Charitable Giving, Tax Reform, and Government Efficiency*

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Abstract

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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.

However, if the government can provide public good more efficiently than the direct donation, the donation may not be preferable because the public good provision via donation would be costly then. Moreover, when the government is much more efficient than charities, people may not donate so much even if they have a warm-glow preference. Saez (2004) suggests that the change of the relative price between public good provision by donation and government will change the behavior of people and the price elasticity of donation. However, the evaluation about the efficiency of the government is usually subjective and different for people. If someone regard the government as efficient, the perceived relative price of giving would be high for them. Thus, the giving behavior would be affected by the subjective perception towards the government.

Considering these points, 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 first main concern is the price elasticity of charity. South Korea (Korea hereafter) experienced

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the 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. Thus, we exploit this tax reform as an exogenous policy change to derive the price elasticity of giving. 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. Our result classifies that the price elasticity of giving in Korea is -1.07 ~ -1.26, which is within the range of the extant research.

Our second concern is the relationship between the giving behavior and the perception towards the government. As we explained, people feeling administrative inefficiency would consider the direct donation is more efficient and would have more willingness to donate. Using the Korean field data, we investigate this and 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.

This paper contributes two strands of charitable giving literature: the elasticity of charitable donations with respect to their tax price and the perception of government's inefficiency. The examples of papers in the first 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].

In the second strand, there are some experimental studies and papers considering the tax evasion. Using an experiment, Li et al. (2011) compare people's willingness to give money for private charities and government agencies whose missions are the same. They show that people tend to donate for private charities more than government agency though they do not directly investigate the relationship between people's perception toward the government and giving behavior. Sheremeta and Uler (2020) show that people increase the voluntary public good provision when they face the wasteful government spending in the experimental setting. Although the government in their setting does not provide public good, they suggest that the willingness for donation may increase if people perceive the inefficiency of government. In

[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.

the tax evasion literature, several paper suggests the perceived inefficiency of government reduce tax morale (Anderson, 2017; Frey and Torgler, 2007; Hammar et al., 2009). We contribute on this literature by showing the relation between the perception of government efficiency and the giving behavior.

This paper consist of XXX sections. Section 2 and 3 respectively explain the institutional background and data. Section 4 deals with the analysis of giving price elasticity and section 5 shows the analysis of perceptions toward the government. We discuss the result in section 6 and section 7 concludes.

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, that is,

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

where $\tau(\cdot)$ is the marginal income tax rate which is determined by $y_i - g_i$. 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,

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

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%
(E) 15000 ~ 30000				35%	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.

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

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

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 (Need modification by Kim san)

The tax incentives for charitable giving in Korea stared in 2000 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.

Table 2: Summary Statistics

	N	Mean	Std.Dev.
Income and Giving Price			
Annual taxable income (unit: 10,000KRW)	53269	1876.121	2700.965
Giving Price	62878	0.858	0.036
Charitable Donations			
Annual charitable giving (unit: 10,000KRW)	67849	29.522	132.914
dummy of Donation > 0	67849	0.203	0.402
Government Efficiency			
Current Tax-Welfare Balance	29272	-0.137	0.889
Ideal Tax-Welfare Balance	29273	0.541	0.721
Individual Characteristics			
Age	67848	51.348	15.806
Female dummy	67848	0.525	0.499
University graduate	67842	0.411	0.492
High school graduate	67842	0.350	0.477
Junior high school graduate	67842	0.238	0.426

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 implements to study 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.

In the analysis, we use data from 2012 to 2018 since we focus on the 2014 tax reform. In addition, we exclude the subject of the sample, whose age is under 23, since they are not likely to have income or asset.

Figure 1 shows the proportion of donors and the average amount of donation by donors in the NasTaB data. It shows that about 20% of respondents in NasTaB data donate in each year and their amount of donation is about 1.7 million KRW.

3.2. Time Series of Chariable Giving

Summary statistics is summarized in Table **??**. We used four types of variables in this paper: sets of variables about Income and Giving Price, Charitable Donations, Government Efficiency, and Individual Characteristics. Giving Price is constructed according to the marginal income tax rate and income level of subjects under tax deduction system, while it is 0.85 under tax credit system, as we explained in section 2.

