

Cost or Benefit?

A Review of the Consumer Federation of America's Report on Regulating Special Access Services

Dr. George S. Ford*

April 18, 2016

Introduction

Recently, the Consumer Federation of America ("CFA") released a report entitled *The Special Problem of Special Access*, written by CFA's research director Mark Cooper. In this report, Dr. Cooper claims that slashing special access prices by 50% will add \$30 billion in economic output annually to the U.S. economy, or \$150 billion over five years.¹ Not surprisingly, Dr. Cooper's figure has been heavily cited by those encouraging the Federal Communications Commission ("FCC") to expand regulatory control over special access services, services that may be "deregulated" in metropolitan areas where certain competitive thresholds are satisfied.²

Curious as to the methods CFA used to produce this claimed \$150 billion benefit, I carefully studied Dr. Cooper's analysis, which led to me a 2011 report by economist Stephen Siwek (of the consulting firm Economists Inc.) entitled *Benefits of Special Access Price Reductions* ("Siwek Report"). Dr. Cooper adopts both method and estimates from Siwek's earlier study, so a review of Dr. Cooper's analysis is really a review of Dr. Siwek's analysis.³ In this PERSPECTIVE, I describe the calculations of the Siwek-Cooper Method (as I'll call it) used to compute the economic benefits of reductions in special access prices. As I easily demonstrate, there are both significant conceptual and technical problems with the Siwek-Cooper Method. The conceptual underpinning of the

method is logically inconsistent and leads to ridiculous policy prescriptions. Also, making relatively minor but valid adjustments to Siwek and Cooper's assumptions turns an alleged multi-billion-dollar benefit from a special access price reduction into a multi-billion-dollar bust for the U.S. economy. Given such significant flaws, policymakers should weight both the *CFA Report* and the *Siwek Report* accordingly.

... there are both significant conceptual and technical problems with the Siwek-Cooper Method. The conceptual underpinning of the method is logically inconsistent and leads to ridiculous policy prescriptions.

Background

The Telecommunications Act of 1996 directs the FCC to promote competition and reduce regulation. In response to that directive, in 1999 the Commission issued a decision granting regulated phone companies some flexibility in setting the prices for high-capacity circuits sold to businesses and other telecommunications firms—called special access services—in metropolitan areas where certain competitive triggers are

satisfied. The Commission did not generally deregulate special access services in 1999 as is often claimed; flexibility was conditional on meeting competitive thresholds. In fact, price regulation remains in force today in many geographic areas across the country.

... making relatively minor but valid adjustments to Siwek and Cooper's assumptions turns an alleged multi-billion-dollar benefit from a special access price reduction into a multi-billion-dollar bust for the U.S. economy.

Buyers of special access services, mostly other telecommunications firms, began their protest of the FCC's pricing flexibility decision before the ink on the original *Order* was dry. A central criticism of the deregulatory approach is the validity of the competitive thresholds (set fifteen years ago) in modern times. For the past fifteen years, the Commission has contemplated a modification of its deregulatory approach but failed to move, mostly due to a paucity of evidence and plausible solutions.⁴ In December 2012, more than a decade after the proceeding was opened, the Commission acted, shuttering its pricing flexibility regime and initiating a search for an alternative regulatory approach for special access services; a service that generates about \$18 billion annually for the incumbent phone companies.⁵ The FCC appears poised to vote on an outline of a new regulatory scheme in the coming weeks.⁶

The Siwek-Cooper Method

While Dr. Cooper's description of his calculation of the \$150 billion in alleged benefits is characteristically a muddled mess, the algorithm used to estimate the broad economic effects of a 50% price cut on special access services is taken

from an earlier report entitled *Benefits of Special Access Price Reductions* by Stephen Siwek (whom Dr. Cooper consistently calls "Spiwak," which is perhaps a Freudian shout out to the President of the Phoenix Center, Lawrence Spiwak).⁷ Unlike the *CFA Report*, however, Siwek's presentation is precise and thus easy to follow. Since the methods used across the two studies are identical, I will refer to the algorithm as the Siwek-Cooper Method, but it should be recognized that Dr. Cooper adds nothing new to Siwek's methodology except to arbitrarily inflate the estimates to bring them forward to 2015.

Perhaps recognizing that elasticity falls at lower prices, the Siwek-Cooper Method avoids the consequences by assuming the elasticity is a constant -1.6 across the entire demand curve. This is an implausible assumption, well known to economists, but ensures that the computed quantity change for a large price reduction is enormous (thus, ensuring a large revenue increase).

