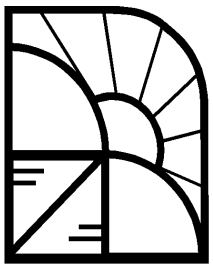

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Phoenix Center Policy Paper Number 50:

How (and How Not) to Measure Market Power Over Business Data Services

George S. Ford, PhD

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Phoenix Center Policy Paper No. 50
How (and How Not) to Measure Market Power Over Business Data Services

George S. Ford, PhD†

Abstract: The Federal Communications Commission recently outlined a "new path forward" for imposing price regulation on high-capacity telecommunications circuits sold to businesses and other telecommunications providers. The Commission outlines a two-step procedure for determining if it will apply rate regulation these Business Data Services: As a first step, the Commission proposes to determine "whether market power exist[s]" and where. If the Commission determines that market power exists, then the Agency proposes to apply a price-cap "style" regime to control prices. The problem, however, is that nowhere does the Commission define a meaningful concept of "market power." To fill this gap, in this POLICY PAPER I construct a policy-relevant definition of market power. I then consider whether the Commission's analysis is capable of identifying the presence of or quantifying the magnitude of market power for Business Data Services. As I demonstrate, it is not. The Agency's analysis is unsupported by basic economics and good statistics, and is thus incapable of providing any meaningful evidence regarding the presence or absence of market power.

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I. Introduction

In May 2016, the Federal Communications Commission ("FCC") issued a *Further Notice of Proposed Rulemaking* in which it outlined a "new path forward" for imposing price regulation on high-capacity telecommunications circuits sold to businesses and other telecommunications providers. These services have historically been referred to as Special Access Services, but now the Commission prefers the label Business Data Services ("BDS"), a broader classification that includes not only Special Access services but also unregulated high-capacity Ethernet services.[1] In its *BDS NPRM*, the Commission outlines a two-step procedure for determining if it will apply rate regulation:[2] As a first step, the Commission proposes to determine "whether market power exist[s]" for BDS and where. If the Commission determines that market power exists, then the

[1] *In the Matter of Business Data Services in an Internet Protocol Environment; Investigation of Certain Price Cap Local Exchange Carrier Business Data Services Tariff Pricing Plans; Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services,* FCC 16-54, TARIFF INVESTIGATION ORDER AND FURTHER NOTICE OF PROPOSED RULEMAKING, 31 FCC Rcd 4723 (rel. May 2, 2016) (hereinafter "*BDS NPRM*").

[2] *Id.* at ¶ 166 ("determine whether market power existed and to evaluate 'whether it is appropriate to make changes to its existing pricing flexibility rules to better target regulatory relief in competitive areas and evaluate whether remedies are appropriate to address any potentially unreasonable terms and conditions.')

Agency proposes to apply a price-cap "style" regime to the prices of BDS under of Section 201 (the "just and reasonable" standard) and 202 (the "unreasonable discrimination" standard) of the Communications Act.[3]

While the Commission's regulatory plan hinges on a finding of market power, the Agency never provides a definition of "market power," much less specifies what constitutes sufficient market power to warrant price regulation. Instead, the Commission simply declares that where the head-count of firms is "too small" prices should be reduced. Yet, as is well established in the economics and antitrust literature, this narrow, structural view of market power has no validity in telecommunications markets where fixed costs are sizable.[4]

In this POLICY PAPER, I attempt to bring some economic sensibility to the analysis of market power for BDS (and telecommunications services generally), beginning with the general definition of market power from antitrust law ("the ability to raise price above the competitive level") and providing specificity by drawing heavily from decades of economic analysis on telecommunications markets, antirust literature, and the DEPARTMENT OF JUSTICE/FEDERAL TRADE COMMISSION HORIZONTAL MERGER GUIDELINES.[5] After properly defining market power, I analyze whether the Commission's analysis in its *BDS NPRM* is capable of either identifying the presence of, or quantifying the magnitude of market power for, BDS. I easily demonstrate it does not.

II. Defining of Market Power

If market power justifies the regulation of BDS rates, then it seems essential that market power be defined and, ideally, defined in a manner suitable for the services or sector to be regulated. Since the Commission has failed to do so, I first turn to standard practice in search of a proper definition.

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[3] *BDS NPRM, supra* n. 1 at ¶ 263 ("We propose that sections 201 and 202 of the Act serve as an adequate basis of statutory authority for actions that the Commission would take to create and implement the Technology-Neutral Framework that we propose to apply to BDS going forward.").

[4] The structural view established by Joe Bain in the 1940s and 1950s remains relevant in antitrust analysis where attorneys and judges treasure precedent and prefer easy-to-follow rules, even if demonstrably invalid. *See, e.g.*, J. Bain, *The Profit Rate as a Measure of Monopoly Power*, 55 QUARTERLY JOURNAL OF ECONOMICS 271-293 (1941).

[5] U.S. DEPARTMENT OF JUSTICE/FEDERAL TRADE COMMISSION 2010 HORIZONTAL MERGER GUIDELINES (available at: https://www.ftc.gov/sites/default/files/attachments/merger-review/100819hmg.pdf).

