

WORKING PAPER NO. 2013-06

---

**Testing the Effectiveness of Regulation and Competition on Cable  
Television Rates**

By

Mary T. Kelly and John S. Ying

---

*WORKING PAPER SERIES*



Alfred Lerner College  
of Business & Economics

DEPARTMENT OF ECONOMICS

The views expressed in the Working Paper Series are those of the author(s) and do not necessarily reflect those of the Department of Economics or of the University of Delaware. Working Papers have not undergone any formal review and approval and are circulated for discussion purposes only and should not be quoted without permission. Your comments and suggestions are welcome and should be directed to the corresponding author. Copyright belongs to the author(s).

# Testing the Effectiveness of Regulation and Competition on Cable Television Rates

by

Mary T. Kelly and John S. Ying\*

## 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.

JEL Classification codes: L50, L51, L96, L97, L98

Keywords: cable rates; regulation; competition

\*Villanova University and University of Delaware, respectively.

Contact information:

Mary T. Kelly, Department of Economics, Villanova University, Villanova, PA 19085, USA; email: [mary.kelly@villanova.edu](mailto:mary.kelly@villanova.edu)

John S. Ying, Department of Economics, University of Delaware, Newark, DE 19716, USA; email: [jying@udel.edu](mailto:jying@udel.edu)

Right running head: Effect of Regulation and Competition on Cable Rates

## INTRODUCTION

Few industries match cable when it comes to swings in regulatory oversight. Between 1992 and 1999, U.S. cable system operators went from an environment of deregulation to regulation, and then back to deregulation. While effective regulation is supposed to model the competitive outcome in terms of price and output when there is a lack of competition in the market, during the intermittent period of regulation, the national average price of cable services increased at a compound annual rate of 5.6 percent, while CPI-U increased at a rate of just 2.4 percent.<sup>1</sup> By 1999, policymakers replaced regulation with pro-competitive policies to encourage new (local exchange carriers - LECs), and existing (direct broadcast satellite - DBS) firms to go up against cable incumbents. During the two years that followed, basic cable subscriber growth slowed, DBS subscriptions jumped considerably, LECs began to enter, and the annual growth rate in cable prices moderated to 4.6 percent.<sup>2</sup> However, in an industry where the number of firms providing video delivery services into a community can range from one to as many as four, national averages can give a distorted view of what the change in policy and competitive entry have on cable prices in local markets.

The purpose of this paper is to examine cable prices during the period 1993 to 2001 and test if the national regulatory policy environment in conjunction with competition, or on its own, had a significant impact on lowering cable prices. If effective, might policymakers consider a swing back to regulatory oversight for an industry that, over the past decade, has become increasingly vertically integrated with content providers, continues to enjoy price increases greater than the annual change in the CPI, and is experiencing slowing market share erosion from direct competitors? If re-regulation in some form is not the answer, do policymakers need to encourage entry

and/or technological development so that consumers might benefit from more choices and more efficient pricing?

## **BRIEF HISTORY OF CABLE REGULATION**

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. With most communities served by one provider, regulators sought to protect consumers from monopoly prices and poor service.<sup>3</sup> As the industry matured and new products and new ways of delivering video programming developed, the policy debate wavered between what type of regulation was appropriate to whether regulation was even necessary.

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.<sup>4</sup> When the Cable Act became effective at the end of 1986, rate regulation no longer applied to most cable systems.<sup>5</sup> With a lack of viable competition in most markets and with cable prices rising more than two times the rate of inflation, Congress re-regulated the industry six years later.<sup>6</sup> In the 1992 Cable Act, Congress directed the FCC to design regulations to ensure that basic cable rates were reasonable.

Accordingly, the Commission, in April 1993, froze rates and adopted a benchmark approach to regulate prices in markets without effective competition.<sup>7</sup> The FCC's established benchmarks took effect in September 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. In response to criticism that the inclusion of low penetration systems in computing benchmark rates inflated allowed prices since many of these smaller systems actually charged higher rates and offered fewer services than firms facing “real” competition, 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%).<sup>8</sup> 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.<sup>9</sup>

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.<sup>10</sup> 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, 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.<sup>11</sup> 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. Hazlett [1990] and 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 transfers to the franchising authority, including non-price concessions.<sup>12</sup> 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 potential rivals 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 LECs would find it profitable to enter. However, in the immediate years following the passage of the 1996 Telecom Act, the LECs entered cautiously, partnering with DBS providers to offer a telecom and video delivery package to consumers.<sup>13</sup> Eventually, concern about losing customers to cable operators offering telephone service in their markets forced the LECs to enter on their own with bundled offerings of voice, internet, and television.<sup>14</sup>

This remarkable period of deregulation, re-regulation, and re-deregulation offers a natural experiment to test the effect of regulation and competition on cable prices when, during some of these years, they were considered alternative ways to discipline the market and, for other years, they co-existed and may have been more complementary in achieving the desired outcome than regulators intended. While other studies have analyzed one year or compared two given years, our paper is the only one to examine this entire period. 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.

