Charitable Giving, Tax Reform, and Government Efficiency*

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Abstract

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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, n.d.). 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 (n.d.), 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

<table>
<tr><th>Income/Year</th><th>2008</th><th>2009</th><th>2010 ~ 2011</th><th>2012 ~ 2013</th><th>2014 ~ 2016</th><th>2017</th><th>2018</th></tr>
<tr><td>(A) ~ 1200</td><td>8%</td><td>6%</td><td>6%</td><td>6%</td><td>6%</td><td>6%</td><td>6%</td></tr>
<tr><td>(B) 1200 ~ 4600</td><td>17%</td><td>16%</td><td>15%</td><td>15%</td><td>15%</td><td>15%</td><td>15%</td></tr>
<tr><td>(C) 4600 ~ 8800</td><td>26%</td><td>25%</td><td>24%</td><td rowspan="2">24%</td><td>24%</td><td>24%</td><td>24%</td></tr>
<tr><td>(D) 8800 ~ 15000</td><td rowspan="4">35%</td><td rowspan="4">35%</td><td rowspan="4">35%</td><td rowspan="2">35%</td><td rowspan="2">35%</td><td>35%</td></tr>
<tr><td>(E) 15000 ~ 30000</td><td>35%</td><td rowspan="3">38%</td><td>38%</td></tr>
<tr><td>(F) 30000 ~ 50000</td><td rowspan="2">38%</td><td>38%</td><td>40%</td></tr>
<tr><td>(G) 50000 ~</td><td>40%</td><td>42%</td></tr>
</table>

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. 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

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 the items of the value survey which we focused is not available before 2012. 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.

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. 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.

