

Rate Regulation, Effective Competition,  
and the Cable Act of 1992

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Rate Regulation, Effective Competition, and the Cable Act of 1992

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## 1. Introduction

The First Amendment prevents Congress from enacting laws that abridge freedom of speech. Yet speech can be just as effectively limited by laws that constrain the returns to its purveyors as by those that directly regulate what speakers may say. It is for this reason that the provisions of the Cable Television Consumer Protection and Competition Act of 1992 ("1992 Cable Act") that direct the Federal Communications Commission to regulate basic cable rates, and the manner in which those provisions have been implemented by the Commission, are of such great interest.

The period that followed the passage of the Cable Act of 1984, which effectively deregulated rates for basic cable service, was marked by a substantial increase both in the number and range of networks that cable systems offered to their subscribers. Between November 30, 1986 and December 31, 1989, the average number of channels received increased from 27.1 to 33.6 on the most popular basic service and from 24.2 to 31.2 on the lowest price service.<sup>1</sup> During this same period, the number of basic cable networks offered on the lowest price tier increased from 11.1 to 17.3, accounting for virtually the entire increase in the number of channels offered. Moreover, this increase came on top of an increase from 7.8 to 11.1 between December 31, 1984 and November 30, 1986, so offered. Moreover, this increase came on top of an increase from 7.8 to 11.1 between December 31, 1984 and November 30, 1986, so

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<sup>1</sup>General Accounting Office, Telecommunications: Follow-Up National Survey of Cable Television Rates and Services, Report to the Chairman, Subcommittee on Telecommunications and Finance, Committee on Energy and Commerce, House of Representatives, June 1990.

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that the number of basic cable networks offered on the lowest price service had more than doubled over the five year period from the end of 1984 to the end of 1989.

Under the terms of the 1992 Cable Act, cable systems face effective competition, and are therefore not subject to basic service rate regulation, if: (i) they are in a franchise area served by at least two unaffiliated multichannel video programming distributors each of which offers service to at least half of all households and all but the largest of which cumulatively serve at least 15 percent of all households, i.e., they are "overbuilt" systems; (ii) fewer than 30 percent of households in their franchise area subscribe, i.e., they are "low penetration" systems; and/or (iii) they are in a franchise area in which the municipal franchising authority is a multichannel video programming distributor that offers service to at least half of all households.<sup>2</sup> The Act directs the Federal Communications Commission to develop a method to regulate basic cable service rates for all other systems.

Although the 1992 Cable Act identifies a large number of factors that the FCC may take into account in establishing its regulatory regime for cable<sup>3</sup>, the approach the Commission

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<sup>2</sup>Sec. (3)(1)(1). The Commission classified systems in the "municipal" category as either those that are operated by the franchising authority or those that compete with systems that are operated by the authority. In practice, however, these systems are ones that are operated by the authority.

<sup>3</sup>Sec. 3(c)(1).

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ultimately adopted is based on a comparison of the rates of effectively competitive and non-effectively competitive systems. In particular, the Commission conducted a statistical analysis in which it found that rates for cable systems that are subject to effective competition are, on average, approximately 10 percent lower than rates for systems that are not subject to such competition, holding other factors that may affect rates constant.<sup>4</sup> Using the results of its statistical analysis, the Commission established a set of "benchmark" rates. Cable systems with rates that exceed these benchmarks must reduce their rates by 10 percent, or to the benchmark, whichever requires a smaller reduction, unless they can demonstrate that their rates are justified by their costs, including a fair rate of return.

Rates for the "basic tier" are to be regulated by local franchising authorities using the FCC's benchmarks. Rates for other tiers, "cable programming services," are to be regulated by the Commission itself.<sup>5</sup> Because the FCC has adopted a unitary regulatory regime in which the same per channel rate benchmark is initially used for both basic and enhanced basic services, future references in this paper to basic cable service are intended to

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<sup>4</sup>The details underlying this analysis appear in Appendix E -- Survey Results and Technical Appendix to Report and Order and Further Notice of Proposed Rulemaking In the Matter of Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992: Rate Regulation, Adopted: April 1, 1993.

<sup>5</sup>Rates for premium service remain unregulated.

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apply to both types of service.<sup>6</sup>

Because the way in which the FCC has implemented the provisions of the 1992 Cable Act can have a substantial impact on the services that are available to cable subscribers, it is important to understand the analytical underpinnings of the Commission's regulatory regime. The principal objective of this paper is to evaluate the methods and data used by the Commission to estimate the competitive differential and to determine the benchmark rates. We conclude that the Commission's estimate is very sensitive both to the statistical method used and to the construction of the variables used in the estimation. In addition, the number of observations of effectively competitive systems is very small in relation to the use to which they are put. Put simply, we have little confidence in the Commission's estimate of the competitive differential.

