



# 4

## The State of Competition in Telecommunications



BRUCE L. EGAN

AND LEONARD WAVERMAN



STANFORD L. LEVIN



LEE L. SELWYN

NINA CORNELL

MARTIN G. TASCHDJIAN

JOHN R. WOODBURY

*Bruce L. Egan and Leonard Waverman*

Not surprisingly, there are many opinions regarding the state of competition in telecommunications. There are many submarkets to consider, each with a very different potential for the manifestation of competition as commonly defined in economics. Competition, of course, is a matter of degree, and there is a great deal of confusion regarding the criteria to determine the level of competition in any given market at any given time. For this reason we focus on empirical observations using the available data to evaluate competition since divestiture.

One of our main purposes is to make the same data available to others for their own interpretation. Space constraints preclude attempts to examine causality in any detailed fashion. This is appropriate considering the limitations of reported data and the short history since the AT&T divestiture. Moreover, economic causality is difficult to evaluate, and the divestiture itself is just one major event among a host of other exogenous and entirely random factors, such as tax reform, low inflation, high growth, technical change, and numerous judicial and regulatory decisions which are in large part responsible for what we observe.

Of critical importance to most economists in evaluating competition are the actual and potential number of market suppliers and buyers, and the ease with which suppliers may enter the market. There are many possible measurements, including the counting of suppliers, and evaluating entry barriers and the ready capacity of alternative suppliers. A traditional structural approach looks at market share at a point in time and over time to evaluate competition. Strict market share calculations are not good indicators of the state of competition in any market. Price movements are also important indicators of competitive conditions, and financial performance and profitability are also relevant.

Beyond the usual indicators, other behavioral considerations include the presence or absence of joint ventures and other partnerships among firms or groups of firms, productivity, product/service introduction and innovation, and progress in technology adoption. Even were data available on all such factors, an analysis of competition is complicated by transition dynamics and institutional, regulatory, and other exogenous factors for which there are often no data at all.

The post-divestiture marketplace features a wide range of submarkets, only some of which are closely related. Various categories of telecom products and services can be substitutes or complements, depending on income levels or other characteristics of users. Various network services are often used in combination by certain residence and business customers, while many others consider them as substitutes and choose one or another. For example, some businesses use switched and dedicated lines in relatively fixed proportions, while others view them as close substitutes based on price. We proceed to look at data on each category separately, recognizing that only net effects are revealed among a host of complex cross-elastic relationships. The market categories examined are: toll network services, including switched and nonswitched network services; local network services, including access lines and usage; access services for toll calling; cus-

tomers premises equipment; network switching and transmission equipment; cellular mobile telecommunications; public or pay telephone equipment and services including alternative operator services; and information services.

Since divestiture, the telecommunications industry has become one of the fastest growing markets in the economy. However, there are large differences in the growth rates of different submarkets. There also appears to be a strong correlation between growth rates and competitive conditions (i.e., the highest rates of growth appear in sectors with the most competition).<sup>1</sup> This correlation exists for several reasons. First, the pressures for entry usually occur in market segments with high growth prospects. Second, competition drives down price and this increases demand. Third, it is easier to support new entrants in very high growth industries. Correlation, however, is not causation; thus it is necessary to consider whether entry constitutes a perhaps short-lived competitive fringe, or genuine long-run price/quality rivalry. Industry "shakeouts" typically follow boom periods, and such situations should be monitored closely.

The top portion of table 4.1 presents data on growth rates in local, toll, and access volumes for the 1984–1988 five-year period. These growth rates are significantly affected by federal and state rate changes mandating local price increases and toll and access service price decreases. The history of these price changes is given in table 4.2. The increase in the price of local and the fall in the price of interstate toll and access reflect the rebalancing of rates that has taken place. Obviously, the aggregate demand response to such large rate and rate-structure changes represents a significant part of observed growth in toll and access service since 1984, and not just inherent structural differences in long-run growth rates. Within the overall industry, growth in local telephone service since divestiture, especially for voice lines and usage, is quite sluggish, with the growth in voice toll and access services being two to four times greater. Such slow growth in the presence of unprecedented postwar economic expansion could indicate local service is a very mature and largely saturated market, whose future is likely to be most closely related to population growth. The same is true of voice toll and access services, but large rate reductions make them appear very high-growth markets. Data services, on the other hand, even local service, show very high growth rates (see figure 4.1). This is not due to divestiture or changes in regulation, but simply reflects shifting demand.

The bottom half of table 4.1 provides information on the levels of "industry" revenues (some 90 to 95 percent of the market, see table

TABLE 4.1  
Industry Data

| <i>Network Market Segment Growth (%)</i><br><i>(year over year)</i> |      |      |      |      |      |
|---|------|------|------|------|------|
|   | 1984 | 1985 | 1986 | 1987 | 1988 |
| Access lines <sup>a</sup>   | —    | 2.6  | 2.6  | 3.4  | 3.2  |
| Local usage <sup>b</sup>  | —    | 2.1  | 0.5  | 0.8  | 0.5  |
| Toll usage <sup>c</sup>   | —    | 8.0  | 6.3  | 8.3  | 9.4  |
| Access usage <sup>d</sup>   | —    | 10.5 | 8.3  | 15.2 | 13.0 |

Note: Comparisons of switched toll and access are difficult to make partly due to differences in measurement and reporting and bypass.

<sup>a</sup>RBOCs plus the 18 largest independents (Source: Annual Reports/FCC Statistics).

<sup>b</sup>Subscriber line usage data (Source: FCC Tier 1 companies, Joint Board Monitoring Report, CC Docket No. 80-286, p.198, 12/88).

<sup>c</sup>Based on AT&T data, for switched service only. Non-reporting carriers are usually higher growth and private and bypass usage is excluded, causing the estimates shown to be lower than actual.

<sup>d</sup>Interstate (Source: FCC report on Interstate Switched Market, March, 1989).

| <i>Industry Revenues (\$B)</i> |       |       |       |       |       |
|--------------------------------|-------|-------|-------|-------|-------|
|                                | 1984  | 1985  | 1986  | 1987  | 1988  |
| Total <sup>e</sup>             | 113.7 | 124.6 | 131.2 | 134.2 | 142.0 |
| Local <sup>f</sup>             | 75.3  | 82.6  | 87.7  | 91.5  | 96.7  |
| Toll <sup>g</sup>              | 38.4  | 42.0  | 43.5  | 42.7  | 45.3  |
| Access <sup>h</sup>            | 25    | 27    | 23    | 22    | 25.2  |

<sup>e</sup>Based on data for approximately 90% of the market (Source: Annual Reports/FCC).

<sup>f</sup>RBOCs plus the 18 largest independent companies, includes local service, intraLATA toll, access (Source: Annual Reports/FCC).

<sup>g</sup>Includes top 5 carriers or about 95% of market (AT&T, MCI, US Sprint, NTN, Allnet).

<sup>h</sup>Author's estimate.

notes). Total revenues, so measured, rose by 24 percent in 1984–1988, with local exchange carrier (LEC) revenues increasing 28 percent, and toll revenues (interLATA) increasing 18 percent. Significant repricing must be taken into account when evaluating these data. The overall financial health of the industry during the five-year period is indicated in tables 4.3–4.5. Table 4.3 shows the market/book values of the pub-

TABLE 4.2  
Telephone Prices  
(annual rate of change)

|       | <i>Local</i> | <i>Intrastate<br/>Toll</i> | <i>Interstate<br/>Toll</i> | <i>Access<sup>a</sup></i> |
|-------|--------------|----------------------------|----------------------------|---------------------------|
| 1984  | +17.2        | +3.6                       | -4.3                       | —                         |
| 1985  | +8.9         | +0.6                       | -3.7                       | -8.1                      |
| 1986  | +7.1         | +0.3                       | -9.5                       | -14.3                     |
| 1987  | +3.3         | -3.0                       | -12.4                      | -21.7                     |
| 1988  | +4.5         | -4.2                       | -4.2                       | -8.5                      |
| Total | +41.0        | -2.7                       | -34.1                      | -52.6                     |

Source: FCC price index study 1989.

<sup>a</sup>Interstate only.

licly traded shares of major firms for 1984–1988, as well as for the S&P 400; table 4.4 provides key financial data for the total industry, and for the LECs and interexchange segments. Table 4.5 (p. 127) shows the industry growth in telecom plant in service and also provides data on capital turnover rates. Several important observations may be made from these data. The first is that operating cash flow and net income

TABLE 4.3  
Market/Book Ratios for Telephone Company Equities

|      | <i>Market/Book Value</i> |            |               |                    |               |
|------|--------------------------|------------|---------------|--------------------|---------------|
|      | <i>AT&amp;T</i>          | <i>GTE</i> | <i>United</i> | <i>S&amp;P 400</i> | <i>RBOC's</i> |
| 1984 | 1.43                     | .96        | 1.17          | 1.51               | .94           |
| 1985 | 1.78                     | 1.24       | 1.32          | 1.86               | 1.16          |
| 1986 | 1.98                     | 1.47       | 1.45          | 2.16               | 1.41          |
| 1987 | 2.00                     | 1.28       | 1.61          | 2.13               | 1.46          |
| 1988 | 2.69                     | 1.55       | 2.53          | N/A                | 1.50          |

Source: All data from Annual Reports (except S&P 400).

Note: Market/Book =  $\frac{\text{(stock price)} \times \text{(shares outstanding)}}{\text{shareholder's equity}}$

TABLE 4.4  
Telco Financial Data (\$M)

|      |                        | <i>Industry Total</i>      |                   |                        |                  |                        |                       |                           |
|------|------------------------|----------------------------|-------------------|------------------------|------------------|------------------------|-----------------------|---------------------------|
|      | <i>Annual Revenues</i> | <i>Operating Cash Flow</i> | <i>Net Income</i> | <i>Deprec. Expense</i> | <i>Dividends</i> | <i>Capital Expend.</i> | <i>Debt Ratio (%)</i> | <i>Rate of Return (%)</i> |
| 1984 | 113711.0               | 25781.3                    | 9869.5            | 13427.3                | 10349.5          | 21843.3                | 35.5                  | 7.49                      |
| 1985 | 123584.6               | 29342.3                    | 10219.8           | 15766.8                | 8744.7           | 24217.7                | 35.1                  | 6.77                      |
| 1986 | 130828.9               | 30754.7                    | 10203.3           | 17969.4                | 9905.5           | 26287.9                | 33.8                  | 7.81                      |
| 1987 | 134187.4               | 30130.8                    | 10516.3           | 20630.6                | 10291.3          | 24899.1                | 34.2                  | 7.70                      |
| 1988 | 141472.0               | 31637.5                    | 11906.6           | 21593.7                | 12110.6          | 25272.0                | 34.0                  | 8.22                      |
|      |                        | <i>LEC Subtotal</i>        |                   |                        |                  |                        |                       |                           |
|      | <i>Annual Revenues</i> | <i>Operating Cash Flow</i> | <i>Net Income</i> | <i>Deprec. Expense</i> | <i>Dividends</i> | <i>Capital Expend.</i> | <i>Debt Ratio (%)</i> | <i>Rate of Return (%)</i> |
| 1984 | 75303.0                | 23207.4                    | 8587.6            | 11927.2                | 7910.5           | 18224.6                | 43.18                 | 7.40                      |
| 1985 | 82432.3                | 25938.2                    | 9645.3            | 13647.6                | 5953.6           | 20401.2                | 42.19                 | 6.80                      |
| 1986 | 87578.0                | 27289.4                    | 10104.8           | 15418.8                | 6320.7           | 21047.9                | 41.43                 | 8.03                      |
| 1987 | 91382.6                | 27301.3                    | 10113.0           | 17804.0                | 6797.6           | 20325.7                | 41.73                 | 7.79                      |
| 1988 | 96128.5                | 28176.8                    | 10368.6           | 18652.3                | 8582.4           | 20740.4                | 41.00                 | 8.00                      |

*Interexchange Subtotal*

|      | Annual Revenues | Operating Cash Flow | Net Income | Deprec. Expense | Dividends | Capital Expenditures | Debt Ratio <sup>a</sup> (%) | Rate of Return (%) |
|------|-----------------|---------------------|------------|-----------------|-----------|----------------------|-----------------------------|--------------------|
| 1984 | 38408.2         | 2573.8              | 1281.9     | 1500.2          | 2439.0    | 3618.8               | 39.0                        | 8.36               |
| 1985 | 41152.2         | 3404.1              | 574.5      | 2119.2          | 2791.1    | 3816.5               | 35.1                        | 6.52               |
| 1986 | 43250.9         | 3465.4              | 98.5       | 2550.6          | 3584.8    | 5239.9               | 38.8                        | 6.05               |
| 1987 | 42804.8         | 2829.6              | 403.3      | 2826.6          | 3493.8    | 4573.4               | 38.4                        | 6.96               |
| 1988 | 45343.5         | 3460.7              | 1538.0     | 2941.4          | 3528.2    | 4531.6               | 38.4                        | 9.83               |

Source: Company reports for five largest IXCs, twenty-five largest LECs (about 95% of market).

Key: Debt Ratio = Long-term debt/invested capital.

Rate of Return = Net income/invested capital.

<sup>a</sup> AT&T and MCI.

(total industry) expanded significantly between 1984 and 1988 (22 and 21 percent, respectively). Operating cash flow grew for both LECs and interexchange carriers (IXCs). Net income was significantly down for IXCs in 1985, 1986, and 1987, reflecting problems for MCI and particularly for US Sprint, but recovered nicely in 1988 and 1989 (not shown). In fact US Sprint turned its first profit in 1989. Capital expenditures have risen appreciably since pre-divestiture. Much of the capital spending in earlier years (1984–1986) was to pay for equal access required by the MFJ and remains high due to aggressive network modernization programs. Table 4.5 shows gross investment for the industry rose steadily between 1984 and 1988, increasing 28 percent overall, and net investment increased about 15 percent. The steady increase in telephone plant has occurred for local and toll carriers.

Note that the ratio of long-term debt to invested capital has decreased, and that depreciation has increased 50 percent. These facts, combined with relatively low inflation and taxes, have allowed the industry to rapidly replace and modernize their plant without sacrificing profits or dividends. Dividends fell somewhat for LECs in 1985 but otherwise have grown steadily for both LECs and IXCs.

Currently, almost two-thirds of industry cash flow is from depreciation. The very important financial effect of recent increases in allowed depreciation rates is a result of both divestiture and competition. It is difficult to imagine that such rapid increases in depreciation would have been allowed by regulators if AT&T still owned the majority of local distribution and manufacturing facilities as a vertically integrated entity.<sup>2</sup> Of course, the simultaneous effects of positive exogenous economic factors which reduced pressure on regulated rate levels certainly is also responsible for the favorable financial picture.

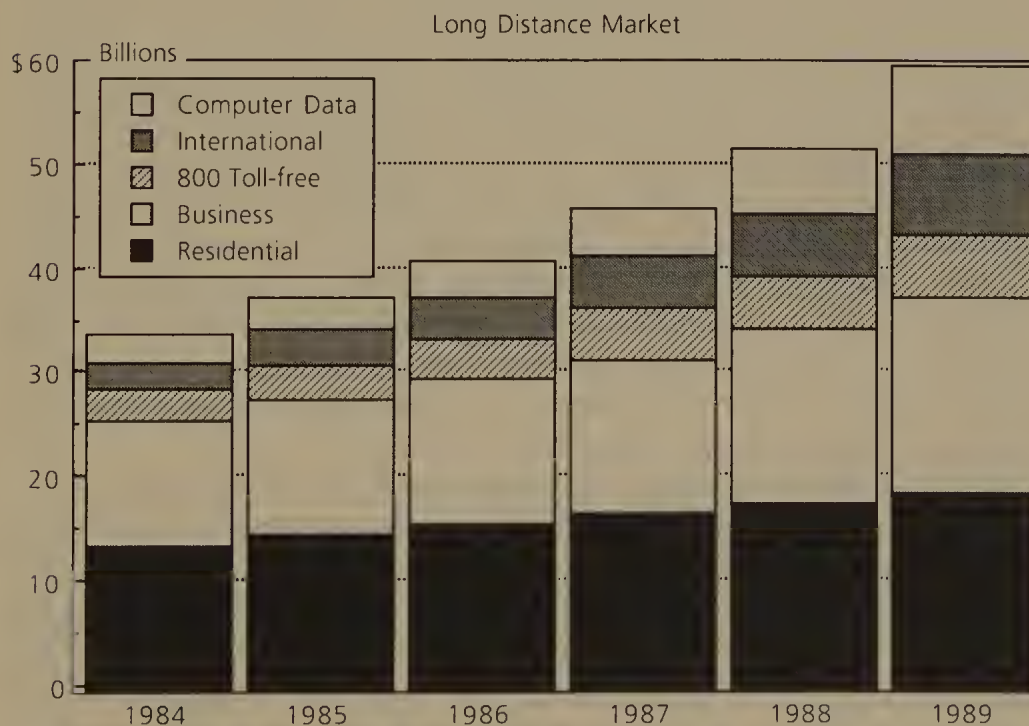
Most financial information concerning the various subcomponents of the "industry" and broad aggregates such as LECs is from public accounting data and may not provide a particularly accurate economic evaluation. However, the data is presumed reasonably consistent across firms, allowing for comparison of nominal financial results. As long as such comparisons are made among firms within a given narrow industry segment, the actual economic conditions underlying the data are likely to be similar for all of them. Of course, the institutional environment may favor certain firms over others, and the most obvious cases will be mentioned. The data presented for each industry segment to yield insights into indicators of competitive activity include market structure, growth, capacity, prices, new products and services, productivity, and technology adoption.



