Key Components of an Apppropriate Price Cap System

When a price cap system is initially instituted, it closely resembles traditional regulation, since the price cap will most likely be based upon the existing tariffs, or some traditional measure of a reasonable set of prices. Over time, however, the two systems can diverge somewhat. The price cap approach allows the firm to vary its overall price level in accordance with industry-wide factors, while traditional regulation allows it to vary its price level in accordance with Company-specific data (in a rate case).
The general formula can be written as,

Ratenew = Rateold X [1 +
(Percent Change in INPUTCOST - Percent Change in TFPTEL],

where INPUTCOST = the cost of inputs used by telecommunications firms such as BA-MD, and TFPTEL = the total factor productivity of the U.S. telecommunications industry.
In order to understand how a price cap system works, key components should be examined, starting with the beginning rates.

The importance of beginning rates under a price cap plan

The initial starting point, the base price, must be the "correct price" for a price cap system of regulation to yield optimal results. These rates are normally based on the same cost-of-service and rate of return criteria used under traditional regulation. If the initial price cap is set too high, the firm may generate monopoly profits, unrelated to the skills and performances of its labor and management. If the price cap is set too low, the firm may incur losses or achieve a return which is far below its cost of capital. In that case, it will turn to the regulator in order to seek a higher price cap, abandonment of the price cap system, or other changes which will bail it out of its difficulties. Most regulators adopting price cap plans have either started with the firm's existing tariffs, or have required some downward reduction in those rates.
If the existing rates are temporarily yielding excess profits, this is not necessarily of great concern under traditional regulation, because returns are expected to fluctuate above and below the cost of capital. Only during a rate case are prices precisely aligned with costs in order to generate a normal profit. Between cases, profits will only coincidentally match the cost of capital. The same holds true under competition, where profits fluctuate with economic conditions, with changes in market conditions, and with the firm's position relative to the industry.
Under both effective competition and effective rate base regulation, profits will fluctuate in a range around the cost of capital. When initiating a system of price cap regulation, however, current profit levels are of special concern. If the firm is currently not earning its cost of capital, capping prices at their existing level may deny the firm an opportunity to overcome the existing deficiency, and thus hold profits below a normal level for many years into the future. The converse is also true. If current rates are yielding a return that is significantly above the cost of capital, by capping prices at the current level, excess profits may continue for many years into the future. Under competitive conditions, these supra-normal returns would tend to disappear over time, as competition intensifies and

economic conditions return to normal. Under traditional regulation, excess returns will indirectly be eliminated by the effects of input inflation if a rate case is not held, or directly by regulators if a rate case is held. Accordingly, in adopting a price cap system, it is important to evaluate the current status of industry profits, and place these into perspective with some reference to historic trends, or capital cost information.

The index variable

The second key variable in most price cap plans is the specific inflation index that is used to determine the annual price cap. Once appropriate starting rates are set, an appropriate index is typically used as an indication of the extent to which overall price levels should be changing over time. In competitive industries, in the market clearing price level tends to equilibrate in the vicinity of the average level of costs incurred by members of the industry. Furthermore, one of the factors which influence price levels in the short run is the level of input costs incurred by the firms. Hence, if a price cap system is to be reasonably consistent with the pattern in competitive markets, prices should be determined, at least in part, by changes in the overall level of input costs experienced by firms in the industry.

Ideally, prices would be indexed to an accurate measure of the overall composite level of input costs borne by local exchange companies. This composite would consider the cost of materials, labor and services that are used by the firm to produce the services whose prices are controlled by the price cap system. With such an index, regulators would be able to focus on industry-wide changes in input costs, without linking prices too closely to the individual firm's cost level. Thus, if a specific firm is able to operate more efficiently, and thus incurs lower than average costs, it will gain the benefit of that efficiency. Yet, all firms are given the benefit of the opportunity to increase prices when their input costs are increasing, and customers are given the benefit of potentially lower prices when input costs are declining.