## II. The FCC's Estimation of Effectively Competitive Rates

The FCC's approach to estimating benchmark rates for basic cable service is to compare the per-channel rates charged by systems deemed subject to effective competition under the 1992 Cable Act with rates charged by a random sample of other systems,

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<sup>6</sup>Per channel rates on different basic service tiers may diverge in the future because cable systems are permitted to increase basic service rates to reflect increases in program costs.

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holding "other factors" constant.<sup>7</sup> The benchmark rates for systems not subject to effective competition are to be based on estimates of the rates that would be charged by similar systems that are subject to such competition.

Specifically, the Commission's analysis is used to determine the per-channel rate of the basic service offerings of cable systems, where the offerings include installation, equipment, and program service. After the benchmark rate is determined for a system, the system must "back out" the actual costs of installation and equipment to determine the maximum permitted rate for basic cable program service.

#### 1. The Commission's Sample

In conducting its analysis, the Commission initially surveyed 748 "cable community units."<sup>8</sup> Of these, 300 were from a 1 percent random sample of all cable community units. The remainder were drawn from units where there was believed to be at least one other multichannel video service provider, units where cable penetration

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<sup>7</sup>The Cable Act of 1992 distinguishes between basic cable service and cable programming service, where the latter can be thought of as the array of satellite-delivered programming services not offered on a per-channel basis. However, the Commission has adopted a unitary regulatory regime in which the same per-channel rate benchmark is used for both basic and enhanced basic services. As a result, future references in this paper to basic cable service are intended to apply to both types of service.

<sup>8</sup>Appendix E -- Survey Results: Technical Issues, p. 1. A cable community unit is probably equivalent to a cable franchise area in most areas. A given cable system may thus contain more than one cable community unit.

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was believed to be less than 30 percent, and units in the 100 largest cable systems.<sup>9</sup> Data were requested for these community units, for the systems of which the community units were a part, and for a second community unit of the same system.

Responses were received from 708 of the 748 "first" units to which surveys were sent.<sup>10</sup> Of these, 21 were either "duplicates" or had insufficient information, so that the resulting sample contained 687 systems. The Commission also reports that there were an additional 420 observations from a "unique second community unit within the same cable system," resulting in 1,107 "usable different community responses."<sup>11</sup>

In fact, the Commission's equation used to estimate the competitive differential is based not on these 1,107 responses but on only 377 observations.<sup>12</sup> Observations were eliminated for a number of reasons.

First, the Commission apparently found, on closer examination, that some of the systems it had initially believed were

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<sup>9</sup>This suggests that the Commission initially identified 348 "overbuilt" or "low penetration" systems, 748 - 300 - 100, in the initial sample, although this number is substantially larger than the number of such systems in the sample the Commission analyzed. The Commission's description of its sampling procedure does not refer to specific requests for data from "municipal" systems. According to Appendix E, footnote 9, data on these systems were obtained from the overbuilt and random samples.

<sup>10</sup>Id., p. 3.

<sup>11</sup>Id.

<sup>12</sup>Id., p. 12.



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"effectively competitive" did not meet the statutory definition. The Commission reports that there were 104 such community units.<sup>13</sup>

Second, the Commission staff has indicated to us that data from second franchises were included in the database used to estimate the competitive differential only for systems that were eventually classified as effectively competitive.<sup>14</sup> Where non-competitive systems reported data for second franchises, these data were eliminated from the Commission's sample.

Third, the Commission apparently did not use the data from the 100 largest cable systems in its analysis except where it found that they faced effective competition, in which case they were classified as competitive and included in the database. The Commission reports that 1 of the low penetration "first" units, 5 of the low penetration "second" units, 1 of the overbuilt "first" units, and 1 of the overbuilt "second" units were obtained from the top-100 sample.<sup>15</sup> The remaining observations for top-100 systems were eliminated.

Finally, an unknown number of observations were eliminated because they did not contain data for all the variables that were

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<sup>13</sup>Id., p. 5.

<sup>14</sup>As noted above, some of the systems that were initially classified as effectively competitive were eventually deleted from the sample because, on closer examination, it was determined that they did not face effective competition. In addition, some of the systems in the random and top-100 samples were eventually classified as effectively competitive.

<sup>15</sup>Footnotes 7, 8, and 9.

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included in the equation used by the Commission to estimate the competitive differential.<sup>16</sup>

## 2. The "Rates" that Were Analyzed

The rates analyzed by the Commission are measures of the revenue per subscriber per channel for basic cable services and equipment and installation. For systems that charged combined rates for service and equipment and installation charges, the Commission's calculation used all basic revenues. For systems that charged separately for services and equipment and installation, the Commission attempted to add to service revenues an estimate of revenues for installation and equipment.<sup>17</sup> Where more than one tier of basic service was offered, the revenues for all basic tiers were combined and a single per-channel rate was calculated for each system.

In calculating revenue per subscriber, the Commission weighted each rate charged by the number of subscribers that took the particular service or type of equipment. Thus, two systems might have the same rates, but one would be found to have higher revenue per subscriber, and thus a higher "rate," if a larger proportion of its subscribers took an enhanced basic tier, or leased equipment from the operator. Indeed, one system might have lower rates than another but report higher revenues per subscriber if its

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<sup>16</sup>Telephone conversation with Scott Roberts, Mass Media Bureau, Federal Communications Commission, June 8, 1993.

