

Links and Abstracts for Papers on Cars, Gasoline, and Pollution

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Impacts of Gasoline Prices

- ? Makota Ohta, Zvi Griliches. "Automobile Prices and Quality: Did the Gasoline Price Increase Change Consumer Tastes in the U.S.?" May 1986. (Published: Journal of Business & Economic Statistics, Vol. 4, No. 2, (April 1986), pp. 187-198.)
 - o Abstract only available on pdf. Essentially, Ohta analyzes the prices of U.S. used passenger cars from 1970-1981, focusing on prices during the 1973 and 1979 oil shocks. He finds that much of the changes in prices are attributable to the increase in the price of gasoline.
- ? Carol A. Dahl. "Consumer Adjustment to a Gasoline Tax." The Review of Economics and Statistics, Vol. 61, No. 3. (Aug., 1979), pp. 427-432. Stable URL: <http://links.jstor.org/sici?sici=0034-6535%28197908%2961%3A3%3C427%3ACATAGT%3E2.0.CO%3B2-I>
 - o Abstract only available on pdf. Dahl breaks the elasticity of gasoline demand into two components: price elasticity of demand for miles traveled and the price elasticity of miles per gallon of automobiles. Also investigates the affect of gasoline price on driving speeds and the automobile stock. Finds that the price elasticity of miles per gallon of automobiles is higher than others have suggested.
- ? **William C. Wheaton.** "The Long-Run Structure of Transportation and Gasoline Demand." The Bell Journal of Economics, Vol. 13, No. 2. (Autumn, 1982), pp. 439-454. Stable URL: <http://links.jstor.org/sici?sici=0361-915X%28198223%2913%3A2%3C439%3ATLSOTA%3E2.0.CO%3B2-8>
 - o This article reports estimates of a cross national model for automobile ownership, fleet fuel efficiency, driving per vehicle, and as derived from these three, gasoline consumption. The model is a recursive system of equations derived by aggregating individual behavioral equations for the choice of a durable good and its usage. The results suggest that across countries, gasoline price differences exert themselves primarily by affecting the amount of driving, and not as time series studies show, through fleet fuel efficiency. The estimates also suggest that gasoline consumption is much more income elastic than it was previously thought to be and that most of this income effect derives from the impact of income on auto ownership.
- ? George G. Daly; Thomas H. Mayor. "Reason and Rationality during Energy Crises." The Journal of Political Economy, Vol. 91, No. 1. (Feb., 1983), pp. 168-181. Stable URL: <http://links.jstor.org/sici?sici=0022-3808%28198302%2991%3A1%3C168%3ARARDEC%3E2.0.CO%3B2-C>
 - o This paper develops a technique for extracting the expectations embedded in the current prices of energy-using durable goods and applies it to used car markets during the two energy "crises" of the 1970s. The resulting estimates indicate that consumers took the energy crises seriously and formed expectations about future gasoline prices that appear rational when compared with the historical gasoline price series, with the forecasts of specialists and experts, or with the actual postsample behavior of gasoline prices. The evidence therefore supports the view that consumers are able to make rather complex choices with a great deal of rationality and casts doubt on the wisdom of policies based on assumptions to the contrary.
- ? Scott E. Atkinson; Robert Halvorsen. "A New Hedonic Technique for Estimating Attribute Demand: An Application to the Demand for Automobile Fuel Efficiency." The Review of Economics and Statistics, Vol. 66, No. 3. (Aug., 1984), pp. 417-426. Stable URL: <http://links.jstor.org/sici?sici=0034-6535%28198408%2966%3A3%3C417%3AANHTFE%3E2.0.CO%3B2-V>

- A new hedonic procedure is applied to estimate the effects of gasoline price on the demand for automobile attributes and fuel efficiency. Direct application of a comparative statics analysis circumvents the problems of identification and severe multicollinearity affecting previous hedonic studies. The results indicate that the effect of induced changes in automobile attributes in response to increases in the price of gasoline is to substantially increase fuel efficiency. The estimated elasticities of fuel efficiency with respect to the price of gasoline imply that the long-run own-price elasticity of demand for gasoline is greater than unity.
- ? **James A. Kahn.** "Gasoline Prices and the Used Automobile Market: A Rational Expectations Asset Price Approach." *The Quarterly Journal of Economics*, Vol. 101, No. 2. (May, 1986), pp. 323-340. Stable URL: <http://links.jstor.org/sici?sici=0033-5533%28198605%29101%3A2%3C323%3AGPATUA%3E2.0.CO%3B2-9>
 - This paper examines the impact of changes in gasoline price expectations on the market values of used automobiles. An asset model of automobile valuation is used to relate year-to-year changes in market values to changes in the present discounted value of gasoline expenses. Econometric evidence from data covering the years 1972 through 1981 substantially confirms the hypothesis of the model that a gasoline price shock causes relative price changes across automobile types in proportion to the differences in their rates of fuel consumption.

