Futures 122 (2020) 102569

Contents lists available at ScienceDirect

Futures

journal homepage: www.elsevier.com/locate/futures

Effect of proxy voting for children under the voting age on parental altruism towards future generations

Yoshio Kamijo[a], Teruyuki Tamura[b], Yoichi Hizen[c,d,*]

[a] School of Political Science and Economics, Waseda University, 1-6-1 Nishi-Waseda, Shinjuku-ku, Tokyo 169-8050, Japan
[b] Department of Management, Kyoto College of Economics, 3-1 Higashinaga-cho, Ooe, Nishikyo-ku, Kyoto City 610-1195, Japan
[c] School of Economics and Management, Kochi University of Technology, 2-22 Eikokuji-cho, Kochi-shi, Kochi 780-8515, Japan
[d] Research Institute for Future Design, Kochi University of Technology, 2-22 Eikokuji-cho, Kochi-shi, Kochi 780-8515, Japan

ARTICLE INFO

Keywords:
Altruism
Future generation
Parents
Proxy voting
Online experiment

ABSTRACT

What types of people are most concerned about the sustainability of our society? Does empowering such people in the political process influence us to make collective decisions that best serve the interests of future generations? This study invites 1000 parents with children under the legal voting age and 1000 parents with children over the legal voting age to an incentivized donation experiment in which a donation will be made to non-profit organizations committed to a better future society. The size of the donation per participant is determined by vote among the participants. We compare two voting rules: ordinary voting, whereby each participant is given one ballot, and proxy voting, whereby parents with unenfranchised children are given an extra ballot on behalf of their children. We observe that, with ordinary voting, the mothers with children under the voting age exhibit a higher degree of altruism towards future generations. With proxy voting, however, this distinction disappears. Furthermore, with proxy voting, the overall average donation indicated by participants is smaller than that indicated under ordinary voting. These observations imply that empowering institutionally those who tend to be more altruistic does not necessarily result in collective decisions that are more altruistic towards future generations.

1. Introduction

What types of people are most concerned about the sustainability of our society? Does empowering such people in the political process produce collective decisions that better serve the interests of future generations? Although there is currently a pressing need to make sustainable choices in a variety of areas in order to bequeath a viable society to future generations (Hara et al., 2019; Hauser et al., 2014; Kamijo et al., 2017), decisions under the prevailing economic, social, and political systems are often shortsighted (Saijo, 2019; Thompson, 2010). Given the consequences of failing to protect the interests of future generations, it is critical that we address the above questions.

It is believed, perhaps naively, that parents, especially mothers, with young children are particularly concerned about the sustainability of our society. In striving to ensure their children's long term well-being, parents with young children would seem likely to assign a relatively high priority to providing their offspring with a healthy social and natural environment in which to live their lives (Barro & Becker, 1989; Saint-Paul & Verdier, 1993). Accordingly, it would be reasonable to expect that this inclination would produce altruistic behavior motivated by concern for future generations (i.e., sacrificing some of one's own benefit for that of future

* Corresponding author.
E-mail addresses: yoshio.kamijo@gmail.com (Y. Kamijo), tetamura@gmail.com (T. Tamura), hizen.yoichi@kochi-tech.ac.jp (Y. Hizen).

https://doi.org/10.1016/j.futures.2020.102569
Received 20 November 2019; Received in revised form 4 April 2020; Accepted 10 May 2020
Available online 24 May 2020

generations). Existing studies, through public opinion surveys and experiments on gender and parental differences, have revealed that parenthood changes an individual's financial situation and social position, and that these changes can, in turn, lead to differences between parents and non-parents in several aspects, including mental state and well-being (Herbst & Ifcher, 2016; Musick et al., 2016; Nomaguchi & Milkie, 2003; Stanca, 2012; Woo & Raley, 2005), policy preferences on fiscal consolidation (Hayo & Neumeier, 2017; Stix, 2013), and risk preferences (Görlitz & Tamm, 2015). Physical changes associated with motherhood are also reported; for example, pregnancy affects the hormonal patterns and brain structure of expecting mothers (Gordon et al., 2010; Hoekzema et al., 2017). However, although there is considerable evidence that people change their preferences and attitudes as a result of becoming parents, there have been no experimental studies on how, in particular, parents with young children differ from others (especially parents whose children are already adults) in terms of their altruistic behavior as it affects future generations. Since parents can directly transfer their wealth and resources to their own children, it is uncertain to what degree they would be inclined to make an altruistic choice benefiting future generations as a whole while reducing the size of their direct transfer of wealth to their progeny.

We conducted an online incentivized donation experiment in which the amount of donation is collectively determined by vote and paid to non-profit organizations working to ensure a better future society. Two thousand parents were recruited for the experiment with the help of a Japanese online survey company. To explore potential policy implications, we focus on how the size of the donation is affected by two alternative voting protocols: ordinary voting (abbreviated as OV), whereby each person has one ballot, and proxy voting (PV), whereby parents with children under the voting age (CUVA) are given extra ballots on behalf of their CUVA and hence exert a greater impact on voting outcomes than parents without CUVA. While concerns regarding the legitimacy of this type of radical voting reform have been expressed (Van Parijs, 1998; Wolf et al., 2015), recent discussions concerning political reforms that might induce more forward-looking societal choices suggest that such a PV scheme has the potential to effectively check the growing inequality in voting power between generations in this time of rapidly aging societies (Aoki & Vaithianathan, 2009; Corak, 2013; Vaithianathan et al., 2013) and encourage collective decision-making based on a longer-term perspective.[1,2]

Contrary to such expectations, our experiment shows a negative result for the PV scheme; that is, it is found that such a scheme actually reduces benefits for future generations. Under the OV scheme, mothers with CUVA are shown to exhibit a higher degree of altruism towards future generations than others in the study; however, under the child-weighted PV scheme, this difference disappears. Moreover, under the PV scheme, the overall average size of the donation indicated by participants as a whole is smaller than that indicated under the OV scheme. These observations imply that institutionally empowering those who are inclined to be more altruistic does not necessarily result in more altruistic collective decisions benefiting future generations.