Moreover, we examine the interplay of local market competition and FCC regulatory oversight during this time horizon and ask if competition has a greater impact on rates when regulation exists.

The remainder of this paper is organized as follows. The next section reviews the prior research on the effectiveness of regulation and competition in the cable industry. Then, we describe the econometric model, followed by a section discussing the data and variables. In the next section, we present the estimation results. The last section concludes with a discussion of the issues and policy implications.

## **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. A few years earlier, Mayo and Otsuka [1991] reached a similar conclusion by showing that, while basic prices were above marginal cost in 1982, regulation held them to considerably below monopoly levels.

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.<sup>15</sup> Similarly, Anstine [2004] compared the quality-adjusted price for a bundle of cable services in 1985 (regulation) to the same package of cable services in 1990 (deregulation). Anstine found that 75 percent of the price increase was attributed to the increase in monopoly power exercised by unconstrained cable operators.<sup>16</sup>

By contrast, Hazlett [1986] and Emmons and Prager [1997] concluded that regulation prior to the passage of the 1984 Cable Act was ineffective in limiting basic cable rates and recommended government policies to promote competition. In his study of 1982 cable rates, Hazlett demonstrated that the rate for basic and HBO was \$1.82 lower in areas with duplicative franchise systems, as compared to monopoly. Emmons and Prager found that, without a loss in quality, basic cable prices were approximately 20 percent lower in overbuilt markets than those in comparable, private monopoly franchise areas, both before (1983) and after deregulation (1989).<sup>17</sup> Levin and Meisel [1991] found similar results with overbuild competition reducing basic cable prices by 22 percent to 30 percent.<sup>18</sup> Beil et al. [1993] also showed that competition was welfare-enhancing. Using 1989 data, they found that head-to-head competition increased the demand for cable services, and reduced basic rates and pay cable rates by \$3.21 and \$1.15, respectively.<sup>19</sup> Further evidence in support of cable competition was found by Beard et al. [2005]. Using pre-regulation data in a three equation system in which price, demand, and service quality were jointly determined, the authors showed that if a firm's monopolized segment of a market increased by 10 percent, monthly cable prices rose by \$1.63.<sup>20</sup>

Studying the impact of the 1992 Cable Act on consumer utility, Crawford and Shum [2007], using 1995 data, found that consumers benefited from the 1992 Cable Act

and the minimum quality standards of local regulation because, in spite of higher prices, there was a significant jump in quality that improved the quality-price ratio.<sup>21</sup> By contrast, Hazlett [1997] suggested that the welfare effect of regulation resulting from the 1992 Cable Act was ambiguous, because, while prices were lower, so were program and service quality.

Since the passage of the 1996 Telecom Act, studies have examined how incumbents responded to real or potential competition. In a study of approximately 400 markets in the late 1990s, Savage and Wirth [2005] found that in markets threatened by entry, incumbent cable operators offered more channels.<sup>22</sup> Specifically, when the probability of entry rose to approximately 42 percent, they found that cable operators provided an average of six more channels and the price per channel declined from \$0.77 to \$0.66. In addition, Goolsbee and Petrin [2004], using micro data for approximately thirty-thousand households in 317 markets, examined the supply-side response of cable systems to DBS entry, and found that cable prices would be 15 percent higher and quality would be lower without DBS entry.<sup>23</sup> They estimated the aggregate welfare gain to be approximately \$3 billion per year for cable subscribers and \$2.5 billion per year for DBS subscribers who otherwise would have subscribed to cable.

## **ECONOMETRIC MODEL**

The purpose of this study is to comprehensively evaluate the impact of regulation and competition on cable service rates. Despite the many previous studies on these issues, our paper is the only one to span the entire period wherein the industry was deregulated, re-regulated, and re-deregulated (1993-2001). If regulation was 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. Because of limitations in our data, a structural approach is not feasible. We estimate a reduced-form price equation, as in papers such as Goolsbee and Petrin [2004]. Firms produce where marginal revenue equals marginal cost, or set price,

$$(1) \quad P = MC / (1 + 1/\delta),$$

where  $MC$  is marginal cost and  $\delta$  is the perceived price elasticity of demand. Following Rubinovitz (1993), the regulatory environment could be represented by

$$(2) \quad P = \theta (P - MR) + MC,$$

where  $\theta$  is a measure of regulatory effectiveness. (For example,  $\theta$  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,

$$(3) \quad R = R(m, e, r, c),$$

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. Through the vector of variables affecting price elasticity, we are able to control for product quality,

though our data limitations preclude a broader hedonic approach such as in Anstine [2004].

