

Testimony of

Mr. R. Preston McAfee

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Prepared Statement of R. Preston McAfee

U.S. Antitrust Policy and the Oil Industry

Before the

Committee on the Judiciary

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Introduction

Mr. Chairman and members of the Committee, my name is R. Preston McAfee. I am J. Stanley Johnson Professor of Business, Economics & Management and Executive Officer for the Social Sciences at Caltech. In 1999 through 2001, I was retained by the Federal Trade Commission ("FTC") to provide expert economic analysis and potential testimony in connection with the FTC's investigations of the mergers of Exxon Corporation and Mobil Corporation, of British Petroleum PLC and the Atlantic Richfield Company, and Conoco and Phillips Petroleum. In addition, I provided assistance to the FTC in its investigation of the summer 2000 gasoline price increase in the Midwest. I have been actively involved in research on the effects of vertical integration on cooperative pricing behavior. I am pleased to be here today to discuss the economic issues that I researched, as they pertain to your examination of mergers in the oil industry in the United States.

As part of my studies of the two mergers, I had access to and studied a substantial amount of information, including the documents that the FTC had gathered in the course of its investigations. I am advised that much of this information was provided to the FTC under statutory authority that generally requires the FTC to keep the information submitted to it confidential, and, except to the extent that information has independently been made public, I am not at liberty to disclose today information submitted to the FTC pursuant to confidentiality restrictions.

However, the U.S. District Court for the Northern District of California has ordered the release of some of the documents filed under seal in *FTC v. BP Amoco*, and I am at liberty to discuss those documents. In addition, some of the information I examined as part of my analysis was obtained from public sources.

I have attached a copy of my May, 2002 statement as Appendix 2 to the U.S. Senate Committee on Governmental Affairs, Permanent Subcommittee on Investigations, which makes relevant points that I will not repeat here.

I would make the following points before this committee.

Sequential Antitrust Enforcement

U.S. antitrust enforcement is both reactive and defensive. We respond to mergers after they are proposed by the merging parties, and we attempt to defend consumers from the threat of monopolization in evaluating the mergers. Usually this evaluation takes the form of asking "will the existing merger significantly increase the probability of the exercise of market power?" which would result in price increases for consumers. In doing so, we view the merger as

the last merger that might arise in the industry, that is, we ask how the merger will likely affect U.S. consumers relative to the status quo.

The problem with this logic is that a given merger is rarely the last merger to be proposed. Consummated large mergers may set a new standard for what is acceptable, leading to additional mergers. A large merger may make the combined firm more effective, prompting rivals to seek analogous mergers. Conversely, rejection of a merger may open the door for mergers that are actually better for consumers. For example, the online job board named Monster, which is the largest online job board, proposed purchasing the number two company Hotjobs. This would have created a strongly dominant firm in national job boards, but since there are many local boards, it is by no means obvious that the Monster/Hotjobs merger would be blocked by the courts. Fortunately, Yahoo! stepped in during the process and purchased Hotjobs, creating two more effectively rivalrous firms. A Monster/Hotjobs combination would likely have deterred further Yahoo! investment in the industry and solidified national job boards around a single player. The market is much more competitive the way it turned out. The Monster/Hotjobs merger was evaluated on the basis of whether that specific combination would likely lead to a price increase, and not whether a rejection of the Monster/Hotjobs merger would likely lead to a more competitive industry and consequent price decreases.

In evaluating mergers, it isn't necessarily the status quo that is the relevant comparison, especially if the status quo is unlikely to persist. There is pressure for large oil companies to get larger, as I will discuss below. As a consequence, in evaluating mergers like Exxon-Mobil, BP-Arco and Chevron-Texaco, there is a need to recognize that the larger firms will get larger; rejecting a single merger is unlikely to stem this trend. Thus, from an economic perspective, the mergers should be evaluated with respect to whether they push the industry toward a more competitive configuration, or toward a less competitive configuration. Such reasoning need not be the same as whether the merger is no worse for consumers than the status quo.

The automobile industry provides an important example. In the 1960s, the automobile industry was primarily domestic, with few imports. Reductions in the cost of international transportation and in trade barriers resulted in a dramatic increase in international automobile trade, resulting in an industry that needed reconfiguration. Much of that reconfiguration has been accomplished through mergers and partnerships, which has made the world industry more efficient. In evaluating mergers in the auto industry, it is not appropriate to use the status quo as a benchmark because the industry is evolving with a predictable trend, even if individual mergers would be challenging to forecast.

The capacity rationalization in the defense industry during the 1990s provides another illustration of this point. There was no doubt that many mergers were necessary, given that U.S. spending on major weapons systems dropped to half its former level. With half the demand, a great deal of supply and resources needed to be removed from the market. Again, in this case mergers were considered as they arose. The effects of the merger of Boeing and McDonnell-Douglas was considered in isolation, rather than in the broader context of the continuing rationalization of capacity. Since some merger involving McDonnell-Douglas was necessary, this merger was approved. But rejection of the Boeing and McDonnell-Douglas combination would likely have led to an alternate merger of McDonnell-Douglas and Northrop or Lockheed. Comparison of a Boeing and McDonnell-Douglas merger with other McDonnell-Douglas combinations may have led to the conclusion that the Boeing and McDonnell-Douglas did not preserve as much competition as could have been preserved.

The U.S. steel industry provides another good example of a market in which predictable reductions in total capacity have strong implications for the antitrust evaluation of any given merger.

As an economist, I am not in a position to comment on the legality of this kind of antitrust consideration. I can say that, as an economic matter, there are mergers where a comparison of a proposed merger against the status quo isn't the right consideration. We do see such logic in the "failing firm defense," in which we compare a merger to the likelihood that one of the parties exits the industry in bankruptcy, a situation that arose with the Greyhound-Trailways merger.

One industry where such considerations often play a role is in banking. The Federal Reserve has the influence to arrange "shotgun marriages" of failing banks and generally to manage the industry at a level uncommon in other industries. However, I am not suggesting that the antitrust authorities engage in managing industries, but rather evaluate mergers in the context of the long run evolution of the industry.

Now let me return to the oil industry. There is a common allegation that many of the oil company mergers are in reaction to others, that the combinations are created much like the fall of dominoes, each combination encouraging the others. Thus, the antitrust authorities should be concerned that each merger will encourage further concentration in the oil industry. As I noted above, I agree with such reasoning in principle.

However, the changing nature of production is in large part responsible for the increase in concentration in the oil industry. International exploration continues to become more arduous, and deeper. Riskier drilling requires a larger firm. Remote oil extraction has become much harder than it used to be. The technical problems - sophisticated drilling equipment, angled drilling, expensive seismology, remote and inhospitable conditions, and myriad languages and regulations - are only a portion of the challenges. Many of the challenges involve dealing with unstable or corrupt governments, rebel groups, and volatile transportation costs across constantly shifting national boundaries. In dealing with these sorts of challenges, a single development project represents a "bet the company" investment for all but the largest three or four oil companies. These firms have grown to the scale that they have primarily because that scale is necessary to mitigate the risks of international exploration. Scale helps not just spread risk over more projects, although it certainly does that, but it also helps deter corrupt local governments from attempting to expropriate oil company investments, as has happened in the past.

Thus, while I think that there are many reasons why mergers should not be analyzed in isolation, as a comparison of a proposed merger and the status quo. I applaud the fact that this committee is taking a long-term view of industry evolution, and believe that incorporating long-term industry dynamics into our understanding of antitrust regulation will move us towards more efficient regulation.

Mergers of Vertically Integrated Firms and Multi-Market Contact

Oil companies are quintessential vertically integrated firms, a phrase which here means that a single company performs all of the activities to get oil from the ground and into gas tanks: exploration, drilling, pumping, oil transport, refining, gasoline transport, and gasoline retailing. These activities are known as a vertical chain (the convention is that consumers are "downstream," so retailing is downstream of refining), and Standard Oil of New Jersey, now Exxon-Mobil, was probably the first fully vertically integrated firm of any significance in the world. The oil industry remains dominated by vertically integrated firms.

In spite of the presence of enormous vertically integrated firms, there are many firms that are not vertically integrated. There are independent refiners like Koch Industries, and independent marketers like Wawa or RaceTrac. There are many firms that specialize in exploration, and a few, like Kinder-Morgan, that specialize in transportation and storage. These firms serve an important role in the industry, and evaluation of mergers requires an understanding of the interaction of vertically integrated firms. Fortunately, there has been a great deal of progress by the economics profession over the past decade in understanding the competitive interaction of vertically integrated firms.

Historically, the evaluation of vertically integrated firms involved a separate investigation of each level. If the merger did not injure competition at each level, the merger was deemed innocuous. But we now know that this reason is seriously flawed. Firms that interact in many markets, whether vertical markets or geographic markets, have options not available to those that interact in a single market, and those options must be assessed. I'm going to refer to such interactions as multi-market contact.

