More Giving or More Givers?

The Effects of Tax Incentives on Charitable Donations in the UK

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Motivation

- How should govts support the private provision of public goods?
- Sensitivity of donations (g) to changes in the price of giving relative to consumption (p) is a key element to answer this question:

$$\varepsilon_{g,p} = \frac{\partial g\left(p, y\right)}{\partial p}$$

- Many estimates from different countries – mainly the US
  - Multiple empirical approaches: diff-in-diff, IV, quantile regs
  - Focus on intensive margin, ignoring extensive-margin decision
  - "Consensus" US estimate $\varepsilon_{g,p} \approx -1$ (eg, Bakija & Heim, 2011)
  - For France, Fack & Landais (2010) obtain $\varepsilon_{g,p} \in (-0.6, -0.2)$

This Paper

- Policy change: major UK income tax reform in 2010
  - Two new tax brackets at the top: $\tau = 50\%$ ($= 60\%$ for short range)
  - Price of giving relative to consumption: $p_{it} = 1 - \tau_{it}$, as in the US
- Data: new administrative dataset of UK income tax returns
  - Universe of self-assessment taxpayers: $N = 75$ million
  - Period 2004/05 through 2012/13
- Estimation techniques:
  - Separate estimation of intensive and extensive-margin elasticities
  - New IV strategy to deal with endogenous earnings responses to reform
  - Pseudo-Poisson regressions to estimate total elasticity
  - Two-step model to account for sample selection

Contributions

- Separate estimation of intensive and extensive-margin responses
  - Infeasible in US studies because the decision to itemize is endogenous (standard deduction system)
- First UK estimates of the price elasticity of giving using admin data
  - Existing estimates from donors' aggregate data (Khanna et al 1995) or lab experiments (Scharf and Smith 2014)
  - Relevant for public policy debate in the UK: charities' annual income approx. £60 billion
- New theoretical framework to derive policy implications of the price elasticity
  - Beyond the simple "unit-elasticity" rule

Institutional Context: Gift Aid

1. **Match**: charity collects donations from individual donors and HM Revenue and Customs (HMRC) matches those at the basic marginal income tax rate (τ_b):

$$P_b = 1 - \tau_b$$

2. **Rebate**: higher-rate taxpayers filing a 'self-assessment' return can also claim deduction on the difference between higher and basic marginal tax rates ($\tau_h - \tau_b$):

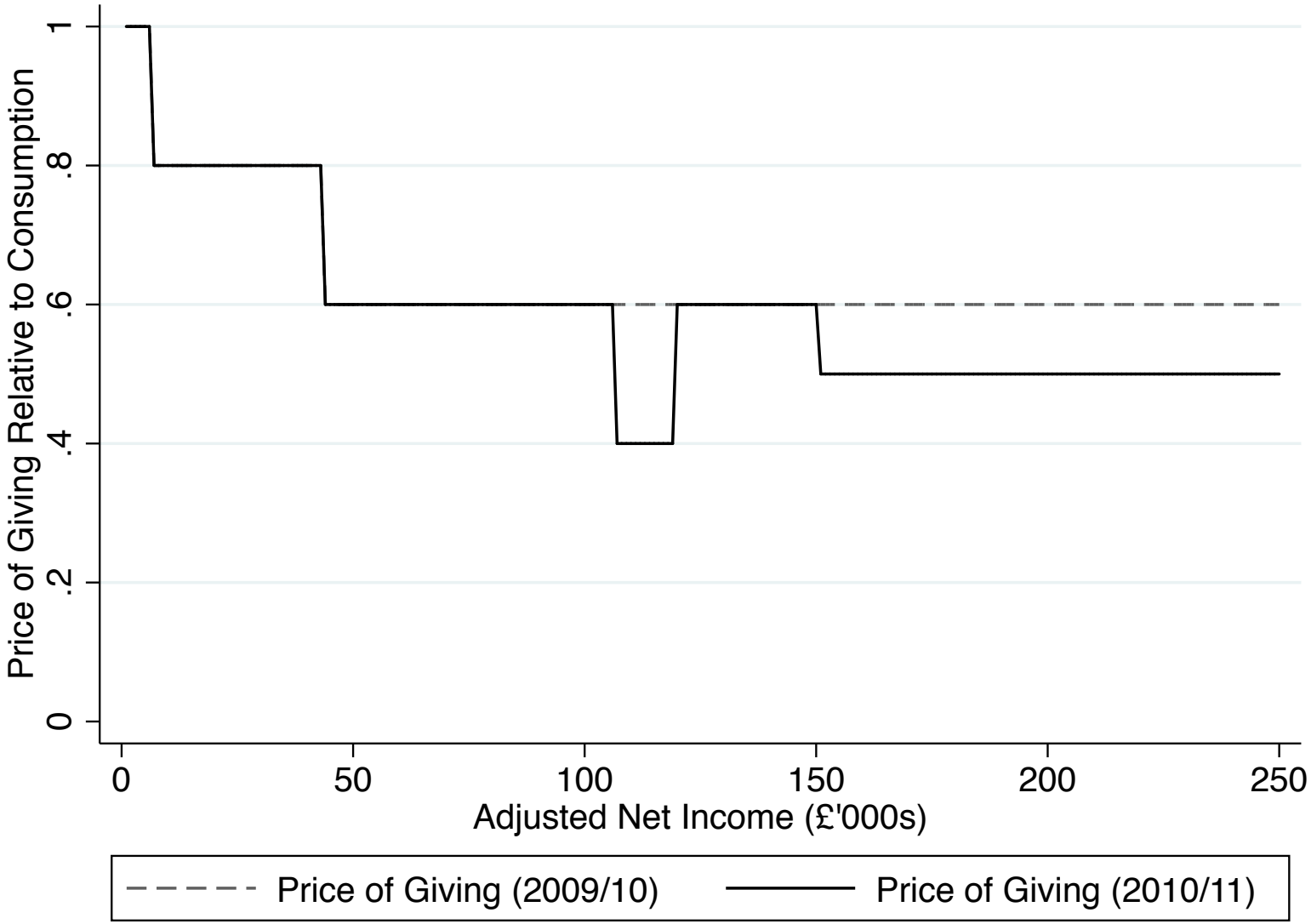
$$P_h = 1 - \tau_h$$

- In sum, Gift Aid incentives are economically equivalent to the US-style deduction system

