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Evaluating and Enhancing Competition in the Interstate Natural Gas Transportation Industry

ABSTRACT

In 1996, the Federal Energy Regulatory Commission (FERC) established criteria it uses when evaluating proposals for market-based rates by natural gas pipelines. Since that time, a number of significant developments have occurred, both in markets for natural gas transportation and in economic tools for market-power assessment. This article will review the current approach for measuring interstate pipeline market power presented in the 1996 Policy Statement of the FERC and will critically evaluate that framework in light of these recent developments. We show that fundamental changes in the operation of natural gas transportation markets and new developments in the economic analysis of market power suggest that the Commission's methodology for assessing market power actually or potentially exercisable by pipelines seeking market-based rates is, as it currently stands, inappropriate and should be updated in light of new developments. As we discuss below, the Commission's approach fails to account for a number of important factors potentially influencing a determination of market power. Consequently, the goals of this article are (1) to apply economically appropriate criteria to current natural gas transportation markets in order to illustrate how to evaluate their competitiveness and (2) to demonstrate that improving the competitive assessment of pipelines competing in those markets could enhance consumer welfare.

I. INTRODUCTION

A marked transformation of the natural gas industry has occurred in recent decades, primarily facilitated by the issuance of two

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orders from the Federal Energy Regulatory Commission (FERC or the Commission). FERC Order No. 436, released in 1985, encouraged interstate pipeline companies to separate their sales and transportation functions in order to provide producers and purchasers of natural gas with more options for trading; the order also established rules governing open access.[1] FERC Order No. 636, released in 1992, required interstate pipelines to unbundle their gas and transportation functions, to cease selling bundled gas supplies, and to provide comparable transportation to all shippers regardless of whether or not the shipper had also purchased gas from that pipeline.[2] Additionally, the Commission has spurred the development of a secondary market for unbundled transportation capacity by allowing holders of interstate pipeline capacity to "release" their capacity for resale to other shippers and requiring pipelines to offer shippers on their systems flexibility in identifying receipt and delivery points. Transportation capacity sold in the capacity-release market can be either firm (sometimes sold subject to recall rights held by the primary capacity holder) or interruptible. Firm capacity rights cannot be taken by the pipeline from the shipper, except in extraordinary circumstances, during the term of the contract, whereas interruptible capacity can be taken by the pipeline on short notice from the shipper. In February of 2000, the Commission further promoted a more liquid and transparent market by releasing Order No. 637, which, among other things, increases the amount of information pipelines are required to post on their websites regarding capacity release (excess capacity) and requires pipelines to allow shippers to segment their capacity where operationally feasible to do so.[3]

These shifts have necessitated a new look at the regulation of interstate natural gas pipelines. The FERC's 1996 *Statement of Policy and Request for Comments* (Policy Statement) discusses multiple alternatives to cost-of-service ratemaking in detail, including criteria for implementing market-based rates.[4] The Policy Statement traces these policy developments back to 1989, when Congress directed the commission to

1. FERC Order No. 436, Regulation of Natural Gas Pipelines After Partial Wellhead Decontrol, 50 Fed. Reg. 42,408 (Oct. 18, 1985).

2. FERC Order No. 636, Pipeline Service Obligations and Revisions to Regulations Governing Self-Implementing Transportation and Regulation of Natural Gas Pipelines After Partial Wellhead Decontrol, 57 Fed. Reg. 13,267 (Apr. 16, 1992).

3. FERC Order No. 637, Regulation of Short-Term Natural Gas Transportation Services, and Regulation of Interstate Natural Gas Transportation Services, 65 Fed. Reg. 10,156 (Feb. 25, 2000).

4. Statement of Policy and Request for Comments, Alternatives to Traditional Cost-of-Service Ratemaking for Natural Gas Pipelines, 74 F.E.R.C. 61,076 (1996) [hereinafter Policy Statement].

improve the competitive structure of the natural gas industry "in order to maximize the benefits of [wellhead] decontrol."[5] Orders Nos. 436 and 636 took steps in this direction, increasing the availability of unbundled transportation and promoting integration of natural gas markets.[6] The effect of these policies has been a shift away from traditional methods of acquiring gas supplies, such that many consumers of gas transportation now require less firm capacity than they have in the past. In this new environment, the Commission acknowledges, additional rate flexibility may be necessary—hence the Commission's establishment of criteria for market-based transportation rates.

According to the Policy Statement, market-based transportation rates are a suitable means for achieving the goal of flexibility, but only in those cases where a natural gas pipeline company can demonstrate that it lacks market power.[7] Defining market power as "the ability of a pipeline to profitably maintain prices above the competitive levels for a significant period of time," the FERC has proposed a number of criteria for assessing market power and judging when market-based rate proposals are appropriate.[8] These criteria have generated a fair amount of comment, with commentators disagreeing over the degree to which these criteria may be appropriate, insufficient, or overly strenuous.[9] Some observers have expressed uncertainty that many companies' firm transportation (FT) service would meet the proposed criteria.[10] This concern appears to be reasonable, given that no pipeline is currently

5. H.R. Rep. No. 29, 101st Cong. 6 (1989), *reprinted in* 1989 U.S.C.C.A.N. 51.

6. FERC Order No. 436, 50 Fed. Reg. 42,408; FERC Order No. 636, 57, 57 Fed. Reg. 13,267.

7. Policy Statement, *supra* note 4, at 61,228–29.

8. *Id*. at 61,230.

9. *Id*. at 61,231–36.

10. As the Commission explained, "Many commenters recognized…that it is unlikely that the primary market, *i.e.*, firm transportation by interstate pipeline companies, will meet the proposed criteria for market-based rates." Policy Statement, *supra* note 4, at 61,227. Such commenters included Brooklyn Union; Connecticut Natural; IPAMS; Illinois, Ohio PUC; Tejas; Atlanta Gas; Columbia Distribution; Northern Distributors; NI-Gas; UDC; Amoco; NGSA; Texaco; PA. OCA; and PaPUC. *See id*. at 61,227 n.18. According to FERC, the "majority of pipeline commenters, along with a few others, indicated that the criteria were too strenuous and ignore competitive factors." *Id*. at 61,227. While some commentators on the market-based rates criteria have also questioned whether the Commission possesses the legal authority to establish such a policy, the Commission explains these criticisms as an overly narrow reading of the case law. See *id*. at 61,228. Furthermore, the Commission cites *Farmers Union Central Exchange v. FERC*, 734 F.2d 1486, 1509 (D.C. 1991), in which the Court noted that a shift toward light-handed regulation is reasonable, so long as the policy objectives of the regulatory statute in question are attainable under the new approach. Policy Statement, *supra* note 4, at 61,228 (citing *Farmers Union*, 734 F.2d at 1509).

permitted by the Commission to charge market-based transportation rates.[11] Indeed, following the Commission's rejection of an application for market-based rates submitted by Gulf South, a subsidiary of Entergy-Koch,[12] pipelines have largely stopped seeking such permission. This outcome is perhaps not surprising given that Koch's pipeline operates in the Louisiana, Mississippi, and Alabama area, which is densely populated with natural gas pipelines.

Fundamental changes in the operation of natural gas transportation markets and new developments in the economic analysis of market power suggest that the Commission's methodology for assessing market power actually or potentially exercisable by pipelines seeking market-based rates is, as it currently stands, inappropriate. As we discuss below, the Commission's approach fails to account for a number of important factors potentially influencing a determination of market power. Consequently, the goals of this article are (1) to apply economically appropriate criteria to current natural gas transportation markets in order to evaluate their competitiveness and (2) to demonstrate that consumer welfare could be enhanced by improving the antitrust analysis of pipelines competing in those markets. We begin by identifying the industry context in which the Commission's decisions are now to be made. We then describe in detail the Commission's current approach to market power analysis with regard to natural gas transportation, drawing attention both to its strengths and weaknesses. These weaknesses are then explicitly discussed and certain advances in the economic analysis of market power that promise to address and correct these shortcomings are highlighted.

II. RECENT DEVELOPMENTS IN THE NATURAL GAS INDUSTRY

There have been a number of specific developments in the natural gas industry since the FERC implemented its open access policies that bear significantly upon the operation of natural gas transportation markets. As the Commission noted in Order No. 637, recent trends in the gas industry following open access include such things as the following:

11. The Commission has approved market-based rates for storage services. *See, e.g.*, K N Interstate Gas Transmission Company Order on Rehearing, 77 F.E.R.C. 61,256 (1996); K N Interstate Gas Transmission Company Declaratory Order and Order on Rehearing, 76 F.E.R.C. 61,134 (1996); and K N Interstate Gas Transmission Company Order Rejecting Tariff Sheets and Providing for Further Procedures, 68 F.E.R.C. 61,401 (1994).

12. Koch Gateway Pipeline Company Order Reversing Initial Decision, 85 F.E.R.C. 61,013 (1998), *rehearing denied*, 89 F.E.R.C. 61,046 (1999) [hereinafter Koch Gateway Order].

- growth in wholesale markets;[13]
- changes to the transportation market, most notably the availability of released capacity traded by means of electronic bulletin boards;[14]
- the development of an integrated and active spot market that is broad in geographic scope;[15]
- the appearance of upstream and downstream market centers or "hubs";[16]
- the development of an active financial market in gas futures;[17]
- lower prices without any threat to reliability;[18] and
- "the development of virtual pipelines…creating in effect a new pipeline between receipt and delivery points that are not physically connected under a single pipeline management."[19]

These developments have facilitated exchange and have increased the transparency of prices in gas commodity and transportation markets. As will be discussed more fully below, one repercussion of this is that the gas wellhead market (that is, the market for natural gas extraction) has become unified, national in scope, and increasingly competitive since the institution of open access.

A. Wholesale Markets and Capacity Release

As noted above, the Commission allows holders of interstate pipeline capacity to release their capacity for resale to other shippers. The development of secondary markets for such "capacity release" has had a profound influence on natural gas transportation as a whole.[20] This influence is easy to understand given the advantages such capacity

13. FERC Order No. 637, 65 Fed. Reg. at 10,158.
14. *Id.* at 10,165.
15. *Id.* at 10,173.
16. *Id.* at 10,162.
17. *Id.*
18. *Id.*
19. FERC Order No. 637, 65 Fed. Reg. at 10,162.
20. In addition to acquiring transportation service via capacity release, buyers can purchase delivered gas in the "gray market" from gas brokers who arrange for deliveries using their own transportation arrangements. The rise of such gray markets is yet another development reducing the potential exercise of market power by a pipeline. Frederick Moring, *FERC Order No. 637—A Partial Review*, NAT. GAS (2000), *at* http://www.crowell.com/content/resources/publications/art_ng_fm_order63700.html (last visited Nov. 16, 2004).

release programs offer to shippers. In 1996, the Energy Information Administration (EIA) of the U.S. Department of Energy articulated a number of these benefits, listing the following as advantages accruing to "replacement" shippers that purchase released capacity:

• *Moderate lead time required.* The acquisition of capacity on the release market requires very little lead time. This allows the replacement shipper to use the capacity release market to satisfy incremental loads economically instead of subscribing to firm capacity that may be underutilized.[21]

• *Flexible terms with respect to duration of contract.* The replacement shipper can acquire capacity for the period it will be needed instead of being constrained by standard contract periods.[22]

• *Ability to obtain capacity*. The replacement shipper is able to obtain capacity even when the pipeline is fully subscribed.[23]

• *Release capacity is usually priced below tariff rates*. The replacement shipper can acquire capacity at a fraction of the maximum regulated rate.[24]

Since 1996, the Commission has taken several steps to enhance the efficiency of transactions for capacity release. For example, in Order No. 587, the Commission adopted regulations to standardize the business practices and communication methodologies of interstate natural gas pipelines to enhance the integration and efficiency of the U.S. pipeline grid.[25] As a result of the enhanced efficiency of the capacity release transactions, shippers have increasingly become able to obtain short-term (as well as long-term) firm transportation capacity in capacity-release deals, and the percentage of interstate throughput moved under released capacity contracts has grown considerably. In 1996, for example, the same year in which the FERC's Policy Statement was issued, the EIA already observed that "[t]he release market has grown steadily in terms of capacity traded, indicating that shippers are becoming experienced in capacity trading."[26] In a more recent version of this report, the EIA again noted:

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21. *See* ENERGY INFO. ADMIN., NATURAL GAS 1996: ISSUES AND TRENDS 42 (1996) [hereinafter EIA], *available at* http://www.eia.doe.gov/oil_gas/natural_gas/analysis_publications/natural_gas_issues_and_trends/it96.html (last visited Aug. 24, 2004) [hereinafter EIA].

22. *Id*. at 43.

23. *Id*.

24. *Id*.

25. Standards for Business Practices of Interstate Natural Gas Pipelines, Order No. 587, 61 Fed. Reg. 39,053 (July 17, 1996).