First, the risk of explicit collusion in the proverbial smoke-filled room is enhanced by multi-market contact. Executives of firms that deal with each other in multiple markets get to know each other better, and have more options for a quid pro quo in arranging collusive price-fixing. Price-fixing involves raising the price beyond competitive levels and therefore requires or results in a reduction of output. Such an output reduction creates the problem of allocating the reduced sales among the firms. Every firm would like others to reduce their output by a greater degree, and squabbling is a natural outcome. Multi-market contact means that output reductions can be allocated across several markets in such a way as to be fair to each participant. The extreme case involves giving each firm a safe market - providing home markets for each firm in which they are unchallenged. Factors such as 'multi-market contact' that reduce the difficulties of enforcing collusion enhance the value of collusion and increase its likelihood.

Second, even in circumstances where executives don't collude, the risk of sharing the market and engaging in "conscious parallelism," is enhanced by multi-market contact. "Conscious parallelism" is a phrase which here means that executives understand each other well enough to reach a collusive outcome without an explicit agreement. Multi-market contact helps firms and executives 'understand' each other better because opponents' behaviors are observed under more circumstances. In addition, firms have more tools with which to reach an implicit agreement of the form "don't compete vigorously against me, and I won't compete vigorously against you" if they compete with each other in multiple markets.

Multi-market contact was an important consideration in the evaluation of the Exxon-Mobil merger. In the West Coast, the same seven companies control transportation, refining and retailing. Consequently, they engage in competition at several different levels of operations. This gives them an important edge in reaching a cooperative outcome, to the detriment of consumers. For example, if one firm behaves aggressively in retail competition, that firm can be punished by the others in retail, in wholesale, or in transportation, whichever is more effective. Furthermore, these firms trade wholesale gasoline with each other and even use each others' transportation facilities on a regular basis. These 'trades' occur off-market, and are negotiated between the two trading firms on a case-by-case basis. While such trades may reduce market friction by smoothing supplies and reducing transactions costs, they may also serve to lessen competitive behavior. The interdependency between firms who 'swap' wholesale gasoline or transportation access on a regular basis implies that "they have a gun to each others' heads," and none can readily afford to compete too aggressively with the other. Relative to the more competitive market east of the Rocky Mountains, West Coast gasoline has a higher mark-up and generally higher prices, even adjusting for CARB gasoline standards. How large an effect this represents, however, is in doubt since other factors - the challenges of adding refining capacity and the "not in my backyard" syndrome, and specialty gasoline - also contribute to higher gasoline prices on the West Coast.

The DOJ and the FTC have the experience and expertise to address these issues and have incorporated them into the evaluation of oil company mergers. Vertical effects played a significant role in the evaluation of Exxon-Mobil. However, the application of antitrust law, which is based primarily on evaluating the direct effect on U.S. consumers, lags behind in recognizing the significance of vertical integration, multi-market contact and interdependence in merger analysis.

Mergers of International Firms

The Exxon-Mobil merger underscores the fact that oil company mergers are not focused on the United States, but occur in the context of a world market. While the world market is not perfectly integrated, it is strongly integrated. It is apparent that Exxon and Mobil did not care very much about merging their U.S. assets, and agreed to any reasonable divestitures needed to comply with U.S. law. The reason for the merger was focused on the international environment.

The international environment, however, may affect U.S. consumers. Exxon was considered by most to be better at international exploration than Mobil, while Mobil was better at operating retail outlets. Subsequent to the merger, Exxon-heritage employees came to direct Mobil-heritage exploration, while Mobil-heritage employees directed Exxon-heritage retailing. This is a means of spreading best practices, and results in efficiencies that benefit U.S. consumers. While some mergers, both in the oil industry and in other industries, fail to produce important synergies or spread best practices, it is worth noting that Exxon-Mobil appears to have improved the efficiency of both organizations.

Some mergers that have little or no direct consequence on U.S. consumers may have significant indirect consequences on U.S. consumers. For example, a merger that enables or encourages a domestic producer to move operations abroad may affect the U.S. production and trade balance. However, this is probably not an important consideration in the oil industry. Transportation costs ensure that most refining is performed domestically, and, indeed, environmental laws are a much more important consideration in the decision to refine gasoline abroad than mergers. Thus, while a potentially important consideration for antitrust policy applied in other industries, the international aspect of mergers is likely not important for oil industry mergers.

The increasing internationalization of business, which offers profound enhancements to the world's quality of life through increased competition and product variety, creates huge challenges in merger enforcement. Currently, there

is little formal synchronization and harmonization between the U.S. and Europe, which operate independently and use distinct principles. Evaluating mergers that affect many nations will create conceptual and analytic challenges, and these challenges will grow over time. The U.S., Europe and Japan have been unable to harmonize our cell phone and television standards. How will we harmonize our antitrust standards in such a way as to promote vigorous competition throughout the world?

Unilateral Effects

Since 1994, twenty three individuals have received the Nobel Prize in Economics, and twelve of the prizes involved game theory. Game theory - popularized by the book and film *A Beautiful Mind*, is the study of interactions of small numbers of people or firms. Game theory has come to dominate economic analysis over the past thirty years. In antitrust parlance, game theoretic issues in mergers are known as unilateral effects. Yet the conclusions reached with game theory barely register in antitrust analysis even though they have appeared in the DOJ Merger Guidelines since 1982.

In the earlier view, mergers had effects because of the increased likelihood of explicit collusion and conspiracy. In this view, industries behaved either competitively or as a monopoly, and monopoly behavior arose because of a price-fixing conspiracy in the proverbial smoke-filled room. Now, however, economists understand that there are many shades of gray between explicit collusion and perfect competition. Such intermediate cases do not involve conspiracy, and arise simply because firms can unilaterally increase prices to some extent. The firm might not be able to raise prices all the way to the monopoly level, but it may increase them substantially over competitive levels. The ability to unilaterally increase prices can arise through product differentiation, through imperfectly informed consumers, through geographical differentiation, or through other means.

Mergers can affect the ability of a firm to exercise unilateral market power by changing the nature of the competitive situation faced by the firm and by increasing the scope or opportunities for exercising market power. A merger might reduce the competitive level while leaving some competition. The existence of unilateral effects is well recognized by U.S. government agencies, and unilateral effect logic has played an important role in each of the merger analyses in which I have been personally involved. However, the earlier view of the competitive effects of mergers, focusing on collusion and conspiracies and ignoring unilateral market power, continues to dominate courtroom analysis.

I am not an attorney, and am not able to provide an analysis of the law. With that caveat, my understanding of the reasoning of the Court in permitting the merger of PeopleSoft and Oracle, a merger in which I testified, depended crucially on the earlier view of mergers. The reasoning goes like this:

Post-merger, there will be two firms providing enterprise resource planning software, Oracle and SAP. Given the nature of these companies, it is very unlikely that they will collude. If they don't collude, they must be competitive. Therefore there are no ill-effects of the merger.

Every statement in this reasoning is correct except the premise that if the firms don't collude, they must be competitive. While the degree depends on the industry, two firms are not generally sufficient to ensure competitive market outcomes. In the airline industry, for example, increases in the number of firms serving a given city-pair apparently reduce prices even going from four to five firms. In gasoline retailing, going from three retailers to four retailers in a given geographic area results in lower markups and more competitive pricing. The number of competitors required to reach a very competitive outcome will vary with other industry factors. This is understood by economists, including staff economists at the antitrust agencies. However, we are often thwarted by historical precedent and by accepted reasoning in the Courts.

For example, the standard to prove a violation of the Sherman Act, Section 2, refers to a "dangerous probability of monopoly power." If 'monopoly power' means an explicit cartel acting as a monopoly, then this phrase makes perfect sense, but very narrowly restricts the ability of the antitrust laws to defend consumers against the exercise of monopoly power. Otherwise, however, this elegant phrase is challenging to connect with modern economic analysis.

There is a pressing need to modernize the underpinnings of the antitrust laws. That can be accomplished by new Court precedents or by modernization of the laws themselves.

With respect to the oil industry, it is my view that explicit collusion is not an important threat. Thus, the major threat created by oil company mergers involves unilateral effects. Such threats arise through a variety of channels, including transportation, refining and retailing. For example, there are only two gasoline pipelines connecting the Gulf of Mexico and the Northeast. Any increase in concentration in control of these pipelines would risk price increases for gasoline transportation. In Exxon-Mobil, the FTC Commissioners sought and obtained divestitures to preserve the status quo.

