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August 28, 2002

Secretary
Missouri Public Service Commission
200 Madison Street, Suite 650
P. O. Box 360
Jefferson City, MO 65102
VIA FEDEX

FILED

AUG 29 2002

**Missouri Public
Service Commission**

Re: In the Matter of an Investigation of the Actual Costs Incurred in Providing
Exchange Access Service and the Access Rates to be Charged by Competitive
Local Telecommunications Companies in the State of Missouri
Case No. TR-2001-65

Dear Sir:

Enclosed are an original and two (2) copies each of the **HC and NP Surrebuttal Testimony of Randy G. Farrar**, and the **Surrebuttal Testimony of Dr. Brian R. Staihr**, on behalf of Sprint in the above-captioned matter. The filing category for this filing is 11 Telephone Specific Issues – Other Telephone Specific Issues. I would appreciate your filing the same and returning filed-stamped copies.

Pursuant to the Commission's Order Adopting Procedural Schedule, Clarifying the Scope of this Proceeding, and Concerning Motion to Waive Service Requirement and Motion to Compel Discovery issued on March 14, 2002 ("Order"), copies of the foregoing are being served on counsel for all represented parties in this case. This cover letter is being served on unrepresented parties pursuant to the Order, advising all unrepresented parties that you may obtain a copy of the referenced documents upon request from the filing party at no cost.

Please direct any further questions or requests to Vickie Worrel at 913-315-9135.

Very truly yours,

Lisa Creighton Hendricks

/vw

cc: Counsel for All Represented Parties of Record w/enclosures
All Unrepresented Parties of Record w/o enclosures

ACCESS COSTS
BRIAN K. STAIHR
SPRINT
SURREBUTTAL TESTIMONY
TR-2001-65
AUGUST 28, 2002

BEFORE THE MISSOURI PUBLIC SERVICE COMMISSION

In the Matter of an Investigation of the Actual)
Costs Incurred in Providing Exchange Access)
Service and the Access Rates to be Charged by) **Case No. TR-2001-65**
Competitive Local Exchange Telecommunications)
Companies in the State of Missouri.)

SURREBUTTAL TESTIMONY

OF

BRIAN R. STAIHR

ON BEHALF OF

SPRINT COMMUNICATIONS COMPANY, L.P.

AND

SPRINT MISSOURI, INC.

August 28, 2002

FILED

AUG 29 2002

Missouri Public
Service Commission

In the Matter of an Investigation of the)
Actual Costs Incurred in Providing Exchange)
Access Service and the Access Rates to be) Case No. TR-2001-65
Charged by Competitive Local Exchange)
Telecommunications Companies in the)
State of Missouri.)

[illegible]

1. I am presently Senior Regulatory Economist for Sprint Corporation.
2. I have participated in the preparation of the attached Surrebuttal Testimony in question and answer form to be presented in the above entitled case;
3. The answers in the attached Surrebuttal Testimony were given by me; and,
4. I have knowledge of the matters set forth in such answers and that such matters are true and correct to the best of my knowledge and belief.

BRK

Brian K. Staihr

Subscribed and sworn to before me on this 26th day of August, 2002.

Arthur Ochs

NOTARY PUBLIC

MICHAEL G. McCAIN
Notary Public, State of Kansas
My Appt. Exp. 4/26/2003

1 **SURREBUTTAL TESTIMONY OF BRIAN K. STAIHR**
2

3 **I. INTRODUCTION**
4

5 Q. *Please state your name, title, and business address.*
6

7 A. My name is Brian K. Staihr. I am employed by Sprint Corporation as Senior
8 Regulatory Economist in the Department of Law and External Affairs. My
9 business address is 6450 Sprint Parkway, Overland Park, Kansas 66251.
10

11 Q. *Are you the same Brian K. Staihr that filed rebuttal testimony in this proceeding*
12 *on August 1, 2002?*
13

14 A. Yes I am.
15

16 Q. *What is the purpose of your surrebuttal testimony?*
17

18 A. In this testimony I respond to two specific issues that are raised, in various forms,
19 in the rebuttal testimonies of Dr. Ben Johnson (on behalf of Commission Staff),
20 Ms. Barbara Meisenheimer (on behalf of Office of Public Counsel) and Mr.
21 William Dunkel (also on behalf of Office of Public Counsel). The two issues are
22 1) the incorrect assertion that the cost of the service known as switched access
23 includes a portion of the cost of the network element known as the local loop, and

1 2) the incorrect statement that a service is not providing a subsidy to another
2 service if it is priced below its stand-alone cost.

