

THE SATELLITE HOME VIEWER IMPROVEMENT ACT: PRICE AND QUALITY IMPACT OF DIRECT BROADCAST SATELLITE COMPANIES' PROVISION OF LOCAL BROADCAST NETWORKS

Michael E. Clements and Stephen M. Brown¹
U.S. General Accounting Office

In the subscription video industry, cable-based companies – the dominant firms – face competition from a competitive fringe – satellite-based companies. Prior to 1999, satellite-based companies operated under a government-created competitive disadvantage. These companies were generally not permitted to deliver local broadcast networks (such as affiliates of ABC or CBS) to their subscribers; cable-based companies did not face this constraint. With passage of the Satellite Home Viewer Improvement Act of 1999, the Congress removed this asymmetry and created a more level competitive environment. We estimate a three-equation structural model to test the impact of direct broadcast satellite (DBS) companies' – the primary satellite-based companies – provision of local broadcast networks. We find that when both DBS companies provide local broadcast networks, cable-based companies improve the quality of service they provide to their subscribers, although we find no impact on the price for cable service.

1. Introduction

In the economics literature, a long tradition exists in the study of the reasons behind and impact of government intervention in various industries. One industry encountering extensive government intervention is the subscription video industry, an industry that includes cable-based and satellite-based delivery of video programming to subscribers. On the cable side, the industry has encountered periods of regulation and deregulation since 1984. Satellite-based companies face government intervention through their use of the radio frequency spectrum, which the government strictly controls. In addition, both cable-based and satellite-based companies face government intervention in their interaction with their primary input suppliers, namely the companies that supply programming. In this paper, we examine one aspect of this government intervention. Specifically, we examine the impact of the Satellite Home Viewer Improvement Act,

¹The opinions expressed in this paper are solely those of the authors and do not represent the opinions or positions of the U.S. General Accounting Office.

legislation that removed an element of asymmetric regulation in the subscription video industry.

2. Satellite Industry and Its Legal Environment

Technological advances provided a necessary condition for satellite-based subscription video service to compete with cable-based service. Satellite-based service emerged in the 1970s as an alternative to cable in rural areas where over-the-air broadcast signals and cable-based service were not available. These early satellite-based services - known as direct to home (DTH) satellite service - were low-powered services that operated in the C-band of the spectrum. Because of the low power, DTH service required large dishes, generally 4 to 8 feet in diameter, to receive the satellite signal. This limited satellite-based service to more rural areas. However, in 1994, a new satellite-based service - direct broadcast satellite (DBS) - emerged. DBS is a high-powered service that operates in the Ku-band of the spectrum. Because of the high power, DBS service requires a relatively small dish - 18 inches in diameter - to receive the satellite signal. This smaller dish size makes satellite-based service feasible to a much wider market, including suburban and urban areas.

These technological advances were not a sufficient condition for satellite and cable competition, as legal barriers prevented satellite-based services from providing local broadcast networks (such as affiliates of ABC and CBS) to most subscribers. Prior to 1999, the Satellite Home Viewer Act (SHVA) of 1988 governed satellite-based companies. Through the SHVA, the Congress sought to protect local broadcast networks, while granting satellite-based companies the opportunity to deliver broadcast networks to unserved households.² The SHVA had the general effect of preventing satellite-based companies from delivering local broadcast networks to subscribers in most circumstances.³ At the same time, a 1976 copyright law and the Cable Television

²A household was defined unserved if it (1) was unable to receive an over-the-air signal of grade B intensity and (2) had not received cable service in the preceding 90 days.

³See, Federal Communications Commission, *In the Matter of: Implementation of the Satellite Home Viewer Improvement Act of 1999, Notice of Proposed Rulemaking*, FCC 99-406 (Washington, DC: Federal Communications Commission, December 22, 1999), 3.

Consumer Protection and Competition Act of 1992 governed cable-based companies. These statutes permitted cable-based companies to deliver local broadcast networks to their subscribers. This asymmetric legal environment placed satellite-based companies at a significant competitive disadvantage, as even the lowest rated broadcast network has full-day ratings that far exceed the highest-rated non-broadcast (or cable-only) network.