26. EIA, *supra* note 21, at 43.

> The capacity release market has grown steadily in terms of capacity traded, indicating that more shippers are using the release market as a source for transportation capacity. The release market's annual growth rate averaged 19 percent during the past 3 heating years (April through March) ended March 31, 1998, for the interstate pipeline companies included in this analysis.[27]

Given the benefits of capacity release identified above and the rapid increase in the volume of traded capacity, one might expect the role of services such as interruptible transportation to have diminished as capacity release markets have matured. Indeed, it appears that the growth in short-term and long-term capacity release has led to a commensurate reduction in the share of interruptible transportation. According to the most recently available data from EIA, interruptible transportation accounted for less than ten percent of total U.S. gas deliveries in 1997, compared with more than 50 percent in the mid-1980s.[28] Thus, the relative volume of interruptible transportation services has declined markedly in recent years, and this decline appears to be primarily attributable to competition from shippers offering released capacity.

B. Market Integration

The restructuring of the natural gas industry has led to the development of an active and integrated spot market (a market characterized by immediate, short-term, specified volume contracts). This market integration has carried with it a number of implications for natural gas transportation rates. Evidence for this claim comes from a number of economic studies that have taken place over the past decade and have investigated the extent to which natural gas markets have become integrated under the open access regime. Generally speaking, the consensus is as we have already noted: markets for natural gas transportation in the United States have become increasingly interconnected, and this integration has had an impact on the ability to set price. In 1993, for example, DeVany and Walls examined evidence from 190 origin and destination market pairs "to see if open access has succeeded in bringing gas markets under the control of competition."[29]

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27. ENERGY INFO. ADMIN., NATURAL GAS 1998: ISSUES AND TRENDS 141 (1999) [hereinafter EIA 1998]. The EIA has not updated its "Issues and Trends" report since 1999.

28. *Id.*

29. Arthur DeVany & W. David Walls, *Pipeline Access and Market Integration in the Natural Gas Industry: Evidence from Cointegration Tests*, 14 ENERGY J. 2 (1993).

According to their findings, "these market-pairs have become increasingly integrated as the network of pipelines has become more connected during the era of open access."[30] A few years later, DeVany and Walls again reported on the natural gas industry, concluding that "[s]pot markets in the city gates, pipeline hubs, and production fields, that are scattered over distant points in the vast pipeline network in the United States, now form a single market."[31]

In 1998, Serletis also refuted the notion that natural gas markets were split between the eastern and western regions of the country. Pointing to common trends in North American natural gas spot markets, Serletis concluded that such an east-west divide did not exist.[32] Similarly, a 1994 paper by Doane and Spulber observed monthly spot price data from 1984 to 1991 in order to determine price correlations, Granger causality, and cointegration.[33] Based on these analyses, the authors concluded that "open access [has] integrated the regional wellhead markets into a national competitive market for natural gas," noting specifically that "[r]egulatory actions promoting open-access transportation have resulted in new distribution channels, open market competition for gas supplies, and a drastically altered role for pipeline companies."[34]

In short, open access has integrated previously disparate natural gas markets, resulting in a more competitive marketplace for buyers and sellers of gas. Since the price of gas in a producing region is generally the delivered price of gas to a destination area less the cost of transportation, price movements in the integrated market have become highly correlated, even though the price of gas can vary from producing region to producing region.[35] The presence of high correlation among spot prices of different geographic areas at varying distances from source

30. *Id*.

31. Arthur DeVany & W. David Walls, *The Law of One Price on a Network: Arbitrage and Price Dynamics in Natural Gas City Gate Markets*, 36 J. REG'L SCI. 555 (1996).

32. Apostolos Serletis, *Is There an East-West Split in North America Gas Markets?*, 18 ENERGY J. 47 (1998). On occasion, natural gas prices in Southern California have diverged from those in Northern California as a result of capacity constraints on El Paso Pipeline and Southern California Gas Company. *Narrative Summary of the Prepared Direct Testimony and Exhibits of Dr. Jonathan D. Ogur on Behalf of Commission Staff; Hearing Before the Fed. Energy Reg. Comm'n*, 107th Cong. 9 (2001) (No. RP00-241-000) (statement of Dr. Jonathan D. Ogur, economist) [hereinafter Statement of Dr. Jonathan D. Ogur], *available at* http://elibrary.ferc.gov/idmws/nvcommon/NVViewer.asp?Doc=5550:0 (last visited Aug. 24, 2004).

33. Michael J. Doane & Daniel F. Spulber, *Open Access and the Evolution of the U.S. Spot Market for Natural Gas*, 37 J.L. & ECON. 477, 513 (1994).

34. *Id*. at 477–78.

35. *Id*. at 489.

locations demonstrates the existence of a broad geographic market for natural gas.[36]

In a competitive market, prices tend to be the same, net of transportation costs.[37] Stated another way, the geographic scope of a market is often characterized as the region within which prices of comparable goods net of transportation costs tend toward equality. If prices differ across regions, sellers can profit by moving products from low-price areas to high-price areas; such arbitrage will continue until price differences have been eliminated.[38] Thus, in a single market, such movement occurs until opportunities for arbitrage are exhausted, *i.e.*, buyers cannot turn to other sellers to obtain lower prices (net of transportation costs) and sellers cannot turn to other buyers to obtain higher prices (net of transportation costs). In the gas market, sellers generally can reach a customer over different routes from different sources, and, given opportunities for arbitrage, prices tend not to exceed the competitive level for long. Thus, in the case of natural gas, the freedom to engage in arbitrage between geographic locations places constraints on the rates charged by pipelines for transportation services.

C. Market Centers and Hubs

As noted above, new trading models have emerged since the introduction of open access by the FERC. One such model is the development of "market centers" (or "hubs"). A market center "provides customers (shippers and gas marketers primarily) with receipt/delivery access to two or more pipeline systems, provides transportation between these points, and offers administrative services that facilitate that movement and/or transfer of gas ownership."[39] A logical outgrowth of open-access restructuring, market centers provide locations at which shippers can buy and sell natural gas, pipeline transportation services, and storage capacity. Among other features, market centers provide short-term gas "loans" for shippers delivering too little volume and

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36. *Id.* at 493. Arbitrage causes the prices to be highly correlated, which demonstrates the existence of a broad economic market.

37. This long-established proposition is often referred to as the "law of one price." ALFRED MARSHALL, PRINCIPLES OF ECONOMICS 341–42 (8th ed. Macmillan 1948) (1890).

38. The natural gas market itself is an illustration of this market development. That is, arbitrage effectively eliminates inter-regional price differences within the United States for natural gas. *See, e.g.*, Michael J. Doane & Daniel F. Spulber, *Open Access and the Evolution of the U.S. Spot Market for Natural Gas*, 37 J. L. & ECON. 477 (1994).

39. JAMES TOBIN, ENERGY INFO. ADMIN., NATURAL GAS MARKET CENTERS AND HUBS: A 2003 UPDATE (2003), *available at* http://www.eia.doe.gov/pub/oil_gas/natural_gas/feature_articles/2003/market_hubs/mkthubsweb.html (last visited Aug. 25, 2004).

temporary gas "parking" for shippers delivering too much, both of which help to satisfy the balancing requirements of the transporting pipeline. In addition, market centers routinely provide title transfer, gas trading, electronic trading, and administrative services to facilitate transactions among purchasers, producers, and transporters of natural gas.[40] There are currently 37 operational market centers in the United States and Canada.[41] These hubs have facilitated the development of increasingly competitive natural gas transportation markets by providing locations where many natural gas shippers can trade and receive value-added services.[42]

The development of market centers has improved the "price discovery" process, *i.e.*, the process of determining market prices through the interactions of buyers and sellers in the marketplace. As noted by EIA, "The availability of market centers has enabled more buyers to seek out the least expensive sources of supply, while providing sellers with a platform to reach those buyers who are willing to pay the most attractive price."[43] The efficiency of the price-discovery process clearly depends on the accuracy of reported prices. Following the collapse of Enron's online energy trading operations in 2001, the validity of some reported gas prices was closely scrutinized. Some evidence suggested that certain gas traders reported erroneous prices in an effort to influence market behavior.[44] Following these revelations, the FERC and the Commodities Future Trading Commission (CFTC) promulgated voluntary guidelines for reporting gas prices so that future such attempts to bias reported gas prices should be reduced or eliminated.[45] Moreover, even the reported efforts to influence reported gas prices so as to create arbitrage opportunities would not affect futures prices, as discussed in the next section.

D. Financial Markets for Gas Futures

The introduction of open access has spurred an active market for the trading of natural gas futures, which both provides an effective hedging instrument for natural gas prices and assists in the creation of a more efficient market for transportation. This is because futures trading

40. *Id*.
41. *Id*.
42. *See* EIA, *supra* note 21, at 63, 66–76.
43. TOBIN, *supra* note 39.
44. *Id*.
45. Policy Statement on Natural Gas and Electric Indices, 104 F.E.R.C. 61,121 (July 24, 2003). The guidelines ask, for example, that a developer of natural gas price indices adopt a code of conduct that discloses how the developer obtains, treats, and maintains price data.

efficiently distributes information and can equalize prices between regions even when the regions are only indirectly or infrequently connected.[46] Futures markets allow for both physical deliveries as well as contracts that can be used to hedge against risk. For example, gas futures can be purchased and traded at the New York Mercantile Exchange (NYMEX), which "makes available for trading a series of basis swap futures contracts that are quoted as price differentials between approximately 30 natural gas pricing points and Henry Hub."[47] Although financial instruments are not part of physical gas supply, they provide a means to address alternative forms of risk, including risks that transportation services will be unexpectedly overpriced or unavailable.

A futures contract is an effective hedging instrument when it reduces the variance of the hedger's total position (cash and futures combined), and it does that best when the variation in the futures price explains all or most of the variation in the spot price. Empirical studies have shown that futures markets are competitive and yield prices that provide accurate information to buyers and sellers on the relative scarcity of goods.[48] In this case, the spot prices and future prices are linked, and the future price is a good predictor of the direction of spot prices at a later date. For example, based on a 1995 analysis of 13 spot markets located during the period, DeVany and Walls concluded that the natural gas futures market yields reliable and unbiased prices, and futures contracts provide market participants with an effective tool to hedge the risk of unexpected price movements.[49]

E. Other Recent Developments

The natural gas industry has continued to evolve since the Commission issued its Policy Statement in 1996. The issuance of FERC Order No. 637 in February of 2000 further increases efficiency and competition in the transportation market, in part by enhancing shippers' ability to segment capacity and improving the operation of imbalance management tools, penalties, operational flow orders, and reporting and

46. *See, e.g.*, Doane & Spulber, *supra* note 33, at 513.

47. NEW YORK MERCANTILE EXCHANGE, NATURAL GAS, *at* http://www.nymex.com/jsp/markets/ng_pre_agree.jsp (last visited Aug. 25, 2004). The Henry Hub is a pipeline interchange on the Louisiana Gulf coast.

48. Michael Hartzmark, *Luck Versus Forecast Ability: Determinants of Trader Performance in Futures Markets*, 64 J. OF BUS. 49–72 (1991); Charles Cox, *Futures Trading and Market Information*, 84 J. POL. ECON. 1215 (1976).

49. ARTHUR S. DEVANY & W. DAVID WALLS, THE EMERGING NEW ORDER IN NATURAL GAS: MARKETS VERSUS REGULATION 91 (1995).

posting requirements.[50] These provisions have enhanced the transparency and liquidity of transportation markets.

To summarize, the Commission's open-access efforts have transformed the natural gas industry. Upstream and downstream market centers have appeared, and these hubs have continued to grow, both in number and in the range of services offered. The trading of released capacity by means of electronic bulletin boards has fundamentally changed transportation markets. More generally, the growth in access to pipeline bulletin boards and websites (and growth in the standardization and detail of the information presented on those websites) allows for more transparency in the natural gas industry and makes it possible for a wider set of users to evaluate and acquire alternative transportation routes. In addition, a growing market for gas futures, options, and derivative contracts further facilitates price transparency and transactional flexibility. These and related developments have facilitated exchange and have increased the transparency of prices in gas commodity and transportation markets.[51] A May 2001 EIA report regarding "recent trends and prospects for the future" of U.S. natural gas markets aptly summarizes these developments:

> The natural gas pipeline network has grown substantially since 1990, with more than 20 billion cubic feet per day of interregional capacity (a 27-percent increase) added through the end of 2000. The network has also become more interconnected, its routings more complex, and business operations more efficient. New types of facilities, such as market centers, and established operations, such as underground storage facilities, have become further integrated into the national pipeline grid, allowing the system to operate with greater flexibility. The restructuring of the industry has changed the way in which network resources are used and has caused some shift in transportation routes and trading and shipping arrangements, but system reliability has continued to improve.[52]

As a result of reduced regulation in the natural gas industry, pipeline capacity has been more efficiently utilized during peak and off-peak periods, real operating and maintenance expenses have fallen,

50. FERC Order No. 637, 65 Fed. Reg. at 10,156.

51. *Id.* § I(B)(2)(a).

