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VERTICAL INTEGRATION AND PRODUCT MARKET COMPETITION: EVIDENCE FROM THE SPANISH LOCAL TV INDUSTRY

Ricard Gil[1]

Abstract

This paper empirically examines the relation between product market competition and vertical integration in the Spanish local TV industry. For this reason, I use a data set of Spanish local TV stations that provides station level information on vertical integration and product market competition, as well as other station and market characteristics, for the years 1996, 1999 and 2002. During this period, changes in regulation in this industry had a strong impact on the level of market competition faced by local TV stations. I use differences in market structure across markets and years to empirically study the relation between vertical integration and competition. My results show that there exists a negative relation between vertical integration and market competition. I also find that despite the fact that private stations are less likely to integrate content production, they are more likely to do so the higher the number of competing stations in their coverage area. Private stations do so because by increasing the percentage of content produced in-house they differentiate themselves from competition and therefore soften competition and maximize profits.

Keywords: Market competition, local TV Industry, product, vertical integration.

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1 Introduction

More than 70 years after the seminal paper of Coase (1937), we now count with several theories that yield predictions regarding the determinants of the boundaries of the firm. Transaction Cost Economics (TCE hereafter) theories (Williamsom (1975,1985); Klein, Crawford and Alchian (1978)) emphasize the role of ex-post quasirents as main determinant while Property Rights (PRT hereafter) theories (Grossman and Hart (1986), Hart and Moore (1990)) focus on the importance of ex-ante investment incentives. On the empirical side, Lafontaine and Slade (2007) have shown that even though the number of papers studying patterns of vertical integration is growing, our knowledge of why and how firms decide between vertical integration and outsourcing is still scarce. As a matter of fact, Whinston (2003) shows that most theories are still left untested and that for example PRT theories testable implications are indeed difficult to test (see Baker and Hubbard (2003) or Woodruff (2002) for two exceptions). In this paper, I turn my attention to the impact of product market competition on vertical integration. Product market competition is yet another determinant of the boundaries of the firm for which the theoretical literature has not offered clear and consistent predictions and therefore one for which we must look at empirical evidence to obtain answers.

As mentioned above, TCE emphasizes the role of quasirents in the make-or-buy decisions of firms. Stronger market competition may increase the value of specific investments elsewhere and therefore may increase or decrease the likelihood of vertical integration depending on whether the manufacturer relies completely on the input supplier making the specific investment. In the extreme case that the manufacturer is using a handful of suppliers, vertical integration will decrease with product market competition. If a manufacturer depends completely on a single supplier, stronger market competition will increase the likelihood of vertical integration. The PRT approach also offer predictions, but these go in all directions. On the one hand, De Bettignies

(2006) shows in a Hotelling model that stronger competition will lead to less vertical integration between manufacturers and retailers. On the other hand, Aghion, Griffith and Howitt (2006) show that there exists a U-shaped relationship between vertical integration and competition. Finally, Grossman and Helpman (2002) find that stronger competition may lower the incidence of vertical integration as long as the cost advantage of independent producers in their model is relatively large and final producer's bargaining power relatively small. In this paper, I empirically examine the relation between product market competition and vertical integration in the Spanish local TV industry and therefore validate or reject some of the predictions of these theories in that particular setting.

In order to do so, I use the census of Spanish local TV stations for the years 1996, 1999 and 2002. The census also provides individual station characteristics for a number of TV stations that vary across years. The census lists a total of 881, 740 and 898 stations for 1996, 1999 and 2002 respectively. Out of this, only 162, 425 and 600 stations (for each year respectively) report detailed station-level information on number of hours and days on-air, percentage of content produced in-house, the station geographical coverage, as well as the station affiliation to a network. On average, TV stations in the data produce 70% of their content, are located in municipalities with 2.5 local TV stations total, and face over 5 competing local TV stations in their coverage area. I argue that changes in local market structure and station coverage area were induced by changes in regulation in the Spanish media and telecommunication industry. Therefore, observed changes in outsourcing associated with changes in product market competition are likely to be independent to market and station characteristics. Even though this assumption allows me to claim exogeneity of my estimate of the correlation between market competition and vertical integration, I present my results as empirical correlations and associations between the two variables of interest.

My findings suggest that Spanish local TV stations facing stronger market competition are also

less likely to vertically integrate in the production of their content and therefore they rely more in program outsourcing. This result can only be found within years and provinces, but it fails to show when examining markets across years or following stations across years. This suggests that make-or-buy decisions are rather uniform across stations within markets and that these decisions are difficult to change once changes in market structure occur, at least in the short and medium term. The instrumental variables analysis and evidence using first-differences provides supports the hypothesis that the empirical relation between vertical integration and competition is mostly in levels and not changes.

Other findings in the paper speak about the relation between vertical integration and a number of other variables such as network membership, private ownership (as opposed to government ownership), economies of scale, whether the station broadcasts its content (versus pay-per-view mode), and whether the station advertises products for others. Results here show that stations that are more likely to integrate the production of their content are also more likely to be located in bigger cities with higher unemployment rates, they are more likely to offer fewer hours of content, they are more likely to broadcast their content, and they are more likely to be owned by local government and authorities. Surprisingly, whether the station is a member of local TV station network or other type of associations had no effect on their make-or-buy decisions of content production.

An interesting set of results emerges when I investigate further the differential behavior of privately owned and government owned stations. It turns out that even though overall stations facing a larger number of stations in their coverage area and private stations are less likely to integrate the production of their content, private stations are more likely to integrate their content production the higher the number of stations in their coverage area. This goes against most predictions from established theories in that backward integration and competition are positively correlated

when investigating decisions from profit maximizing firms. This result is easily reconcilible with the industry institutions in this setting since stations may choose to produce a higher percentage of their content when facing more competition to differentiate themselves from their competitors, soften competition and therefore maximize profits.

The contribution of this paper is to test predictions of established theories on the relation between vertical integration and competition. For this purpose, the paper reviews the relevant theoretical and empirical literature. The main result in the paper that there is a negative empirical relation between vertical integration and competition is in line with most predictions from transaction cost economics and property rights theories of vertical integration. The result that private stations are more likely to integrate the production of content as they face more competing stations in their coverage areas seems to be at odds with most existing theories, but shows that in this industry product differentiation occurs through content differentiation and therefore stations are reacting to tougher competition by differentiating themselves when increasing the percentage of content produced in-house. This is yet another role for vertical integration that has been ignored by the existing literature. This role is especially interesting when considering media and creative industries because innovative activities are difficult to manage and contract upon. The gains from softening competition through in-house innovation have been ignored in the literature up to now (see Aghion and Tirole (1994) or Gil and Spiller (2007)), and therefore future theoretical research should include it in the make-or-buy trade-off that firms face in innovative industries.

The paper is organized as follows. Section 2 describes the existing theoretical and empirical literature that studies the relation between vertical integration and competition, as well as places this paper's contribution within the literature. In section 3 I describe the institutional details of the Spanish local TV industry. Section 4 presents the data. In section 5 I describe the empirical methodology that I use in the paper, show the results, and finally, offer a discussion of the results.

Section 6 concludes.

2 Literature Review

This paper contributes to an old literature that focuses on the determinants of incentive provision. Among other things, many have studied the role of market competition on incentive provision holding organizational form and the level of supervision constant. An example of this is Raith (2003) on the relation between competition, risk and managerial incentives. He primarily examines the relation between risk and incentive provision and shows that firms in more competitive markets provide stronger incentives and this increases firm profits volatility.

Another related literature emphasizes the role of organizational form on incentive provision. For example, Holmstrom and Milgrom (1991 and 1994) show how asset ownership may help balance incentives across non-contractible efforts. These papers and others implicitly assume that market based incentives may not work and, in particular to our interest in this paper, product market competition may not provide strong enough incentives to economic agents. If that is true, the firm may serve as useful substitute to do so through costly monitoring.

Other papers directly address the role of product market competition in determining firm boundaries. Grossman and Helpman (2002) develop a model of industry where organizational form is endogenously determined in equilibrium. They study the impact of product market competition on organizational form by conducting comparative statics on the elasticity of substitution of demand for the final product. Their results indicate that stronger product market competition increases outsourcing as long as independent producers are productive enough and the bargaining power of final producers is relatively small. Another paper with mixed results is Aghion, Griffith and Howitt (2006). In their paper, they investigate the impact of competition on innovation and find

that the relationship between competition and vertical integration is non-monotonic and takes a U-shape form. Finally, de Bettignies (2006) builds a Hotelling linear city model that endogeneizes integration between manufacturers and retailers located at the extremes. He shows that stronger competition (lower transportation costs) are associated with less manufacturer-retailer integration.