In late 1999, the Congress passed the Satellite Home Viewer Improvement Act (SHVIA) that removed the asymmetric legal environment. For the first time, satellite-based companies were permitted to provide local broadcast networks in local television markets.⁴ This new service is commonly referred to as local-into-local, as the signals of local broadcast networks are retransmitted via satellite into local markets. SHVIA gives satellite-based companies the choice, but not the requirement, to provide local broadcast networks.⁵ Both cable-based and satellite-based companies must negotiate with local broadcast networks for retransmission rights to provide the local broadcast networks to subscribers via their systems.⁶ The legislation further requires that local broadcast networks, through 2006, negotiate in good faith with all cable-based and satellite-based companies for retransmission rights and prohibits local broadcast networks from entering into exclusive retransmission consent agreements. Thus, the general thrust of the SHVIA was to provide a more equal competitive environment for cable-based and satellite-based companies.

3. Literature on the Subscription Video Industry

The literature on the subscription video industry has evolved, from a focus on the cable industry, and its regulation and market power, to a focus on competition and the subscription video industry more broadly defined. Jaffe and Kantor (1990) examined the

⁴Under the law, a local television market is defined as the designed market area (DMA), as set forth by Nielsen Media Research.

⁵Cable-based companies are required to carry all local broadcast networks in their local television market, subject to capacity constraints. Beginning in 2002, if a satellite-based company chooses to provide local broadcast networks, it must provide all local broadcast networks in the local television market.

⁶Local broadcast networks must declare their intention to either invoke must carry or negotiate retransmission consent agreements. Under must carry, the network is guaranteed carriage, but receives no compensation. Under retransmission consent, the network can negotiate for compensation, but is not guaranteed carriage.

sales price of individual cable franchises pre- and post-deregulation in 1984.⁷ They found that following deregulation, the per-subscriber price paid for cable franchises increased from the pre-deregulation prices, especially in smaller, less competitive markets, thereby implying the exercise of market power. Rubinovitz (1993), using a three-equation structural approach, also found that after deregulation in 1984 that cable companies appeared to exercise existing market power. Emmons and Prager (1997) estimated reduced-form equations and found that competition and non-private ownership of cable franchises were associated with lower cable rates. Two recent government studies (GAO, 2000 and 2002) examined both cable and satellite-based companies in a systems environment. In these reports, competition from second wire-based competitors was generally associated with a significant reduction in cable rates, while competition from satellite-based companies was generally associated with improved quality delivered by cable-based companies. Finally, Karikari et. al (2003), using a series of reduced-form equations, found that satellite-based companies' penetration rates were higher in regulated cable franchises, where cable rates appeared to be higher, and lower in cable franchises with a second wire-based competitor, where cable rates appeared to be lower.⁸

4. Empirical Framework

To examine the impact of the SHVIA and DBS companies' provision of local broadcast networks, we employ a structural model based on the dominant firm - competitive fringe framework.⁹ The subscription video industry closely resembles the conditions of the dominant firm - competitive fringe framework. In 2001, the national market share of cable-based companies, based on the number of subscribers, was 78 percent while the

⁷Prior to 1984, franchising authorities, either the local or state government, generally regulated cable television rates. The Cable Communications Policy Act of 1984, combined with the Federal Communications Commission's (FCC) implementation of the act, had the effect of eliminating rate regulation for most cable franchises.

⁸Following a rapid increase in cable rates in the late 1980s and early 1990s, Congress passed the Cable Television Consumer Protection and Competition Act in 1992 to re-regulate cable rates in most areas. Franchising authorities regulated the basic tier while FCC regulated the expanded-basic tier. The Telecommunications Act of 1996 sunset the expanded-basic tier rate regulation effective March 31, 1999.

⁹See, for example, D. W. Carlton and J. M. Perloff, *Modern Industrial Organization* (New York, NY: HarperCollins College Publishers, 1994): 157-169 for a discussion of the dominant firm – competitive fringe framework.

market share of satellite-based companies was approximately 18 percent.¹⁰ Also, consistent with the dominant firm - competitive fringe framework, both cable-based and satellite-based companies compete for similar customers with a relatively homogeneous service and thus encounter very similar demand. Yet, their underlying cost structures are different because they rely on fundamentally different technologies to deliver this relatively homogeneous service.¹¹ Thus, cable-based companies can be thought of as the dominant firm while satellite-based companies can be thought of as the competitive fringe. Much of the dominance of cable-based companies can be traced to a first-mover advantage; cable-based companies saturated much of the country by the 1980s and therefore were fully established approximately one decade before DBS service emerged.