The Siwek-Cooper Method uses regional impact multipliers to quantify broad economic effects. Multipliers are based on the theory that if industry spends a billion dollars on a project in a particular region, then the total economic benefits of that expenditures to that region are larger than just the \$1 billion. The "new expenditure" to which the multiplier is applied is the alleged increase in total spending on (and thus total revenues from) special access services subsequent to a 50% price cut. The multipliers used are the RIMS multipliers produced by the U.S. Bureau of Economic Analysis ("BEA").⁸

The total economic effect (T) of slashing special access prices is computed in the Siwek-Cooper Method using the formula,

$$T = m(\Delta R), \tag{1}$$

where m is the multiplier and ΔR is the change in special access revenue (or expenditures by the buyers) resulting from a regulatory-mandated price cut. The output multiplier is assumed to be about 1.90,⁹ so the total effect is simply,

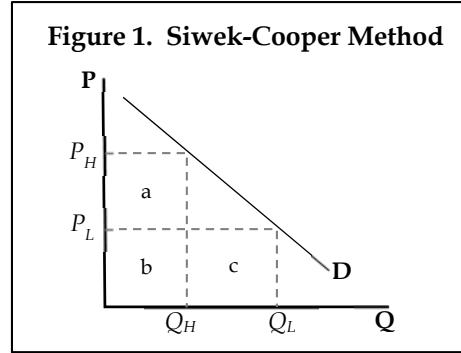
$$T = 1.9\Delta R. \tag{2}$$

This calculation is simple enough, at least as far as appearances go. There are, however, some technical details that pose problems with its internal validity and relevancy. Since ΔR is the key input, I'll focus my attention there.

... the Siwek-Cooper Method concludes that for a 50% price cut the number of special access circuits will triple. It's a silly prediction based on an improper use of the constant elasticity demand function...

Estimating the Revenue Change

To see how ΔR is estimated, consider Figure 1 where price is on the vertical and quantity is on the horizontal axis. The curve labeled D is a demand curve. Two price-quantity combinations are illustrated: a high price outcome (P_H, Q_H) and a low price outcome (P_L, Q_L).



At the high price, total revenues on this good are equal to $P_H \times Q_H$, which is equal to the two rectangles labeled **ab**. Alternately, total revenues are equal to $P_L \times Q_L$ at the low price, which is equal to the two rectangles labeled **bc**. The change in revenues from a price cut, ΔR , is equal to the difference between these two outcomes, which is equal to $\Delta R = a - c$. Plainly, for the price cut to increase revenues, and thus economic activity (by Equations 1 and 2), the rectangle **c** must be larger than the rectangle **a**. Whether or not this condition is satisfied depends on the slope and shape of the demand curve.¹⁰

Economic theory advises that total revenues will rise with a price cut if the demand curve is elastic (smaller than -1) over the range of prices considered.¹¹ The Siwek-Cooper Method assumes, based on research from 2003, that the elasticity is -1.6, which does indeed indicate that prices are in the elastic region of demand.¹² However, elasticities are valid only for very small price changes. Also, the elasticity of demand is not expected to be constant across the full range of prices and is less elastic at lower prices.¹³

Perhaps recognizing that elasticity falls at lower prices, the Siwek-Cooper Method avoids the consequences by assuming the elasticity is a constant -1.6 across the entire demand curve. This is an implausible assumption, well known to economists, but ensures that the computed quantity change for a large price reduction is enormous (thus, ensuring a large revenue increase).

*A serious problem with the Siwek-Cooper Method is that it views special access services as if they were homogenous goods sold in a centralized market. Yet, according to the FCC and those calling for increased regulation of special access services, the market for special access services is the individual “customer” or “location.” *** If true, then the calculations made by the Siwek-Cooper Method are invalid.*

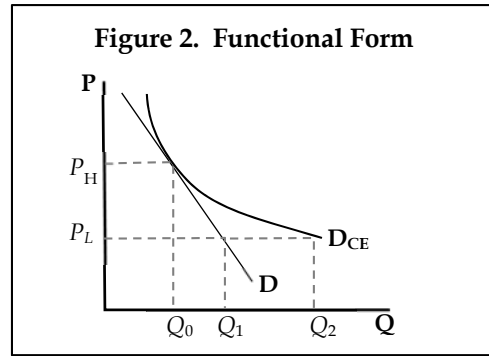


Table 1 shows the nature of the problem in a useful way by contrasting the *assumed elasticity* and the *effective elasticity*, which is defined as the actual percentage change in quantity for a given percentage change in price.¹⁵ As shown in the table, the effective elasticity of the constant-elasticity demand curve is not equal to the assumed elasticity of -1.6 except for very, very small price changes. Indeed, the effective elasticity departs from -1.6 even at a 1% price change. At the 50% price change assumed in the Siwek-Cooper Method, the effective elasticity is -4.06: a huge departure from the assumption of -1.6. This explains why a 50% price cut leads to a 203% increase in quantity in the Siwek study.