Taxation / Regulation

- ? **Don Fullerton, Sarah West.** "Tax and Subsidy Combinations for the Control of Car Pollution". July 2000. <http://www.nber.org/papers/w7774>
 - Despite technological advances, an individual car's emissions still cannot be measured reliably enough to impose a Pigovian tax. This paper explores alternative market incentives that could be used instead. We solve for second-best combinations of uniform taxes on gasoline, engine size, and vehicle age. For 1,261 individuals and cars in the 1994 Consumer Expenditure Survey, we record the car's model, year, and number of cylinders. We then seek a corresponding car in data from the California Air Resources Board that shows the car's engine size, fuel efficiency, and emissions per mile. We calculate the welfare improvement from a zero-tax scenario to the ideal Pigovian tax, and we find that 71 percent of that gain can be achieved by the second-best combination of taxes on gas, size, and vintage. A gas tax alone attains 62 percent of that gain. These results are robust to variation in the elasticity of substitution among goods.
- ? **Don Fullerton, Sarah West.** "Can Taxes on Cars and on Gasoline Mimic an Unavailable Tax on Emissions?" March 1999. <http://www.nber.org/papers/w7059>
 - A tax on vehicle emissions can efficiently induce all of the cheapest forms of abatement. Consumers could drive less, buy a smaller car with better gas mileage, use cleaner gasoline, and repair pollution control equipment (PCE). However, the technology is not yet available to measure and tax each car's total emissions. We thus investigate alternative instruments. In a simple model with identical consumers, we show conditions under which the same efficiency can be attained by the combination of a tax on gas, a tax on engine size, and a subsidy to PCE. In a model with heterogeneous consumers, the same efficiency can again be obtained, but only if each person's gasoline tax rate can be made to depend on the characteristics of the car. We solve for these first-best tax rates. Assuming that tax rates must be uniform across consumers, we then characterize second-best tax rates on gasoline and on characteristics.
- ? **Pinelopi Koujianou Goldberg.** "The Effects of the Corporate Average Fuel Efficiency Standards." July 1996. <http://www.nber.org/papers/w5673> (Published: *Journal of Industrial Economics* (March 1998): 1-33.)