Several important effects arise from the dominant firm - competitive fringe framework. First, cable-based companies have market power. In this framework, the dominant firm establishes the market price at a level that exceeds marginal cost. Second, cable-based companies must incorporate their expectations regarding the actions of satellite-based companies. While the dominant firm establishes the market price, it does so after taking into consideration the competitive fringe supply. That is, the dominant firm maximizes profits over its residual demand function. In our model, we assume that cable-based companies simultaneously select their price and quality - based on the number of cable networks they offer - taking into consideration satellite-based companies decision regarding offering local broadcast networks in the television market.

Taking the forgoing into consideration, we estimate the following three-equation structural model of the subscription video industry:

¹⁰The remaining 4 percent of subscribers were served by a variety of technologies, including C-band satellite, wireless cable (multichannel multipoint distribution service), satellite master antenna television, and other wire-based services (e.g., local telephone).

¹¹The services of cable-based and satellite-based companies are not completely homogeneous. The most significant difference is the lack of local broadcast networks in all markets from satellite-based companies, the condition we test in this paper. Other differences include alternative programming - especially sports programming - on some cable and satellite systems. For example, DirecTV offers the NFL Sunday Ticket that is not available via cable or Dish Network; and in Philadelphia, Comcast SportsNet is only available via cable.

- **Cable rates** are hypothesized to be related to (1) the number of cable networks, (2) the number of cable subscribers, (3) DBS provision of local broadcast networks in the franchise area (local-into-local), (4) the size of the television market in terms of the number of households, (5) horizontal concentration, (6) vertical integration, (7) the presence of a wire-based competitor, (8) regulation, (9) average wages, (10) a dummy variable for areas outside metropolitan areas, and (11) population density. In this equation, we measure cable rates as the total monthly rate charged by the cable franchise for the basic and expanded-basic tier of cable service.¹² The explanatory variables in the cable rate equation are essentially demand, cost, and market structure/regulation variables.
- **Number of cable subscribers** is hypothesized to be related to (1) cable rates (per network), (2) local-into-local, (3) television market size, (4) the number of broadcast networks, (5) the percent of the population residing in an urban area, (6) the age of the cable franchise, (7) homes passed by the cable system, (8) median income, and (9) the presence of a wire-based competitor. We measure the number of cable subscribers as the number of customers in a franchise area that purchase the basic and expanded-basic tier of cable service. This represents the demand equation for cable services, which depends on rates and other demand-related factors.
- **Number of cable networks** is hypothesized to be related to (1) the number of cable subscribers, (2) local-into-local, (3) television market size, (4) median income, (5) system capacity in terms of megahertz, (6) the extent of multiple dwelling units, (7) vertical integration, and (8) the presence of a wire-based competitor. We measure the number of cable networks as the total number of cable-only networks provided with the basic and expanded-basic tier of cable service in a franchise area.

¹²The price paid for cable services should reflect their value to the customer. A higher cable rate may be due to the higher quality or value of the services provided. One of the ways to measure the value of cable services, albeit, an imperfect one, is to use the cable rate per network. In our model, we used the number of networks to capture the idea that higher cable rates may be due to higher quality or value resulting from the availability of more networks.

5. Data

In our dataset, the unit of analysis is the cable franchise. According to the Federal Communications Commission (FCC), there are over 33,000 cable franchises in the United States.¹³ A cable franchise is both a local cable market and an agreement between a cable company and a local or state government that specifies the conditions under which the cable company will provide subscription video service. The agreement specifies many terms and conditions, including for example the geographic boundaries of the cable franchise that therefore establish the local cable market. Cable franchises can vary significantly. For example, the number of subscribers can range from fewer than 10 to over 100,000. Our choice of the cable franchise as the unit of analysis was dictated by the fact that our primary data source - FCC's 2001 survey of cable franchises - was conducted at the franchise level.¹⁴

In Table 1, we provide a list of the variables we employ in the three-equation structural model, as well as the definitions and sources of the variables.

¹³See, FCC's master list of cable franchises at <http://www.fcc.gov/mb/vax/registeredcuid.xls>.

¹⁴On a yearly basis, FCC surveys approximately 750 cable franchises to fulfill a Congressional mandate to report yearly on cable rates in areas found to have effective competition and those without effective competition. Since relatively few cable franchises have been found to have effective competition, FCC conducts a stratified random sample, with strata based on the nature of the effective competition and the size of cable systems lacking effective competition.

