北京大学中国经济研究中心
China Center for Economic Research
讨论稿系列
Working Paper Series

No. E2011004 2011-09

Too Costly to Correct:
An Experimental Study of the Willingness to Pay for Equal Abilities

Hao Hong Jianfeng Ding Yang Yao

No. E2011004 September 13, 2011

Abstract

When governments allocate resources to people, people have different levels of abilities to use those resources to generate income. We conduct an experiment of the divinity game to study a hypothetic social planner's willingness to pay to correct unequal distribution of abilities. The social planner is asked to distribute money from a fixed budget to two other subjects who have different abilities to convert the transfers into their own income. Twenty rounds are conducted that allow the social planner's budget and the gap of abilities between the two other subjects to vary between rounds. We test the data for consistency and recover the social planner's underlying preference for social distribution. The social planner's willingness to pay for equal abilities is measured by the equivalent variation (EV), i.e., the amount of social surplus he would like to forgo to avoid a larger gap of abilities. Both parametric and nonparametric estimations show that the willingness to pay for eliminating the same amount of inequality of abilities declines when the initial inequality starts larger. This result contributes to the experimental literature on the tradeoff between equality and efficiency and sheds lights on the explanation of persistent inequality in some societies.

Keywords: the equality-efficiency tradeoff; willingness to pay; the divinity game

JEL classification: D63, D78

Too Costly to Correct:
An Experimental Study of the Willingness to Pay for Equal Abilities

1. Introduction

One of the motivations for government redistribution is that the recipients can make use of government transfers to generate their own income so their reliance on government can be reduced in the future. Government transfers aiming at providing means of production (e.g., concessional loans, employment guarantee programs, and subsidies to infrastructural construction) are examples of this motivation. Many welfare programs also fit in as they operate on the premise that the recipients can eventually cease to live on welfare. Poverty alleviation programs, job training, and student loans are a few examples. In a more general setting, governments make various forms of allocations, either in financial terms or in the form of specific rights, to boost social output. However, people have different levels of abilities to successfully utilize the resources allocated by the government. When the society is characterized by a high level of inequality of abilities, government redistribution and allocation may entail efficiency losses and thus become less desirable. Therefore, correcting the unequal distribution of abilities is often argued as one of the societal priorities.

This is evident in Dworkin's philosophical theory (Dworkin, 1981, 2000) of distributive justice. Based on the premise that personal gains unrelated to personal efforts are unjust, Dworkin argues that those gains should be redistributed. In Sen (1985, 1999)'s capability approach to economic development, the lack of basic capabilities --- functions that are necessary for people to reach valuable goals --- is regarded as the fundamental cause for hunger, poverty, and underdevelopment. Economic theories studying the relationship between inequality and underdevelopment also suggest a mechanism that the initial inequality of wealth, which is not necessarily related to personal merits, leads to persistent inequality in people's abilities to generate future income (e.g., Banerjee and Newman, 1994; Galor, Moav, and Vollrath, 2009). In recent empirical studies based on questionnaires and

experiments, it is frequently found that subjects are more sympathetic toward redistribution when inequality is purely related to luck (e.g., Scott et al., 2001; Michelbach et al., 2003; Mitchell et al., 1993, 2003).

In this paper, we present an experimental study on a hypothetic social planner's willingness to pay to correct the inequality of abilities. In our experiment, the social planner (SP) is asked to distribute money from a fixed budget to two other subjects who have different abilities to convert the transfers into their own income. It is natural to expect that the SP would give an equal share of budget to the other two subjects if they had the same abilities. When one of them has lower abilities, the sum of the two subjects' actual income declines if the SP continues to make equal transfers. The SP faces the equality-efficiency tradeoff and may reduce the share allocated to the subject with lower abilities. The relative size of the two subjects' abilities then can be interpreted as the price of equal allocation (or the price of equality for short).

