Testimony of Severin Borenstein Before the
California Assembly Transportation Committee
June 7, 1999

Thank you for inviting me to address this committee on the competitiveness of the California gasoline market and the recent spike in gasoline prices. I am Director of the University of California Energy Institute and a Professor of Business Economics at U.C. Berkeley's Haas School of Business. I have been studying the gasoline industry for about 15 years. My full curriculum vitae is attached.

I begin by reviewing some of the basic economics of the gasoline industry that are central to understanding what a competitive gasoline market would look like. I conclude that the price spikes we have seen recently may well reflect a lack of competition in the market, but that the evidence presented thus far sheds very little light on that subject. Instead, it has focused on facts that easily could be explained as part of the natural functioning of a competitive market. More importantly, I argue that the correct policy response is not another investigation into possible anticompetitive behavior, which is unlikely to yield any new insights. Rather, the solution is a change in policy with regard to the CARB gasoline standard that would reduce California's dependence on the dozen in-state refineries (owned by 7 companies) that produce CARB gasoline. The change I propose would loosen the strict supply constraints we have suffered since 1996 and would open up California refiners to increased competition.

The Economics of Gasoline Markets

Whether the California market is competitive or not, gasoline prices in the short run are going to be driven by the interaction of supply and demand, not just by the cost of production. Gasoline prices adjust to clear the market given the quantity of gasoline available. If a shortage exists, price will increase and *all* sellers will receive that higher price, even sellers who have had no reduction in supplies or increase in production cost. *This alone is not evidence of a lack of competition in the market.* In even the most competitive markets, a seller who is lucky enough to have supply when either demand increases or the supply of other suppliers decreases makes a lot of money. When there is a freeze in Florida, California orange growers profit. When there is a surge in demand for

housing in Silicon Valley, existing home owners in the area benefit. When world political instability drives up the price of gold, gold mining companies become much wealthier.

These sellers are not usually called profiteers or gougers, but lucky beneficiaries. Nor has there been much call for holding down these prices through government regulation. With a limited amount of gold or oranges or houses, an attempt to hold down the prices would result in some non-market allocation of the existing supply, such as waiting in line, bribery of intermediaries, or allocation by lottery. The fact that prices increase dramatically, and that those price increases are unrelated to a firm's cost of production is not evidence of any problem in the market. It can be exactly the way the market should respond to a change in the supply/demand relationship.

In the California's gasoline market there has been a very tight supply/demand balance since the introduction of CARB gasoline in 1996. California refineries have been running at historically high utilization rates, above 95%, and have still maintained only average inventories. This means that even if all firms act competitively, an unforeseen decline in the available production capacity – due to fire, an extended maintenance shutdown, or some other cause – is likely to leave the state with a shortage of CARB gasoline supply, since the industry cannot buffer these shocks by increasing production very much at operating refineries.[1] The CARB standard has also greatly diminished the State's ability to import gasoline, since there is very little CARB production capacity outside the state.

At the same time that gasoline supply in California has become increasingly tight, gasoline demand remains insensitive to market conditions. Even a thirty cent per gallon price increase raises the typical two-car family's fuel cost by only about $25 per month, not enough for most people to change their commuting habits or their auto choice, particularly when the spike is thought to be short term.

---

[1] As everyone knows, two major refinery fires in California earlier this year combined with a number of other smaller outages, due to extended maintenance and other causes, to apparently create a shortage of CARB gasoline in the state. The CEC data on production and inventories in California, however, are not consistent with the reports of refining capacity lost or with my discussions with industry people. I'm puzzled by the indication in CEC data that CARB production increased during the week following the Tosco fire and was flat during the week following the Chevron fire. One important factor may be that in-state refiners substituted from producing conventional gas for neighboring states to producing more CARB gasoline. The percentage of California production that met CARB standards increased from about 86% in January to about 95% in April. Also, at least one refiner (ARCO) has reported that following the fires and outages, they faced a severe shortage of some of the blending components necessary to produce gasoline to CARB standards. Thus, some of the shortage may have been in these components rather than the basic feedstock.