<sup>17</sup>Below we explain why we believe that these estimates may contain serious errors.

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subscribers took disproportionately large amounts of enhanced basic service or equipment.

### 3. The Commission's Equation

Using these data, the FCC analyzed the differences in rates between the effectively competitive and other units, controlling for differences in the number of system subscribers, the number of channels, and the number of satellite services offered. These variables were apparently chosen using stepwise least squares.<sup>18</sup> In this approach, a collection of candidate explanatory variables is specified and these variables are then entered into an equation in the order of their statistical significance. Presumably the Commission stopped adding variables when this failed to result in a significant reduction in the unexplained variance in rates. The Commission considered a number of other variables "such as density (subscribers per mile) and percentage of plant underground."<sup>19</sup>

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<sup>18</sup>Appendix E, p. 10.

<sup>19</sup>Appendix E, p. 11.

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These variables were not included in the Commission's final equation because "either they were not statistically significant or were not consistently so."<sup>20</sup>

It is important to note that the Commission employed a procedure in which the significant explanatory variables were identified using a sample that did not contain the "effectively competitive" systems. These variables, the number of system subscribers, the number of basic channels, and the number of satellite channels were then included in an equation that was estimated using observations for both competitive and non-competitive systems, and that contained an additional (binary) variable indicating whether or not an observation was for a system that was subject to effective competition.<sup>21</sup> In estimating the equation as it did, the Commission implicitly assumed that the rates of otherwise identical competitive and non-competitive

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<sup>20</sup>Id. However, even if additional variables proved to be insignificant, it is of some interest whether their inclusion affects the magnitude and/or significance of the remaining variables. In this case, of course, we would be especially interested in how the estimated competitive differential would be affected. We also note that, although the Commission does not report the results of estimating its equation with the low penetration systems omitted from the effectively competitive group, the subscriber variable was not statistically significant when we estimated this equation. Thus, the Commission apparently retained this variable despite the fact that it is not "consistently significant."

<sup>21</sup>Appendix E, p. 11. After we had completed our empirical work, the Commission released a new version of the data set. We attempted to redo the entire analysis with the new data. However, there may be circumstances where we inadvertently rely on the older dataset.

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systems differ only by a percentage that is constant across all systems.<sup>22</sup> The effect of all other variables on the rate charged is assumed to be the same for both sets of systems.

Based on its analysis, the FCC concluded that, for otherwise identical systems, a system confronting effective competition would charge about 10 percent less than one that confronted no such competition, which is its estimate of the coefficient of the variable that identifies the presence of effective competition. The Commission equation was then used to generate benchmark rates for systems that are classified by the number of subscribers, the number of basic channels, and the number of satellite channels. After adjusting for installation and equipment costs, these rates are to be applied in determining rates for all basic service tiers, although no system will initially be required to reduce its overall rates by more than ten percent.

### III. An Analysis of the Commission's Approach

This section demonstrates that the Commission's estimate of a 10 percent competitive differential is quite fragile. We conclude that the estimate of the differential is very sensitive to the construction of the Commission's sample, the variables used in the analysis, the number of observations of effectively competitive systems, and the specification of the equation employed by the

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<sup>22</sup>This difference is assumed to be captured by the coefficient of the effective competition variable in the Commission's equation.

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Commission.

1. The Commission's Sample

The first factor to consider in evaluating the Commission's approach is the size and nature of the sample it employed. As noted above, the sample that was actually used to estimate the competitive differential contains data for only 377 community units, despite repeated references in the Commission's technical appendix to 1,107 units, which are all units for which data were obtained, and 687 units, which are all "first" units for which data were obtained. In fact, many observations were deleted to obtain the sample that was finally employed.

In addition, it should be noted that the sample contains observations for only 110 competitive units among the 377 observations that were used to estimate the Commission's equation. Of these, 64 were low-penetration units, 31 were overbuilt units, and 15 were "municipal" units. Moreover, our analysis of the data

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indicates that there were only 101 different competitive systems in the sample.<sup>23</sup> Of these, 58 were low-penetration systems, 29 were overbuilt systems, and 14 were "municipal" systems.<sup>24</sup>

The Commission was apparently initially concerned about the possibility that a random sample of all systems would result in only a relatively small proportion of large systems. Because most subscribers are served by large systems, the Commission initially "oversampled" such systems "to compensate for the small number of large systems likely to appear in a random sample."<sup>25</sup> However, as noted, the Commission did not use observations on these systems

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<sup>23</sup>Some of the "second" units were apparently for different systems than some of the "first" units. As a result, the number of "second" units is not simply the difference between the number of independent systems and the number of "first" units.

