Charitable Giving, Tax Reform, and Government Efficiency

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Abstract

This paper investigates (1) the price elasticity of giving and (2) whether the different perception towards the government cause the different giving behavior using South Korean panel data. Our result classifies that the price elasticity of giving in Korea is -0.59 ~ -1.01 for intensive margin and -1.17 ~ -1.48 for extensive margin. We also show that the amount of donation is not different between those who regard government as inefficient and the others, though the giving price elasticity of the former is more elastic than the latter. This means that those who think of government as inefficient have more willingness to donate for 1% reduction of giving price.

Keywords: Charitable giving, Giving price, Tax reform, Governement efficiency, South Korea
JEL: D91, I10, I18

1. Introduction

In many countries, governments set a tax relief for charitable giving. This is because, if subsidizing charitable giving induces a large increase in donations, it is desirable for public good provision. To evaluate the effect of tax relief, many papers investigate the elasticity of charitable donations with respect to their tax price (Almunia et al., 2020; Auten et al., 2002; Bakija and Heim, 2011; Fack and Landais, 2010; Randolph, 1995). Focusing on the tax deduction or tax credit on the charity, they show that the price elasticity of giving is about -1 or more in terms of absolute value, which means that the tax relief for the charitable giving is good in the sense that 1% tax relief derives more than 1% donation.

This paper follows the literature of charitable donation and tax relief and investigates the price elasticity of giving. To derive the elasticity, this paper utilize the South Korean (Korea hereafter) tax reform in 2014, from when the tax relief on charitable giving was conducted by tax credit, though tax deduction had been used before 2014.

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The extant research mainly focuses on the tax reform within the regime of tax deduction (Almunia et al., 2020; Auten et al., 2002; Bakija and Heim, 2011; Randolph, 1995) or tax credit (Fack and Landais, 2010). However, there is no research which deal with the giving tax reform between the regime of tax deduction and tax credit as far as we know. Since the extant research focus on the tax reform within the scheme of tax deduction or tax credit, this paper firstly deals with the tax reform from tax deduction system to tax credit system. In this literature, it is well known that tax payers can manipulate their tax rate using charitable giving in the tax deduction regime although such a manipulation cannot be observed in tax credit regime. Thus, by focusing on the regime change between tax deduction and tax credit, we could employ the methods to examine the tax elasticity with less influence of the manipulation.(この記述は要検討)

The Korean tax reform in 2014 started to allow 15% of the total amount of charitable giving as a tax credit for all taxpayers, which means that the giving price for 1 KRW donation is 0.85 KRW. Since the giving price was determined according to the marginal tax rate of progressive income tax before 2014, this tax reform reduced the giving price for low income taxpayers while it increased the price for high income tax payers. Since the variation of giving price can be considered to be exogenous for taxpayers, we exploit this reform and conduct the difference-in-difference (DID) analysis. As a result, our estimation shows that the price elasticity of giving in Korea is -0.59 ~ -1.01 for intensive margin and -1.17 ~ -1.48 for extensive margin.

This paper mainly contributes the literature about the tax elasticity of charitable donations with respect to their tax price. The examples of papers in this strand are Randolph (1995), Auten et al. (2002), Fack and Landais (2010), Bakija and Heim (2011), and Almunia et al. (2020). They typically use the tax return data, the main part of which is the data about wealthy people. Since our data is based on survey, which reflects the income distribution of population, we believe that we can estimate the giving price elasticity of population more precisely. Using the data with low-income households may be difficult to estimate the giving price elasticity in terms of intensive margin since they are expected to donate less than high-income households. To address this issue, we estimate not only the elasticity of intensive margin, as most of papers do, but also the elasticity of extensive margin following Almunia et al. (2020). Moreover, we use the data of Korea, a non-Western country, which the extant research did not examine.[1]

This paper consist of seven sections. Section 2 and 3 respectively explain the institutional background and data. Section 4 explains the estimation method. Section 5 deals with the analysis of giving price elasticity and section 6 shows the analysis of perceptions toward the government. Section 7 concludes.

[1]This point may be important since Kim (2021) reports that the giving behavior is strongly affected by the cultural matter such as the religious belief.

2. Institutional background

In this section, we describe the income tax relief for charitable giving in Korea and used dataset.

2.1. Tax relief for charitable giving by tax deduction and tax credit

In the South Korea, the tax policy about charitable giving drastically changed in 2014. Before then, tax relief of charitable giving was provided by tax deduction while, from 2014, tax relief by tax credit was introduced instead of tax deduction.

The tax deduction and tax credit may have different effects on giving behavior. This subsection summarize the difference of tax deduction and tax credit. Consider that a household has a choice between private consumptions (x_i) and charitable giving (g_i). Let y_i be pre-tax total income. Then, the budget constraint is

$$x_i + g_i = y_i - T_i(y_i, g_i).$$

T_i is tax amount which depends on the pre-tax income and charitable giving. On one hand, tax deduction reduces taxable income by giving. The amount of tax is

$$T_i = \tau(y_i - g_i) \cdot (y_i - g_i),$$

where $\tau(\cdot)$ is the income tax rate which is determined by $y_i - g_i$.[2] The budget constraint will be

$$x_i + [1 - \tau(y_i - g_i)]g_i = [1 - \tau(y_i - g_i)]y_i.$$

Thus, the giving price compared to the price of private consumption is $p_i^d \equiv 1 - \tau(y_i - g_i)$ in tax deduction system. Since the giving price in tax deduction scheme varies depending on (1) the income level and (2) the amount of charitable giving, it is endogenous to them, i.e. (1) and (2).

