

**Vertical integration and local station carriage in the cable television industry:
Results from Logit analysis**

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Abstract

Using historical industry data, this study empirically tests the effects of vertical integration and other system-specific, station-specific and market-specific variables on cable operators' carriage decisions regarding local television stations in 1991, a time when the must carry rules were not in effect. Contrary to an anticompetitive explanation for carriage denials, the logit analysis found that vertical integration in the cable industry did not have a significantly negative effect on cable system carriage of local stations, holding other factors constant. Other results from the study indicate that stations more likely to be denied carriage by cable systems were those with lower viewing shares, young, independent and originating from a distance. While the study raised concerns about the negative impact of non-carriage instances on small independent stations and in smaller markets, the findings generally support the notion that cable's local station carriage decisions were more a result of efficient than anti-competitive motives.

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Introduction

In 1992, Congress codified a new scheme of must carry rules when passing the Cable Competition and Consumer Protection Act (Cable Television Consumer Protection and Competition Act of 1992, hereafter 1992 Cable Act).¹ In a nutshell, the must carry rules require that cable system operators in the U.S. dedicate some of their cable channels to the free carriage of local broadcast stations, if the stations so demand.² The 1992 must-carry rules were immediately challenged in court. After years of litigation, the Supreme Court, applying an intermediate level of legal standard applicable to content neutral regulations of speech, upheld the rules' constitutionality in *Turner Broadcasting System, Inc. v. FCC* (1997, hereafter *Turner II*).

When restating the 1992 must carry rules, Congress foresaw a real threat facing the broadcast industry without mandatory local signal carriage rules. In its own words, cable system operators would “delete, reposition, or not carry local broadcast signals” and seriously jeopardize the economic viability of free local television (1992 Cable Act, p.1462). Some broadcast stations were denied carriage by some cable systems in the late 1980s when must-carry rules were not in force.³ To the cable industry and its supporters, these non-carriage instances are random and sporadic at most. In fact, as many have

¹ Under the 1992 must-carry rules, a television station can choose either retransmission consent or must carry. If choosing the former, a station negotiates with cable systems in its Area of Dominant Influence (ADI) for specific carriage terms (including monetary compensation).

² The must carry rules in various forms date back to as early as the 1950s when the cable television industry was still in the development stage. In the mid-1980s, the D.C. Circuit Court twice struck down the must carry rules, ruling that government interest in the rules was unsubstantiated (*Quincy Cable v. FCC*, 1985; *Century Communications Corp. v. FCC*, 1987/1988). For a detailed history of the must carry rules, see Smith (1997).

³ A 1988 survey conducted by the FCC found that, out of 4,303 responding cable systems, 869 systems (i.e., 20.2%) indicated that they dropped or denied carriage to 704 television stations in a total of 1,820 incidents (FCC, 1988, p. 10).

pointed out, cable systems have in the past consistently carried the large majority of local broadcast signals available in their local markets, with or without must carry regulations. However, the government, the broadcasters and other proponents of the must carry rules have spawned the notion that these isolated non-carriage actions against broadcast stations are broadly systematic and are determined by the cable industry structure. Therefore, without regulations, the cable industry would take unjust advantage of their market power to adopt adverse carriage actions against local broadcasters.

These “structural” arguments gained popularity in the 1980s as the cable industry became increasingly integrated horizontally and vertically.⁴ Policy makers and the public at large worried that these structural trends in an industry that already had monopolistic control of the local multichannel video programming distribution (MVPD) market could heighten cable systems’ incentives to behave anti-competitively, such as denying carriage of certain kinds of program services (unaffiliated or otherwise competitive) on their systems.⁵ The negative effects that vertical integration and/or horizontal concentration may have on program service carriage were especially troublesome to lawmakers because of the First Amendment implications involved. For example, the failure to carry local broadcast stations on cable might endanger the ability of affected broadcast stations to survive, which, by extension, would deny the access of television viewers to the programs that could be otherwise broadcast on those stations. This not only impedes fair competition in the television programming market, but also defeats governmental policies intended to foster program diversity on television.

⁴ Half of the nationally distributed cable networks had vertical ties with cable system owners by the end of the 1980s (FCC, 1990). The FCC also reported that the top 10 multiple system operators (MSOs) controlled 61.8% of U.S. basic cable subscribers in 1990, an increase of 12% since 1984 (FCC, 1990).

⁵ See Waterman & Weiss (1997, Chapter 2) for a discussion of the general social concerns and policy controversies about vertical integration and horizontal concentration.

However, although the anti-competitive theory propagated by the must-carry proponents has been adopted by Congress and later vindicated by the Supreme Court, very little evidence has been presented or debated in and out of the courts to explain cable's broadcast signal carriage behaviors.⁶ As Justice O'Connor noted in her dissenting opinion, the principal opinion of the *Turner* court exhibited "a profound fear of delving into complex economic matters, and a willingness to substitute untested assumptions for evidence" (Turner II, p. 230). In addition, she charged that the *Turner* plurality failed to explain the nature of cable operators' allegedly anticompetitive conduct (Turner II, p. 233). For example, are cable systems owned by vertically integrated and bigger-sized firms more likely to engage in adverse local signal carriage behaviors? How do other market structural and technological factors (such as system penetration rate, market competition and channel capacity) influence a cable system's carriage decisions? Or, in general, were the non-carriage instances experienced by some broadcast stations in the late 1980s a result of cable's efficient or anticompetitive motives? These questions have not been empirically investigated.