<sup>24</sup>The argument for including "second" units in the sample is presumably that they contain information that is not present in the "first" units. There are two responses to this argument. First, it seems likely that data for the second units will often duplicate the data for the first, so that the apparent increase in the number of observations may be spurious. Second, if, in fact, the second-unit data do contain additional information, these data should be included for the non-competitive as well as the competitive systems.

<sup>25</sup>In the Matter of Implementation of the Cable Television Consumer Protection Act of 1992: Rate Regulation, Order, Adopted December 10, 1992, para. 3. Presumably, the reason for initially oversampling the larger systems was to reflect the fact that it is subscribers, not systems, that rate regulation is designed to serve. Because the population of cable systems contains a disproportionate share of systems with relatively few subscribers, a random sample of all systems will contain many of these small systems. That is, most of the systems included will not be of the kind to which consumers actually subscribe. To make the sample more representative of the universe of systems to which consumers actually subscribe, one would oversample the larger systems. Why the Commission deleted these observations is puzzling.

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in its analysis except in the small number of instances where they were identified as effectively competitive. The following Table reports the number of units in the Commission's sample in a number of system subscriber size categories.<sup>26</sup>

| <u>System Subscribers</u> | <u>Units</u> | <u>Competitive Units</u> |
|---------------------------|--------------|--------------------------|
| < 1,000                   | 122          | 45                       |
| 1,001-3,500               | 72           | 19                       |
| 3,501-10,000              | 53           | 8                        |
| 10,001-50,000             | 80           | 21                       |
| > 50,000                  | 50           | 17                       |

It is also notable that there are only about 2,600 subscribers to the system of the median unit in the Commission's sample and only about 1,400 subscribers to the system of the median competitive unit.

While the number of effectively competitive observations is not unusually "small" in the conventional statistical sense, it is small given the purpose for which the Commission will be using the data. The Commission is using the behavior of 110 community units to determine the benchmark rates for 33,000 community units. As compared to a larger sample of effectively competitive systems, the sample used by the Commission is more likely to contain "unusual" observations that will affect both the estimate of the competitive

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<sup>26</sup>As we note below, these are the size categories employed by the General Accounting Office although the GAO's categories apply to systems rather than units.



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differential and its precision. In larger samples, such unusual observations would tend to be offset by other more typical observations.

## 2. The Commission's Equation

Stripped to its essentials, the approach taken by the Commission involves using the rates charged by the effectively competitive systems to determine the rates that can be charged by systems not subject to effective competition. The only role of the other variables in the Commission's equation is to control for differences between the two types of systems other than their competitive situations.

The Commission's estimate of the competitive differential is based on two implicit and apparently untested assumptions. First, the Commission implicitly assumes that the only factor that causes rates to differ between competitive and non-competitive systems is the presence or absence of effective competition. All other factors are assumed to have the same effect on the rates for both types of systems. Thus, for example, the effect of a change in the number of satellite channels on the rate per channel is the same whether or not a system is effectively competitive.

One way to determine whether this critical assumption is statistically correct is to estimate an equation that pools data from both competitive and non-competitive systems and allows the coefficients as well as the intercepts to differ between the two

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types of systems. By comparing the explanatory power of the two equations, or by comparing coefficients directly, one can test the hypothesis that the same equation fits the two sets of systems.<sup>27</sup> However, the Commission only reports, in general terms, the results of estimating an equation using data only for non-effectively competitive systems and, specifically, the results of estimating an equation using data for both systems subject to competition and those that are not. It does not report the results of any analysis of the rates of effectively competitive systems alone, nor does it appear to have conducted a test of whether the coefficients of the two types of systems are the same. Indeed, as noted above, the explanatory variables in the Commission's equation were chosen using observations only for the non-competitive systems, so that the Commission's use of stepwise regression based on all the observations may have resulted in a different set of included explanatory variables and a different estimate of the effectively competitive differential.<sup>28</sup>

In addition, because the Commission appears not to have

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<sup>27</sup>Coefficients of individual variables can be compared using t-tests and the two equations can be compared using an F test. See, e.g., P. Rao and R.L. Miller, Applied Econometrics (Belmont, CA: Wadsworth Publishing Company, 1971), pp. 88-93, for a discussion of the use of dummy variables to measure differences in behavior between two groups where differences can be present in both the intercept and the slopes of the estimated equation. The Commission's approach implicitly assumes that the variance of rates for effectively competitive and other systems is the same.

<sup>28</sup>We remind the reader that the subscriber variable is not significant when the Commission's equation is estimated with the low-penetration systems omitted from the sample.

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examined the behavior of the competitive systems alone, nor tested for differences in coefficients between competitive and non-competitive systems, it cannot be certain that the specification it has employed to estimate the competitive differential is not seriously in error. If the behavior of competitive systems differs significantly from that of non-effectively competitive systems for reasons other than the mere presence or absence of effective competition, the Commission's equation is misspecified and its estimate of the competitive differential may be in error. However, the Commission has apparently not examined this possibility.

