IESE Business School
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Working Paper
WP-895
January, 2011

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DOES REGULATION DRIVE MARKET COMPETITION? EVIDENCE FROM THE SPANISH LOCAL TV INDUSTRY

Ricard Gil[1]

Abstract

This paper empirically examines whether regulation decreases market competition. For this purpose, I use data from Spanish local TV stations for 1996, 1999 and 2002. During this period of time, this industry transitioned from a state of alegality (no regulation in place whatsoever), to being highly regulated and finally to being liberalized. I estimate station population entry thresholds by number of entrants across years to proxy by the nature of competition by determining the necessary market size to sustain an extra station. I find that stations soften competition the most under no regulation and they seem to compete the hardest when highly regulated. I explain in the paper that, even though this is at odds with previous literature, this result is explained by the industry institutions, its low profitability and the nature of the first regulation and its consequent liberalization.

Keywords: regulation, market, competition, TV industry, liberalization.

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1 Introduction

The role of market regulation has generated much debate in Economics. Ideally, governments should set market regulation such that firms compete in ways that benefit consumers and yet they are able to obtain profits. In practice, existing regulation is relatively rigid when compared to a quickly evolving world of new products and new industries. This fact drives firms to compete in dimensions that may diminish consumer surplus and total welfare. Additionally, regulation may be conservative or liberal. The former may be more likely to discourage competition to strengthen provision of valuable dimension, while the latter may encourage competition between firms in all possible dimensions. Therefore, it is important to understand how regulation affects the nature of competition in an industry since this will have most likely ultimate effects on consumer surplus and welfare.

Despite the existing research on regulation and its impact on competition, we know very little about the nature of competition in the absence of regulation and whether introducing regulation, of any type, is indeed beneficial or detrimental to consumers and society by strengthening or softening competition. The direction of this effect could go either way. In the absence of regulation, firms may be more likely to collude or compete in some dimensions at the expense of the most welfare-increasing dimensions. In that case, the introduction of regulation may deter firms from cutting on those "good" dimensions and therefore regulation could be beneficial.[1] Ultimately whether regulation increases or decreases competition is an empirical question and we are forced to look at data to find answers to it. It is here where the contribution of this paper lies.

In this paper, I examine how competition changes within an industry with the introduction of regulation and a posterior liberalization. In particular, I examine the case of the local television

[1] See Armstrong and Vickers (1993) and Vickers (1995) as examples of theoretical literature that provides case-specific predictions about the relation between regulation and competition.

industry in Spain. Up to 1995, Spanish local TV stations were alegal. This meant that they were not recognized nor protected by the law as legal entities. Therefore, their activities were not illegal but they were not legal either. This situation of alegality came to an end when the first law of Spanish local TV was approved by Spanish parliament. Later, and after a change of government, this law was reformed and the industry liberalized between 2000 and 2002. Here I use these changes in regulation to answer the question of whether regulation increased or decreased competition in the Spanish local television industry.

To do so, I use the census of Spanish local TV stations for the years 1996, 1999 and 2002. The census provides information on the number of local TV stations located in each city. The census lists a total of 881, 740 and 898 stations for 1996, 1999 and 2002 respectively. I complement this information with city information for all cities in Spain with more than 1000 inhabitants. These are 3209 cities of which 2647, 2665 and 2617 did not have a local TV station in 1996, 1999 and 2002 respectively. Using methodology from the various papers of Bresnahan and Reiss (1989, 1990 and 1991), I estimate entry thresholds in terms of population necessary to sustain an extra firm in the market. I do this for all three years in my sample and therefore I am able to compare how these thresholds change from a situation where no regulation was in place to a conservative regulation and its posterior liberalization.

My findings suggest that competition among stations was softer when no regulation was in place. When comparing competition when regulation was more restrictive or permissive, I find that, if anything, stations face softer competition under more permissive (liberalized) regulation. At first sight, this is at odds with what one may expect and with other results in the literature. I explain this result by looking closer into the institutional details of this industry and the changes in regulation. When liberalizing this industry in the year 2000, the Spanish government allowed firms to form local station networks that allowed coordination, communication and content sharing

across stations. Given the low profitability in this industry and the strong presence of not-for-profit networks, local TV stations had very strong incentives to collude and soften competition to ensure their survival in this market.

This paper mainly contributes to the empirical literature that examines the relation between regulation and competition in various industries. Some examples of work by others are Joskow (1973) and Samprone (1979) in the property and liability insurance industry, Klein (1990) in the railroad industry, or Joskow (1980) and Fanara and Greenberg (1985) in the health industry. To the best of my knowledge, the closest paper in topic and goal is Danzon and Chao (2000). In their paper, they find that regulation undermines competition across generic competitors in the pharmaceutical industry by examining price competition in this industry in seven different countries with different types of regulation. My paper differs from theirs in that I estimate entry thresholds in the Spanish local TV industry in three different scenarios that differ in regulation. My result is also different in that I find that competition is stronger when firms are more highly regulated.

The paper is organized as follows. In section 2 I describe the institutional details of the Spanish local TV industry and the introduction and change of regulation. Section 3 presents the data. In section 4 I describe the empirical methodology that I use in the paper, show the results, and finally, offer a discussion of the results. Section 5 concludes.

2 Institutional Details

This section builds up from information obtained in personal interviews with industry managers and previous work (Gil (2009)). Television stations maximize profits in two ways. They produce content that they sell to television consumers through subscription fees, or sell television space to advertisers. Since television consumers value television content free of advertising and advertisers

value the number of television viewers, stations choose accordingly the amount of advertising and the value of the subscription fee to maximize total profits.

In addition to this, TV stations carefully choose the content of their programming to attract both viewers and advertisers. In this industry, programming content is important because it differentiates the station product from others. Other factors that play an important role in this industry are whether the station is privately owned (versus owned by local government), whether the station is integrated into a network, and whether the station broadcasts its programming. In the next section, I discuss further these factors as I draw distinctions between the European and American model as well as the idiosyncrasies of the Spanish local TV industry.