The academic contribution to the debate over the must carry rules has been confined largely to legal analysis. Research on must-carry on the empirical front is scant even as the debate and the ensuing litigation over the must-carry rules climaxed in the 1990s. Two notable exceptions are Vita (1997) and Yan (2002). Both have studied the

⁶ While this paper is not a legal analysis of the must carry rules, two things about *Turner II* are worth noticing. First is the great deference the Court gave to the congressional judgment when confronted with contrary evidence from the other side. According to the Court, the question is not whether Congress was correct as an objective matter, but "whether the legislative conclusion was reasonable and supported by substantial evidence..." (p. 211). Second, the Supreme Court did not judge the validity of the must carry rules in association with the governmental goal to "promote fair competition." It seemed as if the goal of the must carry rules was solely to protect the economic viability of the broadcasting industry, and whether cable operators' non-carriage action actually hurt competition simply did not matter. For analysis of *Turner II*, see Hazlett (2000) and Whitmore (2001).

must carry rules using statistical analysis. Vita (1997) tested the probability of a station not carried by a cable system and found that cable systems selling advertising were actually less likely to drop local stations than non-advertisers. Yan (2002) tested the effects of horizontal concentration, vertical integration and other market variables on the number of local stations not carried on cable systems. He found that horizontal concentration had a negative effect on local signal carriage, but vertical integration did not have any significant effect. However, the study did not include in its empirical models any station level variables such as a station's ratings. This imposes serious limitation on the study as station-specific variables certainly affect cable operators' decisions with respect to local signal carriage.⁷

In this study, I test the effects of vertical integration and other system-specific, station-specific and market-specific variables on the probability of a local television station being carried by a cable system. In the following sections, I first describe the economic rationale for the must carry rules and examine the often-neglected incentives that cable operators may have in their carriage decisions concerning local stations. I then discuss the possible effects of structural factors such as vertical integration on cable local signal carriage decisions. Next, I describe the empirical models and methodology of the empirical analysis. Finally, I present the study's results and discuss their policy implications.

The economics of local signal carriage decisions

Economic (dis)incentives of local signal carriage

The government built its must carry cases around an anticompetitive theory that

⁷ Other studies that have provided an economic perspective, but not empirical analysis, to the must carry issues include Vita & Wiegand (1993) and Wirth (1990).

without regulation, the cable industry would take unjust advantage of their market power to adopt adverse carriage actions against local broadcasters. Specifically, supporters of this theory reason that first, the cable and broadcast industries are competitors in the programming market. Therefore, those cable operators who have equity stakes in cable programs are motivated to discriminate against local stations to protect their own interests. The larger a vertically integrated cable system, the more likely it is for its operator or owner to do so (more on this in the next section). Second, they believe that since the two industries are competitors in local video program exhibition, cable systems that sell local advertising would have an incentive to deny carrying local stations in order to gain market share in the local advertising market. This is because the retransmission of local stations opens the door to a competing supply of ad minutes, occupies channel slots that the cable operator could use to sell ad minutes and diverts the audience away from viewing cable network services. Therefore, a strong local broadcast presence has the potential to both decrease consumer demand for cable television service and increase competition for the resources going into cable programming.⁸

However, if cable system operators have every incentive not to carry local stations, how do we explain the fact that cable operators have always carried the vast majority of the broadcast stations on their systems, with or without the must carry regulations? If there are solid incentives for cable operators to carry local stations, what are they?

In the absence of must carry regulations, a cable system operator decides the number and variety of cable program services to maximize the value of a program menu,

⁸ Vita named these two arguments “the programming monopoly hypothesis” and “the advertising monopoly hypothesis” respectively and tested the former hypothesis in his study (Vita, 1997).

subject to channel capacity constraint. In general, a signal will be added (or dropped) to the channel lineup if the additional carriage of the signal will bring about benefits greater (or smaller) than the opportunity cost of such carriage. This implies that there are both disincentives and incentives for a cable operator to carry local stations. However, much of the debate over the must carry rules has focused on the disincentives, neglecting the fact that cable operators have equally strong incentives to carry local stations. These include: the popularity of local broadcast stations among viewers; the low costs involved in carrying local stations; and local signal carriage can increase the competitiveness of cable television service vis-à-vis over-the-air television broadcasting and direct satellite broadcasting (DBS) services. In reality, balancing the benefits and costs often results in favorable local signal carriage decisions by cable system operators. The calculation in Table 1, based on one channel valuation model, takes into account each cable service's rating, its contribution to rates of basic cable services, local ad avails and license fees. It shows that broadcast stations are actually the most valuable (followed by superstations such as TBS and then basic cable program services), thanks to their high viewing ratings among cable households and the lack of affiliate fees to cable operators.

This does not mean, however, that an unregulated cable operator would want to carry every local station in the market. Several general factors affect cable's local signal carriage choices. In addition to the popularity and cost of a local signal, a cable operator also considers whether the retransmission of the local signal increases the competitive position of the cable service and whether the added signal duplicates or diversifies the channel lineup. For example, a station with weak rating numbers such as an independent station, or a duplicate network station from a nearby market, may not be carried by a

cable system even though it is within 35 mile radius from the system and would be entitled for must-carry. In general, however, a close examination of the specific incentives and disincentives involved in the local signal carriage decisions paints a much brighter picture than the one by those favoring must carry regulations.

The Effects of vertical integration

The previous discussion of the incentives that cable system operators have in the carriage of local broadcast stations did not consider strategic industry behaviors and their implications for local signal carriage. The anticompetitive theory of local carriage denial, however, emphasizes such industrial structure as vertical integration in the cable industry and the strategic practice of market foreclosure it may facilitate.

In the cable television industry, market foreclosure by vertical integration can take two forms. First, an integrated cable system operator can deny a rival facility operator (such as a DBS provider) access to an input (a cable network) it owns. Second, an integrated cable system operator can deny a rival program service access to its distribution facilities. The second form of market closure is what concerns the local broadcast stations and the must carry proponents. In addition to outright favoritism toward those cable program services they partially own, vertically integrated cable firms may discriminate against local broadcast stations for other competitive reasons, such as gaining competitive edge in the advertising and/or programming markets.

On the surface, cable firms become vertically integrated with program suppliers to enhance transaction efficiency and to strengthen the cable program supply industry by providing it with needed resources.⁹ Both motivations, however, may lead to barriers of

⁹ Theory has suggested that vertical integration has a number of efficiency-improving effects, including eliminating successive monopoly markup, internalizing quality externalities and reducing transaction costs

access to subscribers for unaffiliated program suppliers, including broadcasters. For example, vertically integrated cable firms can achieve transaction efficiency by reducing or eliminating so-called double-marginalization. That is, integrated cable systems pay input (programming) prices at the marginal cost level and thus perceive lower marginal cost in providing the cable services. Such efficiencies are likely to result in lower final-market prices and lead to the carriage of more services, including local stations.

However, the efficiency outcome from the elimination of the double marginalization externality may actually induce an integrated system to exclude an unaffiliated channel from its system. This is because for two closely substitutive program services, one affiliated and the other not, it would be more profitable to carry the former than the latter. The net revenue to cable systems for carrying an unaffiliated network may be so low that the net effect is non-carriage.