In *NCAA v. Board of Regents*, the Supreme Court defined market power as,

> the ability to raise prices above those that would be charged in a competitive market.[6]

This definition is the most commonly used definition in antitrust and industrial economics. For instance, in his book COMPETITION POLICY: THEORY AND PRACTICE (2004), Massimo Motta, Chief Economist of the European Commission's antitrust authority, echoes the Court:

> Market power [] refers to the ability of a firm to raise price above some competitive level—the benchmark price—in a profitable way.[7]

William Landes and Richard Posner, in their seminal article on market power in the HARVARD LAW JOURNAL, define market power as,

> The ability of a firm (or group of firms, acting jointly) to raise price above the competitive level without losing so many sales so rapidly that the price increase is unprofitable and must be rescinded.[8]

The consistency is apparent. Defining market power as "the ability to raise price above the competitive level" seems a sensible place to start.

A. *What is the Competitive Price?*

Under the standard definition, what "price" is charged in a "competitive market" is an essential input into the analysis of market power. Naturally, we must ask—*what is the competitive price for BDS*? One theoretical (though naïve) extreme is perfect competition, "where firms sell perfectly identical products

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6 *NCAA v. Board of Regents*, 468 U.S. 85, 109 at n. 38 (1984).

7 M. Motta, COMPETITION POLICY: THEORY AND PRACTICE (2004) at p. 40-41. Professor Motta's profile is available at: http://ec.europa.eu/dgs/competition/economist/role_en.html.

8 W.M. Landes and R.A. Posner, *Market Power in Antitrust Cases*, 94 HARVARD LAW REVIEW 937-996 (1981) at p. 939; *also see, e.g.,* T.G. Krattenmaker, R.H. Lande, and S.C. Salop, *Monopoly Power and Market Power in Antitrust Law*, 76 GEORGETOWN LAW JOURNAL 241-269 (1987) (available at: http://ssrn.com/abstract=1140761).

[and] have zero fixed costs, [so that] price is equal to marginal cost at the equilibrium."[9] Yet, as Kaplow and Shapiro observe,

> If one understands the competitive price to refer to the price that would be charged in a hypothetical, textbook, perfectly competitive market in which firms have constant marginal costs equal to the marginal cost of the firm in question at the prevailing equilibrium, then the legal and economic concepts are essentially the same. However, the hypothetical competitive scenario that underlies such statements is rather vague: the counterfactual is not explicit, and some specifications that may implicitly be contemplated may not yield sensible answers. For example, what is meant by the perfectly competitive price in a market with fixed costs?[10]

In telecommunications, fixed costs are substantial, so the "competitive price" cannot equal marginal cost. In fact, as is well known by economists, in the presence of "decreasing average cost[,] a competitive equilibrium does not exist."[11] What then is the "competitive price" suitable for telecommunications markets? Before answering this critical question, I first fully dispense with "perfect competition" and "marginal cost pricing" as relevant benchmarks.

B. *The Irrelevance of Perfect Competition and Marginal Cost Pricing*

A variety of cost measures have relevance in economic theory and regulatory practice. Marginal cost, for instance, is an important cost concept (especially for the theory of welfare economics), but marginal cost is not generally viewed as a relevant cost standard (for nearly any purpose) in telecommunications. The production of telecommunications services involves significant fixed and sunk costs (leading to increasing returns), so a price equal to (short-run) marginal cost

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9 *Id*. ("Since the lowest possible price a firm can profitably charge is the price which equals the marginal cost of production, market power is usually defined as the difference between the prices charge by a firm and its marginal costs of production.")

10 L. Kaplow and C. Shapiro, *Antitrust*, in HANDBOOK OF LAW AND ECONOMICS, VOLUME 2, (eds., A.M. Polinsky and S. Shavell) (2007) at 1098 (available at: http://faculty.haas.berkeley.edu/shapiro/antitrust2007.pdf).

11 O. Shy, INDUSTRIAL ORGANIZATION (1995) at p. 67.

fails to generate sufficient revenue to cover total cost.[12] If the regulator sets a rate equal to marginal cost, then the firm faces financial losses that must be covered by subsidies or would be considered "confiscatory" and outside the "zone of reasonableness" as required by Section 201 of the Communications Act (and thus an illegal rate).[13]

In the TELECOMMUNICATIONS REGULATION HANDBOOK, produced by the International Telecommunications Union ("ITU"), the question of setting regulated rates equal to marginal cost is addressed directly:

> … setting a regulated price equal to marginal cost will not allow the operator to recoup all of its costs. In order for the operator not to lose money and go out of business, the regulator had to set at least some prices above marginal cost.[14]

Likewise, Mitchell and Vogelsang, in their text TELECOMMUNICATIONS PRICING: THEORY AND PRACTICE, declare:

> Marginal cost prices rarely cover the total cost of service, perhaps due to long run excess capacity or due to economies of scale and scope. *** Losses arising from marginal-cost pricing have to be covered from some other source. If this is done internally by the firm it requires some other source of finance, presumably through some deviation from marginal-cost pricing for a different service. Alternatively, if the firm is externally subsidized, taxes have to be raised or other government expenditure will have to be forgone.[15]

Former FCC Chairman Reed Hundt, in an article published in the FEDERAL COMMUNICATIONS LAW JOURNAL, observes:

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12 *See generally* W.J. Baumol & D.F. Bradford, *Optimal Departures from Marginal Cost Pricing*, 60 AMERICAN ECONOMIC REVIEW 265 (1970).