2.1 European versus American Model of Local Television

To understand how competition in the Spanish local TV industry works, I first need to point out the main differences between television markets in Europe and in the US. The US market is mainly characterized by its little government intervention and its verticality, whereas the European markets are mainly characterized by strong government intervention and its lack of verticality.

The US TV industry was first started and dominated by big stations in big markets. As smaller stations started to arise in smaller markets, they became dependent of the dominant stations because these were the main providers of content. Eventually, these relationships of content exchange were so frequent that dominant stations and local stations formed what today we know as TV networks. Nowadays, local stations are ascribed to the networks and even though some of their content is directly provided by the network, they still produce a share of their programming that reflects the unique interest of the local demand.

This differs much from the European case. The European TV industry was mainly monitored by the government of each respective country. Entry in this industry was highly regulated and the

emergence of local stations was limited. Most countries entered the 1980s with only government-owned stations and, at most, a few regional stations that broadcast for a limited range of their national territory. Given the dominant role played by national and regional stations, there was no room left for local stations since regulation did not even acknowledge them as a legal entity. In other words, local stations were alegal because they were not legal but they were not illegal either. Since this paper studies the Spanish case and the consequences of changes in regulation on competition, let me now describe the case of Spain as an example.

Spain counted with two TV stations until the mid 1980s, TVE and TVE2. The former was the main station and the latter served as window to minority content and local news emitted from small satellite stations that had little independence on their programming decisions. During the mid 1980s and the consolidation of the new democratic regime, the central government granted the right to its regional counterparts to develop regional stations. Still then, the local TV station as entity was not recognized by law. Despite this, a number of local stations were created in the late 1980s as a result of the joint effort of local civil associations. Since these local stations were neither prohibited nor recognized by the law, police authorities often did not know what to do about them.

Many other local stations were created in the following years and, as their activities grew in importance both economically and culturally speaking, the need for a legal framework became clear to many politicians and regulators. As a result of this, the Spanish government approved the law of local TV stations in 1996 through which it pretended to regulate the composition, commercial activities, ownership and competitive structure of the local TV station industry in Spain. Some of the most controversial points of the 1996 Law were that no more than two local stations were allowed per city (regardless of city population), network formation was prohibited and all local TV stations were to be non-profit organizations and hold local government personnel on their advisory and executive boards.

2.2 Liberalization of the Spanish Local TV Industry

The 1996 Spanish election changed the scenario quite a bit. The left-winged PSOE party lost the election and the new party in power, the right-winged Partido Popular, had a very different perspective in how the Spanish local television industry should be regulated, if at all. In short, the Partido Popular believed that this industry needed to be deregulated and liberalized. For this reason, they started a liberalization process that proved to be rockier than first anticipated.

Due to the lack of support in congress, the initiative of the new government did not go forward. As a consequence, the government chose to start a "silent" liberalization. Badillo (2003) documents how the government chose not to enforce the law in place that was passed by the previous government. In the 2000 election Partido Popular gained full control of the Parliament and decided to push the deregulation that had been stopped during the previous legislature. The government finally passed a new law in 2002 through which the 1996 law was modified and that started the liberalization and deregulation of the Spanish local television industry. The new law did not regulate the local market structure per municipality nor the station ownership. In particular, stations were no longer required to be government owned or run by local government officials. Similarly, stations were allowed to be organizations run for profit, and allowed to be part of networks with other local television stations and national and regional stations.

In this paper and the following sections in particular, I examine how changes in regulation affected the nature of competition. When regulating this industry, Spanish policy makers wanted to control the nature of competition. This paper assesses whether regulation strengthen or soften competition as the industry went from unregulated in 1996, to strongly regulated in 1999 and deregulated in 2002.

3 Data

The data set used in this paper comes from two different sources. The first source is the Spanish census of local TV stations collected by the Asociacion de Investigacion de Medios de Comunicacion (AIMC hereafter) for years 1996, 1999 and 2002. These census collect information on the name and number of local TV stations per city and province for the years 1996, 1999 and 2002.[2] According to the data, there were 881 stations in 1996, 740 stations in 1999 and 898 in 2002. The second source of data is the business activity and population census published annually by "La Caixa." This census contains yearly information at the city, province and region level on population, unemployment rate, number of cars, and other similar variables. Out of this information, I can compute population growth rates at the city and province level, as well as the number of cars per capita or the number of bank offices for every 1000 people.[3] This census contains information on 3209 cities, all of them cities that at some point had 1000 inhabitants or more. When I merge both data sets, I lose a few stations that are located in cities smaller than 1000 inhabitants. The final data set contains information for 3209 cities in all three years. Out of these, 2647, 2665 and 2617 cities did not have any stations in years 1996, 1999 and 2002 respectively.

Table 1 provides summary statistics across years and cities. Information in this table shows that the average city had 0.25 stations with the median value being 0 and the maximum 17. Overall in the data, 13% of the cities have one station, 2.7% have two stations, 1% have three stations, 0.3% have four stations and 0.4% of the cities have five or more stations. The average city has 12000 inhabitants and grew almost 4%. The unemployment rate average 3.8%, there are 0.3 cars per

[2] AIMC did not include sporadic and random emission of television content but rather established entities that emit in a regular basis. AIMC also sent a questionnaire to all stations in the census. This questionnaire asked questions regarding their schedule, content, coverage area and other business related issues. I do not use this information in this paper. Gil (2009) describes the nature of that data further.

[3] The data did not contain information on population for 1996, and so I proxied that with population levels of 1998. I calculated population growth by looking at growth between 1996 and 1999, 1999 and 2002, and 2002 and 2005.

person and 0.4 bank office per every 1000 people in each city. Finally, 55% of the cities in the data belong to coastal provinces. This last variable is important because land prices and population density are always higher on the coast than inland.