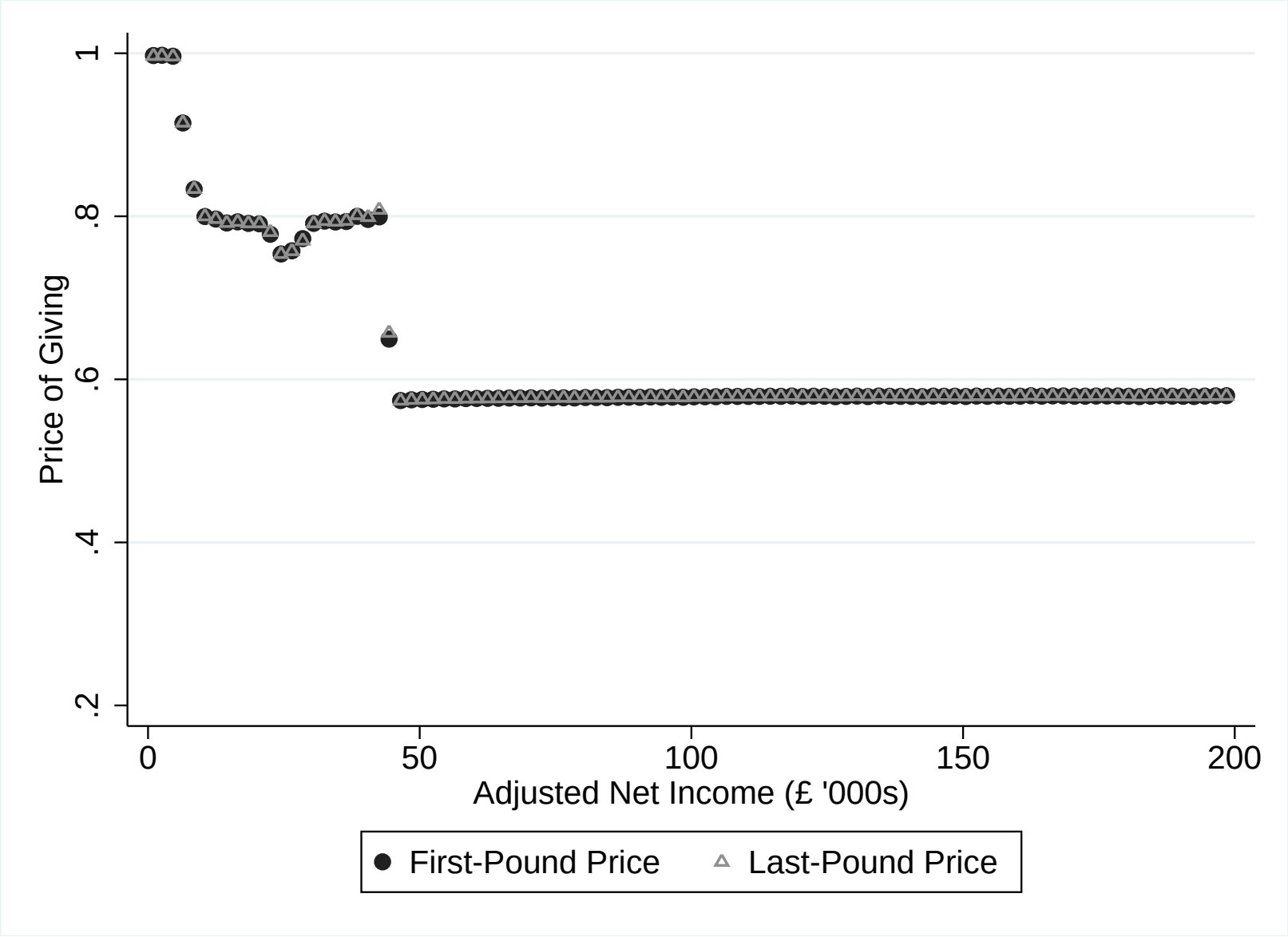
Gift Aid: Example

- A basic rate taxpayer makes a £100 donation to charity out of after-tax income:
  - Charity claims additional £25 from HMRC ($\tau_b = 20\%$)
  - Gross donation (D): £125 $\left(= 100 \times \frac{1}{1-\tau_b}\right)$
- A higher-rate taxpayer makes a £100 donation to charity out of after-tax income
  - Charity claims additional £25 from HMRC
  - Gross donation (D): £125
  - Taxpayer deducts £25 from income tax ($\tau_h = 40\%$)
  - Net donation: £75