On the other hand, tax credit reduces tax amount directly, that is,

$$T_i = \tau(y_i) \cdot y_i - mg_i,$$

where $m \in [0, 1]$ is the tax credit rate. Under the tax credit system, the budget constraint is

$$x_i + (1 - m)g_i = [1 - \tau(y_i)]y_i.$$

[2] $\tau(\cdot)$ here is a function which shows the average tax rate, which is determined progressively. Since the price elasticity of giving shows the marginal and additional increment for one unit of price reduction increase, we use not average but marginal tax rate to construct the giving price following the literature. Usage of the function of the average tax rate here is for explanatory simplicity.

Table 1: Marginal Income Tax Rate

Income/Year	2008	2009	2010 ~ 2011	2012 ~ 2013	2014 ~ 2016	2017	2018
(A) ~ 1200	8%	6%	6%	6%	6%	6%	6%
(B) 1200 ~ 4600	17%	16%	15%	15%	15%	15%	15%
(C) 4600 ~ 8800	26%	25%	24%	24%	24%	24%	24%
(D) 8800 ~ 15000	35%	35%	35%	35%	35%	35%	35%
(E) 15000 ~ 30000					38%		38%
(F) 30000 ~ 50000				38%		38%	40%
(G) 50000 ~						40%	42%

Notes: Marginal income tax rates applied from 2008 to 2018 are summarized. The income level is shown in terms of 10,000 KRW, which is approximately 10 United States dollars (USD) at an exchange rate of 1,000 KRW to one USD.

Thus, the giving price of tax credit system will be $p_i^c = 1 - m$, which is only dependent on the tax credit rate m, which is exogenously determined by the government. Therefore, the giving price in the tax credit system would not be manipulated by donors.

2.2. Korean tax reform in 2014

The tax incentives for charitable giving in Korea stared in 1967 and the market of charitable giving in Korea totaled 10.9 trillion KRW (approximately 1.09 bilion USD, 0.761% of GDP) in 2012 according to the national tax statistics. Since the income tax deduction was initially used as a tax incentive and the marginal income tax rate was determined as Table 1, the minimum giving price before 2014 was 0.62.

In 2014, aiming at the relaxation of regressivity of giving price, the Korean government reformed tax system again, where the tax credit was introduced instead of tax deduction. Since then, 15% of the total amount of charitable giving has been allowed as a tax credit, which means that the giving price from 2014 is 0.85 irrelevant to the income level.

Summarizing this, compared to tax credit system, the high income household, whose (average) income tax rate is more than 15%, get benefit from charitable giving under the tax deduction system. However, middle or low income households would enjoy tax relief in tax credit system more than tax deduction system. We exploit this policy change as an identification strategy.

3. Data

3.1. National Survey of Tax and Benefit (NaSTaB)

In this paper, we use panel data from the National Survey of Tax and Benefit (NasTaB). NasTaB survey is an annual financial panel survey implemented by The Korea Institute of Taxation and Finance to study

Table 2: Summary Statistics

	N	Mean	Std.Dev.	Min	p25	Median	p75	Max
Income and Giving Price								
Annual taxable income (unit: 10,000KRW)	53269	1876.121	2700.965	0.00	0.00	900.00	2902.445	91772.00
Giving Price	62877	0.858	0.036	0.62	0.85	0.85	0.850	0.94
Charitable Donations								
Annual charitable giving (unit: 10,000KRW)	67848	29.523	132.915	0.00	0.00	0.00	0.000	10000.00
dummy of Donation > 0	67848	0.203	0.402	0.00	0.00	0.00	0.000	1.00
Government Efficiency								
Current Tax-Welfare Balance	29272	-0.137	0.889	-2.00	-1.00	0.00	0.000	2.00
Ideal Tax-Welfare Balance	29273	0.541	0.721	-2.00	0.00	0.00	1.000	2.00
Individual Characteristics								
Age	67848	51.348	15.806	24.00	39.00	50.00	62.000	104.00
Female dummy	67848	0.525	0.499	0.00	0.00	1.00	1.000	1.00
University graduate	67842	0.411	0.492	0.00	0.00	0.00	1.000	1.00
High school graduate	67842	0.350	0.477	0.00	0.00	0.00	1.000	1.00
Junior high school graduate	67842	0.238	0.426	0.00	0.00	0.00	0.000	1.00

the tax burden of households and the benefits that households receive from government. The subjects of this survey are general household and household members living in 15 cities and provinces nationwide. This survey is based on a face-to-face interview. If it is difficult for investigators to meet subjects, another family member answers on behalf of him.[3]

In the analysis, we use data from 2013 to 2019 since we focus on the 2014 tax reform. This is because, as Table 1 shows, the giving price before 2014 was changed frequently and incorporating the data before 2012 captures the effects of another tax reform than the reform in 2014. Note that, since tax credit was introduced after 2014 and the credit rate was unchanged since 2014, the giving price does not depend on the income tax rate after 2014. In addition, we exclude the subject of the sample, whose age is under 23, since they are not likely to have income or asset.