One of the features of our game is that the payment received by the SP is not affected by his decisions so he could make decisions as if he were disinterested with respect to the society. For that reason, we call our game "the divinity game". Twenty rounds are conducted that allow the SP's budget and the price of equality to vary between rounds. The willingness to pay for equality of abilities is measured by the equivalent variation (EV) between two prices of equality.

The current literature takes two approaches to measuring the equality-efficiency tradeoff. One is the qualitative approach based on discrete choice games (Frohlich, Oppenheimer, and Eavey, 1987; Frohlich and Oppenheimer, 1992, 1994; Bernasconi, 2002; Bosmans and Schokkaert, 2004; Engelmann and Strobel, 2004; Traub et al., 2005, 2009;) or variations of one shot dictator game (Konow, 2000; Charness and Rabin, 2002; Cappelen et al., 2007; Croson and Konow, 2009). In those games, subjects are either asked to order or choose from discrete social allocations, or make allocations between themselves and other subjects; their orderings or choices then are used to make inferences about the social justice models they apply in the game. While this strand of literature has made significant progresses, especially in discovering the

role of efficiency consideration in people's distributive decisions (Engelmann and Strobel, 2004), the qualitative approach suffers from two deficiencies. First, it only allows for local estimations of the subjects' utility functions (social welfare functions) because of the limited data points generated by the discrete choice games. In other words, the inferences made may be subjected to the variation of the experimental design. For example, Bolton and Ockenfels (2006) find in a voting game that aversion to inequality is a more important motive than efficiency consideration. But this result has been challenged by Engelmann and Strobel (2006) on the ground that in the experiment the efficiency gap is small but the inequality gap is large between the two alternatives for voting. Second, also because of the lack of data, the qualitative approach does not allow the consistency test for subjects' choices. Without the assurance of consistency, it is hard to assess the accuracy of any inference made on the subjects' choices.

The other approach is quantitative. The modified dictator game developed by Andreoni and Miller (2002) is the starting point for this approach. In the modified dictator game, subjects are asked to make allocations under different scenarios of efficiency losses when the receiver takes allocations from the dictator. As a result, a large number of observations can be generated and a utility function can be estimated for each subject. However, the modified dictator game primarily is a game of giving; the different scenarios of efficiency losses are prices of giving rather than prices of equality. Although some inferences can be made for the equality-efficiency tradeoff, the dictator's self-interests are likely to dominate his decisions.[1]

Our divinity game improves the modified dictator game by making the dictator a social planner so the relative size of the two other subjects' abilities becomes the price of equality. Consequently, the SP's decisions purely reflect considerations of the equality-efficiency tradeoff. We also extend the studies of the equality-efficiency tradeoff by directly estimating the EV of price changes. The existing studies spend

[1] Indeed, Andreoni and Miller (2002) find that 47.2% of the subjects always allocated almost the entire budget to themselves, so no equality-efficiency tradeoff was observed on them.

more efforts on measuring the coefficient of inequality aversion (e.g., Amiel, Creedy, and Hurn, 1999; Carlsson, Daruvala, and Johansson-Stenman, 2005; Pirttilä and Uusitalo, 2010), or rationalizing subjects' choices with certain utility functions (Andreoni and Miller, 2002; Fisman, Kariv, and Markovits, 2007; Traub et al., 2005; Traub, Seidl, and Schmidt, 2009). Our approach provides a direct estimate for the SP's willingness to pay to correct the inequality of abilities. We calculate the EV in two ways. One is parametric that is based on the utility functions estimated on the subjects' decisions, and the other is nonparametric that estimate the EV directly from the subjects' choices. The nonparametric approach does not require any restrictions on subjects' utility functions so its results are more general than those of the parametric approach.

The rest of the paper is organized as follows. Section 2 presents the experimental design of the divinity game. Section 3 checks the consistency of the subjects' choices and rationalizes these choices by a CES utility function. It also provides regression results on how the subjects' choices are affected by their social and economic characteristics. Section 4 presents both parametric and nonparametric estimates for the willingness to pay and discusses their implications. Section 5 concludes the paper.