In addition, there is ample evidence that competition at the retail level matters a great deal for final gasoline prices. Such evidence has been presented over the past few years in response to prior Senate hearings and investigations before the Permanent Subcommittee on Investigations and before this Committee's Subcommittee on Antitrust, in the form of committee reports and expert testimony. The FTC has been vigilant about insuring continued retail competition, and the standard applied has generally been to permit no increase in concentration in any geographic area. It is my view that vertical integration and interdependence matters as well. Much of antitrust analysis focuses only on horizontal concentration. However, independent retailers like RaceTrac, Wawa or Costco (Walmart) are usually more aggressive in pricing. This may be because their business model depends more heavily on large volumes and on sales of incidentals like cigarettes, sodas and snacks, or because their business model allows them to gain from the ability to shop for the lowest wholesale prices which offsets lower revenues from the lack of a major brand name. In places where such independents are present, the risk of increased concentration is less than in places where they are absent. For this reason, urban areas and the entire West Coast are much more at risk than suburban and rural areas or metropolitan areas in the southeast and Gulf Coast, which have a much larger independent retail and wholesale markets.

Price Dispersion and Gasoline Pricing

Prices for gasoline in Pasadena vary significantly. Driving two miles from my house, I often pass gas stations with a ten or even fifteen cents price difference for regular unleaded gasoline. In some cases, prices are five cents different for stations within sight of each other. Why?

Gasoline refiners, and to some degree retailers, charge different prices in response to the prices consumers are willing to pay. A substantial fraction of the gasoline-buying public is willing to pay more in order to purchase at specific stations, probably because they are more convenient, or nicer looking, or both. In some cases, the price differences arise simply because a fraction of customers don't pay attention or assume that all the stations have similar prices. The willingness of some consumers to pay more leads to pricing based on the specific location of the station, a phenomenon known by economists as price discrimination, by marketers as value-based pricing, and by oil companies as zone pricing.

The failure of some consumers to shop around can have a significant influence on the price. Consider, for example, a situation where a \$2.00 price would prevail if all buyers were careful shoppers. Suppose 30% of the customers are willing to pay ten cents more than the lowest price, and some stations will increase prices to \$2.10. But the reaction to this increase will generate price increases by other stations, which feedback to the first group, and can easily result in a price range of \$2.10 to \$2.20, double the direct 10¢ effect. Thus, the fact that many Americans select their preferred gas stations on a basis other than price increases prices for all of us. Gasoline retailers respond to the nature of demand, and price increases are a consequence of the unwillingness of a portion of the buyers to shop for the best price.

While changes in customer behavior might reduce the overall price level, that is not necessarily a good thing, because those behavioral changes themselves come at a cost. Getting the lowest price for gasoline isn't the most important consideration for many Americans, who would, for example, rather be spending time with their family than driving from station to station to get the best price for gasoline. As a consequence, any policy that reduces the level of price discrimination may in fact make consumers worse off as a group.

Moreover, most of the analyses of price discrimination suggest that a reduction in competition will tend to decrease the dispersion of prices. The reduction in competition increases the lowest prices by more than it increases the highest prices, thereby reducing the dispersion. Thus, blocking mergers purely because of the existence of price discrimination appears ill-founded. On the other hand, price discrimination does show that there is some market

power, and thus is correctly used as a test of the presence of market power. Moreover, price discrimination is extremely useful in identifying the size of relevant geographic markets.

Conclusion

Perhaps the most important conclusion I would leave with the Committee is that we are fortunate that the hysteria of the 1970s has not returned, and that Americans have accepted the high price of fuel without demanding price regulations, which caused so much damage to our fuel supply. It is important for us to resist an over-reaction, especially the kind that makes matters worse in an attempt to appear to be doing something.

Second, I appreciate the questions and issues that motivated these hearings. Our understanding of antitrust continues to progress, and the oil industry has been a test case for antitrust enforcement for nearly a century. I suspect that, to oil company executives, it feels more like the cross-hairs of antitrust than a test case. I appreciate the need to take a look at the overall evolution of the industry and to ask whether antitrust enforcement has facilitated the development of a competitive industry or permitted market power to increase. I consider that overall the oil industry remains a vibrant, strongly competitive industry, although close and careful scrutiny continues to be necessary and appropriate. I have tried to bring some of the cutting-edge considerations in the evaluation of oil company mergers to the attention of this committee.

CURRICULUM VITAE

R. PRESTON McAFEE

PERSONAL

Born 1956, USA, US citizen

Married to Kristin Famulari McAfee, two children

CONTACT:

100 Baxter Hall MC228-77

California Institute of Technology

Pasadena, CA 91125

<http://www.mcafee.cc>

Office Phone: (626) 395-3476

Office Fax: (626) 793-4681

Email: preston@mcafee.cc

EDUCATION

Ph.D. (Economics) Purdue University, 1980

M.S. (Economics) Purdue University, 1978

M.S. (Mathematics) Purdue University, 1978

B.A. (Economics) University of Florida, 1976 (Highest Honors, Phi Beta Kappa)

ACADEMIC EXPERIENCE

Executive Officer for Social Sciences, California Institute of Technology, 2005-

J. Stanley Johnson Professor, California Institute of Technology, 2004-

Murray S. Johnson Chair, University of Texas at Austin, 1997-2003

Visiting Professor of Business Strategy, University of Chicago GSB, 2000-2001

Chair, Department of Economics, University of Texas at Austin, 1997-8

Rex G. Baker, Jr., Professor of Political Economy, University of Texas at Austin, 1990-7

Visiting Professor of Economics, Massachusetts Institute of Technology, 1994-5

Professor of Economics, University of Western Ontario, 1989-1990

Visiting Professor of Economics, California Institute of Technology, 1989-90

Visiting Associate Professor of Economics, California Institute of Technology, 1988-9

Associate Professor of Economics, University of Western Ontario, 1987-9

Assistant Professor of Economics, University of Western Ontario, 1981-7

Visiting Assistant Professor of Economics, Purdue University, 1980-1

PROFESSIONAL ACTIVITIES

Associate Editor, Theoretical Economics, 2005-
Executive Board, Society for Economic Theory, 2005-
Econometric Society Program Committee, 2005 North American Winter Meetings
AEA Committee to Select the AER Editor, 2004
Albany Symposium, 2003, keynote speaker
AEA Program Committee, 2004 Meetings
U.S. Senate Testimony, May 2, 2002, Governmental Affairs Committee, Permanent Subcommittee on Investigations:
text or 40MB video
AEA Nominating Committee, 2002
U.S. Senate Testimony, April 25, 2001, Committee on Commerce, Science and Transportation, Subcommittee on
Consumer Affairs, Foreign Commerce, and Tourism
Colin Clark Lecture, Australasian Econometric Society Meetings, 1998
John S. Day Distinguished Alumni Award, Purdue's Krannert School of Management, 1997
Fellow (1995) and Member of the Econometric Society
Co-Editor, American Economic Review, 1993-2002
Organized AEA session in honor of William Vickrey, 1992.
Associate Editor, American Economic Review, 1992-3, 2002-5.
Associate Editor, Journal of Economic Theory, 1992-6, 2002-4
Member of AEA, Society for the Promotion of Economic Theory, and Associate of American Bar Association

Referee for AER, Econometrica, JET, JPE, REStud, JEL, QJE, J Math E, J Monetary E, EJ, IER, CJE, J. F., JOLE,
JEBO, Rand, J Pub E, IJIO, J Econometrics, Economica, REStat, J E Ed., J Law E&O, European E Review,
Scandinavian J E, SEPS, Math Soc. Sciences, ORSA J of Computing, J E Bus, Energy J, J Real Estate F&E,
Contemporary Acc. Res., NSF, IBM Systems J

CONSULTING

Major Clients: Airtouch, BMC Software, Cadence, US Department of Defense, Duke Energy, Enron, Federal Trade
Commission (BP-Arco, Exxon-Mobil, Phillips-Conoco, Monster-Hot Jobs merger analyses, 2001 Midwest Gasoline
Price Investigation, FTC v. Rambus), Government of Mexico, Government of Peru, Great Northern Nekoosa, Holly
Corp, U.S. Department of Justice (Oracle-PeopleSoft merger), Lockheed-Martin, NGPL (Papers: Measuring Pipeline
Concentration and Excess Capacity Effects), Pacific Telesys, Picker, Pioneer, PCS Primeco, Realty One, RSR Corp,
Sabre, SBC, Telecom New Zealand, Travelocity.
Consulting Arrangements: Keypoint, now a subsidiary of ERSGroup, and Market Design Inc.