Table **??** is summary statistics of our sample. We used four types of variables in this paper: sets of variables about Income and Giving Price, Charitable Donations, Government Efficiency, and Individual Characteristics. A set of variables about Government Efficiency is constructed from the value survey of NasTaB data. Current Tax-Welfare Balance shows how the subject perceives the balance between tax burden and received welfare from the government, while Ideal Tax-Welfare Balance indicates what is the ideal balance between tax burden and received welfare for the subject. The higher values of them means that

[3]Note that NasTaB data is constructed as the subjects represent the population of Korean society. This enables us to derive giving price elasticity of population without re-weighting samples, which is used in the extant research. Moreover, note that subjects are not limited to the tax payer or income earner reflecting the population.

received welfare from the government is higher than tax burden. We explain the details and constructions of these variables later. The variables about Individual Characteristics, which consist from age, gender and final education levels, are used as control variables.

In the next two subsections, we describe the first two set of variables in detail.

3.2. Income and Giving Price

NaSTaB asks respondents to answer the annual income last year. For example, in the 2014 survey, respondents answer the annual income at 2013. In our sample, the average annual taxable income is 18.76 million KRW. According to the National Tax Statistical Yearbook published by Korean National Tax Service, the average annual taxable income is 32.77 million from 2012 to 2018 for employees who submited the tax return. Since our sample includes subjects with no labor income, such as housewife, our sample mean of income is lower than average income calculated by the public organizations. In Figure **??**, the gray bars show the distribution of annual taxable income in 2013. The income distribution is left-skewed.

Using this variable, we construct the giving price under the tax deduction system (2012 and 2013). After the tax reform (after 2014), the giving price is 0.85 under the tax credit system, as we explained in the section 2. In Figure **??**, the blue line shows giving price in 2012 and 2013, while the red dashed line shows the giving price after 2014. From this figure, those whose annual income is less than 1200 in 2013 could receive benefit by the 2014 tax reform bacause the tax reform decreases the giving price. On the other hand, those whose auunal income is greater than 4600 in 2013 had a loss by the 2014 tax reform since the tax reform increases the giving price.

3.3. Charitable Giving

NaSTaB asks respondents to answer the amount of donation.[4] We use this variable as an first outcome variable when estimating the price effect on the amount of donations among donors (intensive margin). Using this variable, we make a dummy variable taking 1 if repsondents donate (Dummy of Donation). This is the second outcome variable to estimate the price effect on the decision of donations (extensive margin).

Table **??** shows that the average amount of donation is almost 300,000 KRW, and the proportion of donors is roughly 20%. Figure **??** shows the time-series of two variables. The blue line shows the average amount of donation among donors. In each year, its value is nearly 1.5 million KRW, which is 7% of average annual taxable income. The grey bar shows the proportion of donors. After the tax reform, the proportion of donors decreases by 2%. After that, the proportion of donors is greter than 20%.

[4]Respondents answer the amount of donation for seven specific purposes last year. Seven specific purposes are policitical parties, educational organizations, social welfare organizations, organizations for culutre and art, religious groups, charity activies organaized by religious group, other purposes.We sum up the amount of donations, and consider it as the annual charitable giving.

