

TO: Denis Breen
FROM: Wendy Gramm *wlg*
DATE: Sept. 4, 2003

SUBJECT: Experimental Research Fostered by the FTC

I've attached an executive summary of research funded by the FTC this past year. This study of zone pricing in gasoline markets by Bart Wilson of the Interdisciplinary Center for Economic Science at George Mason University and Cary Deck at the University of Arkansas has just been completed.

I have also attached a memo from Charles Plott to me about the FTC's role in promoting research in experiments, and the impact this has had on academic research over the years. Charlie also sent me copies of papers, which I am giving to you. Many of these papers are NOT in electronic form.

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Experimental Gasoline Markets **Executive Summary**

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Few industries evoke such strong sentiments by consumers, retailers, wholesalers, and policy makers as gasoline. Zone pricing – the practice of refiners setting different wholesale prices for retail gasoline stations that operate in different geographic areas or zones – has been a particularly contentious topic in the public policy debate for the past several years. Refiners contend, as Chevron does on its website, that they employ zone pricing to “price our wholesale gasoline to our dealers at prices that will allow them to be competitive in relation to their nearby competition.”¹ However, state legislators and attorneys general have proposed legislation to ban zone pricing claiming that it “only benefits the oil industry, to the detriment of consumers.”²

Another controversial issue that is debated in the gasoline industry is divorcement, the legal restriction that refiners and retailers cannot be vertically integrated, i.e., refiners cannot own and operate retail gasoline stations. Maryland was the first state to pass such legislation in 1974, with a handful of other states following suit.

In this study, we test the opposing viewpoints on these issues using the tool of experimental economics. Experimental economics is a research method that permits observation of economic behavior under laboratory conditions. These tests use cash incentives to help understand us how markets perform and why they work the way they do. A laboratory study complements field work by implementing the chief stylized facts of naturally occurring markets and by examining what cannot be measured with field data. For example, in the laboratory we can measure the gains from trade for consumers, retailers, and wholesalers because the experimenter precisely knows consumer preferences and costs of the retailers and suppliers, which are not directly observable in the naturally occurring economy. Holding constant the wide range of potentially confounding effects found in the naturally occurring economy, in this study we compare markets in which zone pricing is permitted to arise endogenously to markets in which uniform wholesale pricing is mandated, i.e., zone pricing is prohibited. Such a comparison affords a direct examination of the welfare effects of the proposed legislation on consumers, station owners, and refiners before executing it in the field. Similarly, we vary the degree of vertical integration to assess the impact of divorcement. We also explore the “rockets

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¹ http://www.chevron.com/about/currentissues/gasoline/pricing_qanda/gasoline_pricing_qa.shtml#7.

² See “Testimony of Connecticut Attorney General Richard Blumenthal Before the House Judiciary Committee,” <http://www.house.gov/judiciary/blum0407.htm>, April 7, 2000.

and feathers” phenomenon, the perception that retail gasoline prices rise faster than they fall in response to cost shocks, another topic that has led to much public debate.³

Our laboratory environment contains two types of geographic retail areas, isolated and clustered. The geographically clustered area is at the center of a grid and served by four retail stations, whereas there is one station in each of the four geographically isolated areas in the corners of the grid.

Most broadly, we conclude that uniform wholesale pricing and divorcement each harm consumers.

Our specific findings on zone pricing are summarized as follows:

- When zone pricing is banned, consumers in the clustered area pay 10.9% higher prices than when zone pricing is permitted. As a percentage of the total value from consuming gasoline, these higher prices represent a reduction in total consumer welfare of 17-18%.
- Consumers in isolated areas pay the same prices with zone pricing as they do when it is prohibited.

Why does uniform wholesale pricing not help the consumers in isolated areas and harm those in the clustered area? The answer is two-fold. First, high station prices in the isolated areas are not the *result* of high refiner prices with zone pricing, but rather the *cause*. Station prices in the isolated areas are higher because (a) consumers in those areas prefer not to travel long distances to purchase lower-priced gasoline in a more competitive area and (b) there is only one local station. The refiners then use zone pricing to capture the station profits at these isolated and hence more profitable stations. This is consistent with the naturally occurring contexts in which refiners capture the profits of lessee dealer stations because the refiners own the land on which the station operates. (In addition, lessee dealers are unable to change their suppliers, as is the case in this experiment.) In the clustered area with strong station competition, the refiners price very competitively, and as a result, consumers pay lower prices. The upshot is that refiners capture more profits from the stations with zone pricing, but not to the detriment of consumers.