Table 1: Definitions and Sources for Variables

Variable	Definition	Source
RATE	The monthly rate charged for the basic and expanded-basic service.	a
SUBS	The number of subscribers purchasing the basic and expanded-basic service.	a
NETWORK	The number of cable networks provided with the basic and expanded-basic service.	a
RATEPN	The monthly rate charged for basic and expanded-basic service divided by the number of cable networks provided with these services.	a
STAS	The number of over-the-air broadcast networks in the television market.	b
INC	The median per capita income in the franchise area.	c
URBP	The percentage of the county's population that is classified as urban by the U.S. Census Bureau.	c
RURAL	A binary variable that equals 1 if the franchise area is outside a metropolitan statistical area (MSA).	c
MDU	The percentage of housing units accounted for by structures with five or more housing units.	c
AGE	The number of years between when the cable franchise began operation and 2001.	a
SHHP	The number of homes passed by the cable system that serves the franchise area, including homes outside the franchise area.	a
H10	A binary variable that equals 1 if the cable company is affiliated with one of the 10 largest national multiple system operators (MSO).	a
VERTOT	A binary variable that equals 1 if the cable company is affiliated with an MSO that has an ownership interest in a national or regional video programming service.	g
WIRECOMP	A binary variable that equals 1 if a second wire-based company provides cable service (e.g., cable overbuilder, local telephone company).	a
MKTHH	The number of television households in the market.	d
LTLBOTH	A binary variable that equals 1 if both DBS companies offer local-into-local in the cable franchise area.	e
BSTREG	A binary variable that equals 1 if the cable franchise is subject to regulation of its rate for the basic tier service.	a
CAPACITY	The capacity of the cable system serving the franchise, measured in megahertz.	a
DENSY	The ratio of population to square miles in the franchise area.	c
WAGES	The average wage rate in the state where the cable franchise is located.	f

Notes:

a Federal Communications Commission, 2001 Cable Rate Survey

b BIA MEDIA AccessPro

c U.S. Census Bureau, 2000 Census of Population and Housing

d Nielsen Media Research
e National Association of Broadcasters
f Bureau of Labor Statistics, 2000 State OES Estimates
g Federal Communications Commission, 2001 Video Competition Report

5.1. Endogenous Variables

Our empirical analysis includes three endogenous variables that measure the performance of cable-based companies. Cable rate (RATE) measures the monthly rate charged to subscribers for basic and expanded-based service, the most subscribed to cable-based service. To the extent that satellite-based companies' provision of local-into-local (LTLBOTH) enhances these companies' competitiveness with cable-based companies, we expect local-into-local to be associated with lower cable rates as suggested by the dominant firm - competitive fringe framework. The second endogenous variable, cable subscribers (SUBS), measures the number of customers subscribing to the basic and expanded-based cable service. The dominant firm - competitive fringe framework indicates that competition from the competitive fringe, in this case satellite-based companies, will reduce the dominant firm's quantity. Thus, we expect local-into-local to be associated with fewer cable subscribers. Finally, cable networks (NETWORK) measures the number of cable networks subscribers receive with the basic and expanded-basic service. To the extent that local-into-local improves the product quality of satellite-based companies, we would expect it to be associated with a greater number of networks provided on cable systems. In Table 2, we provided the expected relationship between the endogenous and exogenous variables.

5.2. Exogenous Variables

The first group of exogenous variables we include in our empirical analysis are demand variables. Rate per network (RATEPN) measures how much cable subscribers pay for each cable network included in the basic and expanded-basic tier. We expect this to be negatively associated with the number of cable subscribers. The number of over-the-air stations (STAS) measures the quality of video service that consumers in the franchise area can receive free of charge. In television markets with a greater number of over-the-

air stations, we expect that relatively fewer people will subscribe to cable-based service, as the free substitute service is of a higher quality. Income (INC) measures the median per capita income in the franchise area, which we expect to be positively associated with the number of cable subscribers and networks. We expect that rural areas (RURAL) will be associated with higher cable rates, as there are fewer substitute entertainment-based services in rural areas. To the extent that consumers are more likely to be aware of an older cable system, we expect a positive relationship between the age of the cable system (AGE) and the number of cable subscribers. As urban areas likely have a greater amount of substitute entertainment-based services, we expect areas with a greater percentage of their population residing in an urban area (URBP) to have relatively fewer cable subscribers. Finally, we expect that the market size (MKTHH), measured by the number of television households in a market, to be negatively associated with cable rates and the number of cable subscribers and positively associated with the number of cable networks as there will be more entertainment-based services in larger markets that both serve as a substitute for cable-based service and encourage cable-based companies to improve service.