52. ENERGY INFO. ADMIN., U.S. NATURAL GAS MARKETS: RECENT TRENDS AND PROSPECTS FOR THE FUTURE 16 (May 2001), *available at* http://www.eia.doe.gov/oiaf/servicerpt/naturalgas/pdf/oiaf00102.pdf (last visited Aug. 25, 2004).

prices for residential and industrial customers have more accurately informed buyers and sellers of the relative scarcity of natural gas and gas transportation, and service has become more reliable.[53] As discussed in the remainder of this article, these changes, taken together, counsel for a reconsideration of the way in which competitiveness and market power is measured in the transportation of natural gas.

III. FERC'S METHOD OF EVALUATING MARKET POWER IN NATURAL GAS PIPELINES

In its 1996 Policy Statement, the Commission provided guidance on the framework it is to apply when evaluating proposals for market-based rates. According to the Commission, that framework is intended to address two principal questions: "(1) whether the applicant can withhold or restrict services and, as a result, increase price by a significant amount for a significant period of time, and (2) whether the applicant can discriminate unduly in price or terms and conditions."[54] For the Commission to determine that the applicant cannot engage in these practices, it must determine either that the availability of "good alternatives" prevents the achievement and exercise of market power or, where market power exists, that acceptable mitigation conditions have been proposed. The Commission proceeds to analyze market power in three steps:

- definition of the relevant markets, both product and geographic;
- measure of a firm's market share and market concentration; and
- evaluation of entry conditions, buyer power, and other relevant factors.[55]

As discussed below, the relevant product market for the purposes of a FERC market-power inquiry includes the services that are "good alternatives" to the applicant's service. Generally speaking, for an alternative to qualify as a "good" one, it must be available with sufficient timeliness, at a low enough price, and at a high enough quality to allow substitution with the applicant's service.

53. Clifford Winston, *U.S. Industry Adjustment to Economic Deregulation*, 12 J. ECON. PERSP. 89–110 (1998).

54. Policy Statement, *supra* note 4, at 61,230.

55. *Id.*

A. Product Market Definition

The FERC's determination of which products constitute a relevant market is based on the concept of "good alternatives."[56] A good alternative to a given pipeline's service is one that "is available soon enough, has a price that is low enough, and has a quality high enough to permit customers to substitute the alternative" for the pipeline's service.[57] The implication is that the product market consists of the applicant pipeline's service, together with other services that are deemed to be "good alternatives" on the basis of price, quality of service, and timeliness of availability.

Under the FERC's evaluation scheme, asking whether or not a service constitutes a good alternative on the basis of price is equivalent to asking whether or not the price for available capacity is sufficiently low to restrain the applicant seeking market-based rates from increasing its prices. According to the Commission, a price differential of up to ten percent is sufficient to meet this test—that is, in order for a product to be included in the market as a good alternative, its price must be no more than ten percent greater than the applicant pipeline's approved maximum cost-based rate.[58] Explaining this threshold, the Commission has commented that, "if a company can sustain an increase in its rates in the order of 10 percent or more without losing significant market share, the company is in a position to exercise market power to the detriment of the public interest."[59] Nevertheless, the Commission entertains arguments from firms, on a case-by-case basis, that the threshold should be higher or lower in a given market.[60]

With regard to quality, the Commission maintains that a service must have a level of quality "at least as high as that of the service provided by the applicant" in order to be considered a good alternative to the applicant's offering.[61] The FERC requires that applicants for market-based rates submit a full description of the services to which market-based rates will be applied in order to determine the relative quality of potential alternatives.[62] The Commission believes that the FT service of all interstate pipelines is presently comparable, but variation in the overall package of services may exist.[63] As a practical matter,

56. Policy Statement, *supra* note 4, at 61,231.
57. *Id.*
58. *Id.* at 61,232.
59. *Id.*
60. *Id.*
61. *Id.*
62. *Id.* at 61,236.
63. For example, the availability of no-notice service may be limited to certain firms.

however, FERC generally presumes that this condition of comparable quality is met in the case of certain transportation services offered by interstate pipelines. Specifically, it notes that, in the "aftermath of Orders Nos. 436 and 636, the Commission believes that all interstate pipelines currently provide operationally comparable firm transportation service."[64] For a pipeline to establish that interruptible transportation (IT) service is a good alternative to firm transportation service, however, the Commission recommends that the pipeline "demonstrate that an adequate amount of capacity is unsubscribed during peak periods so that the quality of the IT service is comparable to that of the applicant's FT service."[65]

Finally, there is typically an element of time associated with market definition. While antitrust authorities traditionally consider one year to be the time frame in which a service must become available to qualify as a substitute, FERC's Policy Statement does not specify such a time period for gas service substitutes. According to the Policy Statement, the specific service at issue will determine the appropriate time horizon.[66] The Policy Statement also cautions applicants that the mere existence of an alternative is insufficient, unless an applicant can demonstrate the availability of capacity on that alternative.[67] As discussed in section IV.C.3, *infra*, this criterion is flawed from an antitrust perspective. The Commission has offered few guidelines regarding the evaluation of potentially good alternatives on the basis of timeliness of availability. Indeed, the Policy Statement does not define a specific time period within which a product must become available in order to be considered a substitute, stating instead that such a determination is "dependent on the type of product [or] services at issue."[68] Nevertheless, the Policy Statement cautions pipeline applicants reliant on capacity not immediately available that they should not commit customers to long-term contracts on their systems within the delay period.[69]

B. Geographic Market Definition

Once the product market is established, the next step is to determine the relevant geographic market. The FERC notes that this is especially important in transportation service markets, as pipelines

64. Policy Statement, *supra* note 4, at 61,232.
65. *Id.*
66. *Id.* at 61,231.
67. *Id.*
68. *Id.*
69. *Id.*

transport gas out of an origin (producing) region and into a destination (consuming) region.[70] Therefore, both the origin market and destination market must be identified. Accordingly, the Policy Statement indicates that applicants' proposals should generally adopt a two-step approach to geographic market definition. First, "alternative sellers who offer service between the same origin and destination markets" must be identified.[71] Second, "competitors that provide service either out of the origin market or into the destination market" must be identified.[72]

The first step serves to recognize sellers offering service on the same route as the applicant. According to FERC, focusing on pipelines on the same route simplifies the analysis, as this circumvents the question of whether different origin regions are good alternatives to each other.[73] To successfully demonstrate that another pipeline on the same path offers a good alternative to the applicant's pipeline, an applicant must demonstrate that the alternative pipeline could provide the relevant service.[74] The alternative pipeline must have both the capacity and services necessary to use the competitor's facilities in both origin and destination markets over the term of market-based service rates.[75] Parallel alternative pipelines are also important, the Commission argues, if a customer is under contractual obligation to take or deliver gas at specific receipt or delivery points. The Commission cautions, however, that while the purchase and sale of gas on the spot market could meet contractual obligations where necessary, the prices and availability of spot gas may be unreliable.[76]

The second step reflects the existence of alternate destinations markets to which an upstream shipper could send gas, as well as a downstream shipper's choice among multiple origin markets from which to buy gas. These alternatives may further limit the potential market power of a pipeline.[77] Therefore, a market-based rate applicant must identify all competing pipelines that move gas out of the origin market and all competing pipelines that move gas into the destination market. Generally, the Commission states, alternative pipelines must be physically connected to the shipper in question to be included in the

70. Policy Statement, *supra* note 4, at 61,232–33.
71. *Id*. at 61,233.
72. *Id*.
73. *Id*.
74. *Id*.
75. *Id*. at 61,231.
76. *Id*.
77. If, for example, there are alternative pipelines serving the same origin, the producer has alternative buyers, which limits the ability of any individual pipeline serving that producer.

origin market.[78] That said, other pipelines may be included so long as a connection to the shipper could be constructed for sufficiently low cost to yield netback prices to the shipper that are as high under the alternative as they would be with the applicant's pipeline. The Commission does not explicitly state its criteria for defining a destination market.[79]

Natural gas pipelines should be allowed to charge market-based rates when there is sufficient competition to protect buyers of transportation services from the exercise of significant and durable market power. Generally speaking, purchasers of transportation services fall into one of two categories—natural gas sellers and natural gas buyers—and both need to be protected from the exercise of market power by the providers of transportation.[80] Such protection is afforded by the presence of good alternatives to the services of a given transportation supplier, but the "goodness" of an alternative from the perspective of a shipper largely depends upon the shipper's position as a seller or buyer of the transported gas. Since alternatives are to be considered for both transportation *from* and transportation *to* a shipper, the appropriate notion of a market is a geographic location where gas is either received or delivered. Such a geographic area should be as large as economic substitution dictates. In the case of natural gas transportation, which is characterized by multiple receipt and delivery points integrated into a larger pipeline distribution system, the relevant geographic market should arguably include the system as a whole.

The Commission posits another potential definition of the relevant geographic market, but this additional definition is problematic from an antitrust perspective given how the natural gas industry works. According to the Commission, pipelines (1) transport gas out of a producing or origin region, (2) deliver gas into a consuming or destination region, and (3) transport gas between the two.[81] Accordingly, when evaluating a firm's application to charge market-based rates, the FERC considers that a "market" delineated by a specific pair of delivery and receipt areas and a particular delivery path connecting them may constitute the relevant geographic market.[82] According to the Commission, such a "path market" would consist of the applicant and all other sellers of transportation service that could provide a good

78. Policy Statement, *supra* note 4, at 61,233.

79. *Id*. at 61,233–34.

80. Of course, gas traders, or arbitragers, both buy and sell gas.

81. Policy Statement, *supra* note 4, at 61,233.

82. *Id*. at 61,234. Under this market definition approach, gas transportation service between Henry Hub and Chicago, for example, constitutes a relevant geographic market.

alternative to the applicant's service between the specific pair of receipt and delivery areas and over a comparable route.[83] In order to show that another pipeline using the same route has a "good alternative" service, an applicant must demonstrate that "capacity would be available on the alternative [pipeline] and that the customer can obtain any services needed to use the competitor's facilities in both origin and destination markets over the term of the service receiving market-based rates."[84] An alternative pipeline meeting these requirements would be included, under the Commission's methodology, in the same relevant geographic market as that of the applicant.

As discussed in greater detail below, such so-called "path markets" are not markets in any relevant economic sense. They do not accurately capture the good alternatives actually available to shippers and thus should not be adopted as a definition of the relevant geographic market for antitrust analysis.

C. Measurement of Market Share and Market Concentration

Market power studies commonly make use of a statistic known as the Herfindahl-Hirschman Index (HHI) to measure the level of concentration among suppliers in a market.[85] Indeed, the HHI is the way that market concentration is usually assessed and is the statistic employed by the Commission in its Policy Statement.[86] The HHI is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers.[87] This index is based on an equation arising out of a simple model of competition, called the Cournot model. In that model, the proportion of the price that is a

83. *Id.*
84. *Id.* at 61,233.
85. *Id.* at 61,234.
86. *Id.*
87. For example, for a market consisting of three firms with shares of 20 percent, 30 percent, and 50 percent, the HHI is equal to 2900—that is, equal to $20^2 + 30^2 + 40^2$. The HHI thus takes into account the relative size and distribution of firms in the market and approaches zero when a market consists of a large number of firms of relatively equal size. Conversely, the HHI increases both as the number of firms in the market decreases and as the disparity in size between firms increases; an HHI of 10,000, which results from squaring a single share of 100 percent, thus represents a monopoly. When using and reporting the HHI, it has become common to sum the shares in percentage terms (*e.g.*, 30 percent), although the formula justifying the use of the HHI requires expressing the shares in proportion (*e.g.*, 0.30). Using shares expressed as proportions, the HHI has a possible range from near 0.0, in the case of perfect competition, to 1.0 for monopoly. In this article, we follow the convention used by the FERC, which expresses shares in percentage terms and implies a range for the HHI of 0 to 10,000. *See, e.g.*, DENNIS W. CARLTON & JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 344 (2d ed. 1994).

markup over marginal cost (known as the price-cost margin or Lerner Index) equals the HHI divided by the elasticity of demand. In the Cournot model, the HHI represents the sum of the squared market shares, rather than market capacities. In symbols:

$$\frac{p - mc}{p} = \frac{HHI}{\varepsilon},$$

where ε is the market elasticity of demand, *mc* is marginal cost, and *p* is the market price. This formula justifies the use of the HHI in assessing market power by suggesting that larger HHIs will, other things being equal, lead to higher prices.