In order to maintain a constant elasticity, the constant elasticity demand curve is highly bowed and convex to the origin (see Figure 2). This bowed shape creates problems (or advantages for Siwek and Cooper) when analyzing very large price changes (like 50%). Figure 1 illustrates the difference between the constant-elasticity (labeled D_{CE}) and linear demand (labeled D) curves. For a price reduction from P_H to P_L , the quantity changes from Q_0 to Q_1 in the linear case. However, the quantity changes from Q_0 to Q_2 for the constant elasticity demand curve. As the price changes get very large, the bowed nature of the constant elasticity demand curve begin to exert a significant influence on the quantity changes. For instance, the Siwek-Cooper Method assumes an own-price demand elasticity of -1.6, so for a 50% price cut the expected quantity increase would be 80% ($= -1.6 \times -0.5$). However, the constant-elasticity demand curve renders a quantity increase of a whopping 203%! That is, the Siwek-Cooper Method concludes that for a 50% price cut the number of special access circuits will *triple*.¹⁴ It's a silly prediction based on an improper use of the constant elasticity demand function; the quantity effect is also incompatible with the assumed demand elasticity.

Table 1. Elasticity Calculations
(Assumed elasticity = -1.6)

Price Change	Effective Elasticity	
	Constant Elasticity	Linear Demand
0.1%	-1.60	-1.60
1%	-1.62	-1.60
5%	-1.71	-1.60
10%	-1.84	-1.60
20%	-2.15	-1.60
30%	-2.56	-1.60
40%	-3.16	-1.60
50%	-4.06	-1.60
60%	-5.55	-1.60

The fact of the matter is that we don't have any idea what the demand curve for special access will look like in the region of a 50% price cut. It's pure speculation. Economists do expect, however, that the demand curve becomes less elastic at lower prices, which is a feature of the linear demand curve and many other functional forms. Also, research that has attempted to estimate the shape

of the demand curve across a wide range of prices finds that demand curves for telecommunications services do not maintain constant elasticity, but rather are quite inelastic at very low prices and quite elastic at very high prices.¹⁶ (That is, at very low prices consumers largely ignore price, and at very high prices consumers ignore the product.)

It's the case that the constant-elasticity demand curve is used in econometric studies of demand, but mostly because it is somewhat standard procedure and a convenience since an elasticity (rather than the slope) is directly estimated by the statistical procedures. This empirical choice does not, however, imply that the demand curve has a constant elasticity across the full range of prices. It is well understood that when estimating a demand curve, especially of the constant-elasticity functional form,

[o]ne cannot accurately estimate an entire demand curve—instead, the goal is to obtain a good local estimate in the region of the data used for the estimation.¹⁷

Economists and econometricians understand that the constant elasticity formulation is only an approximation and only “locally valid” — that is, the constant elasticity assumption is valid for only very small price changes (discussed more fully below) and also only for the range of prices included in the estimation dataset.

Sensitivity to Assumptions about Demand

The Siwek-Cooper Method exploits the constant-elasticity demand curve to pump up the quantity increase and, in turn, the revenue consequences of a huge price cut; it's a fairly obvious manipulation of the elasticity calculation. Let's consider what happens to the estimate of benefits if we employ different but common forms of the demand curve as well as different assumptions about the elasticity of demand.

First, let's benchmark the analysis with the Siwek-Cooper calculations. In the Siwek study, data on quantity (measured as DSO equivalents) and price

(average revenue per DSO equivalent) for AT&T, Qwest, and Verizon is taken from ARMIS for year 2007, the last year this data is available. (Note, these measures of quantity and price measure neither quantity nor price.)¹⁸ Assuming a constant-elasticity demand curve and an elasticity of -1.6, Siwek computes a 203% increase in quantity from a 50% reduction in price (an effective elasticity of -4.1), leading to a revenue increase of about \$9 billion in 2007.¹⁹ This figure is marked up to \$11 billion for 2010 based on a growth factor of 6% per year (a three-year growth of 19%). The multiplier of 1.9 is applied to this number to produce a total economic harm of \$20.6 billion. (These figures appear in Table IV-1 of the *CFA Report*, though the \$9 billion revenue increase is incorrectly reported for 2010).²⁰ Extending the Siwek calculations to the period 2011 through 2015 using the 6% growth rate, the total economic gain of reducing prices 50% is \$125 billion.

