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Vertical Integration and Market Foreclosure in the Multichannel Video Industry: An Update

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Abstract

The multichannel video industry is a multilayered group of businesses with substantial vertical integration between the different stages of production. Previous studies have found that vertically integrated distributors in this industry will favor affiliated producers, but that overall this relationship was welfare enhancing for consumers. All but one of these previous studies, however, use data that is at least a decade old, and the industry has changed substantially since then, with consolidation, the advent of nationwide competition, new technologies, higher channel capacities, and many more national networks. I examine the effects of vertical integration on cable operator programming offerings, number of channels, and prices with 2002 data. I find that there may be, in some cases, a small propensity to favor affiliated networks, but that it is not systematic, and that consumers subscribing to vertically integrated cable operators are offered more channels divided into a greater number of packages. I also find that the number of independent networks carried increases with the national reach of the cable operator, and calculate the predicted level of national subscriber reach at which carriage of independent networks will decline.

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I. Introduction

This paper examines the effect vertical integration between distributors and programming networks in the cable industry has on cable network carriage, number of networks carried, prices, and cable penetration. Building on earlier work by Chipty (2001), I use much more recent data to investigate the influence of vertical integration on the service consumers receive, and changes in that influence since previous studies. The results shed light on the question of whether vertical integration benefits consumers and/or results in cable operators favoring their affiliated networks.

The multichannel video industry is a multilayered group of businesses with substantial vertical integration between the different stages of production. In industries with vertical relationships, product distributors may have incentive to favor vertically affiliated suppliers. In the multichannel video industry, cable operators will have incentive to favor affiliated upstream programming networks if the revenue generated by increased carriage of the affiliated network (and decreased carriage of rivals to the affiliated network) is greater than the revenue lost from reduced subscribership to the distributor's downstream subscription service, perhaps because consumers choose another service that carries the affiliated network's rival.[1] Previous studies of vertically integrated cable operators, most notably Chipty (2001), have found that they favor affiliated producers, but that overall this relationship was welfare enhancing for consumers.

All but one of these previous studies, however, use data that are at least a decade old, and the industry has changed substantially since then. Since 1994, DBS has grown to a major national provider of multichannel video service, and new technologies, especially digital transmission, have dramatically increased the number of channels carried by multichannel video operators and the number of national video networks. Simultaneously, horizontal concentration has increased among cable distributors, but vertical integration has decreased. I examine the effects of vertical integration on cable operator programming offerings, number of channels, and prices with 2002 data. I find that there may exist, in some cases, a small propensity to favor affiliated networks, but that it is not consistent or systematic, and that consumers subscribing to vertically integrated cable operators are offered more channels divided into a larger number of packages. In other words, consumers receive higher quality and more choice. I also find that the number of independent programming networks carried (that is, programming networks completely unaffiliated with any cable operator) may peak at the national subscriber reach of the current largest cable operator.

[1] *See* Waterman and Weiss (1997) for a general review of the theory about the effects of vertical integration on the cable television industry.

II. Background and Previous Research

For the purposes of this paper, multichannel video service consists of multiple channels or packages of channels of video networks sold to consumer for a subscription fee. Cable service is sold in this country under a system of local franchises: the local government grants a franchise to a cable company to provide service in its area, and regulation is bifurcated between local and federal governments. Cable service, in terms of quality and price, can and does vary widely even between bordering communities. Some other technologies, such as wireless systems and telephone-provided video services, provide competitive video service in a few local areas and also vary from community to community. DBS service, in contrast, began in 1993 and is provided to the entire country with very few differences from community to community in terms of quality and price.[2] Access to DBS service is limited to those who can view the satellite by placing a satellite dish facing south without obstruction, so some at more northerly latitudes or those living in multiple dwelling units not facing south may be unable to receive DBS service.

As noted by Chipty (2001) and FCC (2001), the multichannel video industry can be viewed as consisting of three separate layers: the content or program content production market, the programming network market (sometimes referred to as the "upstream" market), and the distribution market (sometimes referred to as the "downstream" market), with varying levels of vertical integration between the three levels. In the content market, producers of many sizes make programs that they ultimately want distributed to consumers via broadcast, cable, and satellite. Content producers range from tiny independent producers to large production divisions of large, international media conglomerates. Programming networks take individual programs and package them into one or more 24-hour networks that must be distributed to consumers via mutichannel video distribution platforms. Owners of programming networks range in size from small local and regional companies offering one network to one small part of the country to companies offering one national network that covers a small niche subject to large companies producing multiple 24-hour networks that are distributed around the world. The larger programming network companies are frequently part of a larger media conglomerate.

Distributors, or multichannel video providers, own distribution technologies, such as cable systems or DBS systems, that allow them to distribute video from a central location directly to consumers' homes. Multichannel video providers license video networks, package them together and sell them to consumers for a monthly subscription fee. The main providers of multichannel video service are cable operators and DBS operators. There are two major DBS providers, both of which are among the top four largest multichannel video providers in terms of subscribers, and together they serve roughly 20 percent of multichannel video subscribers. There are a large number of cable

[2] Primestar, a "medium power" service began in 1993. Current providers of DBS service provide a "high powered" service, the main difference being a smaller dish. DirecTV began offering the first "high powered" DBS service in 1994, and acquired Primestar's subscribers in 1999, and converted them to "high powered" DBS service. In general, prices are the same for DBS service, although some short-term promotions may change this temporarily for some consumers or communities. In terms of quality, most DBS service is the same for most communities, although DBS offers local broadcast channels in some communities and not others, and more northern latitudes have more difficulty picking up the satellites, and may not be able to purchase all services.

operators of various sizes, from small operators owning a single system serving a small community, to Comcast, which owns hundreds of systems serving nearly 30 percent of subscribers. The cable industry has consolidated considerably over the past ten years, with the top few cable operators serving the vast majority of subscribers in the country. Large cable operators have also concentrated their subscribers around large urban areas in a process known as "clustering."

Vertical integration between these layers of the industry is common, and may affect the behavior of actors at each level. This study is concerned with vertical integration between the programming network layer and cable operators in the distribution layer. In general, only the largest cable operators are vertically integrated with programming networks, although these cable operators possess a wide range of ownership percentages in all kinds and sizes of networks. Harms from this kind of relationships can arise if cable operators can gain more revenue from excluding a network that is a rival to a vertically integrated network, perhaps from increased advertising revenue, exceeds revenue lost from the exclusion, perhaps from the loss of cable subscriptions due defections to rival multichannel video distributors. It is likely that the risk of vertical foreclosure will rise with increased horizontal size, since larger cable operators serving a larger percentage of the industry will have greater ability to harm, or even drive out of business, rival networks. Once an operator gains the ability to deny rival networks viability, the cable operator no longer will face the risk of subscribers defecting to an alternative mutichannel distributor to gain access to the rival network.

Members of Congress were concerned about the potential consequences of downstream consolidation and of vertical integration in the cable industry. To address these consequences, Congress adopted subscriber (horizontal) and channel occupancy (vertical) provisions in Section 613(f).[3] These provisions directed the Commission, "in order to enhance effective competition," to establish reasonable limits on the number of cable subscribers that may be reached through commonly owned or attributed cable systems, and to prescribe rules limiting the number of channels that can be occupied by the cable system's owned or affiliated video programming. It appears that Congress had two principal objectives in mind in adopting Section 613(f). First, Congress was concerned about concentration of the media in the hands of a few who could control the dissemination of information which would enable cable operators to impose their own biases upon the information they disseminate. Second, Congress was concerned that an increase in concentration and vertical integration in the cable industry could result in anti-competitive behavior by cable operators toward programming suppliers, as well as toward potential new entrants.[4]

[3] Section 613 was adopted as Section 11(c) of the Cable Television Consumer Protection and Competition Act of 1992, Pub. L. No. 102-385, 106 Stat. 1460, codified at 47 U.S.C. § 533(f). The constitutionality of the statute itself was upheld in *Time Warner Entertainment Co., L.P. v. United States*, 211 F.3d 1313 (D.C. Cir. 2000). The ownership rules in question were adopted in *Implementation of Section 11(c) of the Cable Television Consumer Protection and Competition Act of 1992 Horizontal Ownership Limits*, Third Report and Order, MM Docket No. 92-264, 14 FCC Rcd 19098 (1999). The Commission's horizontal limit bars a cable operator from having an attributable interest in more than 30 percent of nationwide subscribership of multi-channel video programming, and the vertical limit bars a cable operator from carrying attributable programming on more than 40 percent of channels up to 75 channels of capacity. The rules are currently remanded to the Commission, but remain in effect pending review.

[4] *See Time Warner Entertainment Co. v. FCC*, 240 F.3d 1126 (D.C. Cir. 2001). This court case also reviewed the FCC's implementation of horizontal ownership, vertical integration, and attribution rules, remanding some and reversing others.

