Charitable Giving, Tax Reform, and Self-selection of Tax Report: Evidence from South Korea

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Introduction

- In many countries, tax relief for charitable giving are implemented.
- The elasticity of giving tax relief is known as a key parameter to evaluate the welfare implication (e.g. Saez, 2004).
  - Intuitively, if the elasticity is more than 1 in absolute value, \$1 of tax relief make more than \$1 of charitable giving.
- Many papers investigate the elasticity based on tax return data (e.g. Almunia et al., 2020, Auten et al., 2002, and so on).

Introduction

- However, the tax return data record only the declared charitable giving.
  - First issue: Actual donations is different from declared donations.(Fack and Landais (2016); Gillitzer and Skov (2018))
  - We use panel survey data in South Korea to deal with this issue.
- Tax payers decide the amount of donation and whether to declare tax relief based on the size of tax incentive and declaration cost.
  - Second issue: Neglect of this declaration cost may bias the estimations of elasticity.
  - We use instrumental variable (IV) and control function approach for this issue.
- Based on DID as an identification strategy, we investigate the giving price elasticity of South Korea.

Introduction

Result

1. Baseline results show that the giving price elasticity is less than -1.4 in terms of intensive margins and less than -1.7 in terms of extensive margins in Korea.
2. The estimated giving price elasticity for those who declare charitable giving is around -1.2$\sim$-1.6.

These estimates are more elastic than the estimates in the extant research, many of which show around -1.

3. (Not in the paper) The estimated declaration cost of giving is KRW ($).
4. (Not in the paper) Given our estimates, increasing the subsidy on charitable giving will be desirable in Korea.

2014 tax reform in South Korea

In Korea, income tax payers can receive tax relief for their charitable giving.

- For the application of tax relief, tax payers have to submit a certificate for charitable giving.
- Wage earners pay their income tax by withholding tax and declare their charitable giving via their company.
  - Wage earners can submit the certificate at any time.
- Non wage earners, such as the self-employed, pay their income tax by tax-return and declare their charitable giving via the National Tax Service.
  - Non wage earners have to retain the certificate until they submit tax return.

2014 tax reform in South Korea

Our major price variation comes from the 2014 tax reform.

- Before 2014, tax deduction (所得控除) was used for tax relief on charitable giving.
  - I.e. the giving price depended on income level.
- After 2014, tax credit (税額控除) started to be used for tax relief on charitable giving.
  - The tax credit rate was determined as 15%.
  - Giving price is 0.85, irrespective of income level.

2014 tax reform in South Korea

Model

- Consider private consumption (x_i) and charitable giving (g_i).
- The budget constraint is

$$x_i + g_i = y_i - R_i K - R_i T(y_i, g_i) - (1 - R_i) T(y_i)$$

where y_i is pre-tax total income, R_i is a dummy of declaration of tax relief and $T(y_i)$ and $T(y_i, g_i)$ are respectively the amount of tax when i does not declare tax relief and when i declares tax relief.

- Tax payers declare their charitable giving if its benefit exceeds its cost.

$$R_i = \begin{cases} 1 \text{ if } T(y_i, g_i) - T(y_i) > K \\ 0 \text{ if } T(y_i, g_i) - T(y_i) \leq K. \end{cases} \tag{1}$$

2014 tax reform in South Korea

Tax deduction system (until 2013)

$$T(y_i, g_i) = T(y_i - g_i)$$

- In 2012 and 2013, the marginal tax rate was the same, though it was different from ones before 2011.
- The logged relative giving price is $R_i \ln(1 - T'(y_i - g_i))$.

Tax credit system (from 2014)

$$T(y_i, g_i) = T(y_i) - R_i m g_i$$

- m is tax credit rate and is $m = 0.15$.
- The logged relative giving price is $R_i \ln(1 - 0.15) = R_i \ln 0.85$.

Note: The logged relative giving price for the non-declared is $\ln 1 = 0$.