Another part of this literature has also investigated the relationship between competition and coordination of decisions within a firm. These papers identify decision delegation with outsourcing and centralization with integration. Alonso, Dessein and Matouschek (2008) show that in multi-product firms the flatter the inverse demand curves of the different products the higher the likelihood of decision delegation to each one of product divisions. Legros and Newman (2008) examine the centralization of decisions in a setting where coordination is necessary. Even though they assume perfect competition, they find that an inverted-U relation between integration and prices exists. Even more important, theirs is the only paper where different organizational forms may coexist in equilibrium. Others mentioned above cannot explain the wide variety of organizational forms observed within a same industry. Finally, Ruzzier (2009) explores the relation between product market competition and managerial autonomy. He finds that, even though small increases in competition increase the gains of managerial autonomy, too strong competition may lead managers take excessive risks and therefore it may be optimal to withdraw autonomy from them. Therefore again there is not a monotonic relation between market competition and decision delegation.

On the empirical side, Lafontaine and Slade (2007) review the empirical literature of the determinants and consequences of vertical integration. In their review, there is no section directly addressing the relationship between product market competition and firm boundaries. This is because, to the best of my knowledge, there is little evidence and empirical research on this question. In a recent exploratory study of Spanish manufacturing plants, Bayo, Galdón-Sánchez and Gil (2009) find a positive correlation between product market competition and outsourcing of services.

Therefore the contribution of this paper is twofold. First, it tests the predictions of the existing theoretical papers by empirically estimating the relationship between product market competition and vertical integration. Second, it fills the existing gap in the empirical literature of the determinants of the boundaries of the firm that so far has omitted the role of competition in make-or-buy decisions.

3 Institutional Details

This section builds up from information obtained in personal interviews with industry managers. Television stations are not different than any other firm in another industry in that they also maximize profits. The difference strives in the product that they sell and their channels to finance the production of such product. Television stations rely in more than one revenue source and this makes the problem at hand more interesting. On the one hand, television stations produce content that they sell to television consumers. On the other hand, television stations sell television space to advertisers. Since television consumers value television content free of advertising and advertisers value the number of television viewers, stations need to balance revenues obtained from both sources to maximize total amount of profits. Some stations may not charge consumers to view their content and therefore maximize the number of viewers, and sell advertisement space to advertisers at higher prices. Other stations choose to charge a subscription fee to consumers and limit the amount of advertising.

In order to attract both viewers and advertisers, TV stations carefully choose the content of their programming. Programs may be produced in-house or outsourced. In the case of outsourced programming, these could be old content produced in the past and now recycled into current programming, or content outsourced to an independent producer and specifically produced for and targetting that station's audience. Alternatively, the content may be produced in-house by the

programming division.

In this industry, whether to produce content in-house or buy elsewhere is important because it differentiates the station product from others. Producing all the content internally may be very costly but it sure differentiates a station's product from other competitors. This strategy may be also counter-productive if the station content ends up appealing to only a fraction of the population and not the general public. Outsourcing content production will indeed be cheaper but it also diminishes differentiation with other stations and increases the real degree of competition faced by the station. Local station managers take into account these trade-offs when making decisions and therefore they base their content outsourcing decisions on the degree of expected competition.

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. I talk more about these factors below as I explain differences between the European and American model as well as the particular institutions governing the Spanish local TV industry.

3.1 European versus American Model of Local Television

Television markets in Europe were traditionally organized very differently than US markets. 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 since these were the main providers of content. Eventually, these relationships of content exchange were so frequent that dominant stations and local stations formed what we know today 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 idiosyncracies of the local demand that they serve such as local news and local documentaries.

The process described above is very different than the process experienced by the European TV industry. The European experience 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, in the best of the cases, a few regional stations that broadcasted 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. This paper studies the Spanish case and the consequences of changes in regulation towards local stations. I proceed in this section using 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 the law, the central and regional governments. 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 with their activities.

Many other local stations emerged in the following years and as their activities both economically and culturally speaking grew in importance, the need for a legal framework that would regulate

this new sector 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.

3.2 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 they 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 local product market competition affected the percentage of content procuded in-house by local stations. This indeed was the main source of concern by politicians and regulators who feared that the liberalization and privatization of this industry would ignore the idiosyncracies and needs of local municipalities that were not being served by regional and national TV stations.

4 Data

To carry the research in this paper, I put together three yearly issues of 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 shows that there were 881 stations in 1996, 740 stations in 1999 and 898 in 2002. The census provides information on the location of all stations in Spain during each one of the years. AIMC sent questionnaires to each of the existing stations in each year and published the responses. Unfortunately only 183 stations in 1996 answered the questionnaire while 457 and 645 responded in 1999 and 2002 respectively. In the questionnaire, station managers responded questions regarding the station operation, coverage and reach area, weekly and daily schedules, association memberships, advertising and broadcasting. The source of the dependent variable in this paper is the item in the questionnaire that asks managers about the percentage of content in their programming that is produced in-house. This variable is informative of the extent of vertical integration and make-or-buy decisions in content production for each station that responded to the questionnaire. Finally, I merged each of the cities in the data set with city information contained in the business and population census published by "La Caixa" every year to account for differences across markets. This census does not provide information in towns that have less than a 1,000 people and therefore I lose observations in the specifications where I include

city level controls.

Table 1 provides summary statistics across years and cities. Information in this table shows that on average stations produce in-house 70% of their content. This table also shows that on average stations compete with 5.5 stations in their coverage area but are located in cities with only 2.5 stations. They are on the air between 6 and 7 days and 102 hours a week. The average station locates in a city with 150,000 inhabitants and 4% unemployment rate. Finally, 80% of the stations responding to the questionnaire are privately owned, broadcast and emit paid-for advertising. Stations in the sample associate with 0.75 station networks, and they barely ever associate with cultural and other type of associations.

Given the change in regulation between 1996 and 2002, Table 2 breaks up the sample by year and provides summary statistics for the same set of variables. The table shows that the percentage of in-house content barely changed and was 0.69, 0.72 and 0.67 for 1996, 1999 and 2002 respectively. The changes in competition were more abrupt and the number of stations in the coverage area of respondent stations went from 5.5 to 4.7 and 6 respectively. These changes were mostly driven by changes in the number of stations within the same city since these went from 2.6 to 2 and 2.8 respectively. The number of days that stations emitted stayed constant but the number of hours a week went from 78 to 85 and finally ended at 120 hours a week in 2002. The number of networks went from 0.86 to 0.66 and then up to 0.76 in 2002. All the other variables in the table remain stable across years.

Since changes in regulation between 1996 and 2002 had mostly an intended effect on the number of local stations per city, Tables 3, 4 and 5 cross-tabulate the number of local stations per city for all the stations listed in the census, including those that not responded the questionnaire. In Table 3, I cross-tabulate the number of local stations per city in 1996 and 1999. From this table, we can see that the 881 stations were distributed among 579 cities. Similarly for 1999, the 740 stations

were distributed among 553 cities. All cities located in the diagonal did not change the number of stations between 1996 and 1999, while those in the upper triangle increased the number of stations and those in the lower triangle saw the number of stations decrease. Overall 333 cities kept their number of stations constant, 202 increased their number of stations and 290 decreased their number of stations.

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, 516 cities kept the number of local stations constant, 102 cities saw their number of stations go down and therefore 207 saw the number of stations increase. Overall, between 1996 and 2002 Table 5 shows that 273 cities over the whole period did not change the number of stations, 271 cities saw the number increase and the number of stations decreased in 281 cities of the 825 cities present in the full sample.

Finally, Table 6 cross-tabulates changes in the number of stations between 3-year periods 1996-1999 and 1999-2002. This table shows that the number of local stations remained constant between 1996 and 2002 for 180 cities. The other 645 cities in the sample experienced changes in the number of local stations in one (480 cities) or both 3-year periods (156 cities). As shown in this table, there is enough variation in the data set to examine the question of whether vertical integration decisions change with changes in competition. I proceed to the empirical analysis in the following section.

5 Empirical Methodology and Results

This section describes the empirical methodology in this paper as well as the potential problems that the analysis may encounter. 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 theoretical and empirical literature.

5.1 Empirical Methodology

The empirical analysis in this paper aims to recover the correlation between vertical integration and competition in the Spanish local TV industry. For this purpose, my main specification used in the paper will take the form of simple OLS regressions such that

$$VI_{ijt} = \alpha_0 + \alpha_1 Comp_{ijt} + \alpha_2 X_{ijt} + \gamma_j + \delta_t + u_{ijt}$$

where VI_{ijt} is the percentage of content produced in-house by station i in city/market j and year t, $Comp_{ijt}$ is a measure of competition that may vary at the station or city level, X_{ijt} are a number of controls and characteristics at the city and station level, and γ_j and δ_t are different geographic level and year fixed effects.

