Villanova School of Business Economics Working Paper # 3

Testing the Effectiveness of Regulation and Competition on Cable Television Rates

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ABSTRACT

Regulation of the cable television industry was marked by remarkable periods of deregulation, re-regulation, and re-deregulation during the 1980s and 1990s. Using FCC firm-level survey data spanning 1993 to 2001, we model and econometrically estimate the effect of regulation and competition on cable rates. Our calculations indicate that while regulation lowered rates for small system operators, it raised them for medium and large systems. Meanwhile, competition consistently decreased rates from 5.6 to 8.8 percent, with even larger declines during periods of regulation. Our results suggest that competition is more effective than regulation in containing cable prices.

Keywords: cable rates, regulation, competition

JEL Classification: L51, L96

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1. INTRODUCTION

For many years, policymakers presumed that cable service operators were natural monopolies because of the high initial costs of installing dedicated plant to receive and deliver video programs. Prior to the Cable Television Consumer Protection and Competition Act of 1992 (the 1992 Cable Act), franchises were granted on an exclusive basis with the expectation that efficiencies resulted from one cable operator servicing a community, as opposed to two or more. With most communities served by one provider, regulators sought to protect consumers from monopoly prices and poor service. As the industry matured and new products and new ways of delivering video programming developed, the policy debate wavered between what form of regulation was appropriate to whether regulation was even necessary.

In the mid-1960s, the Federal Communications Commission (FCC) established rules for cable systems; first for those that received signals by microwave antennas and then for all systems. In 1972, the Commission released new rules, including a requirement for cable operators to obtain a certificate of compliance prior to operating a system or adding a television broadcast signal. Until 1984, the FCC regulated upper-tier cable services, and state and local governments regulated basic cable service. Typically, local government oversight consisted of competitive bidding for franchise monopoly rights and rate proceedings to determine the appropriateness of future rate increases. In compliance with regulatory guidelines, cable companies frequently supplied financial and operating data to their respective governing authorities. Oftentimes, however, the process consumed valuable time and resources, particularly for small operators. Arguing that the regulatory process was cumbersome and unnecessary, especially because of increased competition from other media sources, the cable industry petitioned Congress for relief.

In 1984, Congress passed the Cable Communications Policy Act (the Cable Act) that removed FCC regulation of upper-tier rates and prohibited local authorities from regulating basic rates if there was effective competition. Congress loosely defined effective competition as circumstances where three or more unduplicated broadcasting signals (e.g. ABC, NBC, and CBS) were available within a service area. The competition did not have to be a subscriber-based alternative. As such, when the Cable Act became effective in November 1986, rate regulation no longer applied to most cable systems. In these "competitive" markets, franchise agreements contained only non-price terms.

Without viable competition in most markets and with cable prices rising more than two times the rate of inflation, Congress effectively re-regulated the industry by passing the 1992 Cable Act.[1] Congress directed the FCC to design regulations to ensure that basic cable rates were reasonable. Accordingly, the Commission, in April 1993, adopted a benchmark approach to regulate prices in markets without effective competition.[2] The FCC's established benchmarks took effect on September 1, 1993, causing overall average rates for regulated cable services to fall by as much as 10 percent. The size of the reduction was based on the average difference in rates of non-competitive cable systems and the standard set by those operators facing effective competition. Critics argued, however, that the inclusion of low penetration systems in computing

[1] In the 1992 Cable Act, Congress concluded that without local competition, "the result is undue market power for the cable operator as compared to that of consumers and video programmers."

[2] The benchmark group of "competitive" firms included systems serving fewer than 30 percent of households in a local market ("low penetration") and those facing head-to-head competition, either from the municipality or another multichannel video programming distributor (MVPD). The MVPD competitor had to offer an alternative service to at least 50 percent of the households in the franchise area and more than 15 percent of those households had to take service from a company other than the largest one.

benchmark rates inflated allowed prices since many of these smaller systems actually charged higher rates and offered fewer services than firms facing "real" competition.[3] In response to this criticism, the Commission revised its methodology and separately considered the competitive differential for each of the three categories of systems: low penetration (1%), overbuilds (16%), and municipalities (37%). Giving the most weight to the overbuild differential, the FCC (1994) ordered that, no later than July 14, 1994, rates in markets without effective competition be lowered by as much as an additional 7 percent of rates in effect as of September 1992, adjusted for such factors as inflation, program modifications, and external costs.

The FCC was optimistic that regulation would encourage pro-competitive behavior resulting in lower prices and better service. Critics maintained that the FCC was ineffective in regulating the industry. For instance, many systems were accused of putting newer, cheaper, less-watched channels on the basic tier and moving many of the more popular services onto unregulated, higher programming tiers.[4] Moreover, some of the larger multiple system operators (MSOs) signed social contracts with the FCC agreeing to customer rebates and commitments to capital improvement projects in exchange for less stringent regulatory oversight.

