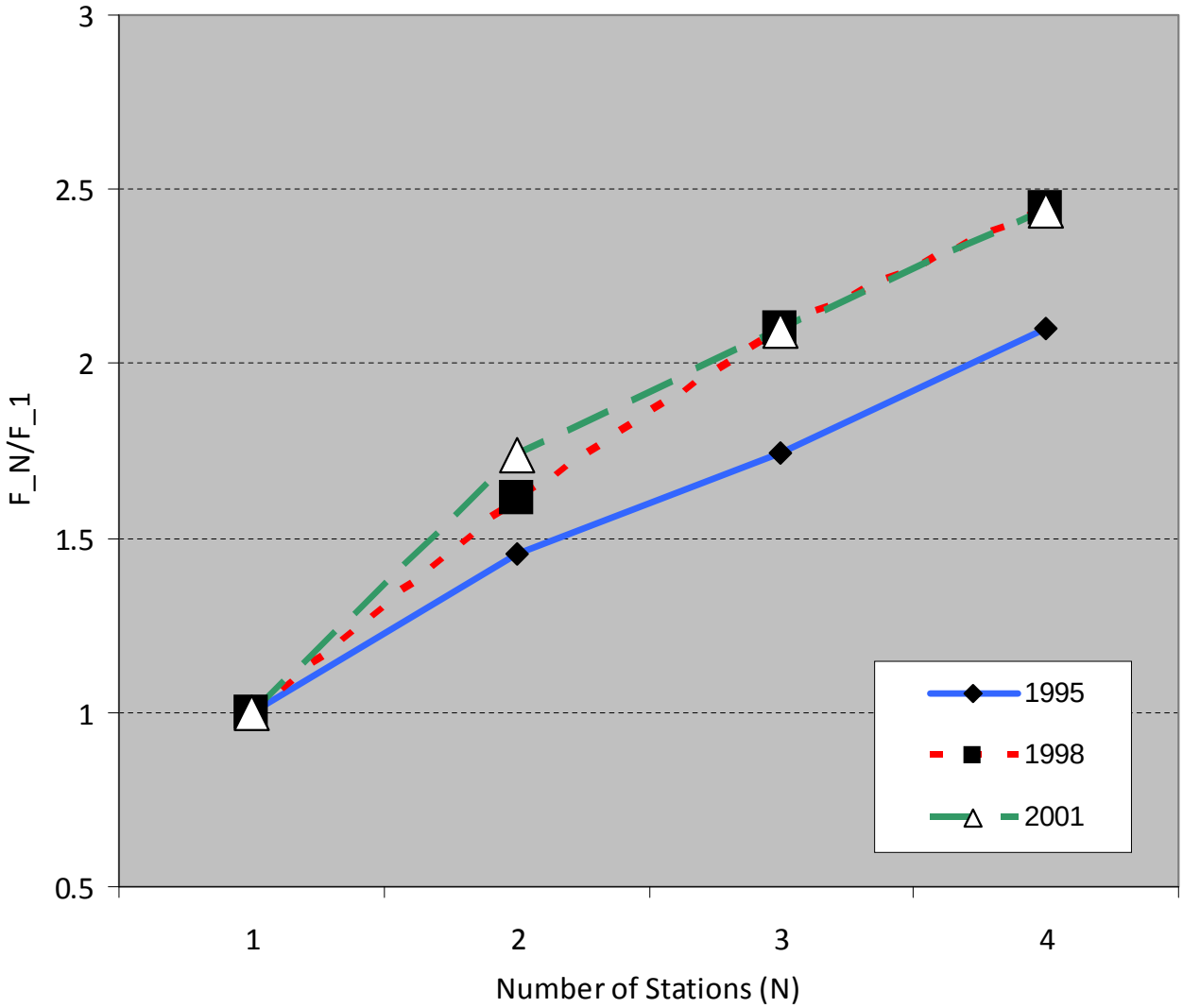
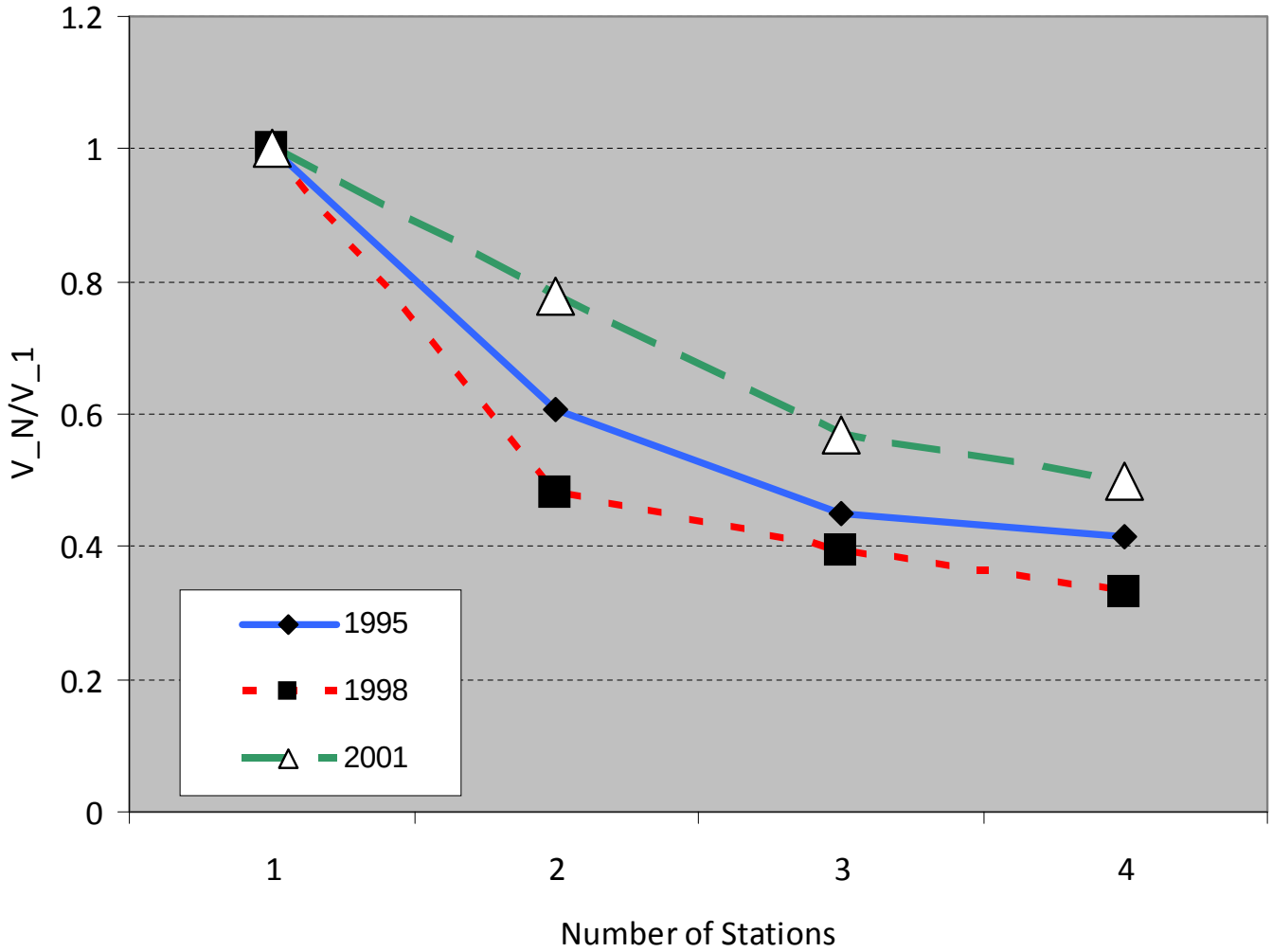