3.1. Time Series of Chariable Giving

4. Estimation

4.1. Empirical strategies

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

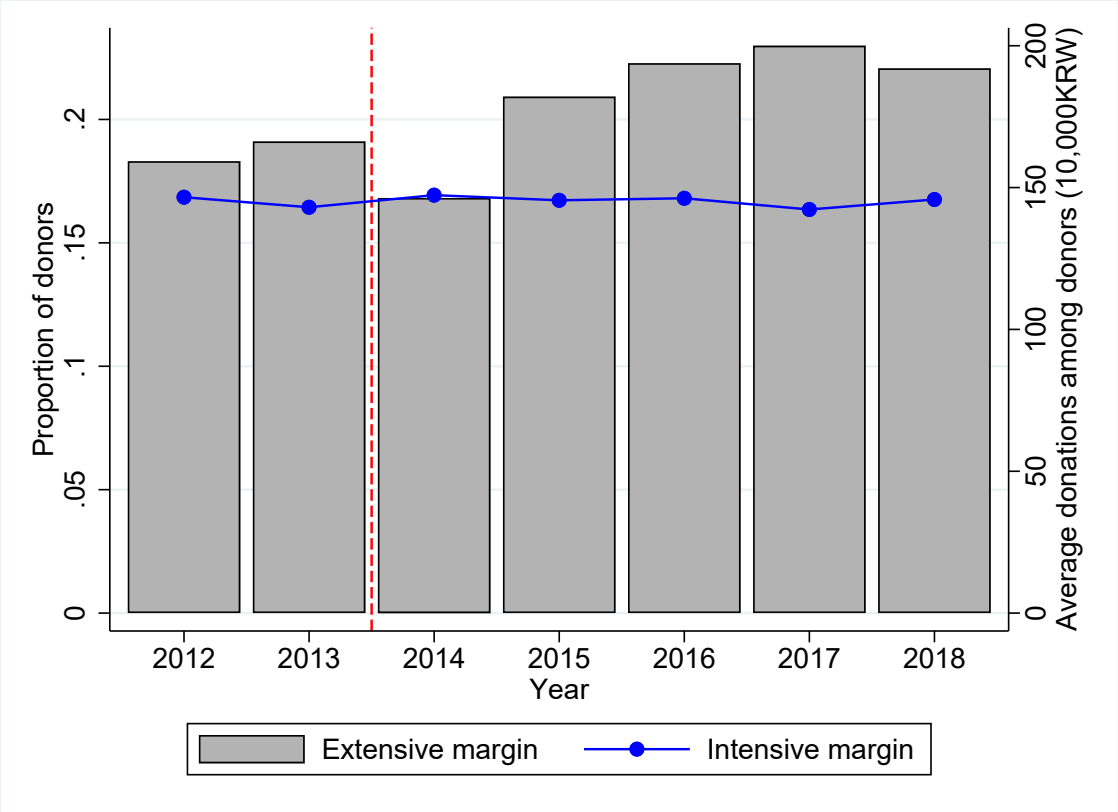

Figure 1: Proportion of Donors and Average Donations among Donors

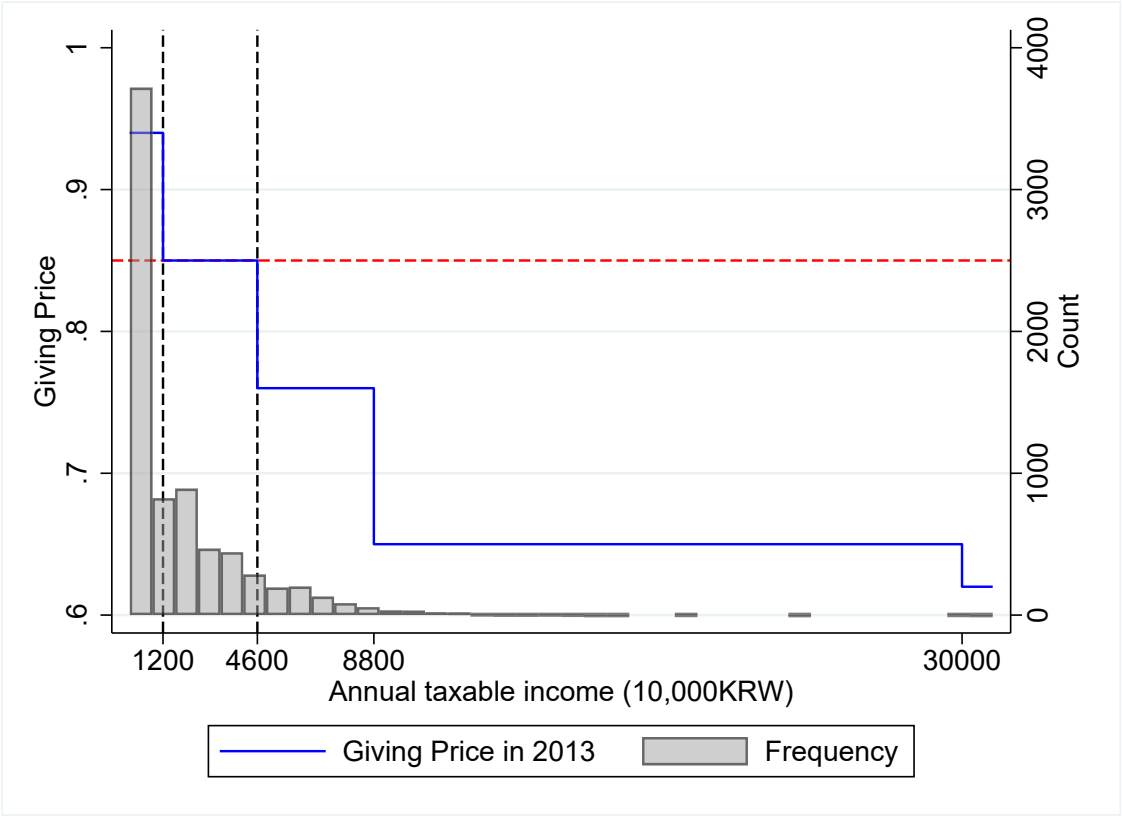

Figure 2: Income Distribution and Giving Price in 2013

Table 2: Summary Statistics

	N	Mean	Std.Dev.	Min	p25	p50	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	62878	0.858	0.036	0.62	0.85	0.85	0.850	0.94
Charitable Donations								
Annual charitable giving (unit: 10,000KRW)	67849	29.522	132.914	0.00	0.00	0.00	0.000	10000.00
dummy of Donation > 0	67849	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

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

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

D_{it} is a dummy variable taking 1 if individual i donates at year t and 0 otherwise. We use linear probability model following Almunia et al. (2020) since the fitted probabilities always take values within the range of (0,

1). Using e_{EXT} in this equation, the price elasticity of extensive margin can be calculated as $\varepsilon_{EXT} = \gamma/\bar{D}$. $\bar{D}$ is the sample mean of D_{it}, which is the proportion of donors in our sample in year t.

Our identification strategy to estimate the price elasticity exploits the exogenous giving price change made by tax reform in 2014. The tax reform brought the reduction of giving price for individual whose income was low, while the high income earner faced the increment of giving price and the price was not changed for the middle income individual. Figure XXX shows the residual plot which shows the average residuals of E.q. (4.1) for three different groups: (i) income $<$ 12 million KRW, (ii) income $\in$ [12 million KRW, 46 million KRW), and (iii) income $>$ 46 million KRW. We can consider that group (i) and (iii) respectively experienced the giving price reduction and increase, while the giving price for group (ii) remained the same, in the 2014 tax reform. Contrary to the expectation, the amount of donations increase for group (iii) while it reduce for group (i) after the tax reform in Figure XXX. However, figure XXX plotting the average residuals of each group of E.q. (4.1) observes the reduction of donation for group (iii) as expected. Thus, the tax reform in 2014 might have a large effect on the extensive margin of donation.