Second, we include a number of variables that proxy for the cost of providing cable-based video service. In markets with a large percentage of multiple dwelling units (MDU), the subscription video industry is generally more competitive as cable-based companies face actual or potential competition from satellite master antenna television (SMATV) service. Depending on the level of service provided by SMATV¹⁵ companies, we could expect either a positive or negative relationship between the percent of housing units that are in MDUs and the number of networks. If a cable system passes a greater number of housing units (SHHP), we would expect a greater number of cable subscribers. Depending on the economies of scale in the cable industry, cable franchises affiliated with larger cable companies (H10) could have either higher or lower costs, and thereby

¹⁵SMATV companies receive video programming through a satellite master antenna and deliver the programming via wire-based facilities that do not use the public right-of-way; these companies primarily serve multiple dwelling units. See, Federal Communications Commission, *In the Matter of: Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, Ninth Annual Report*, FCC 02-338 (Washington, DC: Federal Communications Commission, December 31, 2002), 38-40.

higher or lower cable rates than franchises affiliated with smaller cable companies or unaffiliated cable franchises. Vertical integration (VERTOT) can reduce transaction costs between cable companies and networks, lessen the risk associated with launching additional networks, or encourage cable companies to foreclose entry to new networks. Thus, vertical integration could lead to lower cable rates and more or fewer networks carried on a cable franchise. The capacity of the cable system serving the franchise (CAPACITY), measured in megahertz, should be positively associated with the number of networks offered, as greater capacity permits the carriage of a greater number of networks. Population density (DENSY) is associated with lower infrastructure costs, and we therefore expect a negative relationship between density and cable rates. Alternatively, we expect a positive relationship between wages (WAGE) and cable rates, since higher wages will increase a cable company's costs.

Finally, our empirical analysis incorporates three market structure/regulation variables. The primary explanatory variable of interest in this paper - local-into-local (LTLBOTH) - indicates when both DBS companies offer local broadcast networks to their subscribers in the franchise area. As mentioned above, the dominant firm - competitive fringe framework implies that competition from DBS should influence the price and quality decisions of cable-based companies. If local-into-local enhances the competitiveness and quality of DBS service, we would expect local-into-local to influence cable rates and the number of cable networks. The presence of a second wire-based company (WIRECOMP) also represents a competitive fringe company. We expect wire-based competition to be associated with lower cable rates; although, the number of networks could possibly increase or decrease, based on the quality provided by the wire-based competitor. Finally, in some instances, state or local governments regulate the basic tier of cable-based companies. The public-interest theory of regulation would indicate that cable rates should be lower where the basic tier is subject to regulation (BSTREG).¹⁶

¹⁶In addition to the public-interest theory of regulation, the capture and interest-group theories provide alternative rationales and implications for regulation. For an overview of the various theories of regulation, see C. F. Phillips, *The Regulation of Public Utilities: Theory and Practice* (Arlington, VA: Public Utilities Reports, Inc., 1993), p. 182-187.

Table 2: Expected Relationship Between Endogenous and Exogenous Variables

Variable	Cable Rates	Cable Subscribers	Cable Networks
SUBS	?		+
NETWORK	+		
RATEPN		-	
STAS		-	
INC		+	+
URBP		-	
RURAL	+		
MDU			?
AGE		+	
SHHP		+	
H10	?		
VERTOT	-		?
WIRECOMP	-	-	?
MKTHH	-	-	+
LTLBOTH	-	-	+
BSTREG	-		
CAPACITY			+
DENSY	-		
WAGES	+		

5.3. Matching Franchise Level Data

Because our dataset includes data from a variety of sources, we encountered many different geographic dimensions to our data. Our primary data source – FCC’s 2001 cable rate survey – consists of observations at the cable franchise level. As such, the cable franchise is the unit of analysis. Data from the U.S. Census Bureau can be obtained at several geographic levels, including zip codes, communities, or counties. The Bureau of Labor Statistics reports wage data at the state level. Finally, data from BIA MEDIA AccessPro, Nielsen Media Research, and the National Association of Broadcasters are reported at the level of the television market.