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[3] Low penetration could result from factors having nothing to do with competition, such as poor quality of service or service to only the most lucrative portion of a market.

[4] In March 1994, the FCC adopted its "going-forward" rules, which allowed cable companies to recover the full amount of programming expenses associated with added channels, plus a markup on new programming expenses of 7.5 percent. In November 1994, the FCC revised these rules, which allowed cable companies to increase rates by twenty cents for each channel added to the expanded basic tier plus license fees (maximum of $1.50 over two years). The FCC also created the "New Product Tier" which firms were permitted to offer on an unregulated basis. Crawford (2000) using data from pre- and post-re-regulation found no change in household welfare as a result of the 1992 Cable Act.

Without strong evidence that regulation was effective in containing cable rates and with indications that cable rates were significantly lower in the limited number of markets where competition existed, Congress passed the Telecommunications Act of 1996 (the 1996 Telecom Act), which reduced the regulatory barriers for cable operators and telephone companies to enter each other's businesses. Under this new law, all rate regulation ended on March 31, 1999, except for the basic tier of cable programming in markets without effective competition.[5] Congress assumed that, by that time, most operators would face sufficient competition from telephone companies and other multichannel video programming distributors (MVPDs) to make regulation unnecessary.

Even with policy actions to promote competition, however, the industry remained highly concentrated, and most cable incumbents operated with no real or potential threat of competitive entry. Anecdotal evidence demonstrated that MSOs purposely avoided direct competition, negotiating instead to swap systems with other MSOs to create and strengthen geographical clusters of systems. Perspective overbuilders assessed the possibility of direct competition and overwhelmingly chose not to enter local markets. Some believed that incumbents could lower prices long enough to make their ventures unprofitable or opportunities for some short-run profits were not significant enough to overcome very high entry and exit costs.

Others contended that, although cable agreements were required to be non-exclusive, firms may have won and/or protected their franchises by agreeing to certain

[5] With passage of the 1996 Telecom Act, small cable systems (less than 50,000 subscribers in a franchise area and not affiliated with a large MSO), were immediately deregulated. Moreover, the effective competition criteria were expanded to include video programming offered by local exchange carriers (LECs) in the franchise area.

transfers to the franchising authority, including non-price concessions.[6] It was suspected that in return for these concessions, franchisers put in place administrative hurdles and other barriers that made it too costly and time-consuming for third party firms to enter.

While the lack of competition from overbuilds was disappointing to regulators, the primary objective of the 1996 Telecom Act was to facilitate another type of competitive entry. It was hoped that local exchange carriers (LECs) would find it profitable to enter. In the immediate years following the passage of the 1996 Telecom Act, however, the LECs moved very slowly into the video delivery business. Uncertain whether consumer demand in markets served by well-entrenched incumbents would be sufficient enough to warrant the huge investment in broadband cable, the LECs hesitated entering on a large scale. Instead, they began cautiously, packaging telecom and video delivery services through partnerships with direct broadcast satellite (DBS) providers. However, concern about losing customers to cable operators offering telephone service in their markets forced the LECs to enter on their own. The pace of entry has quickened considerably in recent years.

This remarkable period of deregulation, re-regulation, and re-deregulation offers a natural experiment to test the effect of regulation and competition. Using a unique data set on cable rates from 1993 to 2001, we model and econometrically estimate the effect of regulation and competition on cable rates. The remainder of this paper is organized as follows. Section 2 reviews the prior research on the effectiveness of regulation and competition in the cable industry. Section 3 provides a description of the econometric model, while Section 4 discusses the data and variables. Section 5 presents the

[6] Zupan (1989) estimated that non-price concessions, such as community programming and institutional networks linking multiple public facilities, accounted for 26 percent of a cable company's construction costs and 11 percent of its operating expenses.

estimation results. Section 6 concludes with a discussion of the issues and policy implications.

2. EFFECTIVENESS OF REGULATION AND COMPETITION

Several studies evaluated the effectiveness of regulation and competition in the cable industry, and the extent and use of market power. Otsuka (1997) examined price and level of quality for cable systems under different types of regulation in 1982 and found significantly lower basic prices and higher levels of service (number of distance channels and cable networks) in regulated markets relative to unconstrained monopolistic ones. He concluded that regulation was welfare-enhancing. Mayo and Otsuka (1991) showed that, while basic prices were above marginal cost in 1982, regulation held them to considerably below monopoly levels.