ここらへんの議論ですが、以下の点、要検討です。これらが解決しないと残差プロットの図を出す意味は殆どないと思います。

- 残差プロットの図が Intensive margin について、期待される図とはかなり異なる結果を出しているので、どう議論しようか悩みどころです。
- 平行トレンドについてですが、ここでは政策変更前の期間が 1 期しかないので、チェックできません。なので、個人的には政府の効率性の議論にかかわらず、期間を延長して分析・図を見せるのもありだと思います。とりあえずのバージョンでは平行トレンドについては書きません。

4.1.1. Obstacles for identification

The estimations based on Eq. (**??**) and (**??**) are likely to show biased estimates because there are two potential endogeneity problem: (A) endogeneity of giving price and (B) simultaneous determination of income and donations. For the issue (A), 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.

Regarding issue (B), the change of income caused by the tax reform have effects on both donations through the income effect and the giving price through the marginal tax rate. Therefore, we employ lagged

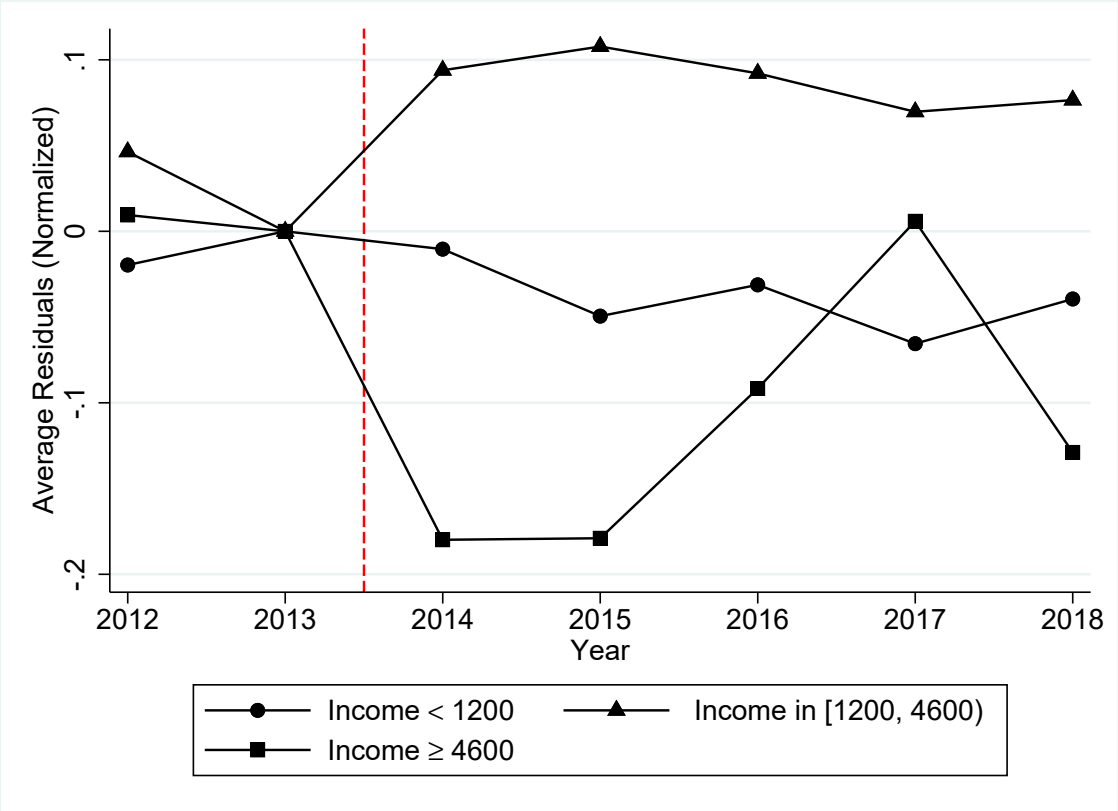

Figure 3: Average Residuals Grouped by Year and Tax-Reform Benefit Group

values of taxable income and construct an instrument variable for the change in the first price of giving as following:

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

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 using the income level which is not affected by the tax reform, 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

6. Governement Efficient and Price Elasticity

7. Conclusions

7.1. Conclusions

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.