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

$$(4) \quad \ln R = \alpha_0 + \alpha_m \ln m + \sum_i \alpha_i \ln e_i + \alpha_r r + \alpha_c c + \frac{1}{2} \alpha_{mm} (\ln m)^2 + \\ \frac{1}{2} \sum_{ij} \alpha_{ij} \ln e_i \ln e_j + \sum_i \alpha_{mi} \ln m \ln e_i + \alpha_{mr} (\ln m) \cdot r + \alpha_{mc} (\ln m) \cdot c + \\ \sum_i \alpha_{ir} (\ln e_i) \cdot r + \sum_i \alpha_{ic} (\ln e_i) \cdot c + \alpha_{rc} r \cdot c + \varepsilon_r,$$

where  $\varepsilon_r$  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

$$(5) \quad (R_1 - R_0) / R_0 \cdot 100 = [\exp(\alpha_r + \alpha_{mr} \ln m + \sum_i \alpha_{ir} \ln e_i + \alpha_{rc} c) - 1] \cdot 100,$$

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

## 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.<sup>24</sup>

Several data checks were 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. Because company names and addresses were expunged from the files, the ability to check responses was limited to the information provided in the surveys. Firms with incomplete or inconsistent responses (about 25% of the observations) were removed from the study. In the study, there are 5,725 observations. Our data set is unique in that it spans nine years, a time of great regulatory change. The limitation is that we can only use variables that the FCC consistently requested in its surveys.<sup>25</sup> A summary of the variables and their sample means is presented in Table 1.

<<**Table 1 here**>>

With respect to the specific variables in the estimated rate equation, the dependent variable is the average customer rate. 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.<sup>26</sup> We expect that this rate would vary depending on the extent of regulatory constraints, the competitiveness of the market, demand conditions, and marginal cost.

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.<sup>27</sup> 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. As a 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.<sup>28</sup>

For demand factors, we include the number of channels received on the basic and major CPST. It serves as a measure of product or system quality, as a higher number of channels should increase consumer demand and willingness to pay.<sup>29</sup> The number of channels 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 expenses.<sup>30</sup> 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. 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.<sup>31</sup> Alternatively, the number of subscribers 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.<sup>32</sup> 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 it might have on rates, however, is the fact that DBS, one of the most formidable competitive alternatives to cable, had penetration rates significantly higher in smaller, non-metropolitan markets prior to the passage of the Satellite Home Viewer Improvement Act (SHVIA).<sup>33</sup> Other forms of direct competition that might have been found in more 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 are stratified into three categories: small (less than 10,000 subscribers), medium (greater than or equal to 10,000 subscribers but less than 50,000 subscribers), and large (greater than or equal to 50,000 subscribers). Dummy variables for medium and large systems are added to the model. 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 (MSO) affiliation. 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 (MSO size) is 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.<sup>34</sup>

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

In this study, competition is present if a viable competitive alternative provider (overbuild, LEC, municipal MVPD) offered video delivery services in the market. Direct broadcast satellite (DBS) falls in the overbuild grouping, in which at least two MVPDs serve 50% or more of households and at least 15% of those households use a provider other than the largest MVPD. Although the FCC included low penetration systems in its effective competition group, it was criticized and we redefined such systems as non-competitive.<sup>35</sup> This modification allows us to evaluate whether inclusion of low penetration systems affects the competitive rate differential.

Within this set of variables, there may be some concern about the endogeneity of the subscriber and channel variables.<sup>36</sup> In a few of their cross-sectional studies, the FCC used two-stage and three-stage least squares estimation techniques to address these concerns. Because they knew the identity of the cable provider, they were able to create firm-specific instrumental variables such as median household income and percent non-urban population. In the data set provided to us, the FCC purged such identifiers, so territory-specific instruments were not available to us. Rather than ignoring this potential problem with unclear biases, we conduct Hausman-type tests on the subscriber and channel variables using a simplified log-linear model. Because the tests indicated an endogeneity problem with both variables, they should perhaps not appear on the right-hand-side of a reduced-form rate equation. We have re-estimated the cable rate equation excluding these variables and their interaction terms. The estimation results of this additional model are included in the discussion below.

## 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 *Medium System* = *Large System* = 0), with variables evaluated at the sample mean or 0. Following this assessment, we focus on the regulation and competition variables.