If supply is very constrained and demand is relatively insensitive to price, even a small shortage can cause large price increases. If you want to think about how large, ask yourself how much gasoline prices would have to go up before you would buy 5% less gasoline. Studies indicate that gasoline prices would have to increase between 25% and 50% to induce a 5% cutback in purchases. That is the reason why, even in a completely competitive gasoline market, a small reduction in supply can result in a newsmaking price spike.

Thus, the large price spikes are not in themselves evidence of an uncompetitive market, nor is the fact that all producers have enjoyed the higher prices, and many have made significant profits from the spike. That said, there is good reason to think that some refiners in the state are able to act in an uncompetitive way during this time. In particular, when supplies are tight, individual producers may have particularly strong incentives to withhold some of their product in order to drive prices even higher.

In normal times, two threats constrain a firm from raising its price: the threat that other sellers will increase their supply and steal the company's sales and the threat that buyers will respond to the higher prices by reducing their purchases of the product. In the California gasoline market, the latter constraint is virtually absent, so we rely on the former. In times of a refinery outage or other disruption, however, the threat that another producer will be able to "fill in" when one company reduces its supply is remote. Instead, such a reduction is likely to force prices considerably higher. The higher price on the quantity the firm still sells is likely to more than compensate for the slight reduction in sales it suffers in order to push up the price.

Note that nothing in this scenario involves communication or collusion, tacit or explicit, among firms. That isn't necessary for the uncompetitive behavior I've described. Such a firm would be exercising market power *unilaterally*. Also, note that such behavior is not a violation of antitrust laws. While California may have some laws pertaining to unfair business practices that may apply, I believe the chance of successful prosecution under these laws is remote given the evidence currently available. Finally, note that even if none of this uncompetitive behavior is occurring, California still has a problem: the CARB standard has decoupled California's gasoline supply from that of the rest of the country, making the State more vulnerable to supply disruptions, whether real or created by producers, that cause periodic price spikes. Steve Stoft, my former colleague at UCEI,

and I have developed an alternative solution to this problem.

Opening California to More Refiner Competition

Rather than rigidly prohibit the sale of non-CARB gasoline (whether it is conventional gas or meets the federal RFG standard) regardless of how expensive CARB gasoline gets, the state should instead require sellers of standard gasoline to pay a surcharge. An extra 15 cents per gallon would be sufficient. This would effectively put a cap on how much California gasoline prices could exceed those in the rest of the country. If the price of gasoline here were more than 15 cents above the price in other states (plus the cost of transportation), suppliers of standard gasoline would start shipping gasoline into the state. In normal times a 15 cent surcharge on standard gasoline would enforce the CARB gasoline rule just as effectively as a rigid regulation, because CARB gasoline costs only about 6 cents more than standard gasoline to produce. Even amortizing all the conversion costs that in-state refiners have shouldered, the extra cost of CARB gasoline is no more than 12 cents per gallon, so the 15 cent surcharge on non-CARB gasoline would still allow CARB gas producers to recoup their investments.

In times of short supply, the surcharge would still not cause a major switch to the more-polluting gasoline formulas. Whatever the reason for the shortage – an unexpected demand surge, a refinery outage, or even an attempt by an in-state supplier to manipulate gasoline prices – the surcharge would only encourage use of standard gasoline up to the point where the California price was driven down to within fifteen cents of the price in other states. In nearly all cases, a small inflow of standard gasoline would be sufficient to have this effect. For the same reason that just a small shortage can drive prices through the roof, just a small inflow from out-of-state refiners can push them back down again.

During a shortage, the state would receive very modest revenues from the surcharge, which would be collected only on the non-CARB gasoline sold in state. Even including this surcharge, gasoline would cost consumers less than they would have been paying if the CARB gasoline standard were enforced rigidly. Thus, both consumers and the state gain. The producers of non-CARB gas, who bear the surcharge, also gain by being allowed to sell in California. The only losers are the suppliers of CARB gasoline who can no longer profit excessively from the temporary shortage. After the shortage has passed, CARB gasoline prices would again drop to be less than 15 cents above out-of-state gasoline prices, sales

of non-CARB gasoline in California would cease, and so would collection of surcharge revenues.