PUBLICATIONS: ARTICLES

1. Feints, Journal of Economics and Management Strategy, forthcoming, (with Ken Hendricks).
2. The Strategic Abuse of the Antitrust Laws, Journal of Strategic Management Education, Vol. 2, no. 1, 2005 (with
Nicholas Vakkur).
3. The Real Lesson of Enron's Implosion: The Trust Business, The Economists' Voice, Vol. 1: No. 2, Article 4.
4. Barrières à l'entrée dans l'analyse antitrust, Revue Lamy de la concurrence: Droit, Economie, Regulation, No. 1,
November 2004 (with Hugo Mialon), 155-7.
5. Evaluating and Enhancing Competition in the Interstate Natural Gas Transportation Industry, Natural Resources
Journal, 44, #3, Summer 2004 (with Michael Doane and Michael Williams).
6. What is a Barrier to Entry? American Economic Review Paper and Proceedings, May 2004 (with Hugo Mialon and
Michael Williams).
7. How to Set Minimum Acceptable Bids, with Application to Real Estate Auctions, Journal of Industrial Economics,
Volume L, No. 4 (December 2002) (with Daniel Quan and Daniel Vincent).
8. Coarse Matching, Econometrica, vol. 70, issue 5, pages 2025-2034.
9. Equilibrium Price Dispersion with Consumer Inventories, Journal of Economic Theory, 105 n.2, August 2002, 503-
17. (with Pilky Hong and Ashish Nayyar).
10. Measuring Anticompetitive Effects of Mergers When Buyer Power is Concentrated, Texas Law Review, (2001)
vol. 79, no. 6, pp. 1621-1639 (with Kenneth Hendricks, Joshua M. Fried, Melanie Stallings Williams and Michael
Williams).
11. Collusive Bidding in the Market for Corporate Control, "Nebraska Law Review, (2000) vol. 79, no. 1, pp. 48-74
(with Joshua M. Fried, Melanie Stallings Williams and Michael Williams).

12. The Effects of Vertical Integration on Competing Input Suppliers, *Federal Reserve Bank of Cleveland Economic Review* 35, no. 1, Quarter 1, 1999.
13. Auctioning Entry into Tournaments, *Journal of Political Economy*, 107, no. 3, June, 1999, 573-605 (with Richard Fullerton).
14. Tarrifying Auctions, *Rand Journal of Economics*, 30, no. 1, Spring, 1999 (with Daniel Vincent and Wendy Takacs).
15. Pretrial Negotiation, Litigation, and Procedural Rules, *Economic Inquiry*, 38: 218-238 (with Jiong Gong).
16. Four Issues in Market Design, *Revista Analisis Economico* 13, no. 1, Junio de 1998, 7-24.
17. Synergies in Wireless Telephony: Evidence from the MTA Auction, *Journal of Economics and Management Strategy*, 6, no. 10, Fall 1997, 497-527 (with Lawrence Ausubel, Peter Cramton, and John McMillan).
18. Sequentially Optimal Auctions, *Games and Economic Behavior* 18, 246-76 (with Daniel Vincent).
19. Competition and Game Theory, *Journal of Marketing Research* 33, August 1996, 263-7 (with John McMillan).
20. Analyzing the Airwaves Auction, *Journal of Economic Perspectives* 10, no.1, Winter 1996, 159-75 (with John McMillan).
21. The Evolutionary Stability of Auctions over Bargaining, *Games and Economic Behavior*, 15, 1996, 228-254 (with Xiaohua Lu).
22. Damaged Goods, *Journal of Economics and Management Strategy* 5, no. 2, Summer, 1996, 149-74 (with Ray Deneckere).
23. Organizational Diseconomies of Scale, *Journal of Economics and Management Strategy* 4, no. 3, Fall 1995, 399-26. (with John McMillan).
24. Multiproduct Equilibrium Price Dispersion, *Journal of Economic Theory* 67, no. 1, October, 1995, 83-105.
25. The Non-existence of Pairwise Proof Equilibrium, *Economics Letters* 49, 1995, 251-9 (with Marius Schwartz).
26. Opportunism in Multilateral Vertical Contracting: Nondiscrimination, Exclusivity and Uniformity, *American Economic Review* 84, no. 1, March 1994, 210-30 (with Marius Schwartz).
- o Reply to Marx & Shaffer's Comment, *American Economic Review* June, 2004.
27. Endogenous Availability, Cartels and Merger in an Equilibrium Price Dispersion, *Journal of Economic Theory* 62, no. 1, February 1994, 24-47.
28. Mechanism Design by Competing Sellers, *Econometrica* 61, no. 6, November 1993, 1281-1312.
29. Collusive Bidding in Hostile Takeovers, *Journal of Economics and Management Strategy*, Winter 1993, 449-482, (with Dan Vincent, Mike Williams and Melanie Havens).
30. The Price Decline Anomaly, *Journal of Economic Theory* 60, June, 1993, 191-212 (with Daniel Vincent).
31. Horizontal Mergers in Spatially Differentiated Noncooperative Markets *Journal of Industrial Economics* XL, December 1992, 349-57 (with Joseph Simons and Michael Williams).
32. Updating the Reserve Price in Common Value Auctions, *American Economic Review Papers and Proceedings*, May 1992, 512-8 (with Daniel Vincent).
33. New U.S. Merger Enforcement Guidelines: Competitive Effects, *International Merger Law Events and Commentary* 21, May 1992, 6-9 (with Joseph Simons and Michael Williams).
34. Industrial Blackmail: Dynamic Tax Competition and Public Investment, *Canadian Journal of Economics* XXVI, no. 3, August 1993, 590-608 (with Ian King and Linda Welling).
35. Investment Decisions under First and Second Price Auctions, *Economic Letters*, 1992, 289-93 (with Ian King and Linda Welling).
36. Animal Spirits *American Economic Review* 82, no.3, June 1992, 493-507 (with Peter Howitt).
37. Bidding Rings, *American Economic Review* 82, no.3, June 1992, 579-99 (with John McMillan).
38. Amicable Divorce: Dissolving a Partnership with Simple Mechanisms, *Journal of Economic Theory* 56, no.2, April 1992, 266-93.
39. A Dominant Strategy Double Auction, *Journal of Economic Theory* 56, no.2, April 1992, 434-50.
40. Horizontal Mergers and Antitrust Policy, *Journal of Industrial Economics* XL, June 1992, 181-7 (with Michael Williams).
41. Correlated Information and Mechanism Design, *Econometrica* 60, No. 2, March 1992, 395-421 (with Philip Reny).
42. A Stone-Weierstrass Theorem without Closure under Suprema, *Proceedings of the American Mathematical Society* 114, Number 1, January 1992, 61-67 (with Philip Reny).
43. Recent Developments in Economic Theory Regarding the Competitive Effects of Horizontal Mergers, *International Merger Law* (with Michael Williams), December, 1992.
44. On What Economic Grounds should Horizontal Mergers be Challenged?, *International Merger Law* (with Michael Williams), no. 7, March 1991.
45. Optimal Contracts for Teams, *International Economic Review* 32, no.3, August 1991: 561-77 (with John McMillan).
46. Efficient Allocation with Continuous Quantities, *Journal of Economic Theory* 53, no. 1, February 1991: 51-74.

47. Externalities and Asymmetric Information, Quarterly Journal of Economics CVI, no. 1, February 1991: 103-121 (with Jeremy Greenwood).
48. Extracting the Surplus in Common Value Auctions, Econometrica 57, no.6, November, 1989: 1451-9, (with John McMillan and Philip Reny).
49. The Department of Justice Merger Guidelines: A Critique and a Proposed Improvement, Pepperdine Law Review 6, no.4, 1989 (with Michael Williams).
50. Government Procurement and International Trade, Journal of International Economics 26, 1989: 291-308 (with John McMillan).
51. Commodity Bundling by a Monopolist, Quarterly Journal of Economics, May 1989, 371-83 (with John McMillan and Michael Whinston).
52. Multidimensional Incentive Compatibility and Mechanism Design, Journal of Economic Theory 46, December 1988: 335-54 (with John McMillan).
53. Stability of Equilibria with Aggregate Externalities, Quarterly Journal of Economics 103, May 1988: 261-77 (with Peter Howitt).
54. Search Mechanisms, Journal of Economic Theory 44, February 1988: 99-123 (with John McMillan).
55. Can Event Studies Detect Anticompetitive Mergers?, Economic Letters 28, 1988: 199-203 (with Michael Williams).
56. Auctions with a Stochastic Number of Bidders, Journal of Economic Theory 43, October 1987: 1-19 (with John McMillan).
57. Competition For Agency Contracts, Rand Journal of Economics, Summer 1987 (with John McMillan).
58. Auctions with Entry, Economics Letters 23, 1987: 343-7 (with John McMillan).
59. Auctions and Bidding, Journal of Economic Literature, June 1987 (with John McMillan).
60. Nonlinear Contracts, Zero Profits and Moral Hazard, Economica 54, February 1987: 97-102 (with Raymond Fische).
61. Costly Search and Recruiting, International Economic Review 28, February 1987: 89-107 (with Peter Howitt).
62. Bidding for Contracts: A Principal-Agent Analysis, Rand Journal of Economics, Autumn 1986 (with John McMillan).
63. Sequential Procurement Auctions, Journal of Public Economics 31, 1986: 181-95 (with Richard Luton).
64. Optimal Tenure and the Timing of Faculty Meetings, Studies in Economic Analysis 10, 1986.
65. Unemployment Insurance and the Entitlement Effect: A Tax Incidence Approach, International Economic Review 27, February 1986 (with John Barron and Paul Speaker).
66. Joint Search for Several Goods, Journal of Economic Theory 32, April 1984 (with John Carlson).
67. American Economic Growth and the Voyage of Columbus, American Economic Review, September 1983.
68. Discrete Equilibrium Price Dispersion, Journal of Political Economy, June 1983 (with John Carlson).
 - o Discrete Equilibrium Price Dispersion Technical Appendix
69. On the use of Bonus Payments in an Experimental Study of Electricity Demand, Review of Economics and Statistics LXV, no.3, August 1983: 506-11 (with Raymond Fische).
70. Optimal Design of a Decision Support System, International Journal of Policy Analysis and Information Systems 6, 1982 (with Andrew Whinston).
71. An OIS Model for Internal Control Evaluation, ACM Transactions on Office Information Systems, ACM-SIGOA, November 1982 (with Andrew Bailey, James Gerlach and Andrew Whinston).
72. An Application of Complexity Theory to the Analysis of Internal Control, Auditing: A Journal of Practice and Theory, Summer 1981: 38-52 (with Andrew Bailey and Andrew Whinston).
73. Internal Accounting Controls in the Office of the Future, IEEE Computer Journal, May 1981 (with Andrew Bailey, James Gerlach and Andrew Whinston).
74. Formal Analysis of Internal Control-An Introduction The Proceedings of the First European Workshop on Information Systems, Aix-en-Provence, 1981 (with Andrew Bailey, James Gerlach and Andrew Whinston).
75. A Formal Model of Problem Solving, International Journal of Policy Analysis and Information Systems 4, 1980 (with Andrew Whinston).