<<Table 2 here>>

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

The first-order coefficient on the number of channels 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.<sup>37</sup> It also indicates that the additional costs of having more channels are passed on to customers in the form of higher prices.

Of the system size stratification variables, only the first-order term for medium size systems is significant at the 5 percent level. Although the first-order coefficient for large systems 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.

The first-order coefficient on the MSO affiliation 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 is not significant. However, several of its second-order terms are highly significant, so it should remain in the specification. For example, the negative second-order term on *MSO Affiliation\*MSO Size* 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 is not significant, many of its second-order interaction terms are significant. In addition, the positive, significant coefficient on *Large System\*Subscribers* 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 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 regulation 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 ( $REG$ ):

$$(6) \quad [R(REG = 1) - R(REG = 0)] / R(REG = 0) \cdot 100 =$$

$$[\exp (REG + REG * Competition + REG * MSO Size + REG * Subscribers +$$

$$REG * Channels + REG * Hourly Earnings + REG * MSO Affiliation +$$

$$REG * Medium System + REG * Large System) - 1] \cdot 100,$$

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:

<<Table 3 here>>

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.<sup>38</sup>

The first-order coefficient on the competition variable 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 medium systems 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*):

$$(7) \quad [R(\text{COMP} = 1) - R(\text{COMP} = 0)] / R(\text{COMP} = 0) \cdot 100 =$$

$$[\exp(\text{COMP} + \text{COMP} * \text{Regulation} + \text{COMP} * \text{MSO Size} +$$

$$\text{COMP} * \text{Subscribers} + \text{COMP} * \text{Channels} + \text{COMP} * \text{Hourly Earnings} +$$

$$\text{COMP} * \text{MSO Affiliation} + \text{COMP} * \text{Medium System} + \text{COMP} * \text{Large}$$

$$\text{System}) - 1] \cdot 100.$$

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

<<**Table 4 here**>>

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.<sup>39</sup> 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 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.

<<**Table 5 here**>>

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

To address possible endogeneity problems with the inclusion of subscribers and channels as independent variables, we conduct a Hausman-type test on the suspected variables using a more tractable log-linear specification.<sup>40</sup> The results of the tests indicate that they are jointly significant or endogenous. We have re-run the reduced-form equation excluding channels and subscribers and their associated interaction terms. The results are presented in Table 6. As shown below in Tables 7a-d, the comparative model results indicate that the effects of regulation and competition on cable rates are not qualitatively different.

<<**Table 6 here**>>

<<**Tables 7a-d here**>>

## **CONCLUSION**

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.<sup>41</sup> 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 complementary 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, two of the top three largest subscriber-based video delivery services are DBS operators. 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.<sup>42</sup> In more recent years, cable operators are also being threatened by indirect substitutes; specifically, the delivery of video content over the internet to home computers, laptops, and mobile devices.

As technological advances bring new products to market, the profit opportunity will be large enough in many markets to make it economically possible for multiple video delivery companies to compete. Most likely, the entrants will be well-financed 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 on its own in constraining cable rates. Competition, on the other hand, where it does exist, demonstrates that it can achieve the desired outcomes.

## **Acknowledgements**

We thank members of the FCC staff for their assistance with the data, and the referee and editor for their helpful comments.

## Notes

1. Over that same period, the number of cable subscribers increased by more than six million and, by 1999, cable passed 97 percent of U.S. homes.
2. Between 1999 and 2001, subscriptions to basic cable increased by just 600,000, while DBS subscriptions increased by 5.5 million. LEC entry took quite a bit longer given technology hurdles. There was little change in the number of markets served by cable overbuilders.
3. 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.
4. Congress loosely defined effective competition as circumstances where three or more unduplicated broadcasting signals (for example, ABC, NBC, and CBS) were available within a service area. The competition did not have to be a subscriber-based alternative.
5. In these “competitive” markets, franchise agreements contained only non-price terms.
6. 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.”
7. 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.
8. Low penetration could result from factors unrelated to competition, such as poor service quality or choosing to serve only the most lucrative portion of a market.
9. 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. 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.
10. 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 LECs in the franchise area.