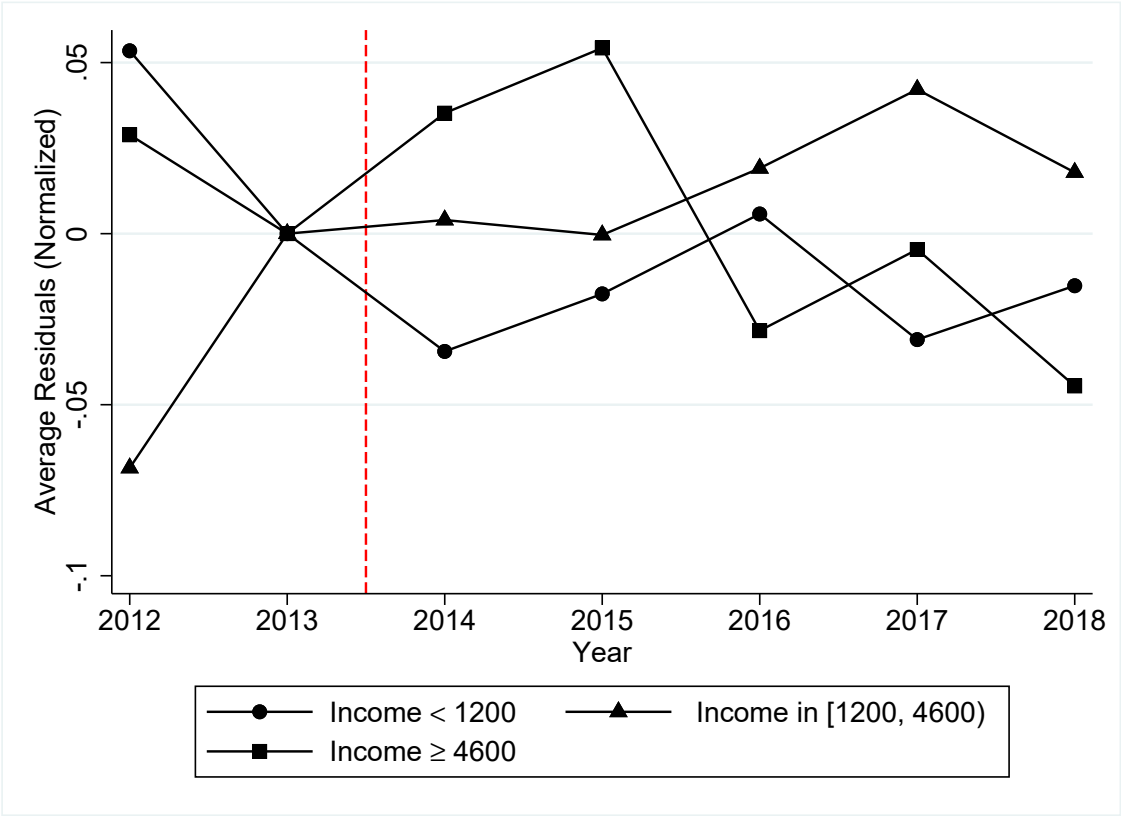

Figure 4: Average Residuals Grouped by Year and Tax-Reform Benefit Group (Intensive Margin)