PUBLICATIONS: OTHER ARTICLES

The Price is Right Mysterious, Engineering and Science, 3, 2005.

PUBLICATIONS: BOOKS

Introduction to Economic Analysis: a free, open source microeconomics text. See <http://www.introecon.com/>.

Competitive Solutions: A Strategist's Toolkit, Princeton University Press, January, 2003.

Incentives in Government Contracting, with John McMillan, Toronto: University of Toronto Press, December, 1988.

PUBLICATIONS: CHAPTERS IN BOOKS

1. Dynamic Pricing in the Airline Industry Handbook on Economics and Information Systems, Ed: T.J. Hendershott, Elsevier, forthcoming 2006 (with Vera te Velde).

2. Private Antitrust Litigation: Procompetitive or Anticompetitive?, The Political Economy of Antitrust, Edited by Vivek Ghosal and Johan Stennek, North-Holland, forthcoming. (with Hugo Mialon and Sue Mialon)
3. Evolution of the Market for Air Travel Information, Advances in Applied Microeconomics Volume 12: Organizing the New Industrial Economy, Ed: Michael Baye, (with Michael Doane and Ken Hendricks)
4. Production Capacity for Durable Goods, in Business Modeling: Multidisciplinary Approaches - Economics, Operational and Information System Perspectives (in Honor of Andrew Whinston), Ed: Clyde Holsapple, Varghese Jacob and H. Raghav Rao, London: Kluwer Academic Publishers, 2002, 55-76.
5. Matching and Expectations in a Market with Heterogeneous Agents, Advances in Applied Micro-Economics, Volume 6, ed: Michael Baye, Greenwich, CT: JAI Press, (with Xiaohua Lu).
6. Convergence to Efficiency in Double Auctions, Advances in Applied Micro-Economics, Volume 6, ed: Michael Baye, Greenwich, CT: JAI Press, (with Jiong Gong).
7. Electronic Markets, Readings on Electronic Commerce, (with John McMillan).
8. Modelling Transactions under Asymmetric Information, Recent Developments in Game Theory, Eds: J. Creddie, J. Eichberger, and J. Borland, London: Edward Elger, 1991 (with John McMillan).
9. Ticom II - The Internal Control Language - An Introduction, Internal Control and the Impact of the Foreign Corrupt Practices Act, ed: Abdel-Khalik, Gainesville: University of Florida Press, 1982 (with Andrew Bailey, James Gerlach and Andrew Whinston).
10. Office Automation, Handbook of Industrial Engineering, New York: Wiley and Sons, 1982 (with Andrew Bailey, James Gerlach and Andrew Whinston).

PUBLICATIONS: BOOK REVIEW

The Economics of Conformism, by Stephen Jones, reviewed for The Canadian Journal of Economics, February 1986. Reprinted in The Canadian Journal of Economics, February, 1987.

PATENT

Patent 6,718,312, with Paul Milgrom

UNPUBLISHED MANUSCRIPTS

Price Discrimination, prepared for Issues in Competition Law and Policy.

Enterprise Resource Planning: A Systems Approach (with Ben Golub).

Signaling Character in Electoral Competition (with Navin Kartik).

License Prices with Financially Constrained Bidders (with Roberto Burguet).

Private v. Public Antitrust Enforcement: A Strategic Analysis (with Hugo Mialon and Sue Mialon)

Price Discrimination and Market Power (with Shane Carbonneau, Hugo Mialon and Sue Mialon)

Technical Appendix

The Role of Excess Capacity in Determining Market Power in Natural Gas Transportation Markets (with Philip Reny)

Capacity Choice Counters the Coase Conjecture (with Tom Wiseman)

Barriers to Entry - First Draft of Long Version (with Hugo Mialon and Michael Williams)

A Theory of Bilateral Oligopoly (with Ken Hendricks)

The Continuing War of Attrition

ADVANCED LECTURES

Competitive Solutions Minicourse 2005

Lectures on Vertical Integration Given to the FCC, 2003

Pricing Lectures Given in Amsterdam at NAKA, 2001

Auction Design for the Real World, 1995

OTHER

Sept 2005 Nightline Interview

Blurb

Publicity Photo

2002 Senate Testimony (Windows Media Format, 40MB)

1993 FCC Filings

Chili Recipe

What is $\Pr\{z > 20\}$?

The Cookie Caper

Appendix 2

Prepared Statement of R. Preston McAfee

U.S. Gasoline Prices

Before the

Committee on Governmental Affairs

Permanent Subcommittee on Investigations

United States Senate

May 2, 2002

Introduction

Mr. Chairman and members of the Committee, my name is R. Preston McAfee. I am Murray S. Johnson Professor of Economics and former Chair of the Department of Economics at the University of Texas at Austin. In 1999 and 2000, I was retained by the Federal Trade Commission ("FTC") to provide expert economic analysis and potential testimony in connection with the FTC's investigations of the mergers of Exxon Corporation and Mobil Corporation and of British Petroleum PLC and the Atlantic Richfield Company. In addition, I provided assistance to the FTC in its investigation of the summer 2000 gasoline price increase in the Midwest, and have been retained by the FTC in an on-going investigation. Finally, I have been actively involved in research on the effects of vertical integration on cooperative pricing behavior. I am pleased to be here today to discuss the economic issues that I researched, as they pertain to your examination of gasoline prices in the United States.

As part of my studies of the two mergers, I had access to and studied a substantial amount of information, including the documents that the FTC had gathered in the course of its investigations. I am advised that much of this information was provided to the FTC under statutory authority that generally requires the FTC to keep the information submitted to it confidential, and, except to the extent that information has independently been made public, I am not at liberty to disclose today information submitted to the FTC pursuant to confidentiality restrictions.

However, the U.S. District Court for the Northern District of California has ordered the release of some of the documents filed under seal in *FTC v. BP Amoco*, and I am at liberty to discuss those documents. In addition, some of the information I examined as part of my analysis was obtained from public sources.

I would make the following points before this subcommittee.

The Competitive Performance of U.S. Gasoline Markets

? West Coast wholesale gasoline markets are not integrated with the rest of the United States and must be analyzed separately from the east.

West Coast wholesale gasoline markets are separate markets from the rest of the United States. Not only do those markets use different gasoline specifications (e.g., California Air Resources Board, or CARB, specifications), but there is no economical means of transporting gasoline from the major refining center of the U.S. Gulf Coast to California. Currently there is no pipeline moving gasoline from the Gulf Coast to the West Coast, although the plan to reverse the flow of the Longhorn Pipeline, which connects Houston and El Paso, might permit creating such a pipeline link. Sending gasoline by ship is relatively expensive. The Panama Canal cannot accommodate very large tankers and is expensive. Large tankers could go around South America, but this is a very long trip. Either way, it is expensive to ship gasoline from the Gulf Coast to the West Coast. Moreover, when the West Coast prices are sufficiently high to justify such shipments, the likely origin is the Caribbean rather than the US Gulf Coast. Although shipments from the Caribbean arrive in California from time to time, these tend to be purchased by West Coast refiners to replace gasoline lost to planned refinery shutdowns, and not as a consequence of an attempt to arbitrage high West Coast prices.

