

# Unbiased Estimation of Tax-Price Elasticity of Charitable Giving with Survey Data

Nicky Grant & Peter Backus

University of Manchester

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# Empirical Question

- 1 Charity donations tax deductible for tax **Itemisers** in US
- 2 Price of donating \$1 function of **MTR ( $\tau$ ) (Marginal Tax Rate) & Itemisation Status)** (Whether they file their tax returns)

$$\text{Price} = \begin{cases} 1 - \tau & : \text{Itemiser} \\ 1 & : \text{Non-Itemiser} \end{cases}$$

Question: What is the elasticity of Donations w.r.t Price?

**Policy Relevance** Charitable Tax Subsidies \$134bn in US 2010 (Lowry,2014)

- Is the charity tax subsidy an Optimal Subsidy in the US?  
e.g Optimal Subsidy is 8 times larger if elasticity is -1 relative to -0.5 Saez (2004)

# Itemisation

- $E_{it}$  all other tax-deductible expenses (e.g medical costs ) (\$)
- $S_{it}$  tax-free allowance ( $\approx$  \$6000 for singles, \$12000 married couples)
- $\Delta_{it} = \max\{D_{it} + E_{it} - S_{it}, 0\}$  is **tax deductible**
- $\Delta_{it} > 0$  agent may itemise (tax-file) and tax-deduct  $\Delta_{it}$

$$\Delta_{it} > 0 \rightarrow \begin{cases} E_{it} > S_{it} & : \text{Exogenous Itemiser} \\ E_{it} \leq S_{it} & : \text{Endogenous Itemiser} \end{cases}$$

$$\Delta_{it} = 0 \quad \text{Non Itemiser}$$

# Baseline Model in Literature

$$\log(D_{it}) = \alpha_i + \beta \log P_{it} + \omega' X_{it} + e_{it}$$

$$P_{it} = 1 - I_{it}\tau_{it}$$

$$I_{it} = 1(D_{it} + E_{it} > S_{it})$$

$D_{it}$  - (Donations+1)

$S_{it}$  - (Standard Deduction+1)

$\tau_{it}$  MTR (usually on first dollar of donation)

$X_{it}$  - Vector of controls (varies depending on data variable)  
commonly **Income, Wealth, Gender, Education.**

## Puzzle in Existing Literature

*Some commentators have voiced the suspicion that, while a few sophisticated taxpayers (and their tax or financial advisors) might be sensitive to variations in tax rates, the average taxpayer is too oblivious or unresponsive to the marginal tax rate for anything like the economic model to be a realistic representation of reality. Clotfelter (2002)*

Elasticity on survey-data sig. larger than tax-filer -1.29 vs. -1.08  
[Meta-Analysis by Pelozo & Steele (2005)]

**Puzzle: Elasticity in general population (survey) larger than wealthier selected sample (tax-filer)**

# Main Contribution of Paper

**Provide strong theoretical and empirical support for downward bias including Non-Itemisers using Survey Data**

Show controlling for itemisation status in FD estimator removes this bias under simple testable restriction

Find strong and robust empirical evidence this restriction holds

Find inelastic price response in general population **Explains the empirical puzzle**

## Bias From 'Switchers': Intuition

$$\Delta \log(D_{it}) = \beta \Delta \log(P_{it}) + \omega' \Delta X_{it} + u_{it}$$

**Stop Itemiser**  $\Delta l_{it} = -1, l_{i,t-1} = 0, l_{it} = -1$

$$\Delta \log(P_{it}) = -\log(1 - \tau_{i,t-1}) > 0$$

$$\Delta \log(D_{it}) = \log(D_{it}) - \log(D_{i,t-1}) \leq \log(S_{it} + E_{it})$$

Since they don't itemise at time  $t$  and  $D_{it} \leq S_{it} + E_{it}$  by definition and  $-\log(D_{i,t-1}) \leq 0$ .