Table 4.6 (pp. 128–29) shows the key financial results for the three major interexchange carriers for the period 1984–1988. On average, total toll revenues have grown by about 4 percent per year, even with the substantial price reductions that were detailed in table 4.2. Cash flow, net income, capital turnover, and capacity additions have all risen rapidly since divestiture, but are beginning to slow down. Construction spending has peaked and is on the decline as significant capacity expansion, particularly in fiber optics plant, has occurred.<sup>3</sup> Depending on one’s definition of usable toll capacity in place, by 1989 intercity capacity was two to five times that at divestiture, but this is the result of competitive entry, not the divestiture itself.

Figure 4.1 shows the growth in various toll market segments since divestiture—in residence, business, 800 Service, international, and data—and indicates the strong relative growth of business toll services, especially 800 Service and data. Again, remember how prices have fallen. Table 4.7 (pp. 130–31) gives estimates of fiber optic installations in the toll market since divestiture for major IXC’s. Fiber-miles in service

FIGURE 4.1



Source: *New York Times* May 22, 1989 Paine Weber.

increased from 456,000 in 1985 to 1.89 million in 1988. In 1989 the figure reached 2.18 million. Advances in electronics will lead to even greater capacity without new lines. This growth is remarkable.<sup>4</sup>

Table 4.8 estimates the market share for interexchange carrier (state and interstate toll) revenues since divestiture and shows a steady decline in AT&T's share of the interstate market from 91 percent in 1984 to 78 percent in 1988. The interstate market remains even more competitive (deregulated) relative to intrastate markets, as is reflected in AT&T's lower market share of interstate switched access minutes of 67 percent in 1988 as compared to 80 percent in 1984. This has no doubt been partly a result of progress in conversion of the public network to equal access. The effects of equal access are indicated in table 4.9. Note that by the end of 1988, AT&T's share of premium and all minutes of interstate toll use were nearly identical.

Since divestiture, the number of IXCs has expanded rapidly from 123 in 1984 to 577 by the end of 1989.<sup>5</sup> Even though most are resellers, there has been a large number of facilities-based entrants. Along with new firms came a proliferation of new toll service offerings, including many from AT&T as a competitive response.

Data on market shares or investment do not capture the full flavor of the degree of competition (or lack of it) in any market. Market share is but one descriptive statistic of the nature of competition. One cannot be unimpressed, however, by the sharp fall in AT&T's share of the interexchange market (table 4.9), by the competitive service offerings in terms of quality (fiber optics), and the range of services and price (although here AT&T is greatly constrained). The obvious response is to say that the market is competitive. Yet the "market" is an aggregate and the toll market is geographically specific. Some observers conclude, and we agree, that AT&T's market domination is confined to lower profit markets (i.e., rural, low-volume, and short-haul private line long-distance services), where competition is not vigorous. But in those markets where AT&T is dominant, its domination encompasses both residential and business customers.<sup>6</sup>

Few markets—and certainly not those with sunk investments such as in fiber optics—can be "perfectly" competitive. The case is not whether the interexchange market fits some textbook version of competition but whether it fits into those sectors we deem competitive enough for ex post evaluations of firm strategies, or into the ex ante regulatory box we view as irredeemably not competitive. We believe the interexchange market is generally in the ex post category—i.e., competitive enough that with few rules (far fewer than in the FCC's 1989 price caps order, which is really closer to rate-of-return regulation

TABLE 4.5  
Telco Investment (\$M)

| <i>Industry Total</i>         |             |             |              |              |             |             |
|-------------------------------|-------------|-------------|--------------|--------------|-------------|-------------|
|                               | <i>GPIS</i> | <i>NPIS</i> | <i>DR(%)</i> | <i>DE(%)</i> | <i>RETS</i> | <i>ADDS</i> |
| 1984                          | 207953.9    | 159686.7    | 23.21        | 6.46         | 7818.7      | 21843.3     |
| 1985                          | 225377.8    | 168715.8    | 25.14        | 7.00         | 8278.5      | 24217.7     |
| 1986                          | 243168.0    | 175685.1    | 27.75        | 7.39         | 8977.4      | 26287.9     |
| 1987                          | 253494.0    | 180041.1    | 28.98        | 8.14         | 10299.8     | 24899.1     |
| 1988                          | 267264.7    | 181855.7    | 31.96        | 8.22         | 9963.8      | 25272.0     |
| <i>LEC Subtotal</i>           |             |             |              |              |             |             |
|                               | <i>GPIS</i> | <i>NPIS</i> | <i>DR(%)</i> | <i>DE(%)</i> | <i>RETS</i> | <i>ADDS</i> |
| 1984                          | 186043.0    | 143591.9    | 22.82        | 6.41         | 7223.4      | 18224.6     |
| 1985                          | 200845.1    | 151195.7    | 24.72        | 6.80         | 7632.7      | 20401.2     |
| 1986                          | 213927.0    | 156194.1    | 26.99        | 7.21         | 8015.5      | 21047.9     |
| 1987                          | 222395.5    | 159855.0    | 28.12        | 8.01         | 9003.8      | 20325.7     |
| 1988                          | 231177.3    | 160233.0    | 30.69        | 8.07         | 8810.8      | 20740.4     |
| <i>RBOC Subtotal</i>          |             |             |              |              |             |             |
|                               | <i>GPIS</i> | <i>NPIS</i> | <i>DR(%)</i> | <i>DE(%)</i> | <i>RETS</i> | <i>ADDS</i> |
| 1984                          | 145481.8    | 113560.3    | 21.94        | 6.05         | 5216.8      | 13872.7     |
| 1985                          | 156243.6    | 118589.0    | 24.10        | 6.54         | 5328.1      | 15458.8     |
| 1986                          | 166862.0    | 122378.2    | 26.66        | 6.92         | 5614.1      | 15750.7     |
| 1987                          | 172877.4    | 124468.5    | 28.00        | 7.88         | 6114.0      | 14735.0     |
| 1988                          | 180900.8    | 126095.4    | 30.30        | 7.96         | 6003.7      | 15315.7     |
| <i>Interexchange Subtotal</i> |             |             |              |              |             |             |
|                               | <i>GPIS</i> | <i>NPIS</i> | <i>DR(%)</i> | <i>DE(%)</i> | <i>RETS</i> | <i>ADDS</i> |
| 1984                          | 21910.9     | 16094.7     | 26.54        | 6.85         | 595.2       | 3618.75     |
| 1985                          | 24532.7     | 17520.1     | 28.58        | 8.64         | 645.8       | 3816.54     |
| 1986                          | 29241.0     | 19490.9     | 33.34        | 8.72         | 961.9       | 5239.94     |
| 1987                          | 31098.5     | 20186.1     | 35.09        | 9.09         | 1296.0      | 4573.39     |
| 1988                          | 34087.4     | 21622.7     | 36.57        | 8.84         | 1153.0      | 4531.60     |

Source: Company reports.

Key: GPIS = Gross plant in service.  
NPIS = Net plant in service.  
DR = Depreciation reserve/GPIS.

DE = Depreciation expense/GPIS.  
RETS = Plant retirements.  
ADDS = Plant additions.

TABLE 4.6  
IXC Financial Data (\$M)

|      | AT&T            |                     |            |                 |           |                 |                |                    |
|------|-----------------|---------------------|------------|-----------------|-----------|-----------------|----------------|--------------------|
|      | Annual Revenues | Operating Cash Flow | Net Income | Deprec. Expense | Dividends | Capital Expend. | Debt Ratio (%) | Rate of Return (%) |
| 1984 | 34935.00        | 2255.50             | 1107.06    | 1148.44         | 1222.00   | 1514.00         | 36.36          | 9.2                |
| 1985 | 36770.00        | 3025.61             | 974.09     | 1661.10         | 1273.00   | 1791.08         | 32.36          | 7.7                |
| 1986 | 36514.00        | 3476.80             | 1307.30    | 1790.04         | 1245.00   | 2483.83         | 33.57          | 9.9                |
| 1987 | 35219.00        | 3163.60             | 1472.80    | 2028.57         | 1287.00   | 2497.76         | 33.25          | 10.9               |
| 1988 | 35407.00        | 2662.00             | 1689.00    | 2029.00         | 1290.00   | 2800.00         | 31.38          | 11.8               |

|      | MCI             |                     |            |                 |           |                 |                |                    |
|------|-----------------|---------------------|------------|-----------------|-----------|-----------------|----------------|--------------------|
|      | Annual Revenues | Operating Cash Flow | Net Income | Deprec. Expense | Dividends | Capital Expend. | Debt Ratio (%) | Rate of Return (%) |
| 1984 | 1959.29         | 377.84              | 59.20      | 264.57          | 0.00      | 1157.12         | 60.30          | 1.90               |
| 1985 | 2542.27         | 643.00              | 113.30     | 347.15          | 0.00      | 1000.10         | 56.27          | 3.76               |
| 1986 | 3592.00         | 398.00              | -448.00    | 451.00          | 0.00      | 1074.00         | 67.95          | -11.38             |
| 1987 | 3939.00         | 523.00              | 88.00      | 471.00          | 0.00      | 619.00          | 66.31          | 2.19               |
| 1988 | 5137.00         | 929.00              | 346.00     | 549.00          | 0.00      | 896.00          | 66.33          | 7.93               |

US Sprint<sup>a</sup>

|      | Annual Revenues | Operating Cash Flow | Net Income | Deprec. Expense | Dividends | Capital Expend. | Debt Ratio (%) | Rate of Return (%) |
|------|-----------------|---------------------|------------|-----------------|-----------|-----------------|----------------|--------------------|
| 1984 | 1245.00         | -68.00              | 114.60     | 80.00           | NA        | 925.00          | NA             | 14.32              |
| 1985 | 1345.00         | -253.00             | -490.00    | 99.00           | NA        | 1000.00         | NA             | -4.10              |
| 1986 | 2345.20         | -418.20             | -700.00    | 281.80          | NA        | 1101.00         | NA             | -3.20              |
| 1987 | 2672.20         | -846.50             | -1154.90   | 308.40          | NA        | 996.00          | NA             | -41.80             |
| 1988 | 3405.40         | -122.50             | -467.10    | 344.60          | NA        | 728.20          | NA             | -15.90             |

Source: Company reports.

Key: Debt Ratio = long term debt/invested capital.  
Rate of Return = net Income/invested capital.

<sup>a</sup>Data for 1984-1986 represents predecessor companies.

TABLE 4.7  
IXC Fiber Optic Deployment

|                      | Approx.<br>Current<br>Invest.<br>(\$M) | Route-Miles |      |      |       | Fiber-Miles |       |       |       |
|----------------------|--|-------------|------|------|-------|-------------|-------|-------|-------|
|                      |  | 1985        | 1986 | 1987 | 1988  | 1985        | 1986  | 1987  | 1988  |
| NTN Partners:        |  |             |      |      |       |             |       |       |       |
| Consolidated Network | 310                                    | 292         | 352  | 352  | 3504  | 3504        | 3864  | 3864  | 3864  |
| Litel                | 881                                    | 950         | 1210 | 1210 | 13730 | 17274       | 22280 | 22280 | 22280 |
| Microtel             | 800                                    | 950         | 967  | 1127 | 8000  | 9500        | 9670  | 17158 | 17158 |
| SouthernNet          | 188                                    | 895         | 895  | —    | 1880  | 8950        | 8950  | —     | —     |
| Southland Fibernet   | 277                                    | 277         | 277  | —    | 2770  | 2770        | 2770  | —     | —     |

|                      | —    | 1172 | —     | 1172  | —     | 1172  | — | 1172   | — | 1172   | — | 1172    | — | 1172   | — | 1172    | — | 1172 | — | 1172 |         |
|----------------------|------|------|-------|-------|-------|-------|---|--------|---|--------|---|---------|---|--------|---|---------|---|------|---|------|---------|
| Southern & Southland |      |      |       |       |       |       |   |        |   |        |   |         |   |        |   |         |   |      |   |      |         |
| LDX Net              |      |      | 670   | 1379  |       | 1172  |   | 1080   |   | 33096  |   | 11720   |   | 33096  |   | 11720   |   | —    |   | —    | 11720   |
| WilTel               |      |      | 214   | 2899  |       | —     |   | 2140   |   | 58077  |   | —       |   | 58077  |   | —       |   | —    |   | —    | —       |
| LDX & WilTel         |      |      | —     | —     | 4244  | 1172  |   | —      |   | —      |   | —       |   | —      |   | —       |   | —    |   | —    | —       |
| NTN Subtotal:        | 584  |      | 3340  | 7642  | 7945  | 5177  |   | 48094  |   | 133171 |   | 104923  |   | 133171 |   | 104923  |   | —    |   | —    | 131865  |
| AT&T                 | 1758 |      | 5677  | 10893 | 18000 | 23324 |   | 136248 |   | 261432 |   | 432000  |   | 261432 |   | 432000  |   | —    |   | —    | 186887  |
| MCI                  | 823  |      | 2560  | 5580  | 8775  | 10975 |   | 79200  |   | 167400 |   | 245700  |   | 167400 |   | 245700  |   | —    |   | —    | 704731  |
| GTE Sprint           | —    |      | 1200  | —     | —     | —     |   | 24000  |   | —      |   | —       |   | —      |   | —       |   | —    |   | —    | 264680  |
| US Telecom           | —    |      | 4100  | —     | —     | —     |   | 98400  |   | —      |   | —       |   | —      |   | —       |   | —    |   | —    | —       |
| US Sprint            | 1670 |      | —     | 10000 | 18195 | 22090 |   | —      |   | 190000 |   | 497224  |   | 190000 |   | 497224  |   | —    |   | —    | 575562  |
| Electra              | 50   |      | 493   | 493   | 493   | 493   |   | 10194  |   | 10194  |   | 10194   |   | 10194  |   | 10194   |   | —    |   | —    | 10194   |
| Lightnet             | 280  |      | 2200  | 5000  | 5300  | 5300  |   | 52800  |   | 120000 |   | 127200  |   | 120000 |   | 127200  |   | —    |   | —    | 127200  |
| Mutual Signal Corp.  | 32   |      | 0     | 0     | 420   | 420   |   | 0      |   | 0      |   | 4200    |   | 0      |   | 4200    |   | —    |   | —    | 4200    |
| Norlight             | 50   |      | 0     | 0     | 670   | 670   |   | 0      |   | 0      |   | 8040    |   | 0      |   | 8040    |   | —    |   | —    | 8040    |
| RCI                  | 7    |      | 580   | 580   | 796   | 413   |   | 6960   |   | 6960   |   | 7202    |   | 6960   |   | 7202    |   | —    |   | —    | 2618    |
| Teleconnect          | 30   |      | 0     | 0     | 320   | 400   |   | 0      |   | 0      |   | 1920    |   | 0      |   | 1920    |   | —    |   | —    | 2400    |
| Totals               | 5285 |      | 20150 | 40183 | 70031 | 73123 |   | 455896 |   | 889157 |   | 1497857 |   | 889157 |   | 1497857 |   | —    |   | —    | 1886512 |

Source: FCC Fiber Report, February 17, 1989.

TABLE 4.8  
Interexchange Carriers Market Shares  
(% Revenue)

|           | 1984  | 1985  | 1986  | 1987  | 1988  |
|-----------|-------|-------|-------|-------|-------|
| AT&T      | 90.96 | 89.35 | 84.42 | 82.28 | 78.09 |
| MCI       | 5.10  | 6.18  | 8.31  | 9.20  | 11.33 |
| US Sprint | 3.24  | 3.27  | 5.42  | 6.24  | 7.51  |
| NTN       | 0.00  | 0.36  | 0.81  | 1.35  | 2.21  |
| Allnet    | 0.70  | 0.84  | 1.04  | 0.92  | 0.87  |

Source: Annual reports, company data.

Note: Top five firms estimated to be 95% of total interexchange market revenues.

than price caps), one can allow real competition.<sup>7</sup> The lack of competition in some interexchange markets does require some oversight, but we are convinced that a judicious price cap regulatory approach can protect captive customers, encourage competition, and still not unduly hamper the actions of AT&T.