In market power studies, the HHI is used primarily as a screening device. Low values of the HHI suggest that prices are unlikely to exceed competitive levels because the ability of one or few firms to control supply and exercise market power is so limited. As a matter of general principle, it is more difficult to predict with certainty the effect on prices when the HHI takes on high values. While a high level of concentration within a market may be a necessary condition for the successful exercise of market power by one or few suppliers, it is by no means a sufficient condition. For instance, some markets served by just two or three firms have been found to be intensely competitive, while others with three or more firms have been found not to be competitive. For example, the market for soft drinks is characterized by intense competition between the two major competitors—Coca Cola and Pepsico. Therefore, for markets characterized by high values for the HHI, other factors—such as ease of entry, buyer power, and elasticity of demand—must be considered.

In evaluating a firm's ability to exercise market power, it is also important to take into account the likely supply responses of rival suppliers to an anticompetitive price increase, since the profitability of a given firm's unilateral price increase depends in large part on the supply responses of rival suppliers. In particular, if those rival suppliers have excess capacity that they will supply in response to a given price increase, the profitability of the price increase declines. In such a case, a high HHI would tend to overstate the likelihood of market power. Rather than being a dispositive finding regarding market power, a high HHI value basically represents a flag that further inquiry is required to determine the presence or extent of market power. More direct studies of

market performance are then generally conducted to determine competitiveness on a case-by-case basis.[88]

As noted above, the HHI is best considered as a screening device to determine when and if additional scrutiny of possible market power is warranted. This naturally raises the question: At what level of the HHI is such additional scrutiny to be triggered? That is, what value is considered a "high" level of market concentration?

Both the FERC and the U.S. Department of Justice (DOJ) have set HHI criteria for evaluating market power. In assessing the market power of pipelines, the Commission has established an HHI of 1800 as its threshold screening device.[89] To put this in perspective, consider that an HHI of approximately 1800 would result from a market in which there were, for example, five to six firms of roughly equal share. According to the Policy Statement, applications for market-based rates will receive "closer scrutiny" when concentration is determined to be in excess of this level.[90] Note, however, that an HHI value exceeding 1800 does not rule out eligibility for market-based rates under this standard. Neither the FERC nor any other agency has applied a bright-line test in which a finding of 1800 (or any other particular level of the HHI) automatically precludes authority for market-based rates. The DOJ, for example, also makes use of the HHI statistic in assessing market power but has concluded in its assessment of the oil pipeline industry that markets exhibiting HHIs below 2500 require no further scrutiny and should be deregulated.[91] An HHI of 2500 corresponds to a market with four equal-sized firms. The DOJ, in its 1986 report on oil pipeline deregulation,[92] maintained that competition among four equal-sized, deregulated firms in any origin or destination market was likely to be more efficient than regulation since cost-of-service regulation imposes significant direct and indirect costs.[93]

Thus, there is nothing sacrosanct about the FERC's use of 1800 as its threshold level of market concentration. Indeed, the Commission has

88. U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, HORIZONTAL MERGER GUIDELINES § 3, *available at* http://www.usdoj.gov/atr/public/guidelines/horiz_book/hmg1.html (last visited Aug. 25, 2004).

89. Policy Statement, *supra* note 4, at 61,235.

90. *Id*.

91. In the face of the impossibility of actually measuring the costs of regulation, the DOJ believes that an HHI of 2500 is a reasonable threshold above which pipelines should be presumed to require continued regulation. ANTITRUST DIV., U.S. DEP'T OF JUSTICE, OIL PIPELINE DEREGULATION: REPORT OF THE U.S. DEPARTMENT OF JUSTICE 29–30 (1986) (footnote omitted), *available at* http://www.usdoj.gov/atr/foia/foiaroom.htm.

92. *Id*.

93. Comments of the U.S. Dep't of Justice in Response to Notice of Technical Conference, F.E.R.C., at 5–6 (July 30, 1992) (No. OR92-6-000).

explicitly stated as much: "The Commission will not adopt a rigid brightline threshold level for the HHI, below which an applicant would automatically qualify for market-based rates, or above which an applicant would be excluded from market-based rates."[94] For example, as explained in its 1996 Policy Statement, the Commission has opted to use a higher HHI of 2500 as an initial screen in oil pipeline cases.[95] In practice, these structural considerations have resulted in cases in which the Commission has approved market-based rates even when the HHI exceeded the 1800 screen. In its *Buckeye* decision, for example, the Commission did not rule out markets with HHIs well in excess of 1800 as eligible for market-based rates; rather, the Commission applied "closer scrutiny" to those geographic markets and concluded that some should nonetheless be allowed to have market-based rates.[96]

D. Evaluation of Other Relevant Factors

The Policy Statement notes that a seller can exercise market power either by unilaterally raising its price or by acting in concert with other firms.[97] In the first scenario, a firm must generally have a large market share to exercise market power successfully. Accordingly, an applicant for market-based rates must submit calculations to the FERC of its market share in all relevant origin, destination, and "path" markets. Large market share, however, is merely one condition for the exercise of market power, as other economic factors could offset a firm's unilateral pricing power. In addition to reporting structural factors such as market shares and market concentration, an applicant should, whenever possible, examine actual market performance. As discussed in section IV.C, market performance studies can provide direct evidence of the competitiveness of markets.

As the Policy Statement recognizes, one economic factor that can offset market power resulting from a high concentration of sellers is concentration among buyers.[98] The presence of buyer concentration, however, is not adequately accounted for in an HHI-based evaluation. Accordingly, we describe the economic principles relevant to evaluating the effect of buyer concentration on market power. Specifically, we show how to calculate the amount by which buyer power reduces transportation rates, by compensating for the implicit and often mistaken

94. Policy Statement, *supra* note 4, at 61,235 (footnote omitted).
95. *Id.*
96. *See* Opinion No. 360, Buckeye Pipe Line Company L.P., 53 F.E.R.C. 61,473 (1990).
97. Policy Statement, *supra* note 4, at 61,234–35.
98. *Id.* at 61,235.

assumption in HHI-based rate calculations that buyers are un-concentrated and thus cannot offset the effects of seller concentration.

Another factor that must be considered in an evaluation of market power is, as the Commission notes, the excess capacity held by sellers.[99] A seller will tend to have a greater or lesser degree of success exercising market power depending on the excess capacity of its rivals. We describe the appropriate economic framework suitable for the natural gas industry and others for determining how much excess capacity a firm's rivals would have to have before a firm would be unable to profitably increase prices.[100]

As noted above, market performance studies provide direct evidence of the competitiveness of markets.[101] In the context of FERC-regulated pipelines, a direct test of a firm's ability to exercise market power over a given service can be obtained by (1) determining if the firm sells all its capacity of that service and (2) comparing its billed rates to its maximum legal rates. Firms with market power withhold capacity in order to obtain prices in excess of cost. Thus, if a firm sells all its capacity, it cannot be exercising market power. If the firm sells all its capacity at prices below maximum regulated levels, this finding is reinforced.

Finally, the Commission has established that an applicant for market-based rates may identify conditions or changes that it could implement in order to mitigate concerns regarding the level and effects of its market power.[102] Thus, if a firm is aware that it will be unable, on the basis of its own analysis, to show it lacks market power, it may propose mitigating conditions or adjustments to its service; these are then evaluated by the Commission.[103]

99. *Id.*
100. *See infra* Part IV.C.3.
101. *See infra* Part IV.C.
102. Policy Statement, *supra* note 4, at 61,235.
103. *Id.* at 61,236–42. The Policy Statement further declares that in cases where market-based rates are not a viable option, regulation will continue on the basis of cost-based rates, including the option to apply for incentive rates. As another alternative, for pipelines that do not attempt to establish their lack of market power and do not desire to pursue an incentive rate program, the Policy Statement outlines a possible recourse rate policy. Under such a program, firms could negotiate rates and terms with each individual shipper to provide flexibility, but shippers would retain the option to revert to cost-based service, if necessary. The recourse service option would restrain pipelines from exercising market power, while allowing some of the gains of more flexible pricing.

1. Actual and Potential Entry as an Offset to Seller Power

Ease of entry into a market can ensure that price increases will not be profitable to incumbents, thereby restraining their attempt to exercise market power. In the case of natural gas transportation, entry may be facilitated by potential pipeline expansions that do not require substantial sunk costs (*i.e.*, costs that cannot be recovered). The Commission allows for evaluation of actual and potential entry as part of a market power assessment, noting that if entry into the relevant market is sufficiently easy, then even a pipeline possessing a large market share or competing in a concentrated market may not be able to exercise market power.[104] Of course, ease of entry influences the number and availability of good alternatives to a given pipeline's service, the determination of which is central to the Commission's assessment of market power.

2. Buyer Power as an Offset to Seller Power

The Commission specifically suggests that, in some cases, a large sophisticated buyer may be able to "negotiate reasonable rates even in a concentrated market."[105] Buyer power, also known as "monopsony power,"[106] is the analogue to monopoly power in the case of sellers. Monopsony power results when buyers have the ability to withhold demand from the market, thereby lowering prices below levels that would have been observed in its absence. It is a countervailing force to seller power and is thus relevant to an assessment of the market power potentially exercisable by a supplier, since sellers do not have the unilateral ability to raise prices above competitive levels in the face of significant buyer power. The FERC recognized as much in its 1996 Policy Statement, specifically discussing buyer power as one of the competitive factors potentially limiting or preventing the exercise of market power by an applicant.[107] Indeed, the Commission explicitly recommends that applicants analyze the role of buyers in the relevant gas transportation markets when assessing the presence or absence of market power.[108] After all, any market power study that ignores the role of buyer power runs the danger of generating incorrect findings. Thus, the presence of

104. Policy Statement, *supra* note 4, at 61,235.
105. *Id.*
106. ROBERT S. PINDYCK & DANIEL L. RUBINFELD, MICROECONOMICS 358 (5th ed. 2000).
107. Policy Statement, *supra* note 4, at 61,235.
108. *Id.*

buyer power[109] can alleviate some or all of the anticompetitive effects of concentrated seller power.[110]

Figure One illustrates how buyer power alleviates some or all of the anticompetitive effects of seller power. In the Figure, market supply is shown by the curve S_1 and market demand by the curve D_1. These supply and demand curves cross at point A, which represents the equilibrium when neither buyers nor sellers exercise market power. Sellers exercise market power by withholding capacity from the market, which is illustrated in Figure One by a shift in the supply curve from S_1 to S_2. All else being equal, the market equilibrium changes from point A to point B, reflecting a higher price and a lower quantity.

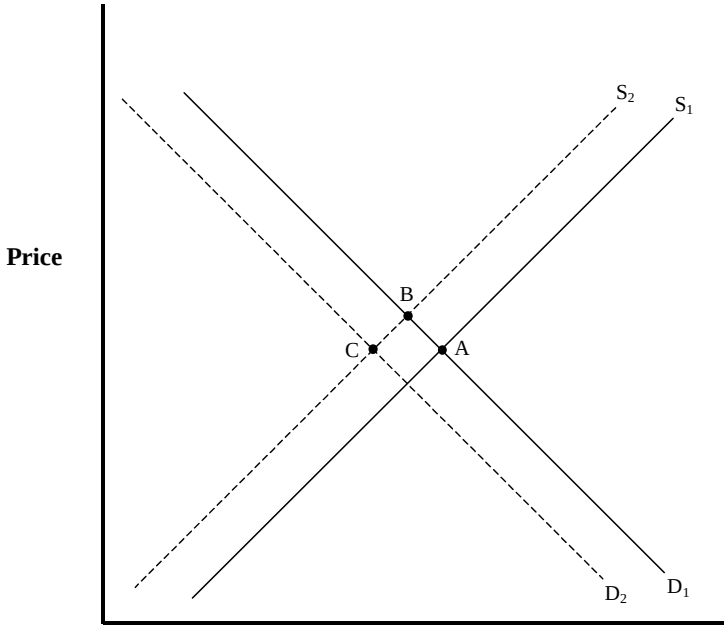
Buyers exercise market power by withholding demand from the market. This is illustrated by a shift in the demand curve from D_1 to D_2. If all else is equal, the market equilibrium changes from point B to point C as the shifting demand curve forces the point of equilibrium to travel downward and leftward along the new supply curve. As Figure One is constructed, buyer power exactly offsets seller power, such that the

109. In this context, buyer power is interpreted to be the ability of buyers (all else being equal) to lower market prices.