Since this research is mostly interested in recovering α_1, I focus on two main possible problems that could cause that $corr(u_{ijt}, Comp_{ijt}) \neq 0$ and therefore that the parameter of interest is estimated with a bias. The first possible problem is the endogeneity of in-house content production and firm entry. More profitable markets that accommodate a larger number of stations may also have a higher taste for specialized content. On the other hand, it could be that larger markets have a lower demand for specialized content since they need to appeal to a large variety of taste and stations in larger markets are less likely to produce their content regardless of competition. The second possible problem is omitted variable bias. There may be factors that are year or station specific that are unobservable to the econometrician, and correlated with $Comp_{ijt}$.

I address both problems using the panel structure of the data set. I solve the first mentioned

problem by using the three-year lagged market structure of each city as an instrument for the market structure in the current year, that is, the market structure in 1999 as an instrument for the structure in 2002 and so on. I create a measure of the market structure in 1993 (as an instrument for $Comp_{ij1996}$) using answers in the questionnaire to the item detailing in what year the stations first started emitting. The assumption is that the number of stations in $t-3$ will be correlated with the number of stations in t, and uncorrelated with the error term of the year t, that is, $corr(Comp_{ijt-3}, Comp_{ijt}) \neq 0$ and $corr(Comp_{ijt-3}, u_{ijt}) = 0$. The latter assumption $corr(Comp_{ijt-3}, u_{ijt}) = 0$ is reasonable because of the iid assumption and the fact that the number of stations in 1996 was completely unrelated to market characteristics due to the regulation existing in 1996.

The latter potential problem is the bias in α_1 due to the omission of variables unobserved by the econometrician. This means that potentially the error term u_{ijt} could have a structure such that

$$u_{ijt} = r_{ij} + z_t + e_{ijt}$$

where r_{ij} are unobservable factors specific to station i and city j, z_t are unobservable factors specific to year t and e_{ijt} is a normally independently and identically distributed error term. Ignoring r_{ij} and z_t may not have consequences for the consistency of α_1 as long as these are not correlated with $Comp_{ijt}$. In such case, the estimate of α_1 will not be efficient but still be consistent. The main problem appears when r_{ij} and z_t are correlated with $Comp_{ijt}$. In that case, the estimates of α_1 will be inefficient and inconsistent. To address this issue, I use market and station fixed effects as well as year fixed effects and control for all the unobservable factors that may bias the estimates of the parameter α_1.

Finally, I also compute first differences for those stations that respond to the vertical integration question in the survey in two consecutive years and run simple OLS such that

$$\Delta VI_i = \beta_0 + \beta_1 \Delta Comp_i + \epsilon_i$$

where ΔVI_i and $\Delta Comp_i$ are first-differences of vertical integration and competition at the station level. I plot this last set of results in several graphs for expositional purposes. In the next section, I proceed to implement the empirical strategy described here.

5.2 Results

In this section I explore the empirical specifications detailed previously. First, I investigate in the cross-sectional data the empirical correlation between my measure of vertical integration and two metrics of competition at the station level. Second, I investigate how market and endogenous station characteristics correlate with vertical integration and possibly crowd out the impact of competition. Third, I investigate whether privately owned stations react differently to competition than government-owned stations. Finally, I show the result of applying instrumental variables and the first-difference analysis.

5.2.1 Vertical Integration and Competition

In Table 7, I regress the percentage of in-house content on two measures of competition. The first measure is the number of stations in the coverage area and it is determined at the station level. The second measure is the number of stations located in the same city. The errors in all specifications are clustered at the city and year level since observations from stations in a same market and year are likely to be correlated.

Columns (1) to (5) in Table 7 detail specifications with the number of stations in each station's

coverage area. Columns (1) to (3) show a statistically significant negative correlation between vertical integration and competition. This is robust to the inclusion of year and province fixed effects. This means that stations with a larger number of stations in their coverage area are also less likely to backward integrate the production of their content. This pattern is robust when examined over time and within provinces. In columns (4) and (5) I introduce city and station fixed effects. The correlation is no longer statistically significant. When comparing this to results in column (3), the result in column (4) indicates that stations within a same city tend to have similar levels of vertical integration. Similarly, results in column (5) indicate that the degree of vertical integration at a station does not seem to change when the number of competing stations changes. This is evidence that make-or-buy decisions may be costly to change in the short and medium term and therefore we should trust the cross-sectional evidence to be indicative of the empirical relation between vertical integration and competition.

Columns (6) to (10) in Table 7 shows results of specifications that include the number of stations within each city as a measure of local product market competition. These specifications in the second-half of the table display all negative correlations with coefficients of larger magnitudes than those in columns (1) to (5). Unfortunately, none of these coefficients are statistically significant. When interpreting these results together with those in the first five columns in Table 7, I infer that differences in vertical integration are not statistically significantly correlated with the number of stations per city, but they are statistically significantly correlated with differences across cities in the number of stations in the station's coverage area.

5.2.2 Vertical Integration and Other Explanatory Variables

Tables 8 and 9 introduces market and station controls to specifications in column (3) and (8) in Table 7. This means that all specifications include province and year fixed effects, and have errors

clustered at the market and year level.

Table 8 controls for competition using the number of stations in the station coverage area. Column (1) is the same specification as column (3) in Table 7. Column (2) controls for population and unemployment rate and shows that the correlation between vertical integration and competition is robust and that the two controls are not statistically significantly correlated with the percentage of content produced in-house. Column (3) introduces controls that account for the total amount of content by the number of days and hours a week that each station reports to be on the air. Results in this column show that stations with more content are also less likely to vertically integrate and that the statistical significance of competition is now gone. This result indicates that as stations are in more competitive environments they tend to compete in the number of weekly hours and that most of the adjustment occurs by outsourcing the production of content while keeping the number of hours produced in-house constant.

Column (4) controls for whether the station emits advertising and whether the station broadcasts its content. The results indicate that stations that advertise are less likely to integrate the production of their content and that broadcasting stations are more likely to integrate the production of their content. Column (5) controls for whether the station is privately owned and whether the station is associated with a station network, cultural association or other type of association. These controls are particularly meaningful because the change in regulation occurred between 1996 and 2002 allowed private investors to enter the industry and permitted the formation of local station networks. Results show that privately owned stations are less likely to integrate production of their content and that network and association membership are uncorrelated with make-or-buy decisions in this setting. Finally, the specification in column (6) includes all controls used in Table 8 and shows a number of robust results. First, stations located in cities with larger number of inhabitants and higher unemployment rates are more likely to integrate their content produc-

tion. Second, stations offering more weekly hours of content are less likely to integrate. Third, broadcasting stations are more likely to integrate while privately owned stations are less likely to integrate. After including all these controls, vertical integration is still negatively correlated with competition but its coefficient is no longer statistically significant.

Table 9 repeats the exercise in Table 8 but in this case I use the number of stations located in each city as the measure of local competition. Results in column (6) are indeed very similar to those in Table 8. In particular, stations located in cities with higher unemployment rate are more likely to vertically integrate their content production, stations offering a large number of weekly hours are less likely to integrate their production of content, broadcasting stations are more likely to integrate their content, and privately owned stations are less likely to integrate. The direct correlation between vertical integration and competition remain statistically insignificant in the same way that it was in the second half of Table 7.

5.2.3 Private vs Government-owned Stations

Results in Table 7 and 8 show that whether a station is privately owned is negatively correlated with the percentage of content produced in-house. For this reason, I now investigate further how privately owned (as opposed to government owned) stations change their make-or-buy decisions when located in more competitive environments.

For this purpose, I provide results of new specifications in Table 10. All the specifications in this table use the number of stations in each station's coverage area and contain year fixed effects and clustered errors at the city and year level. These specifications do not contain any province fixed effects because they contain variables that vary at the province level and therefore fixed effects would absorb their variation.

Column (1) is consistent with evidence in Table 8 and 9 in that privately owned firms are

less likely to integrate the production of their content while the coefficient on competition goes statistically insignificant. The specification in column (2) interacts competition with the private ownership dummy and shows that overall stations in more competitive markets are less likely to integrate the production of their content, confirms that privately owned stations are less likely to integrate but also that privately owned stations are more likely to integrate the higher the number the stations they compete within their coverage area.

In specifications (3), (4) and (5) I restrict the sample of stations to those for which all stations within their city and year responded to the AIMC questionnaire. For these cities I compute the average number of private stations per city and province per year. I introduce these new variables in specifications (3), (4) and (5) together with interactions with the number of stations in the coverage area as well as whether the station is privately owned and three-way interactions. Results in these three specifications still show that there is a negative correlation between vertical integration and competition, and that private stations are less likely to integrate their production of content. If anything new, specification (5) shows that stations in provinces with a higher percentage of private stations are less likely to integrate the production of their content.

Finally, in specifications (6) to (8) I assume that all stations for which I do not have information are government owned (not private) stations. This allows me to compute proxies for the percentage of private stations in all cities and all provinces, and therefore I can run the same specifications in columns (3) to (5) with the full sample of stations for which vertical integration information exists. These results confirm that stations with higher number of stations in their coverage area and private stations are less likely to integrate content production, but private stations are more likely to integrate content production the higher the number of stations in their coverage area.