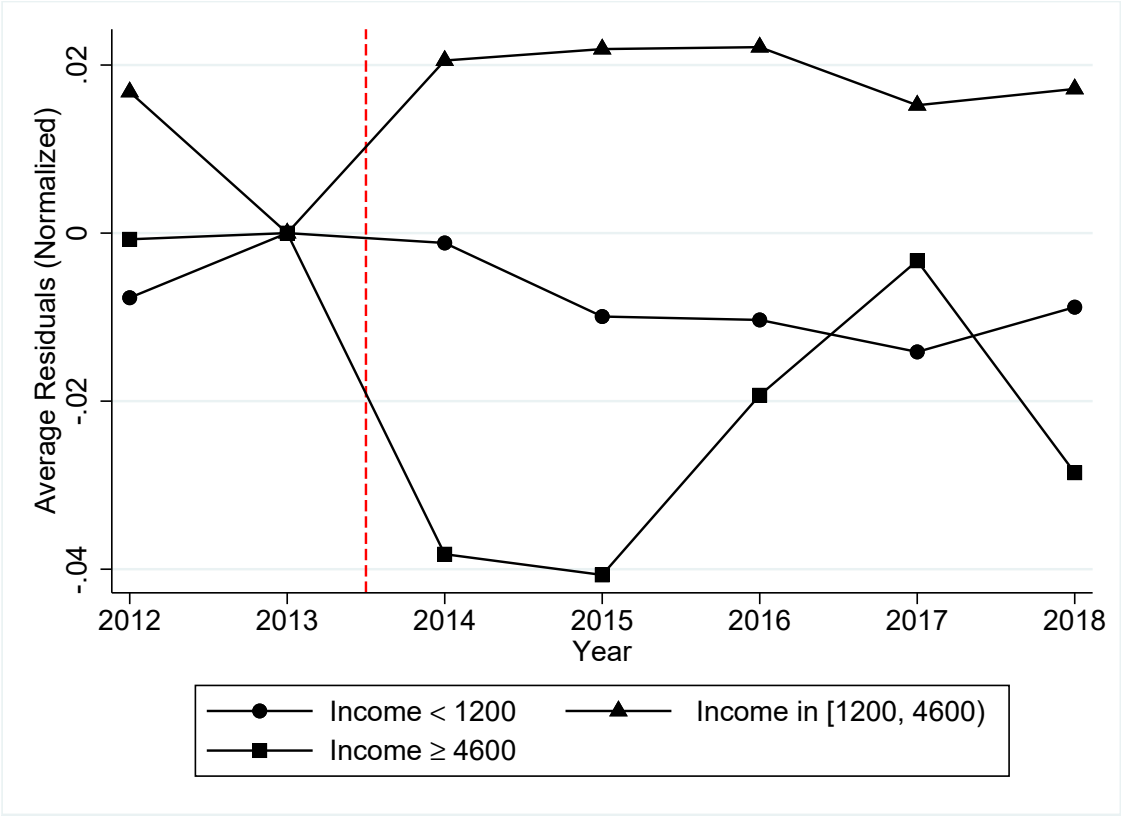

Figure 5: Average Residuals Grouped by Year and Tax-Reform Benefit Group (Extensive Margin)

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}.