2. The Experimental Design

Our divinity game is a revised version of the modified dictator game. There are three subjects in the game. One of them plays the role of the social planner (SP), and the other two, labeled A and B, play the role of ordinary citizens. The role of the SP is to distribute a fixed amount of budget m between A and B. Let π_A and π_B be the amounts of income A and B actually obtain. Suppose that the SP's has a utility function of $u(\pi_A, \pi_B)$. Then his decision problem can be characterized as the follows:

(1) $\underset{\pi_A,\pi_B}{Max} \; u(\pi_A,\pi_B)$

s.t. $\pi_A + p\pi_B = m$,

where $p \geq 1$ is an inefficiency measure for B's abilities relative to A's in converting government allocations into his own income. That is, there is a loss when money is allocated to B. Put in another way, $1/p$ measures B's income abilities relative to A's. When p is equal to one, an inequality-averse SP will choose to give A and B an equal share of income. When p is larger than one, the equality-efficiency tradeoff kicks in, and even an inequality-averse SP will incline to allocate less to B. Therefore, p can also be interpreted as the price of equal distribution of social resources.

In an experimental setting, the above setup may create prejudices on the part of the SP against B. For example, the SP may think that B has inferior abilities because he is lazy. If that were the case, the SP's choices would be contaminated by his distaste against laziness and look more favoring efficiency than equality. To overcome this potential problem, we convert problem (1) into one featuring an explicit choice between efficiency and equality. Let $F = \pi_A + \pi_B$ and $E = \pi_A - \pi_B$. Then F represents efficiency, and E represents inequality of outcomes. Suppose that the SP's preference over F and E is represented by $v(F, E)$. Then his decision problem becomes

(2) $\underset{F,E}{Max} \quad v(F,E)$

s.t. $F = n + bE$,

where b and n are positive values. With the transformations $b = (p - 1)/(p + 1)$ and $n = m(1 - b)$, Problem (2) and Problem (1) are equivalent with a proper transformation between u and v. Now the critical parameter is b, which measures the tradeoff between equality of outcomes and efficiency.

In the experiment, the SP was presented the constraint in Problem (2) and asked to give a number to E in each round. Then F, π_A and π_B were automatically shown on the computer screen. We did this for the following reason. Although in theory Problem (1) and Problem (2) are equivalent, the subjects may not relate Problem (2) to a problem of inequality of abilities. Presenting the subjects π_A and π_B allows them to make that relation. The downside is that, once again it may lead to prejudices against B. In the questionnaire following the experiment, we asked an open-ended question about what

the subjects believed was the purpose of the experiment, and 92.4% of them answered that it was about the tradeoff of efficiency and equality. That is, the problem was not serious even if it existed.