13 For a good primer on basic ratemaking principles, *see* G.S. Ford and L.J. Spiwak, *Tariffing Internet Termination: Pricing Implications of Classifying Broadband as a Title II Telecommunications Service,* 67 FEDERAL COMMUNICATIONS LAW JOURNAL 1 (2015).

14 H. Intven and M. Tetrault, TELECOMMUNICATIONS REGULATION HANDBOOK (2000) at p. B5-B6 (available at: https://www.itu.int/ITU-D/treg/Documentation/Infodev_handbook/7_Appendix.pdf).

15 B. Mitchell and I. Vogelsang, TELECOMMUNICATIONS PRICING: THEORY AND PRACTICE (1991) at pp. 38-9.

> In an industry with large sunk costs and small marginal costs, like most of the telecommunications industry, pricing that goes to marginal cost will not provide an adequate return to the investors who provide capital. Investors will be cautious about investing money upfront because ex post competition could drive prices to nonremunerative levels.[16]

And, in their seminal article on market power (cited in the *BDS NPRM* at ft. 626), Landes and Posner (1981) also confirm that marginal cost is not a meaningful standard for establishing market power:

> When the deviation of price from marginal cost [] simply reflects certain fixed costs, there is no occasion for antitrust concern, even though the firm has market power in our sense of [a markup of price over marginal cost].[17]

The problems with marginal cost pricing are well established in the economic literature on telecommunications markets and have been for decades. Unfortunately, some advocates, and even some economic "experts," continue to use marginal cost as a pricing standard, whether explicitly or implicitly.[18] It is wrong to do so; marginal cost pricing is not an appropriate basis for establishing regulated rates in telecommunications.

For the same reasons, the equilibrium price of *perfect competition* (i.e., marginal cost pricing) is irrelevant to telecommunications policy. Economists Roger Blair and Christine Piette, in ANTITRUST BULLETIN, put it this way:

> The production of local telephone service is marked by substantial economies of scale, which means that average cost declines with increases in output and marginal costs are below average cost. As

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16 R. Hundt and G. Rosston, *Communications Policy for 2006 and Beyond*, 58 FEDERAL COMMUNICATIONS LAW JOURNAL 1, 6 (2006).

17 Landes and Posner, *supra* n. 8 at p. 939.

18 The erroneous use of a marginal cost standard by the FCC has led to some seriously defective decisions. *See, e.g.,* G.S. Ford and L.J. Spiwak, *The Impossible Dream: Forbearance After the Phoenix Order*, PHOENIX CENTER POLICY PERSPECTIVE No. 10-18 (December 16, 2010) (available at: http://www.phoenix-center.org/perspectives/Perspective10-08Final.pdf); G.S. Ford and L.J. Spiwak, *Section 10 Forbearance: Asking The Right Questions to Get the Right Answers*, 23 COMMLAW CONSPECTUS 126 (2014) (available at: http://scholarship.law.edu/commlaw/vol23/iss1/5).

> a result, textbook competition, which involves marginal cost pricing, is infeasible as all firms would have negative profits.[19]

Clement Krouse, in his THEORY OF INDUSTRIAL ECONOMICS, addresses the issue of increasing returns more generally:

> In a homogeneous goods industry the presence of increasing returns in production creates difficulties in using perfect competition as a benchmark for social efficiency. Prices set equal to marginal cost in this case will lead to losses (in the absence of lump-sum subsidies and/or some form of price discrimination).[20]

And Louis Kaplow and Carl Shapiro, in their *Antitrust* article in the HANDBOOK OF LAW AND ECONOMICS, note,

> Although the notion of a perfectly competitive market is extremely useful as a theoretical construct, most real-world markets depart at least somewhat from this ideal. An important reason for this phenomenon is that marginal cost is often below average cost, most notably for products with high fixed []. In such cases, price must exceed marginal cost for firms to remain viable in the long run. Although in theory society could mandate that all prices equal marginal cost and provide subsidies where appropriate, this degree of regulation is generally regarded to be infeasible, and in most industries any attempts to do so are believed to be inferior to reliance upon decentralized market interactions. Antitrust law, as explained in the introduction, has the more modest but, it is hoped, achievable objective of enforcing competition to the extent feasible. Given the near ubiquity of some degree of technical market power, the impossibility of eliminating it entirely, and the inevitable costs of antitrust

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[19] R. Blair and C. Piette, *The Interface of Antitrust and Regulation: Trinko*, 50 ANTITRUST BULLETIN 665-685 (2005).

[20] C. Krouse, THEORY OF INDUSTRIAL ECONOMICS (1990) at p. 55; *see also* H. Intven and M. Tetrault, *supra* n. 14 at p. B-17 ("marginal cost is below average costs, and setting a regulated price equal to marginal cost will not allow the operator to recoup all of its costs. In order for the operator not to lose money and go out of business, the regulator had to set at least some prices above marginal cost").