3
4 **II. LOOP COSTS AS A COMPONENT OF THE COST OF SWITCHED ACCESS**

5
6 Q. *You stated above that it is incorrect to allege that the cost of providing the service*
7 *known as switched access includes the cost of the network element known as the*
8 *local loop. On page 11 of her rebuttal testimony, lines 18-21, Ms. Meisenheimer*
9 *suggests that SWBT's cost study "provides no meaningful insight" because it*
10 *does not include loop costs (or a portion of loop costs). Please comment.*

11
12 A. Ms. Meisenheimer's statement on that page, and some of the references she
13 presents on the following page, are classic examples of the misunderstanding that
14 has permeated countless regulatory proceedings regarding the cost of the loop, the
15 cost of basic service, and the proper methods for estimating and recovering those
16 costs. In a nutshell, Ms. Meisenheimer has failed to distinguish an economic
17 exercise—*calculating a cost*—from a political (or policy) decision—*how that cost*
18 *should be recovered once it is calculated*. It is my understanding that the subject
19 of this phase of this proceeding is determining the actual cost of switched access,
20 not how that cost should be recovered. The failure to distinguish between the two
21 lies in the fact that, historically, access *charges* have been used as a mechanism
22 for recovering a portion of loop costs. That is not the same thing as the loop cost
23 being a component of the cost of switched access. Again, as discussed at length

1 in my rebuttal testimony, Ms. Meisenheimer continues to mistakenly treat *joint*
2 *use* of the loop as evidence that the loop is a joint cost. The first sentence on page
3 12 of her rebuttal testimony is an example of this, where she states, “Joint use of
4 the telecommunications network supports a shared cost allocation to all services
5 that makes [sic] use of that network.” To demonstrate the flaw in this argument,
6 we need only replace the words “telecommunications network” with the words
7 “telephone handset” (since the handset is used for all telecom services): “Joint
8 use of the telephone handset supports a shared cost allocation to all services that
9 make use of that handset.” Is Ms. Meisenheimer suggesting that the cost of
10 switched access should include a portion of the telephone handset? Her testimony
11 does not make such a suggestion, but to be consistent with her own argument she
12 would have to advocate that a portion of the cost of customer premise equipment
13 (CPE) must be contained in the costs of all services that require the use of CPE.

14
15 Q. *But doesn't Ms. Meisenheimer include citations from various parties in support of*
16 *her position?*

17
18 A. The citations that Ms. Meisenheimer provides from NARUC and from the Public
19 Service Commission of Missouri on page 12-13 of her rebuttal testimony are
20 *normative* statements; that is, statements that advocate a certain policy position,
21 not statements of fact. And both statements address the political issue of cost
22 recovery, not the economic issue of cost calculation. As the NARUC citation
23 makes very clear, the issue being discussed in that statement is how the loop cost

1 should be recovered, not how the loop cost is calculated. The same holds true for
2 the statement from the Public Service Commission of Missouri.

3
4 Q. *What about the citation from the FCC on page 12?*

5
6 A. Two points are worth noting regarding the FCC citation. First, it is taken from a
7 1997 Notice of Proposed Rulemaking (NPRM), Notice of Inquiry, and Third
8 Report and Order in the FCC's access reform docket, CC Docket #96-262. In the
9 section that Ms. Meisenheimer cites (Section VI. "Prescriptive Approach to
10 Access Reform," Subsection C.4) the FCC was seeking comment on the policy
11 issue of how access *rates* should be set in the event that they (the FCC) decided to
12 adopt a prescriptive approach to access reform. At the time this NPRM was
13 written the FCC had not yet decided whether to take an active role or a more
14 passive, market-based role in reforming access charges. The first point worth
15 noting is that when the FCC finally did adopt their prescriptive stance regarding
16 access reform the result was the CALLS Order that Ms. Meisenheimer references
17 on pages 5-7 of her rebuttal testimony. The purpose of the CALLS Order was
18 (and is) "removing implicit subsidies in access charges and recovering costs from
19 those services that cause them."¹ By explicitly using the term "subsidies" the
20 FCC is acknowledging that access charges are recovering the costs of some
21 service other than switched access. And the CALLS Order also explicitly states

¹ CALLS Order (Sixth Report and Order in CC Docket No. 96-262, Report and Order in CC Docket No. 99-249, Eleventh Report and Order in CC Docket No. 96-45), released May 31, 2000, paragraph 166.