Vertically integrated cable operators may also strategically deny unaffiliated networks access to their subscribers. They are more likely to do so because of their financial and carriage commitment to their own cable networks. By taking advantage of the economies of scale in networking, integrated systems could potentially raise a rival network's cost and its vulnerability to competition by excluding or otherwise placing the rival network at an disadvantage. This argument applies to local signal carriage, as a reduction in the audience level and further, the program quality of a local signal would theoretically increase the demand for cable program services (Vita, 1997). This motivation for carriage denial is further reinforced by the fact that cable operators and local stations are competitors in the advertising markets (local and national spot).

(Salinger, 1991; Waterman, 1996). Waterman and Weiss (1997, chapter 3 and 4) summarize both of the strategic and efficiency-enhancing reasons for vertical integration and evaluate their implications for program supply in the cable industry.

A related issue about the effects of vertical integration on cable programming supply involves horizontal concentration in the cable industry. Refusal to deal by large size firms is more plausible because bigger firms could be expected to profit more from foreclosure (Waterman & Weiss, 1997, pp. 14-15). This implies that vertical foreclosure is more plausible if an integrated firm is also horizontally bigger.

Empirical analysis of local signal carriage decisions

Hypothesis

The previous sections discussed several factors affecting local signal carriage and the possible effects of vertical integration on local signal carriage decisions. However, these factors and the government's theoretical propositions have seldom been examined in empirical studies because the carriage of local broadcast stations on cable has not been a focus in previous cable studies.¹⁰ This study aims to fill the gap by providing a systematic analysis of the effects of market structural variables on local signal carriage in the cable television industry. It focuses on the effects of vertical integration and the following hypothesis:

H₀: Cable systems owned by cable MSOs that have an ownership interest in a larger number of cable networks are more likely to deny carriage of broadcast signals, all other things equal.

Data

The main data sources for this study are two electronic databases of *Television and Cable Factbook* (1991 and 1995, *Factbook* hereafter). The *Factbook* contains system-level information about each of the cable systems in the U.S., including, for

¹⁰ Previous studies of cable price differentials and carriage decisions with respect to cable program services in the presence of vertical integration show inconsistent results (e.g., Chipty, 2001; Ford & Jackson, 1997; Salinger, 1988; Waterman, 1993, 1996; Waterman & Weiss, 1996). In particular, nonintegrated cable systems do not always pay higher program prices, nor are they systematically denied access to programs affiliated with other system operators.

example, its program offerings, price, subscription level, number of homes passed, channel capacity and ownership.¹¹ The dependent variable *DROP* was constructed by using local carriage information for both years. The 1991 electronic *Television and Cable Factbook* dataset also provided the study with most of the system-level data. Additional system-level, station-level and market-level data were also collected from other sources including *Broadcasting Yearbook* (1992), *Cable and Station Coverage Atlas* (1992), *Investing in Television* (July 1990) and *City and County Data Book* (CCDB, 1994, electronic version). Table 2 lists the dependent and independent variables used in the regression models, their data sources and selected summaries statistics.¹²

Empirical models

The dependent variable *DROP* is a binary variable, measuring if a carriage instance took place in 1991.¹³ The databases used in this study contain 71,750 and 74,281 broadcast carriage instances in 1991 and 1995 respectively. From the 1995 database, a random sample of 4,000 carriage instances was drawn.¹⁴ If a sample carriage instance was not among the 71,750 carriage instances in 1991, then the station was determined to

¹¹ The electronic databases I obtained for this study were originally acquired by other researchers. In particular, the 1991 dataset was produced in Feb. 1992 and the 1995 dataset in Aug. 1995.

¹² All data for the independent variables are for the end of 1991 unless otherwise specified. Note that the summary statistics in Table 2 are those of the 3,966 carriage instances, not those of the individual television stations or cable systems.

¹³ Because a local broadcast station is usually qualified for carriage by a number of cable systems and a station may be denied carriage by some cable systems but not by others, the study uses "local carriage instance" as the unit of analysis. For a local station, qualified carriage by each cable system constitutes a carriage instance. Mathematically, it is defined as following: Suppose that under the must-carry rules, a cable system i ($i = 1, 2, \dots, N$) had to carry m qualified stations, the total number of local carriage instances industry-wide is then $\sum_{i=1}^N m$.

¹⁴ Some carriage instances were deleted before sampling. Those involve stations that were from such states as Alaska, Guam, Hawaii, Virgin Islands, Puerto Rico, stations that were from Mexico and Canada, stations that were still under planning in 1995 and stations that were audio only. Some cable systems were constructed after 1991 and were also deleted from the 1995 database. The remaining population of carriage instances from which the sample was drawn had 67,526 observations.

be not carried by the cable system in the carriage instance.¹⁵ Some stations are new (on-air after 1991) and/or low-power stations. Excluding those, the final sample consists of 3,966 carriage instances, of which 259 (6.5%) are dropped ones (see Table 2).

There are 1,083 individual stations in the sample, of which 104 stations (9.6%) were dropped by at least one cable system in 1991.¹⁶ In addition, there are 3,212 individual cable systems in the final sample, of which 204 (6.4%) had dropped at least one broadcast station.¹⁷

The independent variable of main interest in this study pertains to vertical integration. The main vertical integration measure is *VI_N*, the number of national cable networks with which a cable system's owner is affiliated. An alternative measure of vertical integration is *VI_TOT* that includes both national and regional cable networks.¹⁸ As stated in the hypotheses, I expect *DROP* to be positively correlated with the vertical integration variables.

In addition to vertical integration, cable's local signal carriage decisions are also influenced by other factors that represent the demand, cost and competitive conditions in

¹⁵ This assumes that all carriage instances in 1995 would have been qualified for must-carry in 1991. While seemingly arbitrary, this is not an unreasonable assumption. The 1992 must-carry rules required that a cable system with more than 12 activated channels devote one-third of its channels to carry commercial stations, in addition to public stations. This practically guaranteed that all existing local stations would be covered by the must-carry protection.

¹⁶ The average number of carriage denial experienced by each station is thus 2.5 (259 divided by 104). This is comparable to the average non-carriage incidence, 2.59, reported by the FCC in 1988 (FCC, 1988, p. 15). Note that in 1992, a local broadcast station was carried by 53 cable systems on average.

