APPENDIX 1

RESULTS OF THE TOTAL FACTOR PRODUCTIVITY STUDY

COMPUTATION OF TOTAL FACTOR PRODUCTIVITY

Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	Average Growth
I. OUTPUT											
Total Output	1.0000	1.2240	1.5069	1.6430	2.0117	1.9773	2.0647	2.0929	2.1331	2.1429	
Growth Rate		20.2%	20.8%	8.6%	20.2%	−1.7%	4.3%	1.4%	1.9%	0.5%	8.5%
II. INPUT											
Capital	1.0000	1.4139	1.7522	2.1187	2.2198	2.5461	2.7888	2.8839	2.9131	2.9159	
Growth Rate		34.6%	21.5%	19.0%	4.7%	13.7%	9.1%	3.4%	1.0%	0.1%	11.9%
Labor	1.0000	1.1418	1.4005	1.6111	1.7363	2.2242	2.2487	2.3059	2.3697	2.3315	
Growth Rate		13.3%	20.4%	14.0%	7.5%	24.8%	1.1%	2.5%	2.7%	−1.6%	9.4%
Materials	1.0000	1.3411	1.4706	1.5279	1.7853	2.3703	2.3200	2.3048	2.3456	2.3045	
Growth Rate		29.4%	9.2%	3.8%	15.6%	28.3%	−2.1%	−0.7%	1.8%	−1.8%	9.3%
Cost Shares											
Capital	0.4048	0.4079	0.3711	0.4564	0.4569	0.4186	0.4412	0.4309	0.4141	0.4006	
Labor	0.3292	0.3051	0.3420	0.3100	0.3003	0.3203	0.3123	0.3228	0.3336	0.3422	
Materials	0.2661	0.2870	0.2869	0.2336	0.2428	0.2612	0.2465	0.2463	0.2523	0.2573	
Average Cost Shares											
Capital		0.4063	0.3895	0.4138	0.4566	0.4407	0.4299	0.4360	0.4225	0.4073	
Labor		0.3171	0.3235	0.3260	0.3052	0.3100	0.3163	0.3175	0.3282	0.3379	
Materials		0.2765	0.2870	0.2602	0.2382	0.2493	0.2539	0.2464	0.2493	0.2548	
Total Input	1.0000	1.3021	1.5527	1.7758	1.9260	2.3710	2.4608	2.5129	2.5575	2.5331	
Growth Rate		26.4%	17.6%	13.4%	8.1%	20.8%	3.7%	2.1%	1.8%	−1.0%	10.3%
III. TOTAL FACTOR PRODUCTIVITY											
TFP	1.0000	0.9400	0.9705	0.9252	1.0445	0.8339	0.8390	0.8329	0.8341	0.8460	
Growth Rate		−6.2%	3.2%	−4.8%	12.1%	−22.5%	0.6%	−0.7%	0.1%	1.4%	−1.9%

APPENDIX 2

STATEMENT OF QUALIFICATIONS

Laurits R. Christensen

Dr. Laurits R. Christensen is President of Christensen Associates. From 1967 to 1987 he was Professor of Economics at the University of Wisconsin - Madison. During his tenure at the University, Dr. Christensen established himself as an authority on econometric modeling and productivity studies. He published over 65 articles in distinguished academic journals. Dr. Christensen was recognized by the University for his research accomplishments, being designated a Romnes Faculty Fellow. He served as a member of the Board of Editors for the American Economic Review and as a consultant to the U.S. Bureau of Labor Statistics and the U.S. Treasury.

In 1976, Dr. Christensen founded Christensen Associates to provide high-quality, accurate economic research and consulting to government agencies and private industry. Under his direction, Christensen Associates has conducted economic studies for many clients, and Dr. Christensen has served as an expert economist in regulatory and judicial proceedings.

Dr. Christensen has extensive experience in the measurement of productivity and design of price cap plans for regulated industries. In 1982, Dr. Christensen was asked to design a productivity index for the U.S. railroad industry that was conceptually sound yet practical enough so that it could be easily implemented as a key factor in the incentive regulation program for the U.S. railroads. Dr. Christensen, in collaboration with Dr. Douglas Caves (Senior Vice President, Christensen Associates), developed an index that was studied and debated for seven years. The Interstate Commerce Commission (ICC) formally accepted the Caves-Christensen approach (with minor modifications proposed by an independent reviewer) in March of 1989.

