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ANALYSIS OF PRODUCTIVITY TRENDS OF CITIZENS COMMUNICATIONS

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In 1997[2], the Federal Communications Commission (FCC) represcribed the amount by which it annually adjusts price caps for incumbent local exchange carriers subject to the price cap rules. The FCC imposed a revised price cap adjustment required for price cap LECs to reduce inflation-adjusted prices for interstate access services by an "X-factor" of 6.5 percent annually. The United States Court of Appeals for the District of Columbia circuit reversed and remanded the Commission's decision[3]. On November 15, 1999, the FCC released a Further Notice of Proposed Rulemaking (FNPRM) requesting comment on how to represcribe the X-Factor. The FCC sought comment on three alternatives bases for represcription of the X-

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[2] FCC, In the Matter of Price Cap Performance Review for Local Exchange Carriers, Access Charge Reform, *Fourth Report and Order in CC Docket No. 94-1 and Second Report and Order in CC Docket No. 96-262*, CC Docket No. 94-1 and CC Docket No. 96-262, adopted May 7, 1997, released May 21, 1997.

[3] *USTA v. FCC*, 188 F.3d 521 (D.C. Cir. 1999)

factor: (1) the reasonable range determined in the 1997 Order, (2) a revised and updated staff calculation of TFP for price cap LECs, or (3) staff study which determines (from aggregate interstate expenses and revenues) the X-factor that would have produced a competitive level of capital compensation in the interstate jurisdiction during the period between performance reviews (the imputed-X approach). The FCC also requested comment on how the prescription of the X-factor would affect smaller price cap LECs differently from other price cap LECs, and whether there should be a separate X-factor calculated for smaller price cap LECs.[4]

The analysis contained in this report confirms similar previous findings made by SPR and submitted to the FCC regarding an important consideration for setting the X-Factor in price caps; that is, that significant differences inherent in certain types of LECs may greatly impact the productivity that should be expected of them relative to that expected of the RBOC population.

A 1989 study demonstrated that Cincinnati Bell's productivity growth to be slower than that of larger LECs[5]. In 1991, we filed a study[6] that noted the improbability that non-mandatory price-cap companies were homogeneous but different from mandatory price-cap companies. One of the findings of the study was that LECs whose holding companies are smaller tend to have slower productivity growth[7]. The study found that size of the holding company impacts productivity gains by encompassing the effects of any economies of scale which might have been achieved. Examples of economies of scale available to larger companies include centralization of administrative functions, such as the personnel department or legal department. In July, 1997, we responded to the FCC's decision in this proceeding with a paper making the case that using a single X-Factor is inequitable and does not capture the inherent difference between RBOCs and smaller companies like Cincinnati Bell and

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[4] FNPRM at ¶48.

[5] J. Rohlfs, "Incentive Regulation and Estimates of Productivity," prepared for Cincinnati Bell Telephone Company (Attachment I), June 9, 1989.

[6] J. Rohlfs, "Differences in Productivity Gains Among Telephone Companies," prepared for CENTEL, September 3, 1991.

[7] Another finding of the study was that companies with low unit costs tend to have slower productivity growth. Empirical evidence in this report establishes that the positive effect of Citizen's high cost is overbalanced by the negative effects of its small holding company and relatively rural subscriber base.

Aliant[8]. In April, 1998 we responded with an update of that study that buttressed our earlier findings by broadening the analysis to include another mid-sized company – Aliant[9]. The inclusion in the analysis of an additional company provided the opportunity for a sensitivity analysis confirming the robustness of the earlier estimates. It also revealed results for Aliant consistent with those for Cincinnati Bell.

In prior studies, we were unable to include Citizens because consistent data were lacking. Data before 1996 are inconsistent because of Citizen's acquisitions of numerous properties. Consistent data since 1996 are available for Citizens' acquired properties in New York but not for other properties because only Citizens New York property is subject to full CAM/ARMIS reporting requirements. Now that consistent data are available for New York, they afford an analysis of productivity for the years 1996-1998. The results provide further evidence that differences in productivity among LECs persist. Calculating the recent productivity of Citizens reveals that its productivity differs significantly from that of the RBOCs.