To match cable franchise-level data with data from the U.S. Census Bureau, our general approach was to combine each franchise’s community name field with an indicator of

community type, such as city or town, and then match these names to census place or, alternatively, county subdivision (minor civil division) files. Since many of the franchises in our dataset correspond to recognizable local entities - such as cities, towns, and townships - we were able to make the link directly to Census Bureau data sources and assign demographic and other census data gathered at the level of the associated community. One complicating factor in using community names to assign non-survey-derived information to each franchise is that some cable franchises are in areas, such as unnamed, unincorporated areas, that do not correspond to geographic areas for which Census Bureau or other data are readily available. Thus, for some franchises, the link to Census Bureau records was not as direct. For franchises in unincorporated, unnamed areas and those whose franchise areas represent a section of the associated community (which occurs in some large cities), we first attempted to determine the geographic areas associated with each cable franchise. We acquired additional information on the geographic boundaries of the franchise areas from local government offices responsible for cable franchise oversight.¹⁷ For purposes of assigning demographic and other census data to each of these franchises, we identified a key zip code that we used to link to census data organized at the zip code level. As part of the process used to match zip codes to franchises, we defined a key zip code for each franchise as the zip code with the largest franchise area population.

6. Estimation and Results

Given our empirical framework and data, we estimate the following system of equations with three-stage least squares:

$$Y\Gamma + XB + E = 0 \quad (1)$$

where Y is a 722×3 matrix of endogenous variables, X is a 722×18 matrix of exogenous variables, Γ and B are 3×3 and 18×3 matrices, respectively of the structural parameters of

¹⁷For those jurisdictions for which there were multiple franchises, including counties with franchises in unincorporated unnamed areas, we attempted to define more precise geographic boundaries for each franchise. We contacted local government offices responsible for cable franchise oversight and received maps or other descriptive information linking the specific franchise areas to zip codes, census tracts, local government districts, or some other boundary information. When local governments did not directly

the system, and E is a 722×3 matrix of unobservable errors distributed as $\Sigma \otimes I_{722}$. With three-stage least squares, reduced-form predicted values for Y are estimated and employed as instruments in a two-stage least squares estimation. Residuals from the two-stage least squares estimate are employed to calculate a contemporaneous variance-covariance matrix and estimate the structural equations simultaneously. The three-stage least squares estimator is as follows:

$$\delta = [Z'(\Sigma^{-1} \otimes I)Z]^{-1}Z'(\Sigma^{-1} \otimes I)y \quad (2)$$

where Z is the matrix of endogenous and exogenous variables. We selected the three-stage least squares estimation approach, as opposed to the equation-by-equation two-stage least squares approach, because it produces a smaller asymptotic variance-covariance matrix. One implication of this structural approach is that parameter estimates are the direct effect associated with the explanatory variable on the dependent variable.¹⁸

In Table 3 below, we present descriptive statistics for the endogenous and exogenous variables, for all 722 observations in our dataset.

provide zip code or census tract information, we used information they did provide in conjunction with zip code overlay maps to assign zip codes to the franchise areas.

¹⁸See, for example, W. H. Greene, *Econometric Analysis* (Upper Saddle River, NJ: 1997): 751-759 for a discussion of the three-stages least squares estimation approach.

Table 3: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
RATE	35.89	5.31	14.00	47.84
SUBS	21,008.45	43,256.16	4.00	302,964.00
NETWORK	58.04	14.05	10.00	99.00
RATEPN	0.66	0.19	0.30	1.80
STAS	11.86	5.66	1.00	25.00
INC	43,748.88	16,083.85	13,529.00	139,997.00
URBP	72.81	28.40	0.00	100.00
RURAL	0.26	0.44	0.00	1.00
MDU	14.28	13.57	0.00	98.11
AGE	23.95	9.65	2.00	50.00
SHHP	177,114.36	233,678.73	30.00	1,260,734.00
H10	0.83	0.37	0.00	1.00
VERTOT	0.54	0.50	0.00	1.00
WIRECOMP	0.14	0.35	0.00	1.00
MKTHH	1,432.12	1,655.34	50.00	7,301.00
LTLBOTH	0.51	0.50	0.00	1.00
BSTREG	0.35	0.48	0.00	1.00
CAPACITY	637.62	172.29	216.00	870.00
DENSY	2,843.90	7,066.21	2.25	87,139.78
WAGES	788.38	101.80	575.38	1,045.58

In Table 4 below, we report parameter estimates for each of the three structural equations. All of the variables, except dummy variables, are expressed in natural logarithmic form. Therefore, parameter estimates can be interpreted as elasticities. The parameter estimates for the dummy variables are elasticities in decimal form. Most of the parameter estimates are consistent with the expected relationships that we discuss above.