5.2.4 Instrumental Variable Regressions

Up to now, all evidence (Tables 7, 8, 9 and 10) is showing results from OLS regressions. This section investigates the results of using instrumental variables in the regressions of Table 7.[1] As explained above in the methodology section, I use the three-year lag of market structure in any given city as an instrument for the current market structure of that same city.

Table 11 shows evidence of instrumenting for the number of stations in the station's coverage area (specifications (1) to (4)) and the number of stations in each city (specifications (5) to (8)). The results show that there is no statistical relation between vertical integration and competition. This result could be explained by two different hypotheses. First, it could be that indeed there is no relation between the two variables in this industry. Second, an alternative explanation is that my instrument is not good and that the determinants of market structure (demand and supply factors) in the past are the same across cities as in the current period.

5.2.5 First–Differences Analysis

Another possible source of bias may be the existence of ommitted variables that are correlated with market structure in our analysis. For this purpose, I focus now on the analysis of those stations that I observe in more than two periods consecutively in the data and drop all the other observations. I am left with 97 stations for 1996 and 1999, and 270 observations for 1999 and 2002. I compute first-differences[2] and run simple OLS regressions of changes in vertical integration on changes in the number of stations in the coverage area and changes in the number of stations in each city.

See from results in Table 12 that changes in vertical integration and market structure between

[1] Table 11 does not instrument regressions with station fixed effects.

[2] See that this is very similar to including station fixed effects in the analysis in Table 7.

1999 and 2002 seem to be negatively correlated (specifications (1) and (4)), but changes in vertical integration and market structure between 1996 and 1999 (specifications (2) and (5)) seem to be positively correlated. When the two are combined, the overall correlation is positive if using number of stations in coverage area as the measure of number of competitors, but negative if using the number of stations per city as measure for market structure. Figures 1 to 6 plot each of the points for each of the regressions in Table 12.

Finally, specifications (7) to (9) in Table 12 regress changes in vertical integration with lagged changes in the number of stations per city. As one can see in Figure 7, there is no variation in the lagged change in vertical integration for specification (7). Figures 8 and 9 plot results for specification (8) and (9). Overall, the results combining all data points is a negative and statistically insignificant relation between changes in vertical integration and lagged changes in the number of stations per city. The overall evidence in the first-difference analysis seems to be consistent with our instrumental variables section and shows that there does not seem to be a relation between vertical integration and competition. If there is one, it could be the case that it is difficult to change make-or-buy decisions in the short and medium run.

5.3 Discussion of Results and Relation to Literature

Overall there a number of results in the previous section that deserve discussion. The main finding of the paper is that there exists a negative correlation between vertical integration of content production and the number of competing stations in the coverage area. This result is consistent with predictions from both transaction cost economics and property rights theories, and therefore it is direct support for existing theories of vertical integration.

Another set of findings reports that private stations are less likely to vertically integrate than government owned stations are but these are likely to increase the percentage of content produced in-

house as the number of competing stations in the coverage area increases. This finding establishes a positive correlation between vertical integration and competition and therefore it is at odds with predictions from existing theories of vertical integration. Grossman and Helpman (2002) show that a positive relation may exist as long as the cost advantage of independent producers in their model is relatively low and final producer's bargaining power relatively large. Similarly, Aghion, Griffith and Howitt (2006) hypothesize that there exists a U-shaped relation between vertical integration and competition such that at certain mid-range levels of competition an increase in competition may increase the extent of vertical integration in innovative industries. Unfortunately, the quality of the data does not allow me to test which of these theories, if any, may be more adequate to rationalize this result.

An alternative way to rationalize this result is through the implicit connection in this industry between make-or-buy decisions in content and product differentiation. How much content a station produces in-house determines its differentiation with competing stations. Therefore, stations facing a lot of competition may decide to increase the percentage of content produced in-house in order to differentiate from others, soften competition and maximize profits. This result, and this study, therefore sheds light on yet another role of vertical integration that has not received much attention in the theoretical literature on the role and determinants of vertical integration.

Another interesting result is the negative relation between vertical integration and the total number of weekly hours on the air. The larger the amount of hours in the air the lower the percentage of content produced in-house. This result shows that there is a negative relation between "firm size" and vertical integration. Hortacsu and Syverson (2007) provide evidence for manufacturing plants that show a positive relation between output and vertical integration. This finding suggest that this relation is not universal and that it can go either way.

Finally, and to my surprise, I find no statistical relation between network membership and

the degree of integration in content production. This comes as a surprise because one would expect that one of the key advantages to belonging to a network is access to cheaper content and sharing agreements. Moreover, part of the debate involved in the change in regulation in this industry during the period under study revolved around whether local stations would be able to form horizontal networks (with other local stations) or joint vertical networks (under regional and national stations). Even though politicians were mostly worried about the loss of local identity of stations, these concerns seemed to be unfounded according to the results in this research.

6 Conclusions

Existing theories of vertical integration provide divided predictions regarding the sign of the correlation between vertical integration and competition. While transaction cost economics and property rights theories predict a negative correlation between them, others such as Grossman and Helpman (2002) and Aghion, Griffith and Howitt (2006) show that the relation is not monotonic. This paper takes this question to the data and tests for the empirical relation between vertical integration and competition in the Spanish local TV industry.

The findings are mixed in that there is an overall negative relation between vertical integration and competition in the data, but I also find that privately owned stations are likely to increase the percentage of content produced in-house as the number of competing stations increase. While the former result confirms predictions of dominant theories such as transaction cost economics and derivations of the property rights theory, the latter result is at odds with this prediction and presents a challenge to existing theories of vertical integration. I rationalize this result by understanding the institutional details of this industry. As competition gets tougher, local stations choose to produce a higher percentage of their content to differentiate themselves from other stations, soften "de facto" competition and maximize profits.

This result then sheds light on yet another role of vertical integration in markets where product differentiation is important. On the one hand, vertical integration in innovative industries may be too expensive since innovation is difficult to manage and may have exploding costs when undertaken in-house. On the other hand, integrating the production of content may differentiate the firm's product from others and grant invaluable competitive advantage. The result in this paper provides empirical evidence that local TV stations are sensitive to changes in this margin and therefore this is an important trade-off for firms and economic agents in media and innovative industries.

Unfortunately, there is not enough theoretical literature on the role of vertical integration as a source of product differentiation and therefore the empirical evidence may lack depth in the analysis of testable implications. Future theoretical research should explore this issue and provide testable models with policy implications. On the empirical side, I believe that the relation between vertical integration and competition is an empirical question that has received very little attention and it is understudied. I can only hope that this study will foster future empirical research on this same issue and related topics in this and other industries.

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Table 1. Summary statistics across years and stations

Variable	Obs	Mean	Std. Dev.	Min	Max
% Content In-House	1187	0.69	0.30	0	1
Comp. Coverage Area	1285	5.54	7.71	1	69
Local Competition	1285	2.46	2.70	1	17
City Population	1269	150803.10	431929.50	1082	3016788
Unemployment Rate	1269	4.21	1.86	0.6	12.2
Weekly Hours	1133	102.22	62.07	1	168
Weekly Days	1189	6.57	1.17	0	7
Private Ownership?	1250	0.80	0.40	0	1
No. Networks?	1285	0.74	0.74	0	4
No. Cultural Assoc?	1285	0.04	0.20	0	2
No. Other Assoc?	1285	0.03	0.18	0	2
Advertising?	1255	0.81	0.39	0	1
Broadcasting?	1261	0.80	0.40	0	1

This table provides summary statistics for all variables used in this study.

Table 2. Summary statistics by year

Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
		Year 1996			Year 1999			Year 2002	
% Content In-House	162	0.69	0.27	425	0.72	0.29	600	0.67	0.31
Comp. Coverage Area	183	5.48	6.41	457	4.67	6.68	645	6.17	8.62
Comp. Same City	183	2.62	3.02	457	1.98	2.10	645	2.76	2.92
City Population	179	180144.8	455363.1	453	131827	418793.30	637	156052.8	434449.3
Unemployment Rate	179	6.44	1.67	453	3.96	1.59	637	3.77	1.63
Weekly Hours	161	77.84	54.00	386	85.80	59.70	586	119.74	60.52
Weekly Days	159	6.72	1.06	385	6.50	1.21	645	6.58	1.16
Private Ownership?	172	0.80	0.40	450	0.79	0.41	628	0.80	0.40
No. Networks?	183	0.86	0.75	457	0.66	0.73	645	0.76	0.74
No. Cultural Assoc?	183	0.03	0.18	457	0.04	0.22	645	0.04	0.19
No. Other Assoc?	183	0.02	0.15	457	0.03	0.20	645	0.02	0.17
Advertising?	174	0.89	0.31	448	0.77	0.42	633	0.82	0.39
Broadcasting?	178	0.83	0.38	449	0.76	0.43	634	0.82	0.39

This table presents summary statistics of the variables used broken up by year.

