Jacob P. Gramlich

Home Address:
113 Canner St. #3
New Haven, CT 06511

Office:
Department of Economics
Yale University
Box 208268
New Haven, CT 06520-8268
Fax: (203) 436-2630

Telephone: (203) 859-1385

E-mail: jacob.gramlich@yale.edu

Web page: http://pantheon.yale.edu/~jpg39/

Citizenship: USA

Fields of Concentration:
Industrial Organization
Public Finance

Desired Teaching:
Industrial Organization
Public Finance
Applied Econometrics
Environmental Economics

Comprehensive Examinations Completed:
May 2005 (Oral) Industrial Organization, Public Finance (*with distinction*)
May 2004 (Written) Microeconomic Theory, Macroeconomic Theory

Dissertation Title:
Automotive Fuel Efficiency: Gas Prices, Energy Policy, and Endogenous Product Selection in the US Auto Industry

Committee:
Professor Steven Berry
Professor Philip Haile
Professor Justine Hastings

Expected Completion Date: May 2009

Degrees:
Ph.D., Economics, Yale University (expected 2009)
M.Phil., Economics, Yale University (2006)
M.A., Economics, Yale University (2005)
B.A., Mathematics, Economics (*high distinction)*, University of Virginia (2000)

Post-Graduate Work Experience:

Research Associate, Charles River Associates Inc, Boston, MA, 2001-2003
Youth Minister, South America Mission, San Ignacio, Bolivia, 2000-2001

Fellowships, Honors and Awards:

Yale University:
Economics Departmental Prize Fellowship, 2003-2006
Graduate School of Arts and Sciences Fellowship, 2003 - 2006
Summer Fellowship, 2004 - 2006
Dissertation Fellowship, Spring 2008
University of Virginia:
Outstanding Major of the Year Award, Dept. of Economics, 2000
ΦBK (Phi Beta Kappa), 2000
William M. Hill Award and Scholarship, 1999
Echols Scholarship, 1997-2000
OΔK Leadership Award, Raven Society Inductee, Intermediate Honors

Teaching Experience – Yale University:

Teaching Award:
Raymond Powell Teaching Award, Dept. of Economics, 2006-2007
Course Completed:
Fundamentals of Teaching Quantitative Reasoning, Fall 2005
Teaching Assistant:
Game Theory, Prof. Benjamin Polak, Fall 2008
Game Theory, Prof. Benjamin Polak, Fall 2007
Introduction to Econometrics, Prof. Yuichi Kitamura, Spring 2007
Intermediate Microeconomics, Prof. Pinelopi Goldberg, Spring 2006
Introduction to Microeconomics, Profs. Dean Karlan and Fabian Lange, Fall 2005
Econometrics and Data Analysis, Prof. Donald Brow, Fall 2006 (*Grader*)

Research Assistant Experience:

Yale University, Spatial Agglomeration, Profs. Steven Berry and Patrick Bayer, Summer 2006
Yale University, Entry Models, Profs. Steven Berry and Benjamin Polak, Summer 2004

Papers:

"Gas Prices and Endogenous Product Selection in the US Auto Industry," 2008 (Job Market Paper)
"Predicting the Effects of the 2008 Gas Price Increase on Automotive Fuel Efficiency," 2008

Languages: English (native), Spanish (fluent)

References:

Professor Steven Berry
Department of Economics
Yale University
PO Box 208264
New Haven, CT 06520-8264
Phone: (203) 432-3556
Fax: (203) 432-6323
Email: steven.berry@yale.edu

Professor Philip Haile
Department of Economics
Yale University
PO Box 208264
New Haven, CT 06520-8264
Phone (203) 432-3568
Fax: (203) 432-6323
Email: philip.haile@yale.edu

Professor Justine Hastings
Department of Economics
Yale University
PO Box 208264
New Haven, CT 06520-8264
Phone: (203) 432-3714
Fax: (203) 432-6323
Email: justine.hastings@yale.edu

Professor Yuichi Kitamura (*Teaching Reference*)
Department of Economics
Yale University
PO Box 208281
New Haven, CT 06520-8281
Phone (203) 432- 3699
Fax: (203) 432-6167
Email: yuichi.kitamura@yale.edu

Dissertation Abstract

My dissertation investigates how changes in the economic and policy environment affect firms' decisions about product characteristics. In particular, I investigate the automobile industry, which has recently seen dramatic changes in both gas price and regulation. In 2008, gas prices increased 23% through August. Also in 2008, the government revised fuel efficiency regulations (CAFE standards) for the first time in over 30 years. These changes affect the fuel efficiency that auto manufacturers place in their new automobiles. The question my dissertation seeks to address is this: How do economic and policy changes affect firms' choices of fuel efficiency in their new vehicles? Will firms change fuel efficiencies, and if so, by how much? Understanding how firms choose product characteristics is important, and all the more so in the automobile industry where these characteristics are direct targets of environmental and energy policies.