Dr. Christensen has testified extensively on productivity and incentive regulation in the telephone industry. Dr. Christensen, in collaboration with Ms. Dianne C. Christensen (Senior Vice President, Christensen Associates) and Dr. Philip E. Schoech, conducted a productivity study of the Bell System, the basis of his testimony in the AT&T antitrust cases. He has submitted testimony in the Federal Communications Commission dockets on price cap regulation for AT&T and the Local Exchange Carriers. He has directed productivity studies for the United States Telephone Association, Ameritech, U S West, and BellSouth, and has testified on productivity and incentive regulation before state regulatory commissions in Arkansas, Colorado, Illinois, Indiana, Iowa, North Dakota, Ohio, and Wisconsin.

Dr. Christensen received a B.A. in economics from Cornell University, an M.A. in statistics from the University of California, Berkeley, and a Ph.D. in economics from the University of California, Berkeley.

Philip E. Schoech

Dr. Philip E. Schoech is a Vice President of Christensen Associates. He has been with the firm since 1976 and specializes in productivity measurement, econometric analysis of producer cost, econometric analysis of consumer demand, and cost-benefit analysis. He has served as a consultant on productivity-related issues to the U.S. Bureau of the Census, the U.S. Bureau of Labor Statistics, the National Cooperative Highway Research Program, and the U.S. Postal Service, as well as numerous private companies. He has published papers in the areas of productivity measurement and econometric estimation of returns to scale.

At Christensen Associates, Dr. Schoech has been involved in conducting productivity studies for the telephone and electric utility industries. He collaborated with Dr. Christensen on the Bell System productivity study and has applied those methods to studies of Southern Bell, Illinois Bell, Indiana Bell, and Ohio Bell telephone companies. These methods have also been applied to a recent productivity study of the Local Exchange Carriers subject to price cap regulation. The results of this study were filed by the United States Telephone Association in this year's FCC review of price cap regulation. Dr. Schoech has also been involved in the development of a productivity measurement system for the U.S. Postal Service, used by the Postal Service for the last five years.

Dr. Schoech has a B.A. in mathematics from Northwestern University, and M.A. and Ph.D. degrees in economics from the University of Wisconsin - Madison.

Mark E. Meitzen

Dr. Mark E. Meitzen is Director of the Telecommunications Group at Christensen Associates, joining the firm in 1990. Dr. Meitzen specializes in incentive regulation, cost studies, and contribution analysis He has published articles on incentive regulation and costing methods. Dr. Meitzen has collaborated with Dr. Christensen and Dr. Schoech on their studies of the telephone industry. Prior to 1990, Dr. Meitzen was regulatory economist and served as an internal economic consultant for Southwestern Bell. Dr. Meitzen has also taught economics at St. Louis University, University of Wisconsin - Milwaukee, and Eastern Michigan University.

Dr. Meitzen has a B.S. in economics from the University of Wisconsin - Oshkosh, and M.S. and Ph.D. degrees in economics from the University of Wisconsin - Madison.

ATTACHMENT C

"A Comparison of Real Rates Charged by Competitive Cable Franchises in 1986 and 1993 Based on the 1994 FCC Cable Rate Rules"

Economist Incorporated
June, 1994

A Comparison of Real Rates Charged by Competitive Cable Franchises in 1986 and 1993 Based on the 1994 FCC Cable Rate Rules

Based on the Commission's 1992 survey, last year we compared the real rates charged by competitive franchises in 1986 with the rates that the same franchises would have been allowed to charge under the 1993 proposed benchmark rules. We found that real 1986 rates were substantially below the allowed 1992 benchmark rates under the 1993 benchmark formula and concluded that the price increases for all forms of competitive franchises were likely the result of improved quality of service.[1]

One of the likely sources of improved quality for cable services between 1986 and 1992 was increased expenditures on cable network programming. As an example, cable systems in 1992 spent substantially more on programming than in 1986 as measured by licensing fees for cable networks. Licensing fees increased from $261 million in 1986 to $1.5 billion in 1992 (approximately an increase in 1986 from $0.68 (in 1992 dollars) per subscriber month to $2.26 per subscriber month in 1992).[2]

Under the 1994 going-forward rules, changes in license fees are not subject to an inflation factor and productivity offset. Other costs, however, are subject to such factors the combination of which implies a real 2 percent price reduction for franchises with unchanging characteristics. If the 2-percent productivity offset were reasonable, then we would expect that rates net of programming expenses for a competitive cable franchise with

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1 *Comments of the National Cable Television Association*, Appendix C, "Why the Commission Should Not Adopt a Productivity Offset," August 25, 1993, MM Docket No. 93-215, at 7-10. The same result holds based on the 1994 benchmark formula.