> intervention, the mere fact that a firm enjoys some technical market power is not very informative or useful in antitrust law.[21]

We even find support for the irrelevance of perfect competition and marginal cost pricing in the 2010 DEPARTMENT OF JUSTICE/FEDERAL TRADE COMMISSION HORIZONTAL MERGER GUIDELINES. The MERGER GUIDELINES observe,

> Products involving substantial fixed costs typically will be developed only if suppliers expect there to be [] margins sufficient to cover those fixed costs. High margins can be consistent with incumbent firms earning competitive returns.[22]

It should be clear that marginal cost and perfect competition are not relevant cost or price benchmarks for BDS or nearly any other telecommunication service. Sadly, despite wide recognition that perfect competition and marginal cost are not relevant benchmarks for telecommunications, many analysts continue to do so. There is certainly no shortage of the unskilled application of economics to the telecommunications industries, a surplus that includes the *BDS NPRM*.[23]

C. *A Meaningful "Competitive Price" for BDS*

If not perfect competition and marginal cost pricing, then what is a suitable benchmark for telecommunications policy? Professor Louis Phlips, in COMPETITION POLICY: A GAME-THEORETIC PERSPECTIVE, offers a compelling alternative:

> To state it bluntly: To reach a competitive Nash equilibrium of a single-shot game is the best antitrust policy can hope for in oligopolistic markets (which is a far reaching statement, given that most real life markets are oligopolistic). Therefore, if normal competition is the objective of antirust policy, it should be defined as and have the properties of a competitive Nash equilibrium. [G]iven the multiplicity of possible Nash equilibria, I mean a 'perfect' competitive Nash equilibrium (in quantities or prices, according to the strategies chosen by the industry). [] It is a

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21 Kaplow and Shapiro, *supra* n. 10 at 1079.

22 U.S. DEPARTMENT OF JUSTICE/FEDERAL TRADE COMMISSION 2010 HORIZONTAL MERGER GUIDELINES, supra n. 5 at Section 2.2.1.

23 *The Impossible Dream*, *supra* n. 18.

> perfect non-cooperative and non-collusive Nash equilibrium (whether static or dynamic). [] Such a perfect Nash equilibrium is part of a two-stage equilibrium, in which the other stage implies a market structure that is endogenously determined by the given technology and given tastes. If, at a point in time, demand is such and technology is such that, with free entry, there is room for say only two firms with a given number of products each, and if prices and quantities are at the competitive Nash equilibrium levels, what more can antitrust authorities ask for? [] Antitrust authorities want the best possible market structure given technology and tastes, and, given this market structure, as much competition as is compatible with it and with entrepreneurial freedom. But that is precisely, it seems to me, what is described by a perfect competitive Nash equilibrium.[24]

Here, Phlips argues that the relevant "competitive price" in real-world markets is the price that arises from the maximum level of competition supported by the demand- and supply-side conditions of the market. In other words, if market conditions are such that only two firms can profitable offer service, then the non-collusive duopoly price is the "competitive price." It makes no sense to use the price arising in competition among five firms when that price is not remunerative in a market just large enough to support only two firms.

Key to the wisdom of Professor Phlips' proposal is the formal recognition the number of firms is not an accident or determined exogenously. Firms enter when it is profitable to do so, and they do not enter when it is not profitable to do so. As Phlips observes, real world outcomes are best described in terms of a two-stage equilibrium, where market structure is endogenously determined alongside price.

D. *Deriving the Competitive Price with Endogenous Entry*

To demonstrate what Phlips is proposing, consider a simple two-stage Cournot model of competition. In the first stage, firms decide whether to enter; in the second, they engage in competition. As is standard, the model is solved

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[24] L. Phlips, COMPETITION POLICY: A GAME-THEORETIC PERSPECTIVE (1995).

backwards, permitting expectations about the nature of competition (in the second stage) to determine entry decisions (in the first stage).[25]

Let the demand function be $P = A - Q/m$, where A is the maximum willingness to pay for the product or service, P is market price, Q is market quantity, and m is a scale parameter that alters the size of the market (larger m, larger market).[26] For convenience, marginal cost is assumed to be zero, m is set equal to one, and all firms are identical and share the market equally. Providing the good requires the firm to incur a fixed cost equal to f. Solving for the equilibrium price (P^*), we have:

$$P^* = \frac{A}{N^* + 1}, \tag{1}$$

where N^* is the equilibrium number of firms serving the market. Price is higher, other things constant, the larger is demand (a larger value for A). As expected with Cournot competition, price falls as the number of rivals increases. As N gets very large, P approaches marginal cost (or zero under my assumptions). But marginal cost pricing is not feasible since firms must recover fixed cost f. If firms are to recover f, then N cannot get "too large." When there are fixed costs, the number of firms is not unbounded.

The number of rivals, N, is not determined randomly or set by the whims of policymakers. Nor is N what advocates wish it to be. Like price, the number of competitors is an equilibrium value determined by the demand- and supply-side conditions, and where there are fixed cost there is a limit on how many firm can profitably serve the market. The equilibrium number of firms is equal to:

$$N^* = \frac{A}{\sqrt{f}} - 1. \tag{2}$$

From Expression (2), we see that the number of firms that can serve a market is determined by the size of market demand (determined by the maximum

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25 A similar, but richer, analyses can be found in the literature. *See, e.g.*, J. Sutton, SUNK COST AND MARKET STRUCTURE (1995); R. Clarke, *Scale Economies, Entry and Welfare*, 36 JOURNAL OF ECONOMICS AND BUSINESS 161-176 (1984).