Source of endogeneity

1. Usage of tax return data only captures declared charitable giving.
   - If the charitable giving is not declared, tax relief has a little effect.
   - Some papers use survey data to deal with this problem (e.g. Rehavi and Shack, 2013).
   - **Following them, we use survey panel data of Korea.**
2. If the declaration cost is ignored, the estimation should be biased.
   - The giving price depends not only on marginal tax rate and tax credit rate, but also on the declaration behavior.
   - As far as we know, only Almunia et al. (2020) deal with this problem, though they used tax return data.
   - **We use the different declaration cost btw wage earners and the others as an instrumental variable (IV).**

Data

We use the Korean annual financial panel survey, called the National Survey of Tax and Benefit (hereafter, NaSTab).

- The subjects of this survey are general households and household members living in 15 cities and provinces nationwide.
- This survey is based on a face-to-face interview.
- Data is constructed as the subjects represent the population of Korean society.
- We exclude the subject of the sample, whose age is under 23, since they are not likely to have income or assets.
- We use data from 2013 to 2017.

Data

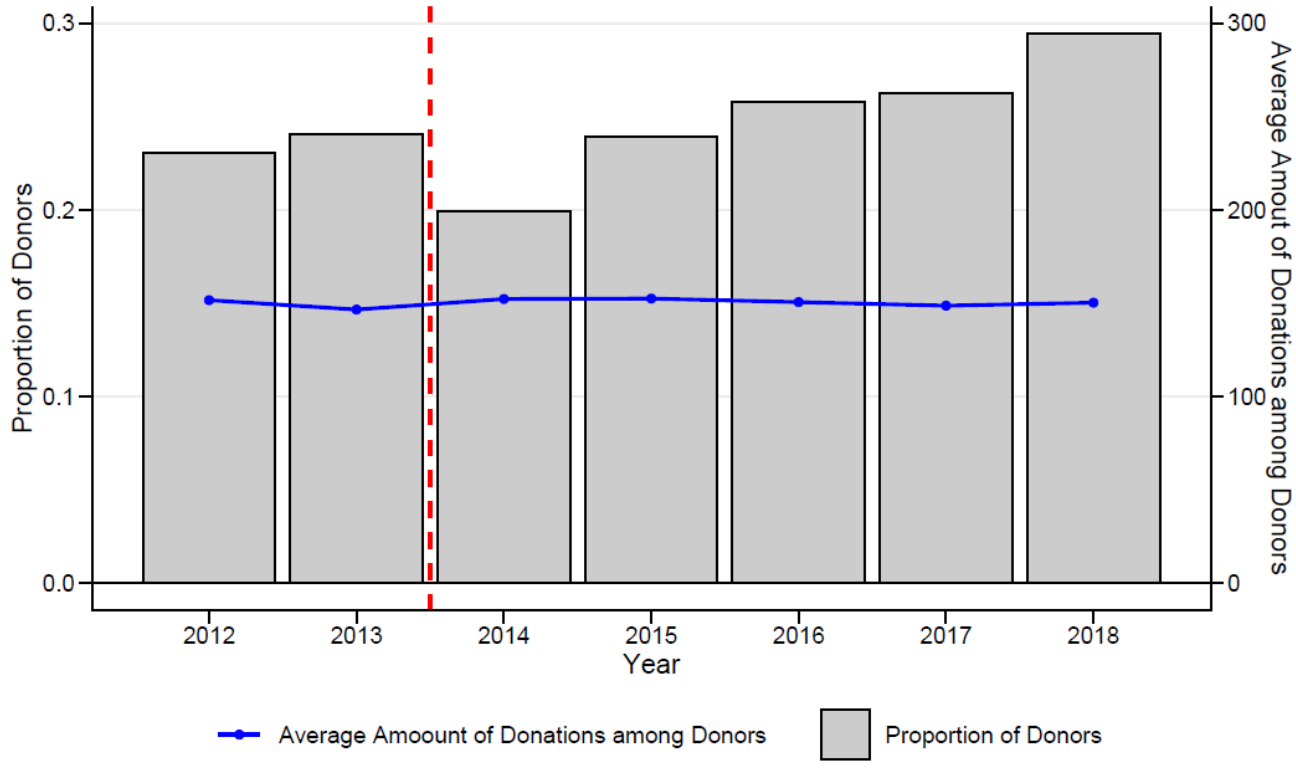

Figure: Proportion of Donors and Average Donations among Donors

- About 20∼30% of people make a donation.
- The average amount of donations among donors is about 1.5 million KRW.