110. The issue of buyer power has also been confronted in case law. For example, in *United States v. Baker Hughes Inc.*, 731 F. Supp. 3 (D.D.C. 1990), *aff'd*, 908 F.2d 981 (D.C. Cir. 1990), the United States sought to enjoin a merger between a subsidiary of Baker Hughes and a subsidiary of Oy Tampella AB, both manufacturers of hardrock hydraulic underground drilling rigs (HHUDR) on the grounds that the merger would substantially lessen competition. The United States presented HHIs showing that merger would increase concentration in an already highly concentrated market. In rejecting the government's request for an injunction, the district court noted that the sophistication of the buyers of HHUDRs was likely to promote competition even in a highly concentrated market. The district court's decision was affirmed by the Court of Appeals for the District of Columbia. *Baker Hughes Inc.*, 908 F.2d 981. Similarly, in *United States v. Calmar Inc.*, 612 F. Supp. 1298 (D.N.J. 1985), the United States sought to enjoin a merger between Calmar, which controlled 60 percent of the product market of "regular sprayers" and 58 percent of the product market of "regular dispensers," and Realex, which controlled 23 percent and 21 percent of the markets for regular sprayers and regular dispensers, respectively. The complaint alleged that the regular sprayer market, even prior to the merger, was highly concentrated, containing just three participants and exhibiting an HHI of approximately 4400; the regular dispenser market had but five participants ex ante, which yielded an HHI of approximately 4000. The proposed merger between the firms was expected to create ex post HHIs of more than 7100 and 6400 in the two markets. Notwithstanding these relatively high HHI statistics, the court denied the application for a preliminary injunction barring the merger, citing such non-quantitative factors as the ease of entry into each product market as mitigating elements. Interestingly, the court also intimated that buyer power—in particular, the ability of buyers to manufacture the pump dispensers themselves—existed to ameliorate some of the concerns regarding supplier concentration. Without assigning a value to buyer power to use in conjunction with the traditional HHI model, the court nonetheless took note of its existence in and potential relevance to the product markets while at issue. *Calmar*, 612 F. Supp. at 1298–1307.

equilibrium price is the same at C as it was at A, albeit with a lower quantity. More generally, buyer power may only partially offset seller power, in which case the final price would be between points A and B. It is possible, however, for buyer power in certain instances to more than offset seller power, in which case the final price would be below point A.

Figure One: The Effects of Buyer Power on Seller Power



Shippers can acquire buyer power through the accumulation of capacity rights. For example, shippers vertically integrate upstream into the market for transportation services when they enter into long-term firm transportation contracts. By acquiring these contracts, shippers become owners of contractual rights to firm transportation services, which they can either sell in the capacity release market or use to supply their own demands for transportation services. If they choose the latter course, they become both a seller and a buyer of transportation services, *i.e.*, they are vertically integrated. In this circumstance, purchases the firm makes from itself are not subjected to the exercise of market power. Thus, all other factors being the same, the more a buyer vertically integrates upstream into the market for transportation services, the less its purchases of those services are subjected to market power.

Buyer power is thus another factor that can weigh against an applicant's ability to exercise market power. If a shipper has large

enough market share, or if the market for a pipeline's service is sufficiently concentrated, then buyers may be able to negotiate reasonable rates, despite a seller's market power. We caution the reader that HHI values generated for the purpose of assessing the market power of a supplier of natural gas seeking market based rates are likely to overstate the presence of such power, since the HHI is a measure of supplier concentration only and thus does not take into account possible buyer power.

IV. CRITIQUE OF FERC'S MARKET POWER ASSESSMENT METHODOLOGY

The Commission's methods for evaluating proposals by natural gas transporters for market-based rates fail to address several issues critical to the accurate assessment of an applicant's ability to gain and exercise market power. As discussed above, the FERC relies on the well-known Herfindahl-Hirschman Index[111] as a measure of the concentration of sellers in a market, and it uses threshold values of the index as a regulatory screen when evaluating a market's "competitiveness."[112] If the HHI is sufficiently small, the Commission concludes that enough service providers exist that market power could not be profitably exercised.[113] The FERC evaluates the HHI for each origin, destination, and "path" market according to data from each mainline receipt point in an origin market and from each delivery point in a destination market. Only the sales or capacity figures of pipelines classified as good alternatives are included in the HHI calculations.[114]

As we explain below, however, the HHI structural approach has significant limitations and is generally considered inferior to a direct, performance-based analysis of market power when such an analysis is feasible. Additionally, the Commission's various definitions of relevant geographic or product markets fail to capture the good alternatives available to a given pipeline's services. This undermines the usefulness of the Commission's estimated HHI, since correct identification of alternatives is a prerequisite to determining market shares appropriately. As noted above, one of our main purposes in this article is to present new tools that can assist in market power analysis. As we discuss the shortcomings inherent in the Commission's current methodology for

111. *See supra* Part III.C.
112. Policy Statement, *supra* note 4, at 61,234–35.
113. *Id.*
114. *See supra* Part III.A.

assessing market power, we also provide suggestions for overcoming those limitations.

A. Origin-Destination "Paths" Are Not Relevant Geographic Markets

As noted above, the Commission has suggested that origin-destination paths can be considered relevant geographic markets for antitrust analysis. We believe, however, that path markets no longer describe the good alternatives available to shippers and, thus, do not constitute relevant antitrust markets. As a result of the Commission's open access policies, the gas industry has become highly integrated and has continued to evolve in ways that eliminate origin-destination paths as relevant geographic markets.[115] Specifically, FERC's open-access policies have greatly expanded the alternatives available to shippers. These alternatives are not reflected in the specification of path markets, which diminishes the usefulness of path markets as a tool for the assessment of market power. As Michaels and DeVany observed in 1995:

> The past decade's expansion of interconnections and trading institutions has so increased competition that the markets the FERC believes are relevant are the ones that its policy has rendered irrelevant. Origin-destination analysis describes opportunities in a balkanized, weakly connected pipeline network that no longer exists.[116]

Indeed, since the Commission's Policy Statement was prepared in 1996, markets have become more highly integrated, new trading institutions have developed, market hubs and storage options have increased in numbers, and capacity release programs have flourished.[117] Path markets do not reflect these characteristics of the industry and thus fail to describe accurately the good alternatives available to shippers. Furthermore, paths cannot appropriately be considered relevant geographic markets because a hypothetical monopolist of gas transportation services on an origin-destination pair cannot profitably raise prices above competitive levels for a significant period of time. Consequently, such origin-destination paths are of no relevance in conducting a market power study of gas transportation providers.

Above, we discussed how the highly integrated nature of the natural gas industry affects the nature of the good alternatives available

115. *See, e.g.*, Doane & Spulber, *supra* note 33.

116. Robert J. Michaels & Arthur DeVany, *Market-Based Rates for Interstate Gas Pipelines: The Relevant Market and the Real Market*, 16 ENERGY L.J. 320 (1995).

117. EIA 1998, *supra* note 27.

to transportation buyers. We now show that protecting pipeline buyers of transportation services (*i.e.*, buyers and sellers of natural gas) from the exercise of market power by sellers does not require that pipelines serve the same route or path. Sellers of natural gas, for instance, are protected from the exercise of market power when they have sufficient alternatives to transportation—that is, when there are other pipelines serving the seller. Protection may require the seller to build a line to another pipeline to create a new, more competitive choice, but it is not necessary that the pipeline go to any particular buyer. Note also that the cost of such a line is relevant, since the option to build a long, expensive spur provides relatively less protection than does the possibility of building a short, inexpensive spur. Furthermore, competing pipelines need not serve the same destination market to protect sellers of natural gas. The concern of natural gas sellers is to obtain "high" prices for their gas, and they typically do not care about the destination of the gas except as the destination affects the netback price their gas commands.

Similarly, a buyer of natural gas is protected from the exercise of market power by any one pipeline when there are so many alternative transportation providers bringing natural gas to the buyer that no one provider can increase transportation prices profitably. If there are substitutes permitting the buyer to obtain gas from other regions, for example, a price increase by one pipeline will prompt buyers to substitute with gas from other pipelines. If such substitution renders the price increase unprofitable, any attempt to increase prices thus causes the pipeline to lose revenue, and the buyer is protected from the exercise of market power. Since buyers of gas can substitute with gas from other regions, buyers need only alternative pipelines. The pipeline need not come from a particular seller.

Therefore, routes or paths between particular buyers and sellers of natural gas are of no relevance in conducting a market power study of gas transportation providers. Indeed, the highly integrated nature of the gas industry makes the notion of origin-destination pairs of geographic areas inappropriate as a description of the market environment. Buyers generally have a number of alternative paths over which to obtain gas. Buyers fundamentally care about delivered gas prices and do not focus on (indeed, often do not even know) the geographical source of supply. Therefore, a market power study should not analyze the routes or paths between particular buyers and sellers of natural gas, but should instead reflect the substitution possibilities of buyers and sellers.

In sum, the highly integrated nature of natural gas transportation markets means that a hypothetical monopolist of gas transportation services on an origin-destination pair of geographic areas cannot profitably raise prices above competitive levels for a significant

period of time. If such an attempt were made, originating shippers would substitute to transportation services to other destinations, and destination shippers would substitute to transportation services from other origins. Therefore, origin-destination pairs cannot constitute relevant antitrust geographic markets because market power cannot be exercised in those geographic areas. The scale economies associated with the construction of natural gas pipelines exist for an individual pipeline connecting a single origin region with a single destination region, but scale economies do not preclude different firms from operating different pipelines within relevant antitrust markets. For example, different pipelines are required to move gas from the Permian Basin into the Chicago area and from Canada into the Chicago area. No cost savings result from having the same firm own these separate pipelines. Similarly, different pipelines transport gas from the Permian Basin to Chicago and from the Permian Basin to California. There is no reason why the pipeline taking gas from the Permian Basin to Chicago and the pipeline taking gas from the Permian Basin to California must be owned by the same firm.

In order to ensure sufficient competition among transportation providers (and thus to protect buyers and sellers of natural gas from the exercise of market power), it is not necessary that alternate pipelines serve the same route or path. As noted above, buyers of gas can substitute to gas from other regions; what is necessary to protect buyers is that alternative pipelines are available. Similarly, sellers are protected if there are other pipelines serving the seller; it is not necessary that these go to any particular buyer. This concept is illustrated in Figure Two, which presents a pipeline that has a monopoly on a path from seller *S1* to buyer *B1* but is nevertheless prevented from exercising market power by the presence of competing alternatives. Any increase in the price of transportation on the route *S1* to *B1* will send the seller to alternate buyers, will send the buyer to alternate sellers, or both. Neither party is willing to absorb the price increase, which means that the pipeline loses market share, rendering the price increase unprofitable. Indeed, as a practical matter, it is not necessary that the alternate pipelines currently exist, provided they can be built sufficiently quickly and cheaply.

Figure Two: Inadequacy of Paths as a Definition of the Relevant Market

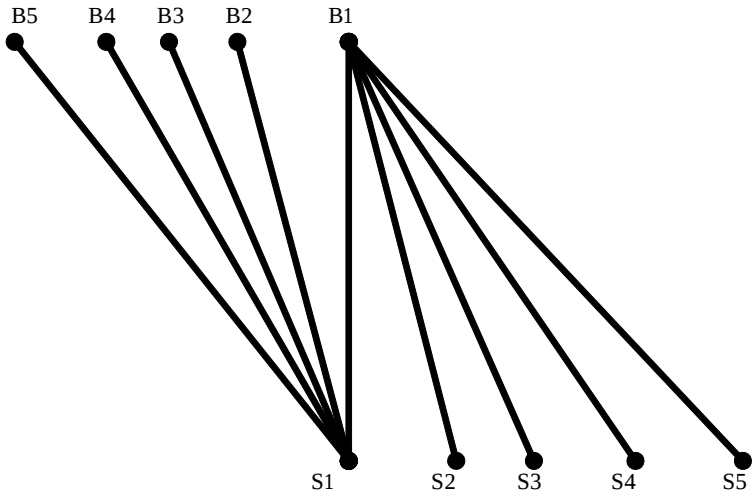


Figure One: Seller *S1* and Buyer *B1* are connected by a single pipeline. However, that pipeline has no ability to exercise market power, because both seller *S1* and buyer *B1* have four alternative sources to sell or buy natural gas.

Path-defined geographic markets may be appropriate in cases like airline travel, where customers care about both their origins and destinations (for example, air travel from San Francisco to Washington, D.C. is not a substitute for air travel from Houston to Washington, D.C., although they have the same destinations), but they are not applicable to the natural gas industry. Buyers of natural gas care only about delivered prices and are indifferent to the source, so long as gas from different regions is equivalent in quality. Similarly, sellers are concerned with netback prices and are indifferent to the location of the buyer offering the netback. These conditions hold because prices in an integrated market are approximately equal net of transportation costs. Since buyers and sellers of natural gas—the purchasers of transportation service—in essence care only about one end of the transaction, markets defined as paths between specific pairs of receipt and delivery areas are irrelevant to a market power study in natural gas transportation. While the FERC has suggested that customers could care about the particular path over which gas travels as a result of specific contractual obligations, such concerns are unlikely to be observed in practice. Delivered gas prices, *e.g.*, to a particular city gate, are the same regardless of the geographic source of the gas. This reflects the integration of wellhead markets for

natural gas.[118] Gas markets have achieved a high degree of liquidity, such that a shipper can generally find ready buyers and sellers with whom to trade in the event that it wishes to change its receipt and delivery locations. And as discussed above, the recent development of market centers further facilitates such trades and exchanges.