Methodologically, several potential issues have been raised regarding the appropriateness of online experiments as an experimental platform (e.g., the weaker control and smaller stake size compared with physical laboratory experiments). However, the reliability of data collected through Amazon Mechanical Turk (MTurk), a major online survey service, was recently demonstrated in a series of comparisons between the experimental results obtained through MTurk and those obtained in a laboratory. For orthodox economic games, for example, quantitative agreement was found between the two types of experimental platforms (Amir et al., 2012; Horton et al., 2011; Suri & Watts, 2011). The endowment of our donation task (100 Japanese yen) is approximately equal to the typical payment in MTurk experiments, and is quite large in comparison to the payments made by survey companies in their non-experimental web surveys. Hence, it can be argued that our donation task provides participants with a sufficiently large monetary incentive in their decision-making.

2. Methods

In our experiment, we use a donation task (d'Adda, 2011) to elicit the altruistic tendencies of participants asked to make a choice affecting the well-being of future generations (for the instructions used in the experiment, refer to the Appendix A). One important difference from typical donation experiments is that the donation amount is determined by vote, and every participant—under each of two voting schemes—will contribute the same collectively-determined amount. Specifically, participants are given an endowment (100 yen, or approximately 1 US dollar) as part of the reward for their participation in the experiment. They are then asked to indicate (i.e., vote for) an amount to be donated from the endowment to non-profit organizations whose activities are deemed beneficial to society in the long run (e.g., environmental protection, education for children, etc.). The amount that each participant will ultimately donate is calculated as the median of all responses under the given voting scheme. Donations to the non-profit organizations are executed within a month after the experiment.

As noted, two types of voting schemes are used to determine the donation amount. The first is an ordinary voting (OV) scheme under which each individual is given one ballot and indicates with that ballot the amount to be donated. The second is a proxy voting (PV) scheme under which individuals *without* CUVA are given one ballot, as in the OV scheme, while parents *with* CUVA are given an extra ballot, in addition to their own ballots, representing a proxy vote on behalf of their CUVA. Although parents with CUVA have two ballots, the amount they will actually donate is not two people's amount but only their own amount. This is to avoid the effect of the difference in the total amount of money they donate as a household. Also to avoid the possibility that a participant's experience under one voting scheme would affect his or her decision under the other voting scheme, we use a between-subject design in which

[1] Freeland, C. Giving the Young a Bigger Say. The New York Times. 7 Mar 2013; available from https://www.nytimes.com/2013/03/08/world/americas/08iht-letter08.html (accessed on 30 Jul 2018).

[2] Phillips, L. Hungarian mothers may get extra votes for their children in elections. The Guardian. 17 Apr 2011; available from https://www.theguardian.com/world/2011/apr/17/hungary-mothers-get-extra-votes (accessed on 17 Apr 2018).

Table 1
Summary of experimental design.

	Ordinary voting (OV)	Proxy voting (PV)
Parents with CUVA	(A) 500 participants; one own ballot for each	(B) 500 participants; one own ballot and one proxy ballot for each
Parents without CUVA	(C) 500 participants; one own ballot for each	(D) 500 participants; one own ballot for each

each study participant participates in only one voting scheme.

We limited the participants to parents in order to focus our analysis on the influence of having CUVA. We recruited 2000 parents (960 women and 1040 men; mean age = 50.6) for an Internet survey on intergenerational altruism through a Japanese survey company in the fourth week of March 2017. The participants had pre-registered with the company and voluntarily chose to join the survey. To begin the survey, the participants were asked whether they had CUVA; they were recruited for a period of time until the sample-size goals had been met (i.e., 1000 parents with CUVA and 1000 parents without CUVA). Then, they made their donation decision. At this stage, participants were randomly assigned to either the OV scheme or the PV scheme so that they were divided into four groups of 500 each, as shown in Table 1: CUVA parents in the OV scheme (cell A), CUVA parents in the PV scheme (cell B), non-CUVA parents in the OV scheme (cell C), and non-CUVA parents in the PV scheme (cell D). We placed the donation decision at the outset of the survey so that answering questions on intergenerational altruism and personal demographics—which came later in the survey—would not affect the decision.

To determine the collective donation amount, the median rule is adopted because of its immunity to strategic manipulation: With the median rule, it is impossible for a participant to manipulate the result of a collective decision by misreporting his or her preference. In the language of game theory, indicating his or her true preference is the dominant strategy for every participant, and hence we regard each participant's choice of donation amount as an expression of his or her true preference.

The median rule is also a group-strategy-proof mechanism in that no group of participants can be made better off should they simultaneously misreport their preferences (Moulin, 1980). This property applies to a case in which some participants are given multiple ballots. While these participants can use their multiple ballots strategically, they will still be unable to change the voting outcome in their preferred direction. Thus, casting both their proxy ballots and their own ballots in accordance with their true preferences is still optimal for parents with CUVA under the PV scheme.

Table 2
Means and standard deviations for all variables.