Table 3. Cross-tabulation of local competition in 1996 and 1999 per city

	Local Competition 1999									
Local Comp. 1996	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**12**	**13**	**Total**
0	86	149	10	1	0	0	0	0	0	246
1	176	213	30	4	1	0	0	0	0	424
2	8	59	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	272	439	79	20	9	2	2	1	1	825

This table tabulates the number of local stations per city for the years 1996 and 1999. Each observation is a city.

Table 4. Cross-tabulation of local competition in 1999 and 2002 per city

	Local Competition 2002													
Local Comp. 1999	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**10**	**11**	**13**	**16**	**Total**
0	148	117	6	1	0	0	0	0	0	0	0	0	0	272
1	65	324	36	10	2	2	0	0	0	0	0	0	0	439
2	5	22	33	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	219	463	83	30	10	10	4	1	1	1	1	1	1	825

This table tabulates the number of local stations per city for the years 1999 and 2002. Each observation is a city.

Table 5. Cross-tabulation of local competition in 1996 and 2002 per city

	Local Competition 2002													
Local Comp. 1996	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**10**	**11**	**13**	**16**	**Total**
0	37	190	16	2	1	0	0	0	0	0	0	0	0	246
1	166	211	33	9	2	3	0	0	0	0	0	0	0	424
2	11	55	15	8	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	219	463	83	30	10	10	4	1	1	1	1	1	1	825

This table tabulates the number of local stations per city for the years 1996 and 2002. Each observation is a city.

Table 6. Changes in Local Competition from 1996 to 1999 vs Changes in Local Competition from 1999 to 2002

	Change in Local Competition 1999 to 2002										
Change in Local Comp. 1996 to 1999	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	**+4**	**…**	**+8**	**Total**
-13	0	0	0	1	0	0	0	0	0	0	1
…	0	0	0	0	0	0	0	0	0	0	0
-7	0	0	0	1	0	0	0	0	0	0	1
-6	0	0	0	0	0	1	0	0	0	0	1
-5	0	0	0	0	0	0	0	0	0	1	1
-4	0	0	0	0	3	0	0	0	0	0	3
-3	0	0	0	4	2	1	0	0	0	0	7
-2	0	0	2	11	8	5	2	1	0	0	29
-1	0	1	5	193	38	7	1	0	0	1	246
0	0	3	35	180	102	9	3	1	0	0	333
+1	0	0	48	117	14	1	2	0	0	0	182
+2	1	2	5	7	1	1	0	0	0	0	17
+3	0	0	0	2	2	0	0	0	0	0	4
Total	1	6	95	516	170	25	8	2	0	2	825

This table groups by city the changes occurred first between 1996 and 1999, and changes between 1999 and 2002.

Table 7. OLS Regressions of Vertical Integration on Two Measures of Competition

Dep Variable: % Content Produced In-House

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Comp. Coverage Area	-0.0026	-0.0023	-0.0022	-0.0025	0.0025					
	(0.0010)**	(0.0010)**	(0.0011)**	(0.0021)	(0.0039)					
Local Competition						-0.0059	-0.0049	-0.0011	0.0078	-0.0061
						(0.0041)	(0.0043)	(0.0041)	(0.0086)	(0.0123)
Constant	0.7071	0.7058	0.7012	0.7073	0.6790	0.7070	0.7046	0.6924	0.6770	0.7073
	(0.0105)***	(0.0105)***	(0.0207)***	(0.0264)***	(0.0358)***	(0.0125)***	(0.0127)***	(0.0218)***	(0.0339)***	(0.0497)***
FE Year	N	Y	Y	Y	Y	N	Y	Y	Y	Y
FE Province	N	N	Y	N	N	N	N	Y	N	N
FE City	N	N	N	Y	N	N	N	N	Y	N
FE Station	N	N	N	N	Y	N	N	N	N	Y
Observations	1187	1187	1187	1187	1187	1187	1187	1187	1187	1187
R-squared	0	0.01	0.16	0.6	0.9	0	0.01	0.15	0.6	0.9

Robust standard errors in parentheses and clustered by city and year. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8. OLS regressions of vertical integration on competition and station characteristics

Dep Variable: % Content Produced In-House

	(1)	(2)	(3)	(4)	(5)	(6)
Comp. Coverage Area	-0.002205	-0.002868	0.0015324	-0.002428	-0.000964	-0.000772
	(0.0011)**	(0.0013)**	(0.0012)	(0.0011)**	(0.0011)	(0.0014)
City Population (1000s)		0.00003				0.00005
		(0.00003)				(0.00003)*
Unemployment Rate		0.0061015				0.0162033
		(0.0076)				(0.0080)**
Weekly Hours			-0.0014			-0.001479
			(0.0002)***			(0.0002)***
Weekly Days			-0.00382			-0.007478
			(0.0087)			(0.0097)
Advertising?				-0.051665		0.0096327
				(0.0260)**		(0.0305)
Broadcasting?				0.055332		0.1031822
				(0.0278)**		(0.0316)***
Private Ownership?					-0.118439	-0.043699
					(0.0203)***	(0.0249)*
Network?					0.005633	0.0284545
					(0.0198)	(0.0211)
Cultural Assoc?					-0.016336	-0.06311
					(0.0470)	(0.0520)
Other Assoc?					-0.075643	-0.074112
					(0.0499)	(0.0573)
Constant	0.7012	0.6607	0.7986	0.6995	0.7857	0.6489
	(0.0203)***	(0.0524)***	(0.0581)***	(0.0369)***	(0.0271)***	(0.0794)***
Observations	1187	1172	1064	1158	1167	1010
R-squared	0.16	0.16	0.2	0.17	0.18	0.23

All six specifications in this table contain year and province fixed effects.
Robust standard errors in parentheses and clustered by city and year. * significant at 10%;
** significant at 5%; *** significant at 1%

Table 9. OLS regressions of vertical integration on local competition and station characteristics

Dep Variable: % Content Produced In-House

	(1)	(2)	(3)	(4)	(5)	(6)
Local Competition	-0.0011	-0.0025	0.0100	0.0003	0.0026	0.0095
	(0.0041)	(0.0070)	(0.0045)**	(0.0041)	(0.0042)	(0.0074)
City Population		0.00001				0.00001
(1000s)		(0.00004)				(0.00004)
Unemployment Rate		0.0037				0.0138
		(0.0076)				(0.0079)*
Weekly Hours			-0.0015			-0.0015
			(0.0002)***			(0.0002)***
Weekly Days			-0.0043			-0.0066
			(0.0088)			(0.0097)
Advertising?				-0.0601		0.0094
				(0.0259)**		(0.0306)
Broadcasting?				0.0430		0.0931
				(0.0274)		(0.0313)***
Private Ownership?					-0.1257	-0.0504
					(0.0195)***	(0.0246)**
Network?					0.0070	0.0290
					(0.0199)	(0.0210)
Cultural Assoc?					-0.0179	-0.0599
					(0.0472)	(0.0534)
Other Assoc?					-0.0808	-0.0762
					(0.0501)	(0.0574)
Constant	0.6924	0.6690	0.7890	0.7038	0.7795	0.6555
	(0.0218)***	(0.0524)***	(0.0589)***	(0.0368)***	(0.0282)***	(0.0777)***
Observations	1187	1172	1064	1158	1167	1010
R-squared	0.15	0.15	0.21	0.17	0.18	0.23

All six specifications in this table contain year and province fixed effects.
Robust standard errors in parentheses and clustered by city and year. * significant at 10%;
** significant at 5%; *** significant at 1%

Table 10. OLS regressions of vertical integration on local competition and ownership type of competing stations

Dep Variable: % Content Produced In-House

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Comp. Coverage Area (CCA)	-0.0009	-0.0128	-0.0092	-0.0098	-0.0071	-0.0136	-0.0127	-0.0158
	(0.0010)	(0.0040)***	(0.0037)**	(0.0038)**	(0.0207)	(0.0041)***	(0.0042)***	(0.0074)**
Private Ownership? (PO)	-0.1635	-0.1986	-0.1652	-0.1468	-0.1392	-0.2642	-0.2747	-0.2671
	(0.0188)***	(0.0224)***	(0.0997)*	(0.0980)	(0.1001)	(0.0514)***	(0.0539)***	(0.0559)***
CCA*PO		0.0125	0.0148	0.0171	0.0177	0.0128	0.0121	0.0169
		(0.0041)***	(0.0137)	(0.0154)	(0.0267)	(0.0053)**	(0.0055)**	(0.0082)**
% Private in City (PO%)			-0.0269	-0.0456	0.0052			
			(0.1030)	(0.1016)	(0.1028)			
CCA*PO%			-0.0047	0.0070	0.0080			
			(0.0142)	(0.0181)	(0.0189)			
PO*CCA*PO%				-0.0135	-0.0150			
				(0.0196)	(0.0200)			
% Private in Province (ProvPO%)					-0.2423			
					(0.0676)***			
CCA*ProvPO%					-0.0012			
					(0.0286)			
PO*CCA*ProvPO%					-0.0023			
					(0.0284)			
Proxy % Private in City (PPO%)						0.0742	0.0846	0.1080
						(0.0547)	(0.0575)	(0.0613)*
CCA*PPO%						0.0014	-0.0154	-0.0219
						(0.0046)	(0.0196)	(0.0208)
PO*CCA*PPO%							0.0167	0.0278
							(0.0191)	(0.0205)
Proxy % Private in Province (ProvPPO%)								-0.1275
								(0.0562)**
CCA*ProvPPO%								0.0118
								(0.0163)
PO*CCA*ProvPPO%								-0.0240
								(0.0161)
Constant	0.8269	0.8584	0.8571	0.8571	1.0043	0.8558	0.8569	0.9034
	(0.0157)***	(0.0189)***	(0.0196)***	(0.0196)***	(0.0473)***	(0.0191)***	(0.0190)***	(0.0284)***
Sample	All	All	Cities with Full Info	Cities with Full Info	Cities with Full Info	All	All	All
Observations	1167	1167	891	891	891	1167	1167	1167
R-squared	0.06	0.06	0.07	0.07	0.09	0.06	0.06	0.08

