Charitable Giving, Tax Reform, and Government Efficiency

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Introduction

Charitable Giving and Taxiation

In many countries, governments set a tax relief for charitable giving.

To evaluate the effect of tax relief, many papers investigate the elasticity of charitable donations with respect to their tax price [@Randolph1995; @Auten2002; @Fack2010; @Bakija2011; @Almunia2020].

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.

Charitable Giving and Taxiation

In addition to the tax price charitable donations, the donations may be affected by people's perception towards the government.

This is because the works and missions of private charity often mirror or overlap with one of governments, and the charity is not needed if the government adequately satisfies the needs of society.

Thus, the different perception towards the government may make the different behavior for charitable giving.

We investigate the relation between tax price elasticity of charitable donations and the different perception towards the government using the South Korean dataset.

Summary in short

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.

▶ the amount of donation is not different between those who regard government as inefficient and the others.

▶ the giving price elasticity of those who regard government as inefficient is more elastic than the others. This means that those who think of government as inefficient have more willingness to donate for 1% reduction of giving price.

South Korean tax reform

We can utilize the effect of the 2014 tax reform in the South Korea.

▶ Before 2014, tax deduction was adopted to subsidize charitable donation behavior.

▶ After 2014, tax credit have been adopted.

The main difference is that tax credits reduce taxes directly, while tax deductions indirectly lower the tax burden by decreasing the marginal tax rate, which increases with gross income.

In addition, the dataset contains the information about perception towards the government.

Related Literature

This study mainly relates to the two strands of studies.

1. Research about tax price elasticity of charitable donations
2. Research about perception towards the government and donation/tax payment.

Research about tax price elasticity of charitable donations

Papers in this strand examines the price and income elasticity of charitable donations using the tax deduction applied for donation. The estimated price elasticities vary, but the typical one is said as -1 (Andreoni and Payne, 2013).

- ▶ Auten et al.(2002): -0.79~-1.26 (the U.S.)
- ▶ Fack and Landais(2010): -0.15~-0.57 (France)
- ▶ Bakija and Heim (2011): -0.61~-1.1 (the U.S.)
- ▶ Duquette (2016): -2.15~-5.01 (the U.S.)
- ▶ Almunia et al.(2020): -0.24~-1.5 (the U.K.)

The study in non-Western country, where the culture of donation may be different, is few. Thus, we firstly examine the elasticity of giving in Korea.

Research about perception towards the government and donation/tax payment.

Experimental studies show that the giving behavior may be affected by perception towards the government.

▶ Li et al.(2011) suggest that governmental organizations collect less donation than private charities though they have the same mission and work.

▶ Sheremeta and Uler(2020) show that individuals provide public good reacting the wasteful spending of government.

This may be because people with distrust in government think that

1. the direct donation is more efficient than public service provision or
2. people can directly allocate and control their funds by donation, unlike public service provision.

Thus, people having the different trust in the government would have different elasticities of giving.

Institutional background

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 section summarize the difference of tax deduction and tax credit.

Budget Set

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.

Tax Deduction

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

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

The relative price of giving is $p_i^d \equiv 1 - \tau(y_i - g_i)$. 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.

Tax Credit

Tax credit reduces tax amount directly, that is,

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

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

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

The relative price of giving is $p_i^c = 1 - m$, which is only dependent on the tax credit rate m, which is exogenously determined by the government.

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.

Marginal income tax rate

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%	24%	35%	35%	35%
(E) 15000 ~ 30000	35%	35%	35%	35%	35%	35%	38%
(F) 30000 ~ 50000	35%	35%	35%	38%	38%	38%	40%
(G) 50000 ~	35%	35%	35%	38%	38%	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.

Our Identification Strategy

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.

Data

National Survey of Tax and Benefit (NaSTaB)

▶ 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.

▶ We use data from 2012 to 2018 **since the items of the value survey which we focused is not available before 2012 (**ここは違います**)**. In addition, we exclude the subject of the sample, whose age is under 23, since they are not likely to have income or asset.