Several previous studies have examined the effects of horizontal concentration and vertical integration in the cable industry, although all but one use data at least ten years old. Clements and Abramowitz (2004) examined carriage on the most popular service, as defined below, and found that cable operators are significantly more likely to carry vertically integrated networks (and networks owned by broadcasters) than non-vertically integrated networks.[5] Chipty, in a series of papers, studied different aspects of the organization of the cable industry. The first studied the effect of cable operator ownership of programming networks (Chipty, 1994), concluding that cable operators favor affiliated networks, and refuse to carry rivals of affiliated networks. The second studied whether national size had an effect on bargaining power and pricing (Chipty, 1995), finding that larger operators supply more channels and subscriptions at all prices. Chipty and Snyder (1999) examined bargaining between a programming seller and multiple buyers in which the program seller engages in simultaneous bilateral bargaining with multiple program buyers. They used advertising revenue to estimate the programmers' gross surplus function, found that it is convex, and thus concluded that cable operator mergers will not enhance the merged firm's bargaining position. This led Chipty and Snyder to conclude that cable operators merge to enhance efficiency rather than to gain bargaining power. Adilov and Alexander (2002), however, generalized the model to include situations where the surplus split is not equal and show that Chipty's and Snyder's results may not hold in such a case. Adilov (2002) examined experimental data on bilateral negotiations between programmers and cable operators and found that the surplus split was not equal.

Ford and Jackson examined the effects of horizontal concentration and vertical integration in the cable industry (Ford and Jackson, 1997). The authors concluded that horizontal concentration resulted in substantial programming cost savings for cable operators. Some of the savings were passed on to cable subscribers, resulting in a net consumer welfare gain. Vertical integration also led to cost savings for cable operators, but resulted in a net consumer loss due to an increase in producer surplus.

This paper follows the methods used in Chipty (2001). Chipty studied vertical integration in the cable industry using 1991 data and found a small tendency by vertically integrated cable operators to favor carrying their affiliated networks to the exclusion of comparable, non-vertically affiliated networks. Chipty also found, however, that such vertically integrated operators experienced efficiency gains, and therefore the net welfare effect for consumers was, at worst, statistically even, or perhaps weakly positive. By updating Chipty (2001), I hope to provide analysis of the effects of vertical integration directly applicable to the market as it now stands.[6]

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[5] See below for comments on Clements and Abramowitz (2004) in relation to the results of this study.

[6] In this paper, I do not recreate Chipty's (2001) demand estimations and, necessarily, the welfare analysis. Instead, I add an analysis of the effect of national subscribers on the issues raised elsewhere in the paper.

III. Data

This study uses data on cable operators collected by the FCC as part of its *Annual Survey of Cable Industry Prices* ("*Price Survey*"). All of the data used in this paper are cross-sectional. The survey collects cable operator-reported data on cable systems, and also asks operators to estimate how many consumers subscribe to DBS within the local area. The sample is intended to be representative of U.S. cable systems. 658 observations from the *Price Survey* dataset, out of the total of 693 surveys returned to the FCC, were sufficiently complete and could be matched to demographic data, and thus could be used for estimation. All of the data come from July 2002, unless otherwise noted below. Demographic data come from the Census Bureau and information on vertical integration comes from the FCC's *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*.[7] The data from the Census Bureau are two years older (as of 2000) than the other data. Table A-1 in the Appendix details the variables and their definitions, and explains some differences between those that Chipty used and the ones I used. For instance, the *Price Survey* does not collect data on premium services prices, so these were excluded from estimations.

IV. Program Offerings

Following Chipty (2001), I first examine the effects of vertical integration in two areas concerning program offerings of cable operators using reduced-form equations. One group of estimations examine the effect of vertical integration on the number of popular tier offerings, premium services offered, and total channels offered. A second group of estimations examine the effect that vertical integration with a programming network has on an operator's decision to carry a rival to that network. As Chipty indicates, increased programming offerings associated with vertical integration indicates efficiency associated with vertical integration and a reduced propensity to carry rival networks indicates foreclosure behavior. The balance between these two effects determines the consumer welfare outcome of vertical integration.

To study the effects of vertical integration on program offerings, I use three measures, number of channels offered on the most popular offering (usually the basic tier plus the next higher tier of service), number of premium services offered, and total number of channels offered. To study the effects of vertical integration, I examine the probability that a vertically integrated operator will carry its affiliated network and a rival to that network in a variety of programming categories, such as news, financial news, and general interest programming. The models also include various other measures of owner characteristics, system characteristics, and demographic variables, closely following Chipty (2001), but adjusted in some cases to reflect changes in the industry. (See the Appendix, Table A-1 for details.)

[7] Following Chipty (2001), a cable operator that holds any percentage interest in a cable network is considered vertically integrated with the network. An exception is that networks owned by Liberty are not considered vertically integrated. Liberty owns only cable properties in Puerto Rico, and thus is not a major cable system operator in the United States.

One important example of an adjustment concerns channel capacity, which is a cable system characteristic. As I note in the Appendix, Chipty used system channel capacity, or the number of analog channels a system was capable of offering; instead this study uses system capacity, measured in megahertz. In 1991, cable systems transmitted all signals in analog format, and only video service was offered. Therefore, megahertz and channel capacity were equivalent: system capacity in megahertz could be found by multiplying the channel capacity by six, or the amount of megahertz required to transmit one analog channel. By 2002, however, many operators were transmitting channels using both analog and digital formats, and using some system capacity to offer additional services, such as high-speed Internet access, telephone, and video-on-demand. Digital transmission allows operators to compress multiple channels into the same six megahertz required to transmit one analog channel. Therefore, system capacity in megahertz is now a more accurate measure of a cable operator's total capacity to offer services. Like Chipty, I constructed estimates both with and without system capacity because of the possibility of endogeneity, and, also like Chipty, found little difference between the results of the two specifications.

To examine the three aggregate measures of program offerings, reduced form parameters are estimated equation-by-equation, using ordinary least squares (OLS). The effect of vertical integration on individual program offerings is examined by estimating reduced form parameters equation-by-equation using probit maximum likelihood. The dataset is an unbalanced panel of 658 systems and 71 owners. As a result, I report both *t*-statistics, using standard errors from OLS and probit maximum likelihood, and robust *t*-statistics, which are computed using robust standard errors. As Chipty describes (2001 at 435 and fn.26), robust standard errors allow for unspecified heteroskedasticity and for correlation in errors across systems controlled by the same cable operator. Since cable operators have consolidated considerably since 1991, and large cable operators have attempted standardization in offerings across systems, dealing with this issue is more important now than it was with 1991 data.

A. *Number of Popular Tier, Premium, and Total Channels Offered*

As noted in Table A-1, changes in the industry dictated the use of a different measure of programming services offered than the number of channels offered on the basic, or lowest, tier. Since 1991, in part in response to regulatory changes, cable operators have moved from offering the majority of their services on the basic tier, to, in many cases, offering a small basic tier with one or more additional tiers of channels above that. These higher tiers are sometimes referred to as Cable Programming Service Tiers or CPSTs. Additionally, in recent years, cable operators have added digital tiers, which consist of additional packages of channels transmitted by digital transmission. Chipty was attempting to examine how vertical integration affected what all subscribers receive, since all by law had to subscribe to the basic tier to receive any other services. Today, there is no equivalent because basic tiers contain a much smaller percentage of available programming services, the vast majority of systems offer additional higher tiers, and subscribers are no longer required to purchase the basic tier (although almost all do). The best possible substitute appears to be what the FCC calls "the most popular service," (FCC 2002) consisting of the basic tier and the next higher CPST. The vast

majority of cable subscribers take this service, and many of the premier cable satellite networks are carried either on the basic tier or first CPST. (This entire discussion excludes premium movie networks like HBO, which are examined separately below.) I therefore examine the effect of vertical integration on the most popular service as defined above.

Examining this measure of services offered produced a surprise compared to Chipty's results. (See the Appendix, Table A-3, for specific results.) Chipty found that cable operators vertically integrated with basic cable networks (like those carried on basic tiers and CPSTs) offered more programming networks on their basic tiers. This is not a surprising result since vertically integrated operators tend to be larger with greater resources and to operate systems in first tier markets with more channels. Using 2002 data, however, I found that cable operators vertically integrated with basic cable networks offered *fewer* networks (5.65 channels fewer on average)[8] on their most popular services. (The one cable operator integrated with premium services, Time Warner, offers more channels on average.) Due to this result, I further examined the service offered by cable operators, examining how vertical integration affects the total number of channels offered. (None of the other coefficients in this specification revealed surprising results, and those are not the focus of this study, so I will not discuss them here. Interested readers can see Table A-3 in the Appendix for these results.)

Examining total channels offered revealed the expected results: cable operators vertically integrated with basic cable networks offered 9.50 additional total channels on average, and the cable operator vertically integrated with premium networks offered more total channels on average. This result indicates that there are efficiency gains from vertical integration, which are being passed on to consumers, but there are some additional interesting implications for consumer choice and competition between vertically integrated and independent cable networks. First, since cable operators vertically integrated with basic cable networks both offer fewer channels on the first two tiers of service, and more total channels over all, at least some of the operators must be offering subscribers the additional channels on higher tiers, sometimes digital, sometimes analog. In other words, subscribers to those systems may receive both higher quality service, and more choice through more packages of basic networks to choose from. Thus, vertical integration with basic networks may benefit consumers both through additional services and through greater choice.