¹⁷ Chipty published a study using the same database. The summary statistics of her sample as she reported (which contained 1,919 systems) were comparable to their counterparts in my sample. Specifically, the sample mean values of penetration rate of basic services, system age (in years) and system channel capacity were 65%, 14.5 and 38 respectively in her sample, and 64%, 14 and 35 in my sample. In addition, she reported that about 34% of systems in her sample were controlled by vertically integrated MSOs and the average number of basic program services with which a system owner was vertically integrated was 2.58 (see Chipty, 2001, Table 1, p. 434). The respective statistics in the current sample are 22.8% and 2.25.

¹⁸ A cable system operator or owner was considered to be vertically integrated with a cable network if it had a five percent or greater interest in the cable network. For those interested in obtaining an appendix explaining how the vertical integration variable was constructed, please contact the author.

the cable television industry. These variables, some at the station-level, some the (cable) system-level and others the (ADI) market-level, are summarized in Table 2 and explained below.

System-level variables The system-level variables include total number of subscribers owned by a system's MSO nationwide (*LNSUB*), subscriber share of a system in its ADI (*SYSSHARE*), penetration rate of a system in its franchise area (*SYSPENE*), channel capacity of a system (*CAP*), number of plant miles of a system (*MILE*), age of a system (*AGE_C*), and viewing share of a cable system's cable network services in the system's ADI (*SHARE_C*).

LNSUB and *SYSSHARE* pertain to firm size, the former at the national level and the latter the regional level. Chipty (1995) showed that both regional and national firm size variables are positively related to the total number of cable services supplied. This is because larger firms enjoy lower marginal cost derived from economies of scale at the regional level and bargaining power at the national level. Therefore, positive effects of these size variables on *DROP* would indicate that larger MSOs dropped a larger number of over-the-air television stations in order to add more cable networks to their lineups. In addition, *SYSSHARE* measures the size of a cable system relative to its local media market. According to the anticompetitive theory of signal carriage, a cable system that serves a larger proportion of a station's potential audience perceives the station to be more competitive and would be more motivated to harm the station (Vita, 1997).¹⁹

¹⁹ As discussed earlier, larger firm size can reinforce both efficiency and anti-competitive effects of vertical integration. Thus, bigger and vertically integrated cable systems may carry even fewer stations. To test this hypothesis, an interaction terms that equals *LNSUB* times *VI_N* (*LNSUB*VI_N*) was included in one of the variations of the empirical models. However, the inclusion of this interaction term caused multicollinearity problems due to the extremely high correlations between *LNSUB*VI_N* and *VI_N* ($r = .998$, $p < .0001$). I therefore avoid using the interaction term in the empirical models.

One necessary condition for an anticompetitive explanation for non-carriage is that cable systems with higher penetration rates tend to drop more broadcast stations (Vita, 1997). This is because carriage denials in these high penetration markets could foreclose a larger chunk of a market to an affected station without incurring much subscription loss to a cable system. This is particularly true if the high penetration markets are those smaller ones with fewer over-the-air television stations or the ones where there are significant reception problems with respect to local broadcast stations. In these markets, the demand for cable television is relatively inelastic. Therefore, a positive effect of *SYSPENE* would be consistent with an anticompetitive rationale for carriage denial. Therefore, a positive effect of *SYSSHARE* on *DROP* is consistent with an anticompetitive explanation for carriage denials.²⁰

CAP and *MILE* are cost variables. Greater channel capacity and more plant miles mean less marginal cost in signal carriage and other system operations. This should lead to the carriage of more channels, local and cable. Findings of positive effects of these variables, contrary to the predictions here, would be consistent with an anticompetitive theory of local carriage denials. The effect of cable system age (*AGE_C*) is ambiguous. Older systems may be more efficient and carry more channels, but they may also have smaller channel capacity if have not been renovated, leading to the carriage of few stations.

One important factor influencing a cable operator's local carriage decision is how many people like to watch broadcast stations compared to cable networks. If cable network programs were relatively more popular than broadcast fare in one ADI versus

²⁰ However, it can also be argued that lower carriage of local stations in high cable penetration markets simply reflects cable subscribers' preference for cable services, but at least a negative effect of *SYSPENE* would not be consistent with an anticompetitive rationale for local carriage denial

another, cable systems would be more likely to carry fewer broadcast stations and reserve the channel space for cable networks. On the other hand, if the reverse were true, cable operators might still choose to carry fewer broadcast stations relative to cable networks to try and increase consumer demand for cable network programming, a finding that would be more consistent with the anti-competitive rationale for non-carriage. The variable *SHARE_C*, measuring the viewing share of cable networks in a system's ADI, was used to determine which of these theories was correct. *SHARE_C* was expected to have a positive effect if the former situation occurs and a negative effect if the latter theory holds true.

Station-level variables The station-level variables include three dummy variables that measure whether a station is a commercial network affiliate station (*NETDUMMY*), a commercial independent station (*INDDUMMY*) or a public television station (*PBSDUMMY*). Other station variables include the age of a broadcast station (*AGE_S*), the viewing share of a station in its ADI (*SHARE_A*) and a dummy variable indicating if a station is located in a different ADI from a cable system (*ADI_DIFF*).

If cable operators' local station carriage decisions were motivated by their desire to limit the local stations' access to viewers and to further monopolize the local advertising market, then one would expect that stronger stations (both in terms of viewing and local advertising shares), generally network-affiliated and more established stations, would become the primary target. However, previous discussion about the incentives of cable local signal carriage also indicated that popular stations increase the value of a system's channel lineup and are thus more likely to be carried by cable operators. While the former prediction is in line with the anti-competitive theory about cable's carriage

behavior, the latter prediction, if found to be true, is indicative of cable's efficient business strategy. *NETDUMMY*, *INDDUMMY*, *AGE_S* and *SHARE_S* were used to test whether systems were more or less likely to drop network affiliated, older and/or more popular stations.²¹

Still another variable that provides us with a clear test of the anti-competitive theory for local signal denial is *DIFF_ADI*, a dummy variable indicating if a station was located in a different ADI from a cable system. The must-carry rules often resulted in systems carrying stations from an ADI different from that of a system. These stations from a different ADI were often duplicate network affiliates. If a cable operator denies carrying a station with the intention to economically hurt the station, the operator would be more likely to do so to a station with whom it competes most, that is, a station closet to the system (Wirth, 1990). On the other hand, the dropping of an independent or a duplicate network affiliate station from another ADI can hardly be regarded as anti-competitive. Finally, interaction terms between *DIFF_ADI* and the station-type dummy variables (*DIFF_NET* and *DIFF_IND*) were also included in the models to test if a station with a particular affiliation status from a different ADI was even more (or less) likely to be carried.