I. REASONS FOR PRODUCTIVITY DIFFERENCES

Despite their common acronym, "LECs" are actually a very diverse population. Some companies serve primarily urban areas, while others serve entirely rural communities. They also vary significantly in size. The RBOCs are many times the size of the smaller companies and serve a mixture of urban and rural areas. As we have asserted in previous studies, it is possible that the RBOCs are sufficiently similar that one X-Factor may be appropriately applied to all of them. However, it is likely that smaller companies such as Citizens face quite different circumstances than do the RBOCs and therefore should not automatically be faced

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[8] Jeffrey H. Rohlfs and Kirsten M. Pehrsson, *One Size Does Not Fit All: The Inadequacy of a Single X-Factor for All Price-Cap Companies*, submitted before the Federal Communications Commission, In the Matter of Price Cap Performance Review for Local Exchange Carriers; Access Charge Reform, CC Docket Nos. 94-1 and 96-262, Attachment to Petition for Reconsideration, July 11, 1997.

[9] Jeffrey H. Rohlfs and Kirsten M. Pehrsson, *One Size Does Not Fit All: Further Evidence Against the Adequacy of a Single X-Factor*, Attachment to Ex Parte Letter from Independent Telephone & Telecommunications Alliance, CC Docket 94-1, May 14, 1998.

with the same X-Factor treatment. Treatment of any LEC as if it belonged to the more homogenous subset of RBOCs can be patently unfair. There are many reasons that rural telecommunications carriers have fewer prospects for productivity growth than do urban carriers. For example:

- Most of the investment of rural carriers is in long loops to serve residential subscribers.

- In recent years, the largest telecommunications efficiency gains have related to handling incremental usage at ever-lower cost. A relatively small part of the costs of rural carriers is usage-sensitive and therefore subject to such efficiency gains.

- The gains from deployment of fiber optics increase directly with the density of traffic. The density of traffic on rural carriers' fiber optic facilities being relatively small, the gains from deploying such facilities are commensurately smaller than for the RBOCs.

In addition, carriers (whether rural or urban) that are owned by small holding companies have fewer prospects of efficiency gains through centralization, discussed previously.

Despite these profound differences, the current price-cap scheme does not make any distinction among categories of LECs — it treats all companies alike. This problem can and should be corrected. The price-cap scheme should be restructured to take account of the different prospects for productivity growth among price-cap LECs and afford a lower X-factor to companies such as Citizens that have lower productivity growth expectations.

One concern the FCC has expressed regarding multiple X-factors is that they could be gamed by the LECs. However, gaming would pose a problem only in a situation where multiple X-factors were constructed to as to reward poor performance. For example, if a company could achieve a better X-factor because it had lower productivity, it might then have an incentive to lower productivity. However, gaming is not an issue so long as the criteria for distinguishing companies with respect to the X-factor are exogenous. Exogenous factors, by definition, are independent of the company's behavior.

II. METHODOLOGY

III.

In the following analysis, we use the FCC's 1997 TFP study methodology to estimate the price/productivity differentials for 1996-1998. However, we do not necessarily endorse this method as the best way to measure productivity growth. The absolute value of the productivity estimates may vary greatly, depending on the specific methodology used. However, the finding of a substantial differential between Citizens and the RBOCs appears robust independent of the estimation method used.

Our analysis here is based primarily on populating the FCC's methodology with ARMIS data for Citizens' New York property. We analyzed the New York property because it has the most consistent and readily-available data, due to CAM/ARMIS reporting requirements. We can make some inference as to the productivity of Citizens' overall productivity by examination of this single property. The New York property is substantial part of the company – it contains over a third of Citizens' total access lines[10]. Besides being the largest of Citizens' properties, the New York service area is less sparsely populated relative to the Citizens' average. As of 1998, the New York property served an average of 31 access lines per square mile, while the average for all Citizens' properties was only 11 access lines per square mile. Measurement of the New York property's productivity is therefore likely to provide a conservative estimate of the productivity differentials between Citizens and the Regional Bell Operating Companies (RBOCs).

A. Adjustments to 1997 Method

We updated the FCC's 1997 TFP methodology by substituting Citizens-New York data for those years where consistent and reliable data series are available. We used data provided by Citizens' staff to augment those available in the FCC's ARMIS and Statistics of Communications Common Carriers reports and NECA publications.

[10] Recent Citizens data report the New York property serves 321,896 of the company's 941,517 lines.

We did, however, make some adjustments to the FCC's 1997 TFP methodology. These adjustments are detailed, below.

Unregulated Costs.