Data

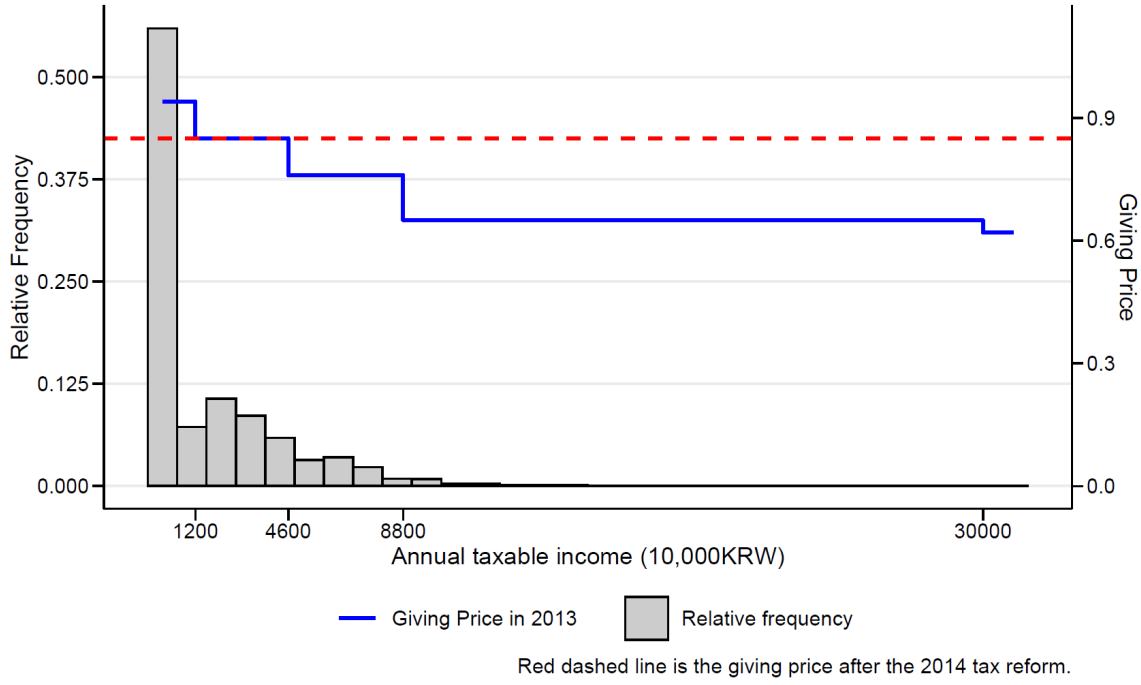

Figure: Income Distribution and Relative Giving Price in 2013

In 2014, relative giving price

- decreases for people whose income is less than 12 million KRW.
- is the same for people whose income is between 12 million KRW and 46 million KRW.
- increase for people whose income is more than 46 million KRW.