The impact on the environment would be negligible. Our calculations are that the proposed plan would result in non-CARB gasoline fulfilling on average less than 1% of California's annual gasoline consumption. Even if CARB gasoline is 15% less polluting than the alternatives, this would increase auto emissions by less than 0.15%.[2]

What this proposed surcharge would do is limit the price volatility of CARB gasoline and expose in-state refiners to greater competition. Furthermore, it would become effective automatically, as soon as California gasoline became sufficiently more expensive that gasoline elsewhere. It would not require a potentially-lengthy, politically-charged debate over the granting of special variances.[3]

The 1999 price spike is the third notable California-specific jump since the introduction of CARB gasoline in 1996. Unless some form of "escape valve" is instituted, California seems destined to continue having these spikes. This proposal for a surcharge on non-CARB gasoline lives up to the goals the state was pursuing when it instituted the reformulated fuel standard while recognizing that the current implementation is too rigid in its structure. The alternative to this proposal appears to be periodic price spikes, each time followed saturation press coverage, legislative hearings, finger pointing, and ultimately no concrete action.

---

[2] This figure is based on the extreme assumptions that a price spike sufficient to induce imports of non-CARB gasoline would occur for two months of every year and fully 5% of the California supply would be non-CARB gasoline during those months. The likely figures are much lower, so the effect on air quality is likely to be much smaller than even the 0.15% increase in emissions.

[3] I should make clear another way in which that the current variance procedure, under which CARB can allow in-state refiners to produce non-CARB gasoline, is no substitute for this proposal. CARB will grant such waivers only to in-state refiners who can show that they are temporarily unable to produce fuel that meets the CARB standards. Out-of-state refiners are not eligible, and in-state refiners are eligible only to the extent they are replacing supplies from their own refinery. Such a variance procedure is hardly the way to increase competition for in-state refiners.

Curriculum Vitae May 1999

Severin Borenstein

Work Addresses

Haas School of Business
U.C. Energy Institute
Berkeley, CA 94720-1900
510–642–3689
FAX: 707-885-2508

U.C. Energy Institute
2539 Channing Way
Berkeley, CA 94720-5180
510–642–5145

Home

15 Ardilla Road
Orinda, CA 94563
510–253–8599

E-mail: borenste@haas.berkeley.edu Webpage: http://haas.berkeley.edu/~borenste

Education:

1974-1976	Carleton College, Northfield, MN
1977-1978	University of California, Berkeley, A.B. Economics
1979-1983	Massachusetts Institute of Technology, Ph.D. Economics (1983)

Teaching and Research Interests:

Primary Fields:	Industrial Organization, Business Strategy, Government Regulation, Law & Economics, Applied Microeconomic Theory
Other Fields:	Finance, Public Finance

Teaching Positions Held:

1983-1990	Assistant Professor of Economics and Public Policy, Department of Economics and Institute of Public Policy Studies, University of Michigan
1989-1990	Visiting Assistant Professor of Economics, Department of Economics, University of California, Davis
1990-1994	Associate Professor of Economics, Department of Economics, University of California, Davis
1992,1993	Visiting Associate Professor of Business Economics (Autumn), Haas School of Business, University of California, Berkeley
1994	Visiting Associate Professor of Business Economics (March), Distance learning MBA for Cathay Pacific Airlines School of Business, University of Michigan
1994	Visiting Professor of Strategic Management (Winter), Graduate School of Business, Stanford University
1994-1996	Professor of Economics, Department of Economics, University of California, Davis
1996-present	Professor of Business, Haas School of Business, University of California, Berkeley

Other Professional Positions:

1978-1979	Staff Economist, Office of Economic Analysis, U.S. Civil Aeronautics Board
1990-1996	Research Associate, Institute of Transportation Studies, University of California, Davis
1992-Present	Co-Director, Program On Workable Energy Regulation, University of California, Davis & Berkeley
1992-Present	Research Associate, National Bureau of Economic Research