Unfortunately, no industry-specific index of input prices exists. Hence, regulators normally turn to one of the broader inflation indices, as a reasonable proxy for an index of telecommunications input costs. One option is the Consumer Price Index (CPI). While it's widely known and well understood, the CPI measures changes in the cost of final goods purchased by households, and thus it isn't very representative of changes in the cost of input factors used by carriers. Another alternative is the Producer Price Index (PPI). The PPI measures changes in the prices purchased by producers. However, the PPI in the aggregate includes numerous components that may not be inputs specific to the telecommunications industry. The Department of Commerce, Bureau of Economic Analysis also reports changes in the individual components that comprise the PPI. Theoretically, one could choose those PPI subindices that best reflect the specific inputs used in the industry, and combine these with an index of labor costs, in order to arrive at a reasonable estimate of changes in input costs. For example, one could weight the changes in the PPI for communications equipment, computers, and other items purchased by LECs with an index of labor costs. However, there would be at least three disadvantages to this approach: it would be time consuming, it would be controversial, and it would not necessarily be reliable. All price indices have limitations; these limitations potentially become more significant as one moves from the macro to the micro level. Thus, for example, the PPI subindex for telecommunications equipment is potentially influenced by data gathering limitations, calculation errors, or other problems that tend to be far less significant or noticeable in the overall PPI.

A Bell Company may propose using the GDP-PI as a price cap index. The GDP-PI is an even more broadly based index than the CPI and PPI. Therefore, it is less volatile and potentially less subject to data gathering limitations and other problems.However, if the GDP-PI is used, it must be clearly understood that it is not an accurate index of changes in the production factors faced by any one particular industry. The GDP-PI, like the GNP deflator, is a reasonable proxy for the overall rate of inflation in the U.S. and it can reasonably be relied upon in developing a price cap system for a particular industry, provided that appropriate adjustments are made.

Adjustments

The first adjustment required is an adjustment to account for the differences between the rate of inflation in input prices within the particular industry and the overall rate of inflation. Historically, inflation has fluctuated widely, with large up swings and down swings. Input costs within a particular industry will not necessarily follow the same inflation pattern experienced by the overall economy. For example, in recent years LEC input prices have not increased as rapidly as price levels in the economy generally. However, it is well known that electronic equipment is not increasing in cost as rapidly as the overall rate of inflation. In fact, some equipment, such as computers, is actually declining in cost. Because of the importance of electronic equipment to the telecommunications industry, the GDP-PI tends to overstate the rate of inflation applicable to the items purchased by the LECS.

Support for the assertion that LEC input prices have grown more slowly than prices for the economy as a whole

A look at natural logarithmic growth rates for the Producer Price Index for communications equipment (including subcomponents) from 1987 to 1994 will reveal that the largest annual increase in the telephone and telegraph apparatus sub-index was 1.8%, from 1987 to 1988. The largest decrease was .44% from 1991 to 1992. As shown in the summary table below, the annual change in this overall index for communications equipment averaged 1.3% during this period. The change in the sub-index for telephone and telegraph apparatus averaged 1.1% over the same period. Cumulatively, the Producer Price Index for telephone and telegraph apparatus grew by just 7.9% from 1987 to 1994.

Summary Table:
Producer Price Index for communications equipment (including subcomponents) from 1987 to 1994

	Average Annual Increase	**1987-94 Cumulative Increase**
Communications Equipment	1.3%	9.0%
Telephone & Telegraph Apparatus	1.1%	7.9%
GDP-PI	3.6%	25.4%

As shown above, the GDP-PI grew at a much more rapid pace during this period.

Cumulatively it grew by 25.4% from 1987 to 1994. Thus, the overall inflation rate has been roughly three times larger than the rate of increase in telephone and telegraph apparatus prices. The largest annual increase was from 1989 to 1990, when the GDP-PI grew by 4.5%. The smallest increase was 2.7%, which occurred from 1993 to 1994. This comparison tends to confirm that equipment prices paid by LECs have not been increasing as rapidly as the GDP-PI.

It should be noted, however, that the PPI data appears to overstate the rate of inflation applicable to telephone equipment, and thus it tends to understate the discrepancy between LEC input prices and the GDP-PI. According to the PPI data, from 1986 to 1994, the price of central office switches increased by 6.2%, and digital switches supposedly increased by 3.1% through 1993. However, few people knowledgeable about the industry would suggest that the net prices paid by LECs for central office switches have actually increased to this degree. To the contrary, it appears that prices have effectively declined over this time period, as a result of increasing discounts off list prices, and product improvements. In fact, there is reason to believe that digital switch prices have declined sharply over this time frame, with discounts expanding substantially. Since the manufacturers attempt to keep their net prices confidential, it isn't surprising that the PPI data would not fully reflect actual trends in the discounts offered by the manufacturers.