On the other hand, the fact that some vertically integrated cable operators are offering additional channels on higher tiers, which generally have much lower penetration than the most popular service, may indicate a more subtle form of discrimination against networks that rival vertically integrated networks than outright vertical foreclosure. Since the higher tiers tend to have much lower penetration rates, placing rivals to vertically integrated services will necessarily provide them smaller audiences, which means lower advertising revenues, which means fewer resources for program development and, ultimately, a lower probability for survival. If nothing else,

[8] Following Chipty (2001, pg. 436, note 28), the difference in number of channels offered is calculated by multiplying the mean number of basic networks with which vertically integrated operators are affiliated (7.87 from Table A-2) by the marginal effect of basic integration (the coefficient on integration with basic service from Table A-3, in this case -0.718 from Panel A, specification (1)).

even subscribers who receive the higher, lower penetration tiers may have more difficulty finding a network placed on channel 354 than one placed on channel 43. Thus, the probit result presented below may not show the entire story of discrimination against rivals to vertically integrated networks. The results of Clements and Abramowitz (2004) are interesting in relation to this supposition. Examining carriage on the most popular service, as defined above, they found that cable operators are significantly more likely to carry vertically integrated networks (and networks owned by broadcasters) than non-vertically integrated networks. At first glance, Clements and Abramowitz (2004), combined with the results of this paper, seems to indicate "channel placement discrimination" by vertically integrated cable operators against non-vertically integrated networks. It is important to note, however, that frequently non-vertically integrated competitors to vertically integrated networks are much newer than the vertically integrated alternative, and thus sought carriage when most popular service packages were full, and thus no carriage but on higher tiers was available. The difficulty of discerning the relative importance of age versus vertical affiliation in carriage decisions on the most popular service package prevented me from investigating this phenomenon more thoroughly, and should give pause to interpreting Clements and Abramowitz (2004) as evidence of discrimination against non-vertically affiliated networks.

B. *Carriage Decisions for Rival Networks*

I next examined cable operator carriage decisions for a variety of programming networks within a programming category, in each case examining pairs with one vertically integrated network and one independent network. In each case, I estimated reduced form parameters using probit maximum likelihood, and examined the probability of carriage of a rival to an affiliated network, of the affiliated network itself, and of both the rival and the affiliated network. I also included a variable (in a modification to Chipty (2001)) for operators affiliated with any network *other than* the affiliated network in question. This variable was included to check for the possibility of a *quid-pro-quo,* which might take one of two forms: (1) carry my network and I will carry yours; or (2) foreclose the rival to my network and I will foreclose the rival to your network.

In this examination, I studied the carriage decisions for five pairs of rival networks: National Geographic and Discovery; CNBC and CNNfn;[9] USA and TNT; MSNBC and CNN; and Bravo and TCM. For each of the pairs, the first listed is independent, the second vertically integrated. In each case, the networks were selected because they were clearly identifiable as part of a distinct programming category (learning, financial news, general interest, news, and non-premium movies, respectively, as listed above), and because they were clearly rivals to each other. While Chipty (2001) examined only two cases, I examined five cases to give a broader picture of program carriage decisions, and

[9] I note that CNNfn has ceased operations since the data for this study were collected, in fact, while I was running regressions! I have kept the results, but it is interesting to note that CNNfn's affiliation with Time Warner did not allow it to survive in the market. Time Warner experience similar problems with CNNSI in competition with ESPN. These represent only two examples, but show that whatever advantage vertical affiliation might provide, it does not assure success in the programming market.

I chose a variety of pairs, such as old network versus old network, new versus old, new versus new, in hopes of gaining insight in a variety of cases.[10]

In general, examination of the likelihood of carriage of rival pairs shows no systematic attempt to exclude rivals to vertically integrated programming networks, nor of a *quid-pro-quo* system of coordinated foreclosure. In some cases, a vertically integrated operator is more likely to carry a rival, and in some cases less likely. The carriage pattern of cable operators affiliated with networks other than the vertically integrated network in the pair move in every direction, seemingly randomly, so it is reasonable to assume that factors other than a *quid-pro-quo* arrangement are driving those carriage decisions. In all cases, though, vertical integration either raised the probability of carriage of the vertically integrated network, or perfectly predicted carriage (*i.e.*, all of the systems owned by the vertically integrated operator carried the vertically integrated network). Thus, vertical integration clearly improves prospects for carriage on vertically integrated systems, but does not appear to reduce universally the prospect of carriage for independent networks that are rivals of the vertically integrated network.

One possible interpretation of this result, since carriage of the independent rivals does appear to be suppressed slightly in one of the five cases,[11] is that vertically integrated operators have some incentive to favor integrated networks, but that, in most cases, other considerations (*e.g.*, consumer demand for the independent rival, pressure from MVPD competitors, *etc.*) overwhelm the foreclosure incentive. Other possible scenarios include that cable operators may favor vertically integrated networks only at first, to give them a first mover advantage in the market, or when they are under competitive pressure,[12] or that vertically integrated operators engage in more subtle forms of discrimination, such as channel placement or contract terms. One might conclude, however, from these results, that market pressures, such as consumer demand and competition from other MVPD providers, sharply curtail the ability of vertically integrated operators to foreclose independent rival networks completely or indefinitely.

V. Penetration Rates and Prices

I next examine to the effect of vertical integration on penetration rates and prices. The full results for the effects of vertical integration on equilibrium prices are contained in Table A-8, and the full results for the effects of vertical integration on equilibrium penetration rates are contained in Table A-9. The results from 2002 are similar, but slightly different, than those for 1991. I note that in both cases, the changes in demographic variables show the greatest differences between 1991 and 2001. This finding may be interesting to some, but bears little relevance to the focus of this paper. Instead, I limit my discussion of the effects of vertical integration on these variables.

[10] Using a variety of ages of networks, and relative ages between rivals, addresses to some degree the difficulty discussed above with Clements and Abramowitz (2004).

[11] National Geographic is carried by a slightly lower fraction (0.623) of vertically integrated cable operators than the model predicts (0.629 or 0.630, depending on the particulars of the specification).

[12] In the case of National Geographic versus Discovery, the competitive pressure rationale is most believable, since the National Geographic brand name may allow the National Geographic channel a better chance at entering Discovery's product niche.

A. *Prices*

Chipty examined integration effects on both basic prices and on premium prices. Since my dataset does not include data on premium prices, I restrict my examination to the effects on a current equivalent to Chitpy's "price of basic cable." As I note elsewhere, especially in my explanation of variables in Table A-1 of the Appendix, changes in the industry since 1991 make the price of basic cable (*i.e.*, of the lowest package of service) less relevant today, I instead examine the effects of integration on the price of the "most popular service" that is, as FCC (2002) notes, generally the basic package plus the next higher tier of service.

Chipty found that integration with basic services had a small positive effect on basic prices, and that integration with premium services had a small negative effect on basic prices. My examination found the opposite for these two variables: integration with basic services has a small, but statistically significant, negative effect on the price of the most popular package, and integration with premium services has a small, but statistically significant, positive effect on equilibrium prices. Only one provider, Time Warner, is integrated with premium services, however, and other unobserved characteristics about that provider's markets may affect equilibrium prices; as noted above, Time Warner does, on average, offer more channels, which likely accounts for this effect.

Since I examine the price for a different service package than Chipty, futher investigation of prices for non-premium services is appropriate, to make direct comparisons more meaningful. As noted elsewhere, the industry has changed significantly, with cable operators offering many more channels in more packages, affording consumers more choice, both in terms of numbers of channels and in terms of the combinations of channels available. Since consumers are now paying more for more channels, it is reasonable to examine a "per-unit" price that at least partially accounts for quality differences. A simple per unit price is a per channel price, so I performed the same regression for most popular package prices, except using a per channel price for the most popular package as the dependent variable instead of the monthly rate.

This specification shows that cable operators integrated with basic networks charge a slightly higher per channel rate for the most popular package, and that Time Warner, the one cable operator integrated with premium networks charge a slightly lower per channel price, and that both variables are significant at a 95% confidence level or higher. Removing the variable measuring integration with premium services causes the coefficient of integration with basic services to change to zero and become statistically insignificant, but the fit is much poorer. I further note that the fit for the per channel specification is noticeably better than that for the monthly rate.

B. *Penetration Rates*

Chipty examined penetration in more detail than I did, with four different measures of penetration, including two measures of premium penetration. Since the *Price Survey* dataset did not collect data on premium penetration rates, I did not include these

variables and specifications. Instead, I examine only the effect of basic integration and premium integration on basic penetration.

In relation to equilibrium penetration rates, like Chipty, I find that vertical integration with basic services has a small positive effect on system penetration rates. The coefficient in Chipty's estimation was not significant at a 95% level of confidence, whereas in the current study, the coefficient is significant at a 99% level of confidence. Integration with premium services has a small negative, but statistically significant effect on penetration rates, but, as I note above, only Time Warner is integrated with premium services, and other unobserved characteristics about that provider's markets (such as the higher rate it charges may cause lower penetration rates.

VI. Effect of National Subscriber Reach

In addition to updating Chipty (2001), I also examined the effect of cable national subscriber reach (i.e., the number of subscribers a cable operator serves in total nationwide) on carriage of independent programming networks (i.e., cable networks with no cable operator ownership at all). To examine the effect of cable national subscriber reach on carriage of independent programming networks, reduced form parameters are estimated, using OLS, with number of independent networks as the dependent variable and independent variables similar to the OLS equations estimated previously. As before, both standard OLS errors and heteroskedasticity robust errors are reported. One important difference with previous equations is that a quadratic term for national cable subscribers is included as an independent variable, which will allow an examination of the curve in relation to national cable subscribership and, given certain results, allow the estimation of the level of national subscribership that leads to maximum carriage of independent networks.[13]

Given a quadratic equation such as:

$$Y = \beta_0 + \beta_1 X + \beta_2 X^2 + \mu$$

where Y is the number of independent networks carried, X is the national subscribership of the cable operator, β represents the estimated parameters, and μ is the error term, the independent effect of national subscribership on carriage of independent networks can be found by taking the derivative with respect to national subscribership, setting it equal to zero, and evaluating.[14] Mathematically,

$$\partial Y / \partial X = \beta_1 + 2^*(\beta_2 X)$$

and the effect of national subscribers can be examined. If β_1 is positive and β_2 is negative, then national subscribership initially has a positive relationship with carriage of independent networks, but reaches a maximum that can be solved for.