The second part of the answer stems from the unintended consequences of uniform wholesale pricing, namely that it ties refiner pricing decisions in isolated areas to those in the competitive, clustered area. When refiners are forced to sell at a uniform price, they would rather set a single price that is higher than the comparable zone price in the clustered area to capture some of the profits of the stations in the isolated areas. Hence, consumers in the clustered area pay higher pump prices. Consumers in the isolated areas do not see lower prices because nothing has fundamentally changed at the retail level. In fact, consumers have even less of an incentive to travel further to the clustered area because those prices are now higher with uniform pricing. The end result is that uniform pricing stymies competition in the clustered area and yields no benefit to consumers in isolated areas.

³ Palmeri, C. “Is Big Oil Pumping Gas Prices?” *Business Week Online*, May 22, 2003.

Our major finding on vertical integration (company-owned stations) versus divorcement (lessee dealer stations) is:

- Consumers in the clustered area and isolated areas respectively pay 13.2% and 16.5% lower prices with company-owned stations than with divorcement. As a percentage of the total value from consuming gasoline, these lower prices represent an increase in total consumer welfare of 20.1% to 50.6%, depending upon whether consumers are closer to the clustered area or the isolated area.

Consumers pay higher prices with lessee dealer stations because the refiners first mark up price to the stations, which in turn place an additional markup on the price to the consumers. This finding affirms the results of previous field studies,⁴ lending credence to our other findings.

Our other major findings are that:

- Banning zone pricing nearly triples average station owner profits, but has no effect on refiner profits.
- Station prices in the clustered area adjust quickly with zone pricing, but still rise faster than they fall (a “rockets and feathers” finding). It takes one quarter of the time for 90% of cost increase to be passed-through to consumers as it does for a comparable reduction in costs to be reflected in prices. Station prices in the isolated areas adjust more slowly than in the clustered area, but rise as fast as they fall.
- With company-owned stations, prices rise as fast as they fall in response to changes in station costs, but this response is much slower than with vertical separation.
- Banning zone pricing breaks down the long run relationship that captures how station prices adjust to changes in costs. The negative implication is that when refiner costs fall, station prices do not follow. This also means that station prices are insulated from increases in wholesale costs, but we also observe that mandating uniform wholesale prices generates high station prices in the clustered area.

⁴ See Barron, John M. and Umbeck, John R., “The Effects of Different Contractual Arrangements: The Case of Retail Gasoline Markets.” *Journal of Law and Economics* v27, 1984, pp. 313-28; and Vita, Michael G., “Regulatory Restrictions on Vertical Integration and Control: The Competitive Impact of Gasoline Divorcement Policies.” *Journal of Regulatory Economics* v18, 2000, pp. 217-33.

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The four papers listed below are projects that were funded (in part) by the FTC. The research efforts in these projects, supported by the FTC, have evolved into a substantial impact on experimental economics and on the profession in general. Several seminal papers were based on the research. All of the major issues introduced by the research are still actively studied in the profession and while the papers themselves are seldom referenced today, the literatures that rest on the papers are voluminous. The papers are listed with a brief comment about contents and an example or two of major papers that followed.

1. C. Plott and L. Wilde, "Professional Diagnosis vs Self-Diagnosis: An Experimental Examination of Some Special Features of Markets with Uncertainty", *Research in Experimental Economics*, Vol.2, Vernon L. Smith (ed), JAI PRes, 1982, 63-112.

A. Contents

This was the first paper to explore asymmetric information in experiments. The problem was to study the efficiency of markets in which the quality of the item delivered was never known to the buyer. Examples were the asymmetric information characteristic of professionals ranging from physicians to auto mechanics. What is the role of competition in such markets?

B. Impact

The Plott and Wilde paper methodology was applied to finance, industrial organization and then to the general creation and testing of "information aggregation mechanisms". The two Plott and Sunder papers were developed directly through the Plott and Wilde methodology. The papers became the foundation for modern experimental finance in which specialized instruments (options and futures) and in which the role and importance of insiders are studied from an efficiency perspective. The path leads directly to the research that recently got DARPA into trouble - see the SEJ paper for the connections. Hundreds of papers followed these initial papers, which serve as our fundamental understanding of asymmetric information in

market environments and in some cases political science as well. The papers that first opened the special areas are listed below.