By contrast, Hazlett (1995, 1997) suggested that the welfare effect of regulation was ambiguous, because, while prices were lower, so were program and service quality.[7] Rubinovitz (1993) attempted to decipher whether price increases between 1984 and 1990 were caused by an increase in the exercise of market power made possible by the elimination of price regulation in 1984, or a change in the elasticity of demand faced by cable companies. Since he did not observe a change in the elasticity of demand, he attributed 43 percent of the real price increase since deregulation to cable systems being able to use their market power more after deregulation.[8]

[7] From a study of the welfare tradeoff to consumers of the provision of one additional satellite channel, Beard et al. (2001) concluded that the gain in consumer surplus due to an increase in quality was almost completely offset by the impact of higher prices.
[8] The remaining 57 percent was attributed to changes in cost and quality.

Jaffe and Kanter (1990), on the other hand, found that in larger, more competitive markets deregulation had a very small impact on expected profits.[9] They concluded that, since the majority of American households were located in larger markets with access to competitive alternatives that constrained market power, and since re-regulation could be market distorting and costly, free entry was the best policy approach for the cable industry. Owen and Greenhalgh (1986) acknowledged that consumers might be better off with competition. They believed that their finding of a 14 percent unit cost penalty in markets with overlapping firms, each with a 50 percent market share, was in the range of price markups that might be expected in the absence of competition or effective regulation. [10]

Levin and Meisel (1991, 1993) also argued against re-regulation of the cable industry, favoring instead policies to promote competition among cable systems and telephone company (telco) ownership of cable services. In their 1991 study, Levin and Meisel found that overbuild competition reduced basic cable prices by 22 percent to 30 percent.[11] Similarly, Emmons and Prager (1997) recommended government policies to promote competition because they found that, without a loss in quality, basic cable prices were approximately 20 percent lower in overbuilt markets than those in comparable,

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[9] Jaffe and Kanter examined the sales value of cable systems before and after deregulation (from 1982 to 1987). They found that in markets with relatively few product substitutes, expected profits increased after deregulation. They recognized that the higher profits in smaller markets may have come from lower costs or greater pricing efficiencies, in which case it was better to let the monopolist keep them, than to eliminate the efficiency.

[10] Owen and Greenhalgh used response data submitted in franchise bidding proposals from 1979 to 1982.

[11] In their 1993 study, Levin and Meisel found that telco-owned cable companies charged less for basic service than non-telco owned cable companies. They attributed the almost 9 percent differential to lower costs and economies of scope rather than to anti-competitive behavior and cross-subsidization.

private monopoly franchise areas, both before (1983) and after deregulation (1989).[12] Since the estimates of the effects of competition were essentially the same in both years, Emmons and Prager concluded that regulation prior to the passage of the 1984 Cable Act was not very effective in limiting basic cable rates.

Beil et al. (1993) also showed that competition was welfare-enhancing and that re-regulation would have increased market power. Specifically, they found that head-to-head competition increased the demand for cable services, and significantly reduced basic and pay cable rates. In his study of 1982 cable rates, Hazlett (1986) also demonstrated that the rates for basic and HBO were considerably lower in areas with duplicative franchise systems, as compared to monopoly jurisdictions. Using a 1990 sample, Merline (1990) found that the price of basic cable was 18.4 percent lower and the number of channels 21.2 higher for firms facing competition relative to those operating in monopoly markets. Finally, Smiley (1990) conjectured that welfare effects of overbuilds depended on local supply and demand conditions. Specifically, entry could be prevented if first-movers cabled the entire franchise area and potential competitors did not have a way of differentiating their products from those already available in the market.

3. ECONOMETRIC MODEL

The purpose of this study is to comprehensively evaluate the impact of regulation and competition on cable service rates spanning the years from 1993 to 2001, a period wherein the industry was deregulated, re-regulated, and re-deregulated. If regulation was

[12] Emmons and Prager's findings suggested that neither the type of rate regulation in effect before the 1984 Cable Act nor indirect competition from alternative entertainment media provided an effective constraint on the market power of monopoly cable operators. While they recommended implementing government policies to encourage competition, they recognized that many markets were not well suited for overbuilds.

effective, prices would be constrained below monopoly levels during those years. By contrast, during periods of deregulation, firms facing no competition would be unconstrained and could theoretically charge monopoly prices. For firms operating in markets with viable competition from a second MVPD, pricing power would be weakened, and may or may not be additionally influenced by the presence of regulation. In our model, we attempt to isolate these effects and answer whether regulation and competition were effective in constraining cable rates.