Time Series of Chariable Giving
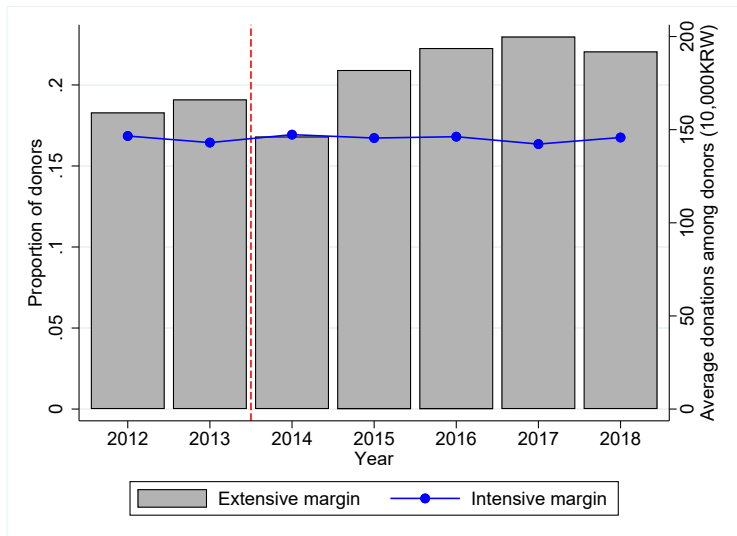
Figure 1: Proportion of Donors and Average Donations among Donors

Summary Statistics

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

Giving Price and Income Distribution

▶ Figure 2 shows the giving price after 2012 and income distribution in 2013.
  ▶ Blue line shows the giving price in 2012 and 2013, which depends on income
  ▶ Red dashed line shows the giving price after 2014, which is not a function of income.
▶ We can make three groups in terms of the benefit from the 2014 tax reform.
  ▶ Benefit group: Final taxable income is less than 1200×10^4KRW.
  ▶ Neutral group: Final taxable income lies between $(1200 \times 10^4, 4600 \times 10^4)$.
  ▶ Loss group: Final taxable income is more than 4600×10^4KRW.

Giving Price and Income Distribution (Cont'd)
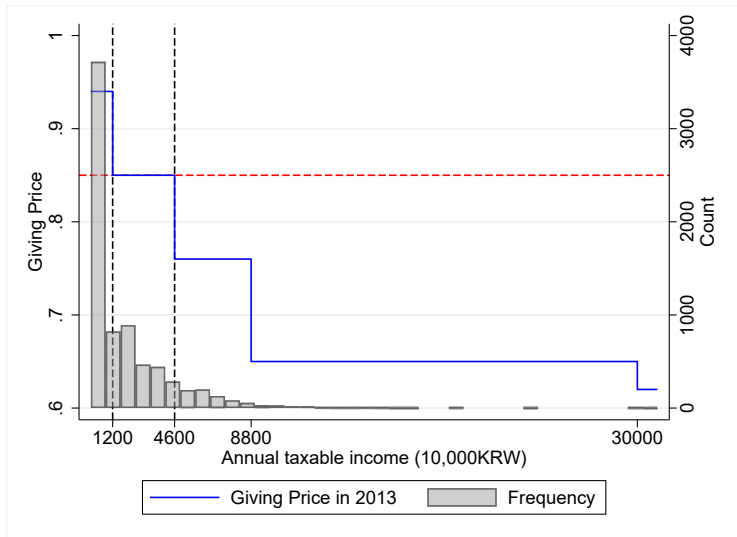
Figure 2: Income Distribution and Giving Price in 2013

Estimation

Empirical Strategies

Following @Almunia2020, 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

▶ The elasticity of extensive margin shows how much the probability to donate changes reacting to marginal increase of giving price.

Elasticitiy of Intensive Margin

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

▶ 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

▶ 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} (following @Zeldow2019).