? The combination of inelastic demand and inelastic supply of gasoline magnifies the price effects of supply disruptions.

An unusual feature of wholesale gasoline markets is the short-term unresponsiveness of both demand and supply to price changes, a characteristic that economists call "inelasticity." When prices rise substantially, consumers do not cut back their driving very much, so that the quantity of gasoline demanded falls very little. Put another way, it takes a large price increase to induce significant conservation in the short term, so that a fifty cent per gallon price increase might induce only 10% less consumption. Moreover, refineries run near capacity most of the time and cannot produce a great deal more gasoline without the installation of major capital equipment. Thus, in the short term, a refinery might be able to produce ½ percent more gasoline if the price justified it, but it takes a large price increase to reconfigure the inputs to produce even that much more gasoline.

? Short run price changes can be three to five times the quantity changes.

Because of the inelasticity of supply and demand, relatively small quantity effects are magnified into large price effects. A 10% shortfall in quantity, which might arise due to a fire in a refinery or a pipeline break, might require a 40% increase in price to clear the market - because consumers continue to drive almost as much, and the refineries cannot produce much more gasoline than they already do. The inelasticity of demand and supply imply that large price swings are normal - small supply disruptions create large price swings. The oil companies do not create such price changes - they are primarily a consequence of factors outside the control of the industry. These factors include the nature of consumer demand and the technology of refining capacity. The one factor that matters which the industry can control is storage, but storage is expensive, so it takes frequent, wide swings in price to make investments in increased storage capacity profitable.

? Government-operated storage facilities, including a strategic gasoline inventory, serve no useful purpose.

There is no market failure associated with storage of gasoline. As a result, the firms in the industry acquire a socially appropriate level of storage, the level at which the benefits of added storage equal the costs. Attempting to artificially inflate the level of storage will have a temporary effect at best, because the creation of government storage facilities will reduce the returns to privately held facilities and tend to eliminate private storage. This is a bad tradeoff for society.

If the costs of creating new storage have been artificially inflated by government regulation, government could act to reduce the costs by streamlining environmental regulations and eliminating redundant or useless regulation. However, real costs should be born by the firms and not subsidized by the government.

? Minimum inventory laws are impractical and may serve to increase volatility.

Minimum inventory requirements have major drawbacks. First, firms will tend to minimize the costs of meeting the law, and thus tend to inventory the products that are less expensive to inventory rather than the products that are most useful to inventory. Since reformulated gasoline tends to be more difficult to inventory, firms will tend to avoid inventories of RFG. Moreover, minimum inventory requirements prevent the market from running storage efficiently, because the firms that operate storage most efficiently should be the main storage companies, not necessarily producers or consumers.

? The foremost problems in storage are boutique fuels and regulatory burdens.

Boutique fuels increase the problem of storage by eliminating pooling. By proliferating fuel types, the amount of storage needed to prevent significant price spikes rises. Storage works like insurance: it reduces costs to be large. By dividing the nation into many smaller, separate fuel types, we increase the costs of storage and reduce its effectiveness.

The regulatory hurdles facing storage creation are high. Gasoline is dangerous and spills are damaging to the environment. The danger to life and health necessitate government intervention in the form of safety and environment regulation, and these regulations exist for good social purpose. However, regulations can be misused. Where regulations can be made more efficient, it is worthwhile doing so, and a side benefit will be a reduced volatility of

gasoline prices. Regulations - not economic incentives - prevent building refineries on the West Coast. The inability to build a new refinery suggests the regulatory burden is too high.

? Oil companies can have at most a very modest effect on the price of oil. BP's attempt to manipulate the spot price of oil on the West Coast resulted in month-to-month changes of less than three cents per gallon.

Blaming the oil companies for the high price of oil and gasoline is a common American pastime, but is not consistent with the facts. Oil companies control a small fraction of world oil, and have little ability to change the price of oil. In the one recent documented attempt to manipulate the spot price of oil, BP shipped a small fraction of its production to the Far East to boost the West Coast price. This resulted in modest changes in the spot price for oil, which translate into even more modest changes in the spot price for gasoline. The scale of oil company operations, even for a giant like BP, is simply too small to make a large difference in the world price of oil.

? OPEC can have a significant effect on world oil prices, but historically OPEC has not been a very successful cartel.

Americans tend to fear OPEC, but the history of OPEC suggests that our fears have been substantially overblown. OPEC is not a very successful cartel. Cartels operate by restricting supply in order to boost the price. The only members of OPEC to significantly restrict supply are Saudi Arabia and Kuwait. OPEC's successes, especially in 1973 and 1981, have been more of a consequence of the joint exercise of market power by these two nations than of the collective or collusive exercise of market power by the remaining members. Of course, our alliance with these two producing countries takes on greater significance in light of their importance to OPEC's ability to exercise market power.

? The tendency to reduce taxes when supply is temporarily disrupted is bad policy. The price must rise to ration demand to the available supply; removing the taxes does not change the price that consumers must pay to ration available supply, but transfers the taxes to the firms.

Illinois suspended collection of its sales tax during the price spike of summer, 2000. This is good politics but bad policy. The price increase was caused by a shortage, and the price charged to consumers had to rise to a point that equated supply and demand. Because of inelastic supply, few new supplies are induced by the removal of the taxes, which means the price consumers pay doesn't change very much in response to the tax removal. Consequently, the removal of the tax mostly results in increased revenue to existing sellers and does not lower the retail price very much if at all. (Illinois also made it illegal for sellers not to pass on the tax cut to consumers, a law that neglects the rationing role of prices entirely and has the effect of making market economics illegal.)

I like seeing taxes removed, but gasoline taxes are one of the most sensible taxes in the country. Gasoline taxes are mostly user fees designed to pay for roads used by gasoline consumers. It doesn't make sense to suspend them in the event of a supply disruption.

West Coast Gasoline

? West Coast gasoline refining and retailing is controlled by an oligopoly of seven firms: Chevron, Shell-Saudi Aramco, BP-Amoco-Arco, Tosco, Valero, Exxon-Mobil, and (likely) Tesoro. These firms are interdependent and aware of each other's responses, which reduces the likelihood of fully competitive behavior. Vertical integration exacerbates the risk of non-competitive behavior.

Concentration in any industry creates a concern that market power may be exercised, to the detriment of consumers. Gasoline refining and retailing on the West Coast are fairly concentrated, but not extraordinarily concentrated. At either level in the production chain, the concentration is high enough to create concern about new mergers. Moreover, those seven firms, along with an eighth firm (Kinder Morgan) control the terminaling facilities and pipelines, which permit the importation and transportation of gasoline in the market. The combination of control at all levels significantly exacerbates the risk of market power, and does so by two distinct means.

First, the control of refining and retailing creates an entry barrier, for any potential entrant must enter at two levels of production, rather than one. For example, if a grocery store decides it would like to enter gasoline retailing (a nationwide phenomenon), the grocery store would ordinarily contact an independent refiner to assure a source of

supply. In the West Coast, however, there are no significant independent refiners; the grocer is forced to buy gasoline from a competitor in the retail market. In principle, the grocer could build a refinery to supply its needs, but in practice environmental concerns make a new refinery uneconomical, and in any case, grocers are unlikely entrants to the refining business. Similarly, an attempt to build a new refinery or expand an existing small refinery runs into the roadblock of finding adequate retail capacity. Alternatively, a retailer could try to bring tankers of gasoline to the market, but then faces one independent supplier of terminaling facilities.

Second, the interconnection of the seven firms on the West Coast induces a more cooperative attitude than might arise otherwise, and a cooperative attitude by firms generally results in less price competition than is desirable. Several of the firms engage in "swaps," in which gasoline is exchanged to meet local needs. These firms buy from each other in the intermediate, bulk gasoline market. Such interdependence tends to mute competition. A firm that undercuts its rivals in one market faces a reaction by the rivals in other markets. For example, a firm that sells more at retail than it refines is hesitant to cut its retail price, for fear that its suppliers, who also compete at the retail level, will react by curtailing their bulk gasoline sales. Such interdependence may lead to prices above competitive levels without any illegal meetings or communications. In such a situation, the firms independently recognize their joint interest, which is called "tacit collusion" by economists.

? The Federal Trade Commission is aware of the threat created by increasing vertical integration and interdependence.

In my opinion, the FTC is very concerned that the West Coast market is less competitive than the market concentration would suggest. Its analyses have incorporated vertical integration issues and the public has been protected from increasing concentration.

? There is no evidence of explicit collusion, and explicit collusion is unlikely.