	All		Proxy voting (PV)		Ordinary voting (OV)		PV – OV
Variables	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	p-value
Amount of donation indicated with own ballots	39.7	35.6	38.2	36.0	41.3	35.1	0.022**
Amount of donation indicated with proxy ballots	–	–	34.6	35.4	–	–	
Male	0.54	0.50	0.56	0.50	0.52	0.50	0.085*
Age	50.6	16.4	50.5	16.3	50.7	16.5	0.722
Ln income	4.91	2.14	4.97	2.12	4.85	2.15	0.099*
Income (Unit: millions of yen)	*3.70*	*3.53*	*3.85*	*3.63*	*3.55*	*3.42*	*0.099**
Edu: junior high school	0.03	0.16	0.02	0.15	0.03	0.16	0.714
Edu: high school	0.31	0.46	0.29	0.45	0.33	0.47	0.074*
Edu: vocational college	0.10	0.30	0.12	0.33	0.08	0.27	0.005***
Edu: technical college or two-year college	0.11	0.31	0.10	0.30	0.11	0.32	0.501
Edu: university	0.41	0.49	0.41	0.49	0.40	0.49	0.964
Edu: graduate school	0.06	0.23	0.06	0.24	0.05	0.22	0.333
With children under the voting age	0.51	0.50	0.52	0.50	0.51	0.50	0.555
Married	0.87	0.33	0.88	0.32	0.87	0.34	0.270
Unmarried	0.13	0.33	0.12	0.32	0.13	0.34	0.270
Number of children	1.86	0.75	1.83	0.73	1.88	0.77	0.317
Sample size	1732		855		877		

Note: Individuals who did not answer one or more questions are excluded. The number of observations for the variable of donation indicated with proxy ballots is 455. For the differences in dummy variables such as gender, educational level, and marital status between proxy voting (PV) and ordinary voting (OV), we conducted chi-square tests of independence. For the differences in the amount of donation indicated with own ballots, age, logarithm of income, and number of children, we conducted non-parametric Mann–Whitney U-tests. Significance levels are indicated with * $p<0.1$, ** $p<0.05$, and *** $p<0.01$. Income itself is not included in our regression analyses but listed here as reference.

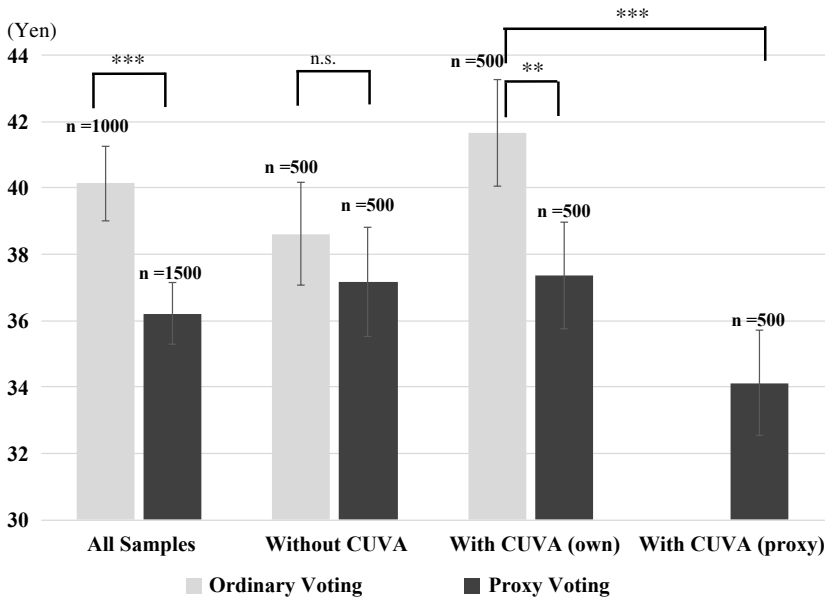

Fig. 1. Average amount of donation according to the voting scheme and whether the parent has a child under the voting age (CUVA).
Note: Error bars represent 95 % confidence intervals. Significance levels for the differences between two bars are indicated with ** $p < 0.05$ and *** $p < 0.01$; "n. s." indicates "not significant."

3. Results

3.1. Descriptive statistics

Table 2 shows the mean value of each of the variables used in our regression analysis. Individuals who did not answer one or more questions are excluded. Although there are statistically significant differences in the proportion of males, income level, and educational level between the two voting scheme groups, the values of the other variables show no significant differences. As is often the case with web surveys, the sample is biased towards higher educational levels. In our analysis, since the share of unmarried people in the sample is small, we merge single, divorced, and widowed individuals into a single dummy variable that we label "Unmarried." Individuals with a technical college degree or a two-year college degree are also combined into one dummy variable—"Edu: technical college or two-year college"—as their shares of the total are small and the number of years of education is the same.

3.2. Donation decisions

Fig. 1 shows the average amount of donation indicated under each voting scheme (OV or PV) according to participant type (with or without CUVA). Contrary to the intended purpose of the PV scheme, the average amount of donation indicated by participants under the PV scheme turned out to be significantly smaller—by 3.92 yen—than the corresponding amount under the OV scheme ("All Samples" in Fig. 1; Mann-Whitney test: $p < 0.01$). Due to this difference, the per-participant donation amount determined by vote (and calculated as the median of the donation amounts indicated by the participants) under the PV scheme is also smaller than under the OV scheme (25 yen in PV and 30 yen in OV).

In exploring how such a counterintuitive outcome could have been produced, we considered three possible explanations for why the average donation amount under the PV procedure turned out to be smaller than under the OV procedure:

1. *(i)Parents with CUVA indicate a smaller donation amount with their own ballots under PV than under OV.*
2. (ii)*Parents with CUVA indicate a smaller donation amount with their proxy ballots under PV than with their own ballots under OV.*
3. (iii)*Parents without CUVA indicate a smaller donation amount under PV than under OV.*

The data support possibilities (*i*) and (*ii*) but not (*iii*). Specifically, among parents with CUVA, the Mann-Whitney test shows $p = 0.04$ for OV versus own ballots in PV (i.e., "With CUVA (own)" in Fig. 1) and $p < 0.01$ for OV versus proxy ballots in PV (i.e., "With CUVA (own)" and "With CUVA (proxy)"). Among parents without CUVA, the same test shows $p = 0.16$ for OV versus PV (i.e.,

"Without CUVA"). These comparisons imply that the unexpected result stems from the fact that the decisions of parents with CUVA shifted in the less-altruistic direction towards future generations when they were given proxy ballots on behalf of their CUVA.