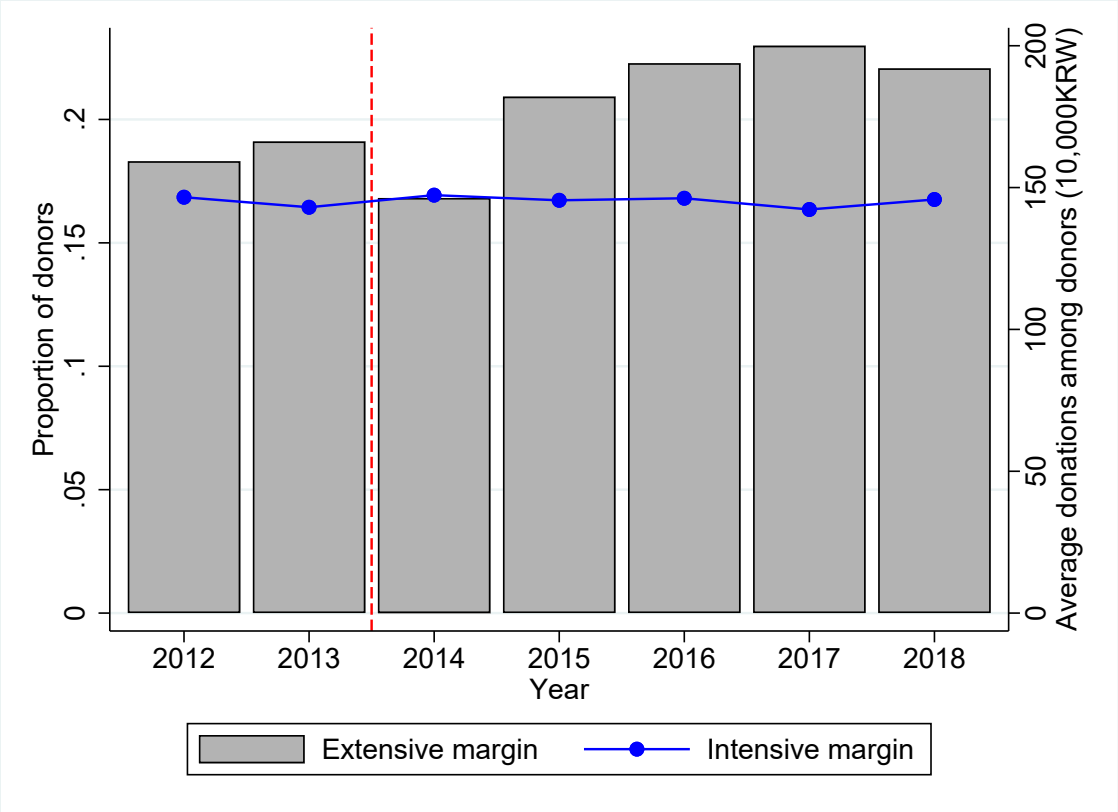

Figure 1: Proportion of Donors and Average Donations among Donors

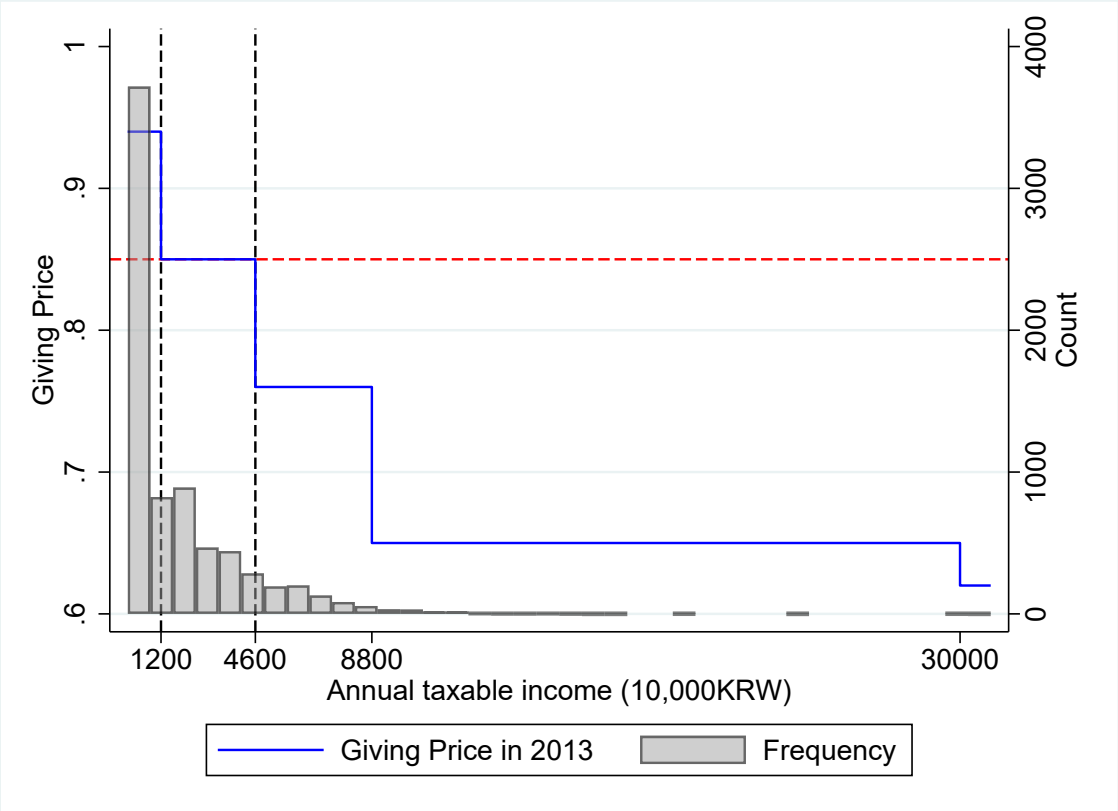

Figure 2: Income Distribution and Giving Price in 2013

Dummy of Donation takes 1 if subject donate and takes 0 otherwise. 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 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 is used as control variables.