26 A change in A shifts the market demand curve, where a change in m rotates the demand curve around a fixed intercept. Both A and m can be used to alter "market size."

willingness to pay) relative to the fixed cost of serving the market.[27] Telecommunications markets are often served by relatively few firms not because of some random process or poor public policy, but because the size of the market is small relative to the fixed cost of providing service (or, equivalently, the fixed costs are high relative to the size of market demand). If only two firms can profitably serve a market, it is of no value to lament the fact there are not ten firms doing so. Nor is sensible to use the equilibrium price for five firms as a regulatory benchmark in a market that can be served by only two firms. If the five-firm price was meaningful, then there would be five firms in the market.

Using Equations (1) and (2), we can determine the "competitive price" and its relation to cost. It should be immediately apparent that the competitive price is not equal to marginal cost. (Marginal cost is assumed to be zero and a zero price forbids the recovery of fixed costs *f*.) If we follow Phlips and define the competitive price as the price that arises at the equilibrium number of firms (permitting non-integer values), then at its lowest level the "competitive price" is equal to average cost (in this model, f/Q). A numerical example can be used to illustrate this fact.

Assume that the demand curve for service has an intercept of 11, fixed costs are 1.0, and marginal costs are zero. Based on the Equation (2), there are ten firms in equilibrium [= 11/1 – 1]. A market with ten rivals is competitive by nearly any standard. To determine the competitive price, let's proceed iteratively. If there is only one firm serving the market, then the price is 5.50 in Equation (1), the market quantity is 5.50, and average cost is 0.18 (= 1/5.5).[28] Given a monopoly in a setting where ten firms can profitably offer service, price is well above average cost as would be expected. But monopoly is not the equilibrium, so entry will occur. Given two firms, price falls to 3.67, quantity rises to 7.33, and average cost is 0.27. Competition lowers price, but price is still above average cost. As the number of firms increases, price continues to fall, market quantity continues to rise, and firm profits continue to fall. Entry continues until there are ten firms; if eleven firms enter, then profits are negative and a firm must exit. At the equilibrium of ten firms ($N^* = 10$), price is 1.0 and market quantity is 10, so that each firm is selling one unit. With fixed costs of 1.0

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[27] For a rich discussion of the equilibrium number of firms, *see* G.S. Ford, T.M. Koutsky and L.J. Spiwak, *Competition After Unbundling: Entry, Industry Structure and Convergence*, 59 FEDERAL COMMUNICATIONS LAW JOURNAL 331 (2007).

[28] Market quantity equals $Q = (N \cdot A)/(N+1)$, and a given firm's quantity is $q = Q/N$.

and a quantity of 1.0 for each firm, the average cost of providing service ($AC = f/Q$) is 1.0. The "competitive price" equals average cost which is "the lowest possible price a firm can profitably charge."[29]

We can alter market conditions to see if the result holds. Consider a smaller market where the intercept of the demand curve is 6.0. Given the smaller market (i.e., a smaller demand), the equilibrium number of firms falls to five. With five firms, the equilibrium price is 1.0, each firm sells one unit, and fixed costs are 1.0. Again, the "competitive price" is equal to average cost. Pushing it even further, if market size is 3.0, then the equilibrium number of firms is 2.0, and once more the equilibrium price is equal to average cost. Any price lower than average cost will lead to financial losses for the firms and, in turn, exit.[30]

E. *An Index of Market Power for BDS*

Given the standard definition of market power, the deviation of price from the "competitive price" forms the basis of a common index of market power: the Lerner Index. In the common but irrelevant scenario of zero fixed costs (among other assumptions), the Lerner Index (labeled L) is often written as the percentage markup of price over marginal cost (labeled MC), or

$$L = (P - MC)/P.[31] \quad (3)$$

Plainly, this specification of the Lerner Index is not a useful tool for assessing market power in telecommunications because the competitive price is equal to average cost, not marginal cost.

Can the Lerner Index be made to fit the economics of telecommunications? A paper by economist Robert Cairns (1996) tackles this very issue, noting that in the

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[29] Motta, *supra* n. 7 at p. 40.

[30] Average cost pricing is this model is not guaranteed. These numerical examples are specified to produce equilibrium prices exactly equal to average cost. If we assume that only "whole" firms provide service (that is, N is an integer), then the price approaches average cost up to the equilibrium number of firms.