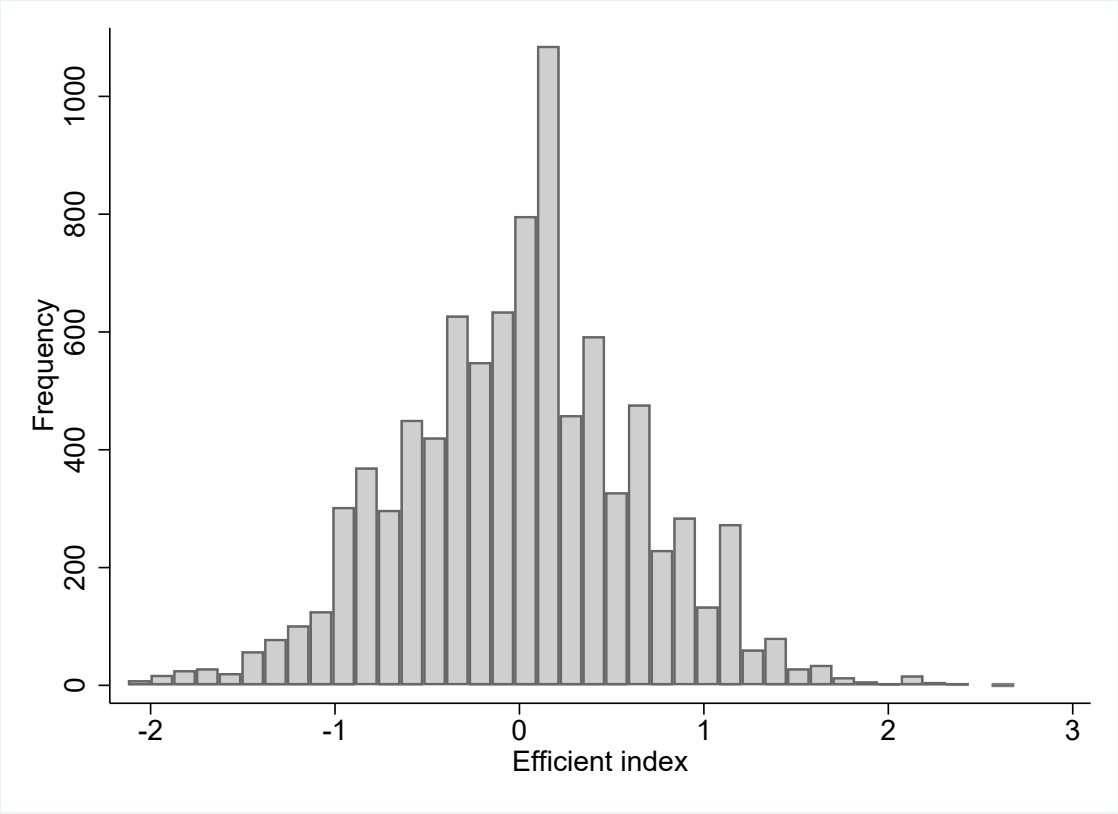

Figure 6: Histogram of Efficient Index

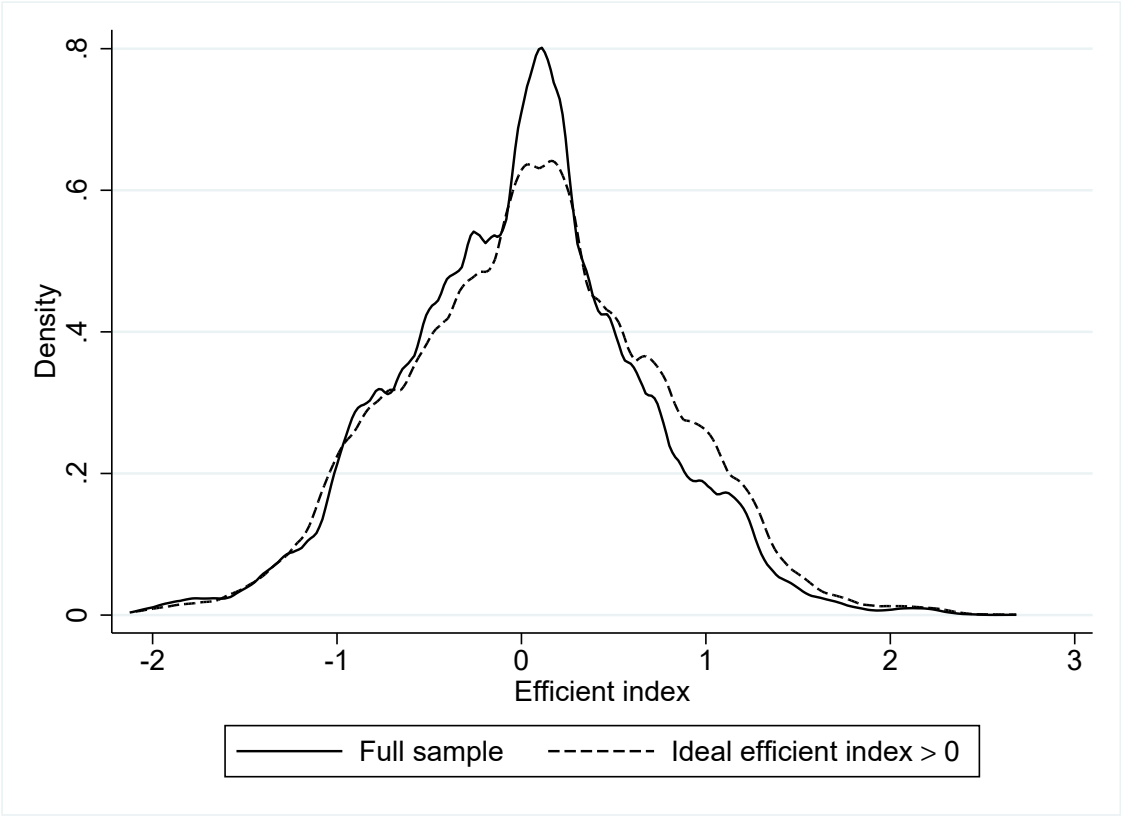

Figure 7: Density of Efficient Index Using those whose ideal efficient index > 0

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.

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 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}.

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.

Table 10: Heterogenous Elasticity by Perceived Government Efficiency

	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)
ln(auunaul taxable income)	4.943***	1.104***	1.589**
	(0.959)	(0.222)	(0.657)
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)
Implied income elasticity	4.943***	5.429***	1.589**
	(0.959)	(1.093)	(0.657)
Individual FE	Y	Y	Y
Time FE	Y	Y	Y
Other Controls	Y	Y	Y
N	50455	50455	11327
R-sq	0.020	0.020	0.034

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. The 2Q (3Q) Efficient Group is a dummy varaible taking 1 if individual i belongs to the second (third) quanitle of efficient index. 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-margin elasticity is evaluated at the sample mean of D_{ijt}.

Table 11: Heterogenous Elasticity Using Those whose Ideal Efficient Index > 0

	Overall	Extensive	Intensive
	(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)
ln(auunaul taxable income)	5.686***	1.202***	3.225*
	(1.272)	(0.273)	(1.880)
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)
Implied income elasticity	5.686***	5.913***	3.225*
	(1.272)	(1.344)	(1.880)
Individual FE	Y	Y	Y
Time FE	Y	Y	Y
Other Controls	Y	Y	Y
N	23366	23366	5004
R-sq	0.020	0.019	0.057

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. The 2Q (3Q) Efficient Group is a dummy varaible taking 1 if individual i belongs to the second (third) quanitle of efficient index. 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. We drop units whose the ideal efficient index is less than or equal to zero. The implied extensive-margin elasticity is evaluated at the sample mean of D_{ijt}.