1 that the costs being addressed are loop costs.² Therefore, regardless of the
2 wording of the NPRM that Ms. Meisenheimer cites, it is clear that the FCC's
3 actions reveal that they believe loop costs are not part of the cost of switched
4 access.

5
6 The second point worth noting is that, as Sprint witness Randy Farrar has stated in
7 his testimony, when the FCC calculates the forward-looking economic cost of
8 basic service as part of the calculation of federal universal service support the
9 FCC includes the local loop *in its entirety* in that calculation. According to the
10 FCC's actions, 100% of the cost of the loop is included in the cost of basic
11 service. So by default, 0% of the cost of the loop is included in the cost of
12 switched access. Now, it is true that after the FCC has calculated the cost of basic
13 service they make a political decision regarding how much of that cost should be
14 supported by a Federal fund. But the policy decision does not enter into the cost
15 calculation. Neither should it in this case.

16
17 At some point in the future it is possible that the Commission will make the
18 conscious policy decision that access *rates* should continue to recover a portion of
19 the cost of the local loop. Or the Commission may decide, as the FCC did, that
20 implicit subsidization of that type is inconsistent with a smoothly functioning
21 competitive market. But that decision is not at issue in this phase of the
22 proceeding. The issue at hand is to determine the actual cost of switched access,

² CALLS Order paragraph 120.

1 and the actual cost of switched access does not include the cost of the loop, any
2 more than it contains the cost of the telephone handset.
3

4 **III. STAND ALONE COST AS A TEST OF THE EXISTENCE OF A SUBSIDY**

5

6 Q. *You also stated above that it is incorrect to claim that a service or good is not*
7 *providing a subsidy unless it is priced above its stand-alone cost. Do parties*
8 *make this claim in rebuttal testimony?*
9

10 A. Yes. In the rebuttal testimony of Mr. Dunkel on behalf of the Office of Public
11 Counsel (page 3) he refers to Dr. Johnson's testimony and agrees with Dr.
12 Johnson in making the (erroneous) statement that "a service is not producing a
13 subsidy unless it is priced above its stand-alone cost." Dr. Johnson himself
14 repeats his mis-statement when he writes on pages 2-3 of his rebuttal testimony
15 that the stand-alone costs he has produced are relevant because they are useful in
16 "determining whether a particular service is actually subsidizing another service."
17 And Ms. Meisenheimer, on page 11 of her rebuttal testimony, refers to SWBT's
18 filing and says that, because SWBT chose not to introduce a stand-alone cost
19 study, SWBT cannot support claims that access subsidizes other services.
20

21 Q. *Dr. Johnson, Ms. Meisenheimer, and Mr. Dunkel all seem to believe that it IS*
22 *correct to state that a service priced below its stand-alone cost is not providing a*
23 *subsidy. Yet in your rebuttal testimony you explained how this is incorrect and*

1 *you provided a very simple demonstration of how this does not hold in the case of*
2 *a multiple-product firm. Please comment.*

3
4 A. It is worth noting that, in both the direct and rebuttal testimonies of Dr. Johnson
5 and Ms. Meisenheimer, neither witness provides a citation or source when they
6 state that “economic theory” supports their position.³ Nor does Mr. Dunkel
7 provide a citation or source other than Dr. Johnson. This is unfortunate, because
8 the economic literature is clear that the test must be applied both to individual
9 services and to groups of services. In other words, taking a single service (offered
10 by a multi-service firm) and determining that its price is below its stand-alone
11 cost tells you nothing. It is necessary to take each subset of services that the
12 service could be part of and compare the prices of the subset of services to that
13 group’s stand-alone cost. Only then can any conclusions be made regarding the
14 existence of cross-subsidies. And no party in this proceeding has done that,
15 which is understandable given the complexity involved in attempting such
16 calculations. In short, Dr. Johnson’s and Mr. Dunkel’s claims that switched
17 access is not providing a subsidy in Missouri have no foundation.

18
19 Q. *The economic literature is clear is with regard to the fact that subsets of services*
20 *must be examined, not just individual services?*

21

³ Dr. Johnson provides a reference from William Baumol regarding stand-alone costs and price ceilings, but no reference regarding stand-alone costs as a test of cross-subsidy.