- This paper examines the effects of the Corporate Average Fuel Efficiency standards (CAFE) on the automobile product mix, prices and fuel consumption. First a discrete choice model of automobile demand and a continuous model of vehicle use are estimated using micro data from the Consumer Expenditure Survey for 1984-1990. Next, the demand side model is combined with a model of oligopoly and product differentiation on the supply side. After estimating the demand and supply parameters, the effects of the CAFE regulation are assessed through simulations and compared to the effects of alternative policy instruments such as a powerful gas guzzler tax and an increase in the gasoline tax. Our results are as follows: Vehicle use is in the short run unresponsive to fuel cost changes; vehicle purchases, however, respond to both car prices and fuel cost. These results taken together imply that (1) contrary to the CAFE opponents' claims, higher fleet fuel efficiency is not neutralized by increased driving, and (2) policies to reduce fuel consumption by shifting the composition of the car fleet towards more fuel efficient vehicles are more promising than policies that target utilization. Policies with compositional effects operate through two channels: changes in vehicle prices and in operating costs. Contrary to environmental groups' claims, our results do not indicate the existence of consumer myopia. Still, we find the gasoline tax increase necessary to achieve fuel consumption reductions equivalent to the ones currently achieved through CAFE is 780%; whether an increase of this size is politically feasible is questionable. Our results indicate that the CAFE regulation reduced fuel consumption but shifts in the classification of products as domestic vs. imports weakened the effectiveness of the standards.
- ? Timothy F. Bresnahan; Dennis A. Yao. "The Nonpecuniary Costs of Automobile Emissions Standards." *The RAND Journal of Economics*, Vol. 16, No. 4. (Winter, 1985), pp. 437-455. Stable URL: <http://links.jstor.org/sici?sici=0741-6261%28198524%2916%3A4%3C437%3ATNCOAE%3E2.0.CO%3B2-0>
 - An important component of the costs of automotive air-pollution control has been nonpecuniary: a decline in vehicle performance characteristics. This regulatory impact on what the auto industry calls "drivability" has never been quantified, although there is considerable reason to believe that it has been a major component of the costs of some of the auto emissions standards of the last decade. We develop a methodology for econometric assessment of such costs, and apply it to the automobile air pollution standards of 1972-1981. We find that these costs are important. For the first standards implemented in the 1970s, they exceeded the costs of pollution control equipment installed on the car and the costs of decreased fuel efficiency. Since then, however, advances in compliance technology have allowed increases in automobile quality so that incremental costs of recent standards are much lower than previously believed.
- ? Peter A. Diamond. "Consumption Externalities and Imperfect Corrective Pricing." *The Bell Journal of Economics and Management Science*, Vol. 4, No. 2. (Autumn, 1973), pp. 526-538. Stable URL: <http://links.jstor.org/sici?sici=0005-8556%28197323%294%3A2%3C526%3ACEAICP%3E2.0.CO%3B2-3>
 - Pricing congested facilities above marginal production cost is a conventional approach to improving resource allocation. Where everyone is producing the same externality, a uniform price (in excess of marginal cost by the value of the externality) permits the competitive equilibrium to be Pareto optimal. Where individuals give rise to different externalities, but a uniform price is in effect, we have a second-best situation. When demands depend only on price, price should exceed marginal cost by a weighted average of externalities generated, the weights being the price derivatives of demand. When demands also depend on congestion, the optimal price generally diverges from this rule. The price should be lower when the individuals giving large external diseconomies per unit demanded tend to be price insensitive and congestion sensitive in their demands (relative to the average). In this case public expenditures to decrease congestion

directly should not be carried to the point where the marginal direct benefit from congestion reduction equals the marginal cost. Optimal income distribution is also examined.

Car Fleet Mix

- ? **James Berkovec.** "New Car Sales and Used Car Stocks: A Model of the Automobile Market." The RAND Journal of Economics, Vol. 16, No. 2. (Summer, 1985), pp. 195-214. Stable URL: <http://links.jstor.org/sici?sici=0741-6261%28198522%2916%3A2%3C195%3ANCSAUC%3E2.0.CO%3B2-9>
 - o This article develops a short-run general equilibrium model of the automobile market by combining a discrete choice model of consumer automobile demand with simple models of new automobile production and used vehicle scrappage. The theoretical model allows an unlimited degree of heterogeneity of both consumers and automobiles, with equilibrium defined as aggregate demand equal to supply for every vehicle type. Econometric estimates of the scrappage and demand functions are then used to create a simulation model of the automobile market, which is used to provide forecasts of automobile sales, stocks, and scrappage for the 1978-1990 period.
- ? **Anna Alberini; Winston Harrington; Virginia McConnell.** "Estimating an Emissions Supply Function from Accelerated Vehicle Retirement Programs." The Review of Economics and Statistics, Vol. 78, No. 2. (May, 1996), pp. 251-265. Stable URL: <http://links.jstor.org/sici?sici=0034-6535%28199605%2978%3A2%3C251%3AEAESFF%3E2.0.CO%3B2-Q>
 - o Local authorities and industries seeking to reduce emissions and improve air quality have shown interest in programs that offer to purchase and retire old, high-polluting vehicles. We analyze the results from an experimental vehicle retirement program in Delaware, during which selected pre-1980 vehicle owners were offered \$500 for their vehicles and surveyed about vehicle characteristics, value and use. With this unique data set we estimate the relationship between the owner's reservation price and the expected remaining life of the vehicle to derive a supply curve for emissions reductions, which predicts the emissions reductions as a function of the offer made to eligible vehicles in a scrappage program.
- ? **Robert W. Hahn.** "An Economic Analysis of Scrappage." The RAND Journal of Economics, Vol. 26, No. 2. (Summer, 1995), pp. 222-242. Stable URL: <http://links.jstor.org/sici?sici=0741-6261%28199522%2926%3A2%3C222%3AAEAOS%3E2.0.CO%3B2-6>
 - o This article examines the impact of policies aimed at encouraging the retirement of older, high-polluting vehicles, such as the "cash for clunkers" policy endorsed by President George Bush in 1992. The analysis assesses the likely benefits and costs of vehicle scrappage programs. I also address the interaction of a scrappage program with other ongoing policies, such as improved inspection and maintenance. Finally, the simulation for Los Angeles suggests plausible design values for a scrappage program.
- ? **Anna Alberini; Winston Harrington; Virginia McConnell.** "Determinants of Participation in Accelerated Vehicle-Retirement Programs." The RAND Journal of Economics, Vol. 26, No. 1. (Spring, 1995), pp. 93-112. Stable URL: <http://links.jstor.org/sici?sici=0741-6261%28199521%2926%3A1%3C93%3ADOPIAV%3E2.0.CO%3B2-M>
 - o Accelerated vehicle-retirement programs are currently being examined as one way to reduce hydrocarbon emissions. Forecasting participation rates in these programs is one of the major areas of uncertainty because the number of participants and their characteristics are likely to vary with the price offered to attract old cars. We present a theoretical model of the owner's car tenure and scrappage decision. Next, we develop and estimate an econometric model of