Table 12: Heterogenous Last Price Elasticity: Panel IV

	Full Sample			Ideal Efficient Index > 0		
	Overall	Extensive	Intensive	Overall	Extensive	Intensive
	(1)	(2)	(3)	(4)	(5)	(6)
ln(last giving price)	-2.604***	-0.586***	-1.166***	-2.984***	-0.579***	-1.681**
	(0.342)	(0.077)	(0.438)	(0.551)	(0.116)	(0.778)
ln(last giving price) X 2Q Efficient Group	-0.272	-0.104	0.043	-0.108	-0.063	0.239
	(0.417)	(0.095)	(0.591)	(0.645)	(0.141)	(1.019)
ln(last giving price) X 3Q Efficient Group	-0.010	-0.038	0.111	0.894	0.056	1.285
	(0.420)	(0.096)	(0.709)	(0.588)	(0.132)	(1.071)
ln(auunaul taxable income)	4.892***	1.087***	1.597**	5.313***	1.141***	2.743
	(0.958)	(0.222)	(0.670)	(1.282)	(0.277)	(1.947)
Implied last price elasiticity (1Q efficient group)	-2.604***	-2.883***	-1.166***	-2.984***	-3.097***	-1.681**
	(0.342)	(0.377)	(0.438)	(0.551)	(0.621)	(0.778)
Implied last price elasiticity (2Q efficient group)	-2.876***	-3.395***	-1.122**	-3.092***	-3.432***	-1.442*
	(0.318)	(0.362)	(0.488)	(0.491)	(0.583)	(0.776)
Implied last price elasiticity (3Q efficient group)	-2.614***	-3.071***	-1.055*	-2.091***	-2.796***	-0.396
	(0.328)	(0.371)	(0.639)	(0.414)	(0.533)	(0.892)
Implied income elasticity	4.892***	5.345***	1.597**	5.313***	6.097***	2.743
	(0.958)	(1.094)	(0.670)	(1.282)	(1.481)	(1.947)
Individual FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Other Controls	Y	Y	Y	Y	Y	Y
N	49575	49575	10447	22974	22974	4612

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. The 2Q (3Q) Efficient Group is a dummy varaible taking 1 if individual i belongs to the second (third) quanitle of efficient index. 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 instumental variables are the first giving price in year t and its interaction with the 2Q (3Q) Efficient Group. We drop units whose the ideal efficient index is less than or equal to zero in column (4)-(6). The implied extensive-margin elasticity is evaluated at the sample mean of D_{ijt}.

Table 13: Heterogenous Price Elasticity with Data after 2012

	Full Sample			Ideal Efficient Index > 0		
	Overall	Extensive	Intensive	Overall	Extensive	Intensive
	(1)	(2)	(3)	(4)	(5)	(6)
ln(giving price)	-1.116***	-0.197**	-1.175***	-1.526**	-0.187	-1.301*
	(0.425)	(0.096)	(0.380)	(0.650)	(0.146)	(0.713)
ln(giving price) X 2Q Efficient Group	-0.499	-0.198	0.164	0.064	-0.090	-0.094
	(0.544)	(0.124)	(0.558)	(0.863)	(0.192)	(0.974)
ln(giving price) X 3Q Efficient Group	-0.125	-0.060	-0.167	0.448	-0.036	0.197
	(0.530)	(0.124)	(0.630)	(0.733)	(0.175)	(0.941)
ln(auunaul taxable income)	4.777***	1.034***	1.757***	6.126***	1.239***	2.903
	(1.002)	(0.229)	(0.652)	(1.414)	(0.305)	(2.188)
Implied price elasiticity (1Q efficient group)	-1.116***	-0.951**	-1.175***	-1.526**	-1.000	-1.301*
	(0.425)	(0.464)	(0.380)	(0.650)	(0.780)	(0.713)
Implied price elasiticity (2Q efficient group)	-1.615***	-1.910***	-1.011**	-1.462**	-1.480*	-1.394*
	(0.431)	(0.470)	(0.455)	(0.730)	(0.835)	(0.755)
Implied price elasiticity (3Q efficient group)	-1.240***	-1.242***	-1.342**	-1.078*	-1.193*	-1.103
	(0.413)	(0.470)	(0.549)	(0.550)	(0.722)	(0.739)
Implied income elasticity	4.777***	4.998***	1.757***	6.126***	6.622***	2.903
	(1.002)	(1.107)	(0.652)	(1.414)	(1.632)	(2.188)
Individual FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Other Controls	Y	Y	Y	Y	Y	Y
N	44115	44115	9967	20441	20441	4419
R-sq	0.018	0.019	0.034	0.018	0.018	0.061

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. The 2Q (3Q) Efficient Group is a dummy varaible taking 1 if individual i belongs to the second (third) quanitle of efficient index. 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. We drop units whose the ideal efficient index is less than or equal to zero in column (4)-(6). The implied extensive-margin elasticity is evaluated at the sample mean of D_{ijt}.