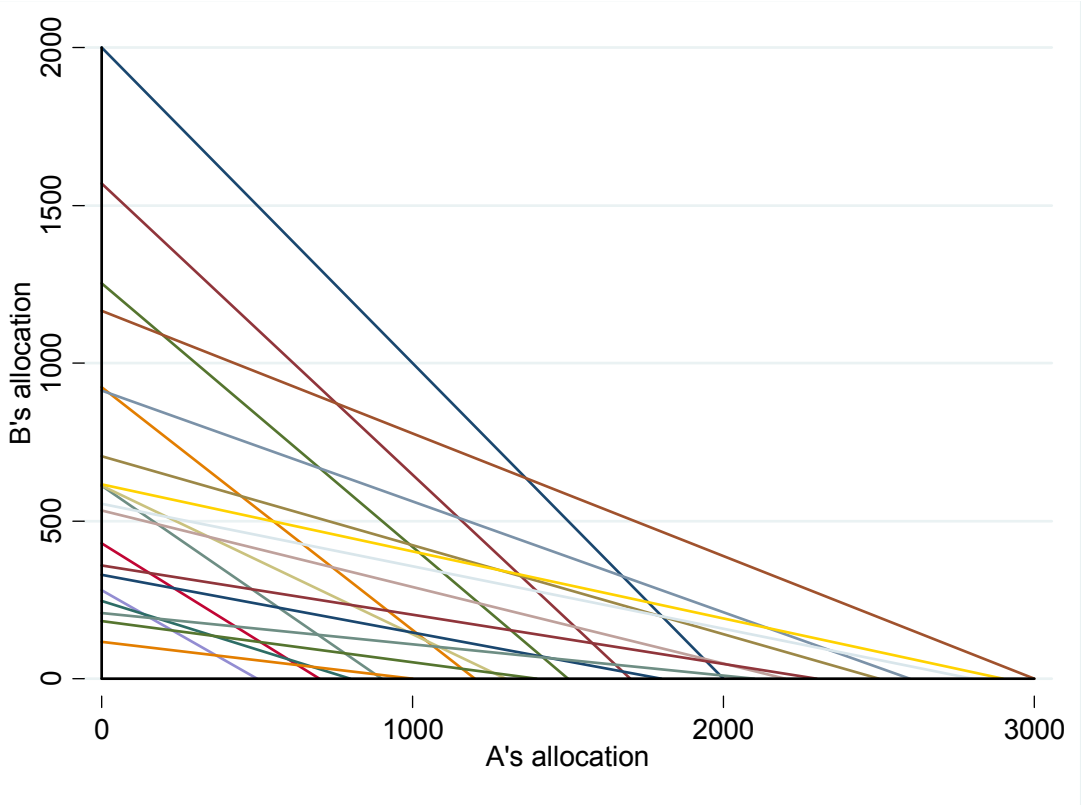
We prepared 20 rounds of experiments and their budget constraints are shown in Table 1. The price of equality ranged from 1 to 10.11 and the budget ranged from 500 to 3000. There was no correlation between the prices and budgets, though. Figure 1 shows the budget constraint (1) to provide a visual presentation. To avoid the effect of order, we randomized the order the prices appeared in the experiment.

Table 1. The budget constraints (ordered by p)

Round	M	p	$\pi_A + p\pi_B = m$	$F = n + bE$
8	2000	1.00	$\pi_A + 1.00\ \pi_B = 2000$	$F = 2000 + 0\ E$
20	1700	1.08	$\pi_A + 1.08\ \pi_B = 1700$	$F = 1632 + 0.04\ E$
9	1500	1.20	$\pi_A + 1.20\ \pi_B = 1500$	$F = 1365 + 0.09\ E$
2	1200	1.30	$\pi_A + 1.30\ \pi_B = 1200$	$F = 1044 + 0.13\ E$
7	900	1.47	$\pi_A + 1.47\ \pi_B = 900$	$F = 729 + 0.19\ E$
11	700	1.63	$\pi_A + 1.63\ \pi_B = 700$	$F = 532 + 0.24\ E$
13	500	1.78	$\pi_A + 1.78\ \pi_B = 500$	$F = 360 + 0.28\ E$
4	1300	2.13	$\pi_A + 2.13\ \pi_B = 1300$	$F = 832 + 0.36\ E$
16	3000	2.57	$\pi_A + 2.57\ \pi_B = 3000$	$F = 1680 + 0.44\ E$
1	2600	2.85	$\pi_A + 2.85\ \pi_B = 2600$	$F = 1352 + 0.48\ E$
3	800	3.26	$\pi_A + 3.26\ \pi_B = 800$	$F = 376 + 0.53\ E$
6	2500	3.55	$\pi_A + 3.55\ \pi_B = 2500$	$F = 1100 + 0.56\ E$
15	2200	4.13	$\pi_A + 4.13\ \pi_B = 2200$	$F = 858 + 0.61\ E$
17	2900	4.71	$\pi_A + 4.71\ \pi_B = 2900$	$F = 1015 + 0.65\ E$
10	2800	5.06	$\pi_A + 5.06\ \pi_B = 2800$	$F = 924 + 0.67\ E$
18	1800	5.45	$\pi_A + 5.45\ \pi_B = 1800$	$F = 558 + 0.69\ E$
5	2300	6.41	$\pi_A + 6.41\ \pi_B = 2300$	$F = 621 + 0.73\ E$
12	1400	7.70	$\pi_A + 7.70\ \pi_B = 1400$	$F = 322 + 0.77\ E$