The Commission's second implicit assumption is that the same equation explains the variance in rates for all cable systems regardless of the number of subscribers that the systems serve. That is, by estimating a single equation for all systems regardless of the number of subscribers they serve, the Commission has assumed that the effect on cable rates of the number of channels, the number of satellite services and, importantly, the magnitude of the competitive differential is the same for all cable systems.<sup>29</sup> In fact, the effect of any one or all of these variables on subscriber rates may depend on the number of subscribers served by the system, leading to another source of potential error in

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<sup>29</sup>The previous point considered possible differences between the equations that explain rates for competitive and non-competitive systems. This point refers to differences in the equations for systems with different numbers of subscribers regardless of whether or not they are competitive.

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estimating the benchmark rates.<sup>30</sup>

As we discuss below, however, our own estimates, using the Commission's revised data, suggest that there are substantial differences in the determinants of rates when systems are classified by the number of subscribers they serve and, in particular, that estimates of the competitive differential are quite sensitive to this respecification.<sup>31</sup> Moreover, when systems are classified by the number of subscribers, allowing for differences in the slope coefficients as well as the intercepts between competitive and non-competitive systems significantly improves the explanatory power of the rate equation.

### 3. The Commission's "Rate" Data

As we noted above, the "rates" that the Commission analyzed were actually the average revenue from basic service, installation, and equipment rental per subscriber. As a result, the "rate" for a given cable system depends not only on what the system charges but also on how many of its subscribers take a given service or

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<sup>30</sup>We are aware, of course, that the Commission has included the number of subscribers as an explanatory variable in its equation. However, the Commission's specification assumes that the relationship between rates and other variables, such as the effectively competitive differential or the number of satellite services, is the same regardless of the number of subscribers.

<sup>31</sup>We realize that the Commission must be concerned with the effect of estimating separate equations for each size class on the number of degrees of freedom that it has available. However, the Commission has no choice in the matter if the specifications differ when systems are classified by the number of subscribers.

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lease a given piece of equipment. Thus, if two systems have the same rates for equipment and service but one is more skillful at selling equipment, its average revenue will be higher than that of the other system and it will be penalized solely because of its marketing prowess.

An alternative, which is not subject to this problem, would have been to estimate "fixed weight" price indexes. Under this approach, a representative "market basket" of services and equipment would be specified and the cost of that market basket would be determined for each system. As a result, differences in the amounts of service and equipment taken by subscribers to different systems would not affect the rate comparisons. Importantly, this approach could lead to a different estimate of the competitive differential.

Even if the Commission's approach to determining rates is accepted, however, there is an additional problem. The FCC has reported that there were many shortcomings in the equipment data it received. As a result, the Commission was forced to make estimates of equipment revenues in developing the data used to estimate the competitive differential. What is perhaps not fully realized is that small errors in making these adjustments can have a significant impact on the estimated competitive differential.

Consider an effectively competitive cable system that offers 10 channels of cable service and charges \$20 for service and equipment, for a price of \$2 per channel. Now consider a cable

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system that does not face effective competition, that also offers 10 channels of service, and that actually charges \$15 for cable service and \$7 for equipment. If the information about both systems is reported accurately, the competitive differential will be calculated as  $((\$15 + \$7)/(\$20)) - 1.00$ , or 10 percent. Suppose, however, that the rate for equipment for the second of the systems is estimated by the Commission at either \$6 or \$8. In the former case, the estimated differential is  $((\$15 + \$6)/(\$20)) - 1.00$ , or 5 percent. In the latter case, the estimated differential is  $((\$15 + \$9)/(\$20)) - 1.00$ , or 20 percent. Estimates that are half as large, or twice as large, as the "true" differential can result from what appear to be relatively small errors in the estimates of equipment rates.

The Commission has indicated that it was able to correct for deficiencies in the equipment data in 50 out of 64 cases in which the equipment data appeared to be incorrect.<sup>32</sup> Our own experience with the equipment data in the Commission's original database suggests a far larger number of observations in which the equipment data are questionable, and far greater difficulty in correcting for these deficiencies using data that were submitted by respondents. We thus remain highly skeptical that the data accurately reflect the rates that are actually being charged.

#### 4. Summary

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<sup>32</sup>Appendix E, p. 8.

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In short, there are at least four major concerns about the Commission's estimates of the competitive differential: (1) the behavior of effectively competitive and non-effectively competitive systems may differ for reasons other than the presence or absence of competition, so that the Commission's equation may be misspecified; (2) the Commission's rate equation may also be misspecified because the same equation is applied to all systems regardless of the number of subscribers they serve; (3) the number of effectively competitive systems in the Commission's sample is small relative to the use to which it is being put; and (4) the Commission is unlikely to have dealt effectively with the "spotty" nature of the equipment data in its sample.

The Commission has ignored some of these problems and has had only limited success in dealing with others. As a result, the Commission's estimates may be biased [(1) and (2)] and inefficient [(3) and (4)], and we do not have great confidence in them. For this reason, we have attempted to produce estimates of competitive benchmarks using alternative approaches as a "check" on what appears to be a very fragile estimate of the competitive differential.