Table 2 repeats the exercise in Table 1 breaking the sample by year. This table shows that the average number of stations decreased from 1996 to 1999, but grew again in 2002 to slightly higher levels than 1996. This overall growth in the number of stations is mainly driven by two extremes, the number of cities with a monopoly station and those cities with five or more stations. The number of stations with two, three or four stations stayed rather stable during this period of time. The average population size grew from 11927 to 12558 and so did the population growth from 1.1% to 6%. All other indicators indicate an improvement in the overall economy as unemployment rates went down from 5.1% to 3.1% and the number of cars per person increased from 0.33 to 0.41. Finally, the number of bank offices per every thousand people went down from 0.44 to 0.35. This just reflects the fact that bank entry did not follow the increase in population observed in the data.

Since this paper's goal is to study the impact of changes in regulation between 1996 and 2002 on entry thresholds to study changes in the nature of competition, it is useful to understand how market structure changed between 1996 and 2002 in a city per city basis. For this purpose, Tables 3, 4 and 5 cross-tabulate the number of local stations per city for all possible pairs of years. Table 3 tabulates the number of local stations per city in 1996 and 1999, while Table 4 and Table 5 do so for 1999 and 2002, and 1996 and 2002 respectively. Table 3 shows how 161 cities with local stations in 1996 had none in 1999. On the other hand, 143 cities with no stations in 1996 observed entry in 1999. Overall, 2504 cities did not have local stations in 1996 and 1999, while 401 cities had any stations in both years.

Tables 4 and 5 repeat the exercise in Table 3 but the former focuses in the transition between 1999 and 2002 while the latter focuses on years 1996 and 2002. Between 1999 and 2002, 2565

cities did not have any stations. When compared to Table 3, only 52 cities had stations in 1999 and lost them all in 2002. On the other hand, 100 cities with no stations in 1999 saw entry by 2002. The rest of cities, 492 to be exact, had stations in both 1999 and 2002. The overall picture is captured in Table 5 that tabulates the number of stations per city for 1996 and 2002. During the whole period, 2459 cities started and finished with no stations. Out of the total 3209 cities, 158 cities lost all stations and 188 cities observed some entry. Over this period, 241 cities started and finished with the same number of stations, while 71 cities saw their number of stations increase and 90 saw it decreased.

Finally, Table 6 cross-tabulates changes in the number of stations between periods 1996-1999 and 1999-2002. This table shows that the number of local stations remained constant between 1996 and 2002 for 2625 cities. Only 21 cities saw their number stations increase in both periods of time, whereas only 6 cities saw their number of stations decreased in both periods. As it is clear from this last table in this section, most changes occurred between 1996 and 1999 since the number of cities with no changes between 1999 and 2002 goes up to 2942 cities. In the next section, I describe the empirical methodology that I am going to use and then I proceed with the estimation.

4 Empirical Methodology and Results

This section describes the empirical methodology in this paper. After that, I show results of implementing this empirical strategy as well as variations from the main specifications. Finally, I discuss the results and relate them to the existing literature.

4.1 Empirical Methodology

In this paper I follow the empirical strategy in Bresnahan and Reiss' (BR hereafter) various papers (1988, 1990 and 1991). Therefore I plan to infer how mark-ups vary with entry by estimating

market entry thresholds. In their papers, BR assumes that demand takes the form

$$Q = d(Z, P)S(Y)$$

where $d(Z, P)$ is the demand of each individual in a given market and $S(Y)$ is the number of consumers in a market. P stands for prices, and Z and Y are demographic characteristics. This functional form assumes that there is no heterogeneity across consumers within a market.

On the cost side, they assume that firms incur fixed costs $F(W)$ and marginal costs $MC(q, W)$, where W represents technology variables that shift exogenously the cost of firms while q stands for the scale of production. BR contemplate the possibility of increasing marginal costs, but in the TV industry the assumption of constant marginal costs may seem more reasonable.

Once established all the components of the demand and cost, I can write down the profit function such that

$$\Pi_N = [P_N - MC(q, W)]d(Z, P_N)S_N - F_N$$

where N is the number of firms in the market and N can take values 1, 2, ... After equating profits to zero and solving for S_N, the equation shows that

$$S_N = \frac{F_N}{[P_N - MC(q, W)]d(Z, P_N)}$$

Essentially, this ratio establishes that the market size (number of consumers) necessary to meet the break even point when N firms are present in the market is directly proportional to the size of fixed cost and inversely proportional to the magnitude of the variable profit per consumer. In their paper and this paper, I am interested in estimating $s_N = \frac{S_N}{N}$ which is the firm entry threshold ratio and see how that varies with N. As established in BR (1991), the ratio $\frac{s_M}{s_N}$ where $M > N$

measures the fall in variable profits per customer between a market with N firms and a market with M firms. This would only be true if fixed costs remain constant for later entrants, otherwise a rapid increase in fixed costs may be disguised as a drop in variable profits per consumer from the empirical strategy that follows. As BR note, it is important to emphasize that the use of this methodology does not measure the level of competition in an industry, instead it measures how the level changes with the number of firms.

Given the data from the AIMC census on local TV stations, I am far from having price and output data for all stations in all markets. For this reason, I estimate entry thresholds by running an ordered probit on the number of stations in each market. Following BR, we know that if we observe N stations in a given market it must be the case that in equilibrium $\Pi_N \geq 0$ and $\Pi_{N-1} < 0$. At this point and after several functional form assumptions, I can estimate a profit function such that

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

where α, β, λ and γ are the parameters that I aim to estimate in the profit function, and Y, Z and W are variables that mean to proxy for market size as well as demand and cost shifters. Finally u is a zero-mean constant-average iid normally distributed error term assumed to capture other profits that are orthogonal to the observables.