[13] Specifications with cubic and quartic terms for national subscribership were also estimated, but terms higher than the quadratic were not significant, so these specifications were abandoned.

[14] Obviously, this is a vast simplification of the full model, and this is done for ease of exposition. Of course, all other terms drop out when taking the derivative, so including them in the first equation adds no information.

The estimated parameters show just this result, as reported in Table A-11, below. The parameter for the number of national subscribers is positive and the parameter for number of national subscribers squared is negative. When this is evaluated, it indicates that the maximum number of independent networks carried will occur at 18.8 million national subscribers. This is lower than the current maximum number of subscribers served by Comcast (roughly 21 million), but this fact should not be given too much weight. Since 2002 data are used, the largest cable operator in the sample was AT&T, prior to its purchase by Comcast, serving only 13.2 million subscribers. Therefore, this is a prediction out of sample, and considerably less reliable than a result that occurs within sample. It may of course be possible that carriage of independent networks will curve again upwards at national subscriber counts higher than 13.2 million, but these data are incapable of revealing this possibility. Additionally, cable operators with larger subscriber counts have higher channel capacity, and may simply be running out of independent networks to carry. Finally, the coefficient on the quadratic term is not significant at traditional levels of statistical significance. Mainly, this result indicates that the increase in carriage of independent networks slows as national subscribers increases. Further examination of this trend with more recent data that reflects the current subscriber counts in the industry is warranted.

VII. Summary and Conclusion

In this study, I have updated older studies of the effects of vertical integration, following closely Chipty (2001). Using 2002 data, I examined the effects of vertical integration on cable operator programming offerings, number of channels, and prices. I find that there may be, in some cases, a small propensity to favor affiliated networks relative to rivals to those networks, but that it is not systematic, and that consumers subscribing to vertically integrated cable operators are offered more total channels divided into a greater number of packages. This means that these subscribers have more choice of services, and can choose from a larger variety of packages. In terms of the most popular package, vertically integrated operators offer fewer channels (offering them instead in additional packages), and in some cases charge slightly lower prices, and in other cases, slightly higher prices. Additionally, I examine the trend in carriage of independent networks as the number of subscribers served nationally by a cable operator increases, and estimate a model that predicts that the number of independent networks carried will peak at roughly 18.8 million subscribers. This prediction should be treated with great caution, however, since no cable operator served more than 13.2 million subscribers in July 2002, the date of the data used in this paper.

These findings can be summarized to say that vertical integration may allow some limited foreclosure, a potential harm (although this effect is small and may be caused by other, unobserved factors), and seems to confer also some efficiencies, which are passed onto consumers through more channels and more choices in how to receive services. Additionally, the fact that foreclosure is not universal (*i.e.*, not observed in every case) indicates that cable operators have limited incentive and/or ability to foreclose, perhaps limited by the ability of consumers to switch to DBS to gain access to more highly desired networks. The effect on prices is uncertain from this study, but not dramatic.

In other words, whatever harms are observed seem to be minor, uncertain, and attenuated, while there are clear efficiency benefits. While vertically integrated operators may engage in more subtle forms of discrimination, such as channel and tier placement, or advertising splits, the most obvious harm, foreclosure, is not systematic, and there is no obvious *quid pro quo* between vertically integrated cable operators concerning carriage of networks affiliated with other operators. While Chipty (2001) found more obvious vertical foreclosure behavior using 1991 data, the same cannot be said for 2002 data in a study that examines a wider variety of networks. The change in the interim may have occurred due to changes in the industry, such as increases in channel capacity or decreases in levels of vertical integration.

Finally, this straightforward update to Chipty's work points to areas for additional research. First, further examination of channel and tier placement of networks may reveal more subtle forms of discrimination. Second, recreating Chipty's (2001) demand estimation, but in a form that takes greater account of changes that have transpired in the industry since 1991, would allow a consumer welfare analysis to quantify the balance between harms and benefits of vertical integration. Third, a time series analysis of how changes in the industry affect the behavior of vertically integrated operators may reveal what factors could lead to harms from vertical integration in the future, and aid the FCC in monitoring the industry to prevent future harms. Fourth, further investigation of the carriage of independent cable networks by larger cable operators could reveal whether national reach encourages or impedes the carriage of independent networks.

Table A-1 – Variable Definitions and Means (N=658)

Theoretical Construct	Empirical Measure	Level	Mean
	Demographic variables		
Size of the television market	Designated Market Area (DMA) rank.	DMA market	49.29
	Number of television households.	DMA market	1,471,833.66
Income	Median household income.	ZCTA5	44,001.17
Older viewership	Percentage of population over 65.	ZCTA5	13.48
Younger viewership	Percentage of population between ages 5 and 15.	ZCTA5	14.14
Non-white viewership	Percentage of population non-white	ZCTA5	20.94
Household size	Persons per household.	ZCTA5	2.40
Urban	Population density	ZCTA5	2,377.84
	Price-quantity-service variables		
Price of most popular cable service	Monthly price for the first two tiers of channels.	Community	35.42
Basic penetration rate	Basic subscriptions divided by homes passed by the cable system.	Community	0.56
Premium services	Number of premium channels offered.	Community	77.12
Popular channels	Number of channels offered in most popular cable service.	Community	60.71
Total channels	Total channels offered.	Community	169.97
	System and owner characteristics		
System age	Number of years since franchise began.	Community	27.42
System size	System capacity.	System	672.23
	Number of homes passed locally.	System	175,279.90
Owner's horizontal size	Owner's subscribers nationally	Owner	7,365,731.07
Integration with basic services	Number of basic program services with which the system owner is vertically integrated.	Owner	4
Integration with premium services	Number of premium program services with which the system owner is vertically integrated.	Owner	2.19
Total integration	Number of total program services with which the system owner is vertically integrated.	Owner	6.19

Notes for Table A-1.

[1] For dummy variables, this column lists the number of observations corresponding to one.

[2] Chipty used area of dominant influence rank, which is no longer compiled. DMA rank is functionally equivalent. Higher numbers denote smaller television markets.

[3] Chipty also used in this category a variable called "basic program duplication," defined as, "number of basic progam services offered divided by the number of program service types offered." In other words, channels were divided into categories of programming, and the number of basic channels offered was divided into the number of categories. I did not include this variable, mainly because the variety of programming has increased dramatically since 1992, and I was faced with the choice of using Chipty's categories, or adding new categories to reflect changes in the industry, and both choices appear arbitrary.

Notes for Table A-1, continued.

[4] Chipty used monthly price of basic cable, or of the lowest tier (i.e., package of channels) of service. Regulatory changes since 1992 have led many cable operators to reduce the number of channels offered on the basic tier and to offer one or more additional tiers, or packages, of channels. I therefore used the most closely equivalent current measure, which is the price of the first two tiers of service, excluding premium services. On systems that offer only a basic tier and then premium services, I used the price of the basic tier alone. Chipty also included the price of premium cable, but we do not have the data for this variable, so it is excluded.

[5] Chipty used system channel capacity. I decided to use system capacity, measured in megahertz. In 1991, cable systems transmitted all signals in analog format, and only video service was offered. Therefore, megahertz and channel capacity were equivalent: system capacity in megahertz could be found by multiplying the channel capacity by six, or the number of megahertz required to transmit one analog channel. By 2002, however, many operators were transmitting channels using both analog and digital formats, and using some system capacity to offer additional services, such as high-speed Internet access, telephone, and video-on-demand. Digital transmission allows operators to compress multiple channels into the same six megahertz required to transmit one analog channel. Therefore, system capacity in megahertz is now a more accurate measure of a cable operator's total capacity to offer services.

Table A-2—Average Product Characteristics by Ownership Status

Variable	Full Sample $N = 658$	Unintegrated Systems $N = 324$	Basic Systems $N = 334$	Premium Systems $N = 96$
Price of most popular package	35.42	34.61	36.21	36.88
Basic Penetration Rate	0.56	0.54	0.58	0.56
Premium services	77.12	54.10	99.45	126.92
Most popular services	60.71	56.46	64.84	69.63
Integration with basic services	4.00	0.00	7.87	12
Integration with premium services	2.19	0.00	4.31	15

Notes: Unintegrated systems are systems where the operator is vertically unintegrated. Basic systems are systems where the operator owns at least one basic service. Premium systems are systems where the operator owns at least one premium service. (The definitions of premium and basic systems are slightly different than what Chipty used. Chipty counted systems owned by operators that were vertically integrated with premium services exclusively as premium systems, but not as basic systems, even if the operator was integrated with basic networks. Since the only operator integrated with premium networks is also integrated with a large number of basic networks (the most of any operator), I counted those systems as basic systems, in addition to breaking out their characteristics as premium systems above. I believe this operator's effect on integration with basic services cannot be ignored simply because it also owns premium services.)