B. "Peak-Day" Demand Periods Are Not Relevant Product Markets

Peak-day demand periods do not constitute a relevant product market for purposes of evaluating market power for two reasons. First, peak-day periods are transitory and therefore cannot be a basis for the determination of market power. By definition, market power is the ability to maintain prices above competitive levels profitably for a significant period of time.[119] Peak-day demand periods, on the other hand, are inherently transient and thus cannot be considered a relevant product market. While the Commission cautioned in its *Koch* decision[120] that a transportation provider might be able to exercise market power during a peak period, temporary pricing should not be the focus of a market power evaluation.

The second reason is that defining peak-day periods as a separate product market fails to consider consumers' alternatives to peak-day prices that are available *prior* to the peak-day period. Emphasizing peak-day transactions in a market power evaluation overlooks the fact that buyers, such as local distribution company (LDC) shippers, often plan their transport service purchases well in advance; those who do not (*e.g.*, gas marketers) tacitly accept the risk of higher peak-day prices. Prior to the peak-day period, consumers have a number of alternatives through which they can secure, in advance, prices for gas transportation that are lower than those that prevail as a result of heightened demand during the peak-day period. To begin with, consumers of pipeline capacity have the option to enter into long-term contracts that offer protection from the price fluctuations of peak demand periods. Next, buyers can acquire transportation services on a short-term basis (*e.g.*, intramonth, one-month, or three-month contracts) if they anticipate their advance reservation of transport capacity will be insufficient to meet demand. Similarly, buyers can purchase delivered

118. Doane & Spulber, *supra* note 33, at 513; DeVany & Walls, *supra* note 31, at 555.

119. FERC Request for Comments on Alternative Pricing Methods, Alternatives to Traditional Cost-of-Service Ratemaking for Natural Gas Pipelines, 70 F.E.R.C. 61,139 at 61,230 (1995).

120. Koch Gateway Order, *supra* note 12.

supplies on the "gray market" on a short-term basis.[121] And, as discussed above, buyers also have the opportunity to acquire transportation rights held by other shippers through capacity release arrangements.

Peoples Energy, the parent company of Peoples Gas and North Shore Gas, which serves the Chicago area, is representative of a local distribution company taking actions to avoid the possibility of hold-up on peak days. According to a recent Securities Exchange Commission (SEC) Form 10-K[122] for the firm:

> Peoples Gas and North Shore Gas have each entered into various long-term and short-term firm gas supply contracts. When used in conjunction with contract peaking and contract storage, Peoples Gas' company-owned storage, and the peak-shaving facilities of the utilities, such supply is deemed sufficient to meet current and foreseeable peak and annual market requirements.[123]

In a similar manner, Puget Sound Energy (PSE), which serves approximately 622,000 customers in Washington State, primarily in the areas surrounding Seattle and Olympia,[124] also effectively mitigates the risk of shortages on peak days. PSE accommodates its peak demand requirements in part by managing "a blended portfolio of long-term firm, short-term firm and non-firm gas supplies from a diverse group of major and independent producers and gas marketers in the United States and Canada."[125] This portfolio, with its "geographic mix of suppliers and daily, monthly and annual take requirements," is structured to capitalize on regional price differentials as they arise, providing to PSE "a high degree of flexibility in managing gas supplies during off-peak periods to minimize costs."[126] During such off-peak periods, PSE thus arranges for

121. The "gray market" is the practice of gas marketers and other shippers, including LDCs, of selling bundled gas and gas transportation service during peak periods.

122. A 10-K is an annual report providing a comprehensive view of a company's business, which is required yearly by the SEC. Securities Exchange Act of 1934, 15 U.S.C. § 78(a).

123. Peoples Energy Corp., Form 10-K, at 10 (Dec. 14, 2001) (for Fiscal Year ended Sept. 31, 2001).

124. Puget Energy, Inc., Form 10-K, pt. I.1 (Business) (Mar. 10, 2003) (for Fiscal Year ended Dec. 31, 2002) [hereinafter Puget Energy 2002 10-K].

125. *Id*. In 1998, for example, PSE took assignment of a third-party peaking gas supply service contract, which now allows PSE to divert away up to 48,000 Dekatherms (approximately 48×10^9 MMBtu) per day of gas it supplies to the Tenaska Cogeneration Facility. Specifically, PSE can cause the facility to operate on distillate fuel (paying any additional costs of such operation to Tenaska) in exchange for the ability to divert the natural gas to PSE's core gas load. *Id*.

126. Puget Energy 2002 10-K, *supra* note 124, pt. I.1 (Gas Supply).

the purchase and storage of natural gas that can be freed later to meet peak demand. As the parent company of the utility explained in its Form 10-K filing for 2002:

> For baseload and peak-shaving purposes, PSE supplements its firm gas supply portfolio by purchasing natural gas at generally lower prices in months of low market demand for gas, injecting it into underground storage facilities and withdrawing it during the winter heating season. Storage facilities at Jackson Prairie in Western Washington and at Clay Basin in Utah are used for this purpose. Peaking needs are also met by using PSE owned gas held in NPC's liquefied natural gas (LNG) facility at Plymouth, Washington, and by producing propane-air gas at a plant owned by PSE and located on its distribution system.[127]

According to the firm's 10-K, all peak firm gas supplies and storage are connected to PSE's markets via firm transportation capacity.[128] Finally, PSE notes also that it "enters into short-term physical and financial derivative instruments to hedge the cost of gas to service its customers."[129]

As the firm asserts in its 2002 10-K filing, "PSE expects to meet its firm peak-day requirements for residential, commercial and industrial markets through its firm gas purchase contracts, firm transportation capacity, firm storage capacity and other firm peaking resources."[130] As a consequence, PSE concludes that it can acquire incremental firm gas supplies to meet anticipated demand increases by its firm customers.[131]

Boston Gas provides a final example of a local distribution company taking actions to avoid the possibility of hold-up on peak days. Boston Gas had peak day firm throughput (in Bcf) of 0.86 in 2002, 0.63 in 2001, and 0.80 in 2000.[132] In order to meet these demands, Boston Gas provides for "peak period demand through a least-cost portfolio of pipeline, storage and supplemental supplies," which it explains thusly:

> Supplemental supplies include LNG and propane air, which are vaporized mainly at points on our distribution system. We own propane air facilities and one LNG facility in Dorchester, Massachusetts. We also lease two LNG

127. *Id.*
128. *Id.*
129. *Id.*
130. *Id.*
131. *Id.*
132. *See* Boston Gas Company d/b/a KeySpan Energy Delivery New England, Form 10-K/A, at 4 (Aug. 16, 2003) (for Fiscal Year ended Dec. 31, 2002).

> facilities sited on land owned by us in Salem and Lynn, Massachusetts and also lease space in facilities located in Providence, Rhode Island and Everett, Massachusetts.[133]

Boston Gas has also contracted with pipeline companies and others for the storage of additional natural gas in underground fields in Maryland, New York, Pennsylvania, and West Virginia; according to the firm, these contracts collectively provide storage capacity of 16.3 Bcf and peak-day deliverability of 0.18 Bcf.[134] Boston Gas utilizes existing contracts for transportation of gas from storage fields to service territories. Their supplemental supplies of both liquefied natural gas and propane are purchased from both foreign and domestic producers.[135] Boston Gas has determined that its peak-day capacity adequately meets the demands of its firm customers.[136] The extent to which companies have developed plans for avoiding peak day shortages reflects the notion that these periods should not be the focus of a market power evaluation.

Buyers of gas transportation services can also avoid or otherwise mitigate peak-day price increases through management of their own gas purchases and reserves. In anticipation of periods of higher demand, for instance, buyers can store natural gas at their own facilities or through the services of third-party storage providers. Unlike electricity, which cannot be stored, natural gas affords purchasers the option of creating and maintaining gas reserves that can be tapped as needed to mitigate the effects of peak-day transportation prices. In addition, LDCs and other such large buyers of transportation services can take steps to reduce their own demand during peak periods. Such steps might include negotiating terms with customers that allow for the interruption of service during peak demand periods, implementing conservation programs, or using alternate fuels.

Given the presence of such alternatives, firm transport services on peak days should not be considered a distinct relevant product market. Additional support for this position comes from the recent development of futures markets in natural gas, which also helps alleviate the effects of peak-day demand increases.[137] By allowing the trading not only of contracts for natural gas delivery but also of physical deliveries (including swaps) themselves, futures markets work to hedge against the risk of a sudden change in transportation price or availability.

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133. *Id.* at 4.
134. *Id.* at 3.
135. *Id.*
136. *Id.* at 4.
137. DeVany & Walls, *supra* note 31.

As the Commission concluded in Order No. 637, the high prices of peak periods primarily reflect rents due to transitory demand conditions, not the exercise of market power.[138] It is demand in excess of capacity—rather than the exercise of market power—that explains the increased cost of transportation on peak days.[139] Indeed, firm behavior observed during peak demand periods is generally consistent with the ordinary operation of a competitive market and inconsistent with the supposed exercise of market power. In order to take advantage of market power to increase prices, after all, a firm must withhold capacity. During peak periods, however, pipelines tend to sell all of their capacity, and many pipelines are unable to withhold capacity because all or most of their capacity is already under contract. In fact, peak demand is such that transportation firms would prefer not to restrict capacity, as these periods provide a profitable opportunity to earn a return on their investment in pipelines. Such a situation is to be expected in a competitive industry; peak-period pricing is actually necessary if firms are to recover the fixed costs of infrastructure.[140] The capacity constraints of peak-day periods, therefore, are important to maintain competition and to allow efficient firms to recover total costs. Conversely, if the market rate during peak periods is artificially constrained by a price cap, inefficiencies may result, since the imposition of maximum rates can prevent the allocation of capacity to those who value it most. In the absence of a cap, prices are more likely to reflect the actual cost of the service being provided and will accordingly provide a more accurate signal of entry conditions and the underlying costs of transportation.

Finally, we note that the issue raised by "high" prices during peak periods is essentially an equity or distributional issue—*i.e.*, which party will receive the short-term economic rents resulting from peak demands. In the absence of market-based rates, these rents currently

138. FERC Order No. 637, 65 Fed. Reg. at 10,162–63.

139. There is also evidence to suggest that the transportation component represents a small portion of the final delivered price of gas to residential users and that there is virtually no correlation between the monthly delivered gas prices and the monthly value of transportation. According to the EIA, in August 2004, the wellhead price of natural gas was, on average, approximately 83 percent of the price of natural gas at the city gate. Thus, transportation accounted for less than 20 percent of the price of natural gas at the city gate. *See* Energy Info. Admin., *U.S. Natural Gas Prices*, *at* http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_nus_m.htm (last updated Oct. 29, 2004). These findings support the hypothesis that, although the monthly price of transportation may increase in peak periods as demand and supply conditions change, only a small portion of the gas actually flows at the high transportation price. One can then conclude that the effect of the increase in transportation rates on delivered gas prices is likely to be negligible.

140. John Panzer, *A Neoclassical Approach to Peak Load Pricing*, 7 BELL J. ECON. 521 (1976).

accrue to arbitrageurs and other participants in the gray market who sell packaged gas and transportation services to LDCs, implicitly charging high prices for the transportation of natural gas.[141] In the presence of market-based rates, some of these rents may accrue to the pipeline instead of the arbitrageurs, but the very ability of the pipeline to compete with arbitrageurs in this manner serves as an additional competitive force. Even assuming, arguendo, that a pipeline could charge transportation rates during peak periods that exceed current maximum legal levels, such activity would not constitute the exercise of market power because it would mainly represent a redistribution of economic rents from gray-market sellers to the pipeline itself. End users would not pay prices that were higher than otherwise. In other words, the presence of an additional seller of transportation at prices not limited by a cap will not cause prices to rise. Indeed, the pipeline's entry into that business would provide additional competition to existing gray-market sellers. Accordingly, that presence would reduce transportation rates during peak periods.

C. Structural Analyses and the Role of the HHI

When the necessary information exists to implement a direct, performance-based analysis of market power, that approach is preferred to an indirect, structural method such as the use of the HHI to infer possible market power from supplier concentration.[142] While the structural method may be used as a screening device, it is the market performance data that provide direct evidence of market competitiveness (or lack thereof). For example, if the HHI concentration level in a market exceeds the DOJ screen of 2500 for oil pipelines, it does not necessarily imply that firms have significant market power. Rather, the structural screen suggests that an additional analysis of performance data is required in order to determine whether or not firms have market power.[143]

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141. As explained by the Commission, the "fact that the value of transportation in the short-term bundled sales market exceeds the daily or monthly maximum rate now permitted in pipeline tariffs is not surprising, *nor is it evidence that market power is being exercised*." FERC Order No. 637, 65 Fed. Reg. at 10,180 (emphasis added).