By assuming that u is drawn from the same distribution across markets, I can use an ordered probit to estimate entry thresholds such that the probability of observing markets with no firms equals

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

where $\Phi(.)$ is the cumulative normal distribution function and $\Pi_1 = \overline{\Pi}_1 + u$. BR then show that if average profits decrease with firm entry in equilibrium ($\overline{\Pi}_1 \geq \overline{\Pi}_2 \geq \overline{\Pi}_3 \geq ...$), the probability of

observing N in equilibrium is

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

Finally, I estimate the profits of markets with 5 or more stations in a market by setting $\Pr(\Pi_5 \geq 0) = \Phi(\overline{\Pi}_5)$.

Next I state how I model $S(Y, \lambda)$, $V_N(Z, W, \alpha, \beta)$ and $F_N(W, \gamma)$ such that

$$S(Y, \lambda) = town\_pop + \lambda_1 prov\_pop + \lambda_2 town\_pop\_\ growth + \lambda_3 prov\_pop\_growth$$

The coefficient of $town\_pop$ is set equal to one because V_N contains a constant term. $Prov\_pop$ stands for population of the province, $town\_pop\_growth$ and $prov\_pop\_growth$ is the population growth experienced by the town and province respectively in any given year.

I model firms' variable profits per consumer V_N such that

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

where $\alpha_1 + X\beta$ stands for monopolist profits and α_n is the degree to which variable profits decrease with entry. The X variables come from business and population census by "La Caixa," and they are unemployment rate, the number of cars per person, and the number of banks offices per thousand people. It is fair to say that even though the choice of these variables that go into X is driven by data availability, these variables capture differences across towns and provinces for any given year in my data. Finally, I model fixed costs as

$$F_N = \gamma_1 coast + \gamma_2 province\_pop^* coast$$

where *coast* is a dummy variable that takes value 1 if city is in a coastal province, and *town_pop*coast* is the interaction of city population and the coastal dummy. These last variables are supposed to proxy for differences across towns, within and across provinces, in land prices and wages.

Once I estimate the ordered probit specification above, I calculate population entry thresholds by plotting the formula

$$S_N = \frac{\widehat{\gamma}_1 \overline{coast} + \widehat{\gamma}_2 \overline{province\_pop^* coast}}{\widehat{\alpha}_1 + \overline{X}\widehat{\beta} - \sum_{n=2}^{5} \widehat{\alpha}_n}$$

where $N = 5$, and per station entry thresholds ratios such that $s_n = \frac{S_n}{n}$ and ratio equals $\frac{s_n}{s_{n-1}}$.

In the next section, I show results of this estimation for each year in my data. Since the cross-section of market structure in 1996 was determined in a frame in alegality, the regulation in 1999 was intending to control competition and regulation in 2002 was aiming to liberalize the industry, I compare results across years to determine the relation between regulation and competition.

4.2 Results

In this section I explore the empirical specifications detailed previously. Table 7 provides results of six different specifications. All specifications have a number of results in common such as positive correlation coefficients of the interactions between city population and unemployment rate, cars per capita and bank office per thousand people. They all have a negative coefficient on city population as well as on the coastal province dummy and its interaction with province population. Finally all of them show negative correlation coefficients on the duopoly, triopoly and quadropoly dummy variables. Specifications (1) to (3) show a positive correlation coefficient on the quintopoly dummy variable, while specifications (4) to (6) show a negative and larger in magnitude coefficient on this same quintopoly dummy.

In the end, I focus on specification (6) for a number of reasons. First, most coefficients

and signs do not differ much from other specifications in Table 7. This specification also shows an increasing impact of competition on variable profits as I will show in the resulting structural parameters. The second and main reason is that this last specification differs from the other five in that this is the only one that will provide a positive estimate for the fixed costs of production. All other specifications provide negative estimates of fixed costs due to the positive coefficient in the three-way interaction variable. Once I focus my attention on specification 6, I show the resulting structural parameters in Table 8.

Table 8 shows the structural parameters that correspond to the profit model above in the methodology section. This table contains three columns. The first column specifies the estimated structural parameter. The second column shows in parentheses from what correlation coefficients estimated in Table 7 each structural parameter comes from. Note here that by assumption in specification (6), the parameter on city population is assumed to be 1, and the parameters λ_1 and λ_3 are restricted to be 0. See also that identification in this case relies on the assumption that fixed costs of entry do not vary with the number of entrants. The original BR papers allow for this cost to vary, but as they announce in their BR (1991) paper including this possibility in the specification may prevent the estimation from identifying the impact of competition on average variable profits. This was the case for all specifications that I tried, and in the end, I chose to assume that fixed costs did not vary with entry. Once I have found the values of the structural parameters I can proceed to estimate values for average variable profits and fixed costs for every year in my sample (1996, 1999 and 2002) and for cities with one, two, three, four and five or more stations. I provide results of this in Table 9.

Results in Table 9 are disappointing, but yet not surprising. They are disappointing in that all estimates of average variable profits are negative. This is at odds with findings in BR (1991) and other papers using this methodology. It is comforting to know that average variable profits

go down with competition and are its lowest in those cities with five or more stations. The fixed cost does not vary much across years and cities with different number of stations. The result that estimated average variable profits are negative should not come as a surprise because of the large presence of local government owned stations and stations managed by local civil associations that are not profit maximizers. Given this result, calculating the breaking-even S by dividing $\frac{F}{V}$ is no longer feasible since this quotient yields negative amounts (see third column in Table 9) and this has no possible interpretation within the context of BR. For this reason, I calculate S by applying the formula $S = City\_Pop + \lambda_2 Province\_Pop$, since I have an estimate of λ_2 from Table 8. The results of this are in the fourth column and the fifth column contains the result of dividing S by the number of stations. This number is supposed to provide entry threshold values for any given number of stations in a market. Finally in the last column, I provide the ratio between S_5 and S_n for any given number n of stations. This ratio provides information on how fast entry thresholds shrink from cities with five or more stations to cities with four, three, two or one station. In the original BR paper, this ratio would identify how fast variable profits decreased with entry (holding constant fixed costs of new entrants). In this case, since my estimation shows that average variable profits are negative, and we calculate this ratio out of observed city and province population, this ratio just represents how fast or slow population entry thresholds increase with entry.