Data

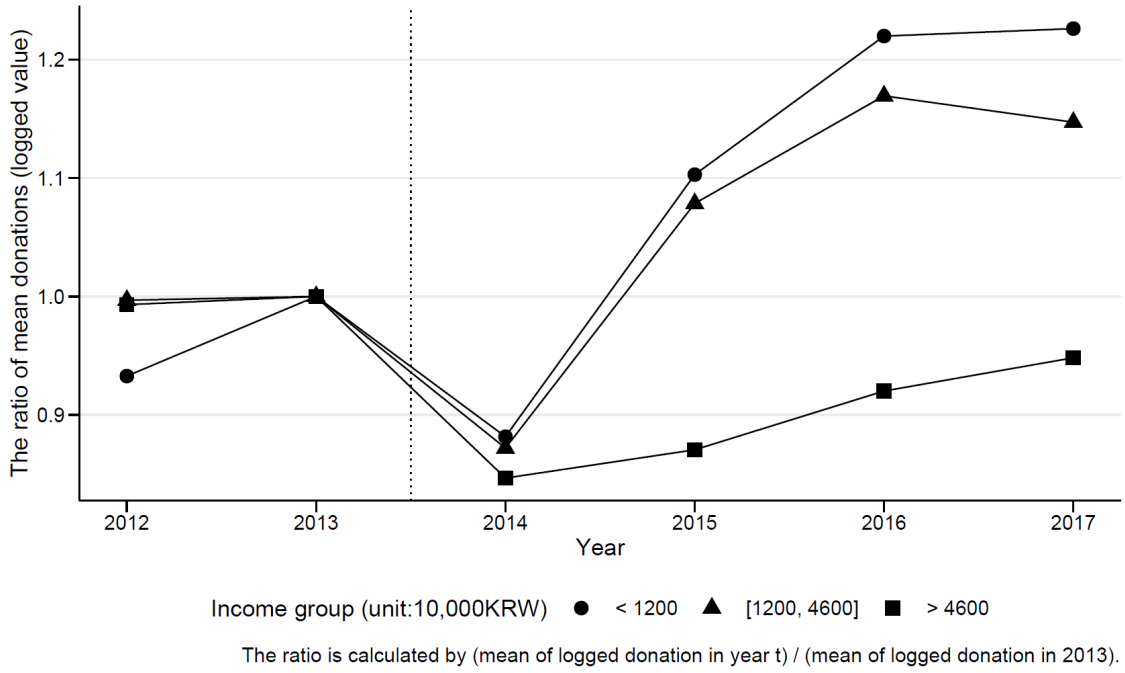

Figure: Average Logged Giving in Three Income Groups

Compared to 2012 and 2013, the amount of charitable giving after 2014

- increases for people whose income is less than 12 million KRW.
- relatively increases for people whose income is between 12 million KRW and 46 million KRW.
- decreases for people whose income is more than 46 million KRW.

Data

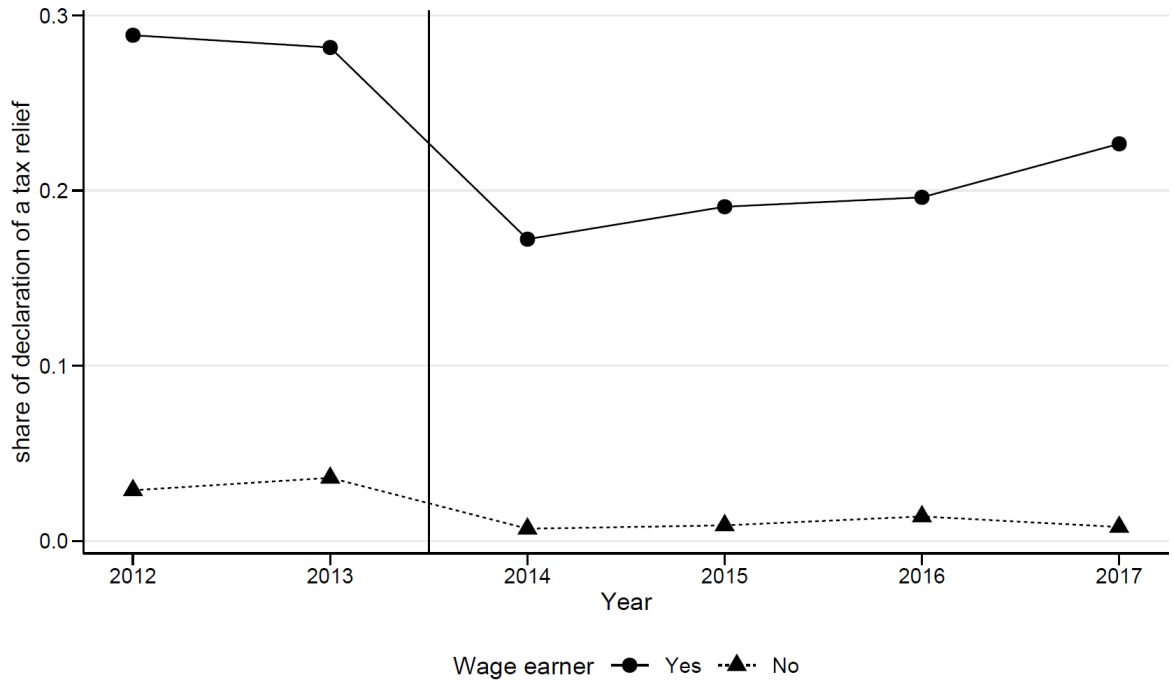

Figure: Share of Declaration of Tax Relief

- Wage earners are more likely to declare their charitable giving to receive tax relief.
  $\rightarrow$ This reflects the difference of the declaration cost.