There are about 1,370 local telephone companies, of which BOCs

TABLE 4.9  
AT&T Share of  
the Interstate Market (%)  
(end of year)

|      | <i>Premium<br/>Minutes</i> | <i>All<br/>Minutes</i> |
|------|----------------------------|------------------------|
| 1984 | 94                         | 80                     |
| 1985 | 88                         | 77                     |
| 1986 | 79                         | 73                     |
| 1987 | 74                         | 70                     |
| 1988 | 69                         | 67                     |

Source: FCC report on Interstate Switched Access, March 1989.



and GTE represent about 85 percent of the total market. Table 4.10 gives key financial data on the seven RBOCs and eighteen of the major independent companies which collectively serve about 90 percent of the total number of local service subscribers in the U.S. The RBOCs have increased cash flow by 23 percent from 1984 to 1988 and have maintained dividends near 1984 levels. If 1984, the year of financial transition, is excluded, dividends have increased steadily since 1985. Net income has risen 30 percent (1988 over 1984) and depreciation expense increased over 60 percent (again 1988 and 1984 comparisons). Data for the eighteen independent LECs aggregated on the bottom portion of table 4.10 show steady cash flow, declining net income, and steadily increasing dividends.

Examination of revenue shares of the top twenty-five LECs since divestiture<sup>8</sup> reveals no indication of serious competition among LECs for the basic local service market, and little for intraLATA toll and other local services. This implies stable market shares of incumbent firms, which thus far only seem sensitive to exogenous regional growth differences. Furthermore, as noted, the RBOCs' and many LECs' market value, net income, cash flow, and profits have increased since 1984 and remain high, all in the face of relatively low growth in the quantity of services sold. The data indicate that no major new local service companies have entered the market, at least not sufficiently to lower any major LEC's market share substantially. This is despite the fact there is no MFJ prohibition against IXCs or other LECs from providing local service in competition with the incumbent dominant LEC. Further evidence of LEC market power is the continued growth of market penetration in spite of a more than 40 percent rise in rates for basic local service since divestiture.

The lack of competition at the state and local level is due to many factors, primarily regulatory policies which do not encourage entry. The incumbent LEC enjoys the relative comfort of rate-base regulation. While most states do not grant exclusive certificates of necessity and convenience to the incumbent LEC, regulatory barriers exacerbate entry barriers of up-front sunk costs with assets fixed and immobile, and very high business risk for new entrants with no rate base, customer base, or cash flow. It is not clear if local competition would flourish in the absence of regulation, but we would certainly expect to see more entry if regulatory protection were removed. The only true test, of course, is to see what would happen without regulation. Where niche local exchange competition has emerged, a host of regulatory, legal, and technical roadblocks continue to face the new entrant.

TABLE 4.10  
LEC Financial Data (\$M)

|      | <i>RBOCs</i>           |                            |                   |                        |                  |                        |                       |                           |
|------|------------------------|----------------------------|-------------------|------------------------|------------------|------------------------|-----------------------|---------------------------|
|      | <i>Annual Revenues</i> | <i>Operating Cash Flow</i> | <i>Net Income</i> | <i>Deprec. Expense</i> | <i>Dividends</i> | <i>Capital Expend.</i> | <i>Debt Ratio (%)</i> | <i>Rate of Return (%)</i> |
| 1984 | 57829.1                | 17982.9                    | 6805.9            | 8783.8                 | 5484.1           | 13872.7                | 41.2                  | 7.6                       |
| 1985 | 63365.5                | 20148.9                    | 7534.0            | 10212.2                | 4556.6           | 15458.8                | 39.8                  | 8.1                       |
| 1986 | 67390.1                | 21233.4                    | 8135.9            | 11531.0                | 4914.0           | 15750.7                | 38.3                  | 8.5                       |
| 1987 | 70187.3                | 21166.2                    | 8372.4            | 13627.6                | 5272.4           | 14735.0                | 39.3                  | 8.5                       |
| 1988 | 74197.4                | 22235.7                    | 8914.5            | 14397.6                | 5392.4           | 15315.7                | 40.0                  | 8.5                       |

*Independent LECs*

|      | <i>Annual Revenues</i> | <i>Operating Cash Flow</i> | <i>Net Income</i> | <i>Deprec. Expense</i> | <i>Dividends</i> | <i>Capital Expend.</i> | <i>Debt Ratio (%)</i> | <i>Rate of Return (%)</i> |
|------|------------------------|----------------------------|-------------------|------------------------|------------------|------------------------|-----------------------|---------------------------|
| 1984 | 17494.9                | 5102.6                     | 1744.9            | 3122.7                 | 1207.1           | 4333.9                 | 46.4                  | 6.4                       |
| 1985 | 19259.2                | 5640.4                     | 2071.4            | 3460.4                 | 1427.7           | 4927.3                 | 47.7                  | 6.5                       |
| 1986 | 20329.2                | 5747.4                     | 1935.7            | 3865.0                 | 1570.0           | 5284.4                 | 47.6                  | 6.6                       |
| 1987 | 21344.9                | 5753.8                     | 1713.1            | 4178.7                 | 1685.8           | 5576.7                 | 47.9                  | 5.7                       |
| 1988 | 22471.0                | 5803.6                     | 1535.1            | 4369.8                 | 1760.7           | 5490.6                 | 48.0                  | 6.2                       |

Source: Annual reports/company reports for RBOCs and 18 largest independents (about 90% of market).

Note: Some data represent non-telco operations due to consolidated reprofing (non-telco activities estimated in 1988 to be no more than 10% of revenues). Data for GTE and United is net of Sprint and US Telecom, respectively.

Key: Operating cash flow = net income + depreciation + deferred tax + other.

Debt ratio = long-term debt/invested capital.

Rate of return = net income/invested capital.

Arguably there are some large new niche competitors in the business local service market. Two of the most prominent are Metropolitan Fiber Systems, Inc., and Communications Teleport. The track record of such firms is still in the start-up phase, however, and thus far they are primarily bypass suppliers. In 1989, these two suppliers announced plans to expand to a number of cities, including New York, Chicago, San Francisco, Los Angeles, Boston, and Houston.<sup>9</sup> These two firms plan to compete against each other, as well as against the LECs.

Another interesting case of potentially important post-divestiture competition were the so-called Shared Tenant Service (STS) providers. These were firms that chose natural aggregates of local subscribers in large buildings or campus complexes, and basically resold LEC service, usually through the use of private remote switching or multiplexing equipment. Accurate data on such private arrangements are not generally available. Such activity grew rapidly in 1984 through about 1986, but recently thereafter it fell off and even declined to the point where it now receives little attention even in the trade press. The likely explanation is that while this new market was initially perceived as substantial, as often is the case with new and untested markets, there was little true potential, given the environment. It proved to be difficult for a STS provider, even in partnership with a building owner or contractor, to contract for a break-even penetration rate among tenants. Furthermore, in some states, litigation brought by LECs and regulators or other groups against the STS industry resulted in delays and even some orders to terminate operations, for fear of cream-skimming the LECs.<sup>10</sup>

Overall we believe the local service market is still a monopoly, though there are some pockets of competition for business customers. We emphasize the true nature of feasible competition will only be known when local service and access are correctly priced in relation to cost, and regulatory barriers are removed.

Access services represent a huge market, strictly a product of regulatory decisions of the early 1980s. Before divestiture, access charges were an implicit part of retail toll prices, except in the case of a few fledgling toll carriers. After divestiture, AT&T and other IXC's had to pay large per-minute fees to LECs whenever a toll call was placed using LEC local connections. Table 4.1 (p. 120) provides data on LEC access revenues since divestiture. Mandated access tariff rate levels have gone from 17.3 cents per minute of toll use in 1984 to 9.8 cents by 1989.<sup>11</sup> The decrease is primarily due to concomitant increases in local Subscriber Line Charges. The many different rate levels for intrastate access are similar to interstate rates, both in level and structure. Access

charges represent almost a third of LEC revenues and almost half of AT&T's annual operating expenses. Average switched toll rates nationwide are about thirty cents per minute.

The main reason for analyzing "access" separate from other LEC markets is that it is uniquely competitive for large users, and many bypass substitutes exist and their numbers are growing rapidly. As is the case with toll service, smaller users in many geographic markets still have no ready alternative to LEC switched access services. In recognition of potential bypass competition, the FCC has significantly reduced interstate access charges on originating switched toll traffic. Some evidence of relative price elasticity in LEC access services is the fact that access service revenues remain steady despite large annual rate declines.

Due to significant early measurement problems and rate reductions since 1984, it is difficult to evaluate real growth rates for LEC access services. Before divestiture, as noted, LEC access charges were part of retail toll prices, which made it more difficult, even for large users, to avoid paying them for switched services. The post-divestiture environment provides large customers with a number of alternatives for obtaining cheaper access services, including WATS, 800 Service, private bypass, and interconnect services. As new IXC toll service options grow, even moderate and small customers will begin to have alternatives to full-priced LEC switched access service. AT&T's new small-customer 800 Readyline Service is an early example.

No solid data source on private bypass of LEC switched access charges exists, and thus it is difficult to estimate market share declines, especially in the face of fairly rapid overall toll service growth partially caused by dramatic rate declines. One method for estimating LEC bypass is available from the FCC Bypass Monitoring Reports in CC Docket 87-339. The 1988 year-end report puts bypass at \$3.7 billion annually for the RBOCs and GTE. An NTIA report<sup>12</sup> estimates compound annual growth rates for bypass networks at 20 percent for the period 1985-1990. Table 4.11 provides some data on the growth of microwave radio and satellite systems. In 1989, about 16,000 domestic common carrier point-to-point microwave systems are in operation, licensed to almost 1,325 carriers, and the annual growth in facilities is substantial. Private (non-common-carrier) systems have also proliferated. As of July 1989, there were about 18,000 domestic satellite earth stations authorized by the FCC, and since 1984 over 12,000 applications for new earth stations had been filed, and about 1,500 for modification of existing stations. The U.S. Department of Commerce forecast sales for satellite ground stations to reach \$900 million by 1991, includ-

TABLE 4.11  
FCC Microwave Facilities Applications

| 1986  | 1987  | 1988  | 1989               | 1990                |
|-------|-------|-------|--------------------|---------------------|
| 8,593 | 7,928 | 6,400 | 7,000 <sup>a</sup> | 13,000 <sup>a</sup> |

Source: FCC Radio Facilities Division (Common carrier point-to-point service.)

<sup>a</sup>Estimates.

*Very Small Aperture Terminal Market (\$M)*

| 1984 | 1985 | 1986 | 1987 | 1988  |
|------|------|------|------|-------|
| 59.7 | 73.5 | 62.6 | 92   | 151.4 |

Source: Dataquest.

ing very small aperture terminals (VSAT), direct broadcast satellites (DBS), and television receive only (TVRO) markets, but other private satellite, radio, copper, and fiber telecom systems vendors have also grown rapidly, well into double-digit growth since divestiture. This growth has, by definition, reduced LEC market share, at least for high volume customers.

Recent FCC pricing rules have allowed LECs to rapidly lower originating access rates to try to stem the competitive tide, but high rates obviously persist at about ten cents per minute. This trend will continue and thus LEC access services, at least for interstate service—which is 75 percent of the market—is effectively competitive, and we recommend deregulation of these markets. In some specific markets (e.g., small and rural customers), access services, like toll service, may still be dominated by one supplier. In state jurisdictions where the market structure for toll and access more closely resembles the monopoly model, we believe a more gradual transition to deregulation is appropriate.

The CPE market was already quite competitive by 1984 due to some important regulatory decisions, especially *Carterfone* (1968) and *Computer Inquiry II*, which detariffed CPE and forced structural separation of AT&T from its CPE division, known at the time as American Bell. Today, there are numerous buyers and sellers, none of which currently exercises market power. Even the industry giant AT&T is only an average supplier, as evidenced by the number of competitive-bid con-

tracts it wins. Foreign imports of CPE dominate the market, and foreign production capacity is so large as to prevent the U.S. from ever again dominating the market to the extent of forcing higher market prices. Table 4.12 shows factory shipments of broad categories of CPE since 1984.

We cannot estimate market share by supplier for "POTS" telephones because there are simply too many of them. That market is competitive. Table 4.13 provides some market share data for all telecommunications equipment, including the equipment used by telcos. The data do not pertain only to the CPE market, but they do show low concentration on a world or U.S. basis. Of greater relevance to our analysis of competition in the CPE market are the data in table 4.13 showing market shares in the PBX market. PBXs are much more sophisticated than "POTS" telephones, and as such, less vendors will exist. Even though market shares of the top four PBX vendors exhibited stability over the 1984 to 1987 period, industry experts recognize the ferocious competition that has existed in this market even with its high start-up costs and exit barriers (the software for an unsuccessful PBX has zero salvage value). If PBXs are a competitive market (and they are), other CPE equipment is clearly a competitive market now.

Two issues remain. First, the BOCs are not allowed to manufacture equipment. Second, ISDN and other developments require more sophisticated CPE. We would be inclined to allow RBOCs to manufacture; given intense competition already, they can only add to it. However, some narrow regulatory rules may be acceptable to prevent favoritism of one's own manufacturing division.<sup>13</sup> As CPE becomes more sophisticated, entry costs rise. Yet, the market is huge and the number of potential producers is large and we see no serious problems for competition.

The present Congressional hearings into broad safeguards, such as cost allocation rules or separate subsidiaries for BOC permission to manufacture equipment, really ignore the enormous competition in CPE, and the inability of any vendor to predate against other suppliers so as to wield long-run market power. Submissions to the House Committee argue the BOCs could subsidize the R&D and software costs for new equipment and thus dominate the equipment market. There is little ground to believe that "deep pockets," wherever financed, will ensure success in the CPE market. Whatever the failures of domestic regulatory policy in fostering competition in other areas, in the case of CPE they have been a very significant stimulus. To some, deregulation of CPE, coupled with BOC line-of-business restrictions, have gone too far and leave the U.S. in a poor competitive position in the interna-

TABLE 4.12  
U.S. Factory Shipments of Telephone and Telegraph Equipment (\$M)

|   | 1984    | 1985    | 1986    | 1987    | 1988    |
|---|---------|---------|---------|---------|---------|
| Private branch exchange equipment         | 1,603.7 | 1,720.8 | 855.9   | 1,222.0 | 1,300.0 |
| Other switching and switchboard equipment | 1,410.6 | 1,660.7 | 1,851.9 | 1,816.1 | 1,850.0 |
| Carrier line equipment                    | 1,917.3 | 2,329.5 | 2,833.0 | 2,737.0 | 2,745.0 |
| Telephone sets                            | 846.7   | 1,218.6 | 783.7   | 875     | NA      |
| Teleprinters                              | 294.1   | 270.8   | 361.2   | NA      | NA      |
| Modems                                    | 848.3   | 829.5   | 1,228.2 | 1,078.1 | 1,155.0 |
| Voice frequency equipment                 | 301.7   | 328.3   | 243.0   | 196.2   | 175.0   |
| Other telephone and telegraph equipment   | 4,161.4 | 3,371.5 | 2,857.5 | 3,027.8 | 3,000.0 |

Source: U.S. Department of Commerce.



tional arena. The U.S. share of the current world CPE market is only about 20 to 25 percent. Most of the rest is from the Far East, and prices have plummeted as a result. Residence customer CPE comes almost entirely from overseas manufacturing facilities, and even for large scale business systems domestic production is estimated to be less than 25 percent of the U.S. market.

For a long time before divestiture, LECs depended on Centrex, a central-office-based business system, to compete with on-premises PBX systems. The displacement of LEC Centrex by competitive PBX sys-

TABLE 4.13  
CPE Market Share Data

| <i>World's Market Top Ten Telecommunications<br/>Equipment Manufacturers</i> |                   |                     |                         |
|--|-------------------|---------------------|-------------------------|
| <i>Rank</i>  | <i>Company</i>    | <i>Headquarters</i> | <i>1986 Sales (\$B)</i> |
| 1  | AT&T Technologies | USA                 | 10.20                   |
| 2  | Alcatel NC        | Belgium             | 8.00                    |
| 3  | Siemens           | W. Germany          | 5.40                    |
| 4  | NEC               | Japan               | 4.50                    |
| 5  | Northern Telecom  | Canada              | 4.40                    |
| 6  | IBM               | USA                 | 3.30                    |
| 7  | Motorola          | USA                 | 3.10                    |
| 8  | Ericsson          | Sweden              | 3.10                    |
| 9  | Fujitsu           | Japan               | 2.10                    |
| 10   | Philips           | Netherlands         | 2.00                    |

*Full Product Line Equipment Manufacturers  
(1987 US Market = \$103B)*

|  |               |       |
|--|---------------|-------|
|  | AT&T          | 12.0% |
|  | Alcatel       | 10.0  |
|  | Siemens       | 8.0   |
|  | Northern Tel. | 6.0   |
|  | Ericsson      | 5.0   |
|  | NEC           | 3.0   |
|  | Philips       | —     |
|  | Fujitsu       | —     |
|  | Italtel       | —     |
|  | Other         | 55.0  |

TABLE 4.13 (continued)

| <i>PBX Market Shares</i> |             |             |             |             |              |
|--------------------------|-------------|-------------|-------------|-------------|--------------|
|                          | <i>1984</i> | <i>1985</i> | <i>1986</i> | <i>1987</i> | <i>E1992</i> |
| AT&T                     | 19.00%      | 26.00%      | 22.00%      | 21.00%      | 22.00%       |
| Northern Telecom         | 21.00       | 22.00       | 21.00       | 20.00       | 20.00        |
| IBM                      | 18.00       | 15.00       | 18.00       | 17.00       | 20.00        |
| Mitel                    | 9.00        | 8.00        | 9.00        | 10.00       | 9.00         |
| NEC                      | 7.00        | 7.00        | 8.00        | 9.00        | 9.00         |
| GEC/Fujitsu              | NA          | NA          | NA          | 8.00        | 7.00         |
| Other                    | 26.00       | 22.00       | 22.00       | 15.00       | 13.00        |
| Total Revenues (\$B)     | 3.5         | 3.67        | 3.42        | 3.39        | NA           |

Source: NTIA Telecom 2000, Gartner Group Reports.

tems since divestiture has been substantial, indicating that even when the LEC enjoys a significant physical advantage of being the sole supplier of Centrex (they own all the central office switching machines), there are ready market substitutes. Recently however, Centrex is making a comeback as a way for business customers to obtain digital service and ISDN, and this could develop into a market advantage for LECs. Nonetheless, recent ONA regulations, which promise to unbundle LEC interconnection arrangements, will likely allow for a competitive alternative.