Table A-3—Effects of Integration on the Equilibrium Number of Channels Offered

	Panel A: Channels Offered on Most Popular Package*					
	(1)			(2)		
Variable	Coefficient	t-statistic robust	t-statistic OLS	Coefficient	t-statistic robust	t-statistic OLS
Integration with basic services	-0.718	5.926	6.082	-0.903	6.068	6.159
Integration with premium services	0.601	7.716	6.764	0.705	7.657	6.384
Natural log of owner's horizontal size	0.382	2.294	2.254	0.547	2.440	2.597
System age	0.057	1.689	1.671	0.078	1.729	1.830
Natural log of homes passed	1.971	7.099	8.396	3.224	9.017	11.491
System capacity	0.043	16.548	18.891			
Natural log of income	1.889	1.590	1.557	1.917	1.274	1.269
Natural log of population density	0.915	3.824	3.716	1.821	5.304	6.048
Younger viewership	-0.104	0.878	0.916	-0.074	0.486	0.523
Older viewership	-0.002	0.042	0.037	-0.071	1.028	0.879
Non-white viewership	-0.023	0.909	1.066	-0.062	2.106	2.299
Household size	0.061	0.087	0.081	-0.141	0.135	0.151
Natural log of television households	0.992	1.119	1.060	0.662	0.631	0.569
DMA rank	-0.003	0.130	0.128	-0.014	0.548	0.540
Constant	-32.216	1.960	1.913	-18.677	0.898	0.891
Adjusted R-Squared		0.681			0.505	

	Panel B: Total Channels Offered					
	(1)			(2)		
Variable	Coefficient	t-statistic robust	t-statistic OLS	Coefficient	t-statistic robust	t-statistic OLS
Integration with basic services	1.207	1.984	1.914	0.505	0.733	0.710
Integration with premium services	2.754	6.373	5.807	3.150	6.664	5.885
Natural log of owner's horizontal size	2.945	3.414	3.254	3.574	3.823	3.497
System age	0.146	0.805	0.801	0.224	1.075	1.091
Natural log of homes passed	6.139	4.253	4.896	10.899	6.492	8.013
System capacity	0.162	12.162	13.434			
Natural log of income	9.048	1.434	1.396	9.156	1.189	1.250
Natural log of population density	4.206	3.030	3.196	7.646	4.492	5.239
Younger viewership	-0.499	0.769	0.822	-0.385	0.496	0.561
Older viewership	-0.445	1.477	1.278	-0.707	2.042	1.797
Non-white viewership	-0.014	0.111	0.126	-0.161	1.163	1.240
Household size	4.953	1.058	1.235	4.187	0.800	0.923
Natural log of television households	-8.119	1.279	1.625	-9.369	1.363	1.659
DMA rank	-0.236	1.855	2.171	-0.278	1.984	2.263
Constant	-62.278	0.634	0.692	-10.849	0.095	0.107
Adjusted R-Squared		0.636			0.535	

	Panel C: Premium Channels Offered					
	(1)			(2)		
Variable	Coefficient	t-statistic robust	t-statistic OLS	Coefficient	t-statistic robust	t-statistic OLS
Integration with basic services	2.280	4.574	4.922	1.883	3.520	3.780
Integration with premium services	1.317	3.730	3.778	1.541	4.099	4.105
Natural log of owner's horizontal size	0.917	1.508	1.378	1.272	2.079	1.775
System age	-0.013	0.096	0.099	0.031	0.209	0.217
Natural log of homes passed	2.863	2.894	3.107	5.553	5.132	5.823
System capacity	0.092	10.217	10.334			
Natural log of income	5.802	1.222	1.218	5.863	1.076	1.141
Natural log of population density	2.805	2.994	2.901	4.749	4.442	4.641
Younger viewership	-0.056	0.123	0.125	0.009	0.017	0.018
Older viewership	-0.229	0.999	0.895	(0.377)	1.484	1.367
Non-white viewership	0.007	0.070	0.078	(0.076)	0.783	0.837
Household size	1.931	0.608	0.655	1.498	0.455	0.471
Natural log of television households	-7.654	1.681	2.085	(8.361)	1.723	2.111
DMA rank	-0.164	1.800	2.057	(0.188)	1.927	2.183
Constant	-8.143	0.113	0.123	20.927	0.262	0.294
Adjusted R-Squared		0.541			0.465	

* The most popular package generally consists of the Basic, or lowest, tier, and the next highest tier, or package, of channels.

Table A-4—National Geographic (Independent) and Discovery (Integrated)

Panel A: Carry Independent Rival Network

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with rival	-0.228	(3.761)	(3.585)	-0.252	(4.178)	(4.100)
System owner vertically integrated with other networks	-0.089	(1.452)	(1.430)	-0.078	(1.299)	(1.284)
Natural log of owner's horizontal size	0.049	(4.336)	(4.307)	0.050	(4.339)	(4.421)
System age	0.003	(1.424)	(1.461)	0.003	(1.610)	(1.626)
Natural log of homes passed	0.010	(0.759)	(0.735)	0.033	(2.558)	(2.585)
System capacity	0.001	(6.045)	(6.219)			
Natural log of income	-0.035	(0.448)	(0.458)	-0.032	(0.429)	(0.425)
Natural log of population density	0.006	(0.380)	(0.357)	0.024	(1.680)	(1.680)
Younger viewership	-0.001	(0.103)	(0.104)	-0.001	(0.077)	(0.079)
Older viewership	-0.005	(0.995)	(1.063)	-0.006	(1.452)	(1.412)
Non-white viewership	-0.002	(1.530)	(1.603)	-0.003	(2.120)	(2.132)
Household size	0.057	(1.272)	(1.193)	0.046	(1.005)	(1.005)
Natural log of television households	-0.083	(1.425)	(1.460)	-0.085	(1.474)	(1.523)
DMA rank	-0.003	(2.285)	(2.319)	-0.003	(2.368)	(2.437)
Psuedo R-Squared		0.169			0.123	
Predicted fraction of all systems that carry independent rival		0.629			0.630	
Fraction of all systems that carry independent rival = 0.623						

Panel B: Carry Vertically Integrated Network*

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with rival	-0.004	(1.445)	(1.167)	-0.004	(1.331)	(1.105)
Natural log of owner's horizontal size	0.000	(1.618)	(1.220)	0.000	(1.590)	(1.212)
System age	0.000	(0.956)	(0.660)	0.000	(0.882)	(0.633)
Natural log of homes passed	0.001	(2.085)	(2.056)	0.001	(2.078)	(2.078)
System capacity	0.000	(0.987)	(0.621)			
Natural log of income	0.003	(1.363)	(1.309)	0.004	(1.351)	(1.267)
Natural log of population density	0.000	(0.900)	(0.369)	0.000	(0.976)	(0.405)
Younger viewership	0.000	(2.037)	(1.689)	-0.001	(1.982)	(1.654)
Older viewership	0.000	(3.354)	(1.454)	0.000	(3.234)	(1.388)
Non-white viewership	0.000	(1.148)	(1.315)	0.000	(1.164)	(1.332)
Household size	0.002	(2.175)	(1.322)	0.003	(2.090)	(1.284)
Natural log of television households	-0.002	(1.524)	(1.148)	-0.002	(1.502)	(1.100)
DMA rank	0.000	(1.233)	(0.881)	0.000	(1.135)	(0.809)
Psuedo R-Squared		0.329			0.325	
Predicted fraction of all systems that carry vertically integrated network		0.988			0.988	
Fraction of all systems that carry vertically integrated network = 0.988						

Panel C: Carry Both Networks

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with rival	-0.228	(3.706)	(3.556)	-0.252	(4.129)	(4.073)
System owner vertically integrated with other networks	-0.089	(1.418)	(1.402)	-0.078	(1.263)	(1.252)
Natural log of owner's horizontal size	0.049	(4.225)	(4.228)	0.050	(4.251)	(4.358)
System age	0.003	(1.461)	(1.500)	0.003	(1.642)	(1.662)
Natural log of homes passed	0.010	(1.081)	(1.034)	0.033	(2.878)	(2.881)
System capacity	0.001	(6.150)	(6.283)			
Natural log of income	-0.035	(0.309)	(0.314)	-0.032	(0.283)	(0.278)
Natural log of population density	0.006	(0.413)	(0.388)	0.024	(1.734)	(1.735)
Younger viewership	-0.001	(0.327)	(0.334)	-0.001	(0.287)	(0.299)
Older viewership	-0.005	(0.831)	(0.885)	-0.006	(1.294)	(1.254)
Non-white viewership	-0.002	(1.385)	(1.453)	-0.003	(1.982)	(1.989)
Household size	0.057	(1.481)	(1.406)	0.046	(1.180)	(1.198)
Natural log of television households	-0.083	(1.523)	(1.566)	-0.085	(1.574)	(1.635)
DMA rank	-0.003	(2.254)	(2.292)	-0.003	(2.342)	(2.417)
Psuedo R-Squared		0.169			0.123	
Predicted fraction of all systems that carry both		0.629			0.630	
Fraction of all systems that carry both = 0.623						

* Vertical integration with another programming network perfectly predicts carrying vertically integrated network, so it is dropped from Panel B.