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#### IV. Testing the Commission's Untested Assumptions

We have attempted to overcome the first and second of the shortcomings described above, both of which involve possible misspecifications of the Commission's equation, and we report the results of doing so below. However, the problem of the small number of observations for competitive systems cannot be overcome. While we have also developed estimates that use what we consider to be a more precise approach to the inclusion of equipment costs, the resulting number of observations is fewer than one-third of the already small number used by the Commission. However, this effort underscores how imprecise the Commission's equipment adjustments

In much of the analysis reported below, we have used the Commission's data and we have accepted the Commission's adjustments for equipment costs, although we remain skeptical about them. We have also adopted the basic functional form employed by the Commission. Finally, we have not taken account of variables that might help explain the variance in rates but which were not used by the Commission in its reported equation. In short, we have stayed as closely as possible to the FCC's basic approach to sample selection, data construction, and estimation, while attempting to determine the effects of modifying some of the implicit assumptions the Commission has made in its statistical analysis.

might be.

We first compared the rates charged by effectively competitive cable systems to the rates charged by non-effectively competitive



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systems in each of the five GAO subscriber categories, taking into account differences in the total number of channels offered, the number of satellite services offered, and the number of subscribers served -- the same variables considered by the Commission. We estimated equations that are identical to those estimated by the Commission as well as ones that allow for differences in the slope coefficients of the equation between competitive and non-competitive systems.

When we estimated the Commission's basic equation for the different subscriber size classes, we obtained results that are, in many respects, quite different from those obtained using the Commission's approach. When all units are included, the estimated competitive differential is approximately 10 percent and statistically significant. The following Table indicates the estimated competitive differentials for the different size classes.

| <u>System Subscribers</u> | <u>Competitive Differential</u> |
|---------------------------|---------------------------------|
| < 1,000                   | -.12*                           |
| 1,001-3,500               | -.24*                           |
| 3,501-10,000              | -.06                            |
| 10,001-50,000             | +.10                            |
| > 50,000                  | -.07                            |

\* Significant at the 95 percent confidence level

Two things are notable about this Table. First, the estimated competitive differentials for the various subscriber size classes

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vary considerably, from a maximum of 24 percent to a negative differential of 10 percent; i.e., effectively competitive units have higher rates than do non-competitive units for the 10,001-50,000 subscriber category. Second, only two of the estimated competitive differentials, those for the two smallest size categories, are statistically significant at the confidence level employed by the Commission. In short, the Commission's estimate of a single competitive differential, 10 percent, masks considerable heterogeneity among system classes. The range about the Commission's estimate is quite large and the estimated differential is not statistically significant for 3 of the 5 subscriber classes.

Next, we analyzed the effect of allowing the slope coefficients as well as the intercepts to differ between competitive and non-competitive systems. This involved estimating the equations with the addition of variables that are the product of the (binary) competitive variable and each of the other explanatory variables. The following Table reports the results of F-tests that indicate whether the addition of these variables significantly reduces the unexplained variance in the rate equation.

| <u>System Subscribers</u> | <u>F-Statistic</u> |
|---------------------------|--------------------|
| < 1,000                   | 1.50               |
| 1,001-3,500               | 5.73*              |
| 3,501-10,000              | 3.37*              |

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|               |      |
|---------------|------|
| 10,001-50,000 | 1.40 |
| > 50,000      | 2.67 |

\* Significant at the 95 percent confidence level.

The most important thing to observe about this Table is that for two of the subscriber size classes, an equation that allows the slope coefficients as well as intercepts to differ between competitive and non-competitive systems results in a significant reduction in the unexplained variance. Moreover, the F-statistic for the largest subscriber class is only slightly short of being significant. This suggests that, for two or three of these size classes, the Commission's equation may be misspecified. Identifying a single competitive differential that applies to all systems even with a given subscriber size class may not be appropriate.

In addition, we examined the hypothesis that an equation in which observations were assigned to size classes, and both the intercepts and slope coefficients were permitted to differ between competitive and non-competitive systems within a given size class, explained a significantly larger proportion of the variance in rates than did the Commission's equation. We found that it did.<sup>33</sup> This confirms the fact that the Commission's implicit assumptions - that the same equation is appropriate for all size classes and that the slope coefficients are the same for competitive and non-

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<sup>33</sup>The F value is 3.19, which is highly significant for 30, 334 degrees of freedom.

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| <u>System Subscribers</u> | <u>Percent of Non-Effectively Competitive Systems For Which the Effectively Competitive Rate Exceeds the Current Rate</u> |
|---------------------------|---|
| < 1000                    | 14.2  |
| 1,001-3,500               | 6.9   |
| 3,501-10,000              | 19.7  |
| 10,001-50,000             | 78.1  |
| > 50,000                  | 18.5  |

#### V. Accounting for Equipment

As previously noted, the Commission asserts that it is unable to adjust its data for equipment costs for only a small number of observations. Thus, the Commission obtained 377 observations whose service rates were equipment-adjusted. By contrast, when we applied a number of reasonable screens to the data to filter out those observations that appeared to us unreliable, our final dataset consisted of only 123 observations.