11. The FCC [2004] reported that in 1994, 20.1 million cable subscribers (35 percent) were part of a regional cluster with 100,000+ subscribers. By 1998, that number grew to 40.4 million (62 percent), and by 2001, 52.3 million (76 percent) cable subscribers were part of a cluster.
12. 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.
13. The LECs were uncertain that consumer demand in markets served by well-entrenched incumbents would be sufficient enough to warrant the huge investment in broadband cable.
14. The two largest entrants were Verizon's FIOS and AT&T's U-Verse.
15. The remaining 57 percent was attributed to changes in cost and quality.
16. An improvement in quality accounted for 25 percent of the increase in price.
17. Emmons and Prager's [1997] 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.
18. Levin and Meisel [1993] 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. They argued for telephone company ownership of cable services.
19. The authors estimated the annual deadweight loss at \$3.6 billion.
20. From a study of the welfare tradeoff to consumers of the provision of one additional satellite channel in the period prior to re-regulation, 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.
21. In an earlier study, Crawford [2000] using data from February 1992 (pre-regulation) and August 1995 (post re-regulation) found that there was no change in household welfare primarily because firms were able to increase prices and reallocate programming after the implementation of the 1992 Cable Act.

22. The authors found that entry by broadband service providers and LECs was more likely in markets characterized by high population density, income, and household growth.
23. The FCC [2002] reported that cable rates and subscriptions were lower and the number of cable channels was higher in markets with wireline competition. By contrast, DBS did not have a significant effect on cable prices, services, or subscriptions. The FCC suggested that if the DBS firms in its study were located primarily in rural areas, cable penetration may have been limited because of high deployment costs.
24. 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.
25. In several of its reports, the FCC conducted regression analyses on the data collected from that year's survey only. In these studies, the FCC was able to supplement its data with territory-specific data since it knew the identity of the firms. Because that information was not available to us, we could not do the same.
26. 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, 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.
27. 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.
28. 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.
29. 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.
30. 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.

31. 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.

32. 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.

33. 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.

34. 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.

35. 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.

36. The possibility of an endogeneity problem with regulation and competition variables was also considered. But, because the regulation dummy variable was constructed based on when there was a change in national regulatory policy and not market specific criteria, and the competition variable was based on the type and market penetration of competitors

in a specific market and not on rates, we believe the likelihood of an endogeneity problem with these variables is small.

37. 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.

38. As an alternative to using a variable to identify periods of regulation, we re-estimated the rate equation using the FCC’s regulatory status indicator for each system. For all three system sizes, average rates were higher under regulation, ranging from .01 percent for small systems to 1.80 percent for large systems.

39. As an alternative to using a variable to identify periods of regulation, we re-estimated the rate equation using the FCC’s regulatory status indicator for each system. For all three system sizes, average rates were higher under regulation, ranging from .01 percent for small systems to 1.80 percent for large systems.

40. The joint F test =  $[(SSE_R - SSE_U)/\text{no. of omitted variables}]/[SSE_U/(n-k)]$ . First, we obtain the residuals from a regression of each of the suspect variables (channels and subscribers) against all other exogenous variables and a time trend variable. Then, we include the residuals from the two regressions as additional variables in the original model in log-linear form (the unrestricted model). The F statistic for our test is 30.28.

41. Overbuilds exist in less than 2 percent of franchise areas.

42. 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.

## References

- Anstine, Diane Bruce. 2004. The Impact of the Regulation of the Cable Television Industry: The Effect on Quality-Adjusted Cable Television Prices. *Applied Economics*, 36(8): 793-802.
- Beard, T. Randolph, Robert B. Ekelund, Jr., George S. Ford, and Richard S. Saba. 2001. Price-Quality Tradeoffs and Welfare Effects in Cable Television Markets. *Journal of Regulatory Economics*, 20(2): 107-123.
- Beard, T. Randolph, George S. Ford, R. Carter Hill, and Richard P. Saba. 2005. Fragmented Duopoly: A Conceptual and Empirical Investigation. *Journal of Business*, 78(6): 2377-2396.
- Beil, Richard O., P. Thomas Dazzio, Robert Ekelund, and John D. Jackson. 1993. Competition and the Price of Municipal Cable Television Services: An Empirical Study. *Journal of Regulatory Economics*, 5(4): 401-415.
- Chipty, Tasneem. 1995. Horizontal Integration for Bargaining Power: Evidence from the Cable Television Industry. *Journal of Economics and Management Strategy*, 4(2): 375-397.
- Crawford, Gregory S. 2000. The Impact of the 1992 Cable Act on Household Demand and Welfare. *RAND Journal of Economics*, 31(3): 422-449.
- Crawford, Gregory S. and Matthew Shum. 2007. Monopoly Quality Degradation and Regulation in Cable Television. *Journal of Law and Economics*, 50(1): 181-219.
- Emmons, William M. III and Robin A. Prager. 1997. 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): 732-750.
- Federal Communications Commission (FCC). 1985. Amendment of Parts 1, 63 & 76 of the Commission's Rules to Implement the Provisions of the Cable Communications Policy Act of 1984. *Report and Order*. 50 Fed Reg. 18637, 18650.
- \_\_\_\_\_. 1991. Reexamination of the Effective Competition Standard for the Regulation of Cable Television Basic Service Rates. *Report and Order and Second Further Notice of Proposed Rulemaking*. 6 FCC Rcd 4545.
- \_\_\_\_\_. 1993. In the Matter of Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992: Rate Regulation. *Report and Order and Further Notice of Proposed Rulemaking*. 8 F.C.C.R. 5631, 5759-60, 5881-82.
- \_\_\_\_\_. 1994a. In the Matter of Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992: Rate Regulation. *Second Order on Reconsideration, Fourth Report and Order, and Fifth Notice of Proposed Rulemaking*. MM Docket No. 92-266.
- \_\_\_\_\_. 1994b. In the Matter of Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992: Rate Regulation. *Sixth Order on Reconsideration, Fifth Report and Order, and Seventh Notice of Proposed Rulemaking*. FCC 94-286.
- \_\_\_\_\_. 1997a. In the Matter of Implementation of Section 3 of the Cable Television Consumer Protection and Competition Act of 1992: Statistical Report on Average Rates for Basic Service, Cable Programming, and Equipment. *Report on Cable Industry Prices*. MM Docket No. 92-266.