It is hard to envision a freely operating CPE market returning to a monopolistic structure, and therefore we believe any residual regulation is probably unnecessary.

The embedded base in large-scale network switching and transmission systems represents a huge investment of over \$230 billion, and includes some 22,400 network switch locations and several billion circuit miles of transmission capacity. Estimates of sales and shipments (1984–1988) for network equipment are given in table 4.14. Currently in the U.S., shipments are about \$15 billion, of which about a third is switching equipment, and the rest is electronic devices and components (about \$2 billion) and transmission systems.

The data in table 4.15 show that the U.S. market for switching and fiber optics is highly concentrated, featuring two major suppliers in each segment. It is difficult to measure the impacts of divestiture on sales and purchases of network equipment. However, sales of Northern Telecom switching equipment increased sharply after 1983. And, in-

TABLE 4.14  
U.S. Shipments of Network Communications Equipment (\$M)

|   | 1984    | 1985     | 1986     | 1987     | 1988  |
|---|---------|----------|----------|----------|-------|
| Telephone switching and switchboard equip. <sup>a</sup> | 5,871.2 | 7,7714.3 | 7,180.0  | 7,480.5  |       |
| Carrier line equip. and modems <sup>b</sup>             | 8,369.5 | 8,348.1  | 4,062.2  | 3,815.1  |       |
| Other telephone and telegraph equip. <sup>c</sup>       |         |          | 3,891.1  | 4,227.2  |       |
| Comm. systems and equip. (excl. broadcast) <sup>d</sup> | 9,258.5 | 10,708.0 | 11,216.5 | 11,363.2 |       |
| Central office equipment <sup>e</sup>                   | 2,856.9 | 4,332.8  | 4,525.0  | 4,442.5  | 4,500 |

Source: U.S. Dept. of Commerce, Bureau of Census.

<sup>a</sup>SIC Code 36611.

<sup>c</sup>SIC Code 36614.

<sup>e</sup>Estimate.

<sup>b</sup>SIC Code 36613.

<sup>d</sup>SIC Code 36631.

roads have been made in the device and components sector, as well as in microwave and satellite technology, since there are many suppliers and some significant new firms.

The nature of production in the market for large-scale switching and transmission systems features very high start-up costs and substantial scale requirements, both static and dynamic.<sup>14</sup> Competition is still evident, however, even with only two major firms since the products of each remain very close substitutes. Moreover, the "competitive fringe" includes a substantial number of large foreign firms licensed to serve the U.S. market. As a result of technical progress and competition, unit prices for transmission and switching capacity are falling, and market power, if it exists, is not evident from current behavior and performance of major firms. What is more, we expect the dominant firms' share of the domestic switching and transmission equipment market to begin to fall as foreign competitors continue to enter and as technology evolves. Competition is really at a global level and on a world basis, four-firm concentration ratios (albeit not measured for the markets in which they can today sell) are lower. We therefore feel the market for central office (CO) switching equipment appears very competitive. Barring future trade barriers or collusion in LEC procurement practices, this market should continue to feature competitive characteristics.

The growth rate in cellular communications services is the highest

TABLE 4.15  
Market Share Data  
Network Equipment

| <i>U.S. Switch Market (1989)</i> |        |
|----------------------------------|--------|
| AT&T                             | 53.00% |
| Northern Telecom                 | 40.00  |
| GPT-Stromberg                    | 3.00   |
| Siemens                          | 2.00   |
| Ericsson                         | 1.00   |
| NEC                              | 0.50   |
| Fujitsu                          | —      |

Source: *Business Week*, May 2, 1989.

| <i>U.S. Fiber Optics Cable Market Share</i> |     |                  |     |
|---|-----|------------------|-----|
| 1985  |     | 1988             |     |
| AT&T  | 37% | AT&T             | 52% |
| Siecor                                      | 32  | Siecor           | 30  |
| ITT   | 13  | Alcatel          | 8   |
| Ericsson                                    | 9   | Pirelli          | 4   |
| Northern Telecom                            | 4   | Northern Telecom | 2   |
| Others                                      | 5   | Others           | 4   |

Source: ElectroniCast Corporation.

of any major new telecommunications market since 1984, but this is not a result of divestiture. In 1984, there were only 50,000 cellular subscribers, and by 1989 there were about 3,500,000. Table 4.16 and figure 4.2 provide data on market share since 1984 for both cellular service and equipment.<sup>15</sup> Price competition for cellular customer equipment is fierce by any measure, and today's average unit price is a small fraction of what it was in 1984. Prices for service have fallen too, but not substantially. Some have argued that those service price declines are insufficient. One possible reason for less competition on the service side is that only two competitors were designated by the FCC to operate in any given locale. Another problem is that cellular is provided over scarce radio spectrum and traditional ownership or control over spectrum use bestows certain market power advantages. Like other

TABLE 4.16  
US Cellular Switching Systems Market  
(% share of system contracts)

|                | 1985 <sup>a</sup> | 1986 <sup>a</sup> | 1987 <sup>a</sup> | 1988 <sup>b</sup> | 1989 <sup>b</sup> |
|----------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Motorola       | 50.0%             | 40.1%             | 36.9%             | 33.1%             | 31.1%             |
| AT&T           | 33.0              | 32.4              | 32.8              | 26.2              | 25.6              |
| NTI/GE         | 8.4               | 12.7              | 12.3              | 12.0              | 15.6              |
| Ericsson       | 2.8               | 9.5               | 9.7               | 10.5              | 14.4              |
| Harris         | 2.8               | —                 | —                 | —                 | —                 |
| NEC            | 2.8               | 2.5               | 3.0               | 2.8               | 2.3               |
| Astronet       | —                 | 1.9               | 4.1               | 8.8               | 5.6               |
| CTI/EF Johnson | —                 | .6                | 0.05              | —                 | —                 |
| NovAtel        | —                 | —                 | 0.05              | 5.1               | 4.6               |
| Plexsys        | —                 | —                 | —                 | 1.1               | 0.5               |

Source: *Cellular Business Magazine*.

<sup>a</sup>Based on top 90 markets.

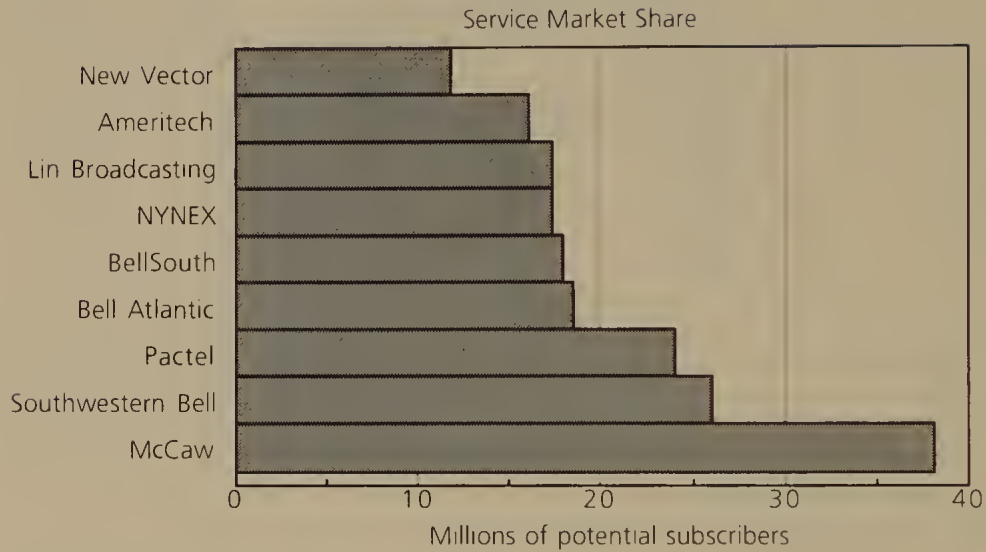
<sup>b</sup>Based on top 306 markets.

markets using scarce radio spectrum, some sort of regulation is necessary, since auction markets are not used and early mistakes were made in the process of regulating this new market.

Service price competition is possible with two suppliers. We see it in the provision of central office equipment, where many real and potential market entrants exist. The same is not true for cellular service. Service prices vary widely city-by-city. Presumably the cost structures are similar (at least for cities of similar size); therefore the ability to regionally segment this market will allow for the potential of monopoly abuse, and it is imperative the two major service suppliers in a given area not be able to coordinate pricing policy.<sup>16</sup> U.S. market share data on cellular service is not particularly meaningful for two reasons—it is a young market in transition, and entry is restricted. There has also been a trend of holding companies buying up cellular franchises, and the high prices paid are indicative of current and future monopoly rents which accrue to the owner of the cellular licenses. Some believe this could result in coordination of pricing and innovation, and perhaps fewer service options. But it has not seemed to affect dramatically the radio paging business or cable TV, both of which also have similar local monopoly possibilities. In the case of cable TV, however, the local area franchise does bestow market power and may be more valuable than

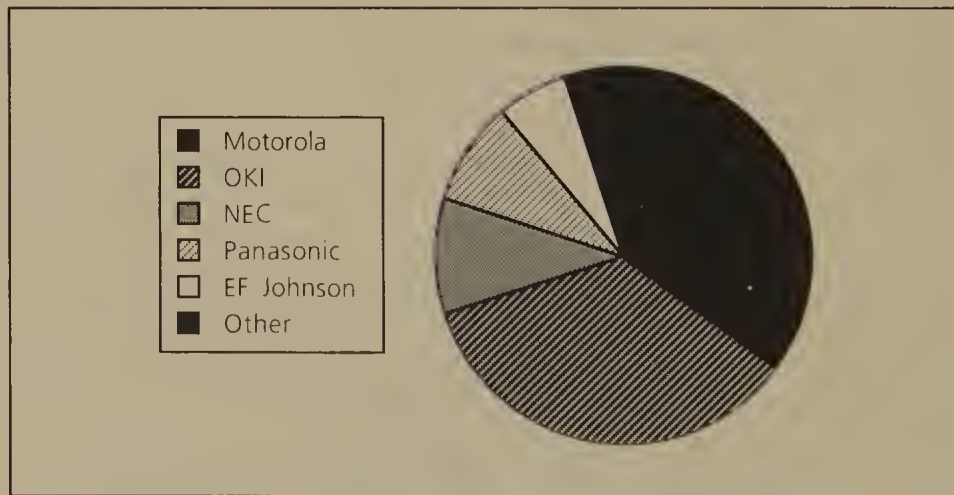
FIGURE 4.2

U.S. Cellular Market



Source: *Business Week* September 21, 1987.

Equipment Market Share



Source: *Cellular Business Magazine*.

the license for local radio spectrum use for paging and cellular service.

The cellular market at retail service and equipment level is competitive, and cellular telephone prices continue to plummet. The wholesale market, however, is not competitive due to local duopolies in spectrum. This probably explains why retail service prices have not

fallen significantly. Until this duopoly situation is changed, regulation is necessary.

Public telephone service has also been a very high-growth market since divestiture, with some locales experiencing stiff competition in public telephone sets and services. But information on prices and service is confusing or nonexistent, and although such problems will likely be alleviated eventually, for now, reduced regulation and lack of good consumer information has in fact often resulted in *higher* market prices. However, this does not necessarily mean monopoly profits, as cost structures are not known and the present market may reflect the fact that old prices were set too low. On the other hand, it could be an indication that deregulation has allowed premises owners to garner local monopoly rents where demand is very price inelastic.

Table 4.17 provides estimates of sales and market share data for customer owned coin operated telephones (COCOTs) and public telephone services. This COCOT part of the market is very competitive since the only real monopoly power lies with the owners of the locations the COCOT vendor desires to use. Of course, there is no data on these local monopoly rents, and in the absence of good regulatory solutions, recent calls for broad reregulation should be viewed with caution. The FCC has proposed requiring COCOT vendors to inform customers of rates and charges for COCOT services, and such minor regulations may be appropriate.

A very important market segment is Alternative Operator Services (AOS), which for the first time competes with telco operators. By 1989,

TABLE 4.17  
Public Pay Phone Vendors Market Data (1988)

| <i>Pay Phone Vendors</i>                 | <i>Market Share Estimates<br/>(units)</i>   |
|--|---|
| Segments                                 | Approx. % Share (units)                     |
| BOCS                                     | 80%   |
| Independent Telcos                       | 10  |
| Private                                  | 9   |
|  | (range is 5 to 15%,<br>depending on region) |
| AT&T                                     | 1   |
| Total number of units: approx. 2 million |   |

Source: Telecom Services, Inc.

AOS sales were \$800 million, or almost 9 percent of the total market for operator services.<sup>17</sup> This also appears to be a very competitive influence and as it develops will provide a ready alternative and some discipline to the AT&T and LEC operator services markets.

The partially deregulated COCOT and AOS markets, while competitive in many aspects, will not be able to be completely deregulated for reasons of emergency service and potential for local monopoly abuse. However, we know of no existing proposals for reregulation that are worth implementing, and prefer the current approach of minimum residual regulation.

The market for information services broadly defined includes such services as facsimile, E-mail, paging, audiotext, videotext, computing, electronic publishing, database, transaction services, and the like.<sup>18</sup> By all accounts, information services' growth potential is enormous and regulatory initiatives such as ONA and the recent MFJ court ruling allowing BOCs to provide gateways for other vendors will significantly stimulate demand. The "market" and its subcomponents is quite competitive, usually featuring many suppliers and price competition. What remains limited is ubiquitous distribution networks and this is where the LECs can help. For now, BOCs are not allowed directly to provide information services as they enjoy a competitive advantage owing to their ubiquitous distribution network. This restriction should eventually be lifted when alternative distribution networks develop and LEC interconnection becomes easy and open under the new ONA guidelines.

Until the Nirvana of competition arrives, there are certain principles for "good" residual regulation, including nondiscriminatory access, unbundling of services and nondiscriminatory pricing rules. Wherever noncompetitive elements remain in telecom markets, they are either because of bottleneck facilities or because of regulation. Those competitors who lease facilities from the bottleneck providers (be these thin interexchange markets or thick local markets) require nondiscriminatory unbundling to effectuate competition. Of course nondiscrimination and interconnection is ultimately a two-way street. As competition increases to the point where alternatives for LEC facilities become available, market forces should increasingly be relied on, and asymmetric rules favoring new competitors should be relaxed.



*Stanford L. Levin*

Perfect competition exists primarily in textbooks and perhaps a few isolated markets. Economists have long sought to define "workable" or "effective" competition to describe markets which are generally competitive but which do not meet the strict definition of perfect competition. While these terms now often have unfavorable connotations, and have been used and abused in reference to telecommunications regulation, the necessity for such a definition remains.

A definition of effective competition must focus on competitive behavior; if the structural conditions for perfect competition were met, there would not be a problem. Thus, the distinction between competitive behavior and competitive structure is particularly relevant for telecommunications.

This is not to say that structural characteristics such as the number of sellers, the degree of product differentiation and market growth have no place in such a definition. However, other characteristics, including the independence of the sellers, responses to competitive actions, the lack of collusion, and the presence of systematic predatory pricing are, in practice, more likely to be the determinants. "The basic characteristic of effective competition is that no one seller (or group of sellers) has the power to choose its level of profits by giving less and charging more. In workable competition, this power is kept in check by rival sellers offering or threatening to offer effective inducements."<sup>19</sup>

It is also important to consider the extent of competitive supply for a particular service. For example, if competitors could absorb much or all of the market demand, it is much less likely that any firm would have a significant ability to increase price, even if market share and other variables might suggest otherwise.

This type of behavioral approach has two major advantages. First, it uses broadly based determinants of competition. It is not necessary to rely solely on one or two measures, such as market share or concentration. The competitive evaluation is based on a wide range of indicators, including structural measures, but also incorporates entry, other firms providing competitive goods or services, and observed behavior.