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.

4. Estimation

Following Almunia et al. (2020), we estimate 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:

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

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).

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

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

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 because the major *within* price variation comes 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. By these two reasons, the *within* prive variation is partly endogenous.

Our identification assumption may violate due to two endogenous problems discussed above. To tackle these problems, we take two methods. First, 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 issue is simulatenous 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

Table 3 shows estimation results of overall elasticity. To get intuition, we do not distinguish elasticities into the intensive-margin one and the extensive-margin one. 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 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

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(auunaul taxable income)	5.392***	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-sq	0.009	0.010	0.010	0.011	0.020

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.

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.

5.2. Robustness Check

The first robustness check is the last price elasticity. Our main results show that *first* price elasticity to avoid the endogeneity of giving price. However, the first prive 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. The instrumental variable is the first giving price.

There is one caution to interapt 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,

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(auunaul taxable income)	2.015***	1.562**	1.445**	1.528**	1.571**
	(0.675)	(0.655)	(0.647)	(0.651)	(0.653)
N	11637	11637	11637	11637	11637
R-sq	0.006	0.009	0.012	0.013	0.034
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(auunaul taxable income)	1.175***	1.124***	1.125***	1.139***	1.102***
	(0.223)	(0.223)	(0.223)	(0.224)	(0.220)
Implied price elasiticity	-1.264***	-1.418***	-1.343***	-1.167***	-1.312***
	(0.226)	(0.237)	(0.256)	(0.256)	(0.253)
Implied income elasticity	5.778***	5.527***	5.531***	5.600***	5.420***
	(1.099)	(1.097)	(1.099)	(1.100)	(1.080)
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-sq	0.008	0.009	0.009	0.010	0.019

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}.

Table 5: Last Price Elasticity: Panel IV

	(1)	(2)	(3)	(4)	(5)
ln(last giving price)	-2.421***	-2.536***	-2.750***	-2.529***	-2.650***
	(0.204)	(0.216)	(0.233)	(0.231)	(0.229)
ln(auunaul taxable income)	5.258***	5.071***	4.981***	5.058***	4.910***
	(0.961)	(0.961)	(0.959)	(0.961)	(0.948)
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	149708.36	133463.98	122042.55	119684.05	115742.55
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.

covariate 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.[2] Thus, our last price elasiticity 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.

The second robustness check is to use data (i) from 2013 to 2018 or (ii) from 2013 to 2014. This robustness check is to tackle with the price change due to the change of income. As discussed before, the change of giving price is caused by both the tax reform and the chanage of income under the tax deduction system. By using subsample restricted by year, the within price variation of giving price is completely exgonenous because we control the annual taxable income.

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

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

	(1)	(2)	(3)	(4)	(5)
Intensive-Margin Elasticity					
ln(last giving price)	-0.898***	-0.961***	-1.197***	-0.998***	-1.074***
	(0.271)	(0.271)	(0.307)	(0.325)	(0.332)
ln(auunaul taxable income)	2.023***	1.638**	1.460**	1.530**	1.572**
	(0.694)	(0.678)	(0.667)	(0.670)	(0.667)
F-statistics of IV	8861.30	8893.12	7522.05	6585.00	6426.96
N	10672	10672	10672	10672	10672
Extensive-Margin Elasticity					
ln(last giving price)	-0.623***	-0.630***	-0.644***	-0.593***	-0.619***
	(0.046)	(0.049)	(0.053)	(0.052)	(0.052)
ln(auunaul taxable income)	1.125***	1.113***	1.103***	1.121***	1.090***
	(0.221)	(0.223)	(0.223)	(0.223)	(0.220)
Implied last price elasiticity	-3.063***	-3.100***	-3.167***	-2.917***	-3.046***
	(0.227)	(0.240)	(0.259)	(0.258)	(0.254)
Implied income elasticity	5.532***	5.472***	5.426***	5.513***	5.361***
	(1.088)	(1.096)	(1.096)	(1.098)	(1.082)
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	149708.36	133463.98	122042.55	119684.05	115742.55
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. 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(auunaul 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-sq	0.009	0.018	0.013	0.024

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.

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 controll covariates and its interaction with year dummies. This value is statistically significant 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 elasiticity is similart to the main results, which is statistically significant. When we use data from 2013 to 2014, the extensive-margin price elasticitiy is more elastic than the main results. Its abolute value is roughly -2, which is statistically significant. In summary, the second robustness check also leads to our first conlusion.