In light of the empirical demands, the Siwek-Cooper Method is poorly designed and offers no compelling insights into the regulation of special access services.

Second, let's replace the constant-elasticity demand curve with a linear one. Using the quantity and price data from the Siwek study, I compute the parameters of the linear demand curve for each of the three incumbent phone companies given an elasticity of -1.6 at the current price.²¹ Using these demand curves, I compute the quantities for a 50% reduction in price, which are, as expected, 80% larger than the quantities at the higher price ($= -1.6 \times -0.5$). Following the Siwek-Cooper Method, I then multiply these larger quantities by the lower prices and compute that special access revenues are \$2 billion *lower* in 2010, *reducing* total economic activity (based on a multiplier of 1.9) by \$4 billion annually.²² The 50% price change is so large that demand becomes

inelastic across the assumed change. Computing this loss over the 2011-2015 period (using Siwek’s 6% growth rate), the reduction in total economic activity from slashing special access prices by 50% is \$24 billion. Thus, a simple yet equally valid assumption about the shape of the demand curve turns an economic benefit into an economic loss.²³

Third, let’s replace the constant-elasticity demand curve with a semilog functional form [$Q = f(\ln(P))$]. Now, the change in revenues is about \$1 billion in 2010. Over the period 2011 through 2015, the total economic impact would be about \$13 billion, less than 10% of the impact asserted in the *CFA Report*—a difference based on nothing more than the use of an equally-plausible demand function.

Let’s turn now to the elasticity assumption. Studies relied upon by the *CFA Report*, including Rappaport, et al. (2003) and WIK Consult (2016), conduct simulations based on a demand elasticity of -1.0.²⁴ Under this unit-elasticity assumption, the constant-elasticity demand curve renders equal revenues at all prices. Consequently, economic output is unaffected by the price cut if the elasticity is -1.0, so there is no economic effect of the price cut using the Siwek-Cooper Method. For the linear model, economic output is reduced by \$61 billion over the five-year period; for the semilog function economic output is reduced by \$37 billion over the five-year window.

Table 2. Siwek-Cooper Method: Change in Economic Output (\$ Billions)

Functional Form	Demand Elasticity	
	-1.6	-1.0
Constant Elasticity	120	0
Linear	-24	-61
Semilog	13	-37

Table 2 summarizes the results of these varied assumptions regarding functional form and demand elasticity. Plainly, the results are very sensitive to the assumptions, none of which has a firm empirical foundation. Importantly, the purpose of this exercise is not to suggest that slashing special access prices by 50% will reduce or expand output in the U.S. economy—the point

of this analysis is just to show the Siwek-Cooper Method is a flimsy estimation technique. In light of the empirical demands, the Siwek-Cooper Method is poorly designed and offers no compelling insights into the regulation of special access services.

... under the Siwek-Cooper Method the “benefits” from slashing special access prices has nothing to do with market power or economic welfare, it has mostly to do with the elasticity of demand and the particular functional form chosen by the analyst.

There is No Demand Curve for Special Access

A serious problem with the Siwek-Cooper Method is that it views special access services as if they were homogenous goods sold in a centralized market. Yet, according to the FCC and those calling for increased regulation of special access services, the market for special access services is the individual “customer” or “location.”²⁵ A recent filing by INCOMPAS, a proponent of special access regulation, explicitly addresses the market definition, describing the market for special access services as an “end-user location or cell tower.”²⁶ If true, then the calculations made by the Siwek-Cooper Method are invalid. There is no demand curve like that envisioned in the Siwek-Cooper Method.

The implications of the “customer specific” market definition was covered in detail in a paper I co-authored a few years ago entitled, *Market Definition and the Economic Effects of Special Access Price Regulation*.²⁷ As discussed in that paper, if the market is narrowly defined as a customer or location (i.e., a cell tower), in which a circuit (or collection of circuits) is exchanged, then there is countervailing market power on the buyer’s side.

There is a bilateral monopoly. As we explained in the paper, even in the presence of a monopoly seller price regulation cannot increase economic welfare.