19	1000	8.52	$\pi_A + 8.52\ \pi_B = 1000$	$F = 210 + 0.79\ E$
14	2100	10.11	$\pi_A + 10.11\ \pi_B = 2100$	$F = 378 + 0.82\ E$

Figure 1. The budget constraints illustrated



In each round, three subjects were randomly drawn to form a group, and each subject was asked to be the SP who treated the other two subjects as A and B. Each subject first got a fixed participation bonus of 10 Yuan. Then on top of that his/her income from the game was determined by a two-step random draw. In the first step, one round was randomly drawn from the 20 rounds of experiments. Then in the second step, a subject was randomly drawn to be the SP, and the other two were randomly decided to be either A or B. The SP's decision in this round then determined A and B's payments. The SP's own income was a fixed amount that was unrevealed until the experiment ended.[2]

By this design, there might be a problem of the lack of incentive for the SP to make responsible decisions because his actual income was fixed. However, this turned out

[2] This treatment is to prevent the SP from comparing others' income with his own.

not a serious problem as most subjects' choices are nearly consistent, as shown in section 3.1.[3]

Our computer interface was developed on the open-source software Multistage developed by SSEL of Caltech and CASSEL of UCLA. The subjects were recruited from Peking University and several other universities in Beijing through advertisements in several websites popular among students. The experiment was conducted in six sessions on March 27 and 28, 2010. After they read the instruction, a quiz was given to the subjects to see if they had understood the experiment. Then a short training phase was provided to allow the subjects to get acquainted with the interface and to understand the experiment.[4] Each session consisted of 27 subjects and lasted for one hour. Thus we had a total of 162 subjects in our experiment. In our analysis, five subjects are excluded because their data were lost due to computer failures. This leaves us with 3,140 observations (157×20) for the SP's decisions. On average, each subject was paid 23.4 Yuan (3.66 dollars) actual income, which was a bit higher than the average salary in Beijing.[5] Table 2 presents summary statistics for the subjects' characteristics obtained from an accompanying survey done immediately after the experiment.

Table 2.Subject characteristics

Characteristic	Mean	St. dev.
Female (%)	55.4	(4.0)
Age	21.5	(0.2)
PKU students (%)*	72.6	(3.6)
Graduate students (%)**	35.0	(3.8)
Student leaders (%)	42.7	(4.0)

[3] Also, in a preparatory experiment we conducted before the main experiment, we compared results from two treatments. In one treatment, subjects were paid a fixed income (three sessions, a total of 90 subjects); in the other treatment, they were paid 5% of F (the sum of income A and B obtained) extra to his fixed payment (two sessions, a total of 60 subjects), We found that the average willingness to pay for equal abilities only differ by 5% between the two treatments.

[4] The results of training rounds were not revealed to subjects so that they would not receive unnecessary information.

[5] The average monthly employee salary in Beijing was 3700 Yuan in 2009 (NSB, 2010), or 21 Yuan per hour if 22 working days are assumed for a month and 8 working hours are assumed for a day.

Major (%)		
Natural sciences	8.3	(2.2)
Social sciences	39.5	(3.9)
Technology	40.8	(3.9)
Humanities	11.5	(2.6)
Family income***		
1	1.3	(0.9)
2	17.8	(3.1)
3	26.8	(3.5)
4	43.9	(4.0)
5	9.6	(2.4)
6	0.6	(0.6)
7	0.0	(0.0)
Sample size	157	

*: The percentage of students who come form Peking University. **: The percentage of students who have been leaders of in their classes. ***: In the questionnaire after the experiment, students were asked to rank their family income between 1 to 7, where 1 = very poor and7 = very rich.