This table shows eight specifications that regress % of content produced in-house with competition in the coverage area and dummy for private ownership of the station. Columns (2) to (8) include controls that accout for interaction effects and percentage of stations in the city and province that are also privately owned (not government owned).

I run specifications under two samples. Columns (3) to (5) only use observations from cities for which I have full information on all stations in those cities. Columns (1), (2), and (6) to (8) include all the sample. For the latter, I assume that if a station that does not provide information is government owned. For this reason, I create proxy variables for percentage of privately owned stations in the city and the province.

Robust standard errors in parentheses and clustered by province and year. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 11. IV regressions of vertical integration on competition

Dep Variable: % Content Produced In-House

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Comp. Coverage Area	0.00374	0.00392	0.00284	-0.1506				
	(0.0074)	(0.0057)	(0.0069)	(1.2373)				
Local Competition					0.00452	0.00504	0.00332	0.02071
					(0.0085)	(0.0069)	(0.0077)	(0.0278)
Constant	0.67158	0.66974	0.47548	0.92556	0.68149	0.67815	0.47265	0.11113
	(0.0429)***	(0.0369)***	(0.0927)***	(0.6082)	(0.02307)***	(0.0272)***	(0.0945)***	(0.0278)***
FE Year	N	Y	Y	N	N	Y	Y	N
FE Province	N	N	Y	Y	N	N	Y	Y
FE City	N	N	N	Y	N	N	N	Y
Observations	1187	1187	1187	1187	1187	1187	1187	1187
R-squared	N/A	N/A	0.14	N/A	N/A	N/A	0.15	0.6

This table shows results of applying ivreg command in STATA. See that the instrument (number of local stations in the city three years before) varies per city and year and therefore I can apply city and province fixed effects.
The stata output did not provide R-squared statistic for 5 out of 8 specifications.
Robust standard errors in parentheses and clustered by city and year. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 12. OLS regressions of changes in vertical integration on changes in competition

Dep Variable: Change in % Content Produced In-House									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Change Comp. Coverage Area	-0.0005	0.0045	0.0002						
	(0.0030)	(0.0062)	(0.0031)						
Change Local Competition				-0.0197	0.0040	-0.0120			
				(0.0171)	(0.0093)	(0.0092)			
Lagged Change Local Competition							-	0.0084	-0.0021
							-	(0.0112)	(0.0096)
Constant	-0.0256	0.0341	-0.0107	-0.0174	0.0353	-0.0083	-0.0262	0.0510	-0.0117
	(0.0124)**	(0.0316)	(0.0129)	(0.0129)	(0.0332)	(0.0121)	(0.0118)**	(0.0388)	(0.0121)
Sample	99-02	96-99	All	99-02	96-99	All	99-02	96-99	All
Observations	270	97	367	270	97	367	270	97	367
R-squared	<0.01	<0.01	<0.01	0.02	<0.01	0.01	<0.01	0.01	<0.01

This table shows OLS regression results of changes on changes
Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 1. Scatter plot changes in vertical integration on changes in competition in coverage area between years 2002 and 1999 (corresponds to column (1) in Table 12).

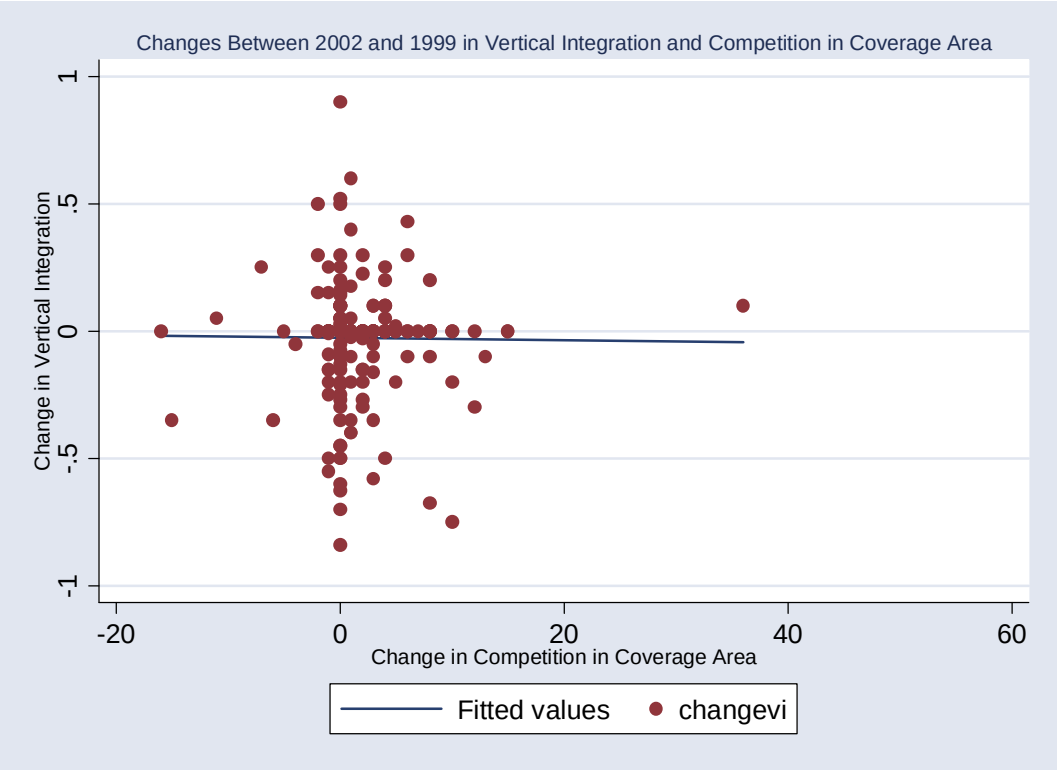

Figure 2. Scatter plot changes in vertical integration on changes in competition in coverage area between years 1999 and 1996 (corresponds to column (2) in Table 12).

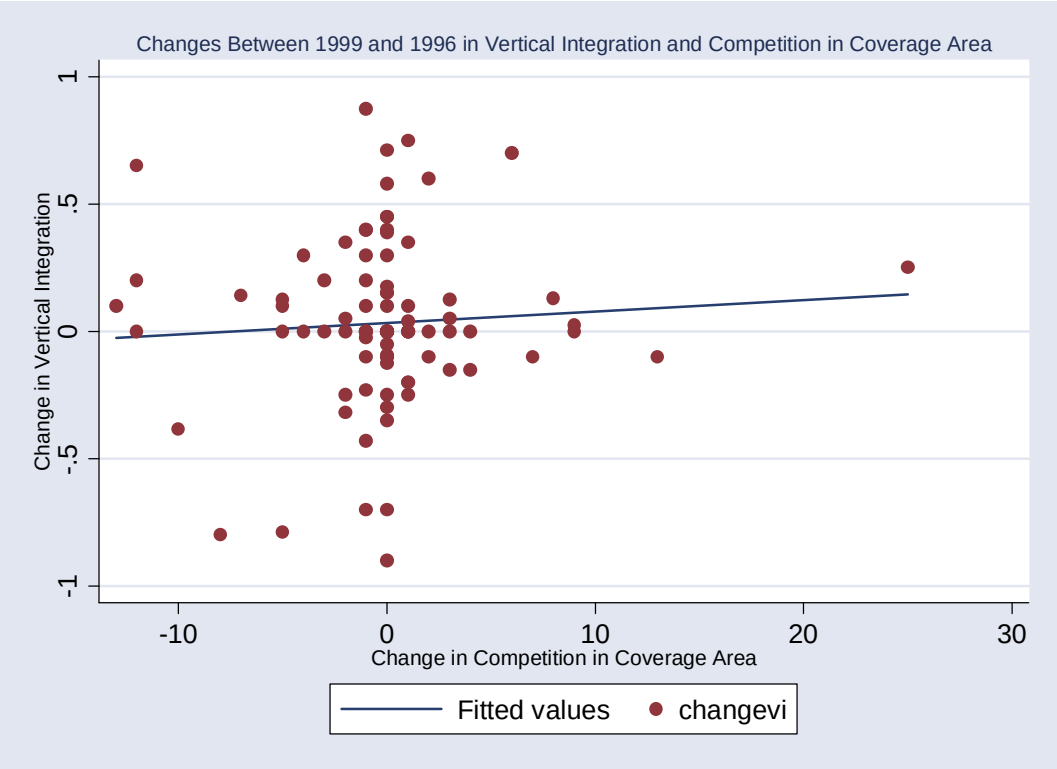

Figure 3. Scatter plot changes in vertical integration on changes in competition in coverage area between years 2002, 1999 and 1996 (corresponds to column (3) in Table 12).