1 A. Yes. As stated in my rebuttal testimony, Dr. Gerald Faulhaber was the first to
2 formalize this theory in an article from 1975 and in that seminal work he
3 specifically refers to the necessity of testing subsets of services for cross-subsidy.⁴
4 In a 1998 article from the Journal of Regulatory Economics Dr. Steve Parsons
5 discusses Dr. Faulhaber's work and explicitly states that the stand-alone cost test
6 requires "that the revenue from a service *or subset of services* be less than or
7 equal to the cost of providing that service *or subset of services* independently"
8 (emphasis added) for prices to be subsidy-free.⁵
9
10 Furthermore, (and also as stated in my rebuttal testimony), my investigation
11 included a study of the positions of several colleagues having expertise in this
12 area, including Dr. Parsons and Dr. Faulhaber, with respect to the application (and
13 mis-application) of the stand-alone cost test. Attached is a short white paper by
14 Dr. Faulhaber, described as an "explication of the principles" contained in his
15 earlier (1975) work, which is consistent with my position presented in my rebuttal
16 testimony: that the stand-alone cost test must be applied to all individual services
17 and all groups of services in order to determine the presence (or absence) of
18 subsidies. The white paper is publicly available at Dr. Faulhaber's website.⁶
19

⁴ Gerald R. Faulhaber, "Cross-Subsidization: Pricing in Public Enterprises", *American Economic Review*, Volume 65, Issue 5, December 1975, pages 969 and 970.

⁵ Steve Parsons, "Cross Subsidization in Telecommunications", *Journal of Regulatory Economics*, 13:157-182, 1998.

⁶ See Schedule BKS-S-1.

The white paper can be found at <http://rider.wharton.upenn.edu/~faulhaber/talks.html>.

1 Q. *Why is it so important to understand that the stand-alone cost test, as conducted*
2 *by Dr. Johnson, proves nothing with regard to the existence (or non-existence) of*
3 *subsidies?*

4
5 A. If one were to mistakenly conclude, based on the result of a single stand-alone
6 cost test, that access charges at their current levels were not subsidizing another
7 service (such as basic local service) then a person or a Commission might
8 conclude that it was acceptable to reduce access charges without a corresponding
9 re-balancing of local rates. Such a conclusion would, of course, be incorrect.
10 Local service is subsidized in Missouri and if the Commission (for whatever
11 reason) sought to reduce the *source* of the subsidy—that is, access charges—it
12 would be necessary to allow local rates to move closer toward their costs. In
13 other words, incorrect conclusions regarding the applicability of a single stand-
14 alone cost test could lay the groundwork for significant policy errors down the
15 road. For that reason, it is important to understand the significance (or lack
16 thereof) of the results that Dr. Johnson has presented.

17
18 Q. *Does that conclude your surrebuttal testimony?*

19
20 A. Yes it does.

CROSS-SUBSIDY ANALYSIS WITH MORE THAN TWO SERVICES

Professor Gerald R. Faulhaber
Professor, Wharton School, University of Pennsylvania
August 11, 2002

The purpose of this note¹ is to address certain misperceptions regarding the proper interpretation and application of the principles of my paper, "Cross-Subsidization: Pricing in Public Enterprises,"² the first work in the economics literature to rigorously define the concept of cross-subsidy. This paper has been of some use in subsequent scholarly research as well as regulatory proceedings in which cross-subsidization is an issue.

Unfortunately, the principles of cross-subsidy analysis established in my 1975 paper have not always been applied correctly. In this note, I address a specific question regarding the use of the "stand-alone cost" (SAC) test in a multi-service firm to determine the presence or absence of cross-subsidy. In brief, the stand-alone cost of any service or group of services of an enterprise is the cost of providing that service (at the existing or "test" demand level) or group of services by themselves, without any other service that is provided by the enterprise. A closely related concept is that of "incremental cost" (IC). The incremental cost of a service or group of services is the additional cost of providing that service or group of services over and above the cost of providing all the remaining services. For example, suppose an enterprise produced five services, $i = 1, 2, 3, 4, 5$, for a total cost of $C(12345)$, and the stand-alone cost of services 2, 3, 4, 5 were $C'(2345)$, then the incremental cost of service 1 is $IC(1) = C(12345) - C'(2345)$. In the paper, I use both incremental cost and stand-alone cost as tools to define subsidy-free prices. In brief, if the revenues of a regulated enterprise just cover total economic costs, then all prices are subsidy-free if the revenues of each service and each group of services is at least as great as the incremental cost of that service or group of services; equivalently, prices are also subsidy-free if the revenues of each service and each group of services is no greater than the stand-alone cost of that service or group of services. I show in the paper that under the assumption that revenues equal economic costs, these two tests for cross-subsidy are equivalent.