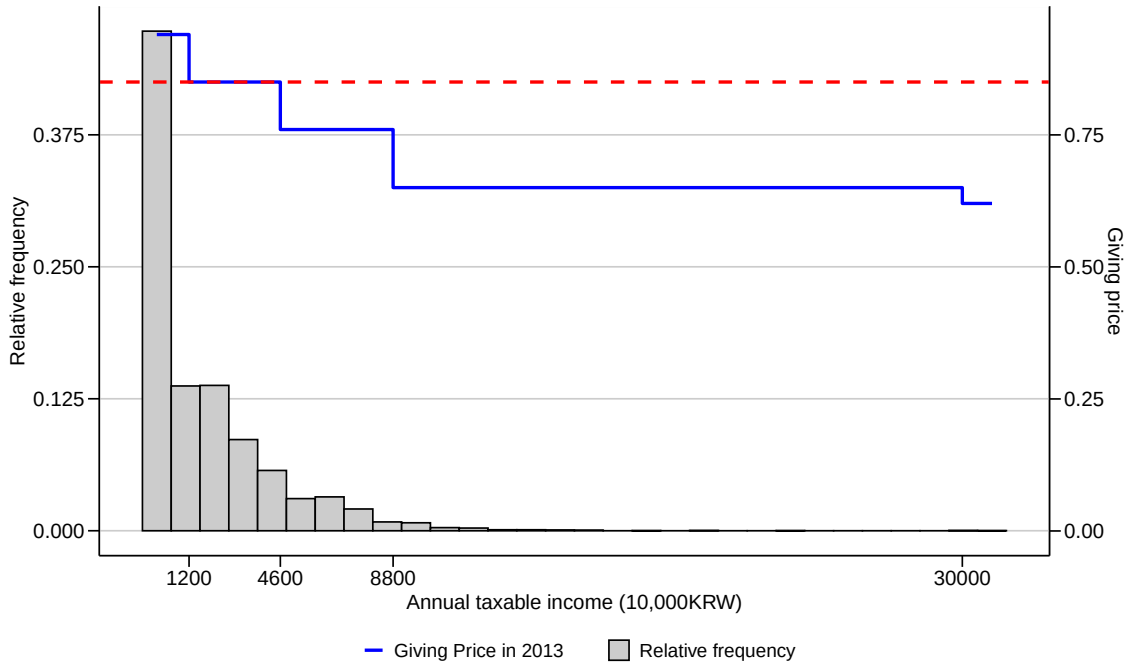

Figure 1: Income Distribution and Giving Price in 2013

4. Estimation

To estimate the giving price elasticity for intensive margin and extensive margin, we use DID analysis which exploit the fact that the giving price was unified in 2014 while the price was different for tax payers with different incomes.

Following Almunia et al. (2020), we estimate the giving price elasticity for intensive margin and extensive margin. The elasticity of intensive margin shows how much donors additionally donates reacting to the marginal increase of giving price, while the elasticity of extensive margin shows how much the probability to donate changes reacting to marginal increase of giving price.

We estimate the elasticity of intensive margin using the following specification:

$$\ln g_{it} = \varepsilon_{INT} \ln p_{it} + g_{INT} \ln y_{it} + X_{it}\beta + \mu_i + \iota_t + u_{it}. \tag{1}$$

g_{it}, p_{it} and y_{it} respectively indicates the amount of giving, the giving price, and income of i in year t. μ_i, ι_t and u_{it} are individual fixed effect, year fixed effect and error term, respectively. The individual fixed effect controls for time-invariant individual characteristics. The year fixed effect controls for events that affect all subjects at the same time. X_{it} is a vector of covariates which include variables about education and gender. Moreover, we add some interaction terms between year fixed effect and control variables into X_{it}, since they will control for events that affects subject with specific characteristics at the same time following Zeldow and Hatfield (2019).

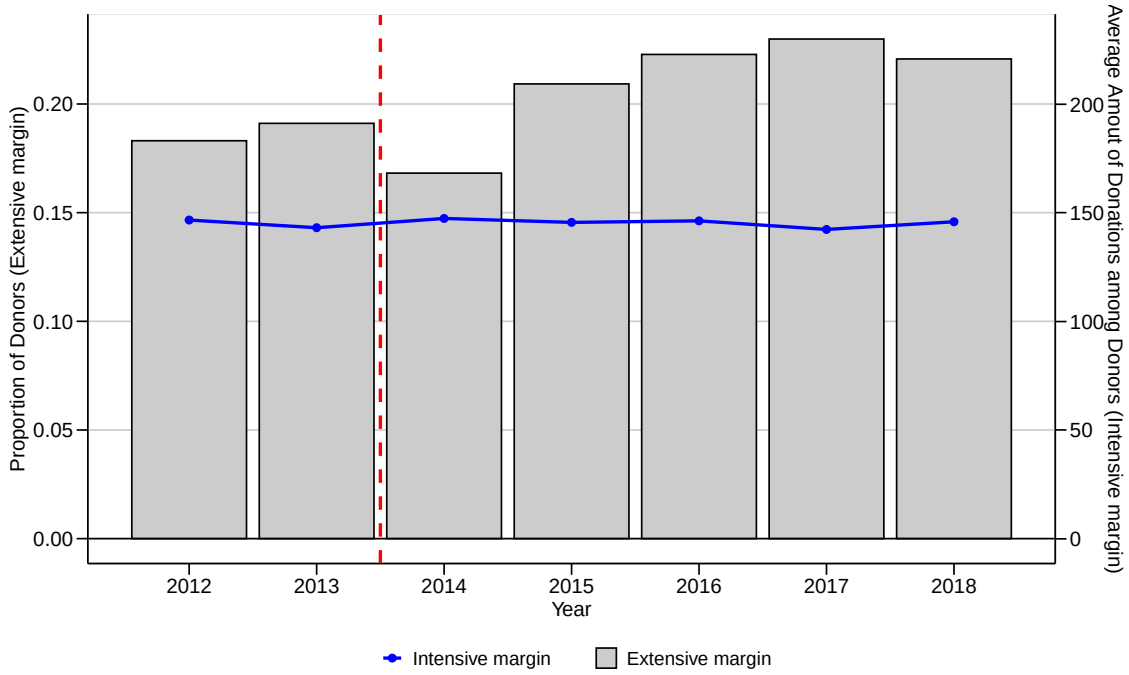

Figure 2: Proportion of Donors and Average Donations among Donors

The elasticity of extensive margin is estimated using the linear probability model such as

$$D_{it} = \delta \ln p_{it} + \gamma \ln y_{it} + X_{it}\beta + \mu_i + \iota_t + v_{it}. \tag{2}$$

D_{it} is a dummy variable taking 1 if individual i donates at year t and 0 otherwise. Since we use the linear probability model, the estimated coefficient δ represents $\hat{\delta} = \frac{\partial D_{it}}{\partial p_{it}} p_{it}$. Also, the estimated coefficient γ represents $\hat{\gamma} = \frac{\partial D_{it}}{\partial y_{it}} y_{it}$. Thus, the extensive-margin price and income elasticity are $\hat{\delta}/D_{it}$ and $\hat{\gamma}/D_{it}$, respectively. We evaluate the extensive-margin price and income elasticity at sample mean of D_{it}.

