
Gasoline Demand with Heterogeneity in Household Responses

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Background

- Gasoline price elasticities derived for a country
- Responses could be different for different socio-economic groups
- May have important distributional issues if one elasticity used for everyone
- Not many work on modelling differences in responses

Plausible Behavioural Responses: Income Elasticities

Low income HH

- Extra income for discretionary travel
- Extra income for other goods



High income HH

- Demand satiation



Plausible Behavioural Responses: Price Elasticities

Low income HH

- More sensitive because of low income 
- Already minimize their driving 

High income HH

- Less sensitive because of high income 
- More discretionary travel, easier to cut back 

Rural HH: Lack of alternate modes 

Multi-vehicle HH: Easy to switch vehicles 

Multi-earner HH: Easy to ride share 

Data

- 1997-2002 Consumer Expenditure Survey Micro-data
- 4 quarterly observations for each HH, rotating panel
- 13251 HH, 53004 observations
- Expenditure proxies for income
- EPA reported fuel economy matched with vehicle info

Econometric Model

- Gasoline demand = $f(\text{income, price, vehicle holdings, location, other demographics, interactions})$
- Translog form: allows price and income elasticities to vary with price and income
- Price and income interacted with dummies for
 - Rural HH
 - Multiple vehicle HH
 - Multiple wage earning HH
- Random Effects Panel Data Method

Parameter Estimates

In(Price)	-4.859**
In(Income)	0.661**
In(Price) × In(Income)	0.210**
In(Income) × In(income)	-0.081**
In(Price) × In(Price)	0.264**
Rural location × In(Price)	0.250**
Rural location × In(Income)	0.024
Multicar HH × In(Price)	-0.152**
Multicar HH × In(Income)	0.100**
Multiple wage earner HH × In(Price)	-0.084**
Multiple wage earner HH × In(Income)	0.042**