participation in an old-vehicle scrap program using data from a recent program in the state of Delaware. We then predict participation rates at different possible offer prices.

Miscellaneous

- ? **Matthew E. Kahn.** “New Evidence on Trends in Vehicle Emissions.” The RAND Journal of Economics, Vol. 27, No. 1. (Spring, 1996), pp. 183-196. Stable URL: <http://links.jstor.org/sici?sici=0741-6261%28199621%2927%3A1%3C183%3ANEOTIV%3E2.0.CO%3B2-H>
 - o Aggregate vehicle emissions have fallen even though total miles driven have increased. This article uses two new cross-sectional databases to study vehicle emissions profiles. I find evidence of large differences in vehicle emissions across model years, makes, and sizes. These findings are relevant for evaluating the benefits of previous regulatory efforts and for predicting the benefits of further vehicle regulation.
- ? Camilla Kazimi. “Valuing Alternative-Fuel Vehicles in Southern California” (in Current Issues in State and Local Public Policy). The American Economic Review, Vol. 87, No. 2, Papers and Proceedings of the Hundred and Fourth Annual Meeting of the American Economic Association. (May, 1997), pp. 265-271. Stable URL: <http://links.jstor.org/sici?sici=0002-8282%28199705%2987%3A2%3C265%3AVAVISC%3E2.0.CO%3B2-0>
 - o Abstract only available on pdf. Kazimi investigates the health benefits of alternative fuel vehicles.
- ? Steven Berry; James Levinsohn; Ariel Pakes. Automobile Prices in Market Equilibrium. Econometrica, Vol. 63, No. 4. (Jul., 1995), pp. 841-890. Stable URL: <http://links.jstor.org/sici?sici=0012-9682%28199507%2963%3A4%3C841%3AAPIME%3E2.0.CO%3B2-U>
 - o This paper develops techniques for empirically analyzing demand and supply in differentiated products markets and then applies these techniques to analyze equilibrium in the U.S. automobile industry. Our primary goal is to present a framework which enables one to obtain estimates of demand and cost parameters for a class of oligopolistic differentiated products markets. These estimates can be obtained using only widely available product-level and aggregate consumer-level data, and they are consistent with a structural model of equilibrium in an oligopolistic industry. When we apply the techniques developed here to the U.S. automobile market, we obtain cost and demand parameters for (essentially) all models marketed over a twenty year period.
- ? David M. Newbury. “Royal Commission Report on Transport and the Environment-- Economic Effects of Recommendations.” The Economic Journal, Vol. 105, No. 432. (Sep., 1995), pp. 1258-1272. Stable URL: <http://links.jstor.org/sici?sici=0013-0133%28199509%29105%3A432%3C1258%3ARCROTA%3E2.0.CO%3B2-5>
 - o Abstract only available on pdf. Considers how to evaluate and deal with a broader set of externalities of road traffic, including congestion and accidents in addition to pollution.
- ? **Edgar M. Hoover.** “Motor Metropolis: Some Observations on Urban Transportation in America.” The Journal of Industrial Economics, Vol. 13, No. 3. (Jun., 1965), pp. 177-192. Stable URL: <http://links.jstor.org/sici?sici=0022-1821%28196506%2913%3A3%3C177%3AMMSOOU%3E2.0.CO%3B2-3>
 - o General essay on the impacts of high car ownership in the US and urban sprawl. Really broad. May be useful for provoking questions.