Table 14: Heterogenous Price Elasticity: k-difference Model

	Overall Elasticity			Intensive-Margin Elasticity		
Lag k	$k=1$	$k=2$	$k=3$	$k=1$	$k=2$	$k=3$
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged difference of first price (log)	-1.778***	-2.884***	-2.467***	-1.401	-2.320**	-2.549***
	(0.553)	(0.520)	(0.509)	(1.074)	(0.970)	(0.788)
X 2Q Efficient Group	-0.204	0.970	0.755	-0.113	-0.035	0.942
	(0.747)	(0.687)	(0.648)	(1.548)	(1.331)	(1.128)
X 3Q Efficient Group	-0.346	1.316**	1.440**	-1.439	0.218	0.302
	(0.704)	(0.644)	(0.624)	(1.610)	(1.319)	(1.196)
Lagged difference of annual income (log)	2.685**	4.641***	5.274***	2.208	4.849***	5.471**
	(1.045)	(1.149)	(1.185)	(1.712)	(1.816)	(2.189)
Implied price elasiticity (1Q efficient group)	-1.778***	-2.884***	-2.467***	-1.401	-2.320**	-2.549***
	(0.553)	(0.520)	(0.509)	(1.074)	(0.970)	(0.788)
Implied price elasiticity (2Q efficient group)	-1.982***	-1.914***	-1.712***	-1.515	-2.355**	-1.607*
	(0.611)	(0.546)	(0.508)	(1.230)	(0.986)	(0.885)
Implied price elasiticity (3Q efficient group)	-2.123***	-1.568***	-1.027**	-2.840**	-2.102**	-2.248**
	(0.550)	(0.494)	(0.485)	(1.317)	(0.995)	(0.973)
Implied income elasticity	2.685**	4.641***	5.274***	2.208	4.849***	5.471**
	(1.045)	(1.149)	(1.185)	(1.712)	(1.816)	(2.189)
Individual FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Other Controls	Y	Y	Y	Y	Y	Y
N	46661	44448	42198	10675	10257	9811
R-sq	0.010	0.016	0.015	0.066	0.073	0.055

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. The 2Q (3Q) Efficient Group is a dummy varaible taking 1 if individual i belongs to the second (third) quanitle of efficient index. 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.

Table 15: Heterogenous Price Elasticity: k-difference Model Using Those whose Ideal Efficient Index > 0

	Overall Elasticity			Intensive-Margin Elasticity		
Lag k	$k=1$	$k=2$	$k=3$	$k=1$	$k=2$	$k=3$
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged difference of first price (log)	-2.215**	-3.269***	-2.647***	-0.841	-4.928***	-2.227
	(0.872)	(0.794)	(0.821)	(1.936)	(1.780)	(1.588)
X 2Q Efficient Group	0.078	0.900	0.604	-0.752	1.312	-0.954
	(1.233)	(1.070)	(0.972)	(2.841)	(2.329)	(1.992)
X 3Q Efficient Group	-0.666	2.307***	2.242**	-3.101	3.154	2.071
	(1.024)	(0.894)	(0.875)	(2.646)	(2.219)	(2.081)
Lagged difference of annual income (log)	3.048**	5.197***	5.749***	3.692	6.587**	8.671**
	(1.319)	(1.564)	(1.419)	(4.077)	(3.120)	(3.406)
Implied price elasiticity (1Q efficient group)	-2.215**	-3.269***	-2.647***	-0.841	-4.928***	-2.227
	(0.872)	(0.794)	(0.821)	(1.936)	(1.780)	(1.588)
Implied price elasiticity (2Q efficient group)	-2.137**	-2.369***	-2.042***	-1.592	-3.616**	-3.182**
	(1.064)	(0.869)	(0.725)	(2.238)	(1.656)	(1.336)
Implied price elasiticity (3Q efficient group)	-2.881***	-0.962	-0.404	-3.942*	-1.775	-0.156
	(0.795)	(0.633)	(0.590)	(2.032)	(1.514)	(1.461)
Implied income elasticity	3.048**	5.197***	5.749***	3.692	6.587**	8.671**
	(1.319)	(1.564)	(1.419)	(4.077)	(3.120)	(3.406)
Individual FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Other Controls	Y	Y	Y	Y	Y	Y
N	21583	20516	19422	4686	4474	4245
R-sq	0.012	0.020	0.020	0.074	0.088	0.091

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at individual level. The 2Q (3Q) Efficient Group is a dummy varaible taking 1 if individual i belongs to the second (third) quanitle of efficient index. 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. We drop units whose the ideal efficient index is less than or equal to zero.

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