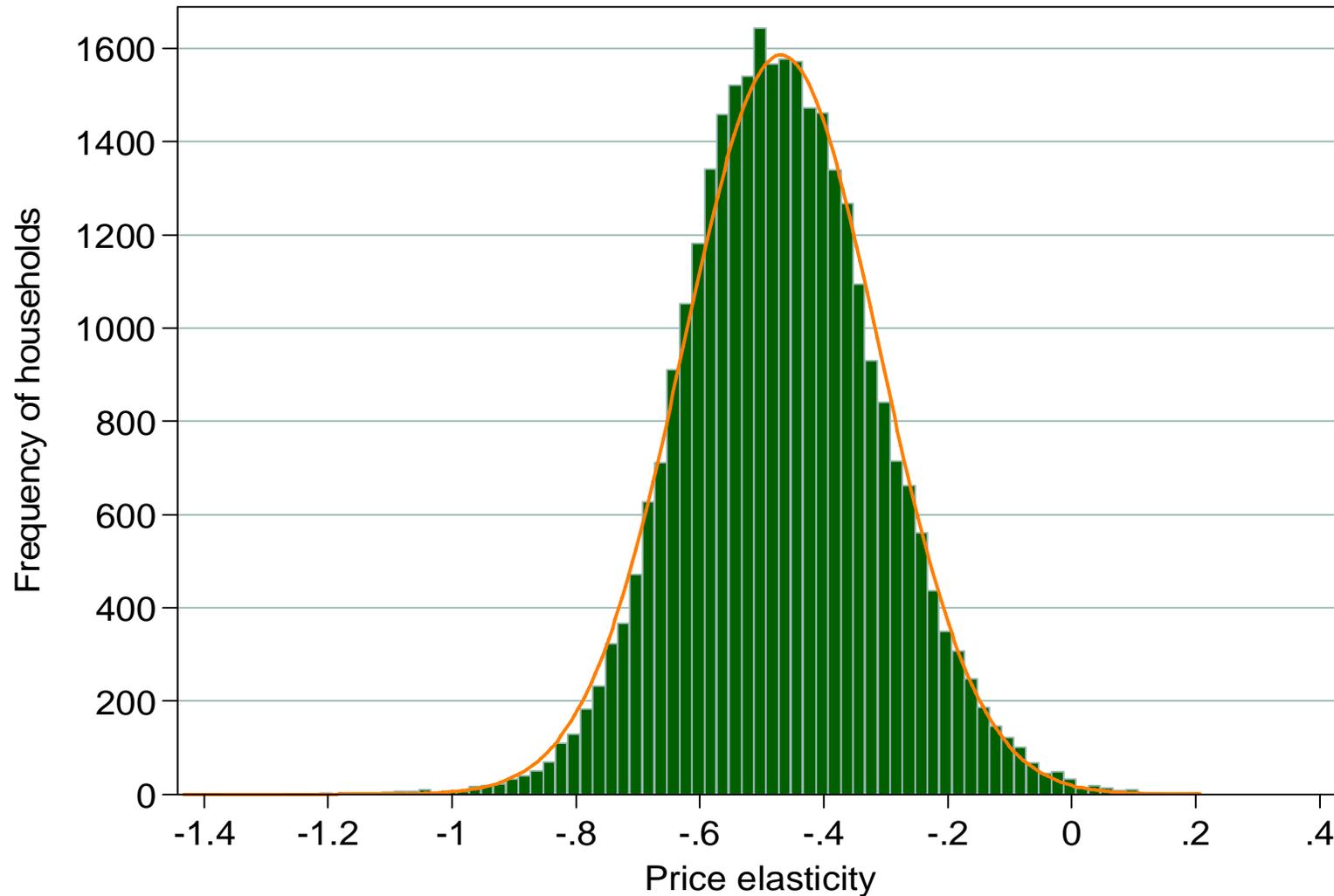
Elasticity Estimates

at national average price and income

Location	Car	Wage earners	Price elasticity	Income elasticity
Urban	Single	Single	-0.341**	0.273**
Urban	Single	Multiple	-0.425**	0.314**
Urban	Multiple	Single	-0.493**	0.373**
Urban	Multiple	Multiple	-0.577**	0.414**
Rural	Single	Single	-0.091	0.297**
Rural	Single	Multiple	-0.175**	0.338**
Rural	Multiple	Single	-0.243**	0.397**
Rural	Multiple	Multiple	-0.327**	0.438**

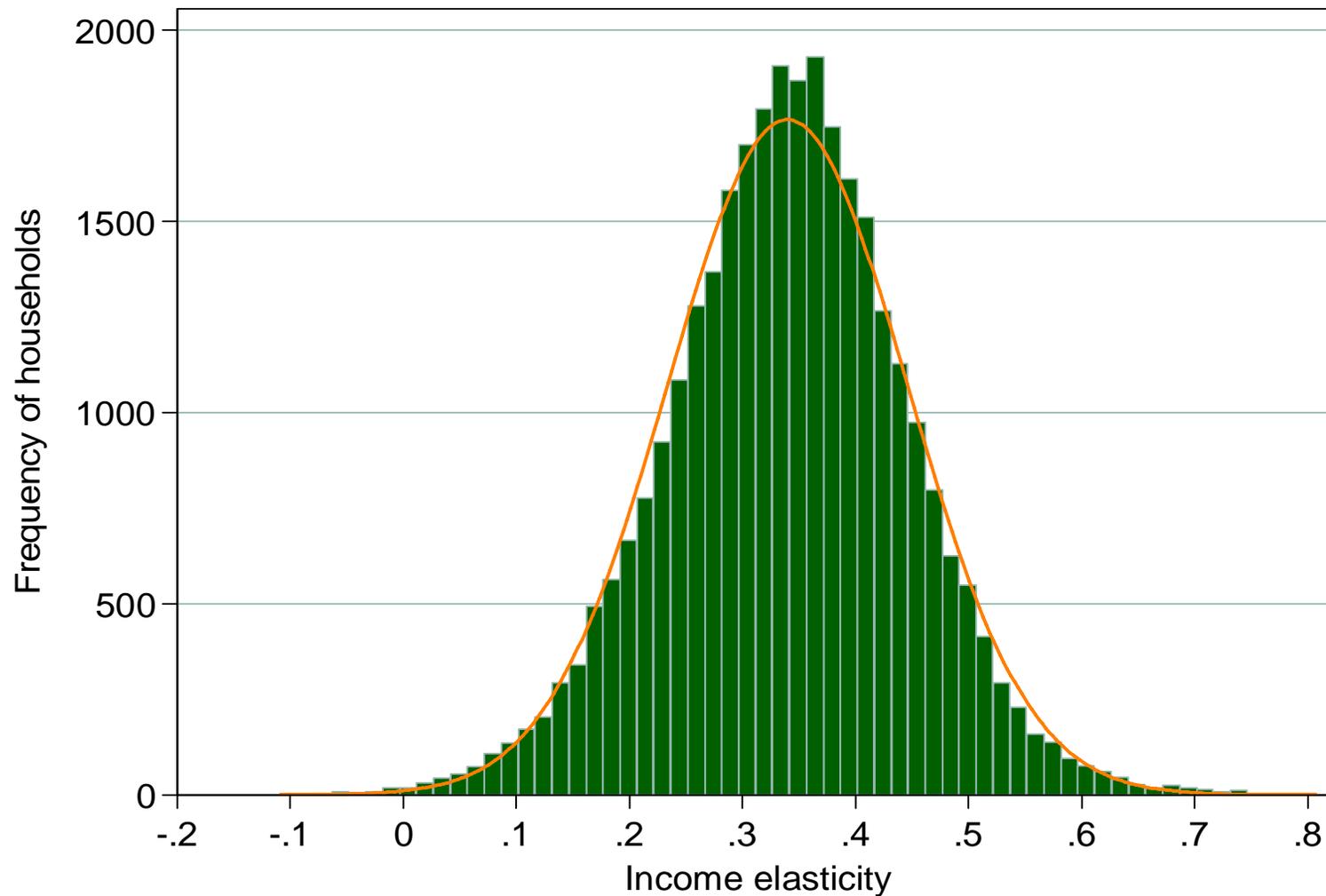
Distribution of Price Elasticities

in 2002 sample of HH



Distribution of Income Elasticities

in 2002 sample of HH



Conclusions

- Households' responses to price changes do vary with demographic characteristics, e.g. on
 - Income
 - Location
 - Vehicle ownership
 - Composition (no. of wage earners)
- Different elasticities may have important distributional and policy implications for some individual groups

Thank you

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