Market-level variables The market-level variables include the number of stations available in a system's ADI (*OTA_A*), the market rank of a system's ADI (*RANK_C*) and the per capital retail sales in a cable system's county (*RETAIL_C*).

One of the reasons for cable subscription is to improve reception quality of over-the-air broadcasting signals. Thus, we would always expect cable systems to carry some broadcast stations available in the local market. However, the more stations that are

²¹ For *NETDUMMY* and *INDDUMMY*, *PBSDUMMY* is the baseline category for comparison.

available in a media market, the less marginal benefit the carriage of an additional station would generate and the more likely the system will be to stop carrying one or more local stations in the absence of the must-carry rules. The number of stations available in a system's ADI (*OTA_A*) is included to test this effect and is expected to have a positive relationship with local signal carriage denials.

RANK_A, the rank of the ADI in which a system is located, is included to indicate the competitiveness between the cable television and broadcasting industries in each television market. It is assumed that the lower the ADI rank, the more competitive the television business. The effect of *RANK_A* on station carriage can be both positive and negative. First, since households in bigger markets generally have higher reservation utilities with respect to cable subscription due to the availability of more over-the-air broadcast services, a positive effect on *DROP* would result if cable systems in more competitive markets carry more stations to try to lure television households to subscribe to cable television. However, because the probability of a station not being carried on cable system in bigger markets (with lower rank numbers) is actually higher than those in smaller markets due to the availability of more stations in bigger markets, the effect of *RANK_A* can be negative. In addition, the anticompetitive theory is more plausible if *RANK_A* has a negative effect on local station carriage. That is, if cable systems sought to strategically disadvantage local broadcast stations by refusing to carry them, other things held constant, they would have more incentive to do so in more competitive markets.

Finally, if it were true that cable systems deny carrying broadcast stations in order to reap local advertising revenues, then one would expect that this happen more often in

relatively prosperous areas. *RETAIL*, the amount of retail sales per capita in a system's county, is included to test this assumption.²² A positive effect of *RETAIL* on the dependent variable is more consistent with the anti-competitive argument.

Estimation

This study used binary regression models due to the binary nature of the dependent variable, *DROP*.²³ Specifically, the logit model was chosen because its coefficients allow for a simpler interpretation in terms of odds ratio.²⁴

A variety of model specifications were considered. The models and their Maximum Likelihood Estimation (MLE) results are summarized in Table 3. As shown, coefficient estimates of these models were largely consistent with each other. The three statistics presented in the last three rows of the table measure the goodness-of-fit of each model and do not show clear superiority of one model over another. The following section focuses on the results of the full model, Model IV.

Results

Table 4 lists again the logit coefficients from Model IV and offers two interpretations of the coefficients. The first one represents the marginal effects of the independent variables on *DROP* while the second one represents their effects on the change in the dependent variable's odds.²⁵

²² To test the theory that cable systems deny carrying local stations to monopolize local advertising revenues, it would be more appropriate to include variables that measure the amount of local advertising sales each cable system had. However, not only was local advertising unpopular in the late 1980s, consistent data for those systems that did sell local ads were unavailable.

²³ It is well-known that it is problematic to use linear regression models when the dependent variable is dichotomous (see Long, 1996, pp. 39-41).

²⁴ Probit is the other popular model for binary regression analysis. The regression results from both probit and logit are qualitatively similar even though the coefficients may be different (Long, 1996, p. 84).

²⁵ The marginal effect represents the partial change in the probability of the dependent variable as a result

System-level variables First, contrary to the main hypothesis, vertical integration had a significantly negative effect ($\beta = -.056, p < .01$). That is, cable systems whose owners had more program interests in cable networks were less likely to deny carrying local stations. Specifically, a system owner that is vertically integrated with one more cable network increased the probability and odds of a station being carried by its system by 0.003 and 5.4% respectively, holding other variables constant.²⁶ This may be because firms with cable program interests, particularly those larger cable firms, are often partners of other media companies that have stakes in broadcast networks, TV stations and other broadcast interests. They thus have less incentive to refuse carrying broadcast stations on their systems.

The national size of a system's owner, *LNSUB*, had a significantly positive effect on *DROP* ($\beta = .096, p < .05$). That is, larger cable MSOs were more likely to drop a broadcast station from their systems. On the average, a 1% increase in the number of a cable MSO's subscribers increased the probability of a station being dropped by 0.006, holding other variables constant. In terms of odds ratio, that would increase the odds of a station being denied carriage by 10%. Larger cable MSOs have been shown to have lower marginal costs with respect to program supply and, as a result, tend to supply more

of a unit change in an independent variable; that is, $\frac{\partial p_i}{\partial x_i}$. For the logit model, $\frac{\partial p_i}{\partial x_i} = \beta_i p_i (1 - p_i)$. In the

current sample, the probability of *DROP*=1 is 0.065. Therefore, the marginal effect of x_i is calculated as

$\frac{\partial p_i}{\partial x_i} = \beta_i * 0.065(1 - 0.065) = 0.061 * \beta_i$. The odds ratio estimates measure, for a unit change in x_i , how

the odds of the dependent variable occurring change. They are calculated as e^{β_i} . Note that odds ratio is a multiplicative measure. So an odds ratio greater than one means a positive effect, while a ratio between 0 and 1 implies a negative effect (Long, 1996, p. 73).

²⁶ The results were similar when *VI* or *VI_TOT* were used instead of *VI_N*. Because *VI_N* and the interaction term (*LNSUB*VI_N*) have a nearly perfect correlation, this result implies that larger MSOs with program interest in more cable program networks were less likely to drop broadcast stations from their systems, although the impact was minuscule.

channels. The result here indicates that larger MSOs dropped a larger number of over-the-air television stations in order to add more cable networks to their lineups. Whether this is anti-competitively motivated, however, is unclear, because cable systems may favor carriage of cable networks over local broadcast stations if the bargaining power of the systems, conferred by their national sizes, leads to favorable deals with the cable networks.