[31] Given perfect competition, the Lerner Index is equal to 0. As price rises above marginal cost, the Lerner Index approaches 1, and the closer to 1 the index, the more market power a firm is presumed to have. *See, e.g.*, R.D. Cairnes, *Toward Measuring Monopoly Power*, 11 REVIEW OF INDUSTRIAL ORGANIZATION 125-133 (1996); Landes and R.A. Posner, *supra* n. 8; D.L. Kaserman and J.W. Mayo, GOVERNMENT AND BUSINESS: THE ECONOMICS OF ANTITRUST AND REGULATION (1995) at pp. 101-2; D.W. Carlton and J.M. Perloff, MODERN INDUSTRIAL ORGANIZATION (2000) at Appendix 8B; J. Tirole, THEORY OF INDUSTRIAL ORGANIZATION (1995) at p. 219.

presence of significant fixed cost, the proper definition of market power is "represented by a divergence between price and average cost."[32] Cairnes proposes a modified Lerner Index of market power equal to:

$$L = [P - \max(MC, AC)]/P. \quad (4)$$

Expression (4) computes the Lerner Index of market power using either marginal cost or average cost, whichever is greater. Given the scale (or density) economies prevalent in telecommunications, average costs will almost certainly exceed marginal cost, thereby permitting a simplification of Expression (4) to an index of market power based on the relationship of price and average cost:

$$L = (P - AC)/P. \quad (5)$$

This specification of the Lerner Index of market power is based on standard antitrust practice but accounts for the economic realities of the telecommunications industry. This Lerner Index has familiar properties. At the lower bound of the zone of reasonableness (AC), the Lerner Index is equal to zero, implying no markup of price over average cost. As price deviates from AC, the Lerner Index approaches unity.[33]

III. Market Power in the *BDS NPRM*

If you search the *BDS NPRM* for a formal definition of market power, you won't find one.[34] The Commission handed over the analysis of market power

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[32] Cairnes, *supra* n. 31 at p. 89.

[33] Expressing market power in relation to average cost has another advantage. Multiplying by the quantity sold, it is easy to see that Expression (5) is equal to the profit-to-sales ratio. Because regulation often targets services broadly (rather than individual transactions or small geographic market segments), profit-to-sales ratios are commonly used to assess market power. Regulation also imposes a great deal of rate averaging across customers and geographies, forcing an aggregation of analysis. Both price-cap and rate-of-return regulation are typically set to cover broad swaths of a regulated firm's output, making firm-wide measures of profit meaningful. So, the price-to-average cost relationship is not only economically sound, it also has the property of being practically and administratively relevant.

[34] The only statement resembling a definition of market power is buried in a lengthy footnote quoting someone else's definition: "the power to control prices or exclude competition." *BDS NPRM, supra* n. 1 at ft. 479. This definition provides almost no guidance in the instant case and is not even accurate; every firm has the power to control its price, it's just that people don't have to buy its goods. *See also* Kaplow and Shapiro, *supra* n. 10 at p. 1098 ("This is not a meaningful screen.")

entirely to Professor Marc Rysman of Boston University, whose analysis is included as an Appendix to the *BDS NPRM*.[35]

A. *Professor Rysman's Definition of Market Power*

Professor Rysman defines market power as follows: if "prices fall when there is local competition [then this is] evidence of market power in the BDS industry."[36] Presumably this definition is embraced by the Commission, since the Agency provides no alternative. As first glance, Rysman's approach seems to fit the standard definition of market power—he compares the price in a "competitive market" to the price in a "less competitive market." Yet, as made plain above, this empirical definition of market power has no merit in the presence of increasing returns (i.e., large fixed costs) and endogenous entry. Competition is expected to lower prices, no doubt, but that fact need not imply that there is market power in markets that do not have competition. The price from a market with an equilibrium of three firms says nothing about the competitive price in a market with an equilibrium of only two firms—the determinants of price are likewise the determinants of the number of firms.

In his critique of the Rysman Study, the Commission's chosen peer reviewer, Professor Thomas Valletti, makes the point plain:

> [W]hy do [competitive providers] not serve buildings where prices seem to be high? Is it because they have to bear some particular kind of entry cost? What are the limits to competition?[37]

These questions are spot on and consistent with the discussion above (especially the proposal by Phlips).[38] Where competition is observed, the market conditions (demand and costs) are such that competition can occur. Where competition is absent, market conditions are such that entry cannot occur. For BDS, cost

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35 M. Rysman, *Empirics of Business Data Services*, White Paper (April 2016), attached to *BDS NPRM*, *supra* n. 1 at Appendix B.

36 *Id*. at p. 211.

37 *Letter to Matthew DelNero from Thomas Valletti*, Peer Review of *Empirics of Business Data Services* written by Professor Marc Rysman of Boston University, FCC DOCKET NO. WC 16-143 (April 28, 2016) (available at: https://www.fcc.gov/peer-review-business-data-services-industry-white-paper) at p. 6.

38 For reasons unknown, Professor Valetti does not push his potent criticism to the unavoidable conclusion that Rysman's analysis is meaningless.

conditions are such that few sellers is a very common occurrence. The lack of entry is not an indicator of market power, it is an indicator that entrants do not believe there is sufficient excess profit in the market to justify the capital costs to serve it.

In telecommunications markets, both price and the number of firms are endogenous, a fact Rysman ignores in his empirical analysis. We find the lack of attention to the endogeneity of entry surprising. For instance, Rysman's analysis claims that in most geographic areas there is either monopoly or duopoly, yet he never inquires as to what market conditions are driving such outcomes or how those conditions may affect the analysis of market power.