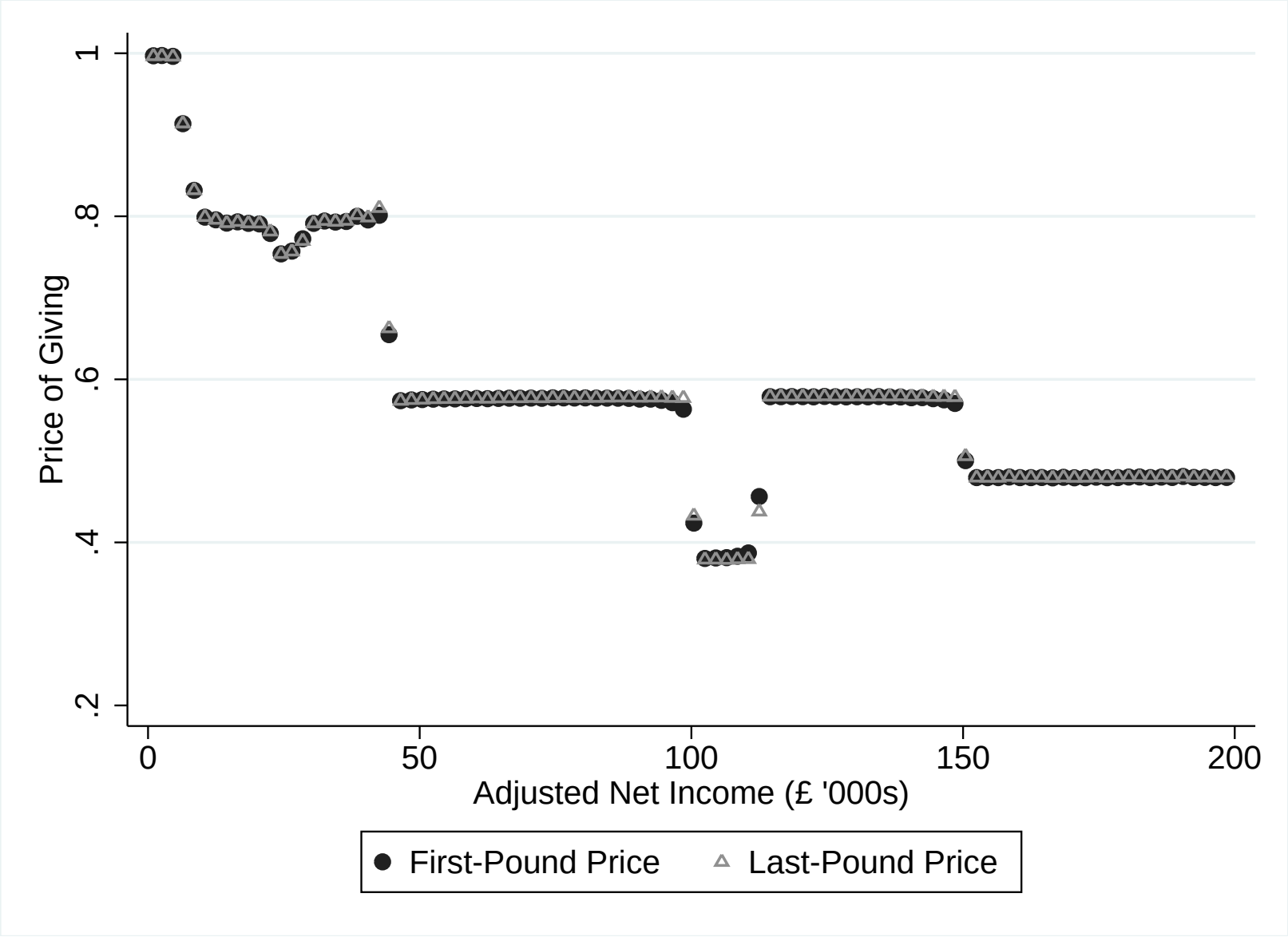
UK income tax reform of 2010



Tax-Price of Giving in the Data (2009/10)



Tax-Price of Giving in the Data (2010/11)

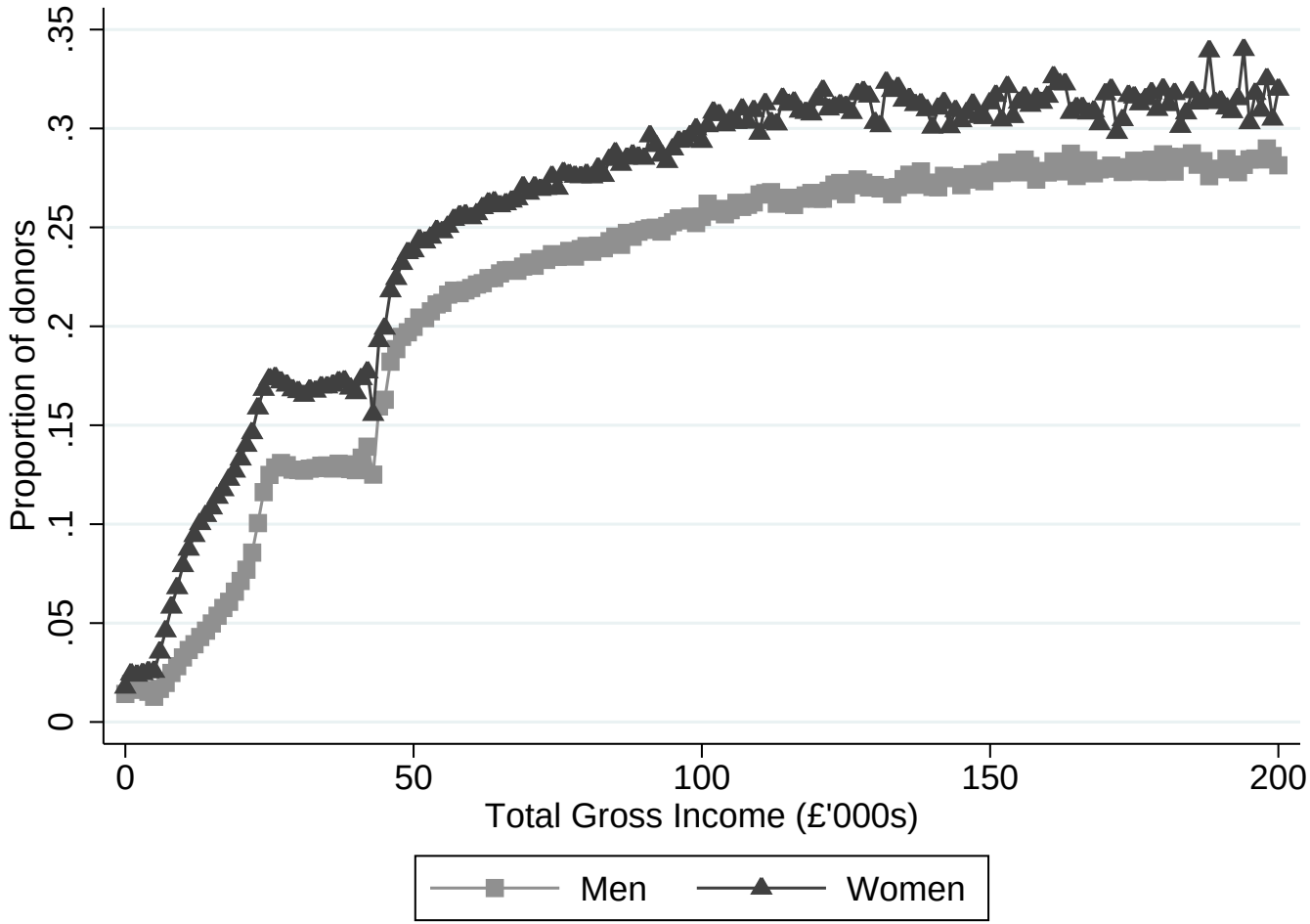


Data

- New panel of administrative data obtained from HMRC
- Full population of Self-Assessment (SA) Income Tax returns for the period 2004/05 through 2012/13
  - Approximately 8-9 million returns *per year*: N = 75 million
  - Does not include about 22 million taxpayers who do not file a tax return (Pay As You Earn system)
  - Low attrition rate: results for balanced panel similar to full sample
- Only 11% of taxpayers report positive donations
  - Corner solution issue (aka "censoring")
  - Potential sample selection bias if giving decision is correlated with sensitivity to price changes