A system's share of subscribers in its own ADI, *SYSSHARE*, did not affect the system's local carriage decision. *SYSPENE*, a system's penetration rate in its franchise area, was found to have a significantly negative effect on *DROP* ($\beta = -1.138, p < .05$). Specifically, a 1% increase in a system's penetration rate increases the probability of a station to be carriage by .07 or decreases the odds of a station being denied carriage by 32%, holding all other variables constant. These findings are not consistent with an anticompetitive explanation for local carriage denials.

Channel capacity (*CAP*) had a significantly negative effect on *DROP* ($\beta = -.027, p < .01$), confirming the hypothesis that great channel capacity increases the chance of a broadcast station being carried by a cable system. An additional channel in a system's channel capacity decreased the odds of a station being dropped by the system by 2.6%, holding other variables constant.

Cable system age had a significantly positive effect on *DROP*, indicating that older systems were more likely to drop stations ($\beta = .03, p < .05$). This may be because some older systems had not updated their system and expanded their channel capacity. Other system-level variables, system plant miles (*MILES*) and household cable viewing share (*SHARE_C*) had no significant effect on *DROP*.

Market-level variables First, as expected, *OTA_A*, the number of stations available in a system's ADI, had a positive effect on *DROP*, meaning that the availability of more local stations in the market increases the chances of a station being dropped. However, the effect was only statistically significant at a higher than usual confidence level (i.e., 10%).

Second, a system's ADI rank, *RANK_A*, has a significantly positive effect on *DROP* ($\beta = .004, p < .10$). This suggests that cable systems in bigger markets (with lower ADI ranks) were more likely to carry a station even though there are more stations available in the market. This finding is not consistent with an anticompetitive rationale for carriage denials. It instead supports the theory that cable systems in bigger markets carry more broadcast stations to increase their value in the face of competition from over-the-air broadcasting and other multi-channel video services (Dertouzos & Wildman, 1989).

Finally, the other market-level variable, *RETAIL_C*, per capita retail sales in a system's county, had no significant effect on cable's local carriage behavior.

Station-level variables First, while a station's household viewing share had significantly positive effect on its cable carriage, the effect of a station's age was significantly negative. That is, the lower viewing share a station had or the younger a station was, the more likely the station was not carried by a cable system. Specifically, a 1% increase in a station's viewing share increased its probability of being carried by a system by .003 and decreased its odds of not being carried by 4.9%. As for station age, being on air one year longer decreased the odds of a station not being carried by a cable system by 6%. Both findings go against the theory that cable's non-carriage behavior was anti-competitively motivated.

Regarding the effect of station type, being an independent station increased the chance of not being carried ($\beta = .655, p < .05$). Relative to public stations, the odds of being denied carriage by a cable system for independent stations was 92.5% higher.

In addition, while an independent station from a different ADI from a cable system was no more likely to be denied carriage by the cable system than a public station from a different ADI (that is, *DIFF_IND* had no significant effect on *DROP*), the opposite was true for a network affiliate station from a different ADI ($\beta = .837, p < .10$). The probability of not being carried for a network affiliate station from a different ADI was .051 higher than a public station from another media market. In terms of odds ratio, the odds of not being carried for a distance network affiliate station was 130.8% higher, compared to its public station counterpart.

Together, the results of the station-level variables showed that independent stations and network affiliate stations from a different ADI were more likely to be denied carriage by a cable system. In addition, less popular and younger stations were more likely to be turned away by a cable system, all other things equal. These results point to a pro-competition theory for local carriage denials.

Conclusion

This study tested whether vertically integrated cable system owners are more likely to deny carriage of broadcast stations, all other things equal. The results indicate that the effect of vertical integration on cable's local carriage decisions was positive. That is, firms with more cable program interests were actually less likely to deny carrying broadcast stations on their systems. This result does not square well with the accusations made by the government and other must carry proponents that vertically integrated cable

firms favor their own program services and discriminate against local stations. An unregulated cable operator chooses the program service that makes the greatest marginal contribution to the value of its channel lineup. Given the greater benefits of carrying local stations (relative to the cost), market foreclosure due to vertical integration, while possibly applicable to other cable program services, did not happen to local broadcast stations.

There is another reason, as some argued, that cable firms with more interests in cable programming have more incentive to deny carrying local stations. That is, a crippled broadcast industry would increase consumer demand for cable program service and production resources going into cable programming; and cable companies with more programming interests would benefit more from this result. However, people supporting this view forget that cable programming companies also have vested interests in broadcast programming. This was true in the 1980s, and even more so now. Hence, the motivation of vertically integrated cable companies to hurt stations for programming purposes is weaker than generally thought by the must carry proponents.

Other main results from the study include:

- 1). Horizontal concentration or bigger firm size in the cable industry had a negative effect on the carriage of local broadcast stations on cable systems. However, as mentioned before, whether these carriage denials - induced by national audience size - were anti-competitively motivated is unclear. An anticompetitive motive for carriage denial is more plausible if cable systems that dropped more stations are those larger ones at the regional level, relative to the size of a broadcast market. The study tested this hypothesis but found no significant effect resulting from regional firm size, *SYSSHARE*.

2). Lower rating stations, independent stations or duplicate network affiliates originating from a different ADI were more likely to be denied carriage by a cable system. These results are the most damaging to the anticompetitive theory for carriage denials as they are entirely consistent with an efficiency rationale.

3). The study found that cable system operators faced local signal carriage pressures. As the number of local market stations available in the local market increase, the likelihood of a cable system operator not carrying broadcast stations likewise increases. However, the results also showed that the expansion of system capacity could ease the pressure on cable systems and make the carriage of additional stations possible.

4). Competition in local media markets affected cable's local carriage behaviors. In particular, cable operators in bigger media markets (presumptively with greater media competition) carried more broadcast stations and were more likely to carry a broadcast station. This result is hardly consistent with an anticompetitive rationale for carriage denials which predicts that more adverse carriage instances take place in more competitive markets. Instead, this result reflects one of the incentives cable system operators had for local signal carriage, that is, carrying popular local stations to increase the competitiveness of cable television service vis-à-vis OTA broadcast and DBS services.