Our methodology follows from standard profit maximization. Firms produce where marginal revenue equals marginal cost, or set price, $P = MC / (1 + 1/\delta)$, where MC is marginal cost and δ is the perceived price elasticity of demand. Following Rubinovitz (1993), the regulatory environment could be represented by

$$P = \theta (P - MR) + MC,$$

where θ is a measure of regulatory effectiveness. (e.g., θ equals 0 under perfect competition, equals 1 under monopoly, and was calculated to be 0.3251 by Kelly and Ying, 2003).

With that underlying motivation for prices, we estimate a cable rate equation of the following general form,

$$R = R (m, e, r, c),$$

where R is the cable rate, m is marginal cost, e is a vector of variables affecting price elasticity, r is a regulatory variable, and c is a competition variable. Ideally, we would estimate a cost function and then compute marginal cost. However, because of the lack of available cost data over the study period, we must proxy for marginal cost.

The econometric specification of the functional form for the cable rate equation is somewhat arbitrary. The most common form would probably be a log-linear equation,

which provides a first-order approximation to the unknown rate equation. We have chosen a second-order approximation using a translog functional form. It allows us to capture interaction effects such as the marginal effect of competition during periods of re-regulation. The translog rate equation can be written as

$$\ln R = \alpha_0 + \alpha_m \ln m + \Sigma_i \alpha_i \ln e_i + \alpha_r r + \alpha_c c + \tfrac{1}{2} \alpha_{mm} (\ln m)^2 +$$

$$\tfrac{1}{2} \Sigma_{ij} \alpha_{ij} \ln e_i \ln e_j + \Sigma_i \alpha_{mi} \ln m \ln e_i + \alpha_{mr} (\ln m) \cdot r + \alpha_{mc} (\ln m) \cdot c +$$

$$\Sigma_i \alpha_{ir} (\ln e_i) \cdot r + \Sigma_i \alpha_{ic} (\ln e_i) \cdot c + \alpha_{rc} r \cdot c + \epsilon_r ,$$

where ϵ_r is a disturbance term. To facilitate interpretation of the estimated coefficients as elasticities, all quantitative variables (excluding dummy variables) have been divided by their sample mean. The equation is estimated using ordinary least squares.

Because the regulation and competition variables are discrete variables, their effect on cable rates is computed as the percent change in rates resulting from a unit change in the variable, r or c. For example, in the case of regulation, we would calculate

$$(R_1 - R_0) / R_0 \cdot 100 = [\exp (\alpha_r + \alpha_{mr} \ln m + \Sigma_i \alpha_{ir} \ln e_i + \alpha_{rc} c) - 1] \cdot 100,$$

where R_1 and R_0 are cable rates when r = 1 and r = 0, respectively.

4. DATA AND VARIABLES

The FCC agreed to provide us with survey responses from its *Report on Cable Industry Prices* for the years 1993 through 2001. Company names and locations were deleted from the files for proprietary concerns. Although the FCC conducted the survey annually, the same firms were not necessarily sampled each year. The data set for this study is a compilation of variables from each survey consolidated into one file. These variables include an average customer rate, total channels, number of basic subscribers, MSO affiliation and size, rates for basic and upper tier programming, and dummy

variables for regulatory status and whether a firm met the FCC's effective competition criteria.[13]

Several data checks have been made to ensure that responses were valid and complete. For instance, customers taking upper tier programming must subscribe to the basic service. Therefore, the number of subscribers reported for the upper tiers should not be greater than the number of basic subscribers. The average rate provided by each firm should be consistent with the FCC's definition of what the average customer paid per month. The disaggregated data on rates, channels and subscribers for equipment and programming services should validate the firm's average rate response. Finally, according to statute, local governments did not have the authority to regulate cable rates in franchises found to have effective competition. Therefore, a firm's response should not indicate that it is both facing effective competition and complying with rate regulation. Because company names and addresses were expunged from the files, the ability to check responses has been limited to the information provided in the surveys. Firms with incomplete or inconsistent responses have been removed from the study. In the nine-year study, there are 5,725 observations.

With respect to the specific variables in the estimated rate equation, the dependent variable is the average customer rate (R). It is given by the monthly price for basic service and the most popular cable programming services tier (CPST), as well as the most popular converter and remote.[14] We expect that this rate would vary depending on the

[13] The average customer rate was not included in the first survey (1993, 1994, 1995). For the purpose of this study, we have calculated the average rate for the firms in the first survey using the methodology specified by the FCC in subsequent reports.

[14] At a minimum, the basic service tier includes all local television signals, public, educational, and governmental access channels. The optional CPSTs are available for additional monthly fees. Excluded from programming services are premium, a la carte,

extent of regulatory constraints, the competitiveness of the market, demand conditions, and marginal cost. A summary of variable definitions is presented in Table 1.