Data

	N	Mean	Std.Dev.	Min	Median	Max
Charitable Donations						
Annual chariatable giving (unit: 10,000KRW)	40064	36.64	153.72	0.00	0.00	10000.00
Dummary of donation > 0	40064	0.24	0.43	0.00	0.00	1.00
Income, giving price, and tax report						
Annual taxable labor income (unit: 10,000KRW)	40054	1674.04	2733.18	0.00	0.00	91772.00
First giving relative price	40063	0.86	0.04	0.62	0.85	0.94
Dummy of declaration of a tax relief	40064	0.11	0.31	0.00	0.00	1.00
Individual Characteristics						
Age	40064	54.20	16.31	24.00	52.00	104.00
Wage earner dummy	29753	0.54	0.50	0.00	1.00	1.00

Table: Summary Statistics

Statistical Model

- Main identification source is tax reform in 2014. (DID-like strategy)
  - Below 12 million KRW: Giving price decreases.
  - Btw 12 and 46 million KRW: Giving price is the same.
  - Above 46 million KRW: Giving price increases.
- To capture the difference of declaration cost, we use a dummy to show whether a subject is a wage earner or not as IV.

Statistical Model

- We estimate the following two-way fixed effect model:

$$\ln g_{it} = \varepsilon_p R_{it} \ln p_{it}(y_{it}, g_{it}) + \varepsilon_y \ln y_{it} + \boldsymbol{X}_{it}\beta + \mu_i + \iota_t + u_{it} \qquad (5)$$

  where μ_i, ι_t and u_{it} are an individual fixed effect, a year fixed effect, and a error term, respectively.
- $\boldsymbol{X}_{it}$ is a vector of covariates including square of age, industry dummy, and area dummy.
- In the literature, estimations in terms of **intensive** and **extensive** margins are common.
  - **Intensive margins**: estimate (5) only for $g_{it} > 0$.
  - **Extensive margins**: estimate (5) but dependent variable is $1[g_{it} > 0]$.

  $\rightarrow$ Following the literature, we estimate both of them.

Statistical Model: Endogeneity of p_{it}

- The giving price (compared to private good) is

$$p_{it}(y_{it}, g_{it}) = \begin{cases} 1 - T_t'(y_{it} - g_{it}) & \text{if } t < 2014 \\ 0.85 & \text{if } t \geq 2014 \end{cases}. \qquad (6')$$

- Since the giving price is endogenous to the amount of giving before 2014, we use "**the first-price of giving**", which is defined as

$$p_{it}^f(y_{it}) = p_{it}(y_{it}, 0)$$

  instead of $p_{it}(y_{it}, 0)$ in the estimation.
- $p_{it}(y_{it}, 0)$ is called as "the last-price of giving".

Statistical Model: Endogeneity of R_{it}

- Since donors can choose whether they declare charitable giving or not, declaration, R_{it}, is endogenous.
- To overcome this, we estimate

$$\ln g_{it} = \varepsilon_p R_{it} \ln p_{it}^f(y_{it}) + \varepsilon_y \ln y_{it} + \boldsymbol{X}_{it}\beta + \mu_i + \iota_t + u_{it} \qquad (7)$$

  where $R_{it} \ln p_{it}^f(y_{it})$ is instrumented by $WageEarner_{it} \times \ln p_{it}^f(y_{it})$.
  - This estimation is based on 2SLS.
- $WageEarner_{it}$ is a dummy to show whether a subject is a wage earner or not.
  - $WageEarner_{it}$ should not correlate to u_{it} when we control incomes and industry dummies.