3. Consistency and rationalization

The setup of our experiment makes Problem (1) and Problem (2) equivalent. Problem (1) is a standard consumer decision problem where each pair of the allocations to A and B is a "consumption bundle" of the SP's and p is the relative price of the two "consumption goods". Therefore, it is more convenient to conduct analyses based on this problem because we can apply the conventional consumer theory.

3.1 Tests of consistency

When p equals 1, 56 subjects do not choose equal distribution of income. However, 24 of them give B at least 40% of the total budget. Overall, four subjects (2.5% of the total number of subjects) are strictly equality-dominated, sticking with equal distribution regardless of the change of price, and four subjects are strictly efficiency-dominated, always giving B zero income regardless of the change of price. This result is similar to those in the existing literature. For example, Fisman, Kariv,

and Markovits (2007) find that two out of 76 subjects (2.6%) are strictly equality-dominated and exactly two other subjects are strictly efficiency-dominated.

Figure 2. Average shares of B's allocation

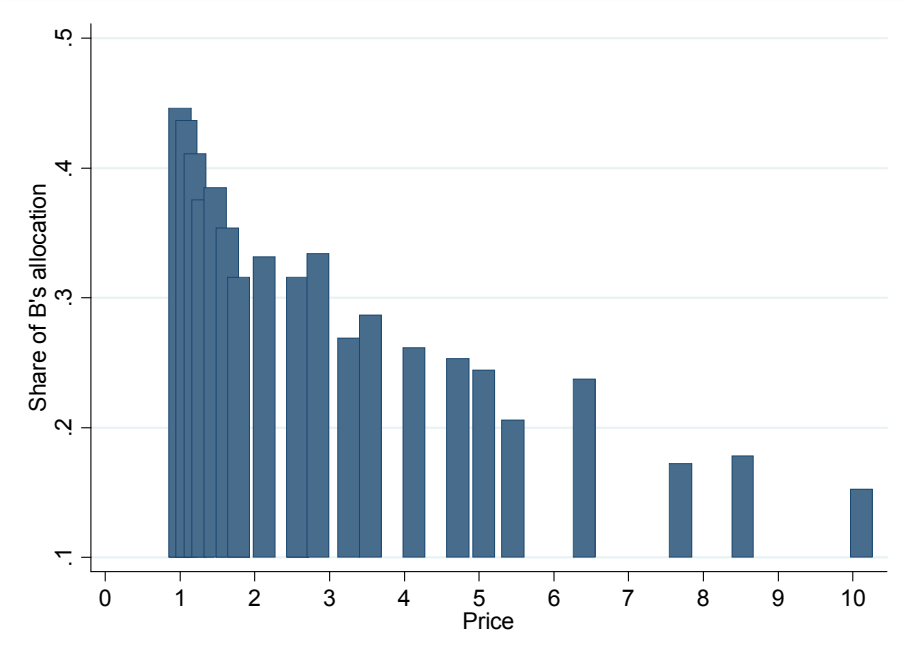
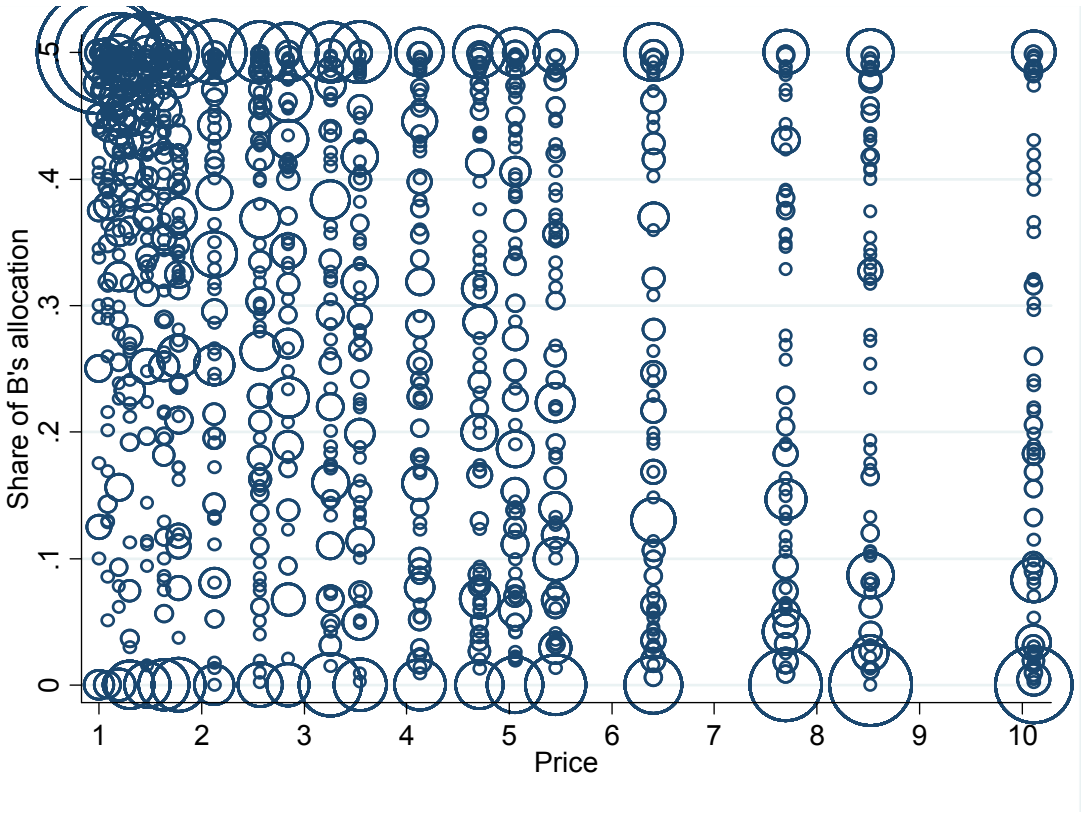