Our identification assumption is the *within* price variation is exogenous because we use the fixed effect model. This assumption may be hold if the major *within* price variation comes only from the 2014 tax reform. After the 2014 tax reform (the tax credit system), the giving price is constant across individuals and there is no room for manipulation by donations and income. However, before the 2014 tax reform, the giving price has two potential endogeneity problem: (A) endogeneity of giving price and (B) simulatenous determination of income and donations.

To tackle these problems, we take two methods. The first method deals with the possibility that the giving price is endogenous because the tax payer can reduce their giving price by increasing their amount of donation and shifting themselves to the lower tax bracket in the tax deduction system. Since this issue does not happen for the first one unit of donation, whose price ("first price") cannot be changed by adjusting the donation, we use this first price as the giving price in the estimation. The first price is formally defined as

the giving price $p_i^d \equiv 1 - \tau(y_i - g_i)$, evaluated at $g_i = 0$. Moreover, this issue does not happen in the tax credit system because the giving price in the tax credit system is exogenously determined by the rate of tax credit allowance. Therefore, we construct the giving price in the tax credit system based on the rate of tax credit allowance.

The second method deals with the issue related to the simultaneous determination of income and donations. Under the tax deduction system, the change of income have effects on both donations through the income effect and the giving price through the marginal tax rate. Therefore, we employ lagged values of taxable income and construct a variable for the change in the first price of giving as following:

$$\ln\left(\frac{p_{it}(y_{it-k} - g_{it-k})}{p_{it-k}(y_{it-k} - g_{it-k})}\right).$$

where $g_{it-k} = 0$. The numerator is the first price that individual i would have faced in year t if she had declared her year $(t-k)$ taxable income at that year. By fixing the income at year $t-k$, the instrument isolates changes in price from income responses to the tax reform. Note that this problem does not happen for the tax credit system, where the giving price is the same across all individuals.

5. Main Results

5.1. Price and Income Elasticity

Before the estimation of giving price elasticities for intensive and extensive margin, we estimate the elasticity without distinguishing them. We call this elasticity as overall elasticity. Table 3 shows estimation results of overall elasticity. The column (1) is the baseline estimation, which include individual and time fixed effects. The price elasticity is rougly -1, which is statistically significant different from zero. This implies that 1% increase of giving price raise charitable giving by 1%. This result is in line with previous researches which focus on Western countries. The income elasticity is about 5.3, which is statistically significant different from zero. This implies that 1% increase of annual income raise charitable giving by 5.3%. The remaining four columns control for events that affects subject with specific characteristics at the same time. As a result, the price elasticity is more elastic than the baseline result. The price elasticity lies between -1.3 and -1.1. On the other hand, the income elasticity is less elastic than the baseline result. The income elasticity lies between -5.1 and -4.9.

Table 4 shows the intensive-margin and the extensive-margin elasticities. The first panel shows the intensive-margin elasticity. Compared to the overall elasticitiy, the price and income elasticitiy are less elastic. Controlling individual and time fixed effects, the price and income elasticity is about -0.6 and about 2, which are statistically significant different from zero (See the column (1)). Moreover, when we include the interaction term between individual characteristics and year dummies, these values vary. The price elasticity

Table 3: Main Results

	(1)	(2)	(3)	(4)	(5)
ln(giving price)	-1.072***	-1.264***	-1.291***	-1.114***	-1.241***
	(0.202)	(0.213)	(0.230)	(0.229)	(0.227)
ln(annual taxable income)	5.393***	5.080***	5.047***	5.116***	4.946***
	(0.970)	(0.964)	(0.964)	(0.966)	(0.949)
Individual FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Age	N	Y	Y	Y	Y
Year x Education	N	N	Y	Y	Y
Year x Gender	N	N	N	Y	Y
Year x Resident Area	N	N	N	N	Y
N	53269	53269	53267	53267	53267
R-squared	0.616	0.616	0.616	0.616	0.620

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. When controlling age, we alson include its squared term.

lies between -1.1 and -0.8, and the income elasticity lies between 1.4 and 1.6. Anyway, our conlusion is that the amount of donations is insensitive to the giving price among donors.

The second panel shows the extensive-margin elasticity. By results of overall elasticities and the intensive-margin elasticities, we expect that the extensive-margin price and income elasticity is more elastic than the overall elasticities. In the column (1), the coefficient of logged giving price and logged annual income are -0.257 and 1.175 respectively, which are statistically significant different from zero. Since we use the linear probability model, we need to calculate $\epsilon^{p}_{EXT} = -0.257/D_{it}$ and $\epsilon^{y}_{EXT} = 1.175/D_{it}$ to obtain the price and income elasticity, respectively. Especially, the coefficient of logged giving price represents the lower-bound of price elasticity because the variable D_{it} takes either 0 or 1. When we evaluate the price elasticity at the sample mean of D_{it}, the implied price elasticity is -1.264, which is slightly more elastic than the overall one. Also, we evaluate the income elasticity at the sample mean of outcome. The implied income elasticity is 5.778, which is slightly more elastic than the overall one. Although the implied price and income elasticity varies with covariates, results are in line with our expectation. Thus, the decision of donations is sensitive to the giving price and annual income.