I have personally read a very large number of documents produced by oil companies as part of confidential investigations, and I have seen no evidence of explicit collusion, illegal meetings among executives, or other indications of conspiracy. I have personally examined sufficiently many documents that I believe I would have seen evidence if such evidence existed. I am confident that the oil companies are not engaged in an explicit conspiracy against the public.

It would be surprising if the oil companies were engaged in a "smoke-filled room" kind of conspiracy. These companies are among the world's most savvy about the antitrust laws, being one of the first major targets of the antitrust laws. Because of this history, the oil companies receive greater scrutiny than some industries, increasing the risks associated with a violation of the antitrust laws.

Moreover, it is difficult to motivate a manager in a large organization to engage in a price-fixing conspiracy (although management at ADM seems to have solved this problem!). The manager personally risks jail by such actions, but the benefits mostly flow to the shareholders. Consequently, it is rare for large corporations to engage in explicit price-fixing.

? A single refinery outage can create a major price spike in the West Coast.

In recent years, California has had a rash of refinery fires that disrupted supply and have sent short-run retail prices up by as much as fifty cents per gallon. Tosco's Bay Area refinery, now owned by Ultramar-Diamond Shamrock, had a rash of fires. From an industry perspective, these fires were profitable, sending prices up significantly with only a modest quantity disruption. The isolation of the West Coast market, combined with inelastic demand, creates a situation where volatility of prices is normal.

? The Longhorn Pipeline, which connects Houston to El Paso, may help integrate the West Coast into the rest of the country's supply pool.

When events are random, pooling can reduce risk. This is the basis of insurance - by pooling the risks we face, we obtain the relatively steady average loss. The isolation of the West Coast prevents it from being pooled with the rest of the nation's wholesale gasoline markets. It is possible to increase the extent to which the nation is integrated through the creation of a pipeline connecting the Gulf Coast with the West Coast. The Longhorn Pipeline will not accomplish this connection by itself, but requires an additional pipeline from El Paso to Phoenix. The Longhorn Pipeline is incredibly unpopular in my hometown of Austin due to environmental concerns.

Eastern Gasoline

? The eastern U.S. (east of the continental divide) has sufficiently many refiners and retailers to be very competitive. However, the "boutique fuels" problem slows competitive responses. Boutique fuels reduce and even prevent substitution across markets.

The rest of the country is blessed with a large number of refiners and retailers. Thus, large discount retailers like RaceTrac have a steady source of supply. The vertical control concerns raised for the West Coast do not arise elsewhere in the U.S.

However, the U.S. is in danger of becoming a patchwork of separate geographic areas, due to what is called the "boutique fuels" problem. The ethanol-based reformulated gasoline used in Chicago and Milwaukee is used nowhere else, so when there was a supply disruption in the summer of 2000, gasoline could not be diverted from other parts of the Midwest to mitigate the short-run price increases. By some counts, there are more than forty gasoline types being produced in the U.S. to meet regulations established for local areas. While such a patchwork of fuel grades may alleviate local environmental concerns, boutique fuels separate our competitive marketplace into many less-competitive marketplaces. The proliferation of types of RFGs (reformulated gasoline) increases our vulnerability to small supply disruptions.

? Some wholesale gasoline markets are served by one or two pipelines.

Pipeline economics exacerbate the problem of boutique fuels. Pipeline economics are summarized by the familiar formula πr^2 , or "pi r squared," which defines the area of a circle. Double the radius of a pipeline, and you quadruple the volume of the pipeline. This simple fact makes one pipeline more efficient than two smaller pipelines. Consequently, many places are served by only one or two pipelines. Pipeline economics exacerbate the effects of disruptions - there may be few alternate routes.

Moreover, boutique fuels create a further problem when combined with the nature of pipelines. Boutique fuels are transported by sending a large volume of one fuel, followed by a large volume of the next. The transition from one fuel to another creates a low value mixed fuel. (The mixture of MTBE-based and ethanol-based RFG produces a mix that is not environmentally sound, for example.) Thus, it is uneconomical to switch frequently from product to product and the loss associated with transportation grows the more types of fuels that are transported on a given pipeline. This makes geographic areas even more vulnerable to supply disruptions.

? Long-distance transportation requires about four weeks, and refining plus transport takes around eight weeks, so a two-month response to an unexpected shortage is to be expected even in a competitive marketplace.

Consider the retail gasoline price increase that occurred in Chicago in summer, 2000. How quickly could the market react? If a Gulf Coast refiner had a stock of Chicago-certified gasoline (ethanol-based RFG II), and the supplier could buy (or already had) pipeline space, the supplier could inject the gasoline into the pipeline. Three to four weeks later, the gasoline would arrive in Chicago. Thus, in the best circumstances, this kind of market reaction to a disruption requires a month. In practice, if the refinery is producing something other than the Chicago fuel and has to shut down and reorganize to produce the Chicago fuel, and the pipeline has to juggle its scheduled deliveries, at least an additional month is required for the fuel to arrive. Thus, realistically, a two-month lag to supply disruptions is reasonable, given the economics of refineries and pipelines.

? The possibility of EPA waivers may slow supply responses.

Some gasoline suppliers thought the EPA might issue waivers for Chicago and Milwaukee, and waited to see what the EPA would do. Such a concern on the part of oil companies is justified, because the EPA does issue waivers in some circumstances, and indeed did so in St. Louis. A company that races to bring RFG II to Chicago, only to have the EPA issue a waiver permitting ordinary fuel to be used, finds itself holding expensive gasoline that can only be sold at the price of inexpensive gasoline.

It is difficult to formulate policy to deal with the unpredictability of the EPA. There are going to be circumstances where the EPA should issue waivers, and others that don't merit waivers. Moreover, it is going to be difficult or impossible to specify in advance all the circumstances where the EPA should issue waivers. It is important, however, to understand the unpredictability of government can exacerbate supply disruptions by muting the responses of markets. Early, definitive announcements help markets perform.

? The need to clean storage tanks between summer and winter creates a window of severe vulnerability to supply disruptions.

Often summer fuels cannot be mixed with winter fuels and still meet EPA standards. The effect of the inability to mix means that the storage tank has to be emptied and cleaned before being refilled with summer fuel. Moreover, firms will generally wait until the very last week before summer fuel is mandated to switch, because cleaner summer fuel is more expensive to produce. This means that all of the storage tanks are empty the same week, which creates a week of severe vulnerability to a supply disruption.

Antitrust

Recent oil company mergers have raised concerns that "big oil" will soon be in a position to increase prices freely. However, these mergers receive exacting scrutiny from federal antitrust agencies and antitrust concerns are eliminated by divestitures. Big mergers have positive aspects - Exxon-Mobil is using the best of both companies, in particular applying Exxon's overseas development skills to Mobil assets, and Mobil's operations and technology know-how to heritage-Exxon domestic operations. Developing the oil resources of foreign nations often requires a very large firm, one that can weather large-scale adversity and develop great resource pools.

? Boutique fuels balkanize the large integrated eastern market, increasing short-term market power concerns.

The proliferation of fuels encourages refineries to specialize and, thereby, reduces the intensity of their competition. At a minimum, the increase in the number of fuels creates short-term market power, because it takes rivals some time to respond to a reduction in supply by any one firm, and there are fewer rivals in a position to respond quickly.

? There is some concern about concentration of retail outlets, primarily in the downtown areas of larger cities where building a new gasoline station is very difficult. Retail concentration is less of a concern in suburban or rural areas, where new stations are entering.

Generally, retail gasoline margins are thin - about seven cents per gallon - and there is little or no antitrust concern about the level of concentration in retail gasoline. Margins are just sufficient to cover the fixed costs of operating the retail station. There is some antitrust concern in the larger cities, where there are few gasoline stations and it is difficult or impossible to obtain zoning permission to open a new station. Elsewhere, new stations are opening up, with the modern multiple-bay convenience store design. Entry prevents the exercise of market power, so areas with retail entry present no significant antitrust concerns.

? The Federal Trade Commission does a thorough job investigating oil company mergers. Big mergers have generally required divestitures to preserve competition.

I have been impressed with the overall quality of the analysis coming from the Federal Trade Commission. The FTC must identify the areas of potential antitrust concern and develop sufficient data and information sources to permit evaluation of the likely competitive effects of mergers involving oil firms. The Exxon-Mobil merger, with over one hundred million pages of document production, resulted in the hallways of the FTC being lined with boxes everywhere one went. The document index ran thousands of pages. Such a document production is daunting, and the FTC has done an impressive job identifying competitive issues and developing a case to take to court to protect

competition. The issues in oil mergers range from owning shares in transportation pipelines to three-dimensional mapping technology. While consumers focus on gasoline, the FTC must evaluate the likely effects of the merger on many other products, such as jet fuel, diesel, asphalt, natural gas, lubricants and even candle wax. I can tell this committee that the FTC is very thorough and careful in its approach, and protects competition to the fullest extent of the law.