Other, less specialized inputs used by the telecommunications industry

While a few items may have increased more rapidly than GDP-PI, others have actually decreased sharply in recent years. For instance, LECs rely heavily on computers for engineering, accounting, billing, and general office purposes. While this downward trend is not fully reflected in the GDP-PI or PPI data, it has been scrutinized by the National Bureau of Economic Research. Econometric Estimates of Prices Indexes for Personal Computers in the 1990s, NBER Working Paper 4559, November 1993. The NBER studied computer prices from 1989 to 1993, and found that over that time period, nominal prices dropped on average, by 11% per year. However, when quality changes, (e.g. improved speed, memory, storage and capacity) were considered, the effective price declined by an average of approximately 30% per year.

Admittedly, most other items purchased by the LECs have not declined as rapidly as computers. By the same token, many of these prices have not increased as rapidly as the GDP-PI. For example, from 1987 through 1994 the price index for supplies used by non-manufacturing firms increased by an average of 2.4% per year. This is significantly less than the 3.6% average rate of increase in the GDP-PI over the same time frame.

Labor Costs

Labor costs in private industry generally, and the communications industry specifically, have increased at a slightly higher pace than the GDP-PI. However, there is reason to suspect that hourly labor costs in the telephone industry will not increase in the future as rapidly as they have increased in the past, due to the effects of increasing competition. Hourly employment costs are significantly higher in the public utilities and transportation sector than in most other parts of the economy. According to a 1994 government report, total compensation costs for employees in the Transportation and Public Utilities sector was $24.58 per hour. This is higher than all other major sectors. The overall average for private industry as a whole was $17.08. Thus, there appears to be an opportunity for firms in this sector to sustain more moderate inflation in their labor costs in the future, without encountering difficulty in keeping or recruiting productive employees.

In any event, even if hourly compensation in the industry remains high, one can anticipate continued reductions in the amount of labor required to produce a given volume of service. The industry has been substituting capital inputs for labor, and there is no reason to assume this trend will disappear. The number of employees per 10,000 access line for all FCC-reporting LECs were 30.1 employees per 10,000 access lines in 1994. The average annual logarithmic change in total employees per 10,000 access lines from 1989 to 1994 was -8.2 percent for all reporting LEC's to the FCC. Since minutes of traffic have generally been growing faster than the number of access lines, a similar comparison would show an even steeper downward trend in the number of employees relative to minutes of traffic handled.

This increase in labor productivity is consistent with data compiled in 1990 by the Department of Labor, Bureau of Labor Statistics. In 1990, the Bureau reported that employment in the telephone communications industry had declined from 1,100,000 employees in 1981 to 897,500 in 1988. [Outlook for Technology and Labor in Telephone Communications, U.S. Department of Labor, Bureau of Labor Statics, Bulletin 2357, July 1990]. According to the Bureau:

> Telephone operators, office accounting and clerical workers, and installers and repairers are among occupational groups declining in number or experiencing slow growth as fiber optic systems, electronic switching, office automation, and other technologies ... are diffused more broadly. [Id., p. 1].

The Bureau also reported that Between 1967 and 1988, output per employee increased 5.9% annually, compared to 1.1% for the non-farm business sector. [Id.]. This rate of increase was among the highest recorded in a service sector industry. [Id.].

Other Reasons Why a Downward Adjustment Should be made to the Inflation Index in Developing a Price Cap System

A downward adjustment or offset factor is necessary to reflect the benefits of increasing economies of scale and economies of density, and the benefits of increasing productivity within the telecommunications industry. Productivity is usually described as the ratio of output to a given level of input. Gains (or losses) in productivity are generally measured by the degree to which output is affected by a unit change in a given input (e.g., labor, capital, or other productive resource). Thus, for example, labor productivity is said to be improving if workers take fewer hours to generate the same output.

In price cap regulation, an adjustment for productivity changes is needed, to ensure that reasonably anticipated increases in LEC productivity are reflected in the price cap index, and thus in end user rates charged by the LECs. Such an adjustment would allow ratepayers to share not only in the long-term benefits of price-cap-induced efficiencies, but in the short-term benefits as well. Ideally, the productivity differential would reflect changes in telecommunications productivity in a manner that simulates the impacts of productivity changes in a competitive industry. However, if the selected productivity measure is inaccurate, it cannot serve these stated purposes. Furthermore, even if a reasonable figure is selected based upon historic data, there is no assurance that future productivity changes will be equivalent to the past. In a competitive industry, if there is a technological breakthrough, or if the total volume of production increases enough to increase economies of scale for the typical firm, most of the benefits will flow to consumers, though possibly after a lag.