Data descriptives

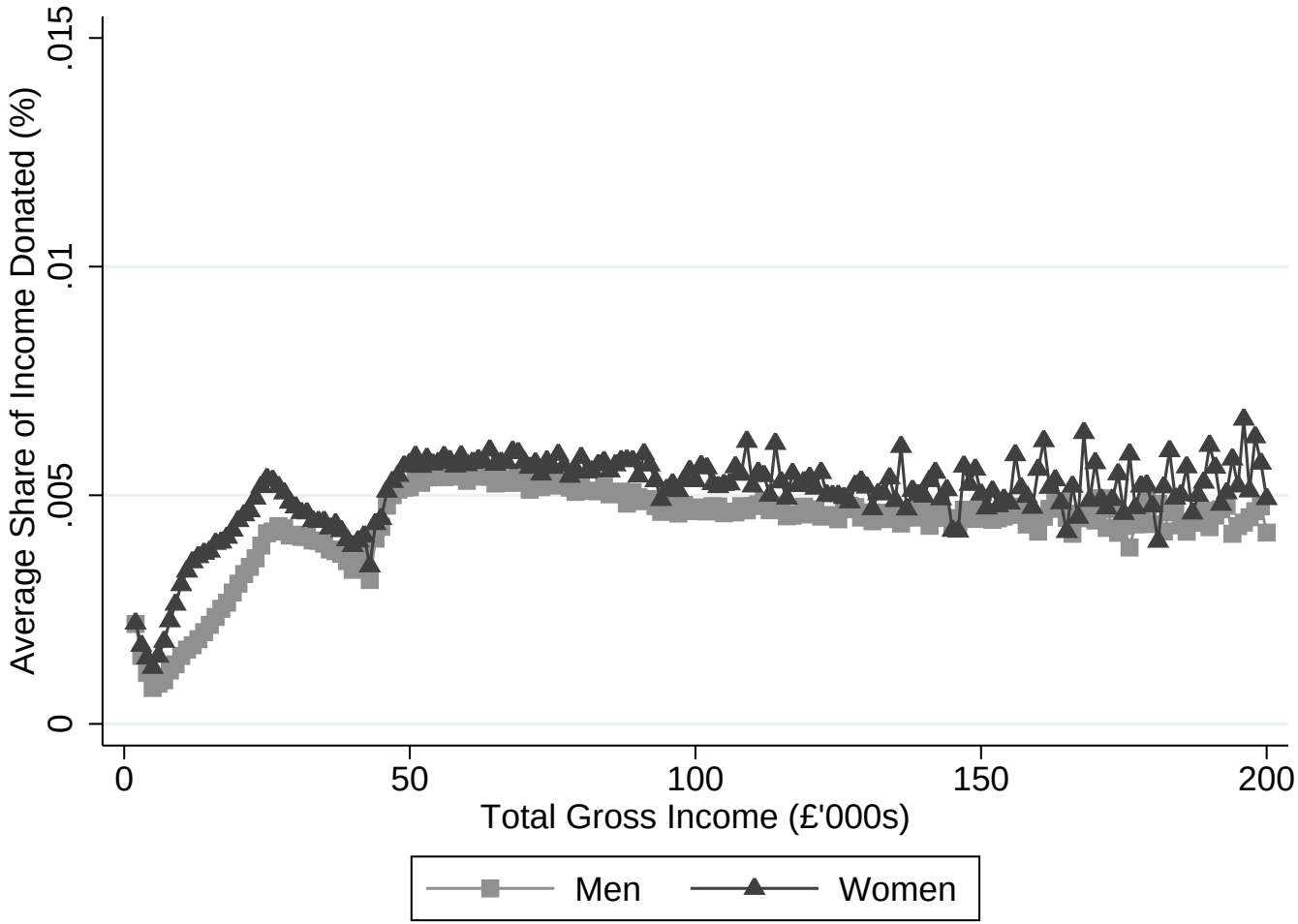
Figure: Fraction of Donors by Income and Gender



Note: Calculations derived from HMRC's administrative data sources

Data descriptives

Figure: Share of Income Donated, by Income and Gender



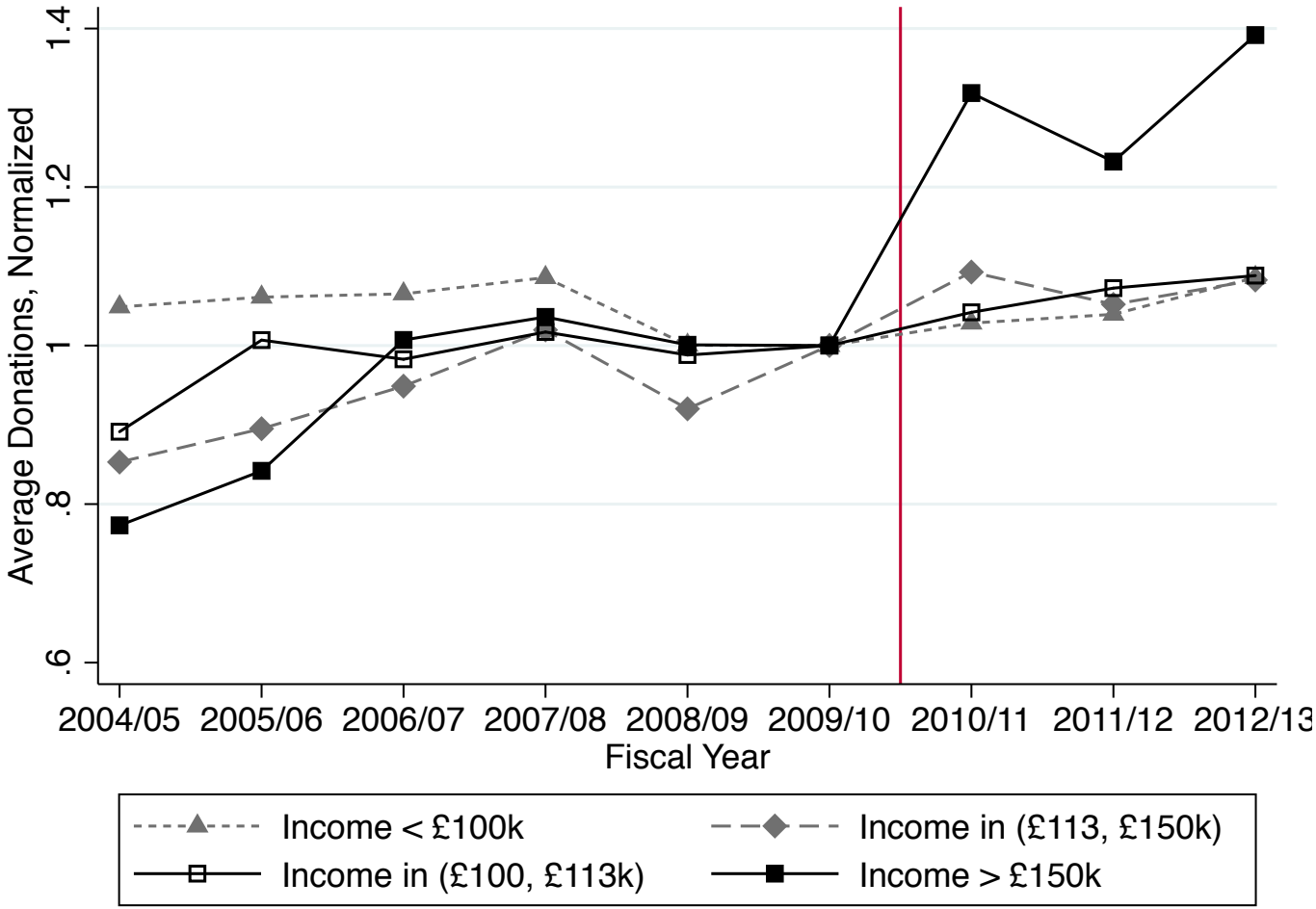
Nore: Calculations derived from HMRC's administrative data sources