The model also includes several demand and cost factors believed to have an impact on cable rates. Despite the obvious importance of marginal cost in the specification of any price equation, we are limited by the available data.[15] We are further hampered by the inability to identify specific firms in the sample, which means that firm-specific proxies for marginal costs are also infeasible. Rather than incorporating a time trend to proxy for broad annual changes in costs, we use a measure of factor prices, the US average hourly earnings of production workers for cable distribution, WAGE.[16]

For demand factors, we include the number of channels received on the basic and major CPST, TCHAN. It serves as a measure of system quality, as a higher number of channels should increase consumer demand and willingness to pay.[17] TCHAN is also expected to be positively related to price because of its impact on costs; offering additional channels would raise costs primarily because of higher programming

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and pay-per-view services, and digital tiers. The major CPST usually offers the most number of channels and had the highest number of subscribers among the CPSTs. According to the FCC, 90 percent of subscribers take both basic service and the major CPST.

[15] In an estimated translog cost function with actual 1994 factor prices for wages, programming, and capital, Kelly and Ying (2003) found that the factor prices for capital, labor, and programming were highly significant and yielded an R^2 of .99. Using the same data in an ordinary least squares regression of marginal cost with just the first-order terms yields an R^2 of .90. Meanwhile, an OLS regression including only those variables for which data are available from the price surveys (basic subscribers, total channels, and subscribers/homes passed) yields an R^2 of .11. These results indicate the importance of the factor prices as determinants of marginal cost, but not necessarily of prices.

[16] The annual Producer Price Index for broadcast equipment and the median family income in the US were also considered for the model. Because of multicollinearity, their inclusion results in implausible coefficients for certain variables.

[17] When a system is upgraded, it is expected that the quality and reliability of the system improve, including the ability to receive more channels. The GAO (2000), FCC, and others found that more channels led to higher cable rates.

expenses.[18] Cable operators would expectantly pass some of those higher costs on to subscribers, depending on the extent of competition in the market and demand conditions.

Another right-hand-side variable is the number of basic subscribers, BSUB. It should capture some of the effects of demand elasticity, in that prices would be lower in larger markets where there are more video delivery substitutes.[19] Alternatively, BSUB might be a proxy for marginal cost since the number of subscribers affects such cost components as third party program reimbursements and the size of the distribution network.[20] If there are economies of scale, an increase in the number of subscribers per system might lower price. What creates some uncertainty about the impact BSUB might have on rates, however, is the fact that DBS, one of the most formidable competitive alternatives to cable, has penetration rates significantly higher in smaller, non-metropolitan markets prior to the passage of the Satellite Home Viewer Improvement Act (SHVIA).[21] Other forms of direct competition that might have been found in more

[18] In addition to the number of channels, the most commonly used proxies for marginal cost include population density, number of subscribers, type of channels, MSO affiliation, age of system, homes passed, and local measures of per capita income and wage rates.

[19] Mayo and Otsuka (1991) found that in larger markets with more direct and indirect substitutes, demand for basic service was elastic. By contrast, basic service demand was generally inelastic in rural areas.

[20] Chipty (1995) argued that large cable operators can enhance their bargaining power by threatening not to carry a supplier's programming. Controlling for regional size, large operators, in terms of number of domestic customers, had lower marginal costs because of the increase in bargaining power.

[21] DBS did not generally transmit local broadcast signals until after 1999 with the passage of SHVIA. Prior to SHVIA, satellite operators could only provide local broadcast signals to "unserved" areas where customers did not receive adequate over-the-air signals. This was typically the situation in rural markets. DBS operators only began actively deploying and marketing DBS in metropolitan markets after SHVIA. The GAO (2000), using 1998 data, found that DBS penetration was not correlated with lower cable rates. However, in markets with higher DBS penetration, cable operators tended to compete on non-price terms, including offering more channels.

populated areas (overbuilds and multichannel multipoint distribution service, or MMDS) account for a very small percentage of the total market share.

To more specifically test the significance of system size, the sample firms have been stratified into three categories: small (less than 10,000 subscribers), medium (greater than or equal to 10,000 subscribes but less than 50,000 subscribers), and large (greater than or equal to 50,000 subscribers). Dummy variables for system size have been added to the model (SIZEM and SIZEL for medium and large systems, respectively). The FCC began stratified sampling in 1996 because non-stratified samples placed disproportionate emphasis on smaller operators serving a relatively low percentage of subscribers. By stratifying the sample, we are able to test if regulation and competition have differential effects on average cable rates based on market size.