With price cap regulation, in contrast, an increase in productivity over the historic trend will tend to result in windfall gains to the carrier, since the price cap will not decline as rapidly as costs are declining, or as rapidly as prices would drop in a competitive market.

Factors that Influence Productivity

Numerous different factors affect a firm's productivity. Some of the most significant and most interesting factors include technological improvements; shifts from high to low cost inputs; and increased economies of density and scale.

How technological improvements affect a firm's productivity

Simply stated, technological advances enable a firm to produce more output per unit of input. In the telecommunications industry, we have seen an explosion of technological improvements as the industry has evolved away from analog technology into digital technology. There have been tremendous improvements in the areas of fiber optic cables, digital multiplexing and transmission systems, operations support computers, digital cross connect systems, digital central office switches, and more. Not only have the prices of these items been declining, as they are increasingly utilized by carriers, their impact becomes more significant. All of these technologies allow the Company to generate more output, (e.g., minutes of use and numbers of access lines in use), per unit of input (e.g., hours of employee time expended).

How productivity is influenced by shifts from one input to another

As certain inputs become cheaper, or increase in price at a slower rate than other inputs, a firm is able to utilize more of the cheaper input, and less of the costly input, while still producing the some level of output. For example, phone companies have been able to gradually reduce their reliance on costly main-frame computers, and increase their use of less costly personal computers and workstations. Furthermore, they have been able to increase their reliance on computers, while reducing their use of costly labor. Unit labor requirements for clerical and related office staff, as well as operators, continue to decline, as computers are increasingly used to perform functions previously handled by employees, or to assist those employees in handling their jobs more quickly and accurately.

Economies of Density and Scale: Evidence that Average Costs per Unit of Output Declines as a Telecommunications Network Expands

Dr. Johnson has developed economic cost estimates that can be used to demonstrate this phenomenon. The economic cost model used in preparing these estimates is described in this website. The estimates presented here do not correspond to any specific wire center; rather, they are indicative of the wide variety of different situations a carrier would encounter when building and operating local networks. To avoid submerging the key issues in a sea of different numbers, it will be advantagious to focus on three wire centers with strongly contrasting network characteristics--first, one serving a rural area, with a relatively small, widely dispersed population, requiring very long loops; second, one serving a small town with moderate density in a compact area, allowing relatively short loops; third, one serving an urban area with a dense population and numerous businesses that can easily be served using relatively short loops. In addition, presented are some cost results for an "average" wire center which lies within these contrasting extremes. The specific estimates presented here are based upon some work our firm has done.

To provide an approximate indication of the extent to which costs tend to vary due to heterogenous conditions within the geographic area served by the wire center, our model provides for two zones. Zone 1 is representative of the highest density portions of the overall geographic area, which are assumed to be in the immediate vicinity of the central office or switch. Zone 2 lies beyond this vicinity, covering a much larger area, with greater loop lengths and a lower concentration of customers. Admittedly, this approach simplifies the actual conditions in each wire center, where customers may be scattered and distributed in something of a random pattern. Also, due to rounding and other complications, the cost estimates for individual zones are not as reliable as the overall estimates. Nevertheless, our model does provide some useful insights concerning the degree to which costs can be expected to vary even within the same wire center serving area, due to the fact that customers are not uniformly dispersed . Customers who are clustered close together (e.g., in a large apartment complex) tend to be less costly to serve than customers who are widely scattered in remote areas far from the wire center.

While the overall results are the most reliable, the disaggregated results for specific zones are worth some consideration, since they provides a more complete picture of the diversity of cost conditions that exist in the state. The overall estimates can actually be viewed as composites--homogenized blends of inherently heterogeneous costs that vary with geographic, demographic, and other conditions. For many purposes, such homogenized overall cost figures for each wire center are entirely adequate. However, it is important to remember that the heterogenous cost differences are real and can be very important to an analyst attempting to predict the pattern of competitive entry, or the effects of alternative price cap systems during the transition to a more competitive market.