"Treatment" and "Control" Groups

- Two control groups:
  - Control 1 (C1): $Y_{it} < 100k$
  - Control 2 (C2): $Y_{it} \in (113k, 150k)$
- Two treatment groups:
  - Treatment 1 (T1): $Y_{it} \in (100k, 113k)$
  - Treatment 2 (T2): $Y_{it} > 150k$
- Identification challenges:
  - Pre-reform trends $\Rightarrow$ Graphical analysis
  - Aggregate shocks, e.g. financial crisis $\Rightarrow$ Year fixed effects
  - Time-invariant individual characteristics, e.g. generosity $\Rightarrow$ Individual fixed effects
  - Time-variant individual characteristics, e.g. income $\Rightarrow$ Controls in regression framework

Graphical Diff-in-diff Analysis

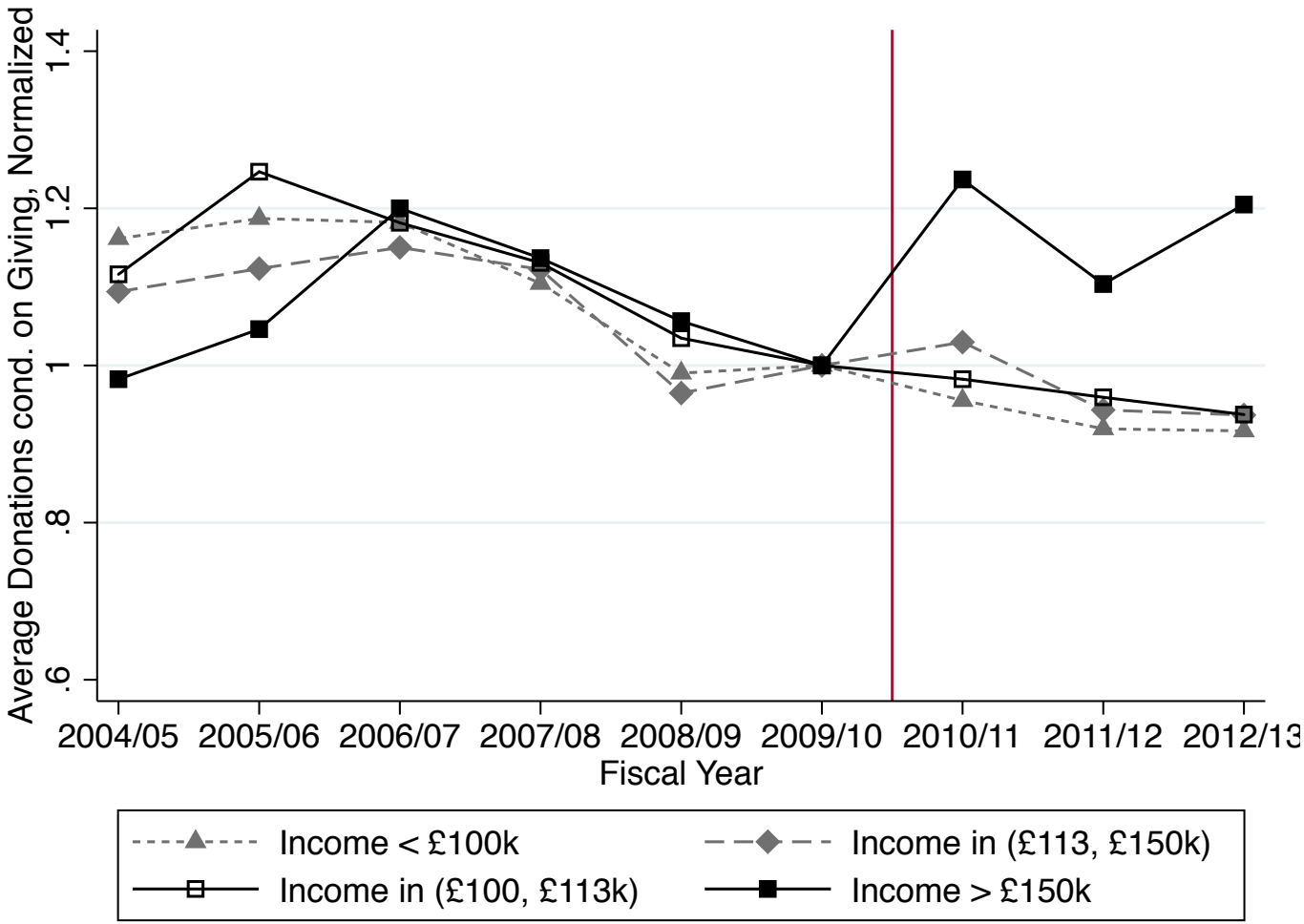
Figure: Normalized Average Donations by Income Group



Note: Calculations derived from HMRC's administrative data sources

Graphical Diff-in-diff Analysis

Figure: Normalized Donations, conditional on Giving



Note: Calculations derived from HMRC's administrative data sources

Regression Analysis

1. Baseline: panel regressions with fixed effects
   - Intensive-margin and extensive-margin elasticities: $\varepsilon_{int}, \varepsilon_{ext}$
   - OLS and IV estimation (first-pound price)
2. Differenced regressions with additional IV for Price
   - Intensive-margin elasticity (ε_{int})
   - Avoid price endogeneity problems present in earlier papers, due to income responses to tax changes
3. Poisson and negative binomial regressions with fixed effects
   - Estimate total elasticity: $\varepsilon_{total} = \varepsilon_{int} + \varepsilon_{ext}$
   - Allow for zeros in the outcome variable

Baseline Regression Framework

- **Intensive margin**: main regression equation

$$\ln g_{it} = \varepsilon_{INT} \ln p_{it} + \eta_{INT} \ln y_{it} + \delta X_{it} + \alpha_i + \alpha_t + u_{it} \quad (1)$$

  - Estimated by OLS or IV only on donors ($g_{it} > 0$)
  - α_i, α_t denote individual and year fixed effects
  - X_{it} includes age (squared), tax advisor dummy