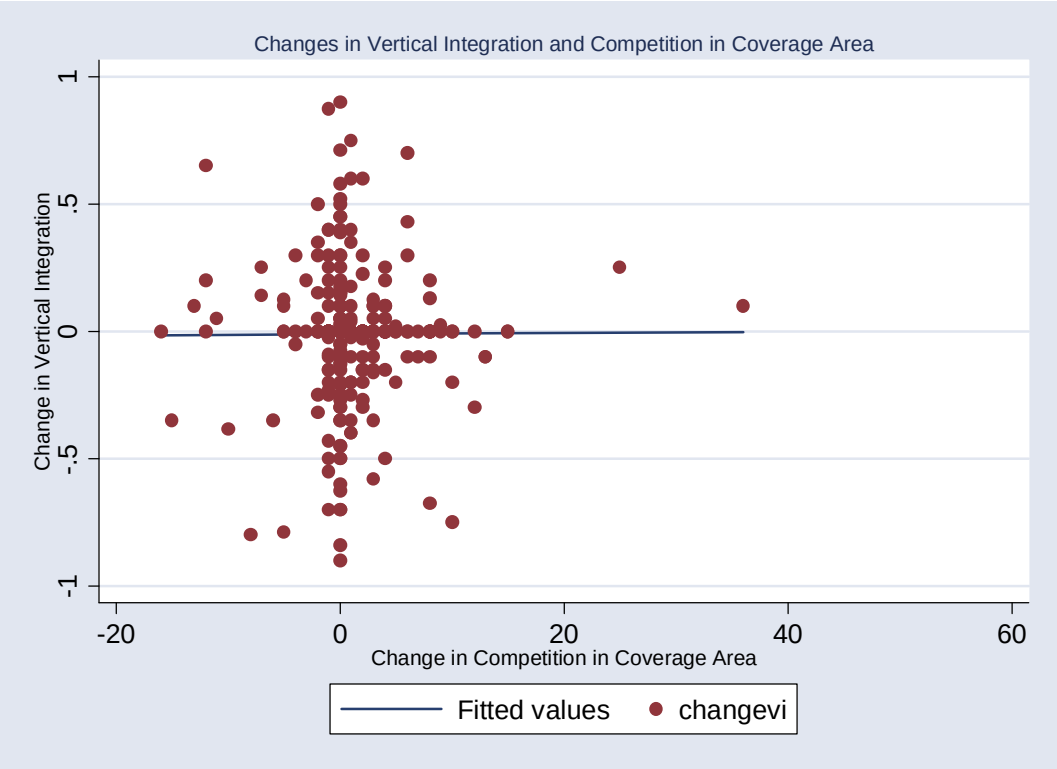

Figure 4. Scatter plot changes in vertical integration on changes in local competition in coverage area between years 2002 and 1999 (corresponds to column (4) in Table 12).

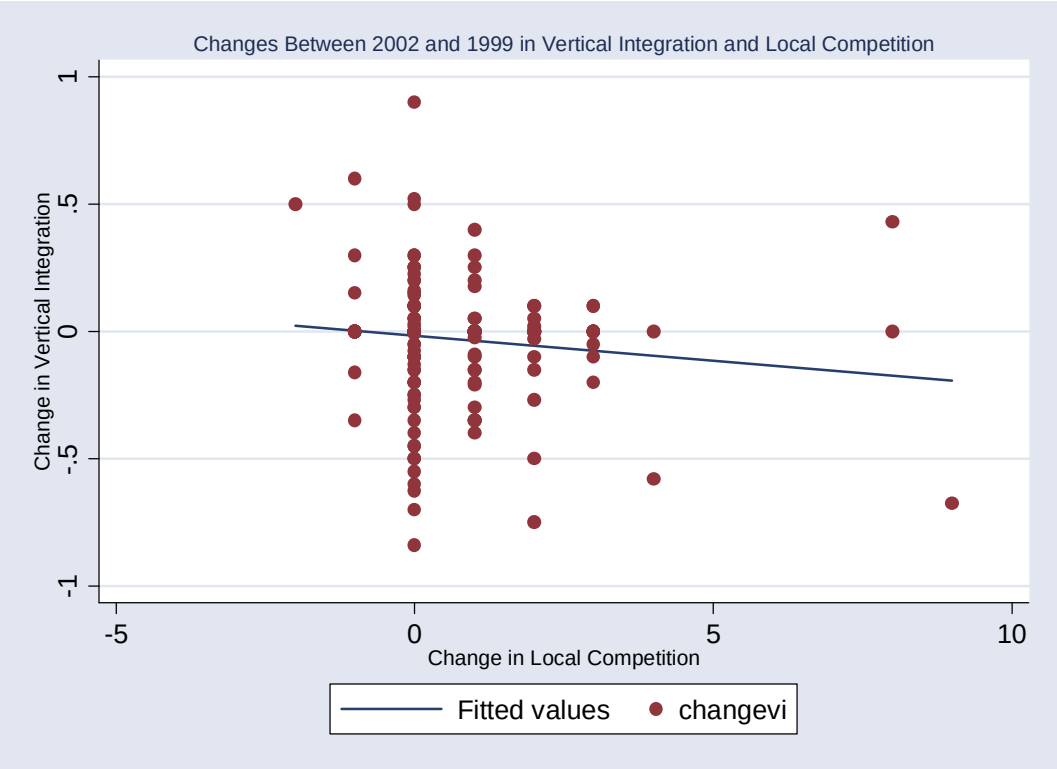

Figure 5. Scatter plot changes in vertical integration on changes in local competition between years 1999 and 1996 (corresponds to column (5) in Table 12).

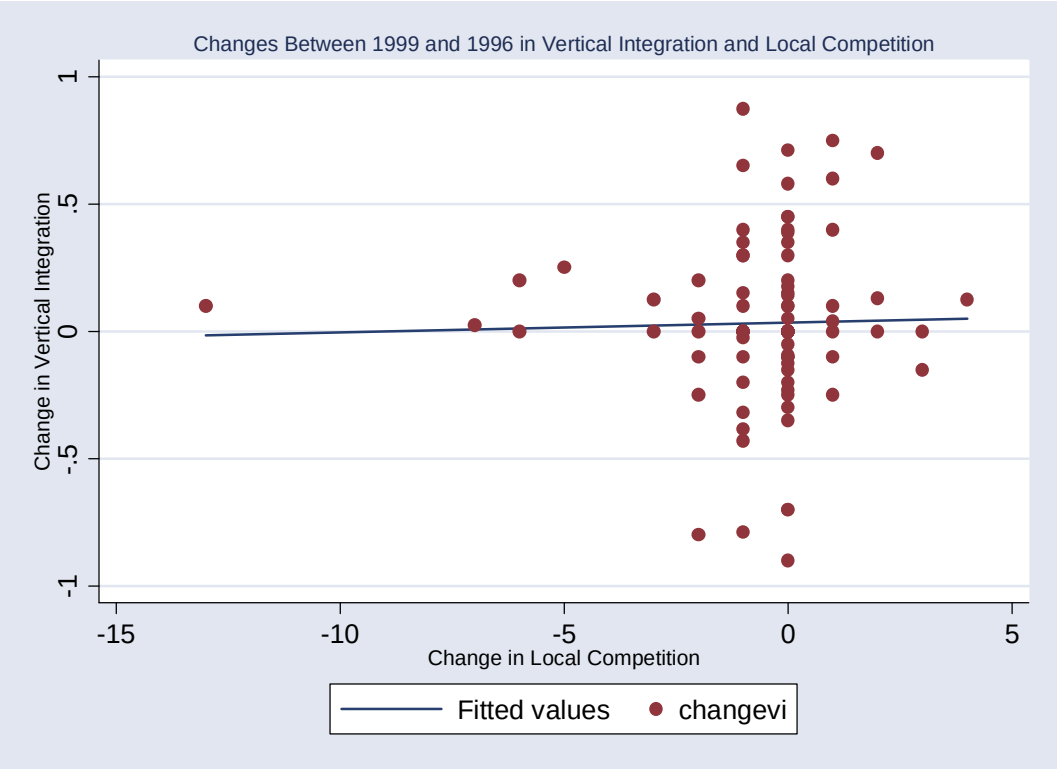

Figure 6. Scatter plot changes in vertical integration on changes in local competition in coverage area between years 2002, 1999 and 1996 (corresponds to column (6) in Table 12).