3.3. Regression analysis of parents with CUVA

To identify which characteristics in Table 2 matter in the less-altruistic shift of decisions among parents with CUVA, we estimate a Tobit model using only parents with CUVA as the sample.[3] Table 3 shows the average marginal effects of the independent variables for each of two dependent variables. The left side of the table shows results when the dependent variable is defined as the amount of donation indicated with own ballots in OV and PV; here, possibility (*i*) (as described in Section 3.2) is examined. The right side of the table shows results when the dependent variable is defined as the amount of donation indicated with each participant's own ballot in OV and each participant's average donation amount indicated with his or her own ballot and the proxy ballot provided in PV; here, possibilities (*i*) and (*ii*) are examined in aggregate. Since it is well established that the influence of having children differs between mothers and fathers (Umberson & Williams, 1999), we also show results with males and females as subsamples.

We first focus on how males and females cast their own ballots (the left side of Table 3). If all other factors are held constant, female participants in the study chose a larger donation amount than males (by 5.94 yen), which is consistent with the previous literature on gender differences (Andreoni & Vesterlund, 2001; Eckel & Grossman, 1998). The PV scheme tends to dampen altruistic decisions, but its effect is much greater for females than for males, and statistically significant only for females; the PV scheme decreases the own ballot donation of females by 8.88 yen. In other words, mothers with CUVA are influenced by the voting rule and shift in the less-altruistic direction under the PV scheme to a greater extent than fathers with CUVA.

These results hold even when we include proxy ballots along with own ballots (the right side of Table 3). In fact, the influence of the PV scheme is strengthened for females; the average donation amount indicated by females under the PV scheme—that is, the average of their own ballot and proxy ballot amounts—is smaller by 10.50 yen than the (own ballot only) donation amount indicated by females under the OV scheme.

3.4. Regression analysis of parents without CUVA

To verify the difference in reactions to voting scheme for parents with and without CUVA, we also conduct a Tobit estimation using the subsample of parents without CUVA. As shown in Table 4, the PV dummy is not significant for any of the categories—males, females, or all. This result, with demographic differences controlled for, confirms the finding indicated in Fig. 1 that voting scheme does not affect the donation decisions of parents without CUVA; it is also consistent with findings from earlier laboratory studies (e.g., Kamijo et al., 2019).

3.5. Comparison of parents with and without CUVA in OV

Since the OV scheme gives a single vote to each participant, the decisions made in the OV scheme do not contain any asymmetry effect in voting power between parents with and without CUVA. In addition, as mentioned in Section 2, the median rule does not induce a strategic manipulation of the donation amount; it is optimal for each participant to vote in accordance with his or her true preference regarding the donation. Therefore, the voting behaviors in the OV scheme are regarded as expressions of the participants' true preferences regarding the size of the donation (i.e., altruism towards future generations).

The Tobit estimation of the choices made under the OV scheme reveals that females are more altruistic than males (see Table 5); the coefficient of the male dummy in the regression using the overall sample is negative, although its significance is relatively weak (i.e., 10 % level). Dealing with the data for males and females separately, we find that having CUVA does not significantly change the donation amount indicated by males but greatly increases that by females (by 13.2 yen). This validates our conclusion that mothers with CUVA are the most altruistic in making decisions that affect future generations.

3.6. Donation decisions with proxy ballots in PV

How parents use their proxy ballots is of interest from a policy perspective. A common argument against the PV scheme is well-summarized in the following remark made in the German Lower House of Parliament: "(Parents) could abuse the delegated right to vote, that is, there may be a problem deciding which parent should exercise this right (translated by the authors)."[4]

In this study, the exact meaning of vote abuse is unclear. However, examining the relationship between the indicated own ballot donation amount and the proxy ballot donation amount under the PV scheme may add to the discussion. As can be seen in Fig. 1, the average donation amount indicated by CUVA parents with their proxy ballot under the PV scheme (34.12 yen) is smaller (by 3.24 yen) than that indicated with their own ballot (37.36 yen) under the same scheme.

Fig. 2 plots the own ballot and proxy ballot pairs for parents with CUVA under the PV scheme. The correlation between the two values is strongly positive ($r = 0.801$). Moreover, approximately 70 % of the CUVA parents indicated the same donation amount with

[3] We use a Tobit model because our dependent variable is left and right censored (i.e., takes values between 0 and 100).

[4] Deutscher Bundestag. Stenografischer Bericht, 102 Sitzung. 2004. Plenarprotokoll 15/102: 9270; available from http://dip21.bundestag.de/dip21/btp/15/15102.pdf (accessed on 23 May 2019).

Table 3
Estimation results of the Tobit model for parents with CUVA.

Dependent variable	Amount of donation indicated with own ballots in OV and PV			Amount of donation indicated with own ballots in OV and the average amount of donation indicated with own ballots and proxy ballots in PV		
Data used	All	Male	Female	All	Male	Female
PV dummy	−4.76*	−1.31	−8.88**	−5.99**	−2.14	−10.50***
Male	−5.94*	–	–	−5.65*	–	–
Age	0.29*	0.40**	0.12	0.20	0.31	0.01
Ln income	−0.43	−3.95	0.37	−0.29	−3.03	0.41
Edu: junior high school	−10.69	1.42	−17.96*	−12.16	−0.51	−18.48*
Edu: vocational college	−1.45	0.36	−3.12	−1.34	−0.27	−2.32
Edu: technical college or two-year college	−2.06	−2.39	−2.49	−1.86	−4.65	−1.07
Edu: university	−2.96	−1.55	−3.59	−3.64	−2.94	−3.82
Edu: graduate school	−0.43	5.29	−16.43***	−1.12	3.22	−13.73**
Unmarried	8.46*	14.69*	3.59	9.53*	16.46**	4.09
Number of children	−2.58	−4.36*	1.31	−2.05	−3.67	1.41
Log pseudolikelihood	−3263.3	−1674.3	−1577.4	−3326.4	−1716.8	−1599.1
Pseudo R-squared	0.0035	0.0046	0.0045	0.0038	0.0043	0.0052
F-statistic	1.95	1.32	2.04	2.19	1.18	1.94
Sample size	889	480	409	889	480	409