In summary, our first conclusion is that the decision of donations is sensitive to the giving price, and the amount of donations is insensitive to the giving price once they decide to donate. In the next subsection, we check the robustness of our first conclusion, using three methods.

Table 4: Main Results: Intensive- and Extensive-Margin Elasticity

	(1)	(2)	(3)	(4)	(5)
Intensive-Margin Elasticity					
ln(giving price)	-0.593***	-0.838***	-1.016***	-0.893***	-0.904***
	(0.203)	(0.212)	(0.232)	(0.243)	(0.248)
ln(annual taxable income)	2.015***	1.562**	1.445**	1.528**	1.571**
	(0.674)	(0.655)	(0.647)	(0.651)	(0.653)
N	11637	11637	11637	11637	11637
R-squared	0.790	0.790	0.791	0.791	0.796
Extensive-Margin Elasticity					
ln(giving price)	-0.257***	-0.288***	-0.273***	-0.237***	-0.267***
	(0.046)	(0.048)	(0.052)	(0.052)	(0.051)
ln(annual taxable income)	1.175***	1.124***	1.125***	1.139***	1.102***
	(0.223)	(0.223)	(0.223)	(0.224)	(0.220)
Implied price elasticity	-1.176***	-1.320***	-1.250***	-1.086***	-1.221***
	(0.210)	(0.221)	(0.239)	(0.238)	(0.235)
Implied income elasticity	5.379***	5.145***	5.148***	5.212***	5.045***
	(1.023)	(1.021)	(1.023)	(1.024)	(1.005)
Individual FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Age	N	Y	Y	Y	Y
Year x Education	N	N	Y	Y	Y
Year x Gender	N	N	N	Y	Y
Year x Resident Area	N	N	N	N	Y
N	53269	53269	53267	53267	53267
R-squared	0.560	0.560	0.560	0.561	0.565

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. When controlling age, we alson include its squared term. The implied extensive-marign price elasticity is evaluated at the sample mean of D_{ijt}.

5.2. Robustness Check

The first robustness check estimates the last price elasticity using the first price of giving as an instrument. Our main results show that *first* price elasticity to avoid the endogeneity of giving price. However, the first price elasiticity is not realistic because people face the *last* marginal price when deciding amount of donations. Thus, we estimate the *last* price elasticity, using the Panel IV method.

There is one caution to interpret the last price elasticity. Under the tax credit system, the last price elasticity is equivalent to the first one. Since major observation units are observed when the tax credit system is implemented, the last giving price is strongly correlated with the first one. In other words, covariates between the last and first giving price is roughly equal to one. In the first stage, the coefficient of first giving price is roughly 0.98 in any specifications.[5] Thus, our last price elasticity may be upper bound of true price elasticity.

The last price elasticity is in line with our first conclusion. Table 5 shows overall last price elasticity. Compared to the main results, the last price elasticity is more elastic. The aboslute value of estimated coefficient is larger than 2.4, which is statistically significant different from zero. This implies that 1% increase of last price decreases charitable contributions by 2.4% or more. Table 6 shows the intensive-margin and extensive-margin last price elasticity. In the first panel, the intensive-margin last price elasticity is similar value to the main results. Its abolute value lies between 0.89 and 1.2. These results are statistically different from zero. In the second panel, the coefficient of logged last price, which represents the lower bound of last price elasticity, lies between -0.63 and -0.59. The implied last price elasticity evalueated at the sample mean of D_{it} is roughly -3. These results are statistically significant different from zero, and more elastic than the first price elasticity.

In the second robustness check, we try to control the manipulation of giving price by adjusting income level using two datasets whose ranges are (i) from 2013 to 2018 and (ii) from 2013 to 2014. Under the tax deduction system, the giving price can be manipulated by income level, though it cannot under the tax credit system. Therefore, if we use the dataset which contains data under the the tax deduction system, the estimator may capture the effect of price change which is caused not by tax reform but by price manipulation by income adjustment. To address this issue, we use dataset in which the time range under the tax deduction system is shorter than the baseline analysis. By doing this exercise, we try to suppress the effect which comes from the price change due to the change of income.

Table 7 shows the overall first giving price elasticity. When we use data from 2013 to 2018, the estimated price elasticity is similar value to the main results. On the other hand, when we use data from 2013 to 2014, the estimated price elasticity is more elastic than the main results. The estimated absolute value is roughly -1.7 when we control covariates and its interaction with year dummies. This value is statistically significant

[5] We do not show the first-stage results. Instead, we show the F-statistics of the instrument variable.

Table 5: Last Price Elasticity: Panel IV

	(1)	(2)	(3)	(4)	(5)
ln(annual taxable income)	5.258***	5.072***	4.981***	5.058***	4.910***
	(0.961)	(0.961)	(0.959)	(0.961)	(0.948)
ln(giving price)	-2.421***	-2.536***	-2.750***	-2.529***	-2.650***
	(0.204)	(0.216)	(0.233)	(0.231)	(0.229)
Individual FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Age	N	Y	Y	Y	Y
Year x Education	N	N	Y	Y	Y
Year x Gender	N	N	N	Y	Y
Year x Resident Area	N	N	N	N	Y
F-statistics of IV	149725.55311418	133479.334193781	122056.582836205	119697.820412665	115755.891475842
N	52304	52304	52302	52302	52302

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. The instumental variable is the first giving price in year t. When controlling age, we alson include its squared term.

different from zero.