Ror example, if a model exclusively focuses on the composite cost data for wire centers as a whole, it may ignore the data that indicate whether "cream skimming" will occur when new carriers enter the market. In contrast, by looking at differences between the zone 1 and zone 2 cost patterns, our model predicts that in some wire centers most new entrants will be forced to pursue a "cream skimming" approach to their facilities construction and limit the geographic scope of their network to high density areas close to their switch. This problem could be overcome to a degree, if the Commission were to require the incumbent carrier to unbundle its network and provide loop capacity at relatively low wholesale prices, thus encouraging carriers to serve the more isolated customers on a resale basis.

In the long run, total costs increase as the network expands, but the rate of increase is less than proportional to the change in size. As a result, average total costs per loop tend to decline as the network expands. For example, consider an average wire center using an all-copper configuration, as summarized below:

Total Cost	Zones 1&2 Average

		Cost Zone 1 Average Cost Zone 2 Average Cost		
90%	110,392	9.52	5.97	11.27
95%	116,105	9.48	5.81	11.29
100%	122,073	9.47	5.80	11.28
105%	122,921	9.08	5.57	10.81
110%	127,283	8.98	5.36	10.76
115%	131,822	8.89	5.42	10.61
120%	133,973	8.66	5.24	10.35
125%	134,811	8.37	5.07	9.99
130%	142,892	8.53	5.71	9.92

As the network expands, the average cost per loop declines from $9.52 per month to just $8.53 per month. The same basic pattern occurs within both the higher density zone 1 (close to the wire center) and the lower density zone 2 (farther from the wire center). The rate of decline is not strictly linear, due to lumpiness of the investment needed to serve the network as it expands in the long run. However, the trend is clearly downward. Thus, as the firm expands, it will tend to experience a downward trend in its average cost per loop. Although not shown here, switching costs evidence a somewhat similar pattern of declining costs with increased usage volume. However, the rate of decline is not necessarily as rapid.

The pattern of declining costs shown above is significant because it demonstrates that the Company is operating in a declining cost industry. Even if its input prices are increasing, its costs may not be increasing, because the uptrend in input costs tends to be offset by the benefits of economies of density and scale, which increase over time, as the total size of the market expands.

Studies that have been performed to measure changes in productivity in the telecommunications industry

The most extensive studies have been performed for and filed in various federal telecommunications proceedings. Early studies were performed and filed in United States v. AT&T, 552 F. Supp. 131 (D.D.C. 1982). According to the FCC, each of these studies indicated that "the telecommunications industry is a most productive sector of the economy". [In the Matter of Policy and Rules Concerning Rates for Dominant Carriers, Report and order, April 17, 1989, Docket No. 87-313, FCC 89-91, para. 200]. In concluding that its price cap formula for dominant carriers should include a productivity offset adjustment, the FCC cited three studies from United States v. AT&T which measured the productivity of Bell companies in the U.S. The first study found that Bell System productivity from 1947 to 1978 was 2.1% greater than the economy as a whole, and 3.0% greater from 1966 to 1978. [Id.]. Another study concluded that from 1972 to 1978, the differential was 3.9%. [Id.]. The third study cited by the FCC found that from 1947 to 1976, productivity within the Bell System increased annually an average of 4.09%. [Id., para. 201]. Based on these long term studies, the FCC tentatively concluded in 1989 that 2.5% was the best estimate of LEC productivity. The FCC also tentatively concluded that the productivity offset should include a .5% "Consumer Productivity Dividend". [Id., para. 693].

In 1990, the FCC considered, in addition to the previous long term studies, an analysis performed by the FCC staff concerning LEC productivity from 1984 and 1989. As mentioned earlier, the FCC concluded that the offset should be increased to either 3.3% or 4.3% depending upon the level of profit sharing an LEC chooses. [In the Matter of Policy and Rules Concerning Rates for Dominant Carriers, Second Report and Order, September 19, 1989, Docket No. 87-313, FCC 89-91, para. 74].
In 1994, the FCC initiated a docket to review LEC performance under the price cap rules established in 1990. [In re: Price Cap Performance Review for Local Exchange Carriers, CC Docket No. 94-1, FCC 95-132.]. In this docket, the FCC considered several recent studies regarding LEC productivity. The first study, known as the "Christensen" study, was performed for United States Telephone Association (USTA). This study concluded that from 1984 to 1992, LEC productivity growth averaged 2.6% per year. [Id., First Report and Order, p. 50]. The second study, performed by National Economic Research Associates, Inc. (NERA), also on behalf of USTA, essentially reaffirmed the Christensen study. However, several parties commenting on the USTA studies, and using USTA data, concluded the productivity offset should be significantly higher than 2.6%, with recommendations ranging from 5.0% to 5.9%. [Id., para. 102].