$u_{it}$  **bounded above & -ve correlated to  $\Delta \log P_{it}$**

# Theorem 1: Downward Bias From Non-Itemisers/Switchers

$$p_1 = \mathcal{P}\{\Delta I_{it} = 1\}$$

$$p_{-1} = \mathcal{P}\{\Delta I_{it} = -1\}$$

$$\xi_1 = \frac{\text{Cov}(u_{it}, \log(P_{it}) | \Delta I_{it}=1)}{\text{Var}(\log(P_{it}))}$$

$$\xi_{-1} = \frac{\text{Cov}(u_{it}, \log(P_{it}) | \Delta I_{it}=-1)}{\text{Var}(\log(P_{it}))}$$

THEOREM 1:  $\hat{\beta}_{FD} \xrightarrow{P} \beta + \underbrace{p_1 \xi_1 + p_{-1} \xi_{-1}}_{< 0}$  where  $\xi_1, \xi_{-1} < 0$

- $p_1$  (probability of Start Itemiser  $\approx 0.10$ )
- $p_{-1}$  (probability of Stop Itemiser  $\approx 0.08$ )  
 $\approx 18\%$  of sample are Switchers

## Theorem 2: Consistent Inference Controlling For Change in Itemisation Status

**Itemiser Model:**  $\Delta \log(D_{it}) = \gamma \Delta I_{it} + \beta \Delta \log(P_{it}) + \omega' \Delta X_{it} + \eta_{it}$

$$\hat{\theta}_{FD}^I = \left( \sum_{i=1}^N \sum_{t=2}^T w_{it} w_{it}' \right)^{-1} \sum_{i=1}^N \sum_{t=2}^T w_{it} \Delta \log(D_{it}) \quad (1)$$

$$w_{it} = (\Delta I_{it}, \Delta \log(P_{it}), \Delta X_{it}')' \quad \hat{\theta}_{FD}^I = (\hat{\gamma}_{FD}^I, \hat{\beta}_{FD}^I, \hat{\omega}_{FD}^I)'$$

$$\bar{\tau}_1 = E[\Delta \log(P_{it}) | \Delta I_{it} = 1] \quad \bar{\tau}_{-1} = E[\Delta \log(P_{it}) | \Delta I_{it} = -1]$$

$$C = \det(E[w_{it} w_{it}'])$$

THEOREM 2  $\hat{\beta}_{FD}^I \xrightarrow{P} \beta + \frac{p_1 p_{-1}}{C} (\bar{\tau}_1 + \bar{\tau}_{-1}) (E[\eta_{it} | \Delta I_{it} = -1] + E[\eta_{it} | \Delta I_{it} = 1])$

# Data Description

**Panel Study of Income Dynamics (PSID)** bi-annual survey of US households.

**Center on Philanthropy Panel Study (COPPS)** module containing questions on giving and volunteering

PSID covering **2000-2012 raw sample 58,993 observations**

Drop households donating  $> 50\%$  taxable income, with taxable income less than the standard deduction ( $S_{it}$ ) and households appearing only once.

Working sample of 27,152 (**5845 households appearing for an average of 5.4 years**)

# Empirical Strategy

$I_{it} = 1(E_{it} > S_{it})$  Exogenous Itemiser [Endogenous Itemisers Omitted]

$$\Delta \log(D_{it}) = \gamma \Delta I_{it} + \beta \Delta \log(P_{it}) + \theta' \Delta X_{it} + e_{it}$$

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- $\gamma = 0$  & OLS Literature
  - $\gamma = 0$  & Instrument  $\Delta \log P$  with  $\Delta \tau$  2SLS1
  - $\gamma = 0$  & Instrument  $\Delta \log P$  with  $\Delta \tau, \Delta \tau^2, \Delta \tau^3$  2SLS2
  - $\gamma \neq 0$  & OLS Itemiser Model
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**Robustness:** Non Linear Effects, Heterogenous Response (over income), Tobit , Within Group.

# Empirical Results: Main Results

Table: Main results

	(1)	(2)	(3)	(4)
	Literature model	2SLS 1	2SLS 2	Itemizer model
$\Delta \log P$	-1.306*** (0.181)	-0.902 (0.844)	-0.804 (0.812)	-0.115 (0.309)
$\Delta \text{itemizer}$				0.433*** (0.099)
Observations	19342	19342	19342	19342
$R^2$	0.019	0.015	0.015	0.020
First stage $F$ -test		0.000	0.000	
$H_0 : \beta_{\Delta \text{Logprice}} \leq -1$	0.954	0.453	0.404	0.001