Our approach differs in two ways from that of the Commission. First, we assumed that all subscribers required cable installation and that the life of a typical subscriber was three years. We accounted for installation costs by amortizing the one-time cost of the installation "services" over that three-year period (at an interest rate of 8 percent). By contrast, the Commission accounted for installation costs by calculating current installation revenues (divided by the number of subscribers). While there should be

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little or no difference between the two approaches in "steady state," relatively new systems will be adding new subscribers more rapidly than more mature systems. The more rapidly growing systems will thus appear to have higher revenue per subscriber than the mature systems. Because it seems to us likely that the newer systems are also non-effectively competitive systems, the average rate of the non-effectively competitive systems will be artificially higher than those of the effectively competitive systems simply because the Commission did not adjust its calculations to account for systems at different stages of growth. Thus, part of the Commission's estimated competitive differential may be a result of this artifact.

Second, in light of the apparent sensitivity of the estimated competitive differential to errors in equipment costs, we chose not to make any crude estimates of equipment revenues at the community unit level using system-wide equipment revenues. Specifically, we used only those observations for which the number of converters, number of remote control devices, and number of additional outlets was each non-zero. Our experience suggested that virtually every cable franchise offers its subscribers converters, remote control devices, and additional outlets. Thus, for any cable franchise that did not provide some data for each of these equipment categories, those data were likely to be in error. Finally, because cable-ready sets or VCRs are in far from universal use, we also required that at least 10 percent of all franchise subscribers

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have converters.

While we believe that these screens are reasonable and tend to result in more accurate estimates of equipment-adjusted rates, they nonetheless resulted in a dataset of only 123 non-effectively competitive observations, far smaller than that of the Commission, and in equipment-adjusted service rates that appear to be quite different from those of the Commission. As detailed in the Table below, our estimates of the adjusted rate differ considerably from those of the Commission, being an average of as much as 21 percent lower than the Commission's and as much as 13 percent higher for various system size classes. As we noted above, this confirms that even small errors in the estimation of equipment revenues can have substantial effects on the estimated competitive differential.

| <u>System Subscribers</u> | <u>Extent to Which Our Estimated Rate<br/>Is Lower than (-) or Exceeds (+)<br/>the FCC Rate<sup>34</sup><br/>(Percent)</u> |
|---------------------------|--|
| < 1,000                   | -17  |
| 1,001-3,500               | -21  |
| 3,501-10,000              | -13  |
| 10,001-50,000             | +5   |
| > 50,000                  | +13  |
| Average                   | +5   |

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<sup>34</sup>All individual rates within each system subscriber group were weighted by the number of franchise subscribers.

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VI. Alternative Measures of the Effectively Competitive Differential

Because we conclude that the Commission's estimate of the competitive differential is very sensitive to both statistical and data issues, we examined an alternative estimate of the differential based on the GAO sample against which the Commission might compare its own estimate. Such a comparison might inform the Commission as to the likelihood that the "true" differential exceeds that estimated by the Commission. Our approach simply calculates an estimate of the "effectively regulated" differential, i.e., the percent difference between the 1986 basic rates charged by regulated cable systems and those charged by unregulated systems. As the Table below reveals, regulated systems charged between 4 and 10 percent below their unregulated counterparts, with the average difference being about 5 percent.

| <u>System Subscribers</u> | <u>Effectively Regulated Differential</u> <sup>35</sup> |
|---------------------------|---|
|                           | (Percent)   |
| < 1,000                   | 5   |
| 1,001-3,500               | 4   |
| 3,501-10,000              | 5   |
| 10,001-50,000             | 4   |

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<sup>35</sup>This column refers to the percentage rate reduction required for unregulated rates to equal regulated rates. The underlying data source of these estimates is the General Accounting Office, National Survey of Cable Television Rates and Services, August 1989, Tables III.11 and III.12.

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|          |    |
|----------|----|
| > 50,000 | 10 |
| Average  | 5  |

While this approach does not resolve any of the difficulties associated with the Commission's estimate of the competitive differential, it does suggest that, on average, the estimated "true" differential is likely to be closer to the 10 percent differential than to a much higher number.

VII. Should Low Penetration Systems be Eliminated from the Analysis?

The Commission has indicated that it is considering whether to eliminate systems with penetration rates below 30 percent from its sample of effectively competitive systems and to recalculate the competitive differential. Apparently that would increase the differential to about 28 percent, leading to further reduction in the benchmark rates for cable systems that are not subject to effective competition.