2 Paul Kagan Associates, *Kagan Media Index*, March 30, 1993, p. 10.

unchanging characteristics would decline by 2 percent annually in real terms. For example, we would expect that a calculated rate based on 1986 franchise characteristics and the 1994 benchmark rate formula net of licensing fees would be less than the real actual 1986 rate by 2 percent compounded annually between 1986 and 1992.

We performed this exercise. We examined separately different types of "competitive" franchises (overbuilds, municipal systems, less-than-30-percent penetration) and "non-competitive" franchises. (We have placed franchises in competitiveness categories based on their 1992 attributes. We do not have information to place them in 1986 competitiveness categories.) We also examined separately franchises that reported that they faced rate regulation in 1986 and those that reported that they did not.[3]

As part of this proceeding, the Commission has collected data on prices and franchise characteristics from a sample of cable systems serving 496 cable franchise areas.[4] The cable operators indicated that they served the same franchise area in 1986 in 287 cases; the Commission received complete 1986 data in 162 cases.[5] Table 1 summarizes the frequency of the provision of 1986 data in the Commission sample.

To compare 1986 rates and the benchmark formula rates under the 1994 going-forward rules, we must subtract programming expenses from both. The Commission's data base does not include information on

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3 Slightly over half of the systems reported that they were not subject to rate regulation in 1986. However, these systems were subject to the possibility of regulation. Our analysis of the 1986 price data revealed no significant difference in the price characteristics of those systems reporting rate regulation and those reporting no rate regulation.

4 See FCC, "Report and Order and Further Notice of Proposed Rulemaking, MM Docket 92-266, April 1, 1993, Appendix E, "Survey Results: Technical Issues;" FCC, "FCC Cable TV Rate Survey Database: Structure of Database and Explanatory Notes," February 24, 1993; and FCC "FCC Cable TV Rate Survey Database: Structure of Database and Explanatory Notes," March 30, 1994. Between 1993 and 1994, the FCC corrected errors in its data base and added several low-penetration systems to the sample.

5 The following franchises are considered not to have submitted complete 1986 information: (1) those that provided no information for 1986; (2) those that had no programming revenue in 1986; and (3) those that had no equipment revenue in 1986.

programming expenses. Consequently, we estimated programming expenses per cable network per subscriber month in 1986 and 1992.[6] We then estimated the total license fees per subscriber for a cable franchise in 1986 as the estimated 1986 average license fee per satellite channel times the number of satellite networks carried by the cable franchise in 1986. We then subtracted the estimated 1986 satellite license fees from the actual average 1986 monthly subscriber revenues that would be subject to regulation in 1992. We then translated this value from 1986 dollars into 1992 dollars by the GNP-PI.

We similarly estimated the license fee expenditures in 1992 for a franchise based on the number of satellite channels and characteristics that it had in 1986. We estimated the benchmark formula regulated rate for a cable franchise with its 1986 characteristics and subtracted the estimated 1992 license fee expenditures.

Table 2 compares the actual 1986 net revenue per subscriber with the net rates that would have been allowed under the 1992 benchmarks.[7] The

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6 We calculated the average monthly license fee per satellite channel per subscriber based on data from the Kagan Media Index. For 1986 total cable network license fees were $261 million, for 1992 network license fees were $1.503 billion. To obtain average annual license fee payments per subscriber, we divided these fees by the number of basic cable subscribers, 39.7 million in 1986 and 55.2 million in 1992. We then divided this amount by 12 to obtain average monthly subscriber fees. We then divided this amount by the average number of satellite channels, weighted by the number of system subscribers. Based on a GAO study (General Accounting Office, *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 Representative, June 1990), we assumed that there were an average of 11.1 satellite networks per subscriber in 1986. We calculated the average number of satellite channels per subscriber in 1992 as 20.6 from the 1992 FCC survey. We subsequently calculated the average license fee per subscriber channel as 5 cents in 1986 and 11 cents in 1992.