Elasticitiy of Extensive Margin

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

▶ D_{it} is a dummy variable taking 1 if individual i donates at year t and 0 otherwise.

▶ Since we use linear probability model, $\delta = \frac{\partial D_{it}}{\partial p_{it}} p_{it}$. The extensive-margin price elasticity is $\varepsilon_{EXT} = \hat{\delta}/D_{it}$. Thus, we evaluate it at sample mean of D_{it}.

Identification Strategy

Our identification assumption is **the within price variation is exogenous**.

▶ This is because we use the fixed effect model to obtain elasticities.

▶ Our identification assumption may hold because the major *within* price variation depends on the 2014 tax reform.

    ▶ After tax reform, the giving price is constant across individuals and there is no room for manipulation by donations and income.

    ▶ Before tax reform (2012 and 2013), the giving price depends on (A) endogeneity of giving price and (B) simultaneous determination of income and donations. For these two reasons, the *within* price is partly endogenous.

Obstacles for Identification

Our identification assumption may violate due to two endogenous problems under the tax deduction system.

1. Endogeneity of giving price:
   ▶ 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.

Obstacles for Identification (Cont'd)

Our identification assumption may violate due to two endogenous problems under the tax deduction system.

2. Simultaneous determination of income and donations:
   - ▶ 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.
   - ▶ We employ lagged values of taxable income and construct an instrument variable, $\ln(p_{it}(y_{it-k} - g_{it-k})/p_{it-k}(y_{it-k} - g_{it-k}))$ where $g_{it-k} = 0$.
   - ▶ By fixing income at year $t-k$, the instrument isolates changes in price from income responses to the tax reform.

Main Results

Price and Income Elasticity

▶ To show our baseline results graphically, Figure 3 shows average residuals grouped by year and benefit of the 2014 tax reform.

  ▶ Residuals are obtained from the regression of logged donations on logged annual taxable income, individual and time fixed year.

Price and Income Elasticity: Residuals Plot

Those who incurring loss owing to the 2014 tax reform drastically decreases thier amount of donations.
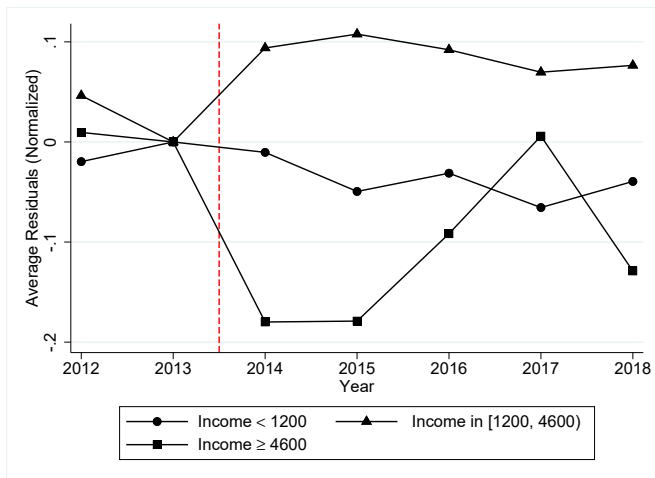
Figure 3: Average Residuals Grouped by Year and Tax-Reform Benefit Group

Price and Income Elasticity: Estimation Results

We found the **price effect** of giving (1% price increase leads to about 1.1% giving decrease), and the **income effect** of giving(1% income increase leads to about 5% giving increase).

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)
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

Intensive and Extensive Margin

▶ To obtain intensive- and extensive-margin elasticity, we repeat the same excercise.
▶ Figure 4 shows average residuals grouped by year and benefit of the 2014 tax reform
  ▶ We used those who donated and estimated residuals obtained from the regression logged donations on logged annual taxable income, individual and time fixed year.
▶ Figure 5 shows average residuals grouped by year and benefir of the 2014 tax reform.
  ▶ We estimated residuals obtained from the regression the donation dummy on logged annual taxable income, individual and time fixed year.