As in our previous studies, we have made an alteration to the FCC's methodology in order to properly calculate the productivity of Citizens relative to the RBOCs. The productivity model developed by the FCC Staff does not include outputs associated with unregulated activities. This omission is manifested in the exclusion of the Miscellaneous Revenues category, which includes revenues from unregulated activities. A productivity model that excludes outputs of unregulated activities should also exclude the inputs used in their production. If not, the estimates of output growth and input growth are inconsistent and cannot be compared to estimate total factor productivity. The FCC's 1997 TFP model does not exclude the inputs used in unregulated activities. This methodology may be reasonable for estimating RBOC productivity growth because unregulated revenues are a small fraction of total RBOC revenues. This methodology is not, however, reasonable for mid-sized companies such as Citizens, that have or have had substantial unregulated ventures. Unregulated activities are a larger part of Citizens' output than of the RBOCs. Therefore, we have modified the FCC's methodology to exclude unregulated inputs from the analysis for Citizens.

1. Local Usage

The FCC's 1997 TFP study uses local call data to measure local usage. Citizens does not collect local call data. Therefore, for the purposes of calculating the productivity differential, we used access lines and also DEMs (which were used by the FCC in its 1999 TFP Staff study). While the use of DEMs suffices to illustrate the large productivity differential between companies, we believe that the long-run marginal costs of local usage depends much more on the number of switched access lines than on either local calls or DEMs. Hence, switched access lines are a better quantity index than either local calls or DEMs. However, we present results using both access line and DEM measures, below. Similarly, we used both DEMs and access lines measures in calculating the RBOC productivity, so that one-to-one comparisons with Citizens could be made.

Use of access lines as a measure of local usage results in lower average productivity for all LECs for the years examined. Even so, there remains a significant differential between the

RBOCs and Citizens productivity averages. The use of DEMs yields higher productivity measurements, but the differential between the RBOCs and Citizens is also greater. It is likely that call data, were it available, would yield productivity differential results somewhere in between these two measures.

2. Use of FCC Updated Indices

We used the updates to the economy-wide indices used by the FCC in its 1999 TFP update. However, we do not necessarily endorse these particular series over others as the correct series to use (*e.g.*, relative to those used by USTA in its update of the 1997 TFP methodology). Regardless, the choice of economy-wide indices should make virtually no difference in assessing productivity differentials between companies.

B. Differential with RBOCs

1. Productivity Differentials

The results of the productivity analyses show that there is a significant differential between the average price/productivity differential of Citizens as compared to that for the RBOCs, using the FCC's 1997 TFP methodology (modified as described above). To obtain comparable RBOC price/productivity results, we used the FCC's 1997 TFP methodology updated with the economy-wide indices and recent RBOC operating data used by the FCC in the 1999 TFP method. The following summarizes the results using alternative methods of measuring local output (lines and DEMs). Further detail on each average is provided in the Appendix. While we feel that lines are the more appropriate measure, if the FCC does opt to use DEMs, it should be consistent and allow the larger differential for Citizens' X-factor.

The resulting differentials of 1.2% (using access lines as the measure of local usage) and 2.5% (using DEMs as the measure of local usage) offer strong evidence that Citizens has slower productivity growth than the RBOCs.

Comparison of 1996-1998 Average Price/Productivity Differentials for Citizens vs. RBOCs, using Modified FCC 1997 TFP Methodology			
	RBOC	Citizens	Differential
Using Access Lines	2.1%	0.9%	1.2%
Using DEMs	3.8%	1.3%	2.5%

IV.

V. CONCLUSIONS

A reasonable inference of productivity for Citizens as a company can be made from analysis of the New York property. It is Citizens' largest property, with over a third of Citizens' access lines. And, because it is not as sparsely populated as other Citizens' properties, the estimate of its differential in productivity with the more urban RBOCs is likely a conservative measure. The differential in productivity between Citizens as a whole (which is even more rural; on average only one-third as densely populated as the New York property) and the RBOCs is likely to be even greater.

The results discussed above offer strong evidence that Citizens has had slower average productivity growth than the RBOCs in recent years. This slower growth does not indicate poor performance by Citizens, but, rather, the particular circumstances faced by that company. In addition to being smaller than the RBOCs, we understand that Citizens serves only rural areas (as defined by the 1996 Telecommunications Act). Also, Citizens consist of multiple properties owned by a small holding company. It therefore has less opportunity for the productivity gains from centralization of functions (*e.g.*, personnel department, legal department, other administrative functions) available to the RBOCs[11]. A company in this environment should not be expected to realize productivity gains at the same rate as do large,

[11] J. Rohlfs, "Differences in Productivity Gains Among Telephone Companies," prepared for CENTEL, September 3, 1991.

primarily urban companies. This inherent problem with the current price-caps scheme should be remedied. Companies such as Citizens should be allowed to participate in the FCC's price-cap plan at a lower productivity-factor and a lower Consumer Productivity Dividend (if separately identified) to reflect their lesser prospects for productivity growth.