7 We have had to make three assumptions to perform this exercise with the new benchmark formula: (1) without information on 1986 system size, we have used 1986 franchise size; (2) without information on 1986 MSO or income characteristics, we have used 1992 MSO and income characteristics; and (3) we have had to assume that, where reported, the 1986 data are complete and accurate. Where information was obviously missing or inaccurate, we excluded observations, as indicated in Table 1. On balance, the first two assumptions may tend to bias upwards slightly the estimate of the 1986 benchmark average revenue.

first three columns of Table 2 present the results for franchises that faced rate regulation in 1986. The next three columns present results for franchises that did not face rate regulation in 1986, and the last set of columns presents combined results for both forms of rate regulation in 1986. For most franchises within each competitiveness category, the 1992 benchmark rate for revenues per subscriber applied to 1986 characteristics overstated the actual real 1986 rate. Average ratios (1992 adjusted benchmark rate:real adjusted 1986 rate) ranged from 112 percent for the less-than-30-percent penetration franchises to 141 percent for municipal systems.[8] Based on the benchmark formula, adjusted real revenues per subscriber have been rising rather than falling, even in competitive franchises. Clearly, these results do not support a positive productivity offset.

The last column of Table 2 indicates the annual rate of average revenue increase per subscriber in the benchmark table *in addition to the GNP-PI index* averaged across franchises that both faced and did not face rate regulation in 1986. The real annual growth of these rates ranged from 1.88 percent for systems with less-than-30-percent penetration to 5.83 percent for overbuilds.[9] The inference to be drawn from this evidence is *not* one of productivity decline but rather of quality improvements that are not captured in either the benchmark formula or in programming expenses. Instead of reducing real rates annually by 2 percent, the Commission should allow quality adjustments to increase real rates annually. The numbers in the last column of Table 2 indicate by how much the benchmark tables should be adjusted *upward* beyond GNP-PI to account for real quality improvements between 1986 and 1992. The results in Table 2 are consistent with the findings of Christensen Associates that total factor productivity in the cable television industry declined between 1984 and 1993.[10]

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8 Based on statistical tests, we cannot reject the hypothesis that there is no difference in these average ratios among different classes of competitive and non-competitive franchises.

9 "Non-competitive" franchises had real rate increase of 2.07 percent per year.

10 L.R. Christensen, P.E. Schoech, and M.E. Meitzen, "Productivity Growth in the Cable Television Industry," Christensen Associates, June 1994.

These results do not mean that cable operators have not improved efficiency. Like other industries that must invest in new technology to remain competitive, cable operators are constantly adapting new technology and providing more efficient services. These results, however, clearly indicate that the data collected by the Commission do not provide a basis to isolate the effect of productivity improvements. Any adoption of a productivity improvement offset by the Commission to reduce price increases for the benchmark tables should be coupled with a much larger quality improvement offset. The net effect of productivity and quality has been increasing revenues per subscriber, for all competitive systems.

Historical quality improvement has been paid for by increasing prices. If regulated price increases are limited to inflation alone (GNP-PI), future quality improvements will be slower than quality improvements were between 1986 and 1992. If regulated price increases are limited to a level less than inflation, future quality improvements will be slower still.

The practical effect of a failure to account for continued quality improvement will be a reduction in the demand for cable. One impact of reduced demand will be reduced program diversity, injuring both consumers and the cable network industry alike.

TABLE 1

FREQUENCY OF PROVISION OF 1986 PRICE DATA FOR FCC SAMPLE OF 496 FRANCHISES

System Served Franchise Area in 1986	1986 DATA		TOTAL
	Complete	Incomplete	
Yes	162	125	287
No	0	138	138
No response	0	71	71
TOTAL	162	334	496

TABLE 2

COMPARISON OF REAL 1986 REVENUE PER SUBSCRIBER CHANNEL EXCLUDING AVERAGE 1986 PROGRAMMING COSTS WITH RATES THAT WOULD HAVE BEEN ALLOWED UNDER 1992 BENCHMARK RATES EXCLUDING AVERAGE 1992 PROGRAMMING COSTS