Table A-5—CNBC (Independent) and CNNfn (Integrated)

Panel A: Carry Independent Rival Network

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with rival	0.013	(0.961)	(1.038)	0.021	(1.587)	(1.472)
System owner vertically integrated with other networks	0.012	(1.069)	(1.138)	0.010	(0.773)	(0.793)
Natural log of owner's horizontal size	-0.001	(0.926)	(0.912)	-0.002	(1.224)	(1.205)
System age	0.001	(2.477)	(2.419)	0.001	(3.049)	(2.756)
Natural log of homes passed	0.003	(1.667)	(1.662)	0.008	(3.541)	(3.504)
System capacity	0.000	(5.155)	(5.297)			
Natural log of income	0.039	(2.719)	(2.171)	0.057	(3.243)	(2.910)
Natural log of population density	0.005	(1.984)	(1.764)	0.009	(3.158)	(3.083)
Younger viewership	-0.003	(1.927)	(1.941)	-0.003	(2.160)	(2.087)
Older viewership	0.000	(0.305)	(0.316)	0.000	(0.291)	(0.350)
Non-white viewership	0.000	(0.534)	(0.500)	0.000	(0.282)	(0.286)
Household size	-0.004	(0.537)	(0.561)	-0.005	(0.640)	(0.721)
Natural log of television households	0.025	(1.785)	(1.294)	0.027	(1.761)	(1.319)
DMA rank	0.000	(1.434)	(1.112)	0.000	(1.403)	(1.121)
Psuedo R-Squared		0.477			0.403	
Predicted fraction of all systems that carry independent rival		0.900			0.901	

Fraction of all systems that carry independent rival = 0.901

Panel B: Carry Vertically Integrated Network

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with rival	0.548	(7.348)	(7.193)	0.536	(7.033)	(7.072)
System owner vertically integrated with other networks	-0.137	(3.208)	(3.033)	-0.161	(3.576)	(3.396)
Natural log of owner's horizontal size	-0.026	(2.387)	(2.326)	-0.018	(1.607)	(1.612)
System age	0.001	(0.766)	(0.747)	0.001	(0.478)	(0.466)
Natural log of homes passed	0.087	(6.014)	(5.845)	0.096	(6.713)	(6.480)
System capacity	0.001	(5.729)	(4.534)			
Natural log of income	0.064	(0.972)	(0.909)	0.071	(1.063)	(0.977)
Natural log of population density	-0.003	(0.208)	(0.234)	0.012	(0.762)	(0.888)
Younger viewership	0.003	(0.449)	(0.421)	0.004	(0.611)	(0.576)
Older viewership	-0.004	(1.006)	(0.934)	-0.006	(1.482)	(1.346)
Non-white viewership	0.000	(0.249)	(0.240)	-0.001	(0.634)	(0.616)
Household size	-0.097	(1.664)	(1.761)	-0.104	(1.660)	(1.824)
Natural log of television households	-0.150	(2.784)	(2.717)	-0.159	(2.727)	(2.769)
DMA rank	-0.003	(2.270)	(2.313)	-0.003	(2.329)	(2.391)
Psuedo R-Squared		0.356			0.325	
Predicted fraction of all systems that carry vertically integrated network		0.282			0.282	

Fraction of all systems that carry vertically integrated network = 0.283

Panel C: Carry Both Networks

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with rival	0.544	(7.347)	(7.173)	0.534	(7.040)	(7.056)
System owner vertically integrated with other networks	-0.147	(3.503)	(3.300)	-0.171	(3.860)	(3.655)
Natural log of owner's horizontal size	-0.025	(2.323)	(2.263)	-0.017	(1.548)	(1.554)
System age	0.001	(0.774)	(0.755)	0.001	(0.488)	(0.477)
Natural log of homes passed	0.085	(5.936)	(5.772)	0.094	(6.636)	(6.406)
System capacity	0.001	(5.710)	(4.517)			
Natural log of income	0.074	(1.126)	(1.055)	0.081	(1.216)	(1.120)
Natural log of population density	-0.005	(0.321)	(0.361)	0.010	(0.645)	(0.753)
Younger viewership	0.003	(0.400)	(0.376)	0.004	(0.563)	(0.532)
Older viewership	-0.004	(0.977)	(0.910)	-0.006	(1.453)	(1.324)
Non-white viewership	0.000	(0.019)	(0.018)	-0.001	(0.412)	(0.399)
Household size	-0.096	(1.672)	(1.764)	-0.104	(1.670)	(1.830)
Natural log of television households	-0.141	(2.656)	(2.569)	-0.150	(2.608)	(2.623)
DMA rank	-0.003	(2.175)	(2.211)	-0.003	(2.238)	(2.289)
Psuedo R-Squared		0.358			0.327	
Predicted fraction of all systems that carry both		0.279			0.279	

Fraction of all systems that carry both = 0.280

Table A-6—USA (Independent) and TNT (Integrated)*

Panel A: Carry Independent Rival Network

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with other networks	-0.013	(3.053)	(1.897)	-0.018	(3.137)	(2.029)
Natural log of owner's horizontal size	0.001	(2.228)	(1.916)	0.001	(2.133)	(1.814)
System age	0.000	(1.069)	(0.704)	0.000	(1.016)	(0.656)
Natural log of homes passed	0.000	(0.525)	(0.614)	0.001	(1.077)	(1.400)
System capacity	0.000	(3.323)	(2.107)			
Natural log of income	0.000	(0.060)	(0.066)	0.001	(0.198)	(0.208)
Natural log of population density	0.000	(0.630)	(0.482)	0.001	(1.284)	(1.062)
Younger viewership	0.000	(0.704)	(0.525)	0.000	(0.986)	(0.749)
Older viewership	0.000	(0.560)	(0.370)	0.000	(0.836)	(0.563)
Non-white viewership	0.000	(0.728)	(0.557)	0.000	(0.814)	(0.593)
Household size	0.002	(1.048)	(0.739)	0.003	(1.079)	(0.809)
Natural log of television households	0.003	(0.732)	(0.490)	0.002	(0.544)	(0.379)
DMA rank	0.000	(0.181)	(0.142)	0.000	(0.081)	(0.068)
Psuedo R-Squared		0.377			0.338	
Predicted fraction of all systems that carry independent rival		0.980			0.980	
Fraction of all systems that carry independent rival = 0.980						

Panel B: Carry Vertically Integrated Network

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with other networks	-0.004	(0.662)	(0.706)	-0.004	(0.670)	(0.722)
Natural log of owner's horizontal size	0.001	(1.485)	(1.225)	0.001	(1.494)	(1.237)
System age	0.000	(0.607)	(0.407)	0.000	(0.596)	(0.402)
Natural log of homes passed	0.001	(1.327)	(1.272)	0.001	(1.383)	(1.447)
System capacity	0.000	(0.232)	(0.124)			
Natural log of income	0.005	(0.691)	(0.746)	0.005	(0.701)	(0.751)
Natural log of population density	0.000	(0.284)	(0.262)	0.000	(0.271)	(0.253)
Younger viewership	-0.001	(2.319)	(1.708)	-0.001	(2.345)	(1.711)
Older viewership	0.000	(0.232)	(0.191)	0.000	(0.230)	(0.190)
Non-white viewership	0.000	(2.257)	(1.783)	0.000	(2.276)	(1.781)
Household size	0.007	(2.202)	(1.672)	0.007	(2.200)	(1.672)
Natural log of television households	-0.003	(0.805)	(0.713)	-0.003	(0.789)	(0.707)
DMA rank	0.000	(0.703)	(0.558)	0.000	(0.704)	(0.557)
Psuedo R-Squared		0.257			0.256	
Predicted fraction of all systems that carry vertically integrated network		0.979			0.979	
Fraction of all systems that carry vertically integrated network = 0.979						

Panel C: Carry Both Networks

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with other networks	-0.022	(1.729)	(1.662)	-0.025	(1.879)	(1.826)
Natural log of owner's horizontal size	0.004	(2.677)	(2.523)	0.004	(2.755)	(2.571)
System age	0.000	(0.304)	(0.216)	0.000	(0.262)	(0.186)
Natural log of homes passed	0.001	(0.628)	(0.664)	0.003	(1.097)	(1.251)
System capacity	0.000	(2.191)	(1.440)			
Natural log of income	0.012	(0.766)	(0.766)	0.013	(0.840)	(0.829)
Natural log of population density	0.000	(0.082)	(0.071)	0.001	(0.208)	(0.186)
Younger viewership	-0.003	(2.308)	(1.814)	-0.003	(2.426)	(1.886)
Older viewership	0.000	(0.388)	(0.265)	0.000	(0.471)	(0.327)
Non-white viewership	0.000	(1.252)	(1.178)	0.000	(1.177)	(1.100)
Household size	0.020	(2.406)	(1.867)	0.020	(2.409)	(1.898)
Natural log of television households	-0.007	(0.631)	(0.670)	-0.007	(0.584)	(0.608)
DMA rank	0.000	(0.979)	(0.974)	0.000	(0.996)	(0.980)
Psuedo R-Squared		0.273			0.263	
Predicted fraction of all systems that carry both		0.965			0.965	
Fraction of all systems that carry both = 0.965						

* Vertical integration with the integrated network perfectly predicts carrying both networks, so it is dropped from all Panels.