Table 8 shows the intensive-margin and the extensive-margin first price elasticity. The first panel shows the intensive-margin elasticity. When we use data from 2012 to 2018, the intensive-margin price elasiticity is similar to the main results, which is statistically significant from zero. However, when we use data from 2013 to 2014 and include only individual and time fixed effects, the estimated coefficient is statistically insignificant different from zero. By controlling covariates and its interaction with year dummies, the intensive-margin price elasticity is -0.712, which is statistically significant. The second panel shows the extensive-margin elasticity. When we use data from 2012 to 2018, the extensive-margin price elasticity is similar to the main results, which is statistically significant. When we use data from 2013 to 2014, the extensive-margin price elasticity is more elastic than the main results. Its absolute value is roughly -2, which is statistically significant.

The third robustness check is to estimate the k-th difference model. The tax reform may have impacts on the giving price in two ways: one is direct giving price change by tax reform and the other is indirect change via wealth effect, which is induced by tax reform. Thus, to isolate the direct effect of the tax reform, we use the information of income level k years before. Concreately speaking, we estimate the k-th difference model formulated as follows:

$$\Delta^k \ln g_{it} = \delta \Delta^k \ln p_{it} + \gamma \Delta^k \ln y_{it} + \Delta^k X_{it}\beta + \mu_i + \iota_t + v_{it},$$

where $\Delta^k \ln g_{it} = \ln g_{it} - \ln g_{it-k}$ and $\Delta^k \ln y_{it} = \ln y_{it} - y_{it-k}$.

Table 6: Intensive- and Extensive-Margin Last Price Elasticity: Panel IV

	(1)	(2)	(3)	(4)	(5)
Intensive-Margin Elasticity					
ln(annual taxable income)	2.024***	1.638**	1.460**	1.530**	1.572**
	(0.694)	(0.677)	(0.666)	(0.669)	(0.666)
ln(giving price)	-0.898***	-0.961***	-1.197***	-0.998***	-1.074***
	(0.270)	(0.271)	(0.307)	(0.325)	(0.332)
F-statistics of IV	149725.55311418	133479.334193781	122056.582836205	119697.820412665	115755.891475842
N	10672	10672	10672	10672	10672
Extensive-Margin Elasticity					
ln(annual taxable income)	1.125***	1.113***	1.103***	1.121***	1.090***
	(0.221)	(0.223)	(0.223)	(0.223)	(0.220)
ln(giving price)	-0.623***	-0.630***	-0.644***	-0.593***	-0.619***
	(0.046)	(0.049)	(0.053)	(0.052)	(0.052)
Implied price elasticity	-3.052***	-3.090***	-3.156***	-2.907***	-3.035***
	(0.227)	(0.239)	(0.258)	(0.257)	(0.254)
Implied income elasticity	5.514***	5.453***	5.407***	5.494***	5.343***
	(1.084)	(1.092)	(1.092)	(1.095)	(1.078)
Individual FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Age	N	Y	Y	Y	Y
Year x Education	N	N	Y	Y	Y
Year x Gender	N	N	N	Y	Y
Year x Resident Area	N	N	N	N	Y
F-statistics of IV	149725.55311418	133479.334193781	122056.582836205	119697.820412665	115755.891475842
Age	N	Y	Y	Y	Y

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. The instumental variable is the first giving price in year t. When controlling age, we alson include its squared term. The implied extensive-marign price elasticity is evaluated at the sample mean of D_{ijt}.

Table 7: Elasticity with Short-Period Data

	After 2012		2013 and 2014	
	(1)	(2)	(3)	(4)
ln(giving price)	-1.014***	-1.286***	-1.398***	-1.686***
	(0.255)	(0.290)	(0.289)	(0.338)
ln(annual taxable income)	5.108***	4.743***	4.013**	3.035
	(1.009)	(0.990)	(1.948)	(1.992)
Individual FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Other Controls	N	Y	N	Y
N	45994	45992	14893	14893
R-squared	0.634	0.637	0.812	0.814

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. Other controls are age (its squared value), the interaction between year dummies and education dummies, the interaction between year dummies and gender dummies, and the interaction between year dummies and resident area.

The variable $\Delta^k p_{it}$ is defined as $\Delta^k p_{it} \equiv \ln p_{it}(y_{it-k}) - \ln p_{it}(y_{it-k})$.[6] The variation of this variable comes from the tax reform because we fix the annual income at year $t-k$. Therefore, we can interpret this coefficient as the giving price elasticity due to the tax reform. In particular, the estimated δ implies that 1% increase of the change of giving price leads to $\hat{\delta}$% increase of the change of charitable giving. Note that we do not estimate the extensive-margin elasticity because it is hard to interpret this estimation equation when we use $\Delta^k D_{it}$ as an outcome variable.