	Rates Regulated in 1986			Rates Not Regulated in 1986			Total			
	1992 Benchmark Rate Using 1986 System Attributes > Real 1986 Rate	1992 Benchmark Rate Using 1986 System Attributes < Real 1986 Rate	1992 Benchmark Rate As A Percentage of Real 1986 Rate	1992 Benchmark Rate Using 1986 System Attributes > Real 1986 Rate	1992 Benchmark Rate Using 1986 System Attributes < Real 1986 Rate	1992 Benchmark Rate As A Percentage of Real 1986 Rate	1992 Benchmark Rate Using 1986 System Attributes > Real 1986 Rate	1992 Benchmark Rate Using 1986 System Attributes < Real 1986 Rate	1992 Benchmark Rate As A Percentage of Real 1986 Rate	Annualized Real Price Increase
Overbuilds	2	3	103%	8	2	122% *	10	5	116% *	2.46% **
Municipal systems	2	0	180%	1	1	101% *	3	1	141% *	5.83% **
Less-Than-30 Percent Penetration	8	3	125%	11	14	106% *	19	17	112% *	1.88% **
Not "competitive"	37	14	118%	40	22	109% *	77	36	113% *	2.07% **
Weighted Total †	47	20	119%	57	38	109% *	104	58	113% *	2.08% **

† Because some franchises fall in more than one category, some totals may be less than the sum of rows.
* The percentages in this column are not significantly different from one another at a critical value of 5 percent.
** The growth rates in this column are not significantly different from one another at a critical value of 5 percent.

ATTACHMENT D

"The Use of Competitive Market Value for Cable System Rate Base Valuation"

Economists Incorporated
September, 1993

(originally submitted with
NCTA Reply Comments in MM Docket No. 93-215)

The Use of Competitive Market Value For Cable System Rate Base Valuation

I. Introduction

Valuing a regulated company's rate base, the assets on which it earns a return, by the original cost of tangible assets has serious deficiencies. This method, which is contemplated in ¶35 of the Notice of Proposed Rulemaking, ignores intangible assets. Intangible assets are long-lived legal rights and competitive advantages that are developed or acquired by a business.[1] Intangible assets include a large and vital part of any cable system's capital investment. Furthermore, original cost can seriously understate the value of tangible assets, which may have increased significantly since those assets were originally acquired.

An important goal of rate regulation is to protect consumers by promoting economic efficiency. Consumer economic welfare is enhanced when prices are "competitive"—as close as possible to the prices that would prevail if there were competition. If prices are too high, the quantity demanded is too low, and sellers earn monopoly rents. If prices are too low, the quantity supplied is too low, leading to shortages and underinvestment. Consumers have as much to lose from prices that are too low as they do from prices that are too high, as the federal government's experience with natural gas wellhead regulation amply demonstrates.[2]

The method of valuing the rate base should lead to prices that are as near to competitive prices as possible—neither too high nor too low. Original cost is the wrong answer to this question for cable television service.

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1 This definition is from Jan R. Williams and Martin A. Miller, *GAAP Guide 1993*, Harcourt, Brace, Jovanovich, New York, 1993, p. 21.01. Our previous paper, "Prices Above Book Values Do Not Imply Market Power," August 25, 1993, contains an extended discussion of the concept of intangible assets.

2 See, for example, MacAvoy, Paul and Robert Pindyck, *Price Controls and the Natural Gas Shortage*, (American Enterprise Institute 1975).

If original cost is used, prices will be too low, because cable operators will be denied a return on an important component of their investment. Thus, cable operators will lack sufficient incentives to make efficient investments, and consumers will be injured.

The use of original cost could have particularly serious financial consequences for the cable industry. Many cable systems changed hands in the late 1980s at prices far in excess of the book value of the assets acquired. The difference between the seller's book value and the acquirer's price was allocated for accounting purposes in varying proportions to a write-up of tangible asset value, to amortizable franchise and subscriber list values, and to goodwill. If the FCC excludes all of this from the rate base, it will deprive these systems of a large part of their asset values that is not attributable to monopoly rents. The practical result may be that some systems' earnings fall by so much that they will be unable to service their debt.