Note: The sample consists of participant types (A) and (B) as defined in Table 1. Individuals who did not answer one or more questions are excluded. “High school” and “married” are the benchmarks for educational level and marital status, respectively. We report the average marginal effect of each independent variable on the amount of donation indicated by his or her vote. Concerning dummy variables such as PV, male, and level of education, the marginal effect captures the degree of expected change in the dependent variable in response to a discrete change in each dummy variable from zero to one. Significance levels are indicated with * $p<0.1$, ** $p<0.05$, and *** $p<0.01$.

Table 4
Estimation results of the Tobit model for parents without CUVA.

Dependent variable	Amount of donation indicated in OV and PV		
Data used	All	Male	Female
PV dummy	−1.63	−4.39	1.83
Male	−5.21	–	–
Age	0.04	−0.13	0.16
Ln income	0.14	−0.19	−0.27
Edu: junior high school	−9.75	−37.72***	2.52
Edu: vocational college	10.47*	−0.28	17.42**
Edu: technical college or two-year college	2.96	2.80	3.69
Edu: university	7.24**	4.97	9.64**
Edu: graduate school	4.07	4.51	−14.14
Unmarried	1.74	−2.78	3.22
Number of children	2.79	1.09	4.01
Log pseudolikelihood	−3081.8	−1599.7	−1475.4
Pseudo R-squared	0.0026	0.0034	0.0051
F-statistic	1.45	1.48	1.55
Sample size	843	448	395

Note: The sample consists of participant types (C) and (D) as defined in Table 1. The average marginal effects are reported. Significance levels are indicated with * $p<0.1$, ** $p<0.05$, and *** $p<0.01$. See the Table 3 note for an explanation of other details.

both their own ballots and their proxy ballots,[5] while approximately 22 % indicated a smaller donation amount with their proxy ballots. According to the Wilcoxon matched-pair signed-rank test, the donation amount indicated with proxy ballots is significantly smaller than that with own ballots ($p < 0.001$).

Tobit regressions using the donation amount indicated with proxy ballots as the dependent variable confirm the findings shown in Fig. 2 after controlling for demographic differences (see Table 6). The donation amount indicated with own ballots is the only variable that consistently explains the donation amount indicated with proxy ballots for the overall sample as well as for the male and female subsamples. Its coefficient is positive but smaller than one. No gender difference is found in the participants’ use of proxy

[5] Indicating the same donation amount with their two votes might be interpreted that parents tried to lessen the weights of their children’s votes to reduce the responsibility of their children; even if his or her child’s vote turns out to determine the actual donation amount, it is not just the child's decision, but the parent's decision too.

Table 5
Estimation results of the Tobit model for investigating the effect of having CUVA in OV.

Dependent variable	Amount of donation indicated in OV		
Data used	All	Male	Female
With CUVA	7.00	3.12	13.20**
Male	−5.51*	–	–
Age	0.14	0.26	0.04
Ln income	0.42	−0.82	1.04
Edu: junior high school	−5.49	2.06	−9.77
Edu: vocational college	5.41	−3.65	10.69
Edu: technical college or two-year college	1.24	−2.93	3.25
Edu: university	−0.09	−4.45	3.75
Edu: graduate school	−1.30	−0.38	−21.23***
Unmarried	6.15	1.66	10.27**
Number of children	0.66	−2.72	4.89*
Log pseudolikelihood	−3304.7	−1666.7	−1625.8
Pseudo R-squared	0.0020	0.0016	0.0080
F-statistic	1.22	0.50	3.47
Sample size	877	452	425

The sample consists of participant types (A) and (C) as defined in Table 1. The average marginal effects are reported. Significance levels are indicated with * $p<0.1$, ** $p<0.05$, and *** $p<0.01$. See the Table 3 note for an explanation of other details.

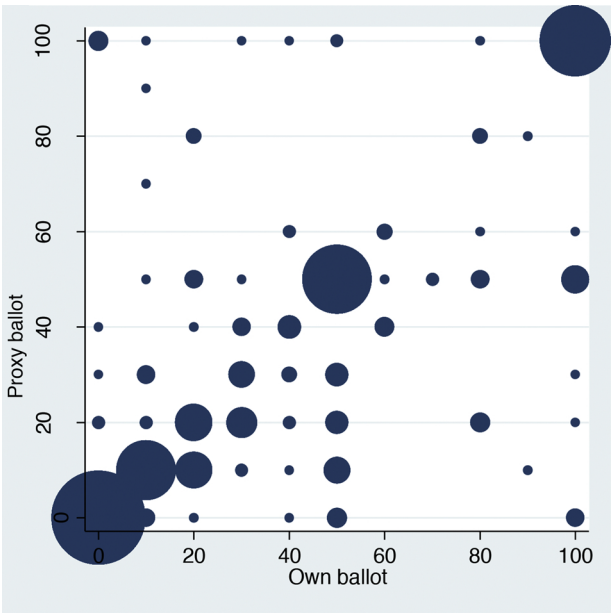

Fig. 2. Scatter diagram of the donation amount indicated by CUVA parents with their own ballot and with their proxy ballot under the PV scheme. Note: The larger dot sizes indicate larger numbers of samples at the same point.

ballots; the effect of the male dummy is not significant. These observations are further discussed in the next section.