Let us now compare ratios across year, and in particular S_5/S_1. This ratio takes value 5.64 in 1996, 5.99 in 1999 and 5.06 in 2002. This means that entry thresholds grew most from monopoly to quintopoly in 1999 and grew the least in 2002. See that this ratio is decreasing uniformly for 1999 and 2002, but it is not for 1996. This would indicate that there was not much competition between the first and the third entrant in 1996 and it is the fourth and the fifth entrant that seem to increase entry thresholds substantially. Patterns for 1999 and 2002 are similar in that even though the ratio decreases to 1 monotonically, it does so more with the fourth and fifth entrant.

To examine how this entry thresholds change step by step I compute the corresponding ratios for every year in Table 10. See in that table that year-per-year ratios for 1999 and 2002 are very similar, and these differ much from those for 1996.

Finally, I display graphically the results in the last two columns of Table 9 in Figure 1 and Figure 2. Figure 1 shows how the ratio S_5/S_n converges to 1 as n goes from 1 to 5. As my previous description stated, the evolution of the ratio for 1999 and 2002 are quite similar, if anything 1999 ratio falls from higher levels. The evolution of the 1996 ratios differs much from that in 1999 and 2002 in that the ratio does not fall until the fourth entrant. This seems to indicate that under no regulation (that is, no regulatory framework) stations in this market were less likely to compete with each other than they were with regulation.

Finally, Figure 2 graphs population entry threshold levels by years. BR (1991) are very explicit in that differences in levels are not good to explain differences in competition across industries. Here, I am comparing the same industry across years. Even though I take their warning, I still think it is useful to compare how entry thresholds vary across years. See that entry thresholds are highest for 1999 for any number of stations in a market. In levels, 1996 and 2002 do not seem too different, the main difference being that the thresholds for 2002 follow the same pattern as those in 1999 and the thresholds in 1996 only rise with the fourth station in a market. In the next section I discuss further the significance of the results in this section.

4.3 Discussion of Results and Relation to Literature

The research in this paper estimates the nature of competition in the Spanish local television industry between 1996 and 2002. These years are interesting to study because this industry transitioned from a status of alegality (no regulation or law was in place regulating agents in this industry) to being strongly regulated in 1999 and liberalized by 2002. The results above indicate

that under no regulation stations faced softer competition than when regulated. Within the two years under study when the industry was already regulated, stations faced stronger competition when the industry was highly regulated than when the industry was liberalized. This result is at odds with results from the literature. For example, Danzon and Chao (2000) observe stronger competition in generic products in pharmaceutical industries in more deregulated countries. Here I find the opposite in that when no regulation is in place stations seem to collude the most (up to the fourth entrant). In addition to this, when comparing results from 1999 and 2002, if anything, stations in 2002 after the industry liberalization took place seem to compete less strongly than they did in 1999.

The reason of this result is explained by the type of regulation introduced in 1999. This regulation forced a lot of local government oversight and even ownership and management. On top of this, it prevented stations to form networks with other stations and therefore any possibility of collusion. After the industry liberalization and the new law of 2002, private ownership and management of stations was allowed and stations networks were permitted. Given the little profitability in this industry (my estimates show that the average station was losing money), stations may have found profitable to coordinate and collude with each other by sharing content through the formation of local station networks. The question arises when interpreting the result for 1996. It is quite conceivable that with no profitability and no government or regulation oversight stations may have had all incentives in the world (and no punishment since they were alegal) to collude and soften competition even further than estimated for the year 2002, and even more so than observed in 1999.

To summarize, this seems to be an example of an industry that when tightly regulated firms (in this case stations) competed among them more strongly than in the absence of all regulation or with a liberalized and permissive regulatory framework.

5 Conclusions

In this paper, I empirically examine whether regulation increases or decreases competition between firms. For this reason, I use data from the Spanish local television industry on station location and market demographics for the years 1996, 1999 and 2002. During these years, the industry went from no regulation whatsoever (prior to 1996) to being highly regulated (1996 to 1999) and to being liberalized (2000 to 2004). I estimate for every year how population entry thresholds vary with the number of entrants to infer the number of consumers necessary for a station to break even and therefore determine how relatively competitive this industry became across different years in the study.

I find that stations faced softer competition prior to 1996 when the industry was not regulated at all. When the industry was regulated, I find that, if anything, stations faced softer competition when the industry was liberalized than when this was highly regulated. This result is at first sight at odds with common economic intuition and results in the previous empirical literature. I rationalize this result by understanding that profitability in this industry is very low (as a matter of fact I estimate negative average variable profits across years and market of different structure) and that when liberalized, stations were allowed to form local station networks that allowed them to share content, coordinate activities and communicate. When liberalizing this industry, stations faced strong incentives to collude and soften competition among them to maximize their chances of survival.

Most previous papers exploring the same topic have examined how changes in existing regulation impacts the nature of competition. This paper differs from those in that I examine how competition changes when an industry transitions from a status of alegality and no regulation to one of legality and regulation, as well as how competition in this industry moves from being highly regulated

to highly liberalized. It is my understanding from examining the literature that despite the clear importance of this research question, this has not received much attention until now. The interpretation of my results also shows that it is important when evaluating the impact of regulation to understand industry institutions as well as the regulation in place and the changes applied to it. I hope that this paper will foster others to explore other industries and study further the impact of regulation on competition as well as consumer surplus and society welfare.