This problem is not limited to those systems that recently changed hands, it affects all systems. Systems that did not change hands nevertheless have a market value that in all probability exceeds book value. To use original cost to value such systems is to deprive them of property value that has no connection to monopoly profits. Cable systems that did not recently change hands should be allowed to earn a return on the large part of the difference between their market and book values that is not attributable to monopoly rents. Failure to do this is likely to affect cable operators' and capital markets' expectation about the future course of regulation. The result will be inefficient underinvestment in this important communications infrastructure industry.

This paper describes an alternative to original cost—competitive market value. The market value of a cable system is equivalent to the discounted present value of the cash flow expected by its owners. The competitive market value is the market value net of the discounted present value of any monopoly rents that the firm might earn were there no effective competition. This paper describes how the Commission can estimate competitive market values for use in cost-of-service rate making and will show that original cost is not an accurate measure of competitive market value.

II. Competitive market value is a superior way to value a rate base

Competitive market value is superior to any of the four approaches to rate base valuation listed in ¶33 of the Notice of Proposed Rulemaking: original cost, replacement cost, reproduction cost, and market value. The original cost method usually underestimates the true value of a firm's tangible assets, because it values those assets at the time of purchase, which might have been many years in the past. Replacement and reproduction cost methods attempt to correct this deficiency. These methods, however, share a second and potentially more serious problem with the original cost method; they omit intangible assets.

A cable system cannot effectively conduct its business without intangible assets, including customer goodwill, contracts, technical expertise, and a skilled management team. Yet a cable system's balance sheet often omits its investments in these assets. Under Generally Accepted Accounting Principles, investments in intangible assets are usually charged to current expenses, so the balance sheet shows only investments in tangible assets. Intangible assets only appear on a company's books, if they are captured through the accident of a transaction.[3] Thus, original, reproduction, or replacement cost methods of valuing the rate base risk ignoring these important assets. Denying cable operators the value of their investments in intangibles would effectively constitute the confiscation of that investment.

The market value methodology avoids both these problems, because a firm's market value reflects the current value to a purchaser of all the firm's assets. The best measure of the economic value of any asset is its market price. The market price of an asset reflects in summary form all the various

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3 A rate base based on balance sheet valuations derived from purchase accounting might seem to avoid these problems. Purchase accounting attempts to correct for the deficiencies of accounting methods of valuing assets by entering the assets of an acquired business on the purchaser's balance sheet at their acquisition cost. The difference between the acquisition cost of the firm and the value of its tangible assets is recorded as intangible assets. See *GAAP Guide 1993,* pp. 3.02-3.07 and 21.01-21.05. Purchase accounting valuations, however, are subject to the same objections that are discussed below for market value rate bases: they are unavailable for systems that have not recently been sold and they might include the discounted present value of monopoly rents.

economic signals and incentives that determine the supply of and demand for the underlying service.

Competitive market value is the market value of a system that is charging competitive rates. Competitive market value can be used to determine rate bases in the cable industry, because the industry contains many systems that are effectively competitive. The experience of these systems can be used to project benchmark competitive market value rate bases of other firms, just as the Commission used them to project benchmark rates. Furthermore, the Commission can also rely on the experience of firms charging rates permitted under the benchmark method of rate regulation. Those rates approximate competitive rates in a way that the Commission has found acceptable under its benchmark approach.

III. Methods of estimating competitive market values[4]

The Commission can estimate competitive market values directly from the prices paid in market transactions for systems charging competitive rates: effectively competitive or benchmark regulated systems. Alternatively, the Commission can estimate competitive market values using the discounted present values of the cash flows from these systems. Buyers of cable systems determine the price that they are willing to pay based on these discounted present values.

Estimating competitive market values based on the acquisition prices of systems that either are effectively competitive or that are charging benchmark rates would require the Commission first to collect data on the prices at which those systems were bought and sold. An adequate amount of such data is currently unavailable. There are few effectively competitive systems that have been sold recently. Furthermore, benchmark regulation is just beginning, so there are no data available on sales of benchmark regulated systems. As experience with benchmark regulation grows,

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4 A paper by the Brattle Group, "Rate Base Issues in Cable Television Cost-of-Service Regulation," August 25, 1993, attached to the Comments of Viacom International Inc. also proposes the use of competitive market value as the rate base and presents two methodologies for establishing the competitive market value of a system.

however, more data on selling prices of benchmark regulated systems will likely become available. These data are likely to be available in time to evaluate cost-of-service-based rates in formal proceedings.