The specific question is: if two (out of three) services offered by an enterprise individually have revenues less than stand-alone cost, can we conclude that no cross-subsidy is being provided to the third service?

An example will help illustrate the question, and my answer. Suppose we have Services 1, 2, and 3. The three services share a common cost of \$100, which must be incurred if

¹ This note was prepared at the request of Sprint to clarify some questions concerning the application of my earlier work on cross-subsidy to address questions that have arisen in regulatory proceedings. It is not an endorsement of any regulatory position of Sprint or any other party. This note is an explication of the principles contained in my earlier work and does not constitute any deviation or modification of that work for any purpose.

² *American Economic Review*, 65(5), December 1975, 966-977.

any or all of the services are offered. Over and above this common cost, each service has an incremental cost of \$75.³ The total cost of all three services together is therefore $\$100 + \$75 + \$75 + \$75 = \$325$. The stand-alone cost of each service is \$175, as each of the services if provided by itself would have to incur the common cost and its incremental cost. Suppose the revenues from Service 1 were \$140 and the revenues from Service 2 were \$150, each less than their individual stand-alone cost of \$175. Can we conclude that the price structure is subsidy-free and no subsidy is being provided to Service 3?

If the enterprise is regulated and the total revenues are just equal to the total cost, then total revenues must equal \$325. Since the revenues from Service 1 and Service 2 together are \$290, it must be the case that the revenues from Service 3 are \$35, clearly less than Service 3's incremental cost. This would suggest that there is a subsidy, or at the very least perhaps a contradiction, in that the SAC is satisfied for all services individually (which would suggest that there is no subsidy) but the IC test is violated for Service 3 (which would suggest that there is a subsidy).

The answer is that at the revenues and costs of the example, there is a subsidy. The reason is very clear in the original 1975 paper: both the SAC and the IC tests must be applied not only to each service individually, but to *all possible groups of services*. The importance of groups of services was a key insight of the 1975 paper, but is often missed in regulatory applications. However, applying these tests to groups of services is absolutely vital to determining the presence or absence of cross-subsidy. Applying these tests merely to individual services cannot be thought of as an approximation, or "good enough." It is a fatal error, as it is in the above example.

When we apply the full set of tests to the revenues and costs of the example (assuming total revenue equals total cost), we find the following:

Services	Revenues	Stand-Alone Cost	Incremental Cost
1	\$140	\$175	\$75
2	\$150	\$175	\$75
3	\$35	\$175	\$75
1 & 2	\$290	\$250	\$150
1 & 3	\$175	\$250	\$150
2 & 3	\$185	\$250	\$150
1 & 2 & 3	\$325	\$325	\$325

It becomes immediately clear from this table that while each service passes its individual stand-alone test, Services 1 and 2 *together* fail their *combined* SAC test, as shown in the shaded row of the table, in which revenues for the two services together are \$290, while the stand-alone costs of these two is \$250.

While the definition of cross-subsidy and the arithmetic of the example are clear, the economic logic of it may not be so clear. For a complete exposition of the issue, the

³ For example, if each service produced 7500 units at a constant marginal cost of \$0.01, incremental cost would be \$75.00.

original article is the best and clearest source. However, I quote in brief from this article to motivate the above mathematical definition: "If the provision of any commodity (or group of commodities) by a multicommodity enterprise subject to a profit constraint leads to prices for the other commodities no higher than they would pay by themselves, then the price structure is *subsidy-free*" [italics in original]. In the example, the provision of Service 3 through the profit-constrained enterprise leads to higher prices for Services 1 and 2. If Service 3 were eliminated from the product set of the enterprise, then total costs would decline from \$325 to \$250, and the current revenues from Services 1 and 2 of \$290 would exceed \$250. Therefore, the price of at least one of the remaining services would have to decrease in order for total revenues to equal total costs. Thus, the provision of Service 3 (at these revenues and costs) "leads to higher prices for the other commodities higher than they would pay by themselves." Result: subsidy.