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Table 1. Summary statistics across year 1996, 1999 and 2002

Variable	Obs	Mean	Std. Dev.	Min	Max
No. Stations per City	9627	0.257	0.770	0	17
Monopoly?	9627	0.134	0.340	0	1
Duopoly?	9627	0.027	0.162	0	1
Triopoly?	9627	0.009	0.093	0	1
Quadropoly?	9627	0.003	0.054	0	1
Quintopoly?	9627	0.004	0.065	0	1
City Population (000)	9627	12.174	67.726	0.322	3016.788
City Growth	9627	0.038	0.113	-0.777	5.726
Province Population (000)	9627	1223.664	1363.042	56.929	5527.152
Province Growth	9627	0.029	0.034	-0.053	0.215
Unemployment Rate per City	9627	3.887	1.901	0	25
Cars per capita and City	9627	0.367	0.146	0.042	7.079
Bank Office per capita and City	9627	0.410	0.427	0	4.009
Province on the Coast?	9627	0.557	0.497	0	1

Note: This table provides summary statistics of all variables used in the empirical analysis. The number of observations for all variables is 9627, that is, 3207 observations for each year in the sample 1996, 1999 and 2002.

Table 2. Summary statistics by year

	1996	1999	2002
Variable	**Mean (Std. Dev.)**	**Mean (Std. Dev.)**	**Mean (Std. Dev.)**
No. Stations per City	0.269	0.228	0.275
	(0.835)	(0.646)	(0.813)
Monopoly?	0.127	0.134	0.140
	(0.333)	(0.341)	(0.347)
Duopoly?	0.030	0.025	0.026
	(0.171)	(0.155)	(0.159)
Triopoly?	0.011	0.006	0.009
	(0.102)	(0.079)	(0.096)
Quadropoly?	0.003	0.003	0.003
	(0.053)	(0.053)	(0.056)
Quintopoly?	0.005	0.002	0.006
	(0.068)	(0.043)	(0.079)
City Population (000)	11.927	12.037	12.558
	(66.869)	(66.903)	(69.394)
City Growth	0.011	0.044	0.060
	(0.039)	(0.147)	(0.119)
Province Population (000)	1199.522	1210.029	1261.442
	(1328.110)	(1340.618)	(1418.267)
Province Growth	0.008	0.032	0.048
	(0.007)	(0.036)	(0.038)
Unemployment Rate per City	5.117	3.347	3.196
	(2.021)	(1.478)	(1.512)
Cars per capita and City	0.332	0.362	0.408
	(0.100)	(0.119)	(0.193)
Bank Office per capita and City	0.446	0.433	0.352
	(0.459)	(0.443)	(0.366)
Province on the Coast?	0.557	0.557	0.557
	(0.497)	(0.497)	(0.497)

Note: This table provides summary statistics of all variables by year. Each year contains information for 3209 cities.

Table 3. Cross-Tabulation of No Stations per City for years 1996 and 1999

	No Stations per City 1999									
No Stations per City 1996	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**12**	**13**	**Total**
0	2,504	133	9	1	0	0	0	0	0	2,647
1	153	218	31	4	1	0	0	0	0	407
2	6	61	24	2	3	1	0	0	0	97
3	2	14	9	9	0	0	0	0	0	34
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	2,665	430	79	20	9	2	2	1	1	3,209

Note: This table shows results of cross-tabulating the number of stations per city in 1996 with the number of stations per city in 1999.

Table 4. Cross-Tabulation of No Stations per City for years 1999 and 2002

	No Stations per City 2002													
No Stations per City 1999	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**10**	**11**	**13**	**16**	**Total**
0	2,565	96	4	0	0	0	0	0	0	0	0	0	0	2,665
1	48	331	36	11	2	2	0	0	0	0	0	0	0	430
2	3	22	35	12	4	2	0	0	0	1	0	0	0	79
3	1	0	7	6	2	3	0	0	0	0	1	0	0	20
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	2,617	449	83	30	10	10	4	1	1	1	1	1	1	3,209

Note: This table shows results of cross-tabulating the number of stations per city in 1999 with the number of stations per city in 2002.

Table 5. Cross-Tabulation of No Stations per City for years 1996 and 2002

	No Stations per City 2002													
No Stations per City 1996	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**10**	**11**	**13**	**16**	**Total**
0	2,459	172	14	1	1	0	0	0	0	0	0	0	0	2,647
1	147	214	33	8	2	3	0	0	0	0	0	0	0	407
2	6	56	17	10	5	3	0	0	0	0	0	0	0	97
3	5	6	14	7	0	2	0	0	0	0	0	0	0	34
4	0	1	3	2	1	0	0	0	1	0	1	0	0	9
5	0	0	2	1	0	0	0	0	0	0	0	0	0	3
6	0	0	0	1	0	0	2	1	0	0	0	0	0	4
7	0	0	0	0	0	0	1	0	0	1	0	0	0	2
8	0	0	0	0	0	1	0	0	0	0	0	0	0	1
9	0	0	0	0	0	1	0	0	0	0	0	1	0	2
13	0	0	0	0	0	0	1	0	0	0	0	0	0	1
15	0	0	0	0	0	0	0	0	0	0	0	0	1	1
17	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Total	2,617	449	83	30	10	10	4	1	1	1	1	1	1	3,209

Note: This table shows results of cross-tabulating the number of stations per city in 1999 with the number of stations per city in 2002.

Table 6. Cross-Tabulation of Changes in No Stations per City between 1996-1999 and 1999-2002

	Change in No Stations 1999-2002									
Change in No Stations 1996-1999	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**8**	**Total**
-13	0	0	0	1	0	0	0	0	0	1
-7	0	0	0	1	0	0	0	0	0	1
-6	0	0	0	0	0	1	0	0	0	1
-5	0	0	0	0	0	0	0	0	1	1
-4	0	0	0	0	3	0	0	0	0	3
-3	0	0	0	4	2	1	0	0	0	7
-2	0	0	2	10	7	5	2	1	0	27
-1	0	1	3	175	35	9	1	0	1	225
0	0	1	36	2,625	85	6	2	1	0	2,756
1	0	0	33	117	14	1	2	0	0	167
2	1	2	4	7	1	1	0	0	0	16
3	0	0	0	2	2	0	0	0	0	4
Total	1	4	78	2,942	149	24	7	2	2	3,209

Note: This table shows results of cross-tabulating the changes in number of stations per city between 1996-1999 and 1999-2002.