Second, this analytical approach eliminates the need to draw definite industry boundaries, something that takes up much energy and is often not truly resolved in most antitrust analysis. This behavioral approach focuses on competitive conditions for a particular good or service. It directly and indirectly incorporates all other products or services which may be in competition and considers how firms interact with each other while focusing on the ultimate behavior of the firms. Such an

approach makes the analysis both simpler and more complete, considering what is directly at issue: whether a particular product or service is sold under effectively competitive conditions. A market definition, in the antitrust sense, is therefore not required, and the term "market," used here for convenience, does not have the antitrust meaning.

In addition, this approach also permits the behavior of markets which are not regulated to be included in the evaluation. For example, cellular service in some jurisdictions is deregulated, while it is subject to full regulation in others. If the markets where cellular service is deregulated exhibit competitive behavior, this must be of major importance in the evaluation. Based on structural or even other behavioral criteria, a preliminary evaluation that the cellular market is not effectively competitive would have to be reassessed if the market is, in fact, exhibiting competitive behavior when it is not regulated.

Evaluating competition means, in part, evaluating pricing in various telecommunications markets. If markets are effectively competitive, pricing should be similar to pricing in comparable competitive markets. For telecommunications, this requires an understanding of pricing by firms producing multiple products and incurring joint and common costs. Among the many intraLATA telecommunications services, certain ones are relatively important or sufficiently different to warrant some brief analysis. The issue is to see if these services are provided under conditions of effective competition, and if not, why not.

The lack of useful data for this analysis is striking, although upon further reflection it is not surprising. For those services that have become significantly more competitive since divestiture, six years is just long enough to begin to generate sufficient time series or cross-section data to permit analysis of post-divestiture changes. In addition, the data available, including those presented by Egan and Waverman, are often not particularly useful in assessing effective competition. For example, minutes of use data may be available to allow the calculation of "market shares" for message toll service (MTS). MTS, however, is not a good product market, as there are many other close substitutes, especially for large users. In addition, minutes of use figures, even if they pertained to an economic market, are of only limited usefulness in assessing effective competition and a much broader array of indicators should be used.

Customer premises equipment, including both telephone instruments and PBXs, was becoming increasingly competitive before divestiture; divestiture simply accelerated the trend. The market looks competitive structurally, with many sellers and frequent entry and exit, as

well as behaviorally, with strong price competition and falling prices over time. Customers are offered a wider range of choice and more sophisticated products at lower prices than before divestiture. Given the international nature of much of the CPE market, suppliers can easily shift capacity and products to the U.S., greatly limiting the ability of any one firm to affect price. The provision of CPE also illustrates very clearly the importance of the customer being able to change equipment at relatively low cost, with almost universal compatibility.

After some initial concern caused by customer confusion and equipment problems, the CPE market has more or less vanished from public concern. There is little interest in generating data, and customers simply take the market, with its wide array of products, for granted. There is no evidence that customers view this market any differently than any other nontelecommunications market with a substantial degree of competition. The CPE market appears to be effectively competitive with the predicted consequences.

The situation for private networks is similar to that for CPE. There are many potential providers of these networks, including many of the major telecommunications companies. Because of the private nature of the market, little in the way of data is available. At the same time, customers are free to choose between regulated services and their own networks. Customers approach private networks much as they do any other service purchased in a competitive market, and, as for CPE, the lack of concern suggests that this market is working just as an effectively competitive market should.

Cellular telecommunications is provided by not more than two companies in each major metropolitan area. It is an example, however, of how resale, plus what appears to be fairly elastic demand for a service with many broad alternatives, is delivering effective competition through competitive behavior. There were some start-up service quality problems, which sometimes linger, but this is not surprising for a rapidly growing business based on new technology. More importantly, these service quality problems are not the result of an indifferent monopoly provider, and all providers are sensitive to complaints and appear to be working hard to improve quality.

Cellular providers seem to compete aggressively on price to build customer bases. Not only have equipment prices declined substantially in the past five years, but usage prices are stable or declining. Profits are not yet widespread, in spite of large investments. All of this suggests an aggressively competitive market.<sup>20</sup>

In some markets cellular service is regulated and in others it is not.

While data have not yet been generated to compare these two types of markets, one future research project will no doubt examine whether continued regulation has improved or hindered behavior and performance in the cellular market.

The philosophy behind pay telephone competition is that it should provide for more phones, sometimes in areas not served by a monopoly provider, while competition might result in lower prices (depending on whether the pay phone services benefit from a subsidy under regulation). Customer-owned coin or pay telephones are subject to different regulation in different jurisdictions, ranging from being banned *de facto* in some states, to being unregulated in others. In evaluating competition, the first issue is whether these phones are allowed, and the second issue is whether the market is effectively competitive.

Even states that do not ban private pay phones create vastly different competitive conditions. For example, pay telephone service provided by Southwestern Bell in Missouri is over twice as expensive as private pay telephone service provided by Southwestern Bell in Texas. It is not surprising, therefore, that by 1989, private companies had only 200 phones in Missouri compared to 33,000 for Southwestern Bell. In contrast, Illinois' liberal approach resulted in 10,000 out of a total 77,000 pay phones in the Chicago area being privately owned.<sup>21</sup>

Whether private pay phone competition is sufficient to restrict price is a complex issue. Some states regulate the price that private pay phone operators may charge, usually limiting the price to that of the regulated local exchange company. Other states, such as Illinois, do not regulate the price but rely on competition. One result of this latter policy is that pay phones are available in locations that could not support them previously, but sometimes at prices that are higher than the regulated company's price.

The competitive issue is not the number of pay phone providers, since they seem to appear when regulators remove entry barriers. Rather, the problem is that many pay phone locations serve customers with relatively inelastic demand, thus conferring to the owner of the pay phone or to the owner of the location some ability to increase prices in these locations. This is generally accomplished by raising prices and paying larger commissions to the location owner. While some providers charge lower prices, the problem is with those who charge higher prices. To some extent, this problem may be transitory, as customers begin to understand the situation and avoid higher-priced private pay phones. At the same time, the location owners may find that the extra revenues are more than offset by poor customer relations. If location issues can be dealt with satisfactorily, and regulatory restriction and

pricing basis in the form of local exchange carriers are eliminated, there can probably be effective competition in pay telephone.

Centrex is an example of a service subject to strong competition from PBXs primarily, as well as other standard business access offerings. Once declared dead, Centrex has found new life, usually with reduced prices and less regulation. The market shows all the signs of effective competition, and as with cellular service, a good research project would be a comparison of Centrex services in states with more and with less regulation.

Other central office based services with good substitutes, such as speed dialing and voice messaging, look like Centrex. Still others, such as call waiting, appear to have poorer substitutes for most non-business customers. Regulators, however, have used such services in many cases to exact substantial subsidies to support local service. While the market for these services may not be effectively competitive, customers would probably not fare worse than they do under regulation.

The enhanced services market is too small and too regulated to allow any clear competitive evaluation at this time. While there seems to be little inherent impediment to an effectively competitive market, demand for these services is still low in most areas. It does not seem to be easy to enter, however, although the lack of competition due to low demand makes it difficult to draw conclusions on pricing.

One major difficulty for enhanced service providers is that they are dealing, usually under regulated tariffs, with local exchange telephone companies who may, in some cases, also be competitors. On the other hand, MFJ restrictions may prevent local exchange companies from entering some segments of this market. Intuitively, this market should be effectively competitive as it matures. This will require working out, perhaps through Open Network Architecture, some method of allowing competition and service provision between local exchange companies and enhanced service providers. At the same time, the market will need to grow to provide a true test of effective competition.

It is helpful in analyzing the interexchange market to revert to the pre-divestiture perspective of long distance. While divestiture has created artificial LATA boundaries and has perpetuated equally artificial state boundaries, the regulatory treatment in these various jurisdictions has been different, allowing some useful conclusions about competitive behavior. In one of the few empirical studies to quantify the results of pricing flexibility, Mathios and Rogers found that flexible state regulation resulted in lower intrastate interLATA toll rates than rate-base regulation.<sup>22</sup> These states have experienced entry by a variety of companies, and the Mathios and Rogers study confirms the appropriateness

of considering competitive behavior rather than structure, as AT&T often still retains a significant market share of some (perhaps economically meaningless) markets.

In those states which do not provide pricing flexibility, the markets are not effectively competitive. Indeed, even in those states with pricing flexibility, there may still be regulatory restrictions on entry, reporting requirements, or pricing bands which inhibit competition. The evidence to date, both from the Mathios and Rogers study and from more anecdotal sources, suggests that in the absence of regulatory and MFJ restrictions, the interLATA intrastate toll market would be effectively competitive.

In an update of their study, Mathios and Rogers extend their analysis to the intraLATA toll market.<sup>23</sup> They find that in states allowing toll competition, including competition from resellers, rates are 7 to 10 percent lower than in the more restrictive states. Once again, this study, along with other anecdotal evidence, confirms the intraLATA market may be effectively competitive. In states where it is not, regulatory barriers may be the reason. The elasticity of supply is important here, as it is with interLATA toll. Competitors have the capacity to handle a large portion of the toll business, severely restricting any one firm's ability to increase price. This is particularly true for large customers, where any "one-plus" advantages are less important.

The interLATA interstate market is controlled by the FCC's policy of dominant firm regulation, where entry is relatively free and prices for all but AT&T are not regulated. AT&T's prices, however, have been subject to traditional rate of return regulation, with a recent partial switch to price cap regulation. This regulatory interference prevents any judgment on effective competition from directly observing the interstate market. However, since competition seems to be working in markets which are smaller and perhaps inherently less competitive than the interstate market, including competition based to a great extent on resale in the intraLATA market, a reasonable tentative conclusion from state experience is that the interstate market would be effectively competitive in the absence of regulation. Certainly, the limited useful data available do not support claims of natural monopoly in toll. In any case, the natural monopoly hypothesis can only be confirmed by allowing competition to function unhindered by regulation.

There is little competition for local exchange services. This may be for two reasons. First, some local exchange services, particularly residential access, have been priced significantly below most measures of cost in most jurisdictions. Unless prospective costs for new entrants

are sufficiently below historical costs, entry will be unlikely, even if it were allowed. Second, it is possible that some aspects of the local exchange exhibit the cost characteristics of a natural monopoly, although this is difficult to confirm without a market test. In addition, most regulatory jurisdictions provide regulatory barriers to competition, creating or enhancing the bottleneck control of the local exchange carrier.

There are, however, several states that allow some types of local exchange competition. Few are as open as Illinois, but New York, Washington, D.C., and other cities as well as Chicago, do have some local exchange competition. This tends to focus on large customers in areas where regulated tariffs are probably not significantly below cost. What is surprising is not the dearth of local exchange competition but that there is any at all, given the typical regulatory hurdles. While there are not any effectively competitive local exchange services today, there could be some in the future if regulatory restrictions are relaxed.

Some of the customer disappointment about post-divestiture telecommunications may be a result of continued regulation and court restrictions and not a result of a failure of competition to deliver what it promised. Indeed, in the toll market, for example, competition, when allowed, does seem to fulfill its promise. In a related effect, continued regulatory and court oversight seems to siphon competitive energies into regulatory and legal battles. Competitors often suggest, directly or indirectly, that if they do not get all of the business, or that if the local exchange carrier or AT&T gets any business, somehow the market is not competitive. Removing regulation when appropriate will channel energies into a more productive competitive arena, benefiting consumers by helping to achieve an effectively competitive market.

In many markets, the single biggest impediment to effective competition may be regulation, and in some of those markets there is already evidence to suggest a move to reduce or eliminate regulation would carry little risk. Appropriate policy, however, would not deregulate until other constraints are substantially eliminated. Other services, including local exchange access, for example, are not at this time effectively competitive. In these markets appropriate policy might include alternative forms of regulation but probably not deregulation.

*Lee L. Selwyn*

Divestiture is unquestionably the seminal telecommunications *policy* event in our generation, but divestiture did not create, nor is it now

creating, a "competitive" market except in limited industry segments. Like the sorcerer's apprentice who chopped the enchanted broomstick into many pieces only to discover that each was possessed with all of the power of the single prototype, the breakup of the Bell System into seven regional offspring served only to create seven monopolies where there had been but one. Moreover, while there has been much attention on the seminal *policy* event, the seminal *technological* events—the development of ultra high capacity fiber optic transmission systems, digital switching, and common network control systems—so increase the economic scale of local exchange carrier network architecture that over time industry concentration cannot help but increase.

It is in this context that efforts to "prove" the presence of "effective competition" must be evaluated. To their credit, Egan and Waverman do not themselves advance a definition of "competition markets," but nevertheless either assert its existence based upon their interpretations of broad trends or, worse, seek to explain its failure to develop in certain market segments on the basis of regulatory intransigence. Sanford Levin speaks of "workable" or "effective" competition as describing "markets which are generally competitive but which do not meet the strict definition of perfect competition." One cannot help but agree that it would be overreaching to require the "perfect competition" academic market model be shown to exist before deregulation could be considered. But the fact that there is no formal academic model to describe the economic structure of the telecommunications network services marketplace cannot justify the adoption of vague notions of "generally competitive" in formulating tests of market condition. Levin seems to settle on a traditional antitrust definition of "effective competition"—"the ability of a firm to increase prices." By examining price movements over the post-divestiture years, Levin argues, it should be possible to see whether or not "effective competition" has actually become a reality.

Of course, even assuming one had *good* data upon which to apply Levin's "pricing behavior" standard, the test would be valid *if and only if* all of the *apparent* pricing changes could be attributed to the development and presence of "effective competition" as opposed to some other explanatory factor(s). Yet while Levin discusses pricing behavior and other conditions extant in a number of industry segments, he fails entirely to establish a nexus between perceived pricing behavior of individual suppliers and the actual competitive condition of the marketplace. Egan and Waverman fall into this same trap as well.

Efforts to assess the degree of effective competition in the inter- and intraLATA long-distance markets on the basis of pricing behavior re-



quire a more extensive examination of price changes than is implicit in Levin's discussion. And Egan and Waverman, for their part, seem to ignore price changes altogether in drawing conclusions from the data they have assembled.<sup>24</sup> For one, the level of dominant carrier rates is far more heavily influenced by regulatory action than by any competitive pressures. The 40 percent-plus reductions in interstate MTS rates cited in both the Levin and Egan and Waverman papers *is not attributable either to the divestiture or to the entry of "competition" per se*; it is instead the direct result of shifting to Subscriber Line Charges and of the Commission's requirement that the dominant interexchange carrier—AT&T—pass through all reductions in carrier access charges to end users of its toll services.<sup>25</sup>

Differences in intrastate toll rate levels are far more attributable to state access charge and overall rate design policy than to the presence (or lack thereof) of competition. California and New York each have little or no intraLATA toll competition, even though rates in the two jurisdictions are at virtually opposite ends of the spectrum: California has high intraLATA toll rates but prohibits intraLATA competition, while New York, in which LATA competition has been allowed for many years, has some of the lowest intraLATA usage charges in the country pursuant to a Public Service Commission policy initiative that began as far back as the mid-1970s.<sup>26</sup>

While it may generally be correct that MTS rates are lower in states which allow toll competition, it is probably incorrect to attribute that pricing condition to the presence of competition itself. States which have examined intraLATA competition policies have recognized that competitive entry requires a realignment of toll and access charges, so as to eliminate the uneconomic pricing practice of loading non-traffic-sensitive cost recovery and other unrelated cost burdens onto toll usage charges. Toll rates are indeed lower in states that allow toll competition, not because of the presence of competition per se, but because the regulatory agencies in those jurisdictions have affirmatively realigned dominant carrier rate levels precisely to achieve this result.

Both Egan and Waverman and Levin correctly observe there is little competition in the provision of basic local exchange network access. Levin seeks to explain this condition not in terms of the pervasive scale and scope economies which exist—and which are increasing in magnitude—in the local network infrastructure, but by the suggestion that competition has failed to develop because local exchange services have traditionally been underpriced. Egan and Waverman similarly dismiss the possibility of fundamental economic and technological impediments to competition at the local exchange level, instead holding regu-

lators responsible for this condition: "The lack of competition at the state and local level is due to many factors, the primary one being regulatory policies which do not encourage entry." But in the same paragraph Egan and Waverman seem to change their position completely: "While most states do not grant exclusive certificates of necessity and convenience [sic] to the incumbent LEC, entry barriers in terms of up-front sunk costs with assets fixed and immobile, and very high business risk for new entrants with no large customer base or cash flow."

Surely Egan and Waverman are not "blaming" regulators for high up-front sunk costs of immobile assets or for the fact that start-up firms (by definition) do not have a customer base? It is, of course, these very natural monopoly conditions—the enormous investment in the basic LEC infrastructure, immobile assets, high entry barriers, the captive LEC customer base—that accounts for the lack of effective competition in the local exchange. And these conditions are all *permanent* fixtures that will not erode with time. Indeed, as the scale of modern digital and fiber optic technology grows, the likelihood of effective entry by a start-up competitor becomes even more illusory.