- **Extensive-margin**: main regression equation

$$D_{it} = \beta \ln p_{it} + \gamma \ln y_{it} + \delta X_{it} + \alpha_i + \alpha_t + v_{it} \quad (2)$$

  - Estimated via linear probability model (LPM) on all observations (donors and non-donors, $g_{it} \geq 0$)

Issue #1: Price is Endogenous

- Endogeneity of OLS estimation:
  - Mechanically, $\text{corr}(p_{it}, g_{it}) > 0$, bc large donations can shift taxpayer to a lower tax bracket, increasing the price of giving ($p_{it} = 1 - \tau_{it}$)
  - Upward bias in OLS estimates of ε_{int}
- Standard IV strategy: "First-pound" price of giving
  - Price of giving the taxpayer would face if she made zero donations

$$p_{it}^{f} = 1 - \tau\left(y_{it} | g_{it} = 0\right)$$

- To deal with correlation between giving and income by controling for $\ln y_{it}$:= disposable income, setting $g_{it} = 0$

Intensive Margin: OLS Regressions (Last-pound price, p)

	Dependent Variable: Log Donations ($\ln g_{it}$)			
	(1)	(2)	(3)	(4)
Log Price of Giving	0.055***	0.003	-0.016***	0.016***
	(0.004)	(0.004)	(0.004)	(0.004)
Log Disposable Income	0.169***	0.156***	0.154***	0.157***
	(0.001)	(0.001)	(0.001)	(0.001)
Individual FE	y	y	y	y
Year FE	n	y	n	y
Other controls	n	n	y	y
Observations	8,275,307	8,275,307	8,240,273	8,240,273
R-squared	0.012	0.043	0.039	0.043
Unique IDs	2,095,064	2,095,064	2,082,159	2,082,159

Note: standard errors in parentheses, clustered at the individual level.

Intensive Margin: IV Regressions ($IV = p^f$)

	Dependent Variable: Log Donations ($\ln g_{it}$)			
	(1)	(2)	(3)	(4)
Log Price of Giving	-0.328***	-0.359***	-0.383***	-0.345***
	(0.004)	(0.004)	(0.004)	(0.004)
Log Disposable Income	0.130***	0.118***	0.116***	0.119***
	(0.001)	(0.001)	(0.001)	(0.001)
Individual FE	y	y	y	y
Year FE	n	y	n	y
Other controls	n	n	y	y
Observations	7,652,940	7,652,940	7,624,586	7,624,586
R-squared	0.009	0.040	0.036	0.041
Unique IDs	1,472,697	1,472,697	1,466,472	1,466,472

Note: standard errors in parentheses, clustered at the individual level.

Extensive Margin: LPM (Last-pound price, p)

	Dependent Variable: Donor Dummy, $D_{it} \equiv (g_{it} > 0)$			
	(1)	(2)	(3)	(4)
Log Price of Giving	-0.030***	-0.059***	-0.059***	-0.060***
	(0.000)	(0.000)	(0.000)	(0.000)
Log Disposable Income	0.010***	0.006***	0.007***	0.007***
	(0.000)	(0.000)	(0.000)	(0.000)
Implied Price Elasticity, ε_{EXT}	-0.267***	-0.527***	-0.518***	-0.521***
	(0.002)	(0.002)	(0.002)	(0.002)
Implied Income Elasticity, η_{EXT}	0.085***	0.057***	0.060***	0.057***
	(0.000)	(0.000)	(0.000)	(0.000)
Individual FE	y	y	y	y
Year FE	n	y	n	y
Other controls	n	n	y	y
Observations	73,319,687	73,319,687	71,850,001	71,850,001
Unique IDs	14,149,861	14,149,861	13,700,463	13,700,463
R-squared	0.0548	0.0408	0.0500	0.00979

Note: standard errors in parentheses, clustered at the individual level.

Extensive Margin: LPM ($IV = p^f$)

	Dependent Variable: Donor Dummy, $D_{it} \equiv (g_{it} > 0)$			
	(1)	(2)	(3)	(4)
Log Price of Giving	-0.060***	-0.090***	-0.090***	-0.091***
	(0.000)	(0.000)	(0.000)	(0.000)
Log Disposable Income	0.007***	0.004***	0.005***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Implied Price Elasticity, ε_{EXT}	-0.533***	-0.801***	-0.789***	-0.794***
	(0.002)	(0.002)	(0.002)	(0.002)
Implied Income Elasticity, η_{EXT}	0.065***	0.036***	0.039***	0.036***
	(0.000)	(0.000)	(0.000)	(0.000)
Individual FE	y	y	y	y
Year FE	n	y	n	y
Other controls	n	n	y	y
Observations	73,319,687	73,319,687	71,850,001	71,850,001
Unique IDs	14,149,861	14,149,861	13,700,463	13,700,463
R-squared	0.055	0.041	0.050	0.010

Note: standard errors in parentheses, clustered at the individual level.

Issue #2: Earnings Response to Tax Reform

- The tax-price p_{it}^f depends on post-reform earnings (z_{it})
  - Controling for $\ln y_{it}$ only solves the problem if the relationship is log-linear (unlikely)
- Proposed solution: use lagged value of earnings to construct price IV (similar to Gruber & Saez, 2002). Taking first differences, we use

$$\ln\left(\frac{p_{it}^f(z_{i,t-k})}{p_{i,t-k}^f(z_{i,t-k})}\right) \tag{3}$$

as an instrument for the log change in the first-pound price,

$$\ln\left(\frac{p_{it}^f(z_{i,t})}{p_{i,t-k}^f(z_{i,t-k})}\right) \tag{4}$$

Intensive Margin: Differenced Regressions ($k = 1$)

	Dep. Var.: Log change in Donations, $\ln(g_{it}/g_{i,t-k})$			
	(1)	(2)	(3)	(4)
First Difference ($k = 1$)				
Log change in First-Pound Price	-0.149***	-0.139***	-0.188***	-0.176***
	(0.010)	(0.010)	(0.009)	(0.009)
Log change in Disposable Income			0.080***	0.081***
			(0.001)	(0.001)
Observations	5,216,321	5,198,174	5,204,515	5,186,411
R-squared R-squared	0.002	0.003	0.006	0.006
Individual FE	y	y	y	y
Year FE	y	y	y	y
Other controls	n	y	n	y

Note: standard errors in parentheses, clustered at the individual level.