4. Discussion

Our experiment produced a counterintuitive result suggesting that a proxy voting (PV) scheme that gives added weight to parents with young children actually results in less altruistic choices when making decisions that are likely to impact future generations. While we found females with children under the voting age (CUVA) to be the most altruistic participants under the ordinary, one-person-one-vote, voting (OV) scheme, this distinction disappeared under the PV scheme in which the parents of young children were given an extra vote. In contrast, males with CUVA and parents without CUVA showed no similar shift.

There are several possible reasons why females with CUVA tend to behave less altruistically when voting under the PV scheme. The first explanation relates to the priming effect embedded in the PV rule itself. In the PV scheme, the granting of proxy ballots is accompanied by an explanation that the extra ballots are being provided on behalf of the parents' CUVA. This explanation may well

Table 6
Estimation results of the Tobit model with the amount of donation indicated with proxy ballots in PV as the dependent variable.

Dependent variable	Amount of donation indicated with proxy ballots		
Data used	All	Male	Female
Amount of donation indicated with own ballots	0.68***	0.66***	0.71***
Male	0.31	–	–
Age	−0.27**	−0.28*	−0.25
Ln income	0.56	2.88	0.30
Edu: junior high school	−8.15	−7.44	−6.95
Edu: vocational college	1.74	0.33	2.34
Edu: technical college or two-year college	−0.23	−4.71	2.26
Edu: university	−3.47	−3.46	−5.06
Edu: graduate school	−0.18	−3.19	7.82
Unmarried	6.85**	8.76*	4.29
Number of children	1.01	1.44	−0.003
Log pseudolikelihood	−1355.9	−732.7	−618.1
Pseudo R-squared	0.1375	0.1528	0.1212
F-statistic	44.46	28.38	19.61
Sample size	445	259	186

The sample consists of participant type (B) as defined in Table 1. The average marginal effects are reported. Significance levels are indicated with * $p<0.1$, ** $p<0.05$, and *** $p<0.01$. See the Table 3 note for an explanation of other details.

shift the attention of CUVA parents away from the rather distant benefit of future generations to the more immediate benefit of their CUVA.[6] As a result, the parents may be inclined to decrease their future-oriented contribution. Indeed, as shown in Fig. 1, under the PV scheme, the donation amount indicated with proxy ballots is smaller than that with own ballots.

According to our results, females with CUVA are generally more altruistic towards future generations but also more susceptible to the priming effect. Findings from several different literature streams can be used to explain this gender difference. In terms of evolutionary and biological aspects, mothers tend to be more altruistic than fathers in matters related to their children due to differences in the male and female gametes, sunk cost bias, paternal uncertainty caused by internal fertilization, and so on (Alger & Cox, 2013). From a sociological point of view, mothers are expected, under societal norms, to engage in childrearing. Furthermore, laboratory experiments in behavioral science have found that females are more context-dependent than males (Croson & Gneezy, 2009).

The second explanation focuses on the unequal voting power between parents with and without CUVA under the PV scheme. The rational choice theory of voting argues that voters attempt to maximize their expected utility from voting and that the degree of influence of each vote on the outcome affects voting behavior. Among the various models, the expressive voting model assumes that people receive a positive psychological benefit from ethical behavior and, in particular, that voters receive positive utility from a vote for a fair option (Schuessler, 2000). From this standpoint, utility-maximizing voters vote for the fair option rather than their preferred option when their influence on the outcome is relatively weak since the opportunity cost of behaving ethically is low in such a situation, while the psychological benefit remains constant (Feddersen et al., 2009; Shayo & Harel, 2012; Tyran, 2004). Based on this argument—commonly labeled the low cost theory—CUVA parents could be expected to vote in a more self-centered manner under the PV scheme since they exert a greater influence on the outcome under this voting scheme versus the OV scheme.

The low cost theory also predicts that non-CUVA parents would vote more altruistically under the PV scheme because the relative influence of their votes is weaker under this scheme than under the OV scheme. However, this second prediction is not supported by our data; the effect of the PV dummy is not statistically significant, as shown in Table 4. Since there is no robust explanation as to why the low cost theory applies to parents with CUVA but not to parents without CUVA, the low cost theory explains our result only partially; similar negative results for the low cost theory have been obtained in previous studies (Kamenica & Egan Brad, 2014; Kamijo et al., 2019; Tyran, 2004). Explanation of the gender differences observed in our experiment also requires a firmer theoretical basis.

5. Conclusion

The results of this study shed light on the discussion of how political systems might be altered in order to produce a more future-oriented decision-making process, with particular focus on the proxy voting (PV) scheme. The expectation that the proposed PV scheme would encourage future-friendly decisions is based on the following two assumptions: (1) Parents, especially mothers, with children under the voting age (CUVA) would be more altruistic regarding decisions affecting future generations, and (2) empowering

[6] Since participants know from the explanation of the PV scheme that participants include parents with CUVA, they may also give attention to CUVA of other parents as well as their own CUVA.

such people in the political process would promote societal decisions that would benefit those future generations.

Our experiment supported the first assumption; mothers with CUVA were shown to exhibit the highest degree of altruism towards future generations under the conventional ordinary voting scheme. However, the second assumption was not supported; the superior altruism of mothers with CUVA disappeared under the PV scheme. This type of experimental testing plays an important role in identifying possible unexpected and counterintuitive responses to institutional change. Our results are highly relevant to any discussion of political reforms aimed at promoting more future-oriented policy-making.