? Exxon and Mobil sold thousands of retail stations and one of their two California refineries, along with shares in pipelines and various other assets.

The divestitures obtained in the Exxon-Mobil merger could produce a sizeable oil company. This agreement serves as a model agreement. The combined company is a better company than its component parts, not because of any increase in market power, but because it has leveraged the best of both companies. This improved performance enhances competition, and benefits the American consumer. At the same time, where competition was threatened because of significant competitive overlaps, divestitures preserved competition.

? BP sold all of Arco's Alaska assets to ensure competition in the search for North Slope oil. This divestiture actually increases competition, since BP's incentive to increase West Coast oil prices was eliminated by the purchase of Arco's retail outlets. BP stopped shipments of oil to the Far East after purchasing Arco's West Coast refineries.

BP Amoco's takeover of Arco shows the insistence of the FTC to preserve competition. BP was initially unwilling to divest significant Alaskan assets, calling such a divestiture a deal-breaker. In spite of BP's tough posturing, the FTC sued to block the merger, which is the largest merger ever challenged by the FTC. After the lawsuit was filed, BP agreed to divest Arco's Alaskan assets, which were acquired by Phillips Petroleum for almost \$7 billion, the largest divestiture ever obtained by the FTC. This divestiture not only eliminates any competitive concerns, but in fact makes the merger pro-competitive. Because BP now owns West Coast refineries, its incentive to increase the spot price of oil on the West Coast is eliminated. The settlement represents a great victory for the antitrust laws, which have preserved competition on Alaska's North Slope, and a great victory for American consumers.

? Vertical integration of West Coast firms magnifies the risk of non-competitive outcomes.

Vertical integration by the seven major refiners decreases market competitiveness by several distinct means. First, entry is more difficult because a firm must enter at several levels (terminaling, refining and retailing) to produce and get the product to market. Second, the wholesale market and swaps (usually geographically-based exchanges) create an interconnection between the firms - they need each other. If BP-Arco buys wholesale gasoline from Chevron, BP-Arco is hesitant to take actions that might injure Chevron at the retail level. Similarly, actions by Chevron that would injure BP at the retail level harm Chevron at the wholesale level. Without any explicit conspiracy, such interdependence impedes pro-competitive behavior.

My assessment is that mergers of firms with West Coast gasoline assets require heightened scrutiny. Over the past five years or more, such mergers have received heightened scrutiny, with an increasing awareness that interdependence of the firms requires an analysis beyond the standard approach, because the standard approach does not recognize the significance of vertical integration in creating non-competitive outcomes. The formulation of appropriate antitrust standards for vertical mergers is a subject in its infancy, but one of growing importance.

? Forced divestiture of retail outlets will likely interfere with efficient delivery of gasoline and is bad government policy.

While mergers of firms operating on the West Coast are of greater concern because of the small number of refiners and retailers and the absence of independent operators at all levels of the production chain, a policy to artificially eliminate vertical integration is likely to do much harm and no good. Moreover, the vertical control issue arises only on the West Coast - for the rest of the country, there are independent refiners that can supply entering or growing retailers (such as grocery stores or RaceTrac), and independent retailers for the independent refiners to supply. Concentration levels are not so high as to create a concern.

There is not a great deal of competition for gasoline retailing in the center of many of the older large cities, such as Boston, New York and Detroit. The problem in these locations is NOT a problem of vertical integration but the simpler

problem that there are few stations (due to high land value) and entry is very difficult. Entry is difficult primarily because land is expensive, but also because the existing stations (whether vertically integrated or not) lobby local zoning boards to prevent entry, using environmental threats as a reason.

There are many pro-competitive reasons for firms to be vertically integrated (operate at multiple levels of the production chain). In particular, vertical integration reduces risk by pooling, as with insurance, and it permits more complex contracting to solve a variety of incentive problems. Incentive effects are very important when various aspects of gasoline delivery that are difficult to monitor matter. Mobil has established a reputation for nicer stations, which serves the company and consumers well. Mobil's incentive and ability to create such a reputation requires a large scale of operation (to make it worthwhile) and the ability to tie its gasoline brand to its retail performance. Elimination of vertical integration would harm or even destroy the ability of a firm like Mobil (now Exxon-Mobil) to create such value for consumers.

A ban on vertical integration, or divorcement of retailing from other stages of operation, may do a great deal of harm. It is analogous to telling Starbucks to stick to coffee roasting and get out of the retail business.

? Elimination of zone pricing may cause average retail prices to rise.

Zone pricing refers to the policy of wholesale suppliers charging retail gasoline stations in different geographic zones different prices based on the nature of customers in that zone. Charging demand-based prices is common in gasoline markets and in many other industries as well. Economists call this price discrimination, while marketers use the softer term "value based pricing." Frequent flyer miles, Saturday night stayover fares, buy one get a second at half price, and senior citizen or student discounts are all examples of the same phenomenon. Even free delivery, in which different customers are charged the same prices in spite of different costs of service, is a form of price discrimination.

One man's surcharge is another man's discount. Relative to uniform pricing, zone pricing increases prices in the areas with little competition and/or rich consumers and reduces prices in the areas with the most competition and/or the poorest consumers. Elimination of zone pricing by statute will tend to force an average markup to all. This amounts to a transfer from poorer areas and/or areas with lots of competition to richer areas and/or areas with little competition. Overall, a ban on zone pricing will likely hurt the neediest segment of society.

Moreover, there is no economic prediction that average prices will fall. Refinery margins won't fall because refinery margins are determined by supply conditions at terminals rather than retail stations. Retail gasoline is quite competitive with very low profit margins in most areas. There is little scope for a significant price decrease.

Conclusion

What can the government do to improve the reliability of delivery and price of gasoline to the U.S. consumer? The main points I would make before this committee are:

? There is only a limited role for government in reducing price volatility. Some level of fluctuations in price is unavoidable, caused by large-scale phenomena like demand increases, and short-term phenomena like pipeline breaks.

? Price volatility is not unambiguously bad. Gasoline prices are volatile because the value of gasoline varies over time. Stabilizing prices at a high level is much worse for consumers than volatile prices.

? Price controls are not a fix for price volatility. We lived through the gasoline lines of the 1970s, and I hope never to see those again. Preventing the establishment of market prices through price controls does not change the underlying conditions, but instead often creates severe shortages and eliminates investment. Price controls do severe damage, as anyone who has driven through the Bronx can verify, because rent controls destroyed the Bronx.

? Tax holidays during price spikes do not decrease the price to consumers but create transfers to oil companies.

? Volatility is increased by the proliferation of boutique fuels. As a nation, we should be aware that every time an area is assigned its own fuel specifications, the rest of us lose a bit of insurance. We should attempt to minimize the total number of distinct gasoline types used.

? The greater the extent to which the nation is interconnected, the less will be the volatility of gasoline prices. Promoting the construction of pipelines can reduce volatility by linking geographic areas more tightly. This may be an expensive fix with limited effects, however.

? Storage reduces volatility. Promoting the expansion of storage tanks is probably the least cost means of reducing volatility. However, such promotion should involve improvements in the regulatory environment, tax breaks or other inducements to the creation of storage facilities, rather than direct rewards to storage of gasoline itself, in order to minimize regulatory costs. It is important that the cure not be worse than the disease.

? Government-run storage will tend to crowd out private storage, which increases the overall cost of gasoline supply without increasing actual supplies.

? Industry executives are justifiably pessimistic about the ability of the nation to produce new refineries, especially in California. Even in their private documents, they say that there will never be a new West Coast refinery built. There is a role for the government to moderate the "Not in My Backyard" (NIMBY) mentality that prevents us from building adequate refineries, adequate electric power generation facilities, pipelines, electric transmission lines, and even cellular phone towers. Fortunately, my home state of Texas has relatively few NIMBY problems and we aren't in danger of losing our power. NIMBYism is approaching a crisis problem in some parts of our country.

? Forcing oil companies out of retail operations, e.g. divorcement, by legislation is likely to eliminate many of the benefits of vertical integration without encouraging competition.

? Elimination of zone pricing will not tend to reduce average gasoline prices, but instead increase prices in competitive and/or poor areas, while decreasing prices in less competitive and/or richer areas.

? Finally, let me end with a "big picture" remark. Over the past thirty years, this country has deregulated trucking, airlines, rail, gasoline, oil, natural gas, and long-distance telephony. It is in the process of deregulating electricity and local telephony for business customers. Overall, the deregulation of the U.S. economy has produced huge gains for American consumers. We should not let a few problems - most notably the California electricity crisis and price spikes in gasoline - deflect us from our market economy or send us back to regulation. In almost all instances, competitive industries deliver more, higher quality goods to consumers than regulated industries. Regulation produced gasoline lines, which are worse in the long run than volatile prices.