Table A-7—MSNBC (Independent) and CNN (Integrated)**

Panel A: Carry Independent Rival Network

Variable	(1) Marginal effect	(1) t-statistic robust	(1) t-statistic probit	(2) Marginal effect	(2) t-statistic robust	(2) t-statistic probit
System owner vertically integrated with rival	0.023	(0.440)	(0.445)	0.034	(0.642)	(0.646)
System owner vertically integrated with other networks	-0.062	(1.613)	(1.617)	-0.086	(2.229)	(2.153)
Natural log of owner's horizontal size	0.004	(0.734)	(0.717)	0.004	(0.655)	(0.649)
System age	0.003	(2.312)	(2.326)	0.004	(2.592)	(2.652)
Natural log of homes passed	0.023	(2.727)	(2.850)	0.041	(4.411)	(4.967)
System capacity	0.001	(6.369)	(6.769)			
Natural log of income	0.021	(0.484)	(0.437)	0.039	(0.763)	(0.756)
Natural log of population density	0.004	(0.437)	(0.425)	0.019	(1.895)	(2.079)
Younger viewership	0.003	(0.802)	(0.786)	0.004	(0.789)	(0.830)
Older viewership	0.002	(0.791)	(0.663)	0.001	(0.451)	(0.433)
Non-white viewership	-0.002	(2.411)	(2.503)	-0.002	(2.721)	(2.781)
Household size	0.050	(2.108)	(1.849)	0.045	(1.680)	(1.601)
Natural log of television households	0.000	0.000	0.000	-0.001	(0.034)	(0.032)
DMA rank	0.000	(0.279)	(0.262)	0.000	(0.427)	(0.418)
Psuedo R-Squared		0.283			0.199	
Predicted fraction of all systems that carry independent rival		0.834			0.834	

Fraction of all systems that carry independent rival = 0.836

Panel B: Carry Vertically Integrated Network

Variable	(1) Marginal effect	(1) t-statistic robust	(1) t-statistic probit	(2) Marginal effect	(2) t-statistic robust	(2) t-statistic probit
System owner vertically integrated with other networks	-0.004	(4.120)	(2.107)	-0.004	(3.925)	(2.119)
Natural log of owner's horizontal size	0.000	(1.255)	(0.565)	0.000	(1.275)	(0.584)
System age	0.000	(1.707)	(1.196)	0.000	(1.603)	(1.132)
Natural log of homes passed	0.000	(1.120)	(0.956)	0.000	(1.499)	(1.272)
System capacity	0.000	(1.366)	(0.832)			
Natural log of income	0.001	(1.315)	(1.178)	0.001	(1.400)	(1.236)
Natural log of population density	0.000	(1.813)	(0.685)	0.000	(1.631)	(0.552)
Younger viewership	0.000	(2.208)	(1.358)	0.000	(2.333)	(1.425)
Older viewership	0.000	(0.951)	(0.371)	0.000	(0.904)	(0.374)
Non-white viewership	0.000	(0.162)	(0.103)	0.000	(0.249)	(0.155)
Household size	0.001	(2.038)	(1.110)	0.001	(2.118)	(1.111)
Natural log of television households	0.003	(2.507)	(1.983)	0.004	(2.571)	(2.009)
DMA rank	0.000	(2.746)	(2.037)	0.000	(2.828)	(2.051)
Psuedo R-Squared		0.314			0.305	
Predicted fraction of all systems that carry vertically integrated network		0.989			0.989	

Fraction of all systems that carry vertically integrated network = 0.989

Panel C: Carry Both Networks

Variable	(1) Marginal effect	(1) t-statistic robust	(1) t-statistic probit	(2) Marginal effect	(2) t-statistic robust	(2) t-statistic probit
System owner vertically integrated with rival	0.024	(0.452)	(0.458)	0.036	(0.658)	(0.664)
System owner vertically integrated with other networks	-0.066	(1.712)	(1.713)	-0.090	(2.314)	(2.231)
Natural log of owner's horizontal size	0.005	(0.806)	(0.787)	0.004	(0.722)	(0.714)
System age	0.003	(2.024)	(2.055)	0.003	(2.340)	(2.408)
Natural log of homes passed	0.024	(2.807)	(2.940)	0.042	(4.455)	(5.035)
System capacity	0.001	(6.384)	(6.739)			
Natural log of income	0.022	(0.499)	(0.448)	0.039	(0.767)	(0.757)
Natural log of population density	0.004	(0.432)	(0.418)	0.019	(1.883)	(2.063)
Younger viewership	0.003	(0.733)	(0.710)	0.003	(0.713)	(0.745)
Older viewership	0.002	(0.766)	(0.641)	0.001	(0.422)	(0.403)
Non-white viewership	-0.002	(2.626)	(2.741)	-0.003	(2.920)	(3.005)
Household size	0.055	(2.309)	(2.023)	0.050	(1.831)	(1.757)
Natural log of television households	-0.002	(0.056)	(0.052)	-0.003	(0.080)	(0.075)
DMA rank	0.000	(0.283)	(0.263)	0.000	(0.431)	(0.419)
Psuedo R-Squared		0.281			0.198	
Predicted fraction of all systems that carry both		0.832			0.832	

Fraction of all systems that carry both = 0.834

** Vertical integration with vertically integrated network perfectly predicts carrying it, so it is dropped from Panel B.

Table A-8—Bravo (Independent) and TCM (Integrated)

Panel A: Carry Independent Rival Network

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with rival	0.064	(0.950)	(0.909)	0.069	(1.036)	(0.986)
System owner vertically integrated with other networks	-0.168	(3.032)	(3.111)	-0.189	(3.423)	(3.563)
Natural log of owner's horizontal size	0.061	(5.855)	(5.987)	0.060	(5.901)	(5.986)
System age	0.000	(0.201)	(0.190)	0.001	(0.512)	(0.490)
Natural log of homes passed	3.574	(0.147)	(0.141)	0.023	(2.011)	(2.001)
System capacity	0.059	(5.652)	(5.901)			
Natural log of income	3.710	(2.654)	(2.680)	0.212	(2.894)	(2.887)
Natural log of population density	0.968	(1.043)	(1.001)	0.030	(2.401)	(2.332)
Younger viewership	-0.012	(1.989)	(1.732)	-0.011	(1.900)	(1.723)
Older viewership	0.001	(0.192)	(0.159)	0.000	(0.057)	(0.048)
Non-white viewership	0.000	(0.230)	(0.250)	-0.001	(0.548)	(0.577)
Household size	2.558	(0.487)	(0.505)	0.014	(0.328)	(0.343)
Natural log of television households	-5.009	(2.742)	(3.211)	0.202	(2.851)	(3.306)
DMA rank	0.003	(2.254)	(2.482)	0.003	(2.277)	(2.537)
Psuedo R-Squared		0.305			0.259	
Predicted fraction of all systems that carry independent rival		0.717			0.717	
Fraction of all systems that carry carry independent rival = 0.716						

Panel B: Carry Vertically Integrated Network

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with rival	0.170	(3.746)	(3.641)	0.170	(3.556)	(3.604)
System owner vertically integrated with other networks	0.063	(1.788)	(1.754)	0.050	(1.397)	(1.375)
Natural log of owner's horizontal size	-0.016	(2.420)	(2.301)	-0.015	(2.224)	(2.135)
System age	-0.002	(1.093)	(1.068)	-0.001	(0.854)	(0.825)
Natural log of homes passed	0.024	(2.655)	(2.548)	0.036	(3.862)	(3.974)
System capacity	0.000	(4.222)	(4.116)			
Natural log of income	0.051	(0.952)	(0.972)	0.059	(1.091)	(1.104)
Natural log of population density	0.002	(0.250)	(0.230)	0.011	(1.108)	(1.058)
Younger viewership	0.001	(0.262)	(0.269)	0.001	(0.275)	(0.287)
Older viewership	-0.003	(1.159)	(1.127)	-0.003	(1.242)	(1.229)
Non-white viewership	-0.001	(0.795)	(0.862)	-0.001	(1.057)	(1.108)
Household size	-0.015	(0.461)	(0.501)	-0.018	(0.551)	(0.623)
Natural log of television households	-0.048	(1.140)	(1.227)	-0.052	(1.223)	(1.298)
DMA rank	-0.001	(1.039)	(1.082)	-0.001	(1.174)	(1.225)
Psuedo R-Squared		0.160			0.133	
Predicted fraction of all systems that carry vertically integrated network		0.812			0.812	
Fraction of all systems that carry vertically integrated network = 0.812						

Panel C: Carry Both Networks

	(1)			(2)		
Variable	Marginal effect	t-statistic robust	t-statistic probit	Marginal effect	t-statistic robust	t-statistic probit
System owner vertically integrated with rival	0.203	(2.879)	(2.755)	0.197	(2.808)	(2.697)
System owner vertically integrated with other networks	-0.114	(2.027)	(2.035)	-0.136	(2.446)	(2.459)
Natural log of owner's horizontal size	0.053	(4.651)	(4.602)	0.054	(4.798)	(4.727)
System age	-0.001	(0.695)	(0.663)	-0.001	(0.470)	(0.450)
Natural log of homes passed	0.008	(0.600)	(0.553)	0.028	(2.163)	(2.111)
System capacity	0.001	(4.975)	(4.988)			
Natural log of income	0.194	(2.397)	(2.519)	0.202	(2.546)	(2.622)
Natural log of population density	0.020	(1.339)	(1.266)	0.034	(2.379)	(2.295)
Younger viewership	-0.006	(0.932)	(0.856)	-0.006	(0.881)	(0.834)
Older viewership	0.001	(0.221)	(0.197)	0.000	(0.017)	(0.015)
Non-white viewership	-0.001	(0.738)	(0.800)	-0.001	(1.075)	(1.135)
Household size	0.024	(0.533)	(0.490)	0.018	(0.414)	(0.392)
Natural log of television households	0.085	(1.300)	(1.426)	0.084	(1.311)	(1.426)
DMA rank	0.001	(0.911)	(0.954)	0.001	(0.858)	(0.903)
Psuedo R-Squared		0.219			0.190	
Predicted fraction of all systems that carry both		0.636			0.636	
Fraction of all systems that carry both = 0.635						