Even in those jurisdictions in which entry into the market for local exchange services has been permitted—e.g., New York, Chicago—actual penetration is minimal, and has had little, if any, perceptible financial impact upon the dominant local exchange monopoly. The lack of growth in LEC revenues since 1984 cited by Egan and Waverman is not the result of "competition" eroding their markets, but is instead a compelling demonstration of the effectiveness of rate-of-return regulation in reflecting the increasing asset productivity on the part of the LECs in prices for LEC monopoly services. While geographically specialized metropolitan fiber optic networks, such as New York Teleport, and other *niche market* providers may continue to expand, the LECs have already demonstrated sufficient softness in the pricing of their own high-capacity digital services that the financial attractiveness of the fringe competitors' services, vis-a-vis those offered by the LECs, can only fade.

Egan and Waverman contend the market for business access services is competitive. They suggest large users have the ability to obtain access services from sources other than the LECs. The inability of Egan and Waverman to obtain any solid data source on private bypass is not, as they seem to believe, the result of an unorganized marketplace. It is instead directly attributable to the fact the type of "bypass" they believe to be so rampant is, in reality, virtually nonexistent. The reason, of course, is that the capital investment and recurring operating costs

associated with a dedicated, customer-provided access arrangement are no match for the substantially lower costs of providing equivalent capacity on a common carrier network. This is especially true when modern fiber optic transmission technology, with its high fixed costs and almost insignificant variable costs, is involved.

Both Egan and Waverman and Levin are clearly correct in stating the CPE segment of the telecommunications marketplace has become competitive. But in reaching that generally undisputed conclusion, they ignore what is perhaps the key element in achieving effective competition in this industry segment—the unbundling of CPE from the monopoly local network access “bottleneck.” That unbundling, of course, had nothing in particular to do with divestiture; the FCC had started down this policy path more than a decade earlier. If we want to achieve increased competition in other market segments—e.g., enhanced services and long-distance—we should not forget what the CPE experience has taught.

Interestingly, despite the dramatic drop in AT&T/BOC market shares from their near-100 percent level at the beginning of this decade, the CPE market has been through its “shake out” and appears to have come to rest at a fairly concentrated state. Gone are the “mom and pop” “interconnect” vendors or small, specialized PBX and key system manufacturers; return the BOCs and AT&T. Another factor in the future CPE marketplace is the reemergence of Centrex as an economically viable alternative to customer premises systems. Loaded with advanced digital switching features coupled with the advantages of flexibility, turnkey operation, and often highly aggressive pricing, Centrex and Centrex-like services could become a formidable competitor to future CPE sales. Moreover, BOC reentry into the Centrex market may provide further incentives to exert market power over “bottleneck” services required for CPE alternatives, services such as PBX trunks and direct inward dialing.

Levin asserts: “The situation for private networks is similar to that for customer premise [sic] equipment.” This claim is not supported by any empirical evidence, and in point of fact is patently false. Even at the interLATA level, which is arguably the most competitive of the network services markets, AT&T retains an overwhelming market share. Because it maintains twice as many analog and three times as many digital points of presence as MCI, its nearest competitor, AT&T is uniquely able to offer private network customers ubiquitous coverage on a far more efficient basis than any of its rivals. At the intraLATA level, most so-called “private networks” are actually constructed out of private line and special access services or leased fiber optic facilities

furnished by the very LECs with whose services Levin believes these networks compete! Moreover, having posited a "pricing behavior" test, Levin ignores the pervasive strategic pricing and market management practices of the LECs with respect to "private network" services; if the private network marketplace were "similar to that for CPE," competition would force the price relationships between analog and digital services, and between single voice channel and high capacity services to cost. The LECs' ability to keep the apparent break-even point well above the technological relationship belies Levin's overly simplistic "explanation" of the condition of this market segment.

In discussing the state of competition in cellular, Levin concludes that the presence of two cellular carriers plus resellers in each market, together with a relatively elastic demand, "is delivering effective competition through competitive behavior." He observes (without actually citing any data), "Cellular providers seem to compete aggressively on price to build customer bases. Not only have equipment prices declined substantially in the past five years, but usage prices are stable or declining." In point of fact, there have been hardly any price reductions or price competition for cellular service; the price decreases that have occurred have come exclusively in cellular telephones. Indeed, under Levin's behavioral approach to assessing the degree of competition in a market, one would be forced to conclude there is virtually no effective competition in the provision of cellular service, as evidenced by the enormous difference in price movements between the undeniably competitive cellular telephone equipment market and the profit-maximizing duopoly structure that was created by the FCC. What has occurred in the five years since divestiture has been an unprecedented run-up in the market value of cellular franchises.

The decision to open private pay phones and operator services to competitive entry can only be described as "a solution in search of a problem." The fundamental monopoly character of these services is not altered by multiple supplier entry, because, as Levin correctly notes, the public utility monopoly is simply replaced by local monopolies under the control of the owner of the property (such as a hotel or airport terminal) on which the pay phone or access to the operator service is provided. Prices to consumers have not fallen; they have increased. And the availability to consumers of information as to the prices and options offered by pay phone and AOS suppliers—clearly an essential attribute of a competitive marketplace—is minimal to nonexistent. The jury is clearly still out on this experiment with "competition," but one may easily conclude, on the basis of actual pricing behavior, that

nothing remotely close to “effective competition” has emerged as of this point in time.

*Nina Cornell*

The discussions of Bruce Egan and Leonard Waverman and of Stanford Levin attempt to utilize standard economic principles to consider the state of competition in a number of telecommunications services. Both examinations, however, suffer from the failure to analyze the effect on competition of that which is unique to competition or potential competition in telecommunications—the bottleneck monopoly enjoyed by the local exchange companies. This omission is somewhat surprising in a volume about divestiture, for it was the bottleneck monopoly over the local exchange that resulted in such a drastic remedy as divestiture to solve the antitrust problems. As both presentations comment in places about whether the restrictions that accompanied divestiture are still warranted, the omission of any analysis of this issue is even more startling.

Egan and Waverman do list some steps needed to try to ensure that local exchange companies do not use their bottleneck monopoly to erect barriers to entry. But nowhere do they show why these steps are needed. Because Egan and Waverman present a large amount of data, most of my comments will focus on them. The conclusions about how to analyze competitiveness in these markets and the necessary regulatory changes needed, however, apply equally to Levin.

The local exchange companies have been and remain the only source of switched interconnection with end users of telecommunications services. Although some large users may route certain services, at least in part, past the local exchange carrier by using a bulk connection between two points, no customer can avoid the local exchange carrier when local switching is required. Moreover, even this ability of a small number of customers (although potentially a large share of total traffic) to sidestep the local exchange carrier is limited in a number of ways. First, no customer has yet been able to avoid the local exchange carrier completely, but can only move some of its telecommunications usage to a bulk facility. Second, even for bulk facilities, not all locations can be served by any carrier but the local exchange carrier, because of very high costs of obtaining the necessary rights of way. This is especially a problem in some cities, where the majority of large users are found.

Finally, in a number of those locations where alternative providers could offer the end user substitute bulk facilities, the alternative provider often must use the conduits or other right-of-way structures of the local exchange carrier. This opens the important and largely unaddressed issue of the local exchange carrier's price for use of its right of way, relative to the price for use of its bulk facilities.

The question of pricing by the local exchange companies for use of their bottleneck monopoly facilities is not limited to the pricing of the use of their right-of-way structures relative to the pricing of their own bulk facilities. In fact, today, most local exchange companies are not required to use nondiscriminatory pricing for virtually any of their offerings to potential competitors relative to their own "competing" services. Not only are they not required to do so, but on those occasions when I have been able to examine a local exchange company's cost data, I have found that local exchange companies rarely pay the same amount as their potential competitors for the bottleneck elements.<sup>27</sup> Most often, the local exchange company implicitly pays itself less for these elements, at least for the services offered to customers who might be the most likely first target for potential competitors.

The existence of the local exchange companies' bottleneck monopoly and the absence, at least so far, of serious regulatory constraints on discriminatory and unduly bundled pricing raise very strong issues of barriers to entry and exit. Unfortunately, Levin essentially ignores these issues entirely. Egan and Waverman do touch upon the bottleneck question, and they call for nondiscriminatory access, unbundling, and nondiscriminatory pricing of access. All of these are essential and are needed now, regardless of later deregulation, if telecommunications markets are to achieve their potential in terms of technological development and expanded services. But Egan and Waverman do not appear to have a genuine appreciation of the extent to which the local exchange carriers are failing to follow these principles, or how large the task will be to change that outcome. As a result, Egan and Waverman's conclusions about the competition facing specific services are almost always wrong, and their suggestions for regulatory treatment for those services would likely lead to substantial abuse of monopoly power. This can be best illustrated by looking at some of the analyses they provide of particular service offerings.

In reference to STS, Egan and Waverman conclude those who initially entered this market failed to judge correctly the potential for profitable operation given the "environment." The implication is that the major cause of the failure of this industry segment was lack of tenant interest. In fact, it was the local exchange company regulatory

litigation which changed almost completely the potential of the STS market. The original premise of STS was that the tenants of a building would share a PBX or similar device, and as a result would economize on the number of lines needed to the central office; calls between and among tenants would be switched at the shared PBX. But this plan was allowed in only a very few places, and local exchange companies won regulatory rules permitting them to force possible major inefficiencies into the intended offerings. They were able to achieve such victories in essence because of their control over the bottleneck monopoly of the local exchange. In the process, nondiscrimination lost. It is hard to understand why a corporation is allowed to "share" a PBX among its employees, but separate tenants within a building, who collectively have the same amount of traffic as that corporation, are not.

Egan and Waverman are perhaps the most flawed in their discussion of access. They reach the surprising conclusion that the access market is effectively competitive—indeed, according to them, "uniquely competitive for large users." They base their claim of competitiveness on two factors: the trend in access revenues, relative to the trend in other revenues of the local exchange carriers; and the growth in so-called "bypass."<sup>28</sup>

The trend in access revenues in Egan and Waverman's table 4.1 does indeed show that access revenues rose in 1985, fell sharply in 1986, fell slightly more in 1987, then rose in 1988 to slightly above 1984 levels. However, to conclude that the trend must be due to competition ignores the data shown in table 4.1 on growth in access usage, and further evidence of the precipitous decline in access charges. Using their data on the revenues and price movements in access confirms their data on the growth in minutes of use of access shown in table 4.1: it has been one of the fastest growing services of the local exchange companies. The decline in the price of access, however, has been even more rapid. Moreover, access growth has been greater than toll growth. If the revenue trends were due to a large increase in access substitutes, it should be reflected by growth in toll volumes exceeding the volume of access usage. That the numbers show the opposite demonstrates the *lack* of competition in access.

The other pillar of support for their conclusion is growth in "bypass." "Bypass" only becomes significant if it is interpreted to include several lines provided by the local exchange carriers themselves, namely local exchange private lines, special access facilities (the tariff term for local exchange company-provided bulk facilities that do not use the local exchange switch), and cellular radio usage. But to include such services as part of "bypass" renders the terms meaningless from a policy per-

spective for two reasons. First, some of the use of these services is not a substitute for use of switched network. Private line and special access facilities are sometimes used as a substitute for switched services, but they are also often used to carry types of traffic that cannot pass over the switched network. Cellular radio usage is only occasionally a substitute for use of the regular wireline telephone system, because much more often, cellular traffic would not exist if the cellular telephone network had not been developed.

Second, the overwhelming share of "bypass" that comes from the offerings of local exchange carriers only means that each local exchange carrier faces significant competition from itself, unless there recently has been a very sudden increase in the use of facilities not provided by the local exchange carriers to carry traffic, that could just as easily—but at a higher price to the user—have gone over the local exchange carriers' access facilities. This is far from the normal definition of competition.

In fact, access is not a service subject to competition. The authors note, "access charges represent . . . almost half of AT&T's annual operating expenses." They also imply rates are far above cost at about ten cents per minute. It is hard to believe that AT&T Communications, a large and sophisticated company, would not have moved massively away from local exchange company-provided access if competitive substitutes at lower prices were available for such a large element of its costs! Clearly, the evidence in the marketplace itself speaks eloquently to the absence of effective substitutes for access, particularly switched access. Without effective substitutes, there is no effective competition. Unlike some of the other services discussed, moreover, there is not a set of regulations which, if imposed on the local exchange company, would significantly change this conclusion, at least not in the near or middle term. Requiring nondiscriminatory pricing of the use of local exchange companies' right-of-way structures could increase actual competition for bulk transport facilities. Switched access services, however, are squarely part of the heart of the bottleneck monopolies of the local exchange companies.

Finally, although Egan and Waverman talk only about access as it relates to the interLATA market, access is also used by toll carriers in the intraLATA market. In the intraLATA arena, not only is access part of the bottleneck monopoly, but the local exchange carriers discriminate against their potential toll competitors both in terms of price and quality. Local exchange carriers have almost universally retained a monopoly on the ability to offer most customers "1 + dialing."

Egan and Waverman conclude that all forms of customer premises



equipment are sold in very competitive markets, and, to quote them, "it is hard to envision a freely operating CPE market returning to a monopolistic structure, and therefore we believe any residual regulation is probably unnecessary." It is accurate that among the manufacturers of customer premises equipment, competition is vigorous. This is not the end of the story, however. In their discussion of customer premise equipment, particularly their discussion of Centrex-type services,<sup>29</sup> the authors ignore the fact the local exchange companies not only *do* have the ability to predate against other suppliers, but are actually doing so now with regulatory blessing. They do so by charging very different rates for the bottleneck monopoly local exchange wires that physically link customers with the central office. A customer who subscribes to a Centrex-type service pays far less for each wire than does a customer who uses a PBX.

Rates for PBX trunks in some jurisdictions can be as much as twenty times or more the rate per wire charged for "intercommunications lines," one of the tariff terms for at least some of the wires used by Centrex-type services. The result of this price discrimination has been the comeback for these services, as Egan and Waverman note.

The price discrimination that has permitted the rejuvenation of these services in the market is even more chilling in light of what the authors note is the possibility that Centrex-type services may be "a way for business customers to obtain digital service and ISDN, and this could develop into a market advantage for LECs." The current ONA regulations have not eliminated tariff restrictions that limit the availability of certain tariffs to certain kinds of users. As long as the local exchange carriers are allowed to decide which users get favorably low and which get unfavorably high rates for identical functions, they have a very powerful ability to predate, contrary to Egan and Waverman's claims. Such price discrimination is a barrier to effective competition.

Even more ominous would be the entry into manufacturing by the RHCs under the present circumstances. Clearly, for these markets to support competition as vigorous as it might be, the present pattern of differing prices for lines depending upon the type of terminal equipment or depending upon which vendors' intercommunications service is used must end. Such a change, however, will not come easily. The present pattern of discriminatory local exchange rates, particularly business local exchange rates, has been sanctioned for years, and regulators do not see the full importance of change.<sup>30</sup>

Egan and Waverman do not give a consistent analysis of the competitiveness of public telephone service. At one point in their discussion, they claim it is basically a competitive service subject to re-

duced regulation, and at another point a service subject to reregulation.

As the authors note, entry by private pay telephone service providers has been somewhat of a mixed blessing for consumers to date, and in a number of cases, the rates charged by the private payphone operators are higher than those of the local exchange companies. The authors seem to believe the cause for this may be monopoly power by premise owners.

Although premise owners may have significant market power, there is another reason for the higher prices by private payphone operators: price squeezes they are under from the local exchange company. In those states where I have been able to examine relevant data, local exchange companies charge private pay phone providers more for the lines to, and for minutes of use of the local exchange network, than they charge users of their own pay phones. Perhaps the most blatant example is in Massachusetts, where NET has been constrained for years to charge ten cents per local call over its payphones, while it charges private payphone vendors eleven cents per "message"—and many local calls consist of more than one "message." If a price squeeze as obvious as that in Massachusetts is hard to eliminate, it does not bode well for the attainment of nondiscriminatory access and pricing alluded to by Egan and Waverman.

Egan and Waverman apparently define "Nirvana" as competition everywhere, and perhaps the adoption by regulators of their suggestions for individual markets. Contrary to their belief, however, the requirements of nondiscriminatory access, unbundling of services, and nondiscriminatory pricing rules are not just needed "until the Nirvana of competition arrives," but in order to establish the conditions for competition to be given a fair market test. The implication of their argument is that adoption of these nondiscriminatory and unbundling rules will be sufficient to abolish the bottleneck monopolies of the local exchange companies. I believe closer examination of the reasons for the bottlenecks would suggest otherwise. The proposed rules are necessary to see where competitive activity could bring benefits to the public, but will not be sufficient to permit total deregulation in the foreseeable future.

*Martin G. Taschdjian*

The issue of the state of competition in the telecommunications industry is of more than passing academic interest. Billions of dollars rest on the outcome of public policy decisions on this subject.

Egan and Waverman have made a sterling attempt to marshal data to determine competitiveness of the various standard "markets" in telecommunications. (I continue to gag on the notion of "submarkets.") But they, like Stanford Levin, present a problematic definition of relevant markets. In both cases, the menu of products, services, technologies, and jurisdictions which they examined for competitiveness, are not markets in any sense of the word. Instead, both discussions have accepted the traditional industry definitions of markets with little or no recognition of their artificiality. Professional economists in particular should be more careful about their usage.