The third robustness check is to estimate the k-th difference model. To tackle with the price change due to the change of income, we estimate the k-th difference model formulated as follows:

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

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(auunaul taxable income)	1.943***	1.714***	1.440	1.047
	(0.662)	(0.649)	(2.975)	(3.072)
N	10158	10158	2922	2922
R-sq	0.006	0.034	0.004	0.046
Extensive-Margin Elasticity				
ln(giving price)	-0.235***	-0.269***	-0.331***	-0.383***
	(0.058)	(0.065)	(0.065)	(0.076)
ln(auunaul taxable income)	1.093***	1.024***	0.801*	0.574
	(0.230)	(0.226)	(0.428)	(0.447)
Implied price elasiticity	-1.136***	-1.300***	-1.845***	-2.131***
	(0.279)	(0.314)	(0.364)	(0.422)
Implied income elasticity	5.287***	4.954***	4.457*	3.196
	(1.114)	(1.094)	(2.381)	(2.488)
Individual FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Other Controls	N	Y	N	Y
N	45994	45992	14893	14893
R-sq	0.008	0.018	0.013	0.022

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}.

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

The our paramater of interest is δ. The variable $\Delta^k p_{it}$ is defined as $\Delta^k p_{it} \equiv \ln p_{it}(y_{it-k}) - \ln p_{it}(y_{it-k})$.[3] The variation of this variable comes from the tax reform only because we fix the annual income at year $t-k$. Therefore, we can safely interapt this coefficient as the price elasiticity of giving because the $\Delta^k p_{it}$ is exogenous. Especially, 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 interapt 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, our three robustness checks are in line with the our first conclusion. The decision to donate is sensitive to the giving price. On the other hand, the amount of donations is insensitive to the giving price once they decide to donate. However, we cannot obtain this conclusion when we use the k-th difference model. One possibility is that the variable of lagged difference of first price, $\Delta^k p_{it}$, is less varied. In fact, XXX.

6. Governement Efficient and Price Elasticity

6.1. Construct Efficiency Index

From the 2015 survey, NaSTaB asks the current and ideal balance between tax burden and welfare level. See the following table.

Welfare/Tax burden	Low	Middle	High
High	2	1	0
Middle	1	0	-1
Low	0	-1	2

[3] 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 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***	-2.170***	-1.752***
	(0.389)	(0.355)	(0.346)
Lagged difference of annual income (log)	2.737***	4.685***	5.307***
	(1.042)	(1.141)	(1.174)
N	49014	46610	44205
R-sq	0.010	0.015	0.015
Intensive-Margin Elasticity			
Lagged difference of first price (log)	-1.854**	-2.282***	-2.163***
	(0.763)	(0.621)	(0.550)
Lagged difference of annual income (log)	2.229	4.675***	5.582**
	(1.715)	(1.791)	(2.178)
Individual FE	Y	Y	Y
Time FE	Y	Y	Y
Other Controls	Y	Y	Y
N	10939	10505	10043
R-sq	0.066	0.073	0.055

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.