1992-Present	Associate Editor of *Review of Economics and Statistics*
1993-Present	Associate Editor of *International Journal of Industrial Organization*
1993-1995	Associate Editor of *Journal of Industrial Economics*
1994-Present	Director, University of California Energy Institute
1995-Present	Editor of *Journal of Industrial Economics*
1997-Present	Member, Governing Board of California Power Exchange Corporation

Honors, Scholarships, Fellowships and Grants:

1979-81	M.I.T. Graduate Scholarship
1982-83	Alfred P. Sloan Foundation Research Fellowship
1986	University of Michigan Rackham Research Fellowship
1986-87	University of Michigan Teaching Development Award
1987-90	National Science Foundation Research Grant #SES-8711576 Title: Efficiency in the Allocation of Operating Licenses
Fall 1987	Michigan Economic Society Undergraduate Teaching Award
1988-89	University of Michigan Rothschild Research Fellowship
1991-93	Universitywide Energy Research Group Research Grant (with Colin Cameron) Title: Asymmetric Retail Gasoline Price Responses to Crude Oil Price Changes
1996-97	Recipient, Cheit Award for Best Teacher in Haas MBA Program
1996-97	Finalist, Cheit Award for Best Teacher in Haas PhD Program
1998-99	National Bureau of Economic Research/Sloan Foundation Research Grant (with Joseph Farrell) Title: Why Do Firms Cut Costs?

Selected Professional Activities:

Testified before U.S. House of Representatives, Subcommittee on Aviation on proposals for market allocation of airport landing and takeoff slots at 'slot-constrained' airports (9/85).

Member of National Academy of Sciences panel examining the impacts of regulatory reform (10/88).

Co-organizer and participant in Department of Transportation seminar on airline policy, including D.O.T. Secretary Skinner and Assistant Secretary Shane, (2/91).

Participant in Department of Transportation briefing on airline policy for D.O.T. Secretary Card and Assistant Secretary Shane, (8/92).

Co-organizer and Chair of National Bureau of Economic Research conference on "Cooperation, Coordination, and Collusion Among Firms," (5/93).

Testified before California joint legislative committee on electricity rates and the restructuring of the California electricity industry (10/94).

Organizer of the winter meeting of the National Bureau of Economic Research Program in Industrial Organization, February 1995.

"Sticky Prices, Inventories, and Market Power in Wholesale Gasoline Markets" (with Andrea Shepard) presented at National Bureau of Economic Research summer institute (8/95) and winter meetings of the American Economics Association (1/96).

"Is There Fat in Oil?: Diagnosing Profit Dissipation from the Stock Market Values of Oil Companies" (with Joe Farrell) presented at the winter meeting of the Econometric Society (1/96) and winter meeting of the National Bureau of Economic Research program in Industrial Organization (2/96).

Testified before the California Little Hoover Commission on regulation of the California electricity industry (3/96).

Co-organizer (with Jim Bushnell) of first POWER research conference on electricity restructuring (3/96).

Co-organizer (with Ben Hermalin) of IOfest '96 — the first annual joint Berkeley-Stanford conference in industrial organization (4/96).

Testified before the Minnesota state legislature on airfares at Minneapolis/St. Paul Airport (6/96).

Testified before the California state legislature on market power in the California gasoline markets and the implementation of state-mandated reformulated gasoline (10/96)

"The Competitive Effect of Transmission Lines in a Deregulated Electricity Generation Market" (with James Bushnell and Steven Stoft) presented at winter meetings of Econometric Society (1/97)

"Financial Distress and Competition in the U.S. Airline Industry" (with Nancy Rose) presented at winter meetings of the American Economics Association (1/97)

Co-organizer (with Jim Bushnell) of second POWER research conference on electricity restructuring (3/97).

"An Empirical Analysis of the Potential for Market Power in California's Electricity Industry" (with Jim Bushnell), presented at second POWER research conference on electricity restructuring (3/97).

Co-organizer (with Ben Hermalin) of IOfest '97 — the third annual joint Berkeley-Stanford conference in industrial organization (10/97).

"Do Investors Forecast Fat Firms? Diagnosing Profit Dissipation from the Stock Market Values of Gold Mining Firms," (with Joe Farrell) presented at the annual Stanford Conference on Strategic Management (2/98).