AT&T submitted its "Direct Model" for estimating LEC productivity, and concluded that LECs achieved an average X Factor of 5.97% under price caps. After including additional data, AT&T revised its X-Factor to 5.54%. [Id., p.61]. AT&T also performed another study to calculate Regional Bell Operating Company (RBOC) productivity, using the method used by the Commission in the original price cap proceeding. Based on its calculations, AT&T asserted that from 1991 to 1993, RBOCs achieved an annual X-Factor of 6.96%. [Id., p. 62]. Several other parties submitted reports and studies, with X-Factor recommendations ranging from 1.7% to 5.9%. [Id., p. 64]. As mentioned earlier, after evaluating this array of evidence, the FCC concluded that a range of 4.0% to 5.3% would be appropriate for the X-factor, depending upon the extent of profit sharing, if any, that would be applicable. Although this factor is only applied to the interstate jurisdiction, the FCC accepted the arguments of the U.S. Telephone Association (USTA) that it should base its X-factor on the overall industry productivity rate, including both interstate and intrastate services.

Network growth as a result in increased revenues

As a network expands over time, we can look at the incremental customers, or the incremental volume of access lines and traffic volumes, and ask the question: what incremental revenues will the firm generate as a result of serving this market expansion? For any one customer, the answer can vary widely. If the customer never places or receives a long distance call, and never uses any of the optional services that are offered by the firm, the incremental revenues may amount to little more than the revenues from basic local exchange service and the FCC's subscriber line charge. Even in this extreme case, however, some other incremental revenues will arise.
Consider directory publishing revenues, for example. The incumbent local exchange carriers earn very substantial revenues (and profits) from yellow page advertising. These rates vary directly with the number of subscribers included in (and receiving) the directory. As additional customers are added to the network, directory publishing

revenues and profits will expand. These incremental revenues can appropriately be considered in evaluating the impact of network growth. Analogously, a magazine publisher that is evaluating a marketing effort targeted at selling additional subscriptions should not simply consider the direct revenues generated by the subscription. She should consider all of the incremental revenues that can be expected as additional subscriptions are sold. These include the additional ads that are sold as the circulation base expands, as well as the increase in advertising rates that can be achieved as the number of subscribers increases.

In evaluating the effect of growth on a local exchange carrier, one should also consider ancillary revenue sources. When speaking of the across-the-board growth that occurs from year to year, the expected revenue growth will be quite diverse. It will include increased revenues from numerous different sources. Consider, for example, what revenues can be expected as the area population expands, and the number of lines per household increases. As the number of residential lines increases over time, the LEC can anticipate substantial incremental revenues and profits from numerous different sources. For instance, directory advertising revenues will increase as the scope of each directory expands to include additional people. Not only will the circulation increase, the directory may be used more frequently, and thus be more useful to subscribers and advertisers. As a result, the number of ads will tend to increase, the size of the ads will tend to increase, and the rates per column inch will tend to increase as the network expands.

Similarly, the volume of switched access minutes sold to interexchange carriers will increase, as the number of subscribers increases. Expansion of the network will unquestionably translate into substantially higher volumes of access traffic. Not only will the incremental customers place outgoing toll calls, and receive numerous long distance calls, the existing customers are also likely to place more calls each month. Hence, one can anticipate that switched access revenues will expand even more rapidly than the number of access lines where this traffic is originated and terminated.

Moreover, many of the incremental customers, once they decide to purchase basic telephone service, will also opt to purchase one or more discretionary services. For example, call waiting service is very popular. Over time, the number of people paying for this premium-priced service tends to increase, as more and more calls are placed, and busy signals and missed calls become more frequent.