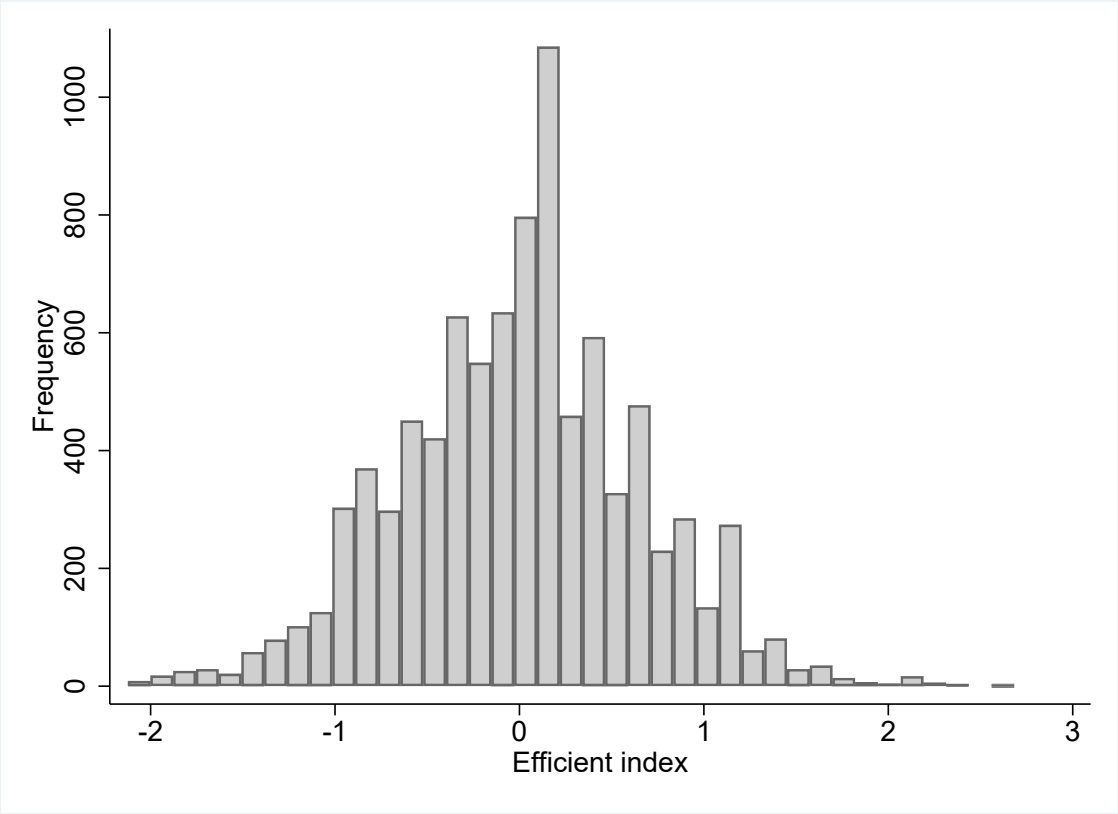

Figure 3: Histogram of Efficient Index

6.2. Construct Efficient Index (Cont'd)

- The pair of answers reflect the individual's perception about the efficiency of government because the government with low tax burden and high welfare level is clearly more efficient than one with high tax and low welfare.
- Based on the pair about current perception, we construct an index called efficiency index by the following steps.

    1. We assign the number from -2 to 2 for each pair of answers depending on the contents of answers, where -2 is the most inefficient and 2 is the most efficient.
    2. To construct the individual's persistent perception toward the government, we regress the assigned number on year fixed effect, the interaction between region and year fixed effect, and individual fixed effect.
    3. use the obtained fixed effect as the efficiency index

Table 10: Heterogenous Elasticity by Perceived Government Efficiency (1)

	Overall	Extensive	Intensive
	(1)	(2)	(3)
ln(giving price)	-1.356***	-0.284***	-0.952***
	(0.336)	(0.076)	(0.334)
ln(giving price) X 2Q Efficient Group	-0.032	-0.059	0.292
	(0.423)	(0.098)	(0.489)
ln(giving price) X 3Q Efficient Group	0.353	0.095	-0.285
	(0.417)	(0.097)	(0.545)
N	50455	50455	11327

6.3. Histrogram of Efficient Index

6.4. Two Potential Concerns

1. There is a room for subjects to interpret the questions of tax/welfare balance as questions about the expenditure policy of the government.
    - To address this issue, we use the question for ideal balance between tax burden and welfare level to rule out the subjects who consider that the higher welfare level than the tax burden is unfavorable.
2. Efficiency index の構成方法にかかわる問題をここに書こうかと思います。上記では固定効果をとっている理由を Persistent な政府への perception を見たいからとしていますが、別にそれぞれの時点での perception をとっても構わないだろうとツッコミが来ると思うので、なぜ固定効果をとっているのかなどを書いてもらえればと思います。

6.5. Heterogenous Price Elasticity by Governement Efficiency

To see the heterogenous price elasticity by efficient index, we utilize the interaction between the efficiency index and the giving price.

Bothe ways of the analyses use the sepcifications based on the Equation (XX) and (XX) for intensive and extensive margins, respectively.

We control individual and time fixed effect, and other covariates.

6.6. Heterogenous Price Elasticity: Estimations Results

6.7. Heterogenous Price Elasticity: Implied Elasticity

6.8. Robustness Check 1

First Potential Concern: interpretaion of the questions of tax/welfare balance as questions about the expenditure policy of the government

Table 11: Heterogenous Elasticity by Perceived Government Efficiency (2)

	Overall	Extensive	Intensive
	(1)	(2)	(3)
Implied price elasiticity (1Q efficient group)	-1.356***	-1.396***	-0.952***
	(0.336)	(0.374)	(0.334)
Implied price elasiticity (2Q efficient group)	-1.388***	-1.686***	-0.661*
	(0.330)	(0.378)	(0.394)
Implied price elasiticity (3Q efficient group)	-1.002***	-0.930**	-1.237***
	(0.327)	(0.374)	(0.468)
N	50455	50455	11327

Table 12: Heterogenous Elasticity Using Those whose Ideal Efficient Index > 0 (1)

	(1)	(2)	(3)
ln(giving price)	-1.831***	-0.316***	-1.303**
	(0.538)	(0.115)	(0.571)
ln(giving price) X 2Q Efficient Group	0.339	0.045	0.308
	(0.657)	(0.146)	(0.807)
ln(giving price) X 3Q Efficient Group	1.295**	0.237*	0.236
	(0.586)	(0.135)	(0.834)
N	23366	23366	5004

- First, we construct three quantile groups, using the original efficient index.
- Second, we rule out the subjects whose efficiency index for the ideal balance question is less than 0 from each group.

6.9. Robustness Check 1: Density of Efficient Index

6.10. Robustness Check 1: Estimation Results

6.11. Robustness Check 1: Implied Price Elasticity

6.12. Robustness Check 2

Second potential concern: Last price elasticity

- We repeat same excercise as the panel IV including two interaction terms as endogenous variables.
- Exgonenous variables are the interaction between giving price and dummies of efficient index group.