Rysman's scraggy discussion of competition and market power draws exclusively from the out-of-date Structure-Conduct-Performance Paradigm formulated in the 1950s by Joe Bain.[39] Bain's ideas were powerful at the time and served as the foundation for thousands of research papers and much of the substance of the economics field of Industrial Organization or Industrial Economics. It's still used today, but sparingly and more loosely than in days past. The profession has moved beyond this simplistic view of the world to embrace what is often referred to as the *New Empirical Industrial Organization* that grew out of a dissatisfaction with the ability Bain's SCP Paradigm to explain real-world outcomes.[40] In this new view, the number of firms is endogenous—the number of competitors in a market is not a "fact" that drops out of the sky as Rysman presumes. Moreover, the modern econometric analysis of industries focuses intensely on endogeneity, yet Rysman ignores it altogether. The modern analysis of "treatment effects," and competition is a type of treatment effect, also pays careful attention to the endogeneity of the treatment.[41] Ignoring the endogeneity of entry is not only obviously wrong, but is inconsistent with modern economic analysis. It is also fatal to Rysman's analysis.

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[39] *See*, *e.g.*, Carlton and Perloff, *supra* n. 31 (or any of its editions); J.S. Bain, *Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936–1940*, 65 QUARTERLY JOURNAL OF ECONOMICS 293–324 (1951); J.S. Bain, BARRIERS TO NEW COMPETITION (1956).

[40] *See*, *e.g.*, T.F. Bresnahan, *Empirical Studies of Industries with Market Power*, in HANDBOOK OF INDUSTRIAL ORGANIZATION (Vol. 2), at pp 1011–57 (eds. R. Schmalensee and R.D. Willig) (1989); L. Einav and J. Levin, *Empirical Industrial Organization: A Progress Report*, 24 JOURNAL OF ECONOMIC PERSPECTIVES 145-162 (2010) (available at: http://web.stanford.edu/~jdlevin/Papers/IO.pdf); A. Jacquemin, THE NEW INDUSTRIAL ORGANIZATION: MARKET FORCES AND STRATEGIC BEHAVIOR (1991).

[41] J.S. Angrist and J. Pischke, MOSTLY HARMLESS ECONOMETRICS: AN EMPIRICIST'S COMPANION (2009).

A detailed discussion of the problems with Rysman's approach, as acknowledged by Professor Valletti, is provided in Ford (2016).[42] We can summarize the central flaw as follows. Say demand and cost conditions produce a situation where only a single firm can provide service profitably and that market conditions are such that this monopolist earns zero economic profit. In this situation, price equals average cost. In another market, say demand and costs conditions permit two firms to offer service, and these duopolists also earn zero economic profit. Again, price equals average incremental cost. Consequently, in both markets price equals average cost and firms in both markets have no market power (the Lerner Index of Exp. 5 is zero). Still, it may be that the duopoly market has lower prices (though this is not theoretically required). This contradiction forces the rejection of Rysman's empirically-based definition of market power. Lower prices in competitive markets do not indicate market power. With high costs relative to demand, the average cost of the firm will be high, and thus the high price "simply reflects certain fixed costs [so] there is no occasion for antitrust concern."[43]

In the most favorable light, Rysman has made the error of equating the "competitive price" to marginal rather than average cost. The Cournot model presented above can be used to illustrate the error. I assume A is 3.0 and f, c and m are 1.0 in an initial (monopoly) case. I alter the size of the market by increasing m and then compute the equilibrium values. Results are summarized in Table 1.

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42 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).

43 Landes and Posner, *supra* n. 8.

Table 1. Market Power and the Number of Competitors

m	*N**	*P**	*AC*	*(P – AC)/P*	*(P – MC)/P*
1.00	1	2.00	2.00	0	0.50
2.25	2	1.67	1.67	0	0.40
4.00	3	1.50	1.50	0	0.33
6.25	4	1.40	1.40	0	0.29
9.00	5	1.33	1.33	0	0.25
12.25	6	1.29	1.29	0	0.22
16.00	7	1.25	1.25	0	0.20
20.25	8	1.22	1.22	0	0.18
25.00	9	1.20	1.20	0	0.17
30.25	10	1.18	1.18	0	0.15

In the first row, the market size parameter is chosen so that monopoly is the equilibrium outcome ($N^* = 1$). The equilibrium price is $2.00 as is average cost. There are no profits and market power by the average-cost Lerner Index (Exp. 5) is zero. The marginal-cost Lerner Index (Exp. 3) is 0.50. As market size grows, the equilibrium number of firms increases (the values are set so that the number of firms in equilibrium increases by one unit in each row of the table). As the number of firms increases, price falls but average cost falls by the same amount so that profits are *always zero*. The average-cost Lerner Index is likewise always zero, meaning that no firm has market power, properly defined. However, the marginal-cost Lerner Index, which has no merit in the present context, falls as the number of firms increases.

It should be clear from Table 1 that the price from a more competitive market says nothing about market power (or the proper price) in a less competitive market. The number of firms is jointly determined with price. The price is a market with five firms is not a meaningful benchmark for a market that can only profitably accommodate two firms. Competition may lower price (and usually does), but that fact says nothing about the presence of market power. If the marginal-cost Lerner Index is used, however, one might conclude that market power does exist, but we have demonstrated that marginal cost is the wrong benchmark. Rysman's approach, under a favorable interpretation, uses the wrong cost standard (or competitive price) and consequently renders false conclusions about market power. The real mistake, however, is the failure of Rysman to consider the endogeneity of entry, a point made by Professor Valletti. In telecommunications markets, including BDS, price and the number of competitors are endogenous. To ignore that fact is to get the wrong answer.