The altruism of parents towards their children is essential to the continuation and prosperity of the human species. Indeed, this would appear to be a principal motivation for altruism towards future generations. However, our experimental results raise the possibility that the love that parents have for their own children actually makes them less likely to choose sustainable alternatives at the expense of more immediate benefits. This follows a logic similar to that by which the successive maximization of short-term profits can hamper long-term profit. This possibility suggests that mechanisms that do not rely specifically on parental altruism towards their offspring are needed to overcome the current sustainability crisis.

Finally, we list two more issues that should be addressed in future studies. First, parents who are given additional votes might be targeted for vote buying. If parents with additional votes abuse their children's votes and are ready to sell them, politicians and interest groups could change their election campaigns.[7] As a result, contrary to the original intention, the resource allocation in the society could shift from the entire current generation to a part of current generation, rather than to future generations. This possibility increases the importance of research on how people use their proxy votes as examined in this paper, and the necessity for future research on the reaction of politicians and interest groups to such change in voting rule.

Second, replacing the current rule with a new rule is difficult in many cases because the introduction of a new rule needs to be approved under the current rule. In our experiment, we focused on how people would vote if the PV scheme were introduced. Our results were not encouraging for the introduction of PV without measures to avoid the change in the decisions of females with CUVA in a less altruistic direction. Even if we succeeded in inventing appropriate measures, we would next need to find a procedure that enables the new voting rule to be introduced despite it could shift a part of resources from the current generation to future generations. Through a questionnaire survey for Japanese voters, Vaithianathan et al. (2013) found that non-CUVA respondents who would not be given extra votes were more likely to oppose the implementation of PV than CUVA parents. Attitudes toward the introduction of the new voting rule could also differ, for example, between people who identify as believing in climate change and people who do not. For its implementation, therefore, both the new voting rule itself and the procedure for its introduction must have legitimacy. Verification from this perspective of legitimacy needs to be accumulated.

Funding

This work was supported by JSPS KAKENHI Grant Numbers 26285047, 18K01515 (Y. Kamijo), and 17K03769 (Y. Hizen).

Declaration of Competing Interest

None.

Acknowledgement

We would like to thank Etienne Farvaque, the editor, and two anonymous reviewers for their useful comments.

Appendix A

Instructions for the donation experiment

Imagine that human beings will exist far beyond the generations of your children and grandchildren. Individuals who will exist beyond your children's and grandchildren's generations are referred to as "future generations."

You have 100 yen. A part of this can be donated for "future generations." Donations can be made in any amount of 100 yen. Please enter a donation amount from 0 yen to 100 yen in 10 yen increments. As described below, the total amount collected from participants will be donated to "certified NPO corporations," as posted on the Cabinet Office NPO website (URL: https://www.npo-homepage.go.jp/). At that time, donations will be made to NPO corporations that conduct businesses such as "education for children" and "environmental conservation."

Next, we illustrate how your choices will affect the points you earn and the donation amount.

As mentioned above, you will be asked to enter a donation amount out of 100 yen for "future generations." However, the amount actually donated by you is not necessarily the amount you entered; it is determined by the average amount indicated by approximately 1000 responses to this questionnaire survey. More precisely, the actual donation amount will be determined using the following "median."

※The median is the value located in the middle of a data set when the data are arranged from lowest to highest.

[7] Here, vote buying and selling do not necessarily mean paying and receiving money literally in exchange for votes because they are illegal in most states. They can mean attracting and casting votes in exchange for policies that benefit voters who give out their votes.

For example, considering the answers of persons A to E below, the amount each person will donate is "40 yen," or equal to person C's answer which is the median of the answers.

Person A (0 yen), Person B (20 yen), Person C (40 yen), Person D (80 yen), Person E (100 yen)

In the actual procedure, in addition to the points earned by answering this questionnaire survey, you are given the points equivalent to the amount remaining after subtracting the donation amount determined by all respondents from 100 yen.

<The next step is different between OV and PV. >

<In OV>

Your donation (please enter an amount from 0 yen to 100 yen, in 10 yen increments)

____yen

<In PV>

This final section will explain how to answer your donation amount. Please note that the steps are slightly different between people with children under 18 years and people without children under 18 years.

If you do not have children under 18 years, please answer (1) your own donation amount. If you have children under 18 years, please answer (2) your own donation amount and (3) a donation amount from your own child, on his/her behalf, who cannot participate directly in this choice. If you have multiple children, please enter a donation amount only on behalf of your youngest child.

In other words, those with children under 18 years will enter a donation amount twice (for themselves and on behalf of their children). The actual donation amount will be the average amount of the total number of (1), (2), and (3) responses (i.e., the "median," as mentioned above).

For both people with children under 18 years and people without children under 18 years, the actual donation amount is the amount determined in the above way. Although those with children under 18 years enter a donation amount twice (for themselves and on behalf of their children), the amount they will actually donate is only their own amount. Please note that it does not mean that they will donate two people's amount (i.e., you and your child).

Your donation (please enter an amount from 0 yen to 100 yen, in 10 yen increments)

____yen

<The following input field is added if the respondent has a child under 18 years.>

Your child's donation (please enter an amount from 0 yen to 100 yen, in 10 yen increments)

____ yen

References

Alger, I., & Cox, D. (2013). The evolution of altruistic preferences: Mothers versus fathers. *Review of Economics of the Household, 11*(3), 421–446.

Amir, O., Rand, D. G., & Gal, Y. (2012). Economic games on the internet: The effect of $1 stakes. *PloS One, 7*(2), e31461.

Andreoni, J., & Vesterlund, L. (2001). Which is the fair sex? Gender differences in altruism. *The Quarterly Journal of Economics, 116*(1), 293–312.

Aoki, R., & Vaithianathan, R. (2009). *Is Demeny voting the answer to low fertility in Japan? (PIE/CIS Discussion Paper No. 435)*.

Barro, R. J., & Becker, G. S. (1989). Fertility choice in a model of economic growth. *Econometrica, 57*(2), 481–501.