5). The above result suggests that more non-carriage instances took place in smaller markets.

These findings, taken as a whole, support the notion that cable's local station carriage decisions were more a result of efficiency rather than anti-competitive motives, although some of the results raise questions regarding the motivations behind cable's

non-carriage behavior. As such, what the findings imply for the must carry regulations and the Supreme Court's ruling is largely unfavorable.

Policy implications

The basic premise of the government's argument in support of the must carry rules is that cable system operators have every incentive to deny carrying local stations on their systems, as a form of market closure. To back up this premise, the government argued, among other things, that because the cable and broadcast television industries are competitors on the programming front, cable operators that are vertically integrated have the incentive to favor their affiliated programmers to the detriment of broadcast programmers.

However, while it is true that the broadcast and cable industries are competitors in some aspects and cable system operators have some disincentives not to carry local stations, the results of the studies here did not bear any systematic evidence that cable systems denied carrying some broadcast stations for anticompetitive reasons. Actually, the stations most likely to be denied carriage, in the absence of the must carry rules, were low rating independent stations and/or duplicate network stations from a distance. While these at-risk stations may represent important voices in a marketplace of ideas, non-carriage of these marginal stations can not be regarded as anticompetitive. In fact, it can be argued that society could make better use of the resources these stations occupy. Therefore, unless the government's interest was to ensure the viability of every single station in the country, the must carry regulations can hardly be viewed as good economic policy in the promotion of efficient use of public resources.

The *Turner II* decision, however, in showing its deference to Congress, bought into the government's findings and economic reasoning too easily. Facing a plausible market foreclosure theory and actual carriage denial behavior in the cable industry, the Supreme Court should have investigated on its own whether the non-carriage instances were random acts or systematic, and whether they were motivated by anticompetitive reasons or efficient ones. The court did not do so. Instead, it merely repeated the evidence presented by the government. In essence, the economic analysis, if any, in the Supreme Court's principal opinion of *Turner II* was flawed on two fronts. First, the analysis failed to recognize that cable systems also have incentives to carry local stations on their systems. More importantly, the Court merely speculated on the nature of cable's non-carriage incidents as anticompetitive, based on an observation of the apparently competitive relationship between the cable industry and the broadcast industry.

In conclusion, if the government promulgates the must carry rules in order to preserve local broadcast stations (particularly independent stations) so they can continue to provide local and public affairs programming, then the developments that have taken place in the media marketplace since then speak loudly to the failure of that objective. Not only are truly independent or unaffiliated stations an endangered species nowadays (thanks largely to the must carry rules), the broadcast and cable industries have also become increasingly integrated, with a handful of media companies dominating the video program distribution market. Apparently the government has used an ill informed economic policy to try to achieve a first amendment objective that is not easily attainable in the marketplace.

That being said, the risk facing the low rating and/or independent stations should be noted. While marginal economically, they may be essential for a rich mix of program choice and democratic voices. Shall we protect those economically marginal stations based on other policy concerns? Such a value-laden question cannot be easily answered by economic analysis. Therefore, before a call for an outright repeal of the must carry rules is issued based the current findings, it is important to realize that there are policy decisions that cannot be informed by economic analysis only.

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Table 1: Valuation of Cable Program Services

<u>Cable Services</u>	<u>[1] 1990 24-hr Rating</u>	<u>[2] Viewing Share (%)</u>	<u>[3] Basic Rate Contri.(\$)</u>	<u>[4] Local Ad Share</u>	<u>[5] Local Ad Contri. (\$)</u>	<u>[6] Licensee Fee (\$)</u>	<u>[7] Channel Value (\$)</u>
TBS	1.55	4.89	0.81	0.00	0.00	0.10	0.71
USA	1.18	3.72	0.62	11.60	0.14	0.19	0.57
CNN	0.98	3.09	0.51	28.00	0.33	0.26	0.58
NICK	1.08	3.41	0.56	0.60	0.01	0.13	0.44
ESPN	0.88	2.78	0.46	30.30	0.36	0.37	0.45
FAM	0.65	2.05	0.34	0.70	0.01	0.05	0.30
TNT	0.93	2.93	0.49	10.40	0.12	0.36	0.25
LIFE	0.58	1.83	0.30	4.90	0.06	0.08	0.28
MTV	0.55	1.74	0.29	3.80	0.05	0.11	0.23
DISC	0.50	1.58	0.26	1.10	0.01	0.06	0.21
TNN	0.50	1.58	0.26	2.90	0.03	0.09	0.20
A&E	0.40	1.26	0.21	1.00	0.01	0.10	0.12
BET	0.30	0.95	0.16	0.00	0.00	0.04	0.12
VH1	0.20	0.63	0.10	0.40	0.00	0.00	0.10
TWC	0.20	0.63	0.10	0.40	0.00	0.04	0.06
FNN	0.13	0.41	0.07	0.10	0.00	0.03	0.04
CNBC	0.10	0.32	0.05	0.10	0.00	0.04	0.01
ABC/CBS/NBC	7.00	22.08	3.66	0.00	0.00	0.00	3.66
FOX/INDY	1.50	4.73	0.78	0.00	0.00	0.00	0.78
PBS	0.80	2.52	0.42	0.00	0.00	0.00	0.42

Notes:

[2]=[1] / 31.7% (Basic Cable HUT)

[3]=[2]x \$16.58 (Average 1990 monthly basic rate).

[5]=[4]x\$1.19 (Average local ad revenue per ad sub per month in 1990)

[7]=[3]+[5]-[6]

Sources:

The Channel Valuation Model is based on that of Paul Kagan Associates with modifications (Cable Television Programming, May 31, 1991, p. 2). Ratings of broadcast networks and stations are estimates and used here for illustration only.