In fact, our paper shows why the entire special access debate is simply a squabble over rents between buyers and sellers. Given a customer or location specific market, economic theory shows clearly that a mandated price cut for special access services can only reduce total economic welfare. Applying the standard, variable quantities framework to special access services is completely off track. The manner in which market power and regulation of special access services is talked about in the FCC record is completely at odds with the FCC's market definition.

Copying Siwek, Sort Of

As discussed above, the *CFA Report* borrows the methodology of the Siwek study, extrapolating Siwek's estimate from 2010 to the 2011-2015 timeframe. However, the details of the extrapolation are unclear. Dr. Cooper merely declares, without supporting calculations, that the average revenue change over the period is \$15 billion annually. Applying the growth factor used by Siwek (6% per year), the average over the 2011-2015 period is \$13 billion, not \$15 billion as assumed in the *CFA Report*.

It's not clear from the discussion of this extrapolation that Dr. Cooper really understands the Siwek method. For example, it appears he believes the \$15 billion are "excess earnings," rather than an expansion of expenditures on special access services. Recognizing that the discussion in the report regarding the \$15 billion figure may simply be unclear, I politely requested from Dr. Cooper more details on the source of his \$15 billion figure. That number is, after all, the most important number in the calculation of the \$150 billion benefit. My email request was simple enough:

On p. 33 of your report, you list \$15 billion in excess earnings. I don't see where that number came from. What's its source?²⁸

Shortly after the request was made, I received the following response from Dr. Cooper:

George, you are really the most careless analyst I have met in my 35 years in Washington. Last time we crossed paths, you totally misquoted the FCC analysis of wireless, futilely trying to criticize my analysis. Here again, you err. The words you attribute to me do not appear on page 36 there or anywhere else in the document. I talk about overcharges and macroeconomic costs of \$15 billion each and make it clear that excess profits are difficult to estimate. I will not let you get away with this crap. I have preserved this thread and will gladly use it to launch my rebuttal of your response to my analysis, if you are not more careful.²⁹

As is typical with Dr. Cooper, his response is vitriolic and unprofessional;³⁰ it is also non-responsive. Nevertheless, Dr. Cooper again describes the \$15 billion as "overcharges." Yet, the \$15 billion in the Siwek-Cooper Method is actually an undercharge, since the figure is based on an increase (not a decrease) in expenditures. Undeterred (perhaps foolishly), I repeated my request, reiterating that the number in question is on page 33 of the report not page 36 and quoting the actual sentence ("Since these excessive earnings have been rising rapidly, assuming an average of \$15 billion per year ..."). As of this writing, Dr. Cooper has yet to respond.

Internal Inconsistency, Ridiculous Prescriptions

Price cuts affect revenues in every industry, so the claim they do so for special access services is uninteresting from a policy perspective. The effects of market power are properly assessed by welfare or surplus changes, not revenue changes.³¹ Revenues changes need not say much about changes in economic welfare. As detailed above, under the Siwek-Cooper Method the "benefits" from slashing special access prices has nothing to do with market power or economic

welfare, it has mostly to do with the elasticity of demand and the particular functional form chosen by the analyst.

... the Siwek-Cooper Method prescribes a policy where the FCC should raise or lower prices for all goods and services it regulates so that the resulting demand elasticity is exactly -1.0. Such a policy prescription is ludicrous, revealing the inherent economic ignorance embodied in the Siwek-Cooper Method.

In fact, by looking at revenue changes the Siwek-Cooper Method suffers from an internal inconsistency. This method depends on revenue increases from price cuts, so the method requires a large elasticity. We can see the role elasticity plays in revenue changes by looking at the formula calculating the percentage change in revenue from a very small percentage change in price:

$$\% \Delta R = (\varepsilon + 1) \% \Delta P, \tag{3}$$

where ε is the own-price elasticity of demand. The larger (more negative) is ε , the larger is change in revenues for a price change. Equation (1) says the larger is ΔR , the greater are the economic gains from a price cut, so, by Equation (3), the more elastic is demand the larger are the economic effects of a price cut. This logic is illustrated in Table 2 where the economic gains are computed at two different elasticities.

Now let's turn to the *CFA Report's* discussion of market power. Presented in the report is the Lerner Index of market power, which can be written as

$$\frac{P - C}{P} = \frac{1}{|\varepsilon|}, \tag{4}$$

which is the inverse elasticity rule.³² Equation (4) shows that market power declines as the elasticity of demand gets larger (in absolute value).