Corak, M. (2013). Public policies for equality and social mobility in Canada. *Canada 2020*.

Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature, 47*(2), 448–474.

d'Adda, G. (2011). Motivation crowding in environmental protection: Evidence from an artefactual field experiment. *Ecological Economics, 70*(11), 2083–2097.

Eckel, C. C., & Grossman, P. J. (1998). Are women less selfish than men? Evidence from dictator games. *The Economic Journal, 108*(448), 726–735.

Feddersen, T., Gailmard, S., & Sandroni, A. (2009). Moral bias in large elections: Theory and experimental evidence. *The American Political Science Review, 103*(2), 175–192.

Gordon, I., Zagoory-Sharon, O., Leckman, J. F., & Feldman, R. (2010). Oxytocin and the development of parenting in humans. *Biological Psychiatry, 68*(4), 377–382.

Görlitz, K., & Tamm, M. (2015). *Parenthood and risk preferences (Ruhr Economic Papers No. 552)*.

Hara, K., Yoshioka, R., Kuroda, M., Kurimoto, S., & Saijo, T. (2019). Reconciling intergenerational conflicts with imaginary future generations: Evidence from a participatory deliberation practice in a municipality in Japan. *Sustainability Science, 14*(6), 1605–1619.

Hauser, O. P., Rand, D. G., Peysakhovich, A., & Nowak, M. A. (2014). Cooperating with the future. *Nature, 511*(7508), 220–223.

Hayo, B., & Neumeier, F. (2017). Public attitudes toward fiscal consolidation: Evidence from a representative German population survey. *Kyklos, 70*(1), 42–69.

Herbst, C. M., & Ifcher, J. (2016). The increasing happiness of US parents. *Review of Economics of the Household, 14*(3), 529–551.

Hoekzema, E., Barba-Müller, E., Pozzobon, C., Picado, M., Lucco, F., García-García, D., Soliva, J. C., Tobeña, A., Desco, M., Crone, E. A., Ballesteros, A., Carmona, S., & Vilarroya, O. (2017). Pregnancy leads to long-lasting changes in human brain structure. *Nature Neuroscience, 20*(2), 287–296.

Horton, J. J., Rand, D. G., & Zeckhauser, R. J. (2011). The online laboratory: Conducting experiments in a real labor market. *Experimental Economics, 14*(3), 399–425.

Kamenica, E., & Egan Brad, L. (2014). Voters, dictators, and peons: Expressive voting and pivotality. *Public Choice, 159*(1–2), 159–176.

Kamijo, Y., Komiya, A., Mifune, N., & Saijo, T. (2017). Negotiating with the future: Incorporating imaginary future generations into negotiations. *Sustainability Science, 12*(3), 409–420.

Kamijo, Y., Hizen, Y., Saijo, T., & Tamura, T. (2019). Voting on behalf of a future generation: A laboratory experiment. *Sustainability, 11*(16), 4271.

Moulin, H. (1980). On strategy-proofness and single peakedness. *Public Choice, 35*(4), 437–455.

Musick, K., Meier, A., & Flood, S. (2016). How parents fare: Mothers' and fathers' subjective well-being in time with children. *American Sociological Review, 81*(5), 1069–1095.

Nomaguchi, K. M., & Milkie, M. A. (2003). Costs and rewards of children: The effects of becoming a parent on adults' lives. *Journal of Marriage and Family, 65*(2), 356–374.

Saijo, T. (2019). Future design. In J.-F. Laslier, H. Moulin, M. R. Sanver, & W. S. Zwicker (Eds.). *Future of economic design: The continuing development of a field as envisioned by its researchers* (pp. 253–260). Berlin, Germany: Springer.

Saint-Paul, G., & Verdier, T. (1993). Education, democracy and growth. *Journal of Development Economics, 42*(2), 399–407.
Schuessler, A. A. (2000). *A logic of expressive choice.* Princeton University Press.
Shayo, M., & Harel, A. (2012). Non-consequentialist voting. *Journal of Economic Behavior & Organization, 81*(1), 299–313.
Stanca, L. (2012). Suffer the little children: Measuring the effects of parenthood on well-being worldwide. *Journal of Economic Behavior & Organization, 81*(3), 742–750.
Stix, H. (2013). Does the broad public want to consolidate public debt? *Kyklos, 66*(1), 102–129.
Suri, S., & Watts, D. J. (2011). Cooperation and contagion in web-based, networked public goods experiments. *PloS One, 6*(3), e16836.
Thompson, D. F. (2010). Representing future generations: Political presentism and democratic trusteeship. *Critical Review of International Social and Political Philosophy, 13*(1), 17–37.
Tyran, J. (2004). Voting when money and morals conflict: An experimental test of expressive voting. *Journal of Public Economics, 88*(7–8), 1645–1664.
Umberson, D., & Williams, K. (1999). Family status and mental health. In C. S. Aneshensel, & J. C. Phelan (Eds.). *Handbook of the sociology of mental health* (pp. 225–253). Boston, MA: Springer.
Vaithianathan, R., Aoki, R., & Sbai, E. (2013). *Support for franchise extension for children: Evidence on Japanese attitude to Demeny voting (CIS Discussion paper No. 610)*.
Van Parijs, P. (1998). The disfranchisement of the elderly, and other attempts to secure intergenerational justice. *Philosophy & Public Affairs, 27*(4), 292–333.
Wolf, S., Goldschmidt, N., & Petersen, T. (2015). Votes on behalf of children: A legitimate way of giving them a voice in politics? *Constitutional Political Economy, 26*(3), 356–374.
Woo, H., & Raley, R. K. (2005). A small extension to “Costs and rewards of children: The effects of becoming a parent on adults’ lives” *Journal of Marriage and Family, 67*(1), 216–221.