Given adequate data, the Commission could model the market value of effectively competitive and benchmark systems as a function of a number of the systems' observable characteristics. The set of characteristics included in this model should be more extensive than those used to calculate benchmark rates. A system will turn to cost-of-service regulation if it cannot operate efficiently under the benchmark rates. Such a system presumably has characteristics that make its costs, and thus perhaps its market value, different from most systems, but that are not captured in the benchmark model. Once the relevant data are available, the Commission can experiment to see which characteristics belong in the model. The Commission can then put information on the relevant characteristics of cost-of-service regulated systems into the model to estimate their benchmark competitive market value.

While public data on selling prices are not yet available, the Commission can nevertheless measure the market values of effectively competitive and benchmark-regulated systems. The Commission can measure the market values of these systems by projecting their future cash flow, and then calculating the discounted present value of that flow. The advantage of this method is that it does not require a sufficient number of acquisitions of effectively competitive or benchmark regulated systems. This method would require the Commission to collect data on systems' current cash flow and on conditions likely to affect changes in their cash flow. The Commission could then estimate market values, which it then could use in the same way as the acquisition prices discussed in the previous paragraph.

IV. An example of competitive market value

This section gives examples of the estimation of competitive market value, and demonstrates that competitive market value is likely to be significantly greater than original cost. The Commission's cable TV rate survey excluded cash flow and data on expenses, which might be used to derive cash flow. Therefore, this section will concentrate on data from those few multiple system operators that are publicly held and that have no signif-

icant activities other than operating cable systems. While these operators are only a small part of the industry, they provide a useful example of how various methods of measuring the rate base might work. Data from the Commission's survey will be used to ensure that the cash flow of these operators excludes monopoly rents.

Competitive market value is the present value of a competitive system's discounted expected future cash flow. Future cash flow will be estimated based on current cash flow, but current cash flow will reflect some rates that are above the benchmark recently established by the Commission. Therefore, the cash flow of these systems will be adjusted to reflect the effects of changing their rates to benchmark levels. If the Commission institutes competitive market value rate bases, it will be able to base such adjustments on the actual experience of benchmark regulated firms. Because benchmark regulation has not yet become effective, however, this paper adjusts cash flow using a number of assumptions concerning systems' plausible responses to regulation.

Pre-regulation cash flow is adjusted under two scenarios: (1) the decline in rates does not increase the number of subscribers or lead subscribers to take additional services, and (2) the decline in rates causes more consumers to subscribe to cable. In the first case, benchmark rates are calculated for each system in the Commission's cable survey that is not effectively competitive, and its regulated revenues are calculated on the assumption that it charges benchmark rates and experiences no increase in subscribers. (The systems whose current rates are already below the benchmark levels are assumed not to change rates.) In the second case, systems' regulated revenues are calculated on the assumption that the percentage increase in their subscribers is 2.2 times the percentage decrease in their rates.[5]

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5 The elasticity of demand for cable, the ratio of the percentage change in quantity demanded to the percentage change in price, was recently estimated at 2.2. Bruce M. Owen and Steven S. Wildman, *Video Economics,* Harvard University Press, Cambridge Mass., 1992, p. 231. The number of subscribers is not allowed to exceed the number of homes passed. Subscribers are assumed not to increase the number of services that they subscribe to. That assumption lowers the estimated competitive market values.

Total revenues decrease by 5 percent in the first scenario and rise by 3 percent in the second.

In the scenario where the number of subscribers is unchanged, costs are assumed also to be unchanged and the change in cash flow is simply the change in revenue. In the scenario where the number of subscribers increases, however, operating expenses are assumed to increase by the same percentage amount as the number of subscribers. The change in cash flow then is equal to the change in revenue minus the change in costs. Table 1 shows the total cash flow of the five system operators under both scenarios. The assumptions used to determine cash flow may appear problematic, but those assumptions will not be necessary in the future. Determining competitive market value will be much easier for the Commission, once it can draw on the actual changes in revenues and expenses experienced by benchmark regulated systems.