Intensive Margin: Differenced Regressions ($k = 2$)

	Dep. Var.: Log change in Donations, $\ln(g_{it}/g_{i,t-k})$			
	(1)	(2)	(3)	(4)
Second Difference ($k = 2$)				
Log change in First-Pound Price	-0.150***	-0.132***	-0.232***	-0.213***
	(0.011)	(0.011)	(0.010)	(0.010)
Log change in Disposable Income			0.109***	0.111***
			(0.002)	(0.002)
Observations	3,463,375	3,451,745	3,456,133	3,444,530
R-squared	0.003	0.004	0.010	0.012
Individual FE	y	y	y	y
Year FE	y	y	y	y
Other controls	n	y	n	y

Note: standard errors in parentheses, clustered at the individual level.

Intensive Margin: Differenced Regressions ($k = 3$)

	Dep. Var.: Log change in Donations, $\ln(g_{it}/g_{i,t-k})$			
	(1)	(2)	(3)	(4)
Third Difference ($k = 3$)				
Log change in First-Pound Price	-0.205***	-0.176***	-0.378***	-0.355***
	(0.015)	(0.016)	(0.013)	(0.013)
Log change in Disposable Income			0.114***	0.116***
			(0.002)	(0.002)
Observations	1,955,897	1,949,354	1,951,991	1,945,460
R-squared	0.006	0.007	0.014	0.016
Individual FE	y	y	y	y
Year FE	y	y	y	y
Other controls	n	y	n	y

Note: standard errors in parentheses, clustered at the individual level.

Issue #3: Censoring

- Almost 90% of taxpayers report $g_{it} = 0$
- Could bias our estimated intensive-margin elasticity if decision to donate correlated with donated amount
- Two alternative approaches:
  - Two-step selection model à la Heckman (1979) to estimate ε_{int}
    - Results very similar to differenced model
  - Poisson or Negative binomial regressions to estimate the total elasticity ($\varepsilon_{total} = \varepsilon_{int} + \varepsilon_{ext}$)

Intensive Margin: Two-Step Selection Model

Inverse Mills Ratio (IMR):	Pooled One effect (1)	Pooled Diff effects (2)	Annual One effect (3)	Annual Diff effects (4)
Price Elasticity of Giving	-0.236***	-0.239***	-0.201***	-0.164***
	(0.006)	(0.006)	(0.006)	(0.009)
Income Elasticity of Giving	0.139***	0.138***	0.138***	0.136***
	(0.002)	(0.002)	(0.002)	(0.002)
P-value on IMR terms	0.000	0.000	0.000	0.000
Observations	5,014,687	5,014,687	5,014,687	5,014,687
R-squared	0.102	0.102	0.100	0.100

Note: robust standard errors in parentheses.

Total Elasticity: Poisson-type Regressions

- Increasingly popular way to model outcomes with a large share of zeros, esp. in trade literature (Santos-Silva & Tenreyro, 2006)
- Allows for linear fixed effects – no incidental parameters problem
- Estimation equation:

$$g_{it} = exp\left(\varepsilon \ln p_{it} + \eta \ln y_{it} + \alpha_i + \alpha_t + \delta X_{it}\right) + u_{it} \tag{5}$$

  - where ε can be interpreted as the total price elasticity

Total Elasticity: Poisson Regressions

	Dependent Variable: Donations in Levels (g_{it})			
	(1)	(2)	(3)	(4)
Log First-Pound Price	-1.670***	-1.603***	-1.018***	-0.947***
	(0.088)	(0.088)	(0.090)	(0.091)
Log Disposable Income			0.564***	0.561***
			(0.063)	(0.036)
Individual FE	y	y	y	y
Year FE	y	y	y	y
Other controls	n	y	n	y
Observations	13,645,910	13,585,847	13,645,910	13,585,847
Unique IDs	1,963,164	1,953,903	1,963,164	1,953,903

Note: standard errors in parentheses, clustered at the individual level.

Total Elasticity: Negative Binomial Regressions

	Dependent Variable: Donations in Levels (g_{it})			
	(1)	(2)	(3)	(4)
Log First-pound Price	-1.573***	-1.798***	-1.080***	-1.161***
	(0.004)	(0.005)	(0.006)	(0.006)
Log Disposable Income			0.121***	0.167***
			(0.001)	(0.001)
Individual FE	y	y	y	y
Year FE	y	y	y	y
Other controls	n	y	n	y
Observations	13,645,910	13,585,847	13,645,910	13,585,847
Unique IDs	1,963,164	1,953,903	1,963,164	1,953,903

Note: standard errors in parentheses, clustered at the individual level.

Heterogeneous Elasticities

- One interesting question is whether the elasticities vary by income level (or age, gender)
- We construct income groups based on *average* income during the period 2005-2012
- Results:
  - ε_{int} larger (in abs. value) for high-income taxpayers
  - ε_{ext} larger for low-income taxpayers
  - $\varepsilon_{total} \approx -0.8$ for high-income and $\varepsilon_{total} \approx -1.6$ for low-income

Heterogeneous Elasticities by Income: Intensive Margin

	Dependent Variable: Log change in Donations, $\ln(g_{it}/g_{i,t-k})$				
Income group	$p0-p25$	$p25-p50$	$p50-p75$	$p75-p95$	$p95-p100$
	(1)	(2)	(3)	(4)	(5)
Log change in First-Pound Price	0.089	-0.048	-0.055**	-0.098***	-0.220***
	(0.065)	(0.043)	(0.025)	(0.013)	(0.028)
Log change in Disposable Income	0.045***	0.077***	0.088***	0.100***	0.114***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Individual FE	y	y	y	y	y
Year FE	y	y	y	y	y
Other controls	y	y	y	y	y
Observations	100,089	526,510	1,483,141	2,167,162	909,509
R-squared	0.005	0.007	0.006	0.007	0.007

Note: standard errors in parentheses, clustered at the individual level.

Heterogeneous Elasticities by Income: Extensive Margin

	Dependent Variable: Donor Dummy $I(g_{it} > 0)$				
	$p0 - p25$	$p25 - p50$	$p50 - p75$	$p75 - p95$	$p95 - p100$
	(1)	(2)	(3)	(4)	(5)
Implied Price Elasticity, ε_{EXT}	-1.583***	-0.998***	-0.455***	-0.270***	-0.170***
	(0.018)	(0.010)	(0.005)	(0.002)	(0.004)
Implied Income Elasticity, η_{EXT}	0.091***	0.092***	0.079***	0.075***	0.076***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Individual FE	y	y	y	y	y
Year FE	y	y	y	y	y
Other controls	y	y	y	y	y
Observations	13,772,160	18,005,842	19,684,814	15,780,001	4,607,184
Unique IDs	3,385,342	3,422,862	3,434,745	2,757,835	699,679
R-squared	0.002	0.006	0.010	0.022	0.037

Note: standard errors in parentheses, clustered at the individual level.