Intensive Margin: Residuals Plot

Donors who receive benefit owing to the 2014 tax reform decrease their donations in 2014 and 2015.
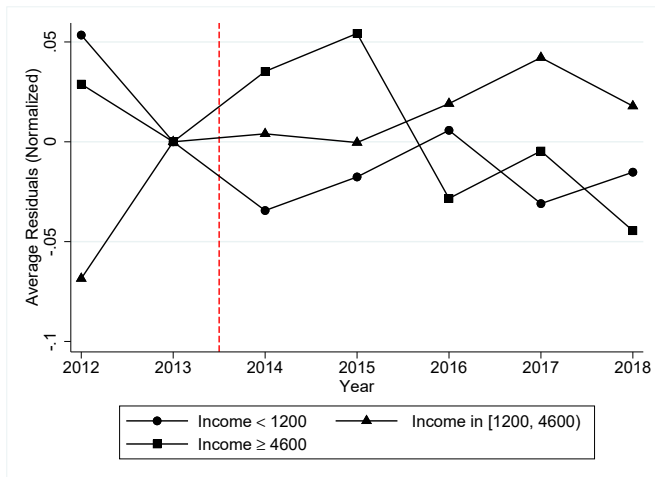
Figure 4: Average Residuals Grouped by Year and Tax-Reform Benefit Group (Intensive Margin)

Extensive Margin: Residuals Plot

Those who incurring loss owing to the 2014 tax reform drastically were less likely to donate.
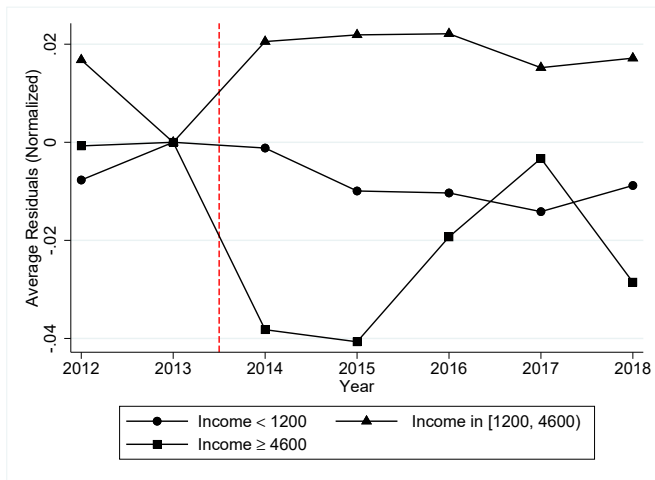
Figure 5: Average Residuals Grouped by Year and Tax-Reform Benefit Group (Extensive Margin)

Intensive and Extensive Margin: Estimation Results

The intensive-margin price elasticity is -0.5 ∼ -1%.

Table 4: Main Results: Intensive-Margin Elasticity

	(1)	(2)	(3)	(4)	(5)
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)
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	11637	11637	11637	11637	11637

Intensive and Extensive Margin: Estimation Results

The extensive-margin price elasticity is -1.2 ~ -1.4%.

Table 5: Main Results: Extensive-Margin Elasticity

	(1)	(2)	(3)	(4)	(5)
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)
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

Robustness Check 1

First potential concern: last price elasticity

▶ Our baseline results show the **first** price elasticity to avoid the endogeneity of giving price.

▶ We estimated the **last** price elasticity, using the Panel IV method.

  ▶ The instrument is the first giving price.
  ▶ Note that the last giving price is equal to the first giving price under the tax credit system.

Robustness Check 1: Result

Overall last price elasticity increases twofold.

Table 6: 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)
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	52304	52304	52302	52302	52302

Robustness Check 1: Intensive Margin

The intensive-margin last price elasticity lies within the range of the first price elasticity.