Figure 2 shows the average shares of B's allocation under different prices. Clearly, B's share generally declines when the price of equality increases. Figure 3 further shows the distribution of B's shares under different prices. There are more subjects who give B zero income when the price of equality increases although there is no clear trend for the distribution to have a smaller dispersion.

Figure 3. Distribution of B's shares



Note: The size of the bubbles represents the share of subjects choosing a particular allocation.

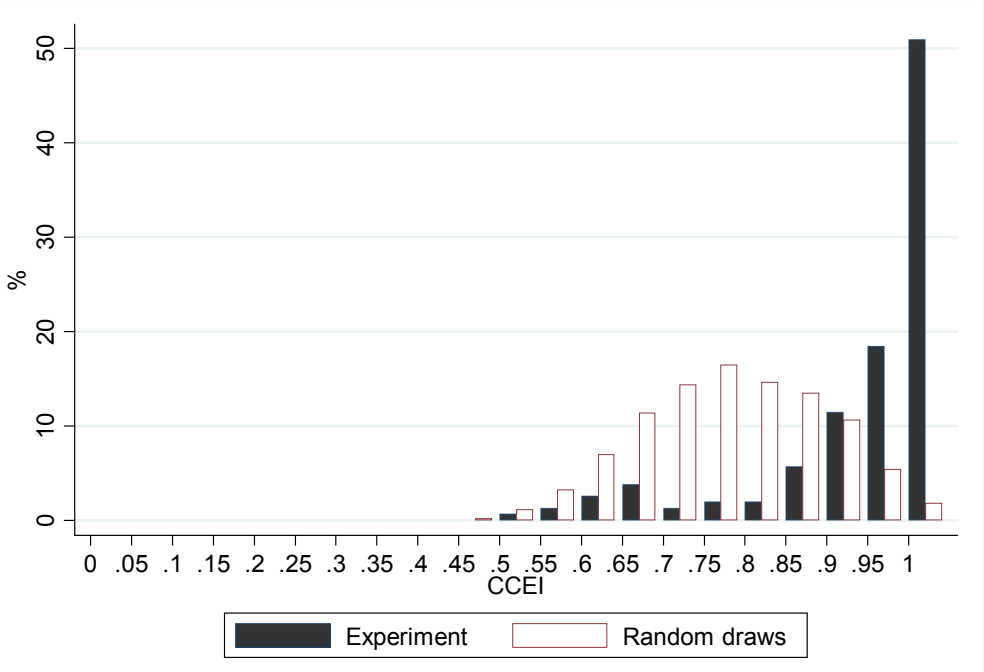
According to the Afriat theorem (Afriat, 1967, Varian, 1982), choices satisfying the Generalized Axiom of Revealed Preference (GARP) can be rationalized by a well-behaved (continuous, monotonic, concave, and non-satiated) utility function. Overall, there are 50.3% of the subjects whose choices all satisfy the GARP. This result is between what Andreoni and Miller (2002) and Fisman, Kariv, and Markovits (2007) obtain in their respective experiments, which are 89.8% and 11%, respectively. This comparison makes sense, though. The difficulty to satisfy the GARP increases when more decisions are being made. The number of decisions in our experiment was between the number in Andreoni and Miller (2002), eight or ten, and the number in Fisman, Kariv, and Markovits (2007), 50.

