

1 **Section Four**

2 **Q. Could you elaborate on the index variable?**

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

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

23 Unfortunately, no industry-specific index of input prices exists. Hence,
24 regulators normally turn to one of the broader inflation indices, as a reasonable proxy

1 for an index of telecommunications input costs. One option is the Consumer Price Index
2 (CPI). While it's widely known and well understood, the CPI measures changes in the
3 cost of final goods purchased by households, and thus it isn't very representative of
4 changes in the cost of input factors used by carriers. Another alternative is the Producer
5 Price Index (PPI). The PPI measures changes in the prices purchased by producers.
6 However, the PPI in the aggregate includes numerous components that may not be
7 inputs specific to the telecommunications industry. The Department of Commerce,
8 Bureau of Economic Analysis also reports changes in the individual components that
9 comprise the PPI.

10 Theoretically, one could choose those PPI subindices that best reflect the
11 specific inputs used in the industry, and combine these with an index of labor costs, in
12 order to arrive at a reasonable estimate of changes in input costs. For example, one
13 could weight the changes in the PPI for communications equipment, computers, and
14 other items purchased by LECs with an index of labor costs. However, there would be
15 at least three disadvantages to this approach: it would be time consuming, it would be
16 controversial, and it would not necessarily be reliable. All price indices have limitations;
17 these limitations potentially become more significant as one moves from the macro to
18 the micro level. Thus, for example, the PPI subindex for telecommunications equipment
19 is potentially influenced by data gathering limitations, calculation errors, or other
20 problems that tend to be far less significant or noticeable in the overall PPI.

21 The Modified Price Plan uses the GDP-PI as a price cap index. The GDP-PI is
22 an even more broadly based index than the CPI and PPI. Therefore, it is less volatile
23 and potentially less subject to data gathering limitations and other problems. Historical
24 GDP-PI growth rates are shown on Schedule 1. However, it must be clearly

1 understood that the GDP-PI is not an accurate index of changes in the production
2 factors faced by any one particular industry. The GDP-PI, like the GNP deflator, is a
3 reasonable proxy for the overall rate of inflation in the U.S., and it can reasonably be
4 relied upon in developing a price cap system for a particular industry, provided that
5 appropriate adjustments are made.
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7 **Q. Could you explain these adjustments?**

8 A. The first adjustment required is an adjustment to account for the differences between
9 the rate of inflation in input prices within the particular industry and the overall rate of
10 inflation. Historically, inflation has fluctuated widely, with large up swings and down
11 swings. Input costs within a particular industry will not necessarily follow the same
12 inflation pattern experienced by the overall economy. For example, in recent years
13 LEC input prices have not increased as rapidly as price levels in the economy generally.
14 However, it is well known that electronic equipment is not increasing in cost as rapidly
15 as the overall rate of inflation. In fact, some equipment, such as computers, is actually
16 declining in cost. Because of the importance of electronic equipment to the
17 telecommunications industry, the GDP-PI tends to overstate the rate of inflation
18 applicable to the items purchased by the LECS.
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20 **Q. Do you have any support for the assertion that LEC input prices have grown
21 more slowly than prices for the economy as a whole?**

22 A. Yes. Schedule 2 shows natural logarithmic growth rates for the Producer Price Index
23 for communications equipment (including subcomponents) from 1987 to 1994. The
24 largest annual increase in the telephone and telegraph apparatus sub-index was 1.8%,

1 from 1987 to 1988, and the largest decrease was .44% from 1991 to 1992. As shown
2 in the summary table below, the annual change in this overall index for communications
3 equipment averaged 1.3% during this period. The change in the sub-index for telephone
4 and telegraph apparatus averaged 1.1% over the same period. Cumulatively, the
5 Producer Price Index for telephone and telegraph apparatus grew by just 7.9% from
6 1987 to 1994.

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

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20 As shown above, the GDP-PI grew at a much more rapid pace during this period.
21 Cumulatively it grew by 25.4% from 1987 to 1994. Thus, the overall inflation rate has
22 been roughly three times larger than the rate of increase in telephone and telegraph
23 apparatus prices. The largest annual increase was from 1989 to 1990, when the GDP-
24 PI grew by 4.5%. The smallest increase was 2.7%, which occurred from 1993 to
25 1994. This comparison tends to confirm that equipment prices paid by LECs have not
26 been increasing as rapidly as the GDP-PI.