The internal conflict of the Siwek-Cooper Method is apparent. On the one hand, the Siwek-Cooper Method requires a big elasticity to produce a big increase in revenues and, in turn, a big increase in economic output. But, on the other hand, economic theory indicates that the more elastic is the demand curve, the less market power there is.

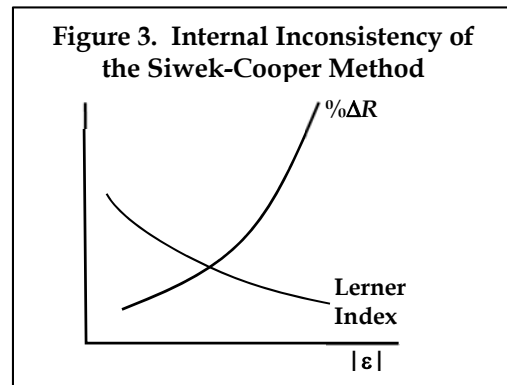


Figure 3 illustrates the confused nature of the Siwek-Cooper Method. The absolute value of the elasticity of demand is measured along the horizontal axis. As the (absolute value of the) elasticity gets larger, revenues rise by a larger percentage, implying the total economic benefits of a price cut as measured by the Siwek-Cooper Method are larger (by Equation 1). Yet, as the (absolute value of the) elasticity gets larger, market power, as measured by the Lerner Index, gets smaller. Indeed, a big number from the Siwek-Cooper Method could be taken to imply that there is not enough market power to warrant regulatory intervention.

Equation (4) also reveals why the constant-elasticity of demand assumption is silly. If the elasticity is equal at all prices, then market power, as measured by Lerner Index, is unchanged after a 50% price cut. So, if regulation is intended to control market power, a regulatory-mandated

50% price fails to accomplish the task according to the Siwek-Cooper Method. Plainly, it's a senseless methodology.

In addition to this internal inconsistency, the Siwek-Cooper Method leads to ridiculous policy prescriptions. As detailed above, the method holds that regulatory-mandated price reductions are valuable to the U.S. economy when demand for a good or service is elastic. By the same token, a price increase will be good for the U.S. economy when the demand for a good or service is inelastic, since revenues will rise with prices in the inelastic region of demand. Consequently, the Siwek-Cooper Method prescribes a policy where the FCC should raise or lower prices for all goods and services it regulates so that the resulting demand elasticity is exactly -1.0. Such a policy prescription is ludicrous, revealing the inherent economic ignorance embodied in the Siwek-Cooper Method.

The internal conflict of the Siwek-Cooper Method is apparent. On the one hand, the Siwek-Cooper Method requires a big elasticity to produce a big increase in revenues and, in turn, a big increase in economic output. But, on the other hand, economic theory indicates that the more elastic is the demand curve, the less market power there is.

Conclusion

Big numbers are a laxative for political action, so Washington loves big numbers. If you want action, then you need to be too big to fail, too big to pass up, or too big to ignore. A problem with this big-number mindset is that often very little attention is given to the details of where these big numbers come from, especially since today's

policy debates mostly occur in an economics-free zone.

In this PERSPECTIVE, I provide a detailed review of the Consumer Federation of America's attempt to calculate a "big number" in the context of the FCC's development of a new regulatory scheme for special access services. As shown here, CFA's claim is based on a method that is internally inconsistent, economically unsound, and computationally flimsy. Justifiable changes in CFA's assumptions results in multi-billion-dollars reductions in economic output and the method leads to ridiculous policy prescriptions.

Is there market power in special access markets? Perhaps. But poorly crafted and clumsily implemented efforts to measure revenue changes are entirely unhelpful. What the Commission needs to know is how to properly define market power in these markets, "how much" market power there is, and if the answer is "a lot," then what regulations, if any, can be designed and implemented that will make society better off.³³ Thus far, the Commission and the advocates for more regulation have no reasonable plan.

By far, however, the most critical misunderstanding in the Commission's thinking is its failure to trace out the implications of its choice for market definition. If special access services are sold in markets defined as individual customers, then there is countervailing market power. Economic theory indicates that regulation cannot improve economic welfare under such conditions. Nevertheless, the Commission, the alleged "expert" agency, blindly proceeds to develop regulations incompatible with its own characterization of special access services.

NOTES:

* Dr. George Ford is Chief Economist of the Phoenix Center for Advanced Legal and Economic Public Policy Studies. The views expressed in this PERSPECTIVE do not represent the views of the Phoenix Center or its staff.