Appendix: Tables 1-4

Table 1.

Citizens-NY Price/Productivity Differential Estimates based on FCC Staff Model, Using Access Lines as Quantity Index for Local Usage

	Input Price Growth Rates			Total Factor Productivity Growth Rates			Citizens-NY
	Citizens-NY	U.S. Nonfarm Business Sector	Differential	Citizens-NY	U.S. Nonfarm Business Sector	Differential	Price/Productivity Differential
Year	A	B	C = B - A	D	E	F = D - E	G = C + F
1996	2.44%	1.38258%	-1.06%	0.44%	1.47713%	-1.04%	-2.1%
1997	-4.95%	1.89887%	6.85%	-6.51%	0.39024%	-6.90%	-0.1%
1998	9.68%	0.71810%	-8.96%	14.51%	0.59259%	13.91%	5.0%
Average: [1996-98]	2.39%	1.33%	-1.06%	2.81%	0.82%	1.99%	0.93%

B: U.S. Nonfarm Business Sector Input Price Growth Rate (%) used by FCC in 99 TFP Update.
E: U.S. Nonfarm Businesss Sector TFP Growth Rate (%) used by FCC in 99 TFP Update.

Table 2.

RBOC Price/Productivity Differential Estimates based on FCC Staff Model, Using Access Lines as Quantity Index for Local Usage

	Input Price Growth Rates			Total Factor Productivity Growth Rates			LEC
Year	Total RBOCs A	U.S. Nonfarm Business Sector B	Differential C = B - A	Total RBOCs D	U.S. Nonfarm Business Sector E	Differential F = D - E	Price/Productivity Differential G = C + F
1996	8.59%	1.38258%	-7.20%	9.80%	1.47713%	8.32%	1.1%
1997	-1.69%	1.89887%	3.59%	1.99%	0.39024%	1.60%	5.2%
1998	4.17%	0.71810%	-3.45%	4.06%	0.59259%	3.47%	0.0%
Average: [1996-98]	3.69%	1.33%	-2.35%	5.28%	0.82%	4.46%	2.11%

B: U.S. Nonfarm Business Sector Input Price Growth Rate (%) used by FCC in 99 TFP Update.
E: U.S. Nonfarm Businesss Sector TFP Growth Rate (%) used by FCC in 99 TFP Update.

Table 3.

Citizens-NY Price/Productivity Differential Estimates based on FCC Staff Model, Using DEMs as Quantity Index for Local Usage

	Input Price Growth Rates			Total Factor Productivity Growth Rates			Citizens-NY
	Citizens-NY	U.S. Nonfarm Business Sector	Differential	Citizens-NY	U.S. Nonfarm Business Sector	Differential	Price/Productivity Differential
Year	A	B	C = B - A	D	E	F = D - E	G = C + F
1996	1.80%	1.38258%	-0.42%	2.51%	1.47713%	1.03%	0.6%
1997	-4.95%	1.89887%	6.85%	-8.26%	0.39024%	-8.65%	-1.8%
1998	9.68%	0.71810%	-8.96%	14.78%	0.59259%	14.19%	5.2%
Average: [1996-98]	2.18%	1.33%	-0.85%	3.01%	0.82%	2.19%	1.34%

B: U.S. Nonfarm Business Sector Input Price Growth Rate (%) used by FCC in 99 TFP Update.
E: U.S. Nonfarm Businesss Sector TFP Growth Rate (%) used by FCC in 99 TFP Update.

Table 4.

RBOC Price/Productivity Differential Estimates based on FCC Staff Model, Using DEMs as Quantity Index for Local Usage

	Input Price Growth Rates			Total Factor Productivity Growth Rates			LEC
	Total RBOCs	U.S. Nonfarm Business Sector	Differential	Total RBOCs	U.S. Nonfarm Business Sector	Differential	Price/Productivity Differential
Year	A	B	C = B - A	D	E	F = D - E	G = C + F
1996	8.59%	1.38258%	-7.20%	11.85%	1.47713%	10.37%	3.2%
1997	-1.69%	1.89887%	3.59%	5.39%	0.39024%	5.00%	8.6%
1998	4.17%	0.71810%	-3.45%	3.62%	0.59259%	3.02%	-0.4%
Average: [1996-98]	3.69%	1.33%	-2.35%	6.95%	0.82%	6.13%	3.78%

B: U.S. Nonfarm Business Sector Input Price Growth Rate (%) used by FCC in 99 TFP Update.
E: U.S. Nonfarm Businesss Sector TFP Growth Rate (%) used by FCC in 99 TFP Update.

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