Table 7. Results from Ordered Probit Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
City Pop (000s)	-0.0719	-0.0719	-0.0713	-0.0500	-0.0681	-0.0408
	(0.0094)***	(0.0094)***	(0.0087)***	(0.0069)***	(0.0087)***	(0.0086)***
Unemp*City Pop	0.0043	0.0043	0.0044	0.0009	0.0049	0.0026
	(0.0006)***	(0.0006)***	(0.0006)***	(0.0005)*	(0.0007)***	(0.0007)***
Cars pc*City Pop	0.0378	0.0378	0.0324	0.0332	0.0312	0.0151
	(0.0171)**	(0.0171)**	(0.0153)**	(0.0122)***	(0.0142)**	(0.0139)
Banks pc*City Pop	0.0256	0.0256	0.0270	0.0283	0.0167	0.0071
	(0.0118)**	(0.0118)**	(0.0106)**	(0.0057)***	(0.0079)**	(0.0073)
Duopoly*City Pop	-0.0082	-0.0082	-0.0053	-0.0032	-0.0058	-0.0008
	(0.0047)*	(0.0047)*	(0.0040)	(0.0026)	(0.0037)	(0.0031)
Triopoly*City Pop	-0.1121	-0.1121	-0.0666	-0.0100	-0.1724	-0.1074
	(0.0479)**	(0.0479)**	(0.0122)***	(0.0066)	(0.0209)***	(0.0172)***
Quadropoly*City Pop	-0.3012	-0.3012	-0.2618	-0.0546	-0.7395	-0.4948
	(0.0527)***	(0.0527)***	(0.0624)***	(0.0365)	(0.0943)***	(0.0724)***
Quintopoly*City Pop	3.8225	3.8225	1.0719	-1.0920	-8.9949	-6.1318
	(0.5706)***	(0.5706)***	(0.2194)***	(0.6799)	(1.1082)***	(0.8489)***
City Pop Growth	-0.4525	-0.4525	-0.5509	0.9821		
	(0.7683)	(0.7683)	(0.6939)	(0.6373)		
Province Pop	0.0003	0.0003	0.0003		0.0003	0.0002
	(0.0001)***	(0.0001)***	(0.0001)***		(0.0001)***	(0.00004)***
Province Pop Growth	1.6617	1.6617				
	(2.2432)	(2.2432)				
Province Coast	-0.1546	-0.1546	-0.1948	-0.4433	-0.1990	-0.3216
	(0.0518)***	(0.0518)***	(0.0529)***	(0.0441)***	(0.0501)***	(0.0443)***
Coast*City Pop	-0.0041	-0.0041	-0.0037	0.0039	-0.0051	
	(0.0036)	(0.0036)	(0.0036)	(0.0023)*	(0.0033)	
Coast*Province Pop	-0.0002	-0.0002	-0.0002	-0.0001	-0.0002	-0.0001
	(0.00004)***	(0.00004)***	(0.00005)***	(0.00002)***	(0.00004)***	(0.00003)**
Coast*City Pop* Province Pop	0.00001	0.00001	0.00001	0.000003	0.00001	
	(0.000001)***	(0.000001)***	(0.000001)***	(0.000001)***	(0.000001)***	
Observations	9627	9627	9627	9627	9627	9627

This table shows results from running ordered probit specifications following the profit function specified in the text. I do not report here coefficients for interactions between unemployment rate, cars, and banks with province population, and town and province population growth.

Table 8 maps coefficients in specification (6) into the structural paramenters in the model. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8. Structural Parameters from Specification (6) Table 7

α_1	(=City Pop)	-0.0408
β_1	(=Unemployment*City Pop)	0.0026
β_2	(=Cars pc*City Pop)	0.0151
β_3	(=Banks pc*City Pop)	0.0071
α_2	(=Duopoly*City Pop)	-0.0008
α_3	(=Triopoly*City Pop)	-0.1074
α_4	(=Quadropoly*City Pop)	-0.4948
α_5	(=Quintopoly*City Pop)	-6.1318
λ_1	0	0
λ_2	(=Province Pop/City Pop)	-0.0045
λ_3	0	0
γ_1	(= Province Coast?)	-0.3216
γ_2	(=Coast*Province Pop)	-0.00007

Note: This table maps coefficients from specification (6) in Table 7
into the structural parameters in the model.
See that specification restricts λ1 and λ3 to equal zero.

Table 9. Calculation of Variable Profits, Fixed Costs and Entry Thresholds

Year	No Stations	V	F	Implied S (=F/V)	S (model)	S/n	S5/Sn
1996	**1**	-0.0185	0.3107	-16.7831	19.4847	19.4847	5.640734
	2	-0.0180	0.3204	-17.8007	57.5243	28.7621	3.821273
	3	-0.1222	0.3573	-2.9231	69.0155	23.0052	4.77753
	4	-0.5093	0.3559	-0.6987	182.4240	45.6060	2.409943
	5 or more	-6.1465	0.3611	-0.0588	549.5394	109.9079	1
1999	**1**	-0.0231	0.3044	-13.1771	22.5581	22.5581	5.994694
	2	-0.0221	0.3443	-15.6055	72.0836	36.0418	3.751997
	3	-0.1284	0.2825	-2.1995	128.5751	42.8584	3.155244
	4	-0.5144	0.3333	-0.6480	390.5478	97.6370	1.385015
	5 or more	-6.1508	0.2678	-0.0435	676.1428	135.2286	1
2002	**1**	-0.0240	0.3246	-13.5240	17.7086	17.7086	5.069642
	2	-0.0232	0.2988	-12.8606	54.1928	27.0964	3.313221
	3	-0.1289	0.2774	-2.1518	95.8040	31.9347	2.811254
	4	-0.5158	0.2992	-0.5801	278.3688	69.5922	1.290035
	5 or more	-6.1515	0.2630	-0.0427	448.8821	89.7764	1

Note: This table calculates the implied from the model variable profits V, Fixed Costs F and S=F/V.
Since this quocient always appears to be negative, I calculate S as = City Pop + $\lambda 2$*Province Pop.
S/n divides S by number of stations, and S5/Sn calculates the rate of change in S between monopoly and 5 or more stations.