Table A-9—Effects of Integration on the Equilibrium Prices

Panel A: Monthly Price of Most Popular Package*

Variable	(1) Coefficient	(1) t-statistic robust	(1) t-statistic OLS	(2) Coefficient	(2) t-statistic robust	(2) t-statistic OLS	(3) Coefficient	(3) t-statistic robust	(3) t-statistic OLS	(4) Coefficient	(4) t-statistic robust	(4) t-statistic OLS
Integration with basic services	-0.360	6.191	5.591	-0.388	6.358	5.928	-0.224	4.852	4.724	-0.238	4.917	4.936
Integration with premium services	0.150	3.644	3.099	0.166	3.950	3.366						
Natural log of owner's horizontal size	0.808	8.251	8.754	0.834	8.424	8.856	0.800	8.161	8.608	0.825	8.329	8.700
System age	0.068	3.558	3.647	0.071	3.672	3.742	0.068	3.564	3.662	0.072	3.683	3.761
Natural log of homes passed	0.435	3.164	3.396	0.627	4.570	5.003	0.381	2.818	2.986	0.575	4.214	4.559
System capacity	0.007	5.073	5.319				0.007	5.263	5.486			
Natural log of income	0.076	0.131	0.114	0.080	0.136	0.118	-0.006	0.010	0.009	-0.010	0.018	0.015
Natural log of population density	0.015	0.114	0.112	0.154	1.132	1.145	0.005	0.036	0.035	0.148	1.080	1.094
Younger viewership	-0.014	0.263	0.228	-0.010	0.172	0.150	-0.008	0.151	0.132	-0.003	0.050	0.044
Older viewership	-0.099	3.455	2.789	-0.110	3.957	3.028	-0.100	3.487	2.800	-0.111	4.031	3.058
Non-white viewership	-0.017	1.434	1.405	-0.022	1.916	1.877	-0.018	1.585	1.563	-0.025	2.098	2.086
Household size	-0.911	2.587	2.226	-0.942	2.535	2.254	-0.906	2.578	2.200	-0.938	2.517	2.227
Natural log of television households	0.337	0.628	0.661	0.287	0.515	0.551	0.185	0.343	0.362	0.116	0.206	0.221
DMA rank	-0.001	0.098	0.105	-0.003	0.236	0.253	-0.005	0.399	0.427	-0.007	0.567	0.669
Constant	12.207	1.307	1.330	14.285	1.487	1.526	15.658	1.687	1.707	18.203	1.910	1.964
Adjusted R-Squared		0.335			0.307			0.326			0.296	

Panel B: Monthly Per Channel Rate for Most Popular Package*

Variable	(1) Coefficient	(1) t-statistic robust	(1) t-statistic OLS	(2) Coefficient	(2) t-statistic robust	(2) t-statistic OLS	(3) Coefficient	(3) t-statistic robust	(3) t-statistic OLS	(4) Coefficient	(4) t-statistic robust	(4) t-statistic OLS
Integration with basic services	0.004	2.266	1.896	0.006	3.162	2.637	0.000	0.251	0.213	0.001	0.949	0.811
Integration with premium services	-0.004	4.072	2.550	-0.005	4.744	2.991						
Natural log of owner's horizontal size	0.015	4.393	4.789	0.013	3.221	3.738	0.015	4.471	4.847	0.013	3.290	3.796
System age	-0.001	1.974	1.938	-0.001	2.052	2.103	-0.001	1.991	1.962	-0.001	2.076*	2.133
Natural log of homes passed	-0.034	5.393	7.986	-0.050	6.794	10.766	-0.033	5.240	7.680	-0.048	6.600	10.444
System capacity	-0.001	11.661	12.364				-0.001	11.781	12.494			
Natural log of income	-0.034	1.266	1.511	-0.034	1.195	1.373	-0.031	1.184	1.404	-0.031	1.091	1.247
Natural log of population density	-0.011	2.629	2.340	-0.021	4.305	4.352	-0.010	2.551	2.268	-0.021	4.217	4.283
Younger viewership	0.001	0.690	0.548	0.001	0.400	0.338	0.001	0.596	0.468	0.001	0.288	0.242
Older viewership	-0.003	2.541	2.382	-0.002	1.710	1.523	-0.003	2.496	2.348	-0.002	1.658	1.475
Non-white viewership	0.000	0.487	0.557	0.001	1.416	1.559	0.000	0.610	0.691	0.001	1.585	1.731
Household size	-0.036	2.996	2.588	-0.033	2.290	2.170	-0.036	2.970	2.587	-0.033	2.260	2.165
Natural log of television households	0.000	0.016	0.014	0.004	0.251	0.220	0.004	0.283	0.260	0.010	0.582	0.512
DMA rank	0.000	0.445	0.481	0.000	0.701	0.754	0.000	0.694	0.747	0.000	0.995	1.071
Constant	1.659	4.389	5.359	1.496	3.718	4.351	1.564	4.180	5.065	1.369	3.423	3.986
Adjusted R-Squared		0.476			0.353			0.472			0.345	

* The most popular package generally consists of the Basic, or lowest, tier, and the next highest tier, or package, of channels.

Table A-10—Effects of Integration on Equilibrium Penetration Rate

Panel A: Basic Penetration Rate, Integration with Premium Services Included

	(1)			(2)		
Variable	Coefficient	Robust	WLS	Coefficient	Robust	WLS
Integration with basic services	0.010	7.051	6.019	0.010	7.101	6.023
Integration with premium services	-0.006	5.497	4.255	-0.006	5.448	4.193
Natural log of owner's horizontal size	-0.006	1.702	1.945	-0.005	1.519	1.731
System age	0.006	10.770	11.113	0.006	10.807	11.124
System capacity	0.000	1.991	2.044			
Natural log of income	0.005	0.271	0.271	0.006	0.291	0.290
Natural log of population density	-0.011	2.823	2.784	-0.009	2.338	2.278
Younger viewership	0.004	2.075	2.150	0.004	2.125	2.196
Older viewership	0.001	0.842	0.889	0.001	0.652	0.684
Non-white viewership	-0.001	3.528	3.638	-0.001	3.710	3.815
Household size	-0.011	0.967	0.851	-0.012	1.047	0.922
Natural log of television households	0.037	2.280	2.397	0.036	2.193	2.316
DMA rank	0.001	1.865	1.926	0.001	1.762	1.821
Constant	-0.140	0.528	0.505	-0.095	0.358	0.340
Adjusted R-Squared		0.247			0.244	

Panel B: Basic Penetration Rate, Integration with Premium Services Not Included

	(1)			(2)		
Variable	Coefficient	Robust	WLS	Coefficient	Robust	WLS
Integration with basic services	0.006	4.753	4.214	0.006	4.838	4.274
Natural log of owner's horizontal size	-0.005	1.523	1.728	-0.005	1.353	1.531
System age	0.006	10.748	10.946	0.006	10.786	10.959
System capacity	0.000	1.900	1.911			
Natural log of income	0.009	0.432	0.427	0.009	0.449	0.443
Natural log of population density	-0.010	2.549	2.498	-0.008	2.082	2.022
Younger viewership	0.004	1.901	1.963	0.004	1.950	2.008
Older viewership	0.001	0.815	0.848	0.001	0.634	0.657
Non-white viewership	-0.001	3.280	3.327	-0.001	3.456	3.499
Household size	-0.011	0.945	0.843	-0.012	1.021	0.910
Natural log of television households	0.042	2.595	2.739	0.041	2.510	2.660
DMA rank	0.001	2.261	2.328	0.001	2.161	2.225
Constant	-0.260	0.966	0.929	-0.216	0.805	0.770
Adjusted R-Squared		0.227			0.224	

Table A-11—Effects of Number of National Subscribers Served by Cable Operators on Independent Network Carriage

	Dependent Variable: Number of Independent Networks Carried		
Variable	Coefficient	Robust	OLS
Integration with basic services	-0.968	4.300	4.150
Integration with premium services	0.797	5.370	4.350
Owner's horizontal size	1.960E-06	3.260	3.890
Owner's horizontal size squared	-5.210E-14	1.360	1.480
System age	0.214	3.190	3.280
Natural log of homes passed	3.514	5.800	7.860
System capacity	0.059	10.810	13.540
Natural log of income	3.356	1.600	1.430
Natural log of population density	0.806	1.560	1.710
Younger viewership	-0.335	1.300	1.540
Older viewership	-0.160	1.450	1.280
Non-white viewership	-0.005	0.100	0.110
Household size	2.568	1.280	1.790
Natural log of television households	-4.845	2.190	2.490
DMA rank	-0.078	1.740	1.950
Number of broadcast channels	0.229	1.070	1.030
Constant	11.406	0.320	0.340
Adjusted R-Squared		0.615	

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