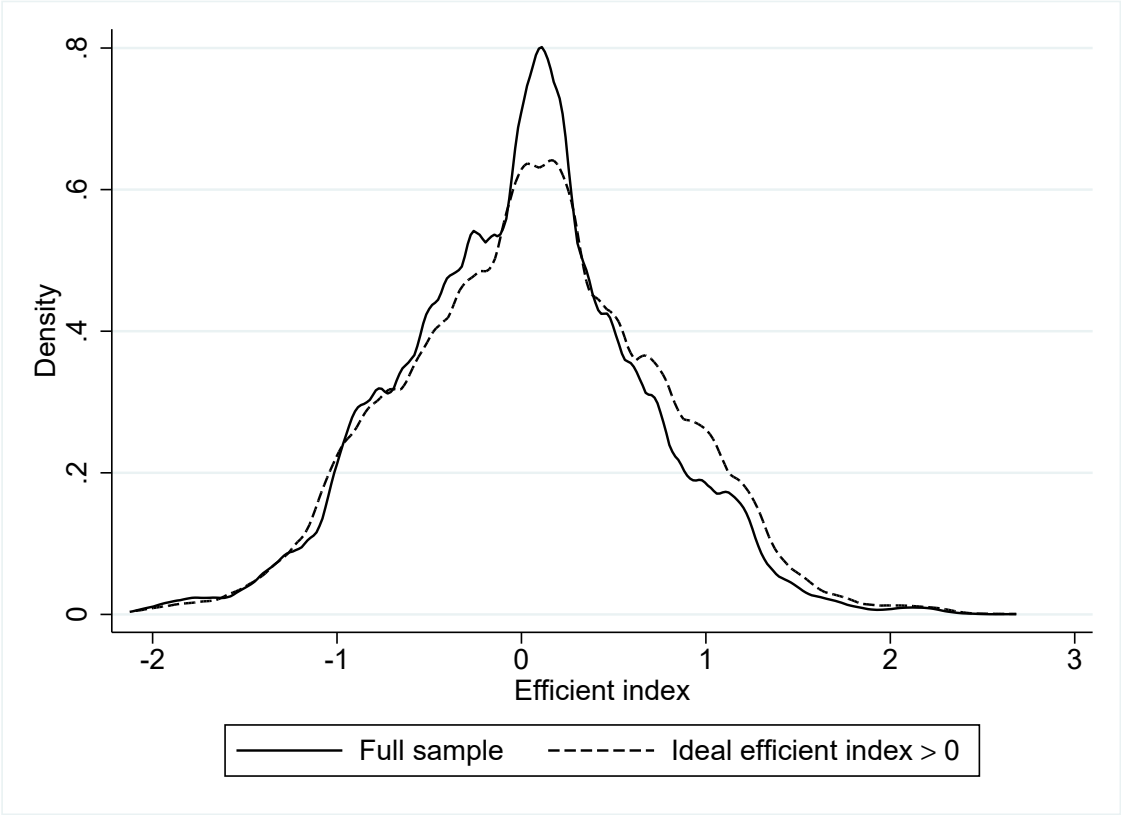

Figure 4: Density of Efficient Index Using those whose ideal efficient index > 0

Table 13: Heterogenous Elasticity Using Those whose Ideal Efficient Index > 0 (1)

	(1)	(2)	(3)
Implied price elasiticity (1Q efficient group)	-1.831***	-1.555***	-1.303**
	(0.538)	(0.565)	(0.571)
Implied price elasiticity (2Q efficient group)	-1.492***	-1.335**	-0.995
	(0.505)	(0.561)	(0.622)
Implied price elasiticity (3Q efficient group)	-0.536	-0.392	-1.067
	(0.416)	(0.500)	(0.680)
N	23366	23366	5004

Table 14: Heterogenous Last Price Elasticity: Panel IV (1)

	Full Sample		
	Overall	Extensive	Intensive
	(1)	(2)	(3)
ln(last giving price)	-2.604***	-0.586***	-1.166***
	(0.342)	(0.077)	(0.438)
ln(last giving price) X 2Q Efficient Group	-0.272	-0.104	0.043
	(0.417)	(0.095)	(0.591)
ln(last giving price) X 3Q Efficient Group	-0.010	-0.038	0.111
	(0.420)	(0.096)	(0.709)
N	49575	49575	10447

Table 15: Heterogenous Last Price Elasticity: Panel IV (2)

	Full Sample		
	Overall	Extensive	Intensive
	(1)	(2)	(3)
Implied last price elasiticity (1Q efficient group)	-2.604***	-2.883***	-1.166***
	(0.342)	(0.377)	(0.438)
Implied last price elasiticity (2Q efficient group)	-2.876***	-3.395***	-1.122**
	(0.318)	(0.362)	(0.488)
Implied last price elasiticity (3Q efficient group)	-2.614***	-3.071***	-1.055*
	(0.328)	(0.371)	(0.639)
N	49575	49575	10447

Table 16: Heterogenous Last Price Elasticity: Panel IV (3)