$$H_0: \tau_1 = \tau_{-1} \quad (p=0.892)$$

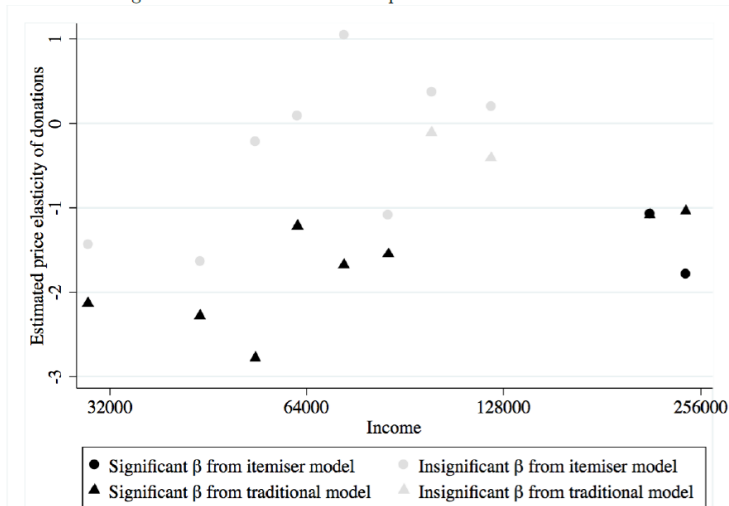
# Non-Linear Price Effects

Table 4: Non-linear effect of  $\Delta \log(P_{it})$

	(1)	(2)	(3)	(4)	(5)
	Switchers	Quadratic	$ \Delta \log P  > 0.15$	$ \Delta \log P  > 0.25$	$ \Delta \log P  > 0.36$
$\Delta \log P$	-0.046 (0.350)	-0.115 (0.309)	0.067 (0.300)	-0.050 (0.294)	-0.055 (0.290)
$\Delta \text{itemizer}$	0.404*** (0.150)	0.433*** (0.099)	0.472*** (0.092)	0.452*** (0.092)	0.451*** (0.091)
Switcher $\times$ $\Delta \log P$	-0.179 (0.606)				
$\Delta \log P^2$		0.018 (0.468)			
$\Delta \log P \times 1( \Delta \log P  > 0.15)$			-0.169 (0.128)		
$\Delta \log P \times 1( \Delta \log P  > 0.25)$				-0.054 (0.149)	
$\Delta \log P \times 1( \Delta \log P  > 0.36)$					-0.069 (0.176)
Observations	19342	19342	19342	19342	19342
$R^2$	0.020	0.020	0.018	0.017	0.017
$H_0 : \beta_{\Delta \log P} \leq -1$	0.003	0.002	0.001	0.002	0.003

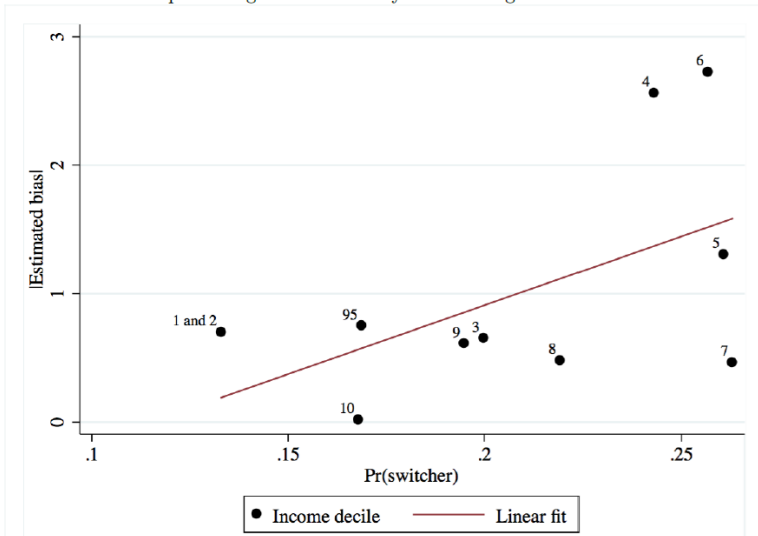
# Heterogenous Response - Income

Figure 1: Variation in estimated price elasticities over income



# Bias-Switcher Relationship over Income Decile

Figure 2: Absolute Bias plotted against Probability of Switching Itemization across Income Dec



# Conclusions

Theoretical & empirical evidence for large downwards bias in price response in Survey Data literature

Controlling for itemisation removes bias under testable restriction found to hold empirically

Yields estimator with s.e 1/3 of an IV approach

Strong evidence average price response is inelastic

Donations price elastic only in top income decile.

53% of \$134bn tax subsidy from income below top decile (\$250000)

Suggests subsidy be removed/lowered for lower income earners