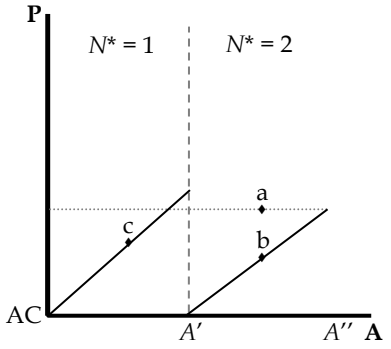
B. *Can Regression Save the Day?*

An anticipated response to our description of the fundamental and fatal flaw in Rysman's analysis is that multivariate regression analysis can be used to hold

demand and cost factors constant. Rysman's simple least squares regressions are no solution. In fact, it is theoretically impossible to "hold other things" constant in such a simple model when the number of firms is endogenous. If market conditions permit multiple firms, then multiple firms will exist. If market conditions permit only a few firms, then few firms will exist. Theoretically, it is not possible to observe three firms in a market where there is only room for two, so things can't be held constant across such outcomes. It is not sensible to compare multiple firm markets to few firm markets under the pretense that things can be held constant across the two. The market price with three firms is not the market price with two firms; N and P are jointly determined. By definition, market conditions cannot be equal if the number of firms is different.

Consider Figure 1 where the market price is on the vertical and market size (parameter A from Eq. 2) is on the horizontal axis (fixed cost are assumed to be 1.0, so the horizontal axis is essentially the ratio of market size to fixed cost as in Eq. 3). Marginal cost are again assumed to be zero for convenience. Up to A', the equilibrium number of firms is 1.0 (monopoly). Above A', the equilibrium number of firms is 2.0 (duopoly), up until A'' where a third firm enters. In the monopoly segment, the price rises as the market gets larger (so that profits may rise but not by enough to induce entry), at least until A' when a second firm enters and prices falls to average cost. Then, the price rises again in the duopoly segment until the third firm enters and price falls to average cost again. Note also that the duopoly and monopoly prices overlap to a significant degree (a higher A pushes up on both P and N).

Figure 1. Price and the Number of Firms



Looking at Figure 1 we see that theoretically it is not possible to compare the monopoly price to the duopoly price under identical conditions. If the conditions are such that duopoly can exist, then monopoly does not. In effect, Rysman is attempting to compare points **a** (a monopoly price) and **b** (a duopoly

price), but such a comparison is not theoretically possible—there is no point **a** because monopoly does not exist when *A* is sufficiently large to produce duopoly. Practically, poor business decisions or bad data may lead to observations like point **a**, but regulation should not be based on peculiarities or bad data.

What Rysman's regression is actually doing is comparing some average of prices in the monopoly segment (say point **c**) to the average of prices in the duopoly segment (say point **b**), which perhaps explains the very small competitive price effects he finds given the overlap of prices shown in the figure (among many other reasons related to poor model specification, bad data, the presence of price regulation in many markets, among other factors). In fact, depending on the distribution of prices and market conditions in the monopoly and duopoly segments, the average price in the monopoly segment may be below that in the duopoly segment. Consequently, we would not be surprised if replication and minor modifications of the Rysman regressions found no effect, or even a positive effect, of competition on prices. Rysman's regression model is mispecified and his estimated parameters are biased in an unknown direction and of unknown magnitude, as has been recognized by others.[44]

C. *The "Competitive Market Test"*

In the *BDS NPRM*, the Commission proposes to assess market power and, if market power is found, to regulate rates. But rather than assess market power, the Commission proposes to use a head count of competitors as a proxy for market power. In this PAPER, I have demonstrated the futility of such a substitution. The number of competitors is determined jointly with price, where the head count is determined by the ratio of market size to fixed costs and prices are determined by market size and the number of competitors. The number of competitors is not a valid proxy for the relationship of price to the competitive price. The number of competitors, or evidence that consistent with a competitive price effect, says nothing about market power, properly defined.

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[44] *See also* A. Sweeting, *Review of Dr. Rysman's "Empirics of Business Data Services" White Paper*, Peer Review requested by the Federal Communications Commission (April 26, 2016) at p. 1 ("results should be interpreted with some caution"); at p. 9 ("one cannot sign the biases that may be present") (available at: http://transition.fcc.gov/Daily_Releases/Daily_Business/2016/db0628/DOC-340040A4.pdf).

IV. Conclusion

In this POLICY PAPER, I draw heavily from decades of economic analysis of telecommunications markets, antirust literature, and the MERGER GUIDELINES to construct a policy-relevant definition of market power for BDS. I then consider whether the Commission's analysis is capable of identifying the presence of or quantifying the magnitude of market power for BDS. It is not. The analysis of the Agency's economic expert, Professor Marc Rysman, is unsupported by basic economics and good econometrics, and is thus incapable of providing any meaningful evidence regarding the presence or absence of market power. Once more, the Commission's efforts to understand market power in BDS (or Special Access Services) are for naught and fall back to the self-serving arguments of BDS buyers that the price is "too damn high."[45]

[45] Quote is attributed to Jimmy McMillan, perennial candidate for multiple federal and state offices (http://www.rentistoodamnhigh.org).