	Ideal Efficient Index > 0		
	Overall	Extensive	Intensive
	(4)	(5)	(6)
ln(last giving price)	-2.984***	-0.579***	-1.681**
	(0.551)	(0.116)	(0.778)
ln(last giving price) X 2Q Efficient Group	-0.108	-0.063	0.239
	(0.645)	(0.141)	(1.019)
ln(last giving price) X 3Q Efficient Group	0.894	0.056	1.285
	(0.588)	(0.132)	(1.071)
N	22974	22974	4612

Table 17: Heterogenous Last Price Elasticity: Panel IV (4)

	Ideal Efficient Index > 0		
	Overall	Extensive	Intensive
	(4)	(5)	(6)
Implied last price elasiticity (1Q efficient group)	-2.984***	-3.097***	-1.681**
	(0.551)	(0.621)	(0.778)
Implied last price elasiticity (2Q efficient group)	-3.092***	-3.432***	-1.442*
	(0.491)	(0.583)	(0.776)
Implied last price elasiticity (3Q efficient group)	-2.091***	-2.796***	-0.396
	(0.414)	(0.533)	(0.892)
N	22974	22974	4612

6.13. Robustness Check 2: Estimation Results (1)

6.14. Robustness Check 2: Implied Price Elasticity (1)

6.15. Robustness Check 2: Estimation Results (2)

6.16. Robustness Check 2: Implied Price Elasticity (2)

6.17. Robustness Check 3

Third potential concerns: Price change due to the change in income

- To resolve this concern, we used the data (i) from 2013 to 2018 or (ii) from 2013 to 2014, and estimated the fixed effect model.
  - By this restriction, the *within* price variation of giving price is completely exgonenous.
- We include interactions between giving price and dummies of the efficient quantile group.

Table 18: Heterogenous Last Price Elasticity: Panel IV (1)

	Full Sample		
	Overall	Extensive	Intensive
	(1)	(2)	(3)
ln(giving price)	-1.116***	-0.197**	-1.175***
	(0.425)	(0.096)	(0.380)
ln(giving price) X 2Q Efficient Group	-0.499	-0.198	0.164
	(0.544)	(0.124)	(0.558)
ln(giving price) X 3Q Efficient Group	-0.125	-0.060	-0.167
	(0.530)	(0.124)	(0.630)
N	44115	44115	9967

Table 19: Heterogenous Last Price Elasticity: Panel IV

	Full Sample		
	Overall	Extensive	Intensive
	(1)	(2)	(3)
Implied price elasiticity (1Q efficient group)	-1.116***	-0.951**	-1.175***
	(0.425)	(0.464)	(0.380)
Implied price elasiticity (2Q efficient group)	-1.615***	-1.910***	-1.011**
	(0.431)	(0.470)	(0.455)
Implied price elasiticity (3Q efficient group)	-1.240***	-1.242***	-1.342**
	(0.413)	(0.470)	(0.549)
N	44115	44115	9967

6.18. Robustness Check 3: Estimation Result (1)

6.19. Robustness Check 3: Implied Price Elasticity (1)

6.20. Robustness Check 3: Estimation Result (3)

6.21. Robustness Check 3: Implied Price Elasticity (4)

6.22. Robustness Check 4

Third potential concerns: Price change due to the change in income

- To exclude this potential concerns, previous identification strategy uses the 2014 tax reform.
- We can also rule out this problem, using the change in the first giving price.
  - The change in the first giving price is $\ln(p_{it}(y_{it-k} - g_{it-k})/p_{it-k}(y_{it-k} - g_{it-k}))$ where $g_{it-k} = 0$.
  - Since we fix the income y_{it-k}, this variation comes from the tax reform.

Table 20: Heterogenous Last Price Elasticity: Panel IV (3)

	Ideal Efficient Index > 0		
	Overall	Extensive	Intensive
	(4)	(5)	(6)
ln(giving price)	-1.526**	-0.187	-1.301*
	(0.650)	(0.146)	(0.713)
ln(giving price) X 2Q Efficient Group	0.064	-0.090	-0.094
	(0.863)	(0.192)	(0.974)
ln(giving price) X 3Q Efficient Group	0.448	-0.036	0.197
	(0.733)	(0.175)	(0.941)
N	20441	20441	4419

Table 21: Heterogenous Last Price Elasticity: Panel IV (4)

	Ideal Efficient Index > 0		
	Overall	Extensive	Intensive
	(4)	(5)	(6)
Implied price elasiticity (1Q efficient group)	-1.526**	-1.000	-1.301*
	(0.650)	(0.780)	(0.713)
Implied price elasiticity (2Q efficient group)	-1.462**	-1.480*	-1.394*
	(0.730)	(0.835)	(0.755)
Implied price elasiticity (3Q efficient group)	-1.078*	-1.193*	-1.103
	(0.550)	(0.722)	(0.739)
N	20441	20441	4419

Table 22: Heterogenous Price Elasticity: k-difference Model (1)