142. FTC v. BP Amoco, No. C-3938 (filed Apr. 13, 2000), *available at* http://www.ftc.gov/os/2000/04/bparcocomplaint.pdf (last visited Aug. 14, 2004); FTC v. Staples, No. 1:97CV 00701 (D.D.C. filed Apr. 10, 1997), *available at* http://www.ftc.gov/os/1997/04/pubbrief.pdf (last visited Aug. 14, 2004).

143. Thus, for example, in its analysis of the proposed merger of BP Amoco with the Atlantic Richfield Company (ARCO), the Federal Trade Commission (FTC) explicitly adopted a direct, performance-based approach. *See* FTC Complaint, *at* http://www.ftc.gov/os/2000/04/bparcocomplaint.pdf (last visited Aug. 14, 2004).

Market performance studies examine firms' prices and the extent to which those prices exceed levels that would be observed in a competitive market. In the context of FERC-regulated pipelines, a firm's ability to exercise market power over a given service can be evaluated by (1) determining if the firm sells all its capacity of that service and (2) comparing its billed rates to its maximum legal rates. Firms with market power withhold capacity in order to obtain prices in excess of cost. If the presence of a regulation establishes maximum legal rates that a pipeline can charge, thereby constraining the ability of the firm to charge prices beyond a certain ceiling, one would expect that a firm with market power would bill at a rate equal to its maximum allowable rates under the regulation. Thus, if a firm sells all its capacity, it cannot be exercising market power. If the firm sells all its capacity at prices below maximum regulated levels, this finding is reinforced.

Such direct tests of the exercise of market power are to be preferred over the indirect inferences of an HHI-based analysis.[144] However, as discussed above, the HHI is useful as an initial screen, since low degrees of market concentration are often sufficient to demonstrate a lack of market power. There is, thus, a place for the HHI in the Commission's assessment of proposals for market-based rates, but we identify a number of issues that should be addressed if the HHI is to perform its role effectively.

1. Elasticity of Demand

As discussed above, the HHI by itself is a poor measure of market power. Instead, a more appropriate measure of how much market power is being exercised is given by the degree to which price is marked up over the competitive pricing level of marginal cost. In the Cournot model, this mark-up equals the HHI divided by the market elasticity of demand.[145] Thus, when market demand is fairly inelastic, the HHI may be a good measure of market power in the absence of buyer power. In contrast, when market demand is elastic, even a very concentrated industry has little ability to influence the price, and the threat of market power is minimal. Note that, in the current context, the relevant market demand elasticity is the demand for gas transportation (*i.e.*, pipeline capacity)—not the demand for delivered gas.[146]

144. *See* cases cited *supra* note 142.

145. For a discussion of the Cournot model, see, *e.g.*, JEFFREY CHURCH & ROGER WARE, INDUSTRIAL ORGANIZATION: A STRATEGIC APPROACH 233 (2000).

146. In addition to the market demand elasticity, we can also define the elasticity of demand facing an individual company. The market demand elasticity measures the percentage of change in the total quantity of sales to all buyers in response to a price

2. Proper Measurement of Market Shares

With respect to market concentration, the recent developments in the gas industry discussed at the outset of this article imply that the economically meaningful measure of market share is one based on relative capacities of shippers' FT service capacity rights, and not on the number of pipelines connected to individual shippers. Additionally, the presence of an integrated network and the availability of capacity release further alleviate concerns regarding undue discrimination as expressed in the FERC's Policy Statement. To discriminate profitably, a pipeline must charge prices to its customers in accord with their elasticities of demand in order to charge higher prices to those with greater willingness to pay. However, the pipeline must also keep these customers separated or otherwise prevent resale among them. With open access, a pipeline cannot prevent such arbitrage because, if there is a disparity between price and cost among customers, capacity release facilitates the use of arbitrage that tends to eliminate those differences.

Our analysis, thus, leads to the conclusion that recent market developments have tended to make irrelevant HHIs for which shares are determined based on the number of pipelines connected to individual shippers. Economically, an HHI based on the number of pipelines is not relevant to competitive outcomes under open access because the ownership of firm transportation rights gives shippers multiple buying options within a single pipe. Instead of acquiring transportation only from the pipeline, shippers can acquire transportation capacity from releasing shippers (*i.e.*, shippers exercising capacity release) with firm transportation rights between two locations. Moreover, flexible receipt and delivery points can be used to avoid bottlenecks.

From an economic standpoint, a more meaningful measure of market share is one based on the relative capacities of shippers holding firm transportation service capacity rights, and not on the number of pipelines connected to individual shippers. After all, market shares should be calculated with an understanding of who competes in the relevant market. Since transportation services may be acquired from the shippers holding FT contractual rights on pipelines, as well as from pipeline owners directly, market shares are accurately measured by the relative capacities of shippers' FT capacity rights. Under such an

increase imposed by all sellers. In contrast, the demand elasticity facing an individual firm measures the percentage of change in the quantity of sales by that firm in response to a price increase by that firm, assuming all other sellers maintain their current prices. The elasticity of demand facing an individual firm can be much more elastic than the market demand elasticity. *See, e.g.*, CARLTON & PERLOFF, *supra* note 87, ch. 4.

assessment, the share held by the pipeline itself should be considered to be the amount of unsold capacity as a percentage of total pipeline capacity. We note that such an understanding of market share with regard to natural gas transportation is not without precedent, as Commission staff has previously presented testimony consistent with this view.[147]

3. Requirements for Excess Capacity

A pipeline applying for market-based rates should not have to show that rival suppliers have excess capacity equal to the applicant's own capacity in the relevant market in order to demonstrate a lack of market power.[148] Such a standard requires that, for an applicant with, say, a 20 percent market share, the other firms in the market collectively must have at least 20 percent excess capacity (or an average of five percent each) in order to demonstrate conclusively the lack of market power. While such a standard is usually sufficient to demonstrate a lack of market power, it will usually be too restrictive. Alternatively, the first standard may be inadequate to demonstrate a lack of market power if rivals will not fully use their capacity.

As an example, consider the case of two equally sized firms that control a market. In that case, excess capacity equal to 50 percent of the market will probably not be sufficient to ensure competitive outcomes; with two firms, the downside of launching a price war is apparent, and competition may not be vigorous. If rival firms sell their excess capacity in response to an anticompetitive price increase, then generally they do not have to have excess capacity equal to the applicant's capacity in order to make a price increase unprofitable. As we demonstrate below, for instance, five firms each with 20 percent of the market and excess capacity of two percent each, for a total of 10 percent, is probably sufficient to ensure nearly competitive outcomes.

A standard requiring that a pipeline applying for market-based rates must show that rival suppliers have excess capacity equal to the applicant's own capacity implicitly assumes that rivals will use their excess capacity to exploit any exercise of market power. This is usually a reasonable assumption, but one that is more likely to hold when there are three or more firms present rather than only two. With more firms, it becomes increasingly likely that at least one of them will vie for a larger

147. Statement of Dr. Jonathan D. Ogur, *supra* note 32.

148. We present a more detailed discussion of the Commission's excess capacity rule in our working paper, THE ROLE OF EXCESS CAPACITY IN DETERMINING MARKET POWER IN NATURAL GAS TRANSPORTATION MARKETS (Univ. of Texas, Austin, Working Paper, 2003) (on file with authors).

share. The more firms there are, the greater the chance that one will set off a price war. In sum, when rivals use their excess capacity to exploit the exercise of market power, the amount of excess capacity required is relatively small.[149]

4. Interruptible Transportation

The ability of a pipeline to sell unutilized capacity as interruptible transportation service (ITS) makes that product market more competitive relative to the case where the pipeline does not have residual rights to the capacity reserved by shippers. The intuition for this result is as follows. Shippers with firm transportation rights exercise market power by withholding their capacity. Such an attempt to reduce quantity can be undone by the pipeline, by recovering the unused capacity and reselling it. That is, the pipeline maximizes profit by taking a portion of the unused capacity and reselling it.

The analysis of market power in interruptible transportation markets proceeds as follows. First, if demand for capacity is sufficiently high, then shippers with firm transportation rights will use all available capacity. In this case, no market power is exercised. Second, if demand for capacity is at an intermediate level, then shippers withhold some capacity to increase the value of their shipments, absent the pipeline's residual rights. However, the existence of the pipeline's residual rights ensures that all capacity is used. Both of these cases correspond to competitive behavior since no capacity is withheld from the market. Third, if demand for capacity is low, the existence of the pipeline's residual rights causes shippers to withhold less capacity than they would have in the absence of the pipeline's residual rights, and, in addition, some of the withheld capacity is recovered and released by the pipeline. In this case, the pipeline's ability to resell unused firm capacity as interruptible capacity has the effect of reducing the price-cost margin relative to the case where a pipeline does not have such residual rights.

5. Incorporating Buyer Power

As discussed previously, the HHI and the corresponding analysis on which it is premised assume that buyers in a given market are dispersed and exert no power over price. However, one important aspect of the market for firm transportation capacity is that buyers hold large shares of available contract quantities and can therefore exert some

149. For example, even when market demand is highly inelastic, *e.g.*, $\varepsilon = 0.1$, a firm with a market share of 49 percent or less would not find it profitable to increase its price as long as rival suppliers possess excess capacity of at least 15 percent of the market.

degree of buyer power in the market for firm transportation service. This fact has important implications for the analysis of the market power potentially exercisable by any particular supplier of firm transportation service. Specifically, it implies that relying solely upon the HHI statistic—regardless of the shares upon which it is based—is inconsistent with the Commission's stated guideline to consider the effect of buyer power. In order to be consistent with the Commission's approach, one must con-sider the competitive implications of buyer power.[150]

Despite its recognition that buyer power should be taken into account when assessing the market power potentially exercisable by a provider of natural gas transportation, the FERC's reliance on the HHI as the primary tool for this analysis fails in this task. Simply put, the HHI does not take buyer power into account. The HHI, which is after all a measure of seller concentration within a market, carries with it the implicit assumption that only sellers, and not buyers, are capable of exercising market power and influencing price. Furthermore, focusing solely on the HHI assumes that the power of sellers is determinative and that market power necessarily results when sellers have concentrated power. Too great a reliance on the HHI ignores the possibility of power concentration in buyers and the resulting reduction of the anti-competitive effects of concentrated seller power.[151] Conversely, the HHI will not reflect the presence of anticompetitive effects that arise from a change in market structure but do not alter the degree of seller concentration.[152]

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150. Policy Statement, *supra* note 4, at 61,234.

151. A commonly cited example involves purchases made by the U.S. Department of Defense, since many of the industries from which the Pentagon buys contain no more than one to three firms. Such extreme seller concentration has less effect in these instances than it would otherwise, because there is only one buyer who possesses a good ability to dictate the terms of trade. While seller concentration in defense industries likely increases prices modestly over those that might prevail with many more sellers, the monopsony power of the buyer mitigates the effects of seller concentration.

152. A good example of a case in which the HHI fails to represent the competitive nature of a market is found in the case of gasoline in California. The seven largest refiners of gasoline in California comprise approximately 95 percent of the production of gasoline sold in the state. *See, e.g.*, PennWell, *Surveys and Reports*, OIL & GAS J. ONLINE (2000), *at* http://ogj.pennnet.com/survey/survey.cfm?Section=Survey (last visited Aug. 25, 2004). However, the seven largest buyers of refined gasoline likewise constitute over 95 percent of retail sales. Thus, the wholesale California gasoline market is comprised of large sellers *and* large buyers. If a buyer in the retail market were to merge with a seller in the refinery market, the resulting effect on the competitiveness of the refinery market would not be reflected in the HHI because that index speaks only to the relative competitiveness of the post-merger market by taking into account a particular market's concentration. Since in this example there would be no merger in the refinery market, the HHI for that market would not change and could not indicate any anticompetitive change in market structure. Yet,

To see why this is so, consider the example of a market for natural gas transportation that is served by only two sellers. With many buyers, such a market is unlikely to achieve competitive performance, since the sellers realize that price-cutting ultimately lowers their profits. If the market had a single large buyer, however, that buyer could threaten to take its business to a single seller. Such a threat would force the sellers to offer nearly competitive prices. Moreover, the mere presence of a large and powerful buyer may be sufficient to ensure that all buyers in the market—large and small—are protected from the exercise of seller power. Capacity release grants the large buyer the ability to become a seller itself; by acquiring more firm transportation rights than it needs for its own downstream customers, the large buyer can offer the excess capacity to smaller shippers in competition with the pipeline, thereby constraining the ability of the pipeline to maintain price above competitive levels. Note that under each of these scenarios, the number and size of the suppliers remains constant. A determination of market power based solely on the HHI would suggest that suppliers restrict output and raise price in a uniform manner in all circumstances. This is patently not the case.

A reasoned assessment of market power, however, will not necessarily exclude consideration of the effect of seller concentration within the market. High seller concentration is, of course, a prerequisite for the exercise of market power by a supplier, but it should be obvious from the discussion above that seller concentration by itself is an inconclusive measure of the ability to raise price above the competitive level for a significant period of time. Fortunately, this difficulty can be addressed. As shown below, the HHI can be modified to take buyer power into account.