Table 7: Intensive-Margin Last Price Elasticity: Panel IV

	(1)	(2)	(3)	(4)	(5)
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)
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	10672	10672	10672	10672	10672

Robustness Check 1: Extensive Margin

The extensive-margin last price elasticity at sample mean is roughly -3%.

Table 8: Extensive-Margin Last Price Elasticity: Panel IV

	(1)	(2)	(3)	(4)	(5)
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)
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	52304	52304	52302	52302	52302

Robust Check 2

Second potential concern: Price change due to the change of income

▶ Since the giving price under the tax deduction depends on the change of income, the *within* variation of giving price may be endogenous.

▶ 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.

Robustness Check 2: Result

Overall price elasticity is -1 ~ -1.7%.

Table 9: 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)
Other Controls	N	Y	N	Y
N	45994	45992	14893	14893

Robustness Check 2: Intensive Marign

The intensive-margin price elasticity is -0.6 ~ -1%. In column (3), the price elasticity is statistically insignificant.

Table 10: Intensive-Margin Elasticity with Short-Period Data

	After 2012		2013 and 2014	
	(1)	(2)	(3)	(4)
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)
Other Controls	N	Y	N	Y
N	10158	10158	2922	2922

Robustness Check 2: Extensive Margin

The extensive-margin price elasticity at sample mean is $-1 \sim -2\%$.

Table 11: Extensive-Margin Elasticity with Short-Period Data

	After 2012		2013 and 2014	
	(1)	(2)	(3)	(4)
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)
Other Controls	N	Y	N	Y
N	45994	45992	14893	14893

Robustness Check 3

Second potential concerns: the change of price due to the change of 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.

Robustness Check 3 (Cont'd)

Our estimation equation is

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

where $\Delta^k Y_{it} = Y_{it} - Y_{it-k}$.

▶ Note that we cannot estimation the extensive-margin elasticity since it is hard to interapt this estimation equation when we use $\Delta^k D_{it}$ as an outcome.

▶ We estimate this model for $k = 1, 2, 3$.

Robustness Check 3: Overall Elasticity

Overall price elasticity is rougnly -2%.

Table 12: Overall Elasticity: k-difference model

lag k	$k = 1$	$k = 2$	$k = 3$
	(1)	(2)	(3)
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

Robustness Check 3: Intensive-Margin Elasticity

The intensive-margin price elasticity is rougnly -2%.

Table 13: Intensive-Margin Elasticity: k-difference model

lag k	$k = 1$	$k = 2$	$k = 3$
	(1)	(2)	(3)
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)
N	10939	10505	10043

Governement Efficient and Price Elasticity

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

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

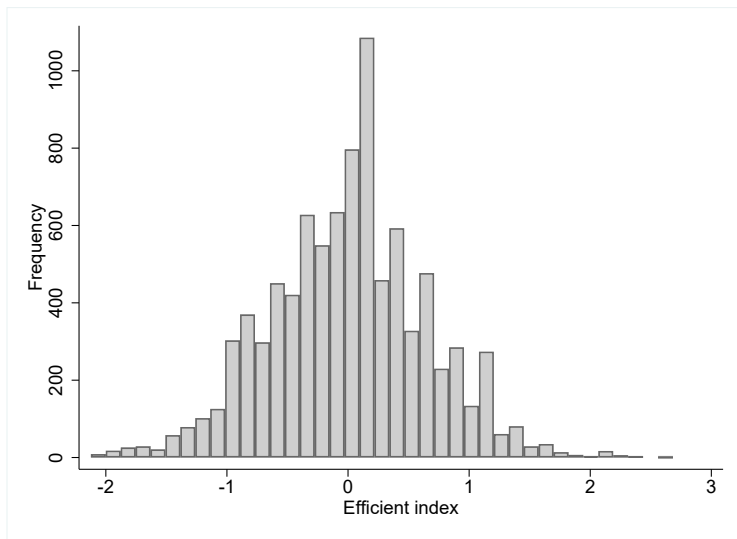# Histrogram of Efficient Index

Figure 6: Histogram of Efficient Index

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。

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.