Table 9 shows results of k-th difference model. The first panel shows the overall elasticity. When we take the one year lag ($k = 1$), the overall price elasticity is roughly -1.9, which is statistically significant. This elasticity slightly varies when we take the two or more year lag ($k > 1$). The overall price elasticity lies between -2.1 and -1.7, which is statistically significant. This implies that the overall price elasticity obtained by this model is more elastic than the main results. The second panel shows the intensive-margin elasticity. When we take the one year lag ($k = 1$), the intensive-margin price elasticity is roughly -1.8, which is statistically significant. The absolute value of the price elasticity is more than 2 when we take two or more year lag ($k > 1$). Thus, contrary to our first conclusion, this model implies that the amount of donations is sensitive to the giving price once we decide to donate.

In summary, the result shows that the size of estimated elasticity may vary depending on the estimation methods. This may be because the sample size is small compared to the extant research. However, our

[6] Under the tax credit system, the giving price does not depend on income y_{it-k}. If the tax credit system is impelemted in year t and $t-k$, then the value of $\Delta^k p_{it}$ takes zero.

Table 8: Intensive- and Extensive-Margin Elasticity with Short-Period Data

	After 2012		2013 and 2014	
	(1)	(2)	(3)	(4)
Intensive-Margin Elasticity				
ln(giving price)	-0.647***	-1.129***	-0.394	-0.712**
	(0.236)	(0.291)	(0.310)	(0.363)
ln(annual taxable income)	1.943***	1.714***	1.440	1.047
	(0.662)	(0.649)	(2.975)	(3.072)
N	10158	10158	2922	2922
R-squared	0.805	0.810	0.923	0.926
Extensive-Margin Elasticity				
ln(giving price)	-0.235***	-0.269***	-0.331***	-0.383***
	(0.058)	(0.065)	(0.065)	(0.076)
ln(annual taxable income)	1.093***	1.024***	0.801*	0.574
	(0.230)	(0.226)	(0.428)	(0.447)
Implied price elasticity	-1.064***	-1.217***	-1.689***	-1.951***
	(0.262)	(0.294)	(0.333)	(0.387)
Implied income elasticity	4.951***	4.638***	4.082*	2.926
	(1.043)	(1.024)	(2.181)	(2.279)
Individual FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Other Controls	N	Y	N	Y
N	45994	45992	14893	14893
R-squared	0.579	0.583	0.782	0.784

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. Other controls are age (its squared value), the interaction between year dummies and education dummies, the interaction between year dummies and gender dummies, and the interaction between year dummies and resident area. The implied extensive-marign price elasticity is evaluated at the sample mean of D_{ijt}.

Table 9: Estimation of Elasticity: k-difference model

lag k	$k=1$	$k=2$	$k=3$
	(1)	(2)	(3)
Overall Elasticity			
Lagged difference of first price (log)	-1.894***	-2.158***	-1.805***
	(0.389)	(0.355)	(0.345)
Lagged difference of annual income (log)	2.737***	4.661***	5.422***
	(1.041)	(1.139)	(1.181)
N	49014	46587	44142
R-squared	0.070	0.128	0.176
Intensive-Margin Elasticity			
Lagged difference of first price (log)	-1.854**	-2.274***	-2.243***
	(0.762)	(0.621)	(0.550)
Lagged difference of annual income (log)	2.229	4.601**	5.826***
	(1.714)	(1.788)	(2.166)
Individual FE	Y	Y	Y
Time FE	Y	Y	Y
Other controls	Y	Y	Y
N	10939	10505	10040
R-squared	0.453	0.485	0.503

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. The lagged difference of first price (log) is $\ln(\text{Price}^{k}_{ijt}) - \ln(\text{Price}_{ij(t-k)})$, where Price^{k}_{ijt} calculates the giving price under the tax system in year t, using annual taxable income in year $t-k$, $\text{Income}_{ij(t-k)}$. The lagged of annual income (log) is $\ln(\text{Income}_{ijt}) - \ln(\text{Income}_{ij(t-k)})$. Other controls are lagged difference of age, lagged difference of squared age, the interaction between year dummies and education dummies, the interaction between year dummies and gender dummies, and the interaction between year dummies and resident area.

three robustness checks are in line with the baseline result, which shows that the price elasticity of intensive margin is less elastic than one of extensive margin. Thus, the obtained results suggest that the decision to donate is sensitive to the giving price, though the amount of donations is insensitive to the giving price once they decide to donate.

6. Conclusions

In this paper, we investigate the giving price elasticity and its heterogeneity as for perception towards the government using South Korean panel data. As a result, we obtain two findings.

Firstly, the estimation shows that the giving price elasticity in Korea is larger than 1 in the sense of absolute value. Although the estimated values seem vulnerable for the estimation method, most of results show that the giving price elasticity is more elastic for extensive margin than intensive margin. This implies that the policymakers should consider not only how much donors additionally pay (intensive margin) but also how many people will be donors (extensive margin) for tax reform.

Secondly, we show that the giving price elasticity for those who think that the government is inefficient is more elastic than the others. Although the previous research shows that those who do not believe the efficiency of the government would donate more than the others, our result firstly shows that such a behavior may depend on the giving price.

From the results, we show that the giving price elasticity would be affected by the efficiency of the government. However, researchers may find the difference of giving behavior as for the other dimensions of heterogeneities. To understand the giving behavior and to contribute the policy making, more sophisticated research is neeeded.

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