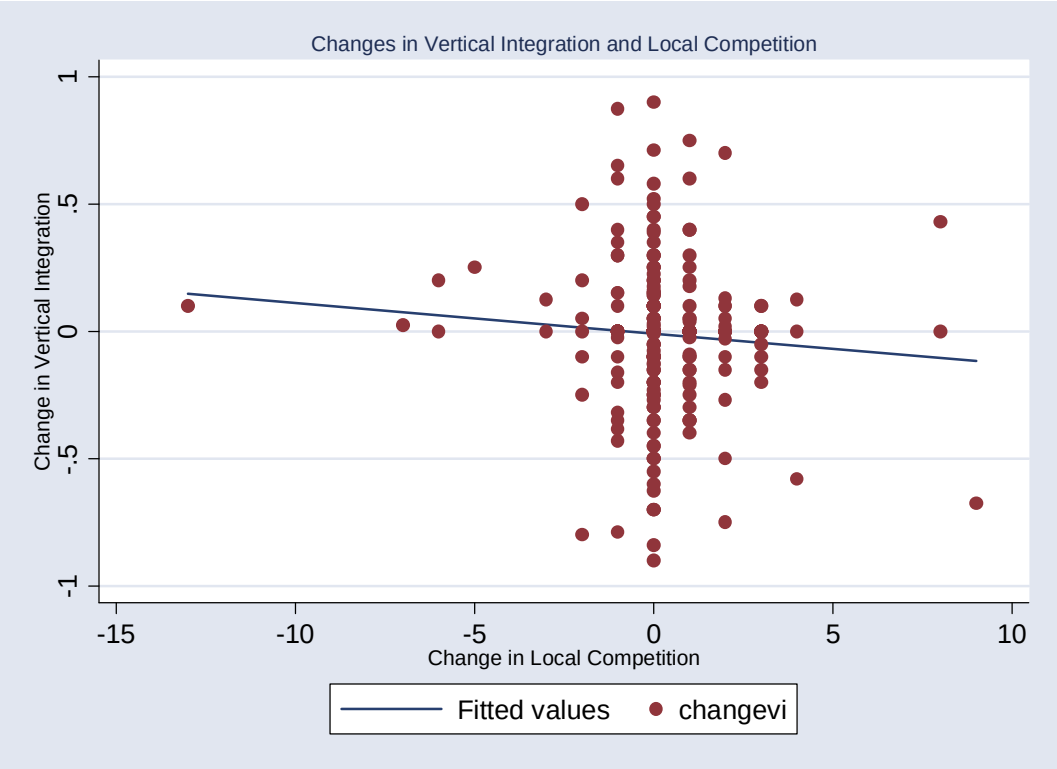

Figure 7. Scatter plot changes in vertical integration 2002-1999 on lagged changes in local competition 1999-1996 (corresponds to column (7) in Table 12).

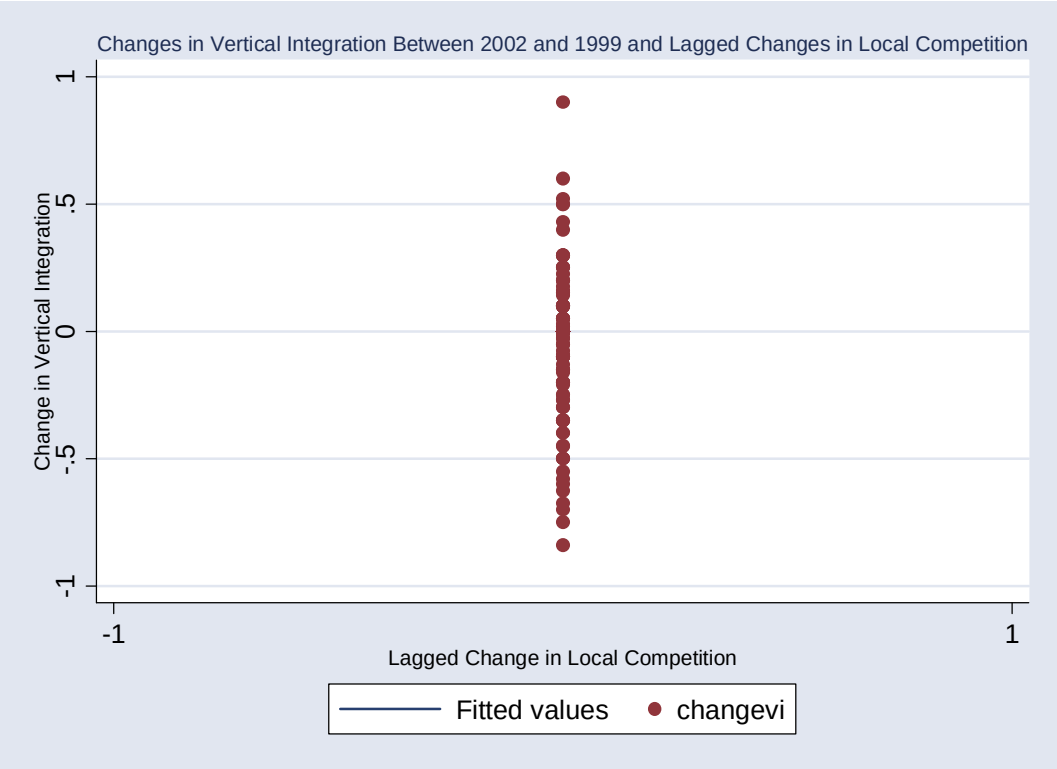

Figure 8. Scatter plot changes in vertical integration 1999-1996 on lagged changes in local competition 1996-1993 (corresponds to column (8) in Table 12).

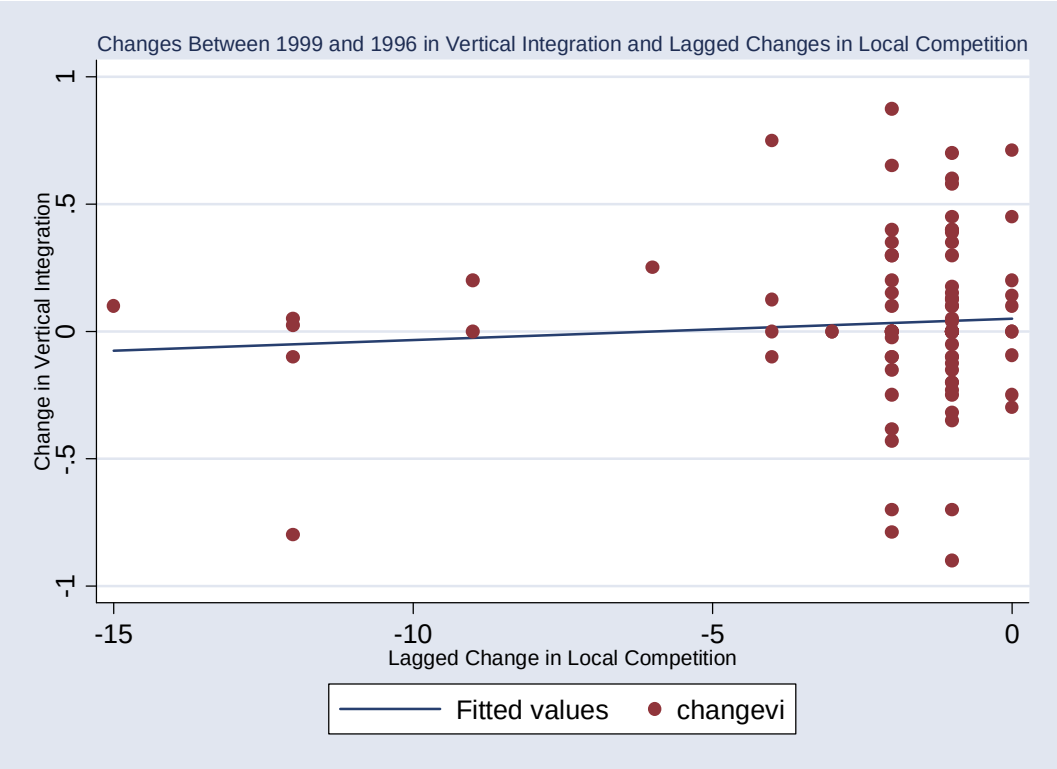

Figure 9. Scatter plot changes in vertical integration on lagged changes in local competition between years 2002, 1999, 1996 and 1993 (corresponds to column (9) in Table 12).