Figure 6. Per-Customer Variable Profits Ratio V_N/V_1, 1995-2001



Several caveats remaining

- We treat "public" and private interchangeably. In reality, ...
- It is not dynamic model. Are these snap shots steady state of the economy for the industry?
- Market definition: Are these cities really isolated?
- Strong assumptions on which demographics variables affect demand or costs

Conclusion

- How does policy enforcement affect firm behavior?
- We estimate entry thresholds across years and decompose them
- Data: Spanish local TV industry 1995, 1998, and 2001
- Findings
  - (1) Fixed costs are affected in 1998 and 2001
  - (2) Variable profits are affected in 2000
- Even a simple model can be informative about (1) how strongly the government enforces the policy and (2) the nature of the regulation enforcement
- The approach is useful for public policies of which enforcement and effect on the competition of firms are not obvious

Appendix

Station Ownership by PP or PSOE City Ruling Government

Variable	Obs	Mean	Std. Dev.	Max Votes PP? = 1	Max Votes PP? = 0	Max Votes PSOE? = 1	Max Votes PSOE? =0
Year 2001							
Private Property?	632	0.80	0.40	0.90	0.72	0.76	0.83
				(0.02)	(0.02)	(0.03)	(0.02)
Max Votes PP?	632	0.46	0.50				
Max Votes PSOE?	632	0.33	0.47				

Variables	1995	1998	2001
province population (λ_1)			
city population growth (λ_2)	0.00280	0.000611	0.00213**
	(0.00221)	(0.000828)	(0.00105)
province population growth (λ_3)	0.0428***	0.00919***	0.00951***
	(0.0112)	(0.00299)	(0.00315)
unemployment	-18.29***	-9.924*	-4.593
	(5.201)	(5.555)	(5.456)
cars	-227.6*	-60.10	-144.6*
	(138.0)	(125.1)	(83.60)
banks	-66.07	67.97	120.6**
	(53.01)	(53.05)	(49.80)
α_1	621.1***	345.2***	326.3***
	(71.24)	(61.11)	(52.07)
α_2	165.8***	165.9***	66.21***
	(27.02)	(24.17)	(23.50)
α_3	69.41***	32.19*	70.34***
	(18.39)	(18.72)	(19.98)
α_4			
α_5	8.761	70.11***	19.17
	(17.62)	(22.13)	(20.54)
α_6			

Variables	1995	1998	2001
γ_1	2.568***	2.617***	2.831***
	(0.133)	(0.137)	(0.141)
γ_2	0.737***	0.898***	1.049***
	(0.0652)	(0.0702)	(0.0765)
γ_3	0.456***	0.681***	0.466***
	(0.0903)	(0.132)	(0.117)
γ_4	0.687***	0.678***	0.673***
	(0.117)	(0.150)	(0.123)
γ_5	0.373	0.0323	0.247
	(0.229)	(0.170)	(0.256)
γ_6	0.207	0.188	0.918***
	(0.143)	(0.456)	(0.341)
$\gamma_{\text{violate\_ppmax}}$			
$\gamma_{\text{violate\_psoemax}}$		0.391	0.569*
		(0.335)	(0.333)
γ_{violate}		-1.326***	-1.105***
		(0.215)	(0.213)
γ_{coast}	-0.479***	-0.458***	-0.486***
	(0.0671)	(0.0647)	(0.0626)
γ_{1km2}	-0.186***	-0.222***	-0.272***
	(0.0263)	(0.0269)	(0.0268)
Log likelihood	3,142	3,146	3,146
Observations	-1508	-1397	-1511

New Entry of Local TV Stations