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clearly, something has changed; in this case, the buyer in the refinery market can now influence the price of refined gasoline by virtue of its vertical integration with the refiners. Thus, in markets in which buyers are concentrated, the traditional HHI model is incapable of characterizing the competitive structure of the market and, therefore, incapable of providing information on market competitiveness. Recent research by Professors Justine Hastings and Richard Gilbert shows that the high degree of vertical integration in California significantly increases retail gasoline prices, even with no change in the HHI. JUSTINE HASTINGS, VERTICAL RELATIONSHIPS AND COMPETITION IN RETAIL GASOLINE MARKETS: AN EMPIRICAL EVIDENCE FROM CONTRACT CHANGES IN SOUTHERN CALIFORNIA (Competition Pol'y Ctr., Working Paper No. CPC00-010, 2000), *available at* http://repositories.cdlib.org/iber/cpc/CPC00-010 (last visited Aug. 14, 2004); RICHARD GILBERT & JUSTINE HASTINGS, VERTICAL INTEGRATION IN GASOLINE SUPPLY: AN EMPIRICAL TEST OF RAISING RIVALS' COSTS (Competition Pol'y Ctr., Working Paper No. CPC01-21, 2001), *available at* http://repositories.cdlib.org/iber/cpc/CPC01-21 (last visited Aug. 14, 2004).

Specifically, Professors R. Preston McAfee and Ken Hendricks have calculated a "modified HHI" (or MHI) statistic,[153] which offers an adjusted measure of market concentration that takes into account also the presence of buyer power. The key insight of this work is that when one firm operates as both a buyer and seller, purchases the firm makes from itself cannot be subjected to market power. That is, the upstream division of the firm will not exert market power over the downstream division of the same firm. Thus, a modified HHI accounts for the extent to which buyers purchase from themselves.[154]

The MHI does more than offer an adjusted measure of market concentration, however. Instead, it provides a measure of the extent to which equilibrium prices likely will exceed marginal costs, based on the structure of the market and the elasticities of supply and demand.[155] Economists measure the extent to which prices exceed marginal costs by the "price-cost margin," which equals price less marginal cost, divided by price. In markets in which no buyer power exists and in which firms do not react to changes in rivals' outputs, the price-cost margin is determined by the HHI and the elasticity of demand (denoted as "*e*").[156] This equivalence is expressed as follows: $(p - mc) / p = \text{HHI} / e$.

Now consider a market in which buyers have some market power but do not compete with each other in downstream markets.[157] In this market, firms will attempt to equate their marginal costs with their marginal valuations of the product. The average difference between the marginal value of the intermediate good (*i.e.*, unbundled gas transportation) and its marginal cost is approximately proportional to the sum of the firms' squared "net market shares." By "net" shares, we mean that each firm's upstream market share (*i.e.*, a shipper's share of FT contract capacity reaching the relevant destination market) is netted against its downstream share (*i.e.*, a shipper's share of retail gas consumption in the relevant destination market). Thus, let s_i be the i^{th} firm's share of the total consumption, and σ_i be the share of the total production. Then the difference between (1) the average marginal value

153. R. PRESTON MCAFEE & KENNETH HENDRICKS, A THEORY OF BILATERAL OLIGOPOLY, WITH APPLICATIONS TO VERTICAL MERGERS (Univ. of Texas, Austin, Working Paper, 2000) (on file with authors).

154. *Id*.

155. *Id*.

156. STEPHEN MARTIN, ADVANCED INDUSTRIAL ECONOMICS 167 (2d ed. 2002). The manner in which firms interact in responding to changes in rivals' outputs is known as the "conjectural variation." If firms are assumed not to react to changes in rivals' outputs, the market model is the well-known Cournot model. *Id*.

157. This is the case for local distribution companies, which generally do not compete with each other for buyers.

and (2) the average marginal cost equals the sum of squares of s_i - σ_i, divided by an appropriate elasticity that reflects the elasticities for both consumption and production.[158]

An analysis of buyer power requires one to determine the shares of firm transportation rights held by individual shippers on pipelines connected to a particular LDC. In addition to this, however, there are two other parameters necessary to an analysis of buyer power: an elasticity of demand (specifically, "downstream retail elasticity") and an elasticity of supply ("upstream cost elasticity"). The elasticity of demand measures the sensitivity of the quantity demanded to a change in price. If demand is determined to be highly elastic with regard to price, this entails that the ability of sellers to increase prices is limited, since price increases are met with large decreases in demand. Similarly, the elasticity of supply measures the responsiveness of suppliers to price changes; a high elasticity of supply limits the ability of buyers to exert market power because attempts to depress prices result in large reductions in supplies. The MHI advanced by McAfee and Hendricks takes elasticities into account and applies them to an assessment of market performance in natural gas transportation.[159]

In markets for natural gas transportation, both these elasticities are likely to be relatively low, suggesting that large changes in price are required to affect the quantity supplied or demanded appreciably. Moreover, since shippers' demand for natural gas transportation is derived from their demand for natural gas, the derived demand elasticity for natural gas transportation is likely to be less elastic than the demand for natural gas itself. Econometric studies show that the demand for natural gas is relatively inelastic; given this, the derived demand elasticity for natural gas transportation likely is less than 1.0 (in absolute value).[160] Similarly, the "upstream cost elasticity" is also likely to be low because suppliers of transportation services (*i.e.*, pipeline owners and shippers holding FT rights) are constrained in responding to changes in price. They are constrained by physical capacity limitations of the

158. Specifically, let v_i' be the marginal value of the i^{th} firm, p be the price, and c_i' be the marginal cost. Let ε be the demand elasticity and η be the supply elasticity. Let s_i be the i^{th} firm's market share of consumption, and σ_i the share of production. Then the formula is:

$$\frac{1}{p}\sum_i (s_i v_i' - \sigma_i c_i') = \sum_i \left(\frac{(s_i - \sigma_i)^2}{\varepsilon(1-s_i) + \eta(1-\sigma_i)} \right).$$

159. MCAFEE & HENDRICKS, *supra* note 153.

160. G.S. Maddala et al., *Estimation of Short-run and Long-run Elasticities of Energy Demand from Panel Data: Using Shrinkage Estimators*, 15 J. BUS. & ECON. STAT. 90 (1997); G.S. Maddala et al., *A Comparative Study of Different Shrinkage Estimators for Panel Data Models*, 2 ANNALS ECON. & FIN. 1 (2001).

pipelines and by the size of shipper contracts already claiming a portion of that capacity. As with elasticity of demand, evidence from econometric studies supports a finding that the supply of natural gas is relatively inelastic; as a result, the upstream cost elasticity for natural gas transportation is also likely to be less than 1.0.[161]

In sum, the MHI statistic yields not simply a measure of market concentration, but rather an estimate of the equilibrium price-cost margin given the degree of upstream and downstream market concentration, as well as the elasticities of supply and demand. Since economists measure market power by the extent to which prices exceed marginal costs, the MHI therefore provides a direct measure of the ability of firms to exercise market power. And as discussed above, direct measures of the exercise of market power are preferable over indirect measures like the HHI. Moreover, using the MHI statistic, we can calculate the equilibrium quantity that will be produced in the market as a percentage of the quantity that would be produced in a perfectly competitive market.

The MHI can be calculated for natural gas pipelines, but, in doing so, we caution the reader to take into account the substantial difference between short-run marginal costs and long-run marginal costs. By "short run," we refer to the period over which some of a firm's inputs (such as the physical pipelines) are fixed, and therefore cannot be increased or decreased, while others (such as compressor fuel) can be varied. By "long run," we refer to the period over which all of a firm's inputs are variable. Hence the tautology: "there are no fixed costs in the long run." In the short run, a pipeline's marginal costs are quite low, since most of the firm's costs are fixed. In the long run, how-ever, a pipeline's marginal costs are relatively high since they must include the capital costs of replacing the pipeline. In this regard, the MHI statistic should be understood as a reflection of the relationship between price and long-run (not short-run) marginal costs. This is to be expected, since transportation rates must necessarily exceed short-run marginal costs; otherwise, the firm could not afford to replace its most important fixed input—the pipeline itself—and thus would find it unprofitable to operate in the long run.

By expressing the relationship between price and long-run marginal cost, the MHI provides an indication of the "competitiveness" of pipeline transportation markets. When properly applied to natural gas pipelines, the MHI statistic yields not simply a measure of market

161. Christophe Barret, *U.S. Natural Gas Market: A Disequilibrium Approach*, PROC. OF INT'L ASS'N FOR ENERGY ECON. 15TH INT'L CONFERENCE, COPING WITH THE ENERGY FUTURE: MARKETS AND REGULATIONS (1992).

concentration, but rather an estimate of the equilibrium price-cost margin given the degree of upstream and downstream market concentration, as well as the elasticities of supply and demand. An additional benefit of the MHI is that it makes it possible to calculate the equilibrium quantity that will be produced in the market as a percentage of the quantity that would have been produced in a perfectly competitive market. The MHI can be used to do the following: to predict market output as a percentage of perfectly efficient market output; to estimate the increase in predicted transportation rates that would be implied if buyer power were not taken into account; and to calculate the percent of distortion in the predicted price of transportation, taking both buyer and seller power into account, when compared to the perfectly efficient transportation rate.[162]

V. CONCLUSION

As discussed above, there have been a number of significant changes in the natural gas transportation industry over the last few years. Wholesale markets have grown, and an integrated spot market has been developed to serve a broad geographic scope. New and innovative opportunities for trading have emerged with the appearance of upstream and downstream market centers and with the development of an active financial market in gas futures. Released capacity has become widely available, facilitated in part by an increase in the use of information technologies to distribute and update pipeline and shipper information quickly. "Virtual pipelines" have in effect created new links between receipt and delivery points not physically connected by the facilities of a single pipeline manager. And, over all, prices have declined without any additional threat to quality or reliability.

At the same time, there have been recent contributions to the economic analysis of market power that are relevant to the regulatory assessment of petitions for market-based rates for natural gas transportation. These include additional scrutiny of the relevant product and geographic markets for natural gas transportation and the identification of direct methodologies for examining whether or not market power has in fact been exercised. More significantly, however, recent economic study has highlighted the limitations inherent in a traditional structural analysis of market power relying solely upon a simple measure of market concentration like the HHI. New tools are available to economists and regulators that correct for these limitations,

162. The MHI has been applied by the FTC in the analysis of oil mergers.

considering as they do characteristics of entry, seller power, elasticity of demand, and available capacity. A "modified HHI" measure that takes these characteristics into account appears a much more robust and reliable tool for assessing possible market power.

We respectfully suggest that current market power methodology as set forth in the 1996 Policy Statement may unnecessarily be delaying the transition to fully competitive transportation markets. To date, only two proposals for market-based rates by interstate pipelines have been advanced. Koch advanced the first, which was denied by federal regulators.[163] The second application was filed for a small segment of the KN system, and although approval was granted, the market-based rates were never placed into effect.[164] It is not clear, however, that these petitions would have threatened an exercise of market power had the developments identified in this article been considered as part of the assessment. Other pipelines have not followed the example of Koch and KN, choosing instead to refrain from applying for market-based rates. Even though there is evidence to suggest that at least some of these other pipelines are not capable of achieving or exercising market power, the methodology of the 1996 Policy Statement as currently interpreted may not adequately reflect this.[165] If the scarcity of applications by market participants for market-based rates is a result of regulatory hurdles that are recognized to be too high, then the FERC's current method for determining market power may in some instances be delaying, rather than promoting, the transition to market-based rates. The implication is that regulation may currently exist where it is not strictly needed.

Many studies have documented the benefits of deregulation in the U.S. economy. For example, the dollar value of deregulation in the airline, rail, and trucking industries has been estimated at $60 billion annually.[166] Conversely, the dollar cost of regulation has been estimated at more than $700 billion annually.[167] Clearly, in circumstances where deregulation is appropriate, *e.g.*, because markets become more competitive, such efforts should be pursued in order to enhance consumer welfare.

In our view, all of these considerations taken together suggest that modifications to the FERC's view of (and guidelines surrounding the determination of) market power for natural gas transportation are

163. Koch Gateway Order, *supra* note 12.

164. *See* sources cited *supra* note 11.

165. *See, e.g.*, PAUL W. MACAVOY, THE NATURAL GAS MARKET: SIXTY YEARS OF REGULATION AND DEREGULATION (2000).

166. W. KIP VISCUSI ET AL., ECONOMICS OF REGULATION AND ANTITRUST 38 (2000).

167. *Id.*

warranted. The 1996 Policy Statement as it stands is a valuable set of tools and guidelines for examining the industry, but we feel that this foundation can be built upon and strengthened further. We recommend that the Policy Statement be modified along the lines suggested throughout this article—that is, updated to recognize explicitly the recent and substantial changes to markets for natural gas transportation and the economic tools for market power assessment.