Table 10. Entry Threshold Ratios

Year	S2/S1	S3/S2	S4/S3	S5/S4
1996	1.47614	0.79984	1.98242	2.40994
1999	1.59773	1.18913	2.27813	1.38501
2002	1.53013	1.17856	2.17921	1.29004

Note: This table shows how entry thresholds vary per entrant within a year. To calculate this ratios, I use entry thresholds from Table 9.

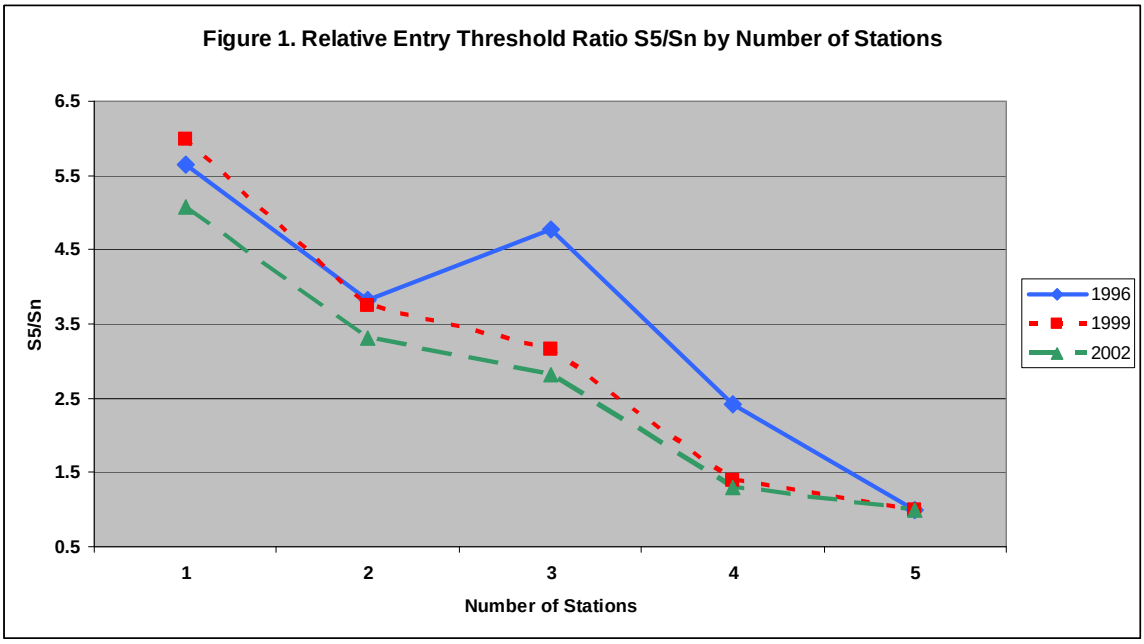
Figure 1. Relative Entry Threshold Ratio S5/Sn by Number of Stations
S5/Sn
6.5
5.5
4.5
3.5
2.5
1.5
0.5
1
2
3
4
5
Number of Stations
1996
1999
2002

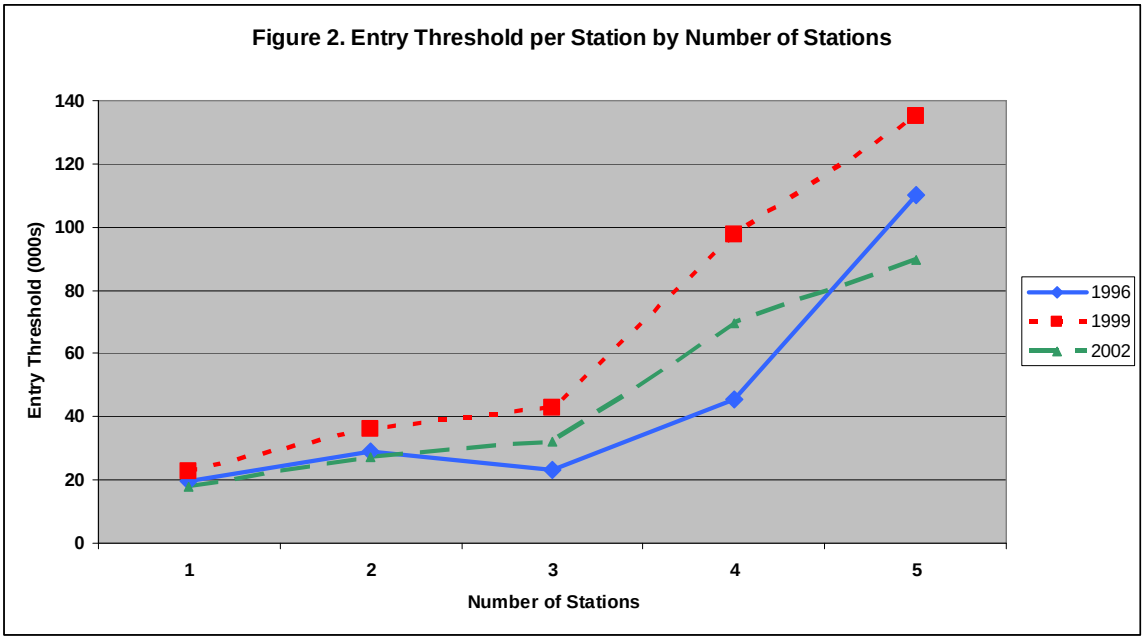
Figure 2. Entry Threshold per Station by Number of Stations
Entry Threshold (000s)
140
120
100
80
60
40
20
0
1
2
3
4
5
Number of Stations
1996
1999
2002