¹ M. Cooper, *The Special Problem of Special Access: Consumer Overcharges and Telephone Company Excess Profits*, Consumer Federation of America (April 2016) (available at: <http://consumerfed.org/wp-content/uploads/2016/04/4-16-The-Special-Problem-of-Special-Access.pdf>) (hereinafter “CFA Report”).

² Press Release: *CFA Study Finds Special Access Market Concentration Cost Consumers & U.S. Economy \$150 Billion Since 2010*, Consumer Federation of America (April 5, 2016) (available at: http://consumerfed.org/press_release/cfa-study-finds-special-access-market-concentration-cost-consumers-and-the-u-s-economy-150-billion-since-2010).

³ S. Siwek, *Economic Benefits of Special Access Price Reductions*, Economists Inc. (March 2011) (available at: <https://prodnet.www.neca.org/publicationsdocs/wwpdf/31511sareport.pdf>).

⁴ G.S. Ford and L.J. Spiwak, *The Need for Better Analysis of High Capacity Services*, 28 JOHN MARSHALL JOURNAL OF COMPUTER AND INFORMATION LAW 343-384 (2011) (available at: <http://phoenix-center.org/papers/JCILSpecialAccess.pdf>).

⁵ *In the Matter of Investigation of Certain Price Cap Local Exchange Carrier Business Data Services Tariff Pricing Plans*, DA 15-1194, ORDER INITIATING INVESTIGATION AND DESIGNATING ISSUES FOR INVESTIGATION, 30 FCC Rcd 11417 (rel. Oct. 16, 2015) (hereafter “*Investigation Order*”). The total market for high capacity services, including services not regulated by and excluded from the Commission’s proceeding, is estimated to be \$40 billion. The incumbent phone companies represent about \$24 billion of that total market.

⁶ T. Wheeler, *Out with the Old, In with the New*, Blog Post (April 8, 2016) (available at: <https://www.fcc.gov/news-events/blog/2016/04/08/out-old-new>); T. Shields, *AT&T, Verizon Said to Face Limits on Business-Data Contracts*, BLOOMBERG.COM (April 8, 2016) (available at: <http://www.bloomberg.com/news/articles/2016-04-08/at-t-verizon-said-to-face-limits-on-business-data-contracts>).

⁷ CFA Report, *supra* n. 1 at Table IV-1.

⁸ Siwek, *id.* at 11-12 and Schedule 3. RIMS multipliers may be downloaded (for a fee) at <https://www.bea.gov/regional/rims/rimsii/>.

⁹ Siwek, *id.* at p. 16.

¹⁰ In Figure 1, the areas **a** and **c** are drawn to be approximately equal, suggesting the price cut will have no effect on revenues and thus no broader economic effect under the Siwek-Cooper Method.

¹¹ The own-price elasticity of demand is equal to the percentage change in quantity for a small percentage change in price.

¹² Siwek, *supra* n. 3, considers elasticities of -1.5, -1.6, and -1.7. The CFA Report, *supra* n. 1, assumes -1.6. The original source of the elasticity estimate is Rappaport, P., Taylor, L. Menko, A. and Brand, T., *Macroeconomic Benefits from a Reduction in Special Access Prices* (June 12, 2003).

¹³ This point is found in any principles level Economics textbook. See also a video tutorial at: <https://www.khanacademy.org/economics-finance-domain/microeconomics/elasticity-tutorial/price-elasticity-tutorial/v/total-revenue-and-elasticity>.

¹⁴ A number of questions come to mind. Who is going to buy this many new circuits? How long would it take to construct them and how much would it cost? A rapid, 200% increase in the deployment of special access circuits would significantly increase the cost of providing the services and, at a 50% price cut, could lead to massive losses for the phone companies.

¹⁵ The percentage quantity change for the constant-elasticity demand curve is $[(1 - P_1/P_0)^{-1.6}] - 1$. See Siwek, *supra* n. 3 at Table 1.0.

¹⁶ E. Heitfield and A. Levy, *Parametric, Semi-Parametric and Non-Parametric Models of Telecommunications Demand: An Investigation of Residential Calling Patterns*, 13 INFORMATION ECONOMICS AND POLICY 311-329 (2001).

¹⁷ T. Van Zandt, *FIRMS, PRICES AND MARKETS* (2012) at Section 8.5.