We also use a dummy variable to identify whether a system has a multiple system operator affiliation, MSO. It is expected that there may be economies of joint ownership which could benefit consumers in the form of lower prices. The number of subscribers in the MSO to which the firm belongs (MSOS) has been also included as a proxy for marginal cost. We anticipate that prices charged by systems affiliated with larger MSOs might be lower because of the stronger bargaining position with programmers and/or scale efficiencies from consolidating marketing, customer support, billing, and other administrative functions.[22]

[22] Ford and Jackson (1997) found that increases in MSO size enabled cable operators to get quantity discounts and enhance bargaining power with suppliers – resulting in a 12 to 13 percent decrease in programming costs/subscriber. They suggested that if these cost savings were passed onto consumers in the form of lower cable prices, the effects of concentration could be welfare-enhancing. Interestingly, the GAO (2003) and FCC (1994) found that cable rates were slightly higher when a firm was owned by one of the largest MSOs.

To capture the effect of the regulatory environment, we use a dummy variable, REG, to identify periods of re-regulation. It equals 1 during 1994-98 and 0 for other years. If regulation by the FCC was effective, rates would be lower during those years.

In this study, competition, COMP, is present if a viable competitive alternative provider (overbuild, LEC, DBS, other) offered video delivery services in the market. Although the FCC included low penetration systems in its effective competition group, it has been criticized and we have redefined such systems as non-competitive.[23] This modification allows us to evaluate whether inclusion of low penetration systems affects the competitive rate differential.

5. ESTIMATION RESULTS

The translog rate equation results are presented in Table 2. We begin with an examination of the first-order terms to assess the overall plausibility of the estimated rate equation. For the most part, these coefficients represent the rate elasticities for a small system operator (when SIZEM = SIZEL = 0), with variables evaluated at the sample mean or 0. Following this assessment, we focus on the regulation and competition variables.

[23] The GAO (2003) also found fault with the FCC's process of updating and verifying the effective competition classification of firms in its Surveys. Analyzing firms' responses to the FCC's 2002 Survey and using independent sources and interviews with company officials, the GAO (2003) determined that 56 percent of the firms classified as satisfying the low penetration test in the Survey had penetration rates exceeding the 30 percent threshold. While the FCC calculated a 6.3 percent competitive rate differential for 2001, the GAO (2003), after checking the status of competition in each franchise and reclassifying firms accordingly, estimated that average rates in markets with a second wire-based competitor were 15 percent lower. In an earlier study using 1998 data, the GAO (2000) found that, in markets where a non-satellite competitor operated in all or part of the franchise area, average rates were 10 percent lower than in those markets without such competition.

As expected, the first-order coefficient on the marginal cost proxy, WAGE, is positive and significant at the 1 percent level. Its coefficient suggests that a 1 percent increase in wages leads to a .665 percent increase in the average cable rate of a small firm. Several second-order WAGE terms are also highly significant.

The first-order coefficient on the total number of channels, TCHAN, is positive and highly significant. A 1 percent increase in the number of channels increases the average rate by .195 percent. The higher price implies that there is greater demand and willingness to pay for better quality services.[24] It also indicates that the additional costs of having more channels have been passed on to customers in the form of higher prices.

Of the system size stratification variables, only the first-order term for medium size (SIZEM) is significant at the 5 percent level. Although the first-order coefficient for SIZEL is not significant, several of its interaction terms are reasonably significant. These negative first-order coefficients hint that, compared to smaller systems, average cable rates are 6.7 percent and 7.4 percent lower in medium and large markets, respectively. There may be some economies of scale in the distribution and administration of video services. It possibly indicates as well that demand conditions, including access to more and varied substitute products, limit the market power of cable companies in bigger markets.

[24] More channels were equated to higher quality. For many customers, however, as more channels are added they provide incrementally less satisfaction. Cable tier pricing requires subscribers to buy all of the channels offered on the tier they choose to purchase, yet they may only watch a small number of them. Some groups advocate "a la carte" pricing, wherein customers could choose and pay for the channels they wish to watch. While perhaps providing more subscriber choice, a-la-carte pricing may negatively impact network diversity and require additional technology and customer service (NCTA, 2004). It is uncertain what the impact on rates would be for the average cable subscriber.

The first-order coefficient on the MSO dummy variable is negative and significant at the 10 percent level, indicating that average cable rates are 5.6 percent lower for smaller systems with MSO affiliations. It reveals that small operators affiliated with a MSO may benefit from the MSO's bargaining position with third party programmers or the reduction of duplicative administrative functions. Some of these costs savings are passed on to consumers in the form of lower prices.

While the affiliation with a MSO is significant, the first-order coefficient on MSO size (MSOS) is not significant. However, several of the MSOS second-order terms are highly significant, so it should remain in the specification. For example, the negative second-order term on MSO*MSOS is significant at the 1 percent level and implies that given a firm is affiliated with a MSO, an increase in the number of subscribers in that MSO marginally decreases rates.