(i) C. Plott and S. Sunder, "Efficiency of Experimental Security Markets with Insider Information: An Application of Rational-Expectations Models," *Journal of Political Economy*, 90 (4), August 1982, 663-98.

(ii) C. Plott and S. Sunder, "Rational Expectations and the Aggregation of Diverse Information in Laboratory Security Markets", *Econometrica*, 56 (5) September 1988, 1085-118.

(iii) C. Plott and Ross Miller, "Product Quality Signaling in Experimental Markets", *Econometrica*, 53(4), July 1985, 837-72.

(iv) C. Plott, "Markets as Information Gathering Tools", *Southern Economic Journal*, 67 (1), 2000, 2-5.

2. M. Lynch, R. Miller, C. Plott and R. Porter, "Product Quality, Informational Efficiency and Regulations in Experimental Markets", *Research in Experimental Economics*, 4, JAI Press, 1991, 269-318.

A. Contents

How does the right to advertise influence markets in which the quality of the purchase is known to the buyer only after the purchase? Do "lemons" emerge and are the poor quality goods avoided through reputation development?

B. Impact

This is the first evidence of the existence of lemons and the methodology is used as the control for cases in which lemon's corrections are to be studied.

More recently the "behavioral economics" crowd has been suggesting that trust (independent of any reputation phenomenon) is a sufficiently reliable human trait that industrial organization and policy can rely on it. The research on trust was developed without a clear realization that the experiments were similar to those used to study markets for lemons but the results seemed much different. Additional study of the issue using the results and techniques of Lynch, Miller, Plott and Porter paper have cast doubt on the robustness of the trust phenomenon to slight changes in the experimental design. The manuscript by Paul J. Healy can give you references and a flavor of the issues and suggests that classical principles are more reliable than those based on "other regarding" preferences.

(i) Paul J. Healy, " Fair Wages or Markets for Lemons? Reconciling the Results of Conflicting Experiments", California Institute of Technology, August, 2003.

3. Grether and C.R. Plott, "The Effects of Market Practices in Oligopolistic Markets: An Experimental Examination of the Ethyl Case", *Economic Inquiry*, XXII, October 1984,479-507

A. Content

This is the first attempt to use laboratory experimental methods in an anti trust case. It was also the first experiment to use the concept of "facilitating practices" as part of the treatment variables. The practices themselves were (and are) of general interest because of their subtle power to helping solve the underlying "public goods" or "prisoner's dilemma" problem.

B. Impact

The following two papers are examples of how the Grether and Plott paper influenced the literature. The first is an example of how conspiracy and conspiracy deterring institutions are explored. The second is an example of how the same issue finds its way into a much broader discussion of public goods provision.

(i) L. Clauser and Charles Plott, "On the Anatomy of the 'Nonfacilitating' Features of the Double Auction Institution in Conspiratorial Markets", *The Double Auction market: Institutions, Theories and Laboratory Evidence*, D. Friedman and J. Rust (Eds.), Addison-Wesley, 1993, pp.333-53.

(ii) C.R. Plott, "Laboratory Experiments in Economics: The Implications of Posted Price Institutions", *Science*, 232, 9 May 1986, 732-8.

4. C.R. Plott, "Theories of Industrial Organization as Explanations of Experimental Market Behavior" *Strategy, Predation, and Antitrust Analysis*, Steven Salop (ed.), Federal Trade Commission, September 1981.

A. Content

This a review paper done for the FTC and presented at an FTC conference. Basically, it summarized the experiments of the day as

related to industrial organization theory and the possible interests of the FTC.

B Impact

The impact of the paper does not come from the paper itself but from the fact that the paper was expanded into a review paper that has had a major impact on economics. At one time it was among the most referenced papers that used experimental methods and served to introduce the economics profession to what might be learned through the application of the methods.

(i) C.R. Plott, "Industrial Organization Theory and Experimental Economics", *Journal of Economic Literature*, XX, December 1982, 1485-527.

FTC Sponsored Economic Research

Supplement to Memorandum from Charles R. Plott to Dr. Wendy Gramm

Additional Study not discussed in the memorandum:

1. M. Lynch, R. Miller, C. Plott, and R. Porter, "Product Quality, Consumer Information and 'Lemons' in Experimental Markets, *Empirical Approaches to Consumer Protection Economics*, Pauline M. Ippolito & David T. Scheffman (eds), Federal Trade Commission (1984), 251-305.