Table 1: Cable Operators' Estimated Cash Flow Under Various Regulatory Scenarios[6]

		Cash Flow	
	Pre-Regulation	**Scenario 1**	**Scenario 2**
5 Companies	$463,607,010	$376,965,124	$434,533,263

Calculating market value requires projecting future cash flow. In an actual rate base proceeding, the Commission can consider evidence concerning system specific factors that might lead cash flow to change in the future. For purposes of this exercise, however, operators' cash flow will be assumed to grow at a constant rate in perpetuity. Under this assumption, a

6 Data are for the last fiscal year for which the firm filed a 10-K with the Securities and Exchange Commission. The ending dates of these fiscal years are Adelphia, March 31, 1993, American Television and Communication Corp., December 31, 1991, Falcon Cable Systems, December 31, 1992, Galaxy Cablevision, December 31, 1992, and TCA, October 31, 1992. American Television and Communication Corp. was recently acquired and no longer files an independent 10-K.

system's market value is equal to m times its cash flow, where $m = 1/(i - g)$, g is the growth rate of cash flow, and i is the market interest rate. This example assumes an interest rate of 11.25 percent. The Commission uses that rate when calculating equipment costs under benchmark regulation. To give a conservative estimate of market value, the growth rate will be assumed to be zero. While cable systems have been growing significantly in recent years, this assumption allows for the possibility that regulation will slow their growth. These assumptions result in a multiple of 8.89, which is somewhat lower than the acquisition price to cash flow multiples that have been seen in most recent acquisitions of cable systems.[7]

Multiplying the estimated cash flow numbers in Table 1 by 8.89 produces the competitive market value of the operators' equity only, because cash flow was measured net of interest payments on debt. To estimate competitive market value of the entire firm, which corresponds to an asset rate base, the book value of total liabilities, excluding shareholders' equity and current liabilities, is added to the calculated value of equity. Table 2 shows the resulting estimates of competitive market value.

Table 2: Cable Operators' Original Cost Rate Base and Estimated Competitive Market Values Under Various Regulatory Scenarios[8]

	Original Cost	Competitive Market Value	
		Scenario 1	Scenario 2
5 Companies	$1,813,369,077	$6,578,136,419	$7,089,853,214

Table 2 also shows estimates of the total original cost rate base of these cable operators. Original cost rate bases were estimated by adding working

7 Estimates of cash flow multiples in large cable acquisitions are in Paul Kagan and Associates Inc., *The Cable TV Financial Databook,* June 1993, pp. 131-134.

8 Data on original cost are from the same sources as Table 1.

capital, defined as the difference between current assets and current liabilities, to plant, property, and equipment net of depreciation. As can be seen, competitive market value greatly exceeds original cost. Table 3 shows the ratio of competitive market value to original cost. The ratios ranged from 2.4 to 6.7 and the average competitive market value of these firms is slightly less than 4 times the average original cost.

Table 3: The Ratio of Competitive Market Value to Original Cost for Cable Operators

	Ratio	
	Scenario 1	**Scenario 2**
5 Companies	3.6	3.9

Requiring a rate base that is so far below the competitive market values of cable systems can seriously harm the cable industry. Given the estimated original cost rate bases and the 14% rate of return contemplated in ¶21 of the Notice of Proposed Rulemaking, Table 4 compares the overall revenue requirement, which is net of operating expenses, to overall interest payments. For three of the five companies, and for the group as a whole, the returns allowed on the original cost rate base would be less than their interest payments. Thus, with an original cost rate base, not only would cable companies earn an inadequate return on their investment, they would be unable to service their debt.

Table 4: Cable Operators' Estimated Revenue Requirements Using an Original Cost Rate Base and Their Interest Payments[9]

	Revenue Requirement	Interest Payments	Difference
5 Companies	$253,871,671	$262,053,126	($8,181,455)

9 Data on interest payments are from the same sources as Table 1.

V. Conclusion

Competitive market value is a way to measure the rate base that does not ignore important intangible assets or include the present value of monopoly rents in the rate base. Further, competitive market value provides efficient signals for investment and investor expectations consistent with economically efficient development of the industry. Original cost is a seriously inadequate way to measure a cable system's rate base. Estimates of competitive market value for a group of multiple system operators show that original cost does not adequately approximate competitive market value.

ATTACHMENT E

"Revisiting the Issues of Rate Base and Rate of Return in Cable Regulation"

Economists Incorporated
June, 1994