Consistent Estimation of Tax-Price Elasticity of Charitable Giving with Survey Data

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Empirical Question

1. Charity donations tax deductible for tax **Itemisers** in US
2. Price of donating \$1 function of **MTR (τ)** & **Itemisation Status** (I)

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

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 Δ_{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)

τ_{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 Peloza & Steele (2005)]

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

Main Contributions of Paper

Provide theoretical and empirical support for downward bias in standard mondel including Non-Itemisers using Survey Data

Show controlling for itemisation status in FD estimator removes this bias under a 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 $\Delta I_{it} = -1, I_{i,t-1} = 0, \ I_{it} = 1$

- $\Delta \log(P_{it}) = -\log(1 - \tau_{i,t-1}) > 0$
- $\Delta \log(D_{it}) = \log(D_{it}) - \log(D_{i,t-1}) \leq \log(S_{it} + E_{it})$

Since $I_{it} = 0$ then $D_{it} \leq S_{it} + E_{it}$ by definition and $-\log(D_{i,t-1}) \leq 0$.

u_{it} bounded above & -ve correlation with $\Delta \log P_{it}$

Theorem 1: Downard Bias From Non-Itemisers/Switchers

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

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

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 ≈ 0.10)
- p_{-1} (probability of Stop Itemiser ≈ 0.08)

$\approx 18\%$ of sample are Switchers

Theorem 2: Consistent inference Controlling for ΔI_{it}

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

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

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

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

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

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 28,480 **(6325) households appearing for an average of 5.4 years)**

MTR and price construction

Actual Price: $\boxed{P_{it}^{a} = 1 - I_{it}\tau_{it}}$

Auten et al (2002) Price: $\boxed{P_{it}^{b} = 1 - \tau_{it}^{b}}$

τ_{it}^{s}: **'Synthetic' MTR** using i's tax characteristics in t, including giving set to 0, but the tax code from $t-2$.

τ_{it}^{f}: MTR applied to first dollar of giving

τ_{it}^{p}: MTR for giving set at 1% household income

τ_{it}^{b}: **'Auten MTR'** $\tau_{it}^{b} = \frac{1}{2}(\tau_{it}^{f} + \tau_{it}^{p})$

Empirical Strategy

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

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

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(1) $\gamma = 0$ & OLS Literature

(2) $\gamma = 0$ & Instrument $\Delta \log P$ with $\Delta \tau^b$ IV1

(3) $\gamma = 0$ & Instrument $\Delta \log P$ with $\Delta \tau^s$ IV2

(4) γ unrestricted & OLS when $\tau_1 = \tau_{-1}$ Itemiser Model

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Robustness: Non Linear Effects, Heterogenous Response (over income), Tobit , Within Group.

Empirical Results: Main Results

	(1)	(2)	(3)	(4)
	Standard model	IV with $\tau_{it}^{s} - \tau_{it}^{b}$	IV with $\Delta\tau_{it}^{b}$	Itemizer model
$\Delta \log P^{b}$	-1.346***	-0.263	-0.168	-0.049
	(0.192)	(2.324)	(0.658)	(0.315)
Δitemizer				0.452***
				(0.095)
Observations	19342	19342	19342	19342
R^2	0.019	0.013	0.013	0.019
First stage F-statistic		76.290	613.959	
$H_0 : \beta_{\Delta Logprice} < -1$	0.965	0.751	0.147	0.001

Notes: All standard errors are clustered (at the household level). The penultimate row test that the 2SLS-FD estimator is identified. The tests reported in the last row is the one-sided t-tests of the estimated price elasticities being elastic (≤ -1) against the alternative hypothesis that the donations are price inelastic. Stars indicate statistical significance according to the following schedule: *** 1%, ** 5% and * 10%.

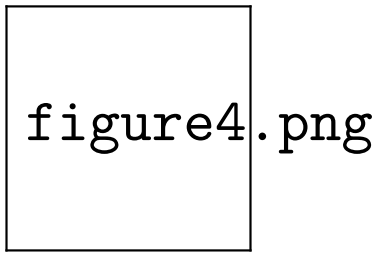
H_0: $\tau_1 = \tau_{-1}$ (p=0.892)

Non-Linear Price Effects

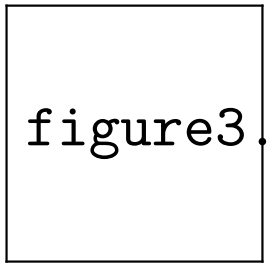
Table 4: Non-linear effect of $\Delta \log(P_{it})$

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

Heterogenous Response - Income



Bias-Switcher Relationship over Income Decile



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