Table 4: Three-Stage Least Squares Model Results for the Structural Equations (Standard errors are in parentheses)

Variable	Cable Rates		Cable Subscribers		Cable Networks
SUBS	0.0363 *** (0.0086)				0.5014 *** (0.0264)
NETWORK	0.1770 *** (0.0344)				
RATEPN			-3.1629 *** (0.2629)		
STAS			0.1760 (0.2143)		
INC			-0.7328 *** (0.1985)		0.0885 *** (0.0226)
URBP			0.3502 *** (0.0731)		
RURAL	-0.0064 (0.0144)				
MDU					0.0067 (0.0100)
AGE			0.6814 *** (0.1209)		
SHHP			0.3588 *** (0.0344)		
H10	0.0781 *** (0.0154)				
VERTOT	-0.0194 (0.0125)				-0.0430 *** (0.0152)
WIRECOMP	-0.1662 *** (0.0150)		-0.4584 ** (0.1830)		0.0229 (0.0202)
MKTHH	0.0103 (0.0082)		0.2955 ** (0.1390)		-0.0085 (0.0113)
LTLBOTH	-0.0039 (0.0177)		-0.4729 ** (0.2111)		0.0487 ** (0.0271)
BSTREG	-0.0207 (0.0144)				
DENSY	-0.0162 *** (0.0056)				
CAPACITY					0.5014 *** (0.0264)
WAGES	0.0319 (0.0425)				
INTERCEPT	2.369 *** (0.2952)		5.0149 ** (2.0162)		-0.5897 ** (0.2464)

Notes:

* Significant at the 10 percent level

- ** Significant at the 5 percent level
- *** Significant at the 1 percent level

For the local-into-local variable, the parameter estimates are generally consistent with expectations arising from the dominant firm - competitive fringe framework. When both DBS companies provide local broadcast networks to their subscribers, the cable company has significantly fewer subscribers than similar cable companies where this competition is not present. This finding is consistent with DBS companies capturing market share when these companies provide local broadcast networks to their subscribers. While the parameter estimate is negative with respect to cable rates and thus consistent with expectations, it is not statistically significant. Finally, the provision of local-into-local by DBS companies is associated with improved quality provided by the cable company. Cable companies provide approximately 5 percent more networks to their subscribers when both DBS companies provide local broadcast networks than similar companies not facing this competition. This is also consistent with expectations, wherein local-into-local improves DBS companies' quality and therefore encourages cable companies to improve their quality by providing their subscribers with additional networks.

Another competition variable, the presence of a second wire-based company, also has an important effect on the subscription video industry. When a second wire-based company serves a cable franchise, cable rates are significantly - approximately 17 percent - lower than similar cable franchise areas without this competition. Also, the incumbent cable company serves significantly fewer subscribers but does not improve its quality. Since both companies serve a defined geographic market and can serve all customers in the market, they appear more likely to engage in Bertrand competition wherein there would be significant price competition. Alternatively, since DBS companies provide nationwide service, they are unlikely to engage in intense price competition in a given geographic market.

Ownership affiliations also appear to influence the subscription video industry. First, when the cable company is affiliated with one of the 10 largest cable multiple system operators, cable rates are 8 percent higher than in similar markets without this affiliation.

This result implies that cable companies affiliated with a large cable company have higher costs than those unaffiliated with a large cable company. This is somewhat surprising, since the primary marginal cost for subscription video providers - both cable-based and satellite-based - is programming and programmers often provide volume discounts to larger subscription video providers. Second, cable companies vertically integrated with a network provide their subscribers with 4 percent fewer networks than unaffiliated cable companies.¹⁹

Several remaining variables also provide important insights on the subscription video industry. In the cable rates equation, the provision of additional networks is associated with higher cable rates. This result is to be expected, since provision of additional networks increases the cable company's marginal costs. Also, high-density areas, which are generally less costly to serve, are associated with lower cable rates as expected. In the cable subscriber equation, older cable franchises generally have more subscribers than newer cable franchises. Interestingly, higher levels of income and less urban areas are associated with fewer cable subscribers; these results are not consistent with expectations. Finally, in the cable network equation, system capacity and income are associated with the provision of a greater number of cable networks.