Statistical Model: Endogeneity of R_{it}

- In alternative models, we use propensity score to declare $P(Z_{it})$ as an instrument.
  - This estimation method is called "control function (CF)" approach.
  - The propensity score is estimated by a probit model

$$R_{it} = 1[\delta_0 + Z_{it}\delta_1 + u_{it1} > 0], \tag{8}$$

    where $Z_{it} \equiv \{WageEarner_{it}, \ln p^f_{it}(y_{it}), \ln y_{it}, \boldsymbol{X}_{it}\}$.
  - The propensity score is $P(Z_{it}) = \Phi(\hat{\delta}_0 + Z_{it}\hat{\delta}_1)$.
  - We consider two cases:
    ① pooled probit model (δ_0, δ_1) is constant.
    ② separated probit model (δ_0, δ_1) can vary by year.
- In addition, we also estimate the following by OLS:

$$\ln g_{it} = \varepsilon_p P(Z_{it}) \ln p^f_{it}(y_{it}) + \varepsilon_y \ln y_{it} + \boldsymbol{X}_{it}\beta + \mu_i + \iota_t + u_{it} \tag{9}$$

Results: Intensive Margins

	FE-2SLS			OLS	
	(1)	(2)	(3)	(4)	(5)
Applying tax relief x log(first price)	-1.429***	-1.506***	-1.598***		
	(0.398)	(0.354)	(0.361)		
PS of applying tax relief x log(first price)				-1.584***	-1.564***
				(0.371)	(0.353)
log(income)	1.162	1.102	1.030	1.037	1.013
	(1.112)	(1.084)	(1.085)	(1.110)	(1.116)
Num.Obs.	7080	7080	7080	7080	7080
R2	0.820	0.820	0.820	0.820	0.820
R2 Adj.	0.693	0.693	0.693	0.693	0.694
FE: area	X	X	X	X	X
FE: industry	X	X	X	X	X
FE: panelid	X	X	X	X	X
FE: year	X	X	X	X	X
Square of age	X	X	X	X	X
Instrument	Wage earner x Price	PS x Price	PS x Price		
Method of PS		Pool	Separate	Pool	Separate

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table: First-Price Elasticities (Intensive Margins)

The estimated giving price elasticity in terms of intensive margins is about -1.5.

Results: Extensive Margins

	FE-2SLS			OLS	
	(1)	(2)	(3)	(4)	(5)
Applying tax relief x log(first price)	-0.445***	-0.509***	-0.710***		
	(0.172)	(0.124)	(0.113)		
PS of applying tax relief x log(first price)				-0.416***	-0.546***
				(0.111)	(0.097)
log(income)	2.105***	2.074***	1.975***	1.955***	1.832***
	(0.280)	(0.263)	(0.257)	(0.281)	(0.279)
Implied price elasticity	-1.863***	-2.129***	-2.975***	-1.743***	-2.286***
	(0.721)	(0.518)	(0.475)	(0.465)	(0.407)
Num.Obs.	26922	26922	26922	26922	26922
R2	0.679	0.681	0.687	0.663	0.663
R2 Adj.	0.569	0.572	0.580	0.547	0.547
FE: area	X	X	X	X	X
FE: industry	X	X	X	X	X
FE: panelid	X	X	X	X	X
FE: year	X	X	X	X	X
Square of age	X	X	X	X	X
Instrument	Wage earner x Price	PS x Price	PS x Price		
Method of PS		Pool	Separate	Pool	Separate

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table: First-Price Elasticities (Extensive Margins)

The estimated giving price elasticity in terms of extensive margins is about -1.7 $\sim$ -2.9.

Results

- The results show that the giving price elasticity in Korea is more elastic than many papers in the literature show.
  - In the literature, the giving price elasticity in terms of intensive margins is typically -1.
- The elasticity in terms of extensive margins captures the behavior of whether people donate or not.
  - The elastic extensive margins elasticity shows that reducing giving price induce people to donate.
  - IV を使わない場合の推定結果が得られるならば、ここで IV を使わない推定結果と比べたときの含意を書く。

Results

We try several robustness checks.