Co-organizer (with Jim Bushnell) of third POWER research conference on electricity restructuring (3/98).

Testified before the California state legislature on oversight and market power in the California electricity markets (3/99)

Co-organizer (with Jim Bushnell) of fourth POWER research conference on electricity restructuring (3/99).

"Diagnosing Market Power in California's Deregulated Wholesale Electricity Market" (with James Bushnell and Frank Wolak), presented at the fourth annual POWER research conference on electricity restructuring (3/99).

Testified before the California state legislature on California gasoline prices and markets (4/99)

Journal Publications:

"Price Discrimination in Free-Entry Markets," *RAND Journal of Economics*, **16**(Autumn 1985).

"On the Efficiency of Competitive Markets for Operating Licenses," *Quarterly Journal of Economics*, **103**(May 1988).

"Market Incentives for Safe Commercial Airline Operation," (with Martin Zimmerman), *American Economic Review*, **78**(December 1988).

"The Economics of Costly Risk Sorting in Competitive Insurance Markets," *International Review of Law and Economics*, **9**(June 1989).

"How to Carve a Medical Degree: Human Capital Assets in Divorce Settlements," (with Paul Courant), *American Economic Review*, **79**(December 1989).

"Hubs and High Fares: Dominance and Market Power in the U.S. Airline Industry," *RAND Journal of Economics*, **20**(Autumn 1989).

"Airline Mergers, Airport Dominance, and Market Power," *American Economic Review Papers and Proceedings*, **80** (May 1990).

"Carrot and Yardstick Regulation: Enhancing Market Performance with Output Prizes," (with Mark Bagnoli), *Journal of Regulatory Economics*, **3**(June 1991).

"The Dominant-Firm Advantage in Multi-Product Industries: Evidence from the U.S. Airlines," *Quarterly Journal of Economics*, **106**(November 1991).

"Selling Costs and Switching Costs: Explaining Retail Gasoline Margins," *RAND Journal of Economics*, **22**(Autumn 1991).

"The Evolution of U.S. Airline Competition," *Journal of Economic Perspectives*, **7**(Spring 1992).

"Competition and Price Dispersion in the U.S. Airline Industry," (with Nancy Rose), *Journal of Political Economy*, **103**(August 1994).

"Antitrust Policy in Aftermarkets," (with Jeffrey MacKie-Mason and Janet Netz), *Antitrust Law Journal*, **63**(Winter 1995).

"Bankruptcy and Pricing Behavior in U.S. Airline Markets" (with Nancy Rose), *American Economic Review Papers and Proceedings*, **85** (May 1995).

"Dynamic Pricing in Retail Gasoline Markets" (with Andrea Shepard), *RAND Journal of Economics*, **27** (Autumn 1996).

"Settling for Coupons: Discount Contracts as Compensation and Punishment in Antitrust Lawsuits," *Journal of Law and Economics*, **39** (October 1996).

"Market Power in California Electric Markets" (with James Bushnell, Edward Kahn, and Steven Stoft), *Utilities Policy*, **5** (3/4, 1996).

"Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes?" (with Colin Cameron and Richard Gilbert), *Quarterly Journal of Economics*, **112** (February 1997).

"Why Do All the Flights Leave at 8 a.m.? Competition and Brand Differentiation in Airline Scheduling" (with Janet Netz), forthcoming in *International Journal of Industrial Organization.*

"An Empirical Analysis of the Potential for Market Power in California's Electricity Industry" (with James Bushnell), forthcoming in *Journal of Industrial Economics.*

"Market Power in Electricity Markets: Beyond Concentration Measures" (with James Bushnell and Christopher Knittel), forthcoming in *The Energy Journal*

Other Publications:

"High Air Fares: Don't Blame Deregulation," *Washington Post*, August 25, 1987.

"USAir Merger Promises Higher Fares, Less Competition," *Hartford Courant*, January 12, 1988.

"Losses in Airline Demand and Value Following Accidents," (with Martin Zimmerman) in Moses and Savage, eds., *Transportation Safety in an Age of Deregulation*, Oxford: Oxford University Press, 1989.