	Overall Elasticity		
Lag k	$k=1$	$k=2$	$k=3$
	(1)	(2)	(3)
Lagged difference of first price (log)	-1.778***	-2.884***	-2.467***
	(0.553)	(0.520)	(0.509)
X 2Q Efficient Group	-0.204	0.970	0.755
	(0.747)	(0.687)	(0.648)
X 3Q Efficient Group	-0.346	1.316**	1.440**
	(0.704)	(0.644)	(0.624)
N	46661	44448	42198

Table 23: Heterogenous Price Elasticity: k-difference Model (2)

	Overall Elasticity		
Lag k	$k=1$	$k=2$	$k=3$
	(1)	(2)	(3)
Implied price elasiticity (1Q efficient group)	-1.778***	-2.884***	-2.467***
	(0.553)	(0.520)	(0.509)
Implied price elasiticity (2Q efficient group)	-1.982***	-1.914***	-1.712***
	(0.611)	(0.546)	(0.508)
Implied price elasiticity (3Q efficient group)	-2.123***	-1.568***	-1.027**
	(0.550)	(0.494)	(0.485)
N	46661	44448	42198

Table 24: Heterogenous Price Elasticity: k-difference Model (3)

	Intensive-Margin Elasticity		
Lag k	$k=1$	$k=2$	$k=3$
	(4)	(5)	(6)
Lagged difference of first price (log)	-1.401	-2.320**	-2.549***
	(1.074)	(0.970)	(0.788)
X 2Q Efficient Group	-0.113	-0.035	0.942
	(1.548)	(1.331)	(1.128)
X 3Q Efficient Group	-1.439	0.218	0.302
	(1.610)	(1.319)	(1.196)
N	10675	10257	9811

Table 25: Heterogenous Price Elasticity: k-difference Model (4)

	Intensive-Margin Elasticity		
Lag k	$k=1$	$k=2$	$k=3$
	(4)	(5)	(6)
Implied price elasiticity (1Q efficient group)	-1.401	-2.320**	-2.549***
	(1.074)	(0.970)	(0.788)
Implied price elasiticity (2Q efficient group)	-1.515	-2.355**	-1.607*
	(1.230)	(0.986)	(0.885)
Implied price elasiticity (3Q efficient group)	-2.840**	-2.102**	-2.248**
	(1.317)	(0.995)	(0.973)
N	10675	10257	9811

Table 26: Heterogenous Price Elasticity: k-difference Model Using Those whose Ideal Efficient Index > 0 (1)

	Overall Elasticity		
Lag k	$k=1$	$k=2$	$k=3$
	(1)	(2)	(3)
Lagged difference of first price (log)	-2.215**	-3.269***	-2.647***
	(0.872)	(0.794)	(0.821)
X 2Q Efficient Group	0.078	0.900	0.604
	(1.233)	(1.070)	(0.972)
X 3Q Efficient Group	-0.666	2.307***	2.242**
	(1.024)	(0.894)	(0.875)
N	21583	20516	19422

Table 27: Heterogenous Price Elasticity: k-difference Model Using Those whose Ideal Efficient Index > 0 (2)

	Overall Elasticity		
Lag k	$k=1$	$k=2$	$k=3$
	(1)	(2)	(3)
Implied price elasiticity (1Q efficient group)	-2.215**	-3.269***	-2.647***
	(0.872)	(0.794)	(0.821)
Implied price elasiticity (2Q efficient group)	-2.137**	-2.369***	-2.042***
	(1.064)	(0.869)	(0.725)
Implied price elasiticity (3Q efficient group)	-2.881***	-0.962	-0.404
	(0.795)	(0.633)	(0.590)
N	21583	20516	19422

Table 28: Heterogenous Price Elasticity: k-difference Model Using Those whose Ideal Efficient Index > 0 (3)

	Intensive-Margin Elasticity		
Lag k	$k=1$	$k=2$	$k=3$
	(4)	(5)	(6)
Lagged difference of first price (log)	-0.841	-4.928***	-2.227
	(1.936)	(1.780)	(1.588)
X 2Q Efficient Group	-0.752	1.312	-0.954
	(2.841)	(2.329)	(1.992)
X 3Q Efficient Group	-3.101	3.154	2.071
	(2.646)	(2.219)	(2.081)
N	4686	4474	4245

Table 29: Heterogenous Price Elasticity: k-difference Model Using Those whose Ideal Efficient Index > 0 (4)

	Intensive-Margin Elasticity		
Lag k	$k=1$	$k=2$	$k=3$
	(4)	(5)	(6)
Implied price elasiticity (1Q efficient group)	-0.841	-4.928***	-2.227
	(1.936)	(1.780)	(1.588)
Implied price elasiticity (2Q efficient group)	-1.592	-3.616**	-3.182**
	(2.238)	(1.656)	(1.336)
Implied price elasiticity (3Q efficient group)	-3.942*	-1.775	-0.156
	(2.032)	(1.514)	(1.461)
N	4686	4474	4245

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