Heterogeneous Elasticities by Income: Total Elasticity

	Dependent Variable: Log Donations ($\ln g_{it}$)				
	$p0-p25$	$p25-p50$	$p50-p75$	$p75-p95$	$p95-p100$
Negative Binomial	(1)	(2)	(3)	(4)	(5)
Log Price of Giving	-1.852***	-1.624***	-0.719***	-0.736***	-0.745***
	(0.027)	(0.022)	(0.013)	(0.009)	(0.011)
Log Disposable Income	0.085***	0.243***	0.295***	0.252***	0.076***
	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)
Poisson					
Log Price of Giving	-2.216***	-1.120***	-0.514***	-0.413***	-1.208***
	(0.099)	(0.053)	(0.042)	(0.024)	(0.173)
Log Disposable Income	0.164***	0.413***	0.437***	0.531***	0.582***
	(0.016)	(0.018)	(0.023)	(0.016)	(0.044)
Individual FE	y	y	y	y	y
Year FE	y	y	y	y	y
Other controls	y	y	y	y	y
Observations	754,910	1,970,915	3,847,126	4,932,990	2,079,906
Unique IDs	125,025	296,276	561,094	695,029	276,479

Note: standard errors in parentheses, clustered at the individual level.

Heterog. Elasticities by Gender & Age: Intensive Margin

	Dep. Var.: Change in Log Donations, $\ln g_{it} / \ln g_{i,t-k}$				
	Men	Women	Age < 40	Age $40 - 65$	Age > 65
	(1)	(2)	(3)	(4)	(5)
Log change in First-Pound Price	-0.192***	-0.140***	-0.204***	-0.226***	-0.118***
	(0.011)	(0.017)	(0.033)	(0.013)	(0.014)
Log change in Disposable Income	0.082***	0.081***	0.082***	0.072***	0.104***
	(0.002)	(0.002)	(0.004)	(0.002)	(0.004)
Individual FE	y	y	y	y	y
Year FE	y	y	y	y	y
Other controls	y	y	y	y	y
Observations	3,358,795	1,827,616	588,690	2,711,995	1,885,726
R-squared	0.007	0.006	0.010	0.006	0.006

Note: standard errors in parentheses, clustered at the individual level.

Heterog. Elasticities by Gender & Age: Extensive Margin

	Dependent Variable: Donor Dummy I($g_{it} > 0$)				
	Men	Women	Age < 40	Age $40 - 65$	Age > 65
	(1)	(2)	(3)	(4)	(5)
Implied Price Elasticity, ε_{EXT}	-0.653***	-0.724***	-1.273***	-0.625***	-0.263***
	(0.002)	(0.004)	(0.007)	(0.003)	(0.004)
Implied Income Elasticity, η_{EXT}	0.041***	0.046***	0.078***	0.046***	0.071***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Individual FE	y	y	y	y	y
Year FE	y	y	y	y	y
Other controls	y	y	y	y	y
Observations	47,406,495	24,443,506	20,581,542	39,550,708	11,717,751
Unique IDs	8,905,195	4,795,268	5,789,633	8,003,184	2,467,174
R-squared	0.011	0.014	0.014	0.011	0.007

Note: standard errors in parentheses, clustered at the individual level.

Heterog. Elasticities by Gender & Age: Total Elasticity

	Dependent Variable: Log Donations ($\ln g_{it}$)				
	Men	Women	Age < 40	Age $40 - 65$	Age > 65
Negative Binomial	(1)	(2)	(3)	(4)	(5)
Log Price of Giving	-1.070***	-0.879***	-1.101***	-0.959***	-0.891***
	(0.006)	(0.010)	(0.012)	(0.009)	(0.006)
Log Disposable Income	0.153***	0.250***	0.157***	0.179***	0.123***
	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)
Poisson					
Log Price of Giving	-1.036***	-0.356***	-1.324***	-0.867***	-0.900***
	(0.115)	(0.118)	(0.320)	(0.102)	(0.195)
Log Disposable Income	0.540***	0.634***	0.601***	0.536***	0.531***
	(0.039)	(0.072)	(0.108)	(0.040)	(0.140)
Individual FE	y	y	y	y	y
Year FE	y	y	y	y	y
Other controls	y	y	y	y	y
Observations	8,497,798	5,088,049	2,307,553	7,068,175	3,462,729
Unique IDs	1,201,588	752,315	446,348	1,113,730	560,224

Note: standard errors in parentheses, clustered at the individual level.

Summary of Elasticity Estimates

- Panel fixed-effects (OLS/IV):
  - Intensive-margin price elasticity: $\varepsilon^{int} \in (-0.23, -0.17)$
  - Extensive-margin price elasticity: $\varepsilon^{ext} \in (-0.81, -0.78)$
  - Total price elasticity $(\varepsilon_{ext} + \varepsilon_{int}) \approx -1$
    - With some heterogeneity across income levels
- Total price elasticity (Poisson/Negative Binomial):
  - Total price elasticity: $\varepsilon \in (-1.16, -0.94)$
  - Consistent with int+ext margin estimates

Interpretation of Results: Optimal Subsidy?

- Traditionally, focus on the "unit-elasticity" rule:
  - If $|\varepsilon| > 1$, increase the subsidy
  - If $|\varepsilon| < 1$, decrease the subsidy
- This criterion assumes away:
  - Individual's utilities
  - Crowding-out of private donations if there is public contribution
  - (Positive) external effects of donations

Unit-Elasticity Rule: "Treasury Efficiency"

Define the net benefit (B) of a subsidy to charitable donations as:

$$B = (1 - s)\, DN$$

where $D =$ *per capita* donation, $N =$ number of donors, $s =$ subsidy
The subsidy is "treasury efficient" (assuming no crowding in/out) if:

$$\frac{\partial B}{\partial s} = -DN + \left(\frac{\partial D}{\partial s} N + \frac{\partial N}{\partial s} D \right) (1 - s) > 0$$

$$\left(\frac{\partial D}{\partial (1 - s)} \frac{(1 - s)}{D} + \frac{\partial N}{\partial (1 - s)} \frac{(1 - s)}{N} \right) < -1$$

$$(\varepsilon_{int} + \varepsilon_{ext}) < -1$$

Optimal Subsidy: Theoretical Framework

- We extend Saez's (2004) optimal tax expenditures framework:
  - Allow for extensive-margin responses
  - Let the government place a different value on private donations vs direct govt subsidies
- Our elasticity estimates are only consistent with the current subsidy being optimal if the govt values private donations less than direct govt provision
  - "Merit goods" argument: govt believes that donors' preferences do not line up with the majority's preferences
  - This result holds even when accounting for private donors' "warm-glow" utility in the social welfare function