27 It should be noted, however, that the PPI data appears to overstate the rate of
28 inflation applicable to telephone equipment, and thus it tends to understate the
29 discrepancy between LEC input prices and the GDP-PI. According to the PPI data,
30 from 1986 to 1994, the price of central office switches increased by 6.2%, and digital

1 switches supposedly increased by 3.1% through 1993. However, few people
2 knowledgeable about the industry would suggest that the net prices paid by LECs for
3 central office switches have actually increased to this degree. To the contrary, it
4 appears that prices have effectively declined over this time period, as a result of
5 increasing discounts off list prices, and product improvements. In fact, there is reason to
6 believe that digital switch prices have declined sharply over this time frame, with
7 discounts expanding substantially. Since the manufacturers attempt to keep their net
8 prices confidential, it isn't surprising that the PPI data would not fully reflect actual
9 trends in the discounts offered by the manufacturers.

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11 **Q. What about the other, less specialized inputs used by the telecommunications**
12 **industry?**

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

1 Admittedly, most other items purchased by the LECs have not declined as
2 rapidly as computers. By the same token, many of these prices have not increased as
3 rapidly as the GDP-PI. For example, as shown on Schedule 3, from 1987 through
4 1994 the price index for supplies used by non-manufacturing firms increased by an
5 average of 2.4% per year. This is significantly less than the 3.6% average rate of
6 increase in the GDP-PI over the same time frame.

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8 **Q. Have you also considered labor costs, since these are an important input into**
9 **telephone services?**

10 A. Yes. Schedule 4 shows that labor costs in private industry generally, and the
11 communications industry specifically, have increased at a slightly higher pace than the
12 GDP-PI. However, there is reason to suspect that hourly labor costs in the telephone
13 industry will not increase in the future as rapidly as they have increased in the past, due
14 to the effects of increasing competition. Hourly employment costs are significantly
15 higher in the public utilities and transportation sector than in most other parts of the
16 economy. According to a 1994 government report, total compensation costs for
17 employees in the Transportation and Public Utilities sector was \$24.56 per hour. This is
18 higher than all other major sectors. The overall average for private industry as a whole
19 was \$17.08. Thus, there appears to be an opportunity for firms in this sector to sustain
20 more moderate inflation in their labor costs in the future, without encountering difficulty
21 in keeping or recruiting productive employees.

22 In any event, even if hourly compensation in the industry remains high, one can
23 anticipate continued reductions in the amount of labor required to produce a given
24 volume of service. As the Commission knows, the industry has been substituting capital

1 inputs for labor, and there is no reason to assume this trend will disappear. Schedule 5
2 shows the number of employees per 10,000 access line for BellSouth, from 1986 to
3 1994. In 1986, BellSouth employed 58.5 telephone employees per 10,000 access
4 lines. By 1990, this figure had dropped to 49.1. By 1994, BellSouth employed only
5 36.5 telephone employees per 10,000 access lines. Since minutes of traffic have
6 generally been growing faster than the number of access lines, a similar comparison
7 would show an even steeper downward trend in the number of employees relative to
8 minutes of traffic handled.

9 BellSouth's increase in labor productivity is consistent with data compiled in
10 1990 by the Department of Labor, Bureau of Labor Statistics. In 1990, the Bureau
11 reported that employment in the telephone communications industry had declined from
12 1,100,000 employees in 1981 to 897,500 in 1988. [Outbok for Technology and
13 Labor in Telephone Communications, U.S. Department of Labor, Bureau of Labor
14 Statics, Bulletin 2357, July 1990]. According to the Bureau:

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16 Telephone operators, office accounting and clerical workers, and installers and
17 repairers are among occupational groups declining in number or experiencing
18 slow growth as fiber optic systems, electronic switching, office automation, and
19 other technologies ... are diffused more broadly. [Id., p. 1].
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21 The Bureau also reported that Between 1967 and 1988, output per employee
22 increased 5.9% annually, compared to 1.1% for the non-farm business sector. [Id.].
23 This rate of increase was among the highest recorded in a service sector industry. [Id.].
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