NOTES CONTINUED:

- ¹⁸ A DS0 is a circuit capable of 64 kilobits per second. Larger circuits can be converted to DS0 equivalents based on their individual capacities. For instance, a DS1 has a DS0 equivalent of 24. Circuits are not sold as DS0 equivalents, however, so this measure of quantity isn't a quantity at all. Also, the DS0 equivalent data includes both DS0, DS1, and DS3 circuits, so it is neither a measure of quantity of these individual products nor does the average revenues across all circuits measure the price of any of the individual circuit types.
- ¹⁹ Siwek, *supra* n. 3 at Table 2.1.
- ²⁰ CFA Report, *supra* n. 1 at Table IV-1.
- ²¹ The linear demand curve is $P = a - bQ$, so the elasticity is equal to $(1/b)(P/Q)$. Once the parameters a and b are computed at the initial price-quantity pair, the quantity at the 50% lower price is computed.
- ²² Normally, we expect revenues to rise from a price cut when demand is elastic, but again that is based on small price changes, not the enormous cuts assumed by Siwek. The demand curve becomes inelastic at the lower price, causing revenues to fall.
- ²³ It is impossible to say what the demand curve will look like across such a huge price cut, but it's certainly true that the linear curve is every bit as valid as the constant-elasticity version.
- ²⁴ Rappaport, *et al.*, *supra* n. 12; I. Godlovitch, G. Greenfield, S. Lucidi, S. Marcus and T. Plueckebaum, *Ethernet Leased Lines: An International Benchmark*, WIK-Consult GmbH, Appendix to Reply Comments of BT Americas, WC Docket No. 05-25, RM-10593 (February 19, 2016) (available at: <http://apps.fcc.gov/ecfs/document/view?id=60001515277>). Unlike the Siwek-Cooper method, the analysis conducted in these studies did not need revenues to rise to generate a useful number.
- ²⁵ T.R. Beard, G.S. Ford, and L.J. Spiwak, *Market Definition and the Economic Effects of Special Access Price Regulation*, 22 COMMLAW CONSPECTUS 237-266 (2014) (available at: <http://scholarship.law.edu/commlaw/vol22/iss2/10>).
- ²⁶ February 19, 2016 Reply Comments of INCOMPASS filed in *In the Matter of Special Access Rates for Price Cap Local Exchange Carrier*, WC Docket No. 05-25 (available at: http://www.incompas.org/Files/filings/2016/2-22-16_INCOMPAS_Replies_to_the_Large_Incumbents.pdf).
- ²⁷ *Market Definition and the Economic Effects of Special Access Price Regulation*, *supra* n. 25.
- ²⁸ Email message from George S. Ford to Mark Cooper (Consumer Federation of American) my original message (April 6, 2016).
- ²⁹ Reply email message from Mark Cooper (April 6, 2016).
- ³⁰ Such vitriol and unprofessionalism is not uncommon from Dr. Cooper. For example, a few years back I authored a piece correcting Dr. Coper's flawed economics of an analysis on the U.S. wireless industry. See G.S. Ford, *Price, Profit, and Efficiency: Mark Cooper's Bungled Analysis*, @LAWANDECONOMICS BLOG (December 13, 2013) (available at: <http://www.phoenix-center.org/blog/archives/1671>). Rather than address the merits of my critiques in a civilized way, Dr. Cooper chose to file a document with the FCC accusing the Phoenix Center of willfully perpetuating a fraud upon the Commission. See M. Cooper, *Abuse of Market Power for Broadband Internet Access Service: Blind Theory and Bonehead Analysis Can't Hide the Problem - The Flawed and Misleading Analysis of the Phoenix Center and the Information Technology and Innovation Foundation*, Consumer Federation of America (January 2014) (available at: <http://apps.fcc.gov/ecfs/document/view?id=7521068464>). As to be expected, aside from Dr. Cooper's assorted *ad hominem* attacks, his response was as equally flawed as his original argument. See G.S. Ford, *In Response to Mark Cooper*, @LAWANDECONOMICS BLOG (January 31, 2014) (available at: <http://www.phoenix-center.org/blog/archives/1812>).
- ³¹ While Dr. Cooper claims to "rel[y] on a standard welfare economics analytical framework," welfare analysis plays no role in the calculation of the \$150 billion. CFA Report, *supra* n. 1 at p. 2.
- ³² *Id.* at p. 19, 20.
- ³³ *Need for Better Analysis of High Capacity Services*, *supra* n. 4; G.S. Ford, *The Road to Nowhere: Regulatory Implications of the FCC's Special Access Data Request*, PHOENIX CENTER POLICY PERSPECTIVE NO. 16-02 (February 23, 2016) (available at: <http://www.phoenix-center.org/perspectives/Perspective16-02Final.pdf>).