As a final example, consider the likelihood that some of the marginal customers will purchase inside wire maintenance. Whether or not this is a wise purchasing decision (some would argue it is greatly overpriced insurance), the carrier may reasonably anticipate incremental revenues from this ancillary source, as marginal customers are added to the network--some of whom will agree to pay a monthly fee in order to have their inside wires maintained. Regardless of whether the analysis considers all of these revenue streams, or just some, it is clear that the rate of growth in revenues will tend to outstrip the rate of growth in costs. Put schematically, over time one would expect to observe the following pattern:

	Costs	**Revenues**	**Profits**
Local Loops	DOWN	UP	UP
Local Minutes	UP	SAME	DOWN
Access Minutes	DOWN	UP	UP
Toll Minutes	DOWN	UP	UP

Custom Calling	DOWN	UP	UP	
Directory	DOWN	UP	UP	

The table below illustrates the net effect of this general pattern for a typical residential customer over a five year span, during which the rate for basic local exchange service (including the FCC's subscriber line charge) is assumed to be held constant. In preparing this table, I have used cost information drawn from the Pennsylvania study I mentioned earlier. However, I used Maryland revenue data in preparing this example.

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenues					
Basic	19.00	19.00	19.00	19.00	19.00
Other	16.50	17.16	17.85	18.56	19.30
Total	35.50	36.16	36.85	37.56	38.30
Costs					
Basic	1.11	1.15	1.20	1.25	1.30
Other	2.25	2.34	2.44	2.53	2.63
Joint	13.47	13.15	13.09	13.06	12.79
Total	16.83	16.65	16.73	16.84	16.72
Contribution	18.67	19.51	20.12	20.72	21.58

In this table, the "other" category includes switched access, intraLATA toll, custom calling, and directory publishing. The "joint" category includes the cost of the drop and termination at the customer premise, the local loop connecting him to the central office, and the non-traffic sensitive portion of the central office equipment. Many of these costs tend to decline as the size of the network expands in the long run. This pattern of decline is reflected in this example, derived from our economic costing model.

In developing this example, assumptions are used that are generally reflective of rates and usage patterns in a Local Exchange Company's service territory. However, this is not an exact representation of the revenues generated by the average residential customer. While the numeric relationships in this example may not precisely match a particular customer, the overall trend is representative of conditions in the industry generally. Note that the costs of local usage increase with increased calling volumes, but this is not offset by any increase in basic local revenues per loop (since the customer pays a flat rate). However, this uncompensated cost increase is more than offset by favorable trends in other categories. Although not shown here, the same general pattern holds for other types of wire centers and other types of customers, including business customers. The net effect, then, is that growth in the size of the local network, as well as growth in calling volumes can lead to higher profit margins over time, as reflected in the "contribution" line above.

The Effects of Competition as they Relate to Price Cap Regulation

While it is clear that competition produces many benefits--increased customer choice, increased pressures for maximum efficiency, etc.--it should also be recognized that it can have negative effects on the incumbent carriers and their captive customers, at least in the short run. For one thing, competition slows the incumbent's growth rate as its market share declines, reducing the benefits of economies of density and scale, and the growth in revenues and profits just discussed. Furthermore, competitive pressures will tend to be strongest where margins are perceived to be the highest and/or barriers to entry are the lowest. These factors tend to create strong incentives for the incumbent carrier to reduce prices in the markets where margins are high, or barriers to entry are low, or both. Conversely, where competitive pressures are weakest, either because margins are lower, or because barriers to entry are higher, or both, the incumbent may attempt to raise prices. That is, the unevenness of competitive pressure may encourage the incumbent carrier to make an effort to "rebalance" its rates in an effort to sustain profitability in the face of price reductions in the more competitive markets. One of the most significant features of most systems of price cap regulation is that the carrier is given greater freedom to engage in rebalancing of its rates. The extent to which this occurs will depend in part on the amount of pricing freedom the firm is given under the particular plan that is adopted, and it will depend in part on the extent to which the Commission is able to reduce barriers to entry in various markets.

Assuming barriers to entry persist in some areas, prices will likely rise in those areas, unless this is precluded by the price cap rules. Consider, for example, the situation where new carriers will incur relatively high average costs if they attempt to enter smaller markets, because the market isn't large enough for the carrier to gain the benefits of economies of scale and density. In this situation, new carriers will be less likely to enter the smallest markets. The problem is most acute in rural areas and for very small carriers (e.g., a 5% market share).

In such circumstances, the incumbent may have an incentive to increase its prices in these markets, perhaps stopping just short of the point where it estimates a potential entrant's average costs would be. This is sometimes referred to as the entry deterring pricing (maximize profits subject to a constraint of not enticing competition into the market). Simply stated, without regulatory constraints and without effective competition, if the incumbent is free to charge "what the market will bear," it will have an incentive to greatly increase rates in rural markets relative to urban markets, where barriers to entry are lower.