"Dissipating the Airline Deregulation Dividend: The Decline of Competition at Hub Airports," *Regulation*, Fall 1990 (and reply letter in Winter 1991 issue).

"Prospects for Competitive European Air Travel," in W.J. Adams, ed. *Singular Europe: Economy and Polity of the European Community After 1992*, Ann Arbor: University of Michigan Press, 1992.

"USAir in 1986," (with Andrea Shepard), Stanford Graduate School of Business Strategic Management Case S-SM-4, January 1993.

"The Economics of Customer Lock-In and Market Power in the Service Business," (with Jeffrey MacKie-Mason and Janet Netz) in Patrick T. Harker, ed. *The Service Productivity and Quality Challenge*, Kluwer Academic Press, 1994.

"Uncle Sam at the Gas Pump: Causes and Consequences of Regulating Gasoline Distribution," (with Richard Gilbert), *Regulation*, Spring 1993.

"A Guide to the Blue Book," (principal authors Carl Blumstein and James Bushnell), *Electricity Journal*, September 1994.

"Repeat-Buyer Programs in Network Industries," in Werner Sichel ed., *Networks, Infrastructure, and The New Task for Regulation*, University of Michigan Press, 1996.

"Airline Deregulation" (with Nancy Rose), entry in *The New Palgrave Dictionary of Law and Economics*, 1998.

"Rapid Communication and Price Fixing: The Airline Tariff Publishing Company Case," in John E. Kwoka and Lawrence J. White, eds., *The Antitrust Revolution: The Role of Economics*, 3rd edition, 1998.

"A Cheaper Way to Clean Gasoline" (with Steven Stoft) in *San Francisco Chronicle*, March 16, 1999.

Educational Software:

"The Competitive Strategy Game," Version 3.22, October 1998. A computer simulation of competition among firms for use in undergraduate and graduate courses in economics and business. (Since Version 1.0 was relased in January 1994, the game has been used in undergraduate, MBA, and/or Ph.D. courses at more that 20 universities including U.C. Davis, U.C. Berkeley, U.C. Irvine, Stanford University, University of Michigan, Purdue University, M.I.T., University of Chicago, Yale University, and London Business School.

Working Papers:

"Sticky Prices, Inventories, and Market Power in Wholesale Gasoline Markets" (with Andrea Shepard), National Bureau of Economic Research Working Paper #5468, February 1996 (under revision for *RAND Journal of Economics*).

"Exercising Market Power in Proprietary Aftermarkets," (with Jeffrey MacKie-Mason and Janet Netz), October 1996 (under revision for *Journal of Economics & Management Strategy*).

"Do Investors Forecast Fat Firms? Diagnosing Profit Dissipation from the Stock Market Values of Gold Mining Firms," (with Joe Farrell), March 1999.

"The Competitive Effect of Transmission Lines in a Deregulated Electricity Generation Market" (with James Bushnell and Steven Stoft), October 1998 (revised and resubmitted to *RAND Journal of Economics*).

"Financial Distress and Competition in the U.S. Airline Industry" (with Nancy Rose), January 1997.

"Competition and Productive Efficiency" (with Joe Farrell), September 1998.

"A Cournot-Nash Equilibrium Analysis of the New Jersey Electricity Market" (with James Bushnell and Christopher Knittel), January 1998 (in Submission).

"Diagnosing Market Power in California's Deregulated Wholesale Electricity Market" (with James Bushnell and Frank Wolak), February 1999.

"Comments on the Use of Computer Models for Merger Analysis in the Electricity Industry"(with James Bushnell and Christopher Knittel), filing in Federal Energy Regulatory Commission Inquiry Concerning the Commission's Policy on the Use of Computer Models in Merger Analysis. Docket No. PL98-6-000.

Work in Progress:

"Strategic Incompatibility: The Evolution of Round-Trip Restrictions in the U.S. Airline Industry"

"Why Do Firms Cut Costs?" (with Joe Farrell)

"Stock Movements and Competitive Rivalry"

"Market Isolation, Price Volatility, and Market Power: The Effect of California's Reformulated Gasoline" (with Peter Reiss)

"The Economics of Electricity Exchanges" (with James Bushnell)