Though the first-order coefficient on the number of basic subscribers, BSUB, is not significant, many of its second-order interaction terms are significant. In addition, the positive, significant coefficient on SIZEL*BSUB shows that for large operators, more basic subscribers leads to higher cable rates. It supports the interpretation of basic subscribers serving as a proxy for marginal cost.

Having considered the plausibility of the estimated rate equation, we next turn to the principal variables of interest. The first-order coefficient on the regulatory variable, REG, is positive and significant at the 5 percent level. By itself, it suggests that after controlling for other factors, re-regulation has raised the average cable rates of small operators by 5.8 percent. Of course, that interpretation could be misleading depending on the sign and magnitude of the other REG terms. Of its 8 interaction terms, 5 coefficients are significant at the 10 percent or higher level.

For a more complete evaluation of the effect of regulation on average rates for small, medium and large systems, we calculate the percentage change in rates (R) due to regulation (REG):

$$[R(REG = 1) - R(REG = 0)] / R(REG = 0) \cdot 100 =$$

$$[\exp (REG + REG*COMP + REG*MSOS + REG*BSUB + REG*TCHAN + REG*WAGE + REG*MSO + REG*SIZEM + REG*SIZEL) - 1] \cdot 100,$$

where the terms in the exponential refer to the coefficients associated with that term and have been evaluated at the mean or representative value of the variables for each system size. The results of these calculations are given below:

	Regulation without Competition	Regulation with Competition
Small Systems	-0.38%	-2.55%
Medium Systems	5.28%	2.99%
Large Systems	2.54%	0.31%

Average cable rates during periods of regulation are slightly lower in smaller markets, but actually higher in medium-sized markets by 5.3 percent and large markets by 2.5 percent. Perhaps larger systems were able to take advantage of regulatory guidelines such as the "going-forward" rules and added channels to programming tiers. Systems could then raise prices to recoup the costs of these additional channels. During periods of regulation, rates are lower in competitive markets than in non-competitive markets. Controlling for factors such as product quality, these results raise doubts about the effectiveness of re-regulation of the cable industry following the 1992 Cable Act.

The first-order coefficient on the competition variable, COMP, is negative and significant at the 1 percent level. It indicates that average rates are 11.7 percent lower for small systems facing competition. Four of its second-order terms are significant as well,

at the 10 percent or higher level. For instance, the interaction term with SIZEM is positive and highly significant, suggesting that competition reduces rates less for medium-sized companies.

To evaluate fully the effect of competition on average cable rates for small, medium and large systems, we calculate the percentage change in rates (R) due to competition (COMP):

$$[R(COMP = 1) - R(COMP = 0)] / R(COMP = 0) \cdot 100 =$$

$$[\exp (COMP + COMP*REG + COMP*MSOS + COMP*BSUB + COMP*TCHAN + COMP*WAGE + COMP*MSO + COMP*SIZEM + COMP*SIZEL) - 1] \cdot 100$$

Again, the variables are evaluated at the mean or representative value for each system size. The results of the calculations are provided below:

	Competition without Regulation	Competition with Regulation
Small Systems	-6.86%	- 8.89%
Medium Systems	-5.63%	- 7.69%
Large Systems	-8.79%	-10.77%

Overall, competition is effective in lowering average cable rates, from 5.6 to 8.8 percent. Moreover, excluding low penetration systems from the competitive group generally results in larger rate differentials than what were found by the FCC in its price surveys.[25] The most significant effect on rates occurs in large markets. Despite the late entry of DBS and LECs into metropolitan markets, large cable operators may have

[25] In its *Report on Cable Industry Prices*, the FCC reported that average rates were lower in markets where there was effective competition, ranging from as little as 2.3 percent in 1995 to as high as 8.4 percent in 1993. For most years, the average competitive differentials were approximately 5 to 6 percent.

responded to potential entry and indirect competition from alternative video services by constraining prices below the levels found in smaller markets. We would expect that the rate differential would be even larger if data from more recent years were included in the study. We also find that during periods of regulation, the competitive rate differential is even greater. Perhaps there was a regulatory "spillover effect" wherein the possibility of expanded regulatory oversight disciplined cable operators. In addition to lower rates, cable operators responded to competition by offering more channels.

	Overall	With Competition
Small	45.67	53.99
Medium	47.67	61.54
Large	59.81	64.98
Average	47.85	55.91

These results highlight the significance of competition in lowering rates and the ineffectiveness of re-regulation.