Table 2 List and Summary Statistics of Variables in the Logit Analysis

Variable	Mean	Std Dev	Obs #	Description	Source
<i>Dependent variable:</i>					
DROP	0.065	0.247	3966	If a local station was carried by a system (1=no)	[1]
<i>System-specific variables:</i>					
VI	0.234	0.424	3966	If a system owner is vertically integrated (1=yes) (1990)	[2][3][4]
VI_N	2.307	5.095	3966	No. of national cable networks with which a system is vertically integrated	[2][3][4]
VI_TOT	2.936	6.545	3966	No. of cable networks with which a system is vertically integrated	[2][3][4]
LNSUB	11.462	2.928	3909	(log) No. of cable subscribers nationwide a cable system owner owns	[1]
SYSSHARE	0.013	0.039	3564	Subscriber share of a system in its ADI	[1][5]
SYSPENE	0.641	0.185	2995	Penetration rate of a cable system in its franchise area	[1]
CAP	36.141	14.524	3480	Channel capacity of a cable system	[1]
MILE	173.337	483.227	3231	Plant miles of a cable system	[1]
AGE_C	14.017	9.804	3451	Age of a cable system as of 1992	[1]
SHARE_C	24.091	11.665	3965	All day household viewing share of cable networks in a system's ADI (1989)	[6]
<i>Station-specific variables:</i>					
NETDUMMY	0.682	0.466	3966	If a station is affiliated with a commercial network (ABC, CBS, Fox, NBC)	[1]
INDDUMMY	0.135	0.341	3966	If a station is not affiliated with a commercial network (ABC, CBS, Fox, NBC)	[1]
PBSDUMMY	0.184	0.387	3966	If a station is an educational or affiliated with PBS	[1]
AGE_S	28.889	12.128	3965	Age of a station as of 1992	[6]
SHARE_S	12.300	8.727	3965	Prime time household viewing share of a station in its ADI (1990)	[6]
DIFF_ADI	0.274	0.446	3966	If a station was located in a different ADI from that of a system	[5][6]
<i>Market-specific variables:</i>					
OTA_A	9.178	4.544	3966	No. of local stations available in a system's ADI (1990)	[5]
RANK_A	64.990	50.701	3966	Rank of a system's ADI (1990)	[5]
RETAIL_C	5207.62	1876.57	3966	Per cap retail sales in a system's county (1987)	[7]

Note: Data are mostly for the end of 1991, unless otherwise indicated.

Data Sources:

- [1] *Television and Cable Factbook*, electronic version, (Data extracted in Feb. 1992)
- [2] *Television and Cable Factbook* (1990)
- [3] *Cable TV Programming* (Dec. 20, 1989, p.3.)
- [4] 1990 FCC Cable Report (Appendix G, Table VI).
- [5] *Cable and Station Coverage Atlas* (1990)
- [6] *Investing in Television* (1990)
- [7] *City and County Databook*, electronic version, (1994)

Table 3 Results of Logit Regressions
(Regression coefficient with Wald chi-square statistics in parenthesis)

Dep. Var.: DROP, N=2,588

	Model I	Model II	Model III	Model IV
INTERCEPT	-1.600** (4.789)	-1.569** (4.606)	-1.505** (4.214)	-1.624** (4.788)
VI_N	-0.057*** (8.049)		-0.057*** (8.107)	-0.056*** (7.720)
VI_TOT		-0.041*** (7.031)		
LNSUB	0.093** (5.190)	0.088** (4.713)	0.093** (5.252)	0.096** (5.556)
SYSSHARE			-3.308 (1.175)	
SYSPENE	-1.214** (5.265)	-1.203** (5.176)	-1.154** (4.779)	-1.138** (4.653)
CAP	-0.028*** (12.863)	-0.028*** (12.646)	-0.028*** (13.080)	-0.027*** (11.727)
MILE	-0.000 (0.600)	-0.000 (0.598)	-0.000 (0.630)	-0.000 (0.187)
AGE_C	0.028*** (7.771)	0.028*** (7.628)	0.028*** (7.257)	0.030*** (8.150)
SHARE_C	-0.006 (0.347)	-0.006 (0.339)	-0.007 (0.416)	-0.006 (0.263)
OTA_A	0.046* (2.486)	0.047* (2.597)	0.045* (2.430)	0.039* (1.764)
RANK_A	0.003 (2.260)	0.003 (2.305)	0.004* (2.706)	0.004* (2.914)
RETAIL_C	0.000 (1.061)	0.000 (1.021)	0.000 (1.120)	0.000 (1.603)
SHARE_S	-0.048** (5.565)	-0.048** (5.548)	-0.051** (6.238)	-0.050** (5.949)
AGE_S	-0.061*** (42.095)	-0.061*** (42.143)	-0.060*** (40.982)	-0.061*** (41.469)
NETDUMMY	0.190 (0.421)	0.186 (0.402)	-0.066 (0.042)	-0.081 (0.063)
INDDUMMY	0.719*** (7.031)	0.716*** (6.984)	0.656** (4.893)	0.655** (4.869)
DIFF_ADI	0.434** (4.598)	0.429** (4.490)	-0.041 (0.010)	-0.065 (0.024)
DIFF_NET			0.834* (2.918)	0.837* (2.935)
DIFF_IND			0.086 (0.022)	0.107 (0.033)
Good-of-fit Measures:				
AIC	1077.70	1078.83	1077.53	1078.18
SC	1171.44	1172.57	1182.99	1189.50
-2 Log L	1045.70	1046.83	1041.53	1040.18

* significant at the .10 level
** significant at the .05 level
*** significant at the .01 level

Table 4 Marginal Effects and Odds Ratio Estimates of the Full Logit Model

Dep. Var.: DROP, N=2,588

	Logit Coefficient	Margial effect	Odds Ratio
VI_N	-0.056***	-0.003	0.946
LNSUB	0.096***	0.006	1.101
SYSSHARE	-3.308	-0.202	0.037
SYSPENE	-1.138**	-0.069	0.320
CAP	-0.027***	-0.002	0.974
MILE	-0.000	-0.000	1.000
AGE_C	0.030**	0.002	1.030
SHARE_C	-0.006	-0.000	0.994
OTA_A	0.039*	0.002	1.040
RANK_A	0.004*	0.000	1.004
RETAIL_C	0.000	0.000	1.000
SHARE_S	-0.050**	-0.003	0.951
AGE_S	-0.061***	-0.004	0.941
NETDUMMY	-0.081	-0.005	0.922
INDDUMMY	0.655**	0.040	1.925
DIFF_ADI	-0.065	-0.004	0.935
DIFF_NET	0.837*	0.051	2.308
DIFF_IND	0.107	0.007	1.113

* significant at the .10 level
 ** significant at the .05 level
 *** significant at the .01 level