Egan and Waverman also confuse the markets with the players in the markets. For example, the treatment by public policymakers of interstate toll as a market separate from intrastate toll has led to much mischief. Another example is the tendency to identify the IXC "market" with AT&T. This confusion leads Egan and Waverman into logical difficulties. They conclude that the IXC market is sufficiently competitive so that the FCC price cap order is too restrictive a regulatory regime.

The implication is that the FCC is overregulating a workably competitive market. But in fact, AT&T is the only IXC subject to the price cap order. No other IXC is regulated by the FCC in any meaningful sense. So either AT&T is the IXC industry and is dominant, which the authors argue is not the case, or the industry is largely unregulated already. But they imply that this is not the case. Below, I propose a means of assessing the issue of level of competition more objectively.

Turning to the local exchange carrier "market," Egan and Waverman touch on the interesting phenomenon of slow growth in local service. Their conclusion about local usage per access line is corroborated in table 4.18 and raises an important point. Where has the local usage gone since divestiture?

I do not believe that growth has simply stopped. One possible answer is that before equal access, feature Group A access was counted as local usage. Alternatively, it seems the growth in local usage is being captured by entities other than the local exchange carriers.

Some candidates: (1) the dramatic penetration of PBX and key systems, documented by Egan and Waverman, has drained traffic which once used the public switched network and made it essentially internal, private traffic; (2) traffic is being captured by radio-based systems such as cellular and SMR (Specialized Mobile Radio), which offer alternatives to the local exchange; (3) some of this traffic undoubtedly is going to private systems, or to shared tenant services, LANs (local area network) and WANs (wide area network).

TABLE 4.18  
Percent Change in Local Call Volume  
per Access Line

|                 | 1980-1984 | 1984-1986 |
|-----------------|-----------|-----------|
| Ameritech       | 8.2%      | 0%        |
| Bell Atlantic   | 3.4       | 0         |
| BellSouth       | 2.4       | 2.5       |
| NYNEX           | 13.3      | 1.1       |
| Pacific         | 16.2      | 0         |
| Southwest Bell  | 7.8       | -1.1      |
| US West         | 5.5       | 0.3       |
| Cincinnati Bell | 3.7       | 0.5       |
| SNET            | 7.3       | 4.5       |

Source: Sonneville Associates, *Macro Analysis of Telco Enterprises*, 1988, p. 56.

Turning to Sanford Levin's paper, I find his reliance on the notion of "workable competition" flawed because it is not defined operationally. The traditional definition he adopts—a situation of rivalry or potential rivalry among suppliers—boils down to a tautology. I would offer instead a practitioner's definition which distinguishes between short-run and long-run workable competition. In the short run, a market is workably competitive when each of the vendors, faced with the marginal customer, has a roughly *equal opportunity to fail* to make the sale. Markets that seem to pass this test are CPE and private networks.<sup>31</sup>

In addition, there are important aspects of competition which divestiture was intended to foster that are not addressed either by Levin or Egan and Waverman. *AT&T vs IBM*: there is strong competition in the standards arena, but little in the area of goods and services. *AT&T vs LECs*: competition is a battle for customer control and who will be the "dumb pipe."

Finally, there is the serious underlying policy issue which is addressed only tangentially. "When is it appropriate to deregulate a dominant firm?" This long-run issue has not arisen in previous waves of deregulation of airlines, trucking firms, or banks, because those industries were (arguably) structurally competitive.

Current efforts at deregulation are targeted at industries which until

recently had been deemed natural monopolies. The telephone industry, CATV, and electricity are examples. Under this kind of industry structure, deregulation follows a pattern of: entry permission; "greenhousing" of competition (continued regulation of the former monopolist with little or no regulation of the fringe entrants); and finally, relaxation of regulation of the (formerly) dominant firm.

It is the transition from the greenhouse stage to the deregulation stage that requires standards for decisions. The (de)regulator faces the possibility of error from two sources—what statisticians might call Type I error and Type II error.

Type I error results from regulating as a monopolist a firm which is in fact competitive. The costs associated with such error include the direct and indirect costs of regulation, as well as the foregone benefits of competition on resource allocation, innovation, etc. Type II error results from deregulating a firm which is in fact noncompetitive. The costs here are from two sources: first, the welfare losses resulting from any predation by the dominant firm as it seeks to drive out competitors; second, welfare losses due to monopoly pricing by a now-unregulated monopolist.

In general, the costs of Type I error are likely to be less than the costs of Type II error because of differences in reversibility conditions. It is probably easier to deregulate a firm that is competitive than to re-regulate once deregulation has been accomplished. The type of cost/benefit analysis needed parallels that of building a dam in a scenic area. One can build the dam later, but once built, the area can never be recovered and the costs of tearing down the dam are high.

It is important therefore that the decision to deregulate a dominant firm be done only after careful analysis, not willy-nilly or on the basis of uninformed "theology." There are two questions which a regulator pondering a deregulation of a dominant firm must answer: if I deregulate, will the firm raise its prices to the monopoly level? If I deregulate, will the firm use its market power in less competitive segments of the marketplace to cross-subsidize and exclude competitors in other segments?

In a 1981 article, Landes and Posner derive a formula which can be extended to answer the first question.<sup>32</sup> The Landes and Posner formula cannot directly answer the second question. But if the answer to either question is yes, deregulation would be undesirable. Therefore, passing the Landes and Posner test is a necessary but not sufficient condition for deregulation.

The Landes and Posner formula is:

$$L = \frac{MS_D}{e_{(D/M)} + (1 - MS_D)e_{(S/F)}}$$

where:

$$L = \frac{\text{price} - \text{marginal cost}}{\text{price}}$$

$MS_D$  = Market share of the dominant firm.

$e_{(D/M)}$  = Market elasticity of demand.

$e_{(S/F)}$  = Supply elasticity of the competitive fringe.

This formula relates the Lerner index of monopoly power to market share, but has as a critical argument the elasticity of supply of the competitive fringe. The variables in the Landes and Posner formula fall into three classes:

**A) Technical/policy:** The left-hand variable  $L$  represents the Lerner index, which is a measure of the ability (or need) to set price above marginal cost. Traditionally, prices above marginal cost reflect market power. However, in the presence of economies of scale, some deviation of price from marginal cost is needed to satisfy the firm's break-even constraint. The extent of the needed deviation is a combination of technical and policy analysis.

On a per unit basis, to satisfy the break-even constraint, prices should exceed marginal cost by the ratio that average costs bear to marginal costs. (It is also possible to incorporate Ramsey pricing into this framework.) This can be shown to equal:

$$\frac{\text{Average cost}}{\text{Marginal cost}} = 1 + \frac{\text{Fixed cost}}{\text{Variable cost}}$$

These kinds of calculations are readily knowable.

**B) Market data:** In this category is the measurement of the market share of the dominant firm. While there can be great variations in this measure, there are usually "zones of reasonableness."

**C) Parameters:** There are two parameters in the Landes and Posner formula; the market elasticity of demand, and the supply elasticity of the competitive fringe. For a regulated dominant firm, the market elasticity is usually known, at least within some range. This is a result of regulation. When a regulated monopolist seeks to change rates, it usually must estimate the revenue effects of the rate change, and this requires a knowledge of the market demand elasticity.

More problematic is the elasticity of supply of the competitive fringe. Fringe firms tend to be very diverse in geography, accounting proce-

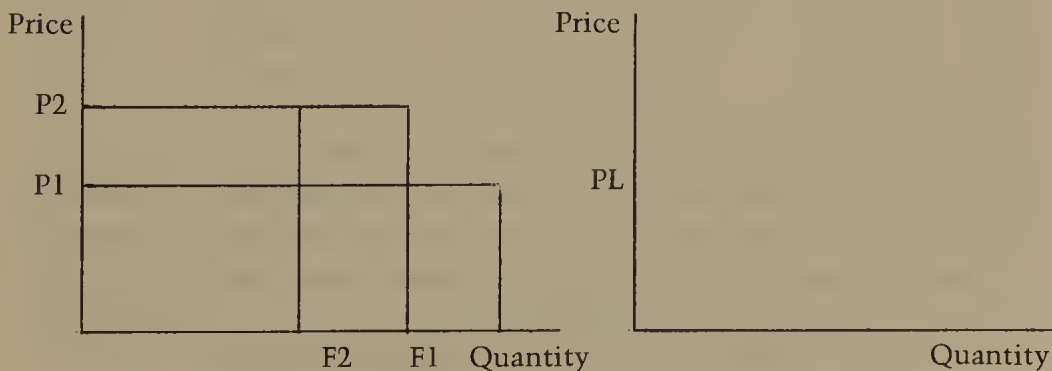
dures, technology, and extent of diversification. Moreover, they usually view the type of data needed to estimate a fringe supply function as proprietary.

Nevertheless, this is a crucial parameter. A dominant firm seeking deregulation will argue that the fringe supply elasticity approaches infinity—i.e. that the market is perfectly contestable. As a consequence, deregulation can safely occur (under the standards of the question above) at a high market share.<sup>33</sup> Opponents of early deregulation on the other hand, will argue that the fringe elasticity approaches zero.

The extent to which market forces constrain price increases by the dominant firm is crucially dependent, therefore, on the value of the fringe supply elasticity. There are two ways of dealing with this problem.

One way is simply to try values for the fringe supply elasticity for some acceptable value of  $L$  and see whether the value that would allow deregulation at the current market share is believable. An alternative is to derive elasticity of supply under the assumptions that the competitive fringe firms are price takers and profit maximizers, and that the market clears.

The amount supplied the fringe is the difference between total market demand and the demand satisfied by the dominant firm. At the limit price ( $P_L$ ), the competitive fringe sells nothing, but as the dominant firm sets a price above the limit price, the quantity supplied by the competitive fringe is represented by the difference between the market demand curve and the demand curve facing the dominant firm. We can therefore trace out a fringe supply curve which is related to the difference in the elasticity of demand of the market and the elasticity of demand of the dominant firm. Knowing the demand and supply elasticities, plus a value for  $L$ , it is possible to solve for the market share that the dominant firm should have before it could be deregulated without fear that prices would be increased.



## 172 STRUCTURAL ENVIRONMENT

Putting this all together, the Landes-Posner formula can be written as:

$$L = \frac{MS_D}{2e_{(D,M)} - (MS_D)e_{(D,D)}}$$

Note that when a firm is a monopolist,  $MS_D = 1$  and  $e_{(D,M)} = e_{(D,D)}$ , so the equation reduces to:

$$L = \frac{1}{e_{(D,M)}}$$

Let us develop an example of how the formula might be applied. Suppose we have a hypothetical dominant firm and market with the following price elasticities of demand:

| <i>Service</i> | <i>Firm Elasticity</i> | <i>Market Elasticity</i> |
|----------------|------------------------|--------------------------|
| A              | -0.66                  | -0.2                     |
| B              | -0.46                  | -0.2                     |
| C              | -0.18                  | -0.1                     |

The next piece of information needed to apply the formula is a value for the Lerner index. Estimates of this ratio of fixed costs to variable costs depend on the time horizon and the interpretation of accounting data. For illustrative purposes, if the ratio of fixed to variable costs is 0.32, the market share that warrants deregulation is as follows:

| <i>Service</i> | <i>L</i> | <i>Threshold Share</i> | <i>Market Elasticity</i> | <i>Firm Elasticity</i> |
|----------------|----------|------------------------|--------------------------|------------------------|
| A              | .32      | 16%                    | -0.2                     | -.66                   |
| B              | .32      | 15%                    | -0.2                     | -.46                   |
| C              | .32      | 6.8%                   | -0.1                     | -.18                   |

Given these threshold market shares, the original form of the Landes and Posner model can be used to calculate the supply elasticities of the comparative fringe firms, these are shown below:

| <i>Service</i> | <i>Threshold Share</i> | <i>Fringe Supply Elasticity</i> |
|----------------|------------------------|---------------------------------|
| A              | 16%                    | 1.39                            |
| B              | 15%                    | 1.09                            |
| C              | 6.8%                   | 0.42                            |

It is clear that the fringe supply elasticity is not so high that it can act as an effective constraint on the ability of a dominant firm (defined as a firm with market share above 70 percent, according to some) to increase its prices. Moreover, these are not unreasonable numbers for an industry with high costs of entry.

This methodology can help the regulator seeking tools to assess



deregulation. We leave it to public policy practitioners to apply the model and draw conclusions about (1) whether any given firm is ripe for deregulation, or (2) the form such deregulation may take.

*John R. Woodbury*

At the outset, one might reasonably ask why policymakers should care about the state of telecom competition. One answer might bear relation to the First Amendment: a more competitive telecommunications marketplace is likely to foster First Amendment values in the provision of information services. I think it is fair to assert that there is an apparent general belief that competition is a necessary condition for such a goal.<sup>34</sup> Further, there is a corresponding belief among many that competition is not sufficient, that something more is required—although that “something more” is never made clear. Nonetheless, if the market is more competitive, I presume First Amendment experts would agree the policy role for government is less intrusive than would otherwise be the case.

A second answer to the question posed is that the degree of competition tells us something about the need for various kinds of regulations. In this regard, I would amplify on a point made in passing by Egan and Waverman. In assessing how well telecommunications markets have performed since both divestiture and deregulation, a finding that some telecommunications markets are still characterized by market power does not necessarily herald the failure of deregulation. Nor does it necessarily signal the need for continued regulation. Many real-world firms likely possess some degree of market power, and an absence-of-market-power criterion would lead one to recommend the regulation of price and entry in so many more markets, that even the most ardent regulator might feel uncomfortable.

I raise this issue because I detect a sense among some authors of this volume that deregulation is only appropriate when an industry is fully competitive.<sup>35</sup> Among others, I detect a sense that deregulation is appropriate only if the market would be declared obviously competitive under the Justice Department’s merger guidelines. But from an economic standpoint, deregulation is appropriate if consumers would be better off—or at least no worse off—than under the existing or alternative regulatory regimes. And if regulation is sufficiently costly to consumers, even the exercise of substantial market power in a deregulated environment might be a better alternative for consumers.

Equally important, regulation is not an all-or-nothing proposition, as

has become particularly apparent in telecommunications; regulatory intervention can extend from less intrusive (and presumably less costly) forms such as antitrust and price caps to the more intrusive and costly rate-of-return regulation and line-of-business restrictions. The task of determining which regulatory form is appropriate requires an assessment of the costs and the benefits of each. More to the point, assessing the degree of competition in telecommunications markets can provide some information about the extent of any benefits from restraining the prevailing degree of market power. Given the costs of regulation, the more competitive the market and the better the market performs, the less likely it is that more intrusive regulation is the policy solution that best serves consumers.<sup>36</sup>

For markets in which product or process innovation is relatively unimportant, idealized competition is the inability of any single firm or group of firms to raise the market price above marginal costs. Because the ideal may be attainable only at great costs, the appropriate question to ask of telecommunications markets may not be how they differ from ideal competition but rather how they differ from monopoly. By contrast, in markets in which innovation is important, the industry organization that best promotes the interests of consumers may be one characterized by substantial power over price by a single firm or group of firms.<sup>37</sup>

Rendering even the more straightforward judgments about power over price is fraught with pitfalls on the kind of data that can be used as evidence. Unfortunately, neither the Egan and Waverman study nor the Levin analysis fares well in characterizing the empirical indices of competitive behavior. Levin devotes more space to the topic than Egan and Waverman, but in the end he leaves the reader empty-handed.<sup>38</sup> Advising that their purpose is to provide enough data to permit the reader to make a judgment regarding the state of competition, Egan and Waverman offer only a brief but incomplete catalog of empirical factors to consider. As a result, the probability of making a judgment error is quite high. A few examples may help to illustrate my concerns.

Levin and Egan and Waverman suggest that an industry in which prices are falling is one that is performing well, but neither ever tells us what permits that inference. Falling prices may be a consequence of process innovations that lower the costs of producing a service. As a result of the innovations, the industry can produce more of the service at a lower price. Thus, if falling prices are the result of process innovations, one might conclude that the industry in the innovation dimension was performing well (although one might reasonably ask against what benchmark one can judge that performance).