Heterogenous Price Elasticity: Estimations Results

Table 14: 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

Heterogenous Price Elasticity: Implied Elasticity

Table 15: 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

Robustness Check 1

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

▶ 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.

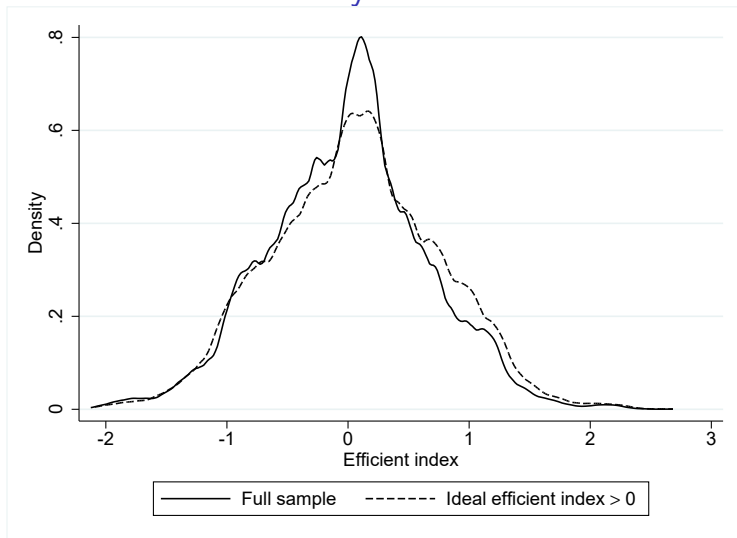# Robustness Check 1: Density of Efficient Index

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

Robustness Check 1: Estimation Results

Table 16: 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

Robustness Check 1: Implied Price Elasticity

Table 17: 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

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.

Robustness Check 2: Estimation Results (1)

Table 18: 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

Robustness Check 2: Implied Price Elasticity (1)

Table 19: Heterogenous Last Price Elasiticity: 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

Robustness Check 2: Estimation Results (2)

Table 20: 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

Robustness Check 2: Implied Price Elasticity (2)

Table 21: 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

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.

Robustness Check 3: Estimation Result (1)

Table 22: 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

Robustness Check 3: Implied Price Elasticity (1)

Table 23: 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

Robustness Check 3: Estimation Result (3)

Table 24: 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

Robustness Check 3: Implied Price Elasticity (4)

Table 25: 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

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.

Robustness Check 4: Estimation Results (1)

Table 26: Heterogenous Price Elasticity: k-difference Model (1)

Lag k	Overall Elasticity		
	$k=1$	$k=2$	$k=3$
	(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

Robustness Check 4: Implied Price Elasticity (1)

Table 27: 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

Robustness Check 4: Estimation Results (2)

Table 28: Heterogenous Price Elasticity: k-difference Model (3)

Lag k	Intensive-Margin Elasticity		
	$k = 1$	$k = 2$	$k = 3$
	(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

Robustness Check 4: Implied Price Elasticity (2)

Table 29: Heterogenous Price Elasticity: k-difference Model (4)

Lag k	Intensive-Margin Elasticity		
	$k=1$	$k=2$	$k=3$
	(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

Robustness Check 4 (Ideal Efficient ID > 0): Estimation Results (1)

Table 30: Heterogenous Price Elasticity: k-difference Model Using Those whose Ideal Efficient Index > 0 (1)

Lag k	Overall Elasticity		
	$k = 1$	$k = 2$	$k = 3$
	(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

Robustness Check 4 (Ideal Efficient ID > 0): Implied Price Elasticity (1)

Table 31: 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

Robustness Check 4 (Ideal Efficient ID > 0): Estimation Results (2)

Table 32: 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

Robustness Check 4 (Ideal Efficient ID > 0): Implied Price Elasticity (2)

Table 33: 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

Conclusions

Conclusions

References I