6. CONCLUSION

Certainly, our results suggest that competition provides the best solution to containing rising cable prices. Administrative barriers and the cost of building and installing cable plant, however deter most overbuild threats, particularly by private operators.[26] Potential overbuilders realize that they cannot compete against incumbent operators solely by providing video programming in a small number of markets. Successful overbuilders need the resources to finance entry and the complimentary services to include in the product mix. Fortunately, for a growing number of consumers living in communities without overbuilds, competition is not limited to this type. Today,

[26] Overbuilds exist in less than 2 percent of franchise areas.

two of the top four largest subscriber-based video delivery services are DBS operators.[27] The entry of DBS forces cable incumbents to price and package their services to be more competitive, and spend millions of dollars to expand network capabilities.[28] In more recent years, cable operators are also being threatened by the well-financed LECs.

As technological advances bring new products to market, the profit opportunity will be large enough in many markets to make it economically possible for two or more video delivery companies to compete. Most likely, the entrants will be a DBS provider and/or LEC, as industry convergence and consolidation provide the means and the incentive to enter. Policy actions should encourage competitive entry. Re-regulation, although an option, has proven to be ineffective in constraining cable rates. Competition, on the other hand, where it does exist, demonstrates that it can achieve the desired outcomes.

[27] DIRECTV is second and EchoStar is third (NCTA, 2006). DBS subscribers represent 28 percent of the MVPD market.

[28] In areas where consumers receive local channels from both DBS operators, the GAO (2003) found that cable operators provided 5 percent more channels. Furthermore, the GAO (2003) found that in 2001, two years after SHVIA, DBS penetration was negatively related to average cable rates.

Table 1. Variable Descriptions

Variable	Description
R	Monthly price for programming services (basic and most popular cable programming service tier) and equipment (most popular converter and a remote)
REG	A binary variable that equals 1 if the year is 1994, 1995, 1996, 1997, or 1998 – periods of re-regulation.
COMP	A binary variable that equals 1 if the cable system operates in a competitive market (does not include low penetration systems)
MSO	A binary variable that equals 1 if the system is affiliated with an MSO
MSOS	Number of subscribers for the MSO to which the cable company is affiliated
BSUB	Number of basic subscribers for the cable company
SIZEM	Number of subscribers served by the cable operator is greater than or equal to 10,000 but less than 50,000
SIZEL	Number of subscribers served by the cable operator is greater than or equal to 50,000
TCHAN	Number of channels on the basic and most popular cable programming tier
WAGE	The annual US average hourly earnings of production workers for cable and other program distribution from 1993 to 2001

Table 2. Translog Rate Equation Results

Dependent Variable
R: Average Cable Rate

Parameter	Estimate	St. Error	
Constant	.047	.033	
REG	.056	.026	**
MSO	-.058	.032	*
COMP	-.124	.026	***
SIZEM	-.069	.033	**
SIZEL	-.077	.049	
MSOS	.008	.008	
BSUB	.005	.010	
TCHAN	.195	.038	***
WAGE	.665	.137	***
.5*MSOS^2	.000	.001	
.5*BSUB^2	.000	.001	
.5*TCHAN^2	-.183	.030	***
.5*WAGE^2	.617	.530	
COMP*MSOS	.001	.003	
COMP*BSUB	-.015	.003	***
COMP*TCHAN	-.012	.019	
COMP*WAGE	-.061	.067	
COMP*MSO	.020	.024	
COMP*REG	-.022	.013	*
REG*MSOS	.001	.003	
REG*BSUB	.006	.003	*
REG*TCHAN	-.017	.017	
REG*WAGE	.496	.054	***
REG*MSO	-.043	.024	*
SIZEM*MSOS	.010	.005	*
SIZEM*TCHAN	-.056	.024	**
SIZEM*WAGE	.000	.080	
SIZEM*REG	.031	.016	**
SIZEM*MSO	.082	.032	***
SIZEM*COMP	.051	.015	***
SIZEM*BSUB	-.014	.010	
SIZEL*MSOS	-.008	.010	
SIZEL*TCHAN	-.058	.039	
SIZEL*WAGE	-.011	.123	
SIZEL*REG	-.025	.021	
SIZEL*MSO	.068	.044	
SIZEL*COMP	.044	.025	*
SIZEL*BSUB	.028	.014	**
MSO*MSOS	-.018	.007	***
MSO*BSUB	-.008	.009	

MSO*TCHAN	-.010	.033	
MSO*WAGE	.488	.126	***
MSOS*BSUB	-.003	.001	***
MSOS*TCHAN	.019	.005	***
MSOS*WAGE	-.014	.014	
BSUB*TCHAN	.017	.006	***
BSUB*WAGE	.011	.016	
TCHAN*WAGE	.559	.089	***

$R^2 = .659$

*** Significant at 1%
** Significant at 5%
* Significant at 10%

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