- \_\_\_\_\_. 1997b. In the Matter of Implementation of Section 3 of the Cable Television Consumer Protection and Competition Act of 1992: Statistical Report on Average Rates for Basic Service, Cable Programming, and Equipment. *Report on Cable Industry Prices*. MM Docket No. 92-266.
- \_\_\_\_\_. 1999. In the Matter of Implementation of Section 3 of the Cable Television Consumer Protection and Competition Act of 1992: Statistical Report on Average Rates for Basic Service, Cable Programming, and Equipment. *Report on Cable Industry Prices*. MM Docket No. 92-266.
- \_\_\_\_\_. 2000. In the Matter of Implementation of Section 3 of the Cable Television Consumer Protection and Competition Act of 1992: Statistical Report on Average Rates for Basic Service, Cable Programming, and Equipment. *Report on Cable Industry Prices*. MM Docket No. 92-266.
- \_\_\_\_\_. 2001. In the Matter of Implementation of Section 3 of the Cable Television Consumer Protection and Competition Act of 1992: Statistical Report on Average Rates for Basic Service, Cable Programming, and Equipment. *Report on Cable Industry Prices*. MM Docket No. 92-266.
- \_\_\_\_\_. 2002. In the Matter of Implementation of Section 3 of the Cable Television Consumer Protection and Competition Act of 1992: Statistical Report on Average Rates for Basic Service, Cable Programming, and Equipment. *Report on Cable Industry Prices*. MM Docket No. 92-266.
- \_\_\_\_\_. 2003. In the Matter of Implementation of Section 3 of the Cable Television Consumer Protection and Competition Act of 1992: Statistical Report on Average Rates for Basic Service, Cable Programming, and Equipment. *Report on Cable Industry Prices*. MM Docket No. 92-266.
- \_\_\_\_\_. 2004. In the Matter of Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming. *Tenth Annual Report*. MB Docket No. 03-172.
- \_\_\_\_\_. 2005. In the Matter of Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming. *Eleventh Annual Report*. MB Docket No. 04-227.
- Ford, George S. and John D. Jackson. 1997. Horizontal Concentration and Vertical Integration in the Cable Television Industry. *Review of Industrial Organization*, 12(4): 501-518.
- Goolsbee, Austan and Amil Petrin. 2004. The Consumer Gains from Direct Broadcast Satellites and the Competition with Cable TV. *Econometrica*, 72(2): 351-381.
- Hazlett, Thomas W. 1986. Competition vs. Franchise Monopoly in Cable Television. *Contemporary Policy Issues*, 4(2): 80-97.
- \_\_\_\_\_. 1990. Duopolistic Competition in Cable Television: Implications for Public Policy. *Yale Journal on Regulation*, (Winter): 65-120.
- \_\_\_\_\_. 1997. Prices and Output under Cable TV Reregulation. *Journal of Regulatory Economics*, 12(2): 173-195.
- Kelly, Mary T. and John S. Ying. 2003. On Measuring Competitive Viability and Monopoly Power in Cable: An Empirical Cost Approach. *The Review of Economics and Statistics*, 85(4): 962-970.
- Levin, Stanford L. and John B. Meisel. 1991. Cable Television and Competition: Theory, Evidence and Policy. *Telecommunications Policy*, 15(6): 519-528.