7. Conclusion

With the Satellite Home Viewer Improvement Act of 1999, the Congress implemented a dramatic shift in the competitive landscape of the subscription video industry. Prior to this act, technology provided a necessary condition for enhanced competition between cable-based and satellite-based companies. However, asymmetric regulation brought about by legislation forestalled competition. The Satellite Home Viewer Improvement

¹⁹T. Chipy, "Vertical Integration, Market Foreclosure, and Consumer Welfare in the Cable Television Industry," *American Economic Review* 91:3 (2001): 428-453 found that cable companies vertically integrated with a basic cable network increased the number of basic cable networks offered to subscribers, while cable companies vertically integrated with a premium cable network decreased the number of basic and premium cable networks offered to subscribers. D. Waterman and A. Weiss, "The Effects of Vertical Integration Between Cable Television Systems and Pay Cable Networks," *Journal of Econometrics* 72 (1996): 357-395 also found that cable companies vertically integrated with premium cable networks offered fewer premium cable networks than unaffiliated cable companies.

Act removed this asymmetric regulation and therefore ushered in a new era of competition. We find that DBS companies' provision of local broadcast networks, which the act permitted, is associated with cable-based companies providing improved quality and with a reduction in demand for service from cable-based companies. These findings are consistent with the underlying dominant firm - competitive fringe framework that appears to characterize this industry and represent a significant improvement in the competitive environment for consumers in the subscription video industry.

References

- BIA Research, Inc. *BIA MEDIA AccessPro*. Chantilly, VA: BIA Research, Inc. 2000.
- Bureau of Labor Statistics. *2000 State OES Estimates, Occupational Employment Statistics (OES) Survey*. Washington, DC: Bureau of Labor Statistics. 2000.
- Carlton, D. W. and J. M. Perloff. *Modern Industrial Organization*. New York, NY: HarperCollins College Publishers. 1994.
- Chipty, T. "Vertical Integration, Market Foreclosure, and Consumer Welfare in the Cable Television Industry." *American Economic Review* 91:3 (2001): 428-453.
- Emmons III, W. M., and R. A. Prager. "The Effects of Market Structure and Ownership on Prices and Service Offerings in the U.S. Cable Television Industry." *RAND Journal of Economics* 28:4 (1997): 732-750.
- Federal Communications Commission. *In the Matter of: Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, Ninth Annual Report*, FCC 02-338. Washington, DC: Federal Communications Commission. December 31, 2002.
- Federal Communications Commission. *In the Matter of: Implementation of Section 3 of the Cable Television Consumer Protection and Competition Act of 1992, Report on Cable Industry Prices*, FCC 02-107. Washington, DC: Federal Communications Commission. April 4, 2002.
- Federal Communications Commission. *In the Matter of: Implementation of the Satellite Home Viewer Improvement Act of 1999, Notice of Proposed Rulemaking*, FCC 99-406. Washington, DC: Federal Communications Commission. December 22, 1999.
- General Accounting Office. *TELECOMMUNICATIONS: Issues in Providing Cable and Satellite Television Services*, GAO-03-130. Washington, DC: General Accounting Office. October 2002.
- General Accounting Office. *TELECOMMUNICATIONS: The Effect of Competition From Satellite Providers on Cable Rates*, GAO-00-164. Washington, DC: General Accounting Office. July 2000.
- Greene, W. H. *Econometric Analysis*. Upper Saddle River, NJ: Prentice Hall. 1997.
- Jaffe, A. B. and D. M. Kantor. "Market Power of Local Cable Television Franchises: Evidence From the Effects of Deregulation." *RAND Journal of Economics* 21:2 (1990): 226-234.

- Karikari, J. A. et. al. "Subscriptions for Direct Broadcast Satellite and Cable Television in the US: An Empirical Analysis." *Information Economics and Policy* 15:1 (2003): 1-15.
- National Association of Broadcasters. *Petition to Deny of the National Association of Broadcasters In re: Consolidated Applications of EchoStar Communications Corporation, General Motors Corporation, Hughes Electronics Corporation*. February 4, 2002.
- Nielsen Media Research. *Nielsen Station Index: Zip Codes by Designed Market Areas (DMA's)*. New York, NY: Nielsen Media Research. 2001.
- Phillips, C. F. *The Regulation of Public Utilities: Theory and Practice*. Arlington, VA: Public Utilities Reports, Inc. 1993.
- Rubinovitz, R. N. "Market Power and Price Increases for Basic Service Since Deregulation." *RAND Journal of Economics* 24:1 (1993): 1-18.
- U.S. Census Bureau. *2000 Census of Population and Housing, Summary File 3*. Washington, DC: U.S. Census Bureau. 2000.
- Waterman, D. and A. Weiss. "The Effects of Vertical Integration Between Cable Television Systems and Pay Cable Networks." *Journal of Econometrics* 72 (1996): 357-395.