But consumer demand might be such that the primary effect of the same innovation is the release of resources to other sectors, with little change in output and price of the service in question. In that case, we presumably would not conclude industry performance was deficient even though it would fail the falling price test of Egan and Waverman and Levin. Worse yet, if the industry is characterized by service innovations, which provide consumers with better services at a higher price, the falling price test would lead one to conclude incorrectly that the industry is performing poorly. In addition, falling prices may have nothing to do with innovation, but may instead simply reflect declines in the cost of some of the inputs used to produce the service.<sup>39</sup>

If Levin and Egan and Waverman propose the falling price test on the assumption that beneficial deregulation should reduce prices, then the test is still flawed. What if, prior to implementing deregulation, we could have correctly predicted, for example, that CPE would be offered in a competitive market, but nonetheless that prices would rise instead of fall? Would maintenance of regulation be appropriate economic policy? If the price rise were due to artificially low prices mandated by regulation and not market power, then an increase in price would benefit consumers (although the political salability of deregulation may be reduced). If prices rise because input costs increase, we would surely not conclude that the market is performing poorly. If the postderegulation increase in price were due to market power that had been restrained by regulation, maintaining regulation may still not be the consumer welfare maximizing policy (because of the costs of regulation).<sup>40</sup>

Egan and Waverman also suggest that the financial performance of market participants is a useful gauge of market performance, and expend a considerable amount of space describing that performance. Yet, they fail to tell us why what is good for MCI is good for the country. In fact, good financial performance is not necessarily indicative of a well-functioning market. In unregulated markets characterized by monopoly, excess profits, which could be characterized as good financial performance, are symptomatic of that market power. In well-functioning competitive markets, financial performance depends upon the ability of the firms to satisfy consumer demands. Those firms that tend to serve those demands better do relatively better financially. In such markets, the existence of firms that are performing poorly or failing financially in and of itself has no significance for consumer welfare.<sup>41</sup>

Neither Egan and Waverman nor Levin provide any discussion of market definition, in either its product or geographic dimensions. Levin apparently concludes that the need for that exercise is obsolete, since

one can measure directly whether firms are behaving competitively. However, he offers the reader no measurement metric, presumably because none is readily available. Egan and Waverman offer no market definition discussion, presumably because their stated purpose is to present the data so that individual readers may render their own conclusions. But they offer the reader no data upon which market judgments might be made.

For example, consider the discussion of cellular phone services. Egan and Waverman and Levin both treat cellular phone service as a separate product market, without offering the reader any reason why this might be the case. In particular, it would not be separate if a small increase in the price of the service (as opposed to the equipment) led to substantial declines in use. For example, local exchange service might be a good substitute for cellular service. Given the FCC spectrum limitation on entry, cellular providers may be mere "fringe" competitors of local exchange services. In that case, the price for cellular services would largely be dictated by the price of local exchange service and the cellular specific costs: cellular providers—even if they merged—would remain price takers rather than price makers. No price or even antitrust regulation of cellular would be required, except perhaps to prevent the local exchange from acquiring any of the cellular licenses. The acquisition of cellular licenses by local telcos is something the FCC in its wisdom not only permitted, but encouraged as a matter of policy.

It may well be that cellular services are in a distinct product market: a small increase in the price of cellular service may not result in a substantial decline in the use of cellular. But one reason for the existence of a distinct cellular market may be regulation induced. By limiting the amount of spectrum available to cellular, the FCC guaranteed that cellular service would be artificially scarce relative to its demand. Given that scarcity and at the consequently high regulation-induced price of cellular service, few consumers view cellular as a substitute for local exchange. If the FCC instead had allocated significantly more spectrum for cellular, or better yet, had permitted entrepreneurs to purchase adjacent spectrum for cellular service, the price for cellular might have been far more competitive with local exchange service.<sup>42</sup> If so, cellular might have broken the local exchange monopoly, thereby permitting us to more easily do away with the MFJ.<sup>43</sup>

Interestingly, each study reaches different conclusions regarding the state of cellular competition, differences that highlight the significance of market definition in market power analysis. Levin asserts almost tautologically that the market is competitive because the two cellular providers "compete" with the local exchange. Egan and Waverman

express concern over the fact that there are only two cellular providers per area, a concern that makes policy sense only if cellular is in a distinct market. They do stop short of recommending conventional rate-of-return regulation, but puzzle about how to make the two providers compete. If cellular providers are earning apparent excess profits, either because of market power, spectrum limitation on cellular services, or some combination of the two, the FCC could always amend the licenses of those using other nearby spectrum to permit those licenses to offer cellular. Price or other behavioral regulations are not the only possible responses to the perceived "problem."

Not surprisingly, Levin argues that the interstate long-distance services are effectively competitive, but offers little in the way of corroborating evidence. Egan and Waverman are clearly impressed with the dramatic fall in AT&T's market share since divestiture,<sup>44</sup> but not sufficiently impressed to recommend complete deregulation. They cite one study which concludes that in many "low-profit" markets, AT&T continues to have a market share of customers in excess of 75 percent.

First, it seems that Egan and Waverman may have fallen into the trap of concluding that deregulation is only appropriate when the market is competitive. Second, if these high share markets are indeed "low-profit" markets, the scope for the exercise of market power might be quite limited.

Third, Egan and Waverman have committed the analytical sin of inferring market power from a high share of sales or customers alone. In particular, it may well be that an unregulated AT&T would be unable to raise price for any sustained period in these "problem" markets. Other competitors might have sufficient capacity to quickly expand the amount of toll service they provide into those markets. The FCC's John Haring and Kathy Levitz have observed that AT&T has only a 40 percent share of all long-distance assets, while MCI has 29 percent; US Sprint, 18 percent; and other providers, 13 percent.<sup>45</sup> Indeed, one current financial concern is the growing excess capacity in the long-distance business.

When gauged by capacity, then, the share of AT&T suggests that in most markets, an unregulated AT&T may not possess excessive market power.<sup>46</sup> And AT&T's share seems comparable to that of other large firms—such as General Motors, IBM and Xerox—regulated only by the antitrust laws. One can only hope the twisted 1989 version of price caps foisted on the FCC and AT&T by Congressional critics will be a very temporary phenomenon.

At the dawn of airline deregulation, many economists—including myself—regarded the airline industry (and the trucking industry) as

close to a real world analog of contestability as we were likely to see. As a result, anticompetitive problems were expected to be exceedingly rare. There quickly developed among policymakers, particularly at the Department of Transportation (DOT), which until 1989 had the power to disapprove airline mergers, a "don't worry, be happy" antitrust approach to the airline industry. Even as evidence began to accumulate that structure still seemed to matter for airline industry performance, a DOT official described the industry as one in which the possession of market power was technically impossible.

As a result of the "don't worry, be happy" policy, DOT approved a raft of mergers—some of which were opposed by the Department of Justice, and which likely resulted in higher fares and fewer choices for some consumers. Because of DOT's knee-jerk reliance on contestability, even in the face of contrary evidence, praise for airline deregulation has given way to clarion calls for reregulation.

Levin clearly falls into the "don't worry, be happy" mold. Although Egan and Waverman are far more substantive and cautious, they nonetheless carry a risk of avoidable policy error as a result of their failure to specify carefully their analytical optic, their inclusion of some largely irrelevant criteria in their competition assessment, and their exclusion of some relevant criteria.

I am concerned that obviously mistaken analyses will lead to consumer harm. The Levin approach would likely take us down the path followed by DOT, adopting a hands-off policy which is sure to have the effect of permitting the development of market power. As with the airline industry, deregulation will wrongly be blamed for the ills of the telecommunications industry brought on by the failure of antitrust.

If Egan and Waverman's analytic prescriptions are followed, there is no doubt some antitrust and deregulation mistakes will be made, although it is difficult to predict how serious they will be. If the mistakes are serious enough, the damage could be almost as great as that from following the Levin prescription. I would simply hope our policymakers engage in a more careful competitive analysis of telecommunications markets before deciding whether to act, and what action to take.

#### ENDNOTES

1. This is not true for cellular radio as discussed later, where demand growth is exceptional but only two basic service providers exist in any regional market.

2. For a detailed account of the recent telco investment activity and the role of depreciation, see Bruce L. Egan and Lester D. Taylor, "Capital Budgeting and Technology Adoption in Telecommunications; The Case of Fiber," Center for

Telecommunications and Information Studies, Working Paper #349, Columbia University, September 1989.

3. For more detailed data on investment for individual firms since 1984, see table 2.1 in Bruce L. Egan and Leonard Waverman, "The State of Competition in U.S. Telecommunications," Center for Telecommunications and Information Studies, Working Paper #350, Columbia University, September 1989.

4. According to FCC estimates, if state-of-the-art electronic and photonic devices were used on the 1988 installed base of fiber, the network capacity would be ten times that of AT&T's pre-divestiture network. With current devices and components for transmission systems and the amount of "lit" (active) fiber transmission lines, capacity is at least doubled.

5. The FCC recently released market-share and other key statistics in the new 1989 Statistics of Communications Common Carriers, Industry Analysis Division, May 1990. At the end of 1989, AT&T's reported market share was at 64 percent for interstate switched minutes. Furthermore, AT&T's toll traffic has grown at an average annual rate of about one-third that of all other carriers combined. See FCC Report, *Long Distance Market Shares*, March 20, 1990.

6. Multinational Business Systems, November 1987, pp. 6 and 15.

7. See L. Waverman, "U.S. Interchange Competition," in Robert Crandall and Kenneth Flamm, eds., *Changing the Rules: Technological Change, International Competition and Regulations in Communication* (Washington, D.C.: Brookings Institution, 1989).

8. For more detailed data for major LECs and IXC firms, see Egan and Waverman, table 3.8, *supra* at note 3.

9. See *Communications Week*, June 26, 1989, p. 15.

10. Much of the early market for STS providers was the significant profit opportunity from reselling access to long-distance service, and with the substantial toll and access charge price cuts their margins were squeezed. Many states since 1986 have chosen to regulate or prohibit STS operations, and the FCC has declined to preempt such regulation.

11. For details of the exact price changes for access services see table 4.0, *supra* at note 3.

12. NTIA report, *Telecom 2000*, 1988, p. 343.

13. A safeguard against subsidies might be not to allow RBOCs to sell equipment to themselves, which may already apply in today's situation where they have an equipment sales division selling to the telephone company for internal use, and this cost enters the rate base.

14. For any telco, once it has selected one or two vendors for certain kinds of equipment—e.g., central office switches—costs of conversion to other vendors may make it unlikely new suppliers will win contracts.

15. For more detailed data information see *supra* at note 3.

16. See Proceeding 1.88-11-040 before the California PUC on the state of competition in cellular.

17. See table 8.1 in Egan and Waverman, *supra* at note 3.

18. For data on local networks and information services growth since 1984, see tables 9.0, 9.1, 10.0 in Egan and Waverman, *supra* at note 3.

19. Les Seplaki, *Antitrust and the Economics of the Market* (New York: Harcourt, Brace, Jovanovich, 1982), p. 36.

20. See, for example, "Cellular Telephone Business Is Full of Hang-ups," *St. Louis Post-Dispatch*, February 19, 1989.

21. "Private Companies Stymied," *St. Louis Post-Dispatch*, February 19, 1989.

22. Alan Mathios and Robert P. Rogers, "The Impact of Alternative Forms of State Regulation of AT&T on Direct Dial Long Distance Telephone Rates," Bureau of Economics, Federal Trade Commission, Working Paper Series No. 159, December 1987.

23. Alan Mathios and Robert P. Rogers, "The Impact of State Price and Entry Regulation on Intrastate Long Distance Telephone Rates," Bureau of Economics, Federal Trade Commission, November 1988.

24. Egan and Waverman note that AT&T's toll revenues have increased some 2 percent over the 1984–1988 period, and compare this small revenue growth to enormously higher growth rates for MCI and US Sprint. One cannot help but be impressed, however, with the fact that, *even in the face of a 40 percent price decrease*, AT&T was still able to maintain steady revenues; indeed, when the significantly lower access charges are factored into the calculation, AT&T's *net revenues*, like its overall level of usage, experienced considerable expansion. As for MCI and US Sprint, it is certainly easy to ascribe high growth *percentages* to start-up firms with minimal base period demand. According to data cited by Egan and Waverman, AT&T interstate minutes of use increased by some 36 percent over the 1984–1988 period, from 73 billion to over 99 billion.

25. The majority of the increase in the price of basic residential service that Egan and Waverman cite in their table 4.2 can be attributed to the interstate Subscriber Line Charge (SLC), which had nothing specifically to do with the divestiture itself. Offsetting these increases are significant *reductions* in toll charges that are also incurred by residential customers. It is a distortion of the facts to limit a comparison of pre- and post-divestiture residential telephone bills to local services only; had Egan and Waverman included an amount for toll usage *that reflected the significant rate decreases that took place over the same period of time*, their results would have looked considerably different.

26. See, e.g., New York Public Service Commission Cases 26426, 27089, 27100, 28425, 28710, 28961, 28978.

27. One of the somewhat puzzling facts about regulation of local exchange companies is that, despite the fact that they have a monopoly over most of their service offerings, all cost data is confidential. Access to such data is very limited, and outsiders who do gain access are not allowed to use it for any purpose other than a particular regulatory or judicial proceeding.

28. "Bypass" is actually just a pejorative name for competition.

29. I use the term "Centrex-type services" to refer to all services offered by local exchange companies that offer intercommunications services through the central office switch. Within the various BOCs, these services go by such names as ESSX, Centron, and the like. In most jurisdictions, Centrex is the name given



to a tariffed offering that is now grandfathered: no new customers may sign up for it. Despite differences in name, however, all Centrex-type services share the characteristic with Centrex that the user most often has a separate wire to the central office for each telephone number that is a part of the system.

30. Egan and Waverman, in their discussion of local exchange competition, repeat the dubious assertions of the local exchange companies that local rates are subsidized. This claim has been used as part of the reason to erect the complicated pattern of differing local exchange rates for different "classes" of business customers. To date, such claims of subsidy have been supported by relying on very questionable allocations of costs to local exchange, including the argument that the local loop is "caused" by local exchange usage. The local loop is a cost that is incremental to almost all the *collection* of services offered by the local exchange company, not to just one of them. To quote Dennis Weisman, "how many sins of man have been committed under the term 'cost based pricing.' . . . For the economist that term means something very specific; all the other [measurements] are simply meaningless manipulations of data designed to some predetermined outcome. You can call them costs, [although] it really doesn't mean anything in the economic efficiency sense of the term."

31. Although it appears that many arguably competitive industries price far above marginal costs—see Robert E. Hall, "The Relationship between Price and Marginal Cost in U.S. Industry," *Journal of Political Economy* (1988), 96:921–47.

32. William M. Landes and Richard A. Posner, "Market Power in Antitrust Cases" *Harvard Law Review* (March 5, 1981), 94:937–96.

33. Carl Shapiro and Robert Willig, "InterLATA Capacity Growth and Market Competition." Paper presented at the 13th Telecommunications Policy Research Conference, Airlie House, Va., 1985.

34. I am ignoring the possibility that in some cases (e.g., natural monopoly) the market structure that best promotes First Amendment goals is far from obvious.

35. Perhaps this view has its origins in airline deregulation for which the industry to be deregulated displayed every sign of being highly competitive.

36. This kind of cost-benefit analysis suggests that retaining or imposing rate-of-return regulation simply because an industry failed an anti-trust "test" for permitting a merger is a flawed policy because it ignores the rising costs associated with more intrusive regulation. As a result of these rising costs, the optimal form of regulation may well result in the possession of some market power by the regulated entity. Put differently, the costs of eliminating *all* market power may be far greater than the benefits. We may want to challenge "significant" mergers in such an industry, but that is a far less costly policy than rate-of-return regulation.

37. For example, it seems on the one hand that the debate regarding the deregulation of interLATA interexchange service is largely one about the pricing power of AT&T. On the other hand, the controversy regarding the wisdom of the line-of-business restrictions is argued (at least by the RBOCs) in the arena of innovation. Antitrust economists seem much more comfortable about ren-

dering judgments about the degree of pricing power than about the market structure that best promotes innovation, probably because we know so little about innovation processes.

38. For example, Levin asserts that the contestability theory has greatly reduced the antitrust significance of market structure and has emphasized instead the degree of "competitive behavior" which is characterized by "independence of sellers, responses to competitive actions, [and] lack of collusion" among other measures. Levin also contends that the antitrust definition of competition should focus more on the ability of the firm to raise price rather than structural conditions. Nowhere does he tell the reader, for example, how we should go about measuring the degree of collusion, of seller independence, or of power over price.

39. Presumably, Levin and Egan and Waverman do not mean to suggest that an industry with falling prices is more likely to be competitive than monopolistic. Competition and monopoly models typically lead to predictions about price levels, not about price trends.

40. In a curious twist, Egan and Waverman maintain one indicator of the market power of the local exchange companies (LECs) is the 40 percent increase in basic local service rates since divestiture, rates that presumably were approved by the local regulators.

41. Perhaps the focus on financial performance is a residue of rate-of-return regulation which could result in an allowed return being less than the competitive return. Monitoring the financial performance of the regulated firms could assist the regulators in determining whether the allowed return was too low (or too high).

42. Surprisingly, Egan and Waverman assert erroneously that ownership of a scarce resource like spectrum automatically confers market power. I am certain that any major market radio station owner would vigorously contest that view.

43. In this regard, it will be interesting to observe the outcome of the New Zealand experiment, which anticipates relying on cellular service as a constraint on the market power of the wireline local exchange.

44. It is not clear that AT&T's market share contains any useful information regarding its likely behavior in the deregulation era. Unlike its competitors, AT&T's price changes have until recently required prior FCC approval.

45. John Haring and Kathy Levitz, "What Makes the Dominant Firm Dominant?" OPP Working Paper Series, Federal Communications Commission, April 1989.

46. However, if one did regard toll service as being highly differentiated by carrier, the sales or customer market shares would carry greater weight. But the analysis still would not end with the share distribution.