The example of the question provides an excellent opportunity to focus on the role of *groups* of services, rather than just services individually, in cross-subsidy analysis. The importance of groups of service in cross-subsidy analysis is impossible to over-emphasize, and yet it may be overlooked in regulatory work. Unfortunately, as the simple example shows, such oversight can lead to fatal errors in the analysis. Clearly, performing the subsidy analysis on all groups of services may substantially increase the cost analyses needed to support the subsidy analysis. But avoiding the hard work will almost surely lead to a flawed analysis, as in the example.

Further Considerations for Practical Application of Subsidy Analysis

The simplicity of the example belies a host of both theoretical and practical complexities in the application of subsidy analysis in practice. In brief, these complexities are easily accommodated without undermining the basic theory. I describe several such complexities and outline their resolution below:

The case of total revenues not equal to total cost. In price-regulated enterprises, the norm would be that total revenues would equal total economic cost. In non-regulated enterprises, the norm would be that total revenues would at least equal and possibly exceed total economic cost (we ignore the case of long-run losses, as the enterprise would shortly go out of business). In this case, the equivalence of the SAC tests and the IC tests no longer holds, but the concept of cross-subsidy is still valid. Under these assumptions, the stockholders of the firm become a "player" and the analysis must consider effects on this group as well as on services. The focus of cross-subsidy analysis shifts entirely to the IC tests; the SAC tests are not helpful under conditions of positive economic profits.

The services in question are cross-elastic. This case is dealt with in the paper, and requires some adjustment in the cross-subsidy test to consider incremental revenues as well as incremental costs. With cross-elasticities, the removal of a service may result not just in a loss of that service's revenue, but in changes to the revenues of other services as well. This effect must be accounted for in the practical application of the test, as described in the original article.

How are the firm's services defined? This seemingly simple question masks a number of important issues. For example, suppose a service actually consists of many different "rate elements," one for each component of the service. Is each rate element a service, for purposes of subsidy analysis? How about a tapered rate schedule? Is every element of the taper a separate service?

In brief, the answer is that anything the enterprise assigns a separate price to can and should be treated as a separate service. If for other purposes the word "service" is reserved for a larger grouping of component prices, then this larger grouping is included in the subsidy test as a group of services, as discussed above. The more detailed analysis ensures that customers that use some service components more intensely than others will not inadvertently be subsidizing customers with other component usage patterns within the larger service grouping.

A more difficult problem arises if the enterprise bundles services together into a single price that could more logically be offered separately. In this case, treating the bundle with its single price may lead to problems. Presumably, if regulators are concerned that bundling may produce hidden subsidies, then they may require the services to be unbundling and priced separately.⁴ Clearly, this would facilitate the subsidy analysis. However, absent an unbundling directive from regulators, such analysis would not be possible.

Shouldn't we be more concerned with customers being subsidized rather than services? This issue was taken up in my paper (with S. Levinson), "Subsidy-Free Prices and Anonymous Equity,"⁵ in which I examine the relationship between services being subsidy-free and customers being subsidy-free. The most stringent form of customer subsidy-free is called "anonymous equity;" the requirement that services be subsidy-free is a necessary but not sufficient condition for prices to be anonymously equitable. Therefore, the classic cross-subsidy analysis is the most helpful starting point for a more complete analysis of possible subsidy flows among customers.

What is the proper method for measuring incremental and/or stand-alone cost? While these cost definitions are quite clear conceptually, the practical implementation of measurement methods has been perhaps the most vexing problem in regulatory economics over the past forty years. Dispassionate scholars disagree on cost measurement methods, and parties to regulatory proceedings usually have very different views of appropriate methods. The FCC uses TELRIC (Total Element Long Run Incremental Cost) as a basis for cost advice to the states for pricing unbundled network elements from incumbent local exchange companies to competitive local exchange companies, but this standard has been hotly disputed in the courts and by academics. The measurement issues are beyond the scope of cross-subsidy analysis, although clearly the value of the analysis depends critically upon the validity of the cost estimates.

⁴ Unbundling of local loops for telephone companies was mandated by the Telecommunications Act of 1996, and implemented by the Federal Communications Commission and state regulators. This unbundling required separate prices be set for each unbundled element.

⁵ *American Economic Review*, 71(5), December 1981, 1083-1091.