The reasoning behind the Commission's consideration of whether to eliminate the low-penetration systems from its analysis is both clear and incomplete. The Commission apparently believes that some systems may have low penetration for reasons other than the fact that they face effective competition. That is, the Commission is considering whether the rates charged by these systems are, in fact, indicative of the rates that would be charged by systems that



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did face effective competition. Even if the Commission were justified in deleting the low-penetration systems, this does not mean the Commission should rely solely on the remaining observations. Instances of overbuilding may be unsustainable, because the rates being charged are insufficient for both systems to cover their entire cost, so that observed rates may reflect disequilibrium behavior. Municipal systems may charge low rates because they can avoid costs that must be incurred by private firms, or because they can shift costs elsewhere in the municipal budget.

In the short run, overbuilt systems can coexist so long as both obtain revenues that exceed their variable costs. However, in the long run, i.e., when all costs are variable, one of the systems may fail, or the systems will merge, unless rates at least equal total costs.<sup>36</sup> Although the rates observed during the short run are the result of competition, if they are not sufficient to cover total costs, they will not equal long-run competitive equilibrium rates. As a result, these rates will be poor benchmarks for systems that are not subject to competition.<sup>37</sup>

This discussion indicates that obtaining appropriate competitive benchmarks by observing the market behavior of cable

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<sup>36</sup>Their ability to do so will depend on the nature of competition between them, which, in turn, will depend, in part, on the extent to which the systems offer differentiated services.

<sup>37</sup>The Commission recognizes the same point when it notes that the prices of some community units "may be below cost and may not be sustainable in the long run." Appendix E, p. 13.

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systems is likely to be difficult. However, selectively eliminating observations for low-penetration systems because they may not involve truly competitive rates is not the solution to this problem. The reason is that the remainder of the sample, overbuilt and municipal systems, contains its own difficulties. Removing observations on systems with rates that are thought to be "too high" is no solution if the remaining systems have rates that are "too low." That is why it is important to consider other methods for determining the competitive benchmarks as a "check" on the Commission's estimate.

If the Commission were to base its estimate of the competitive differential on a sample that contains only those "effectively competitive" systems that compete with multichannel providers, or are in markets where the municipal franchising authority provides multichannel service, that sample reconstruction would not resolve and, indeed, might magnify the fragility of the current estimate. Most importantly, there are simply too few such effectively competitive systems to provide a reliable benchmark. The database used by the Commission to estimate the competitive differential contained only 31 "overbuilt" units and only 15 "municipal" units. Moreover, these figures overstate the number of independent observations on competitive systems. As we noted above, for example, there are only 29 separate overbuilt systems in the Commission's sample, a number that is clearly too small to be used as the sole basis for regulating cable subscriber rates.

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Despite the obvious difficulties in doing so, we have conducted the same analysis of the Commission's equation for the sample excluding low-penetration systems as reported above for the entire Commission sample. We first estimated the Commission's equation for separate size classes. As the following Table indicates, the estimated competitive differential, far from being a single stable value across size classes, varies widely, from as low as 7 percent to as high as 50 percent. Moreover, the competitive differential is not significantly different from zero for two of the system size classes. This suggests that the Commission's basic equation, in which the competitive differential is assumed to be the same for all systems, is also seriously misspecified when the restricted database is used.

| <u>System Subscribers</u> | <u>Competitive Differential</u> |
|---------------------------|---------------------------------|
| < 1,000                   | -.37*                           |
| 1,001-3,500               | -.50*                           |
| 3,501-10,000              | -.20                            |
| 10,001-50,000             | -.07                            |
| > 50,000                  | -.20*                           |

\* Significant at the 95 percent confidence level.

As in the analysis of the entire sample, we also allowed the slope coefficients as well as the intercepts to differ between competitive and non-competitive systems for each subscriber class.

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| <u>System Subscribers</u> | <u>F-Statistic</u> |
|---------------------------|--------------------|
| < 1,000                   | .32                |
| 1,000-3,500               | .87                |
| 3,500-10,000              | 2.65               |
| 10,000-50,000             | 3.20*              |
| > 50,000                  | 3.35*              |

\* Significant at the 95 percent confidence level.

Here, the results are similar to those when all observations are included. For two of the five size classes, an equation that permits the slope coefficients to differ between competitive and non-competitive systems significantly reduces the unexplained variance in subscriber rates. The regression for a third size class (3,501 - 10,000) is close to being significant.

#### VIII. Conclusion

The analysis in this paper demonstrates a number of fundamental difficulties with the FCC's approach to estimating the competitive differential for cable television systems. These difficulties arise from the data employed and the statistical methods used. Because the estimate of the competitive differential is quite sensitive to straightforward modifications of the Commission's basic approach, the reliability of the resulting estimate is suspect. Nonetheless, an estimate of the competitive differential using different data and a different method is much closer to the Commission's current estimate than it is to estimates

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obtained using the Commission's approach but deleting observations for low penetration systems. Finally, so few effectively competitive systems would remain in the sample if the low penetration systems were eliminated that their rates could not reasonably be used as a basis for regulating the rates of the entire cable industry.