I develop a model of the automobile industry which, unlike previous models, allows firms to choose the characteristics of their new vehicles. This allows me to predict changes in the product characteristics themselves. In addition to product choice, the model makes two further contributions. First, I use less restrictive and more plausible identifying assumptions than those typically used to estimate demand. Second, my model is able to estimate that consumers have a preference for fuel efficiency. Much previous work has not been able to demonstrate such a preference. The model can be used to analyze various changes in the market and policy landscape, including, but not limited to, gas price changes and gas taxes. In my paper, I use the model to predict the effects of the 2008 gas price increase. I find that firms and consumers do respond to the fuel price, and the responses are quantitatively significant.

Modeling Product Choice Firms choose product characteristics, such as fuel efficiency, to maximize profit. However, empirical models have generally assumed product characteristics to be fixed and exogenously determined. This is a limitation when, as with fuel efficiency, changes in characteristics are of direct interest. I develop a model in which gas prices are exogenous and uncertain, consumers are responsive to gas prices, and firms choose fuel efficiency in response to consumer preferences.

Firms face tradeoffs in providing fuel efficiency. To add efficiency to an automobile, something, such as weight or power, must be sacrificed. Therefore firms face a technological frontier between fuel efficiency and other quality. Changes in the gas price induce changes in firms' optimal locations along this frontier. During times of high fuel price firms have more incentive to provide efficiency; during times of low fuel prices they have more incentive to provide quality.

I model consumer demand as a nested logit with nests based on automobile class (compact car, pickup truck, etc.). In addition to class, consumers have preferences over price, fuel efficiency, and other quality. The utility of the outside good (not purchasing a new automobile) is captured by a number of macroeconomic variables.

I model firms' decisions in two stages. One year before the year of sale, firms observe gas prices, cost shocks, and demand shocks. In response they commit to product characteristics, still one year in advance to allow for a production lag. Then, in the interim year, gas prices change. Finally, in the year of sale, firms

choose prices and consumers make purchase decisions. Although firms commit to characteristics a year in advance, they may adjust their vehicle prices during the year of sale in response to new gas prices.

In my model I relax a restrictive assumption that has previously been used to estimate empirical models of demand. That assumption is that *unobservable* cost and demand shocks are orthogonal to *observable* cost and demand determinants. While this assumption does facilitate estimation, it is implausible in many applied contexts, including automobiles. I dispense with that assumption by constructing alternative estimation moments based on the timing of decisions in the auto industry (Hansen and Singleton 1982).

A further contribution of the model is that my parameter estimates indicate that consumers care about fuel efficiency. In previous work, estimates of fuel efficiency preference have been biased toward zero. The reason for this is that in automobiles, fuel efficiency is negatively correlated with other characteristics that provide utility. I avoid this bias in my model by controlling for both the cost and quality effects of fuel efficiency.

The model is estimated using data from the new US automobile market from 1971-2007. The estimation routine is Generalized Method of Moments. Moments are constructed from the timing of the model and from assumptions concerning demand and cost shocks.

The results of the estimation show a good model fit, both in terms of statistical significance and in matching various metrics such as willingness-to-pay and profit margins. Allowing for correlation between shocks and characteristics proves to have quantitative significance, as does allowing for cost and quality effects of fuel efficiency.

Counterfactuals The model can be used to predict firms' fuel efficiency responses to various counterfactual scenarios. To demonstrate this ability, I predict the effect that the 2008 23% increase in gas prices will have on firms' fuel efficiency choices in subsequent model offerings. The model is estimated on data through 2007. I then make 2008 out-of-sample predictions and compare them to 2008 year-to-date actual figures in order to check the model's predictive capacity. Finally, the model is used to estimate changes in automobile offerings for 2009 and beyond.

The model's 2008 predictions are qualitatively and quantitatively similar to 2008 actual figures. They exhibit a) a reduction in aggregate sales, and b) an increase in sales-weighted fuel efficiency. The model predicts an aggregate sales decline of 11.9%, compared to 12% actual through August. The sales-weighted fuel efficiency increase is predicted to be 27.9%, a number consistent with the large 2008 reductions in purchases of fuel-inefficient SUVs and light trucks.

For 2009 and beyond, I demonstrate that firms have incentives to raise fuel efficiency on average 21% in their new automobiles. These estimates hold constant other models' fuel efficiencies, rather than solving for the new equilibrium of fuel efficiency decisions. The new equilibrium is not guaranteed to exist, but I hope to address this issue in future work.