- \_\_\_\_\_. 1993. Telephone Company Ownership of Rural Cable Television Companies. *Review of Industrial Organization*, 8(4): 465-72.
- Mayo, John W. and Yasuji Otsuka. 1991. Demand, Pricing, and Regulation: Evidence from the Cable TV Industry. *RAND Journal of Economics*, 22(3): 396-410.
- National Cable & Telecommunications Association (NCTA). 2004. The Pitfalls of A La Carte: Fewer Choices, Less Diversity, Higher Prices, *NCTA White Paper*.
- \_\_\_\_\_. 2006. The Video Market is Fully Competitive: More than 30 Million Consumers Now Subscribe to Cable's Competitors. *NCTA Talking Points*.
- Otsuka, Yasuji. 1997. A Welfare Analysis of Local Franchise and Other Types of Regulation: Evidence from the Cable TV Industry. *Journal of Regulatory Economics*, 11(2): 157-180.
- Rubinovitz, Robert N. 1993. Market Power and Price Increases for Basic Cable Service since Deregulation. *RAND Journal of Economics*, 24(1): 1-18.
- Savage, Scott J. and Michael Wirth. 2005. Price, Programming and Potential Competition in US Cable Television Markets. *Journal of Regulatory Economics*, 27(1): 25-46.
- U. S. Census Bureau. Table F-7: Type of Family (all Races) by Median and Mean Income: 1947 to 2001. *Historical Income Tables – Families*.
- U. S. Congress. 1992. *Cable Television Consumer Protection and Competition Act of 1992*. P.L.102-385.
- \_\_\_\_\_. 1996. *Telecommunications Act of 1996*. P.L.104-104.
- U. S. Department of Labor, Bureau of Labor Statistics. Cable and Other Program Distribution: Average Hourly Earnings of Production Workers. *National Employment, Hours and Earnings*.
- \_\_\_\_\_. Radio/TV Broadcast & Wireless Communication Equipment Manufacturing: Broadcast, Studio, and Related Electronic Equipment. *Producer Price Index Industry Data*.
- U. S. General Accounting Office (GAO). 2000. Telecommunications: The Effect of Competition From Satellite Provides on Cable Rates. *Report to Congressional Requesters*, GAO/RCED-00-164.
- \_\_\_\_\_. 2003. Telecommunications: Issues Related to Competition and Subscriber Rates in the Cable Television Industry. *Report to the Chairman on Commerce, Science, and Transportation, U.S. Senate*, GAO-048-8.
- Zupan, Mark A. 1989. Non-price Concessions and the Effect of Franchise Bidding Schemes on Cable Company Costs. *Applied Economics*, 21(3): 305-323.

**Table 1: Variable Definitions and Sample Means**

Variable	Description	Sample Mean
Average Cable Rate	Monthly price for programming services (basic and most popular cable programming service tier) and equipment (most popular converter and a remote)	\$30.28
Regulation	Binary variable that equals 1 during periods of re-regulation (years 1994-1998)	.40
Competition	Binary variable that equals 1 if the cable system operates in a competitive market (overbuild, LEC, municipal, but not low penetration systems)	.18
MSO Affiliation	Binary variable that equals 1 if the system is affiliated with an MSO	.95
MSO Size	Number of subscribers for the MSO to which the cable company is affiliated	78,308
Subscribers	Number of basic subscribers for the cable company	18,014
Medium System	Binary variable that equals 1 for cable operators with subscribers greater than or equal to 10,000 but less than 50,000	.20
Large System	Binary variable that equals 1 for cable operators with subscribers greater than or equal to 50,000	.13
Channels	Number of channels on the basic and most popular cable programming tier	47.85
Hourly Earnings	Annual US average hourly earnings of production workers for cable and other program distribution	\$13.27