1. Estimation excluding 2013 and 2014 data: to eliminate announcement effect.
2. Estimation using the last-price
3. Estimation using the subsample of those who have applied for tax relief
   - We use Semykina and Wooldridge (2010)'s way of the correction of sample selection bias.
   - Estimated elasticity (intensive margins) is around -1.2∼-1.6.
   - Subsample analysis enables us to use several methods to deal with issues related to tax deduction system.
     e.g. fluctuation of income level (Randolph, 1995, and so on.)
     → usage of k-th difference model / lead and lag.

Most of result shows that the giving price elasticity is less than

- -1.4 in terms of intensive margins and
- -1.7 in terms of extensive margins.

Implications for the welfare (not in the paper)

Following Almunia et al. (2020), we can derive the welfare implication by specifying the following utility maximization.

$$\begin{aligned} \max_{x_i, g_i, R_i} \; & U(x_i, g_i, G) = x_i - R_i K + \theta u(g_i) + V(G) \\ \text{s.t. } & x_i + g_i = R_i(y - T(y, g_i)) + (1 - R_i)(y - T(y)), \\ & \text{and } G = g_i + G_{-i}, \end{aligned}$$

where $\theta \in [\underline{\theta}, \bar{\theta}]$ is the parameter to show the preference for donation, which follows the density $f(\cdot)$.

- G is the total donation (including the governmental provision).
- G_{-i} is the total donation except i.
- For simplicity, assume tax schedule is now linear and tax rate is τ.

Implications for the welfare (not in the paper)

- Then, the optimization will be

$$\max_{g_i, R_i} (1-\tau)y - R_i p g_i - (1-R_i)g_i - R_i K + \theta u(g_i) + V(G).$$

- Denote $g(p;\theta)$ and $g(1;\theta)$ as the donation when $R_i = 1$ and 0.
- As a result of the optimization, the indirect utility of those who declare giving and do not will respectively be

$$\nu(p;\theta) = \theta_i u(g(p;\theta)) - p g(p;\theta)$$
$$\nu(1;\theta) = \theta_i u(g(1;\theta)) - g(1;\theta).$$

Implications for the welfare (not in the paper)

- Depends on θ and giving price p, three types of individuals exist.
  1. Non-donor: $\theta \leq \theta_0$
  2. Donor but non-declarer: $\theta \in (\theta_0, \theta(p)]$
     $\rightarrow$ Denote their total donation as $g^0(p) \equiv \int_{\theta_0}^{\theta(p)} g(1;\theta) f(\theta) d\theta$.
  3. Donor and declarer: $\theta > \theta(p)$
     $\rightarrow$ Denote their total donation as $g^1(p) \equiv \int_{\theta(q)}^{\bar{\theta}} g(p;\theta) f(\theta) d\theta$.
- Social welfare can be written as

$$W = V(G) + \int_{\theta(p)}^{\bar{\theta}} (\nu(p;\theta) - K) f(\theta) d\theta + \int_{\theta_0}^{\theta(p)} \nu(1;\theta) f(\theta) d\theta + \lambda[ty - (1-p)g^1(p) - G_g]$$

where λ is the marginal cost of public finance.

Implications for the welfare (not in the paper)

- Using $\lambda = V'$ (Saez, 2004), the effect of changing giving price p on the welfare W can be shown as

$$\frac{dW}{dp} = \lambda(g_p^0 + g_p^1) + (\lambda - 1)g^1 - \lambda(1-p)g_p^1.$$

- $\frac{dW}{dp} < 0$ is equivalent to

$$\epsilon \equiv -\frac{pg_p^1}{g^1} > \frac{\lambda - 1}{\lambda} + \frac{g_p^0}{g^1}.$$

  - From the subsample analysis, ϵ is $1.304 \sim 1.603$.
  - Assuming $\lambda \in [1, 2]$, $\frac{\lambda-1}{\lambda} \in [0, \frac{1}{2}]$.
  - From the data, $\frac{g_p^0}{g^1}$ is 0.00003.

- Our result suggests that more generous tax relief will increase the welfare in Korea.