**Table 2: Translog Rate Equation Results – Original Model**

Dependent Variable: *Average Cable Rate*

Parameter	Estimate	St. Error	Significance
Constant	.047	.033	
Regulation	.056	.026	**
MSO Affiliation	-.058	.032	*
Competition	-.124	.026	***
Medium System	-.069	.033	**
Large System	-.077	.049	
MSO Size	.008	.008	
Subscribers	.005	.010	
Channels	.195	.038	***
Hourly Earnings	.665	.137	***
.5*(MSO Size) <sup>2</sup>	.000	.001	
.5*(Subscribers) <sup>2</sup>	.000	.001	
.5*(Channels) <sup>2</sup>	-.183	.030	***
.5*(Hourly Earnings) <sup>2</sup>	.617	.530	
Competition*MSO Size	.001	.003	
Competition*Subscribers	-.015	.003	***
Competition*Channels	-.012	.019	
Competition*Hourly Earnings	-.061	.067	
Competition*MSO Affiliation	.020	.024	
Competition*Regulation	-.022	.013	*
Regulation*MSO Size	.001	.003	
Regulation*Subscribers	.006	.003	*
Regulation*Channels	-.017	.017	
Regulation*Hourly Earnings	.496	.054	***
Regulation*MSO Affiliation	-.043	.024	*
Medium System*MSO Size	.010	.005	*
Medium System*Channels	-.056	.024	**
Medium System*Hourly Earnings	.000	.080	
Medium System*Regulation	.031	.016	**
Medium System*MSO Affiliation	.082	.032	***
Medium System*Competition	.051	.015	***
Medium System*Subscribers	-.014	.010	
Large System*MSO Size	-.008	.010	
Large System*Channels	-.058	.039	
Large System*Hourly Earnings	-.011	.123	
Large System*Regulation	-.025	.021	
Large System*MSO Affiliation	.068	.044	
Large System*Competition	.044	.025	*
Large System*Subscribers	.028	.014	**
MSO Affiliation*MSO Size	-.018	.007	***
MSO Affiliation*Subscribers	-.008	.009	

MSO Affiliation*Channels	-.010	.033	
MSO Affiliation*Hourly Earnings	.488	.126	***
MSO Size*Subscribers	-.003	.001	***
MSO Size *Channels	.019	.005	***
MSO Size*Hourly Earnings	-.014	.014	
Subscribers*Channels	.017	.006	***
Subscribers*Hourly Earnings	.011	.016	
Channels*Hourly Earnings	.559	.089	***

---

$R^2 = .659$

\*\*\* Significant at 1%

\*\* Significant at 5%

\* Significant at 10%

**Table 3: Effect of Regulation on Average Cable Rates**

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

**Table 4: Effect of Competition on Average Cable Rates**

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

**Table 5: Number of Channels by System Size**

System Size	All Cable Systems	Competitive Systems Only
Small	45.67	53.99
Medium	47.67	61.54
Large	59.81	64.98
Average	47.85	55.91

**Table 6: Translog Rate Equation Results – Without Channel and Subscriber Variables**

Dependent Variable: *Average Cable Rate*

Parameter	Estimate	St. Error	Significance
Constant	.027	.027	
Regulation	.032	.025	
MSO Affiliation	-.026	.027	
Competition	-.085	.026	***
Medium System	-.063	.025	***
Large System	-.030	.034	
MSO Size	.022	.007	***
Hourly Earnings	.847	.130	***
.5*(MSO Size) <sup>2</sup>	.001	.001	
.5*(Hourly Earnings) <sup>2</sup>	1.897	.489	***
Competition*MSO Size	-.003	.003	
Competition*Hourly Earnings	-.060	.062	
Competition*MSO Affiliation	.027	.025	
Competition*Regulation	-.020	.013	
Regulation*MSO Size	.001	.003	
Regulation*Hourly Earnings	.428	.050	***
Regulation*MSO Affiliation	-.049	.024	**
Medium System*MSO Size	-.002	.005	
Medium System*Hourly Earnings	.036	.062	
Medium System*Regulation	.036	.012	***
Medium System*MSO Affiliation	.066	.023	***
Medium System*Competition	.015	.012	
Large System*MSO Size	-.012	.008	
Large System*Hourly Earnings	.103	.099	
Large System*Regulation	.005	.017	
Large System*MSO Affiliation	.059	.034	*
Large System*Competition	-.021	.021	
MSO Affiliation*MSO Size	-.016	.006	**
MSO Affiliation*Hourly Earnings	.478	.122	***
MSO Size*Hourly Earnings	.037	.012	***

R<sup>2</sup> = .633

\*\*\* Significant at 1%

\*\* Significant at 5%

\* Significant at 10%

**Table 7a: Regulation without Competition**

System Size	Original Model	Without Channels, Subscribers
Small	-0.38%	-2.04%
Medium	5.28%	2.70%
Large	2.54%	1.53%

**Table 7b: Regulation with Competition**

System Size	Original Model	Without Channels, Subscribers
Small	-2.55%	-3.97%
Medium	2.99%	0.67%
Large	0.31%	-0.47%

**Table 7c: Competition without Regulation**

System Size	Original Model	Without Channels, Subscribers
Small	-6.86%	-5.59%
Medium	-5.63%	-4.61%
Large	-8.79%	-8.28%

**Table 7d: Competition with Regulation**

System Size	Original Model	Without Channels, Subscribers
Small	- 8.89%	- 7.45%
Medium	- 7.69%	- 6.49%
Large	-10.77%	-10.09%