We are also concerned with the subjects whose choices are almost rational. Following Afriat (1972), we use the CCEI (critical cost efficiency index) to measure the extent that a subject's choices deviate from the GARP. The CCEI is constructed by the extent by which the budget has to be adjusted in order to make the choice under it

to satisfy the GARP. It is an index taking values between 0 and 1, with larger values indicating smaller adjustments needed. Following Fisman, Kariv, and Markovits (2007), we use 0.8 as the cutoff number for virtual rationality. In our case, 87.9% of the subjects have CCEI scores equal or higher than 0.8, slightly higher than the percentage in Fisman, Kariv, and Markovits (2007), which is 86%.

To offer a final test of consistency, we follow Andreoni and Miller (2002) and Fisman, Kariv, and Markovits (2007) to apply the test of Bronars (1987) that compares experimental data with choices of a hypothetical subject who randomizes uniformly among all possible allocations. We create 25,000 sets of random choices and calculate their CCEI scores. Figure 4 compares the distribution of those CCEI scores and the distribution of the CCEI scores in our data. Clearly, the choices observed in our experiment are much more consistent than those randomly generated.

Figure 4. Distributions of CCEI scores in random draws and our experiment



3.2 Estimating the CES utility function

Since most subjects' choices satisfy GARP, their choices can be rationalized by a well-behaved utility function. In this subsection we follow Andreoni and Miller (2002) and Fisman, Kariv, and Markovits (2007) to estimate a CES function for $u(\pi_A, \pi_B)$

defined in Problem (1) for each subject whose CCEI score is 0.8 or larger, excluding those efficiency- and equality-dominated subjects and one whose choices have a very large standard deviation. In the end, we estimate the utility functions for 138 subjects.

The CES utility function takes the form:

(3) $u(\pi_A,\pi_B)=[\alpha(\pi_A)^{\rho}+(1-\alpha)(\pi_B)^{\rho}]^{1/\rho}$,

where $\alpha\in[0,1]$, ρ < 1. It is well known that when $\alpha=0.5$, utilitarian ($\rho\to 1$), Rawlsian ($\rho\to-\infty$), and Cobb-Douglas ($\rho\to 0$) utility functions are special cases of the CES utility function. The elasticity of substitution is $\sigma=1/(\rho-1)$. A smaller elasticity implies that the subject is less sensitive to price changes; in particular, he does not reduce the allocation to B very much when *p* increases. Therefore, a subject with a smaller elasticity prefers equality more than efficiency. Conversely, a subject with a larger elasticity prefers efficiency more than equality.

It is easy to obtain the SP's demand function for A's allocation:

(4) $\pi_a(p,m)=\dfrac{gm}{p^r+g}$, where $r=-\rho/(1-\rho)$, and $g=[\alpha/(1-\alpha)]^{1/(1-\rho)}$.

So we can estimate the following function with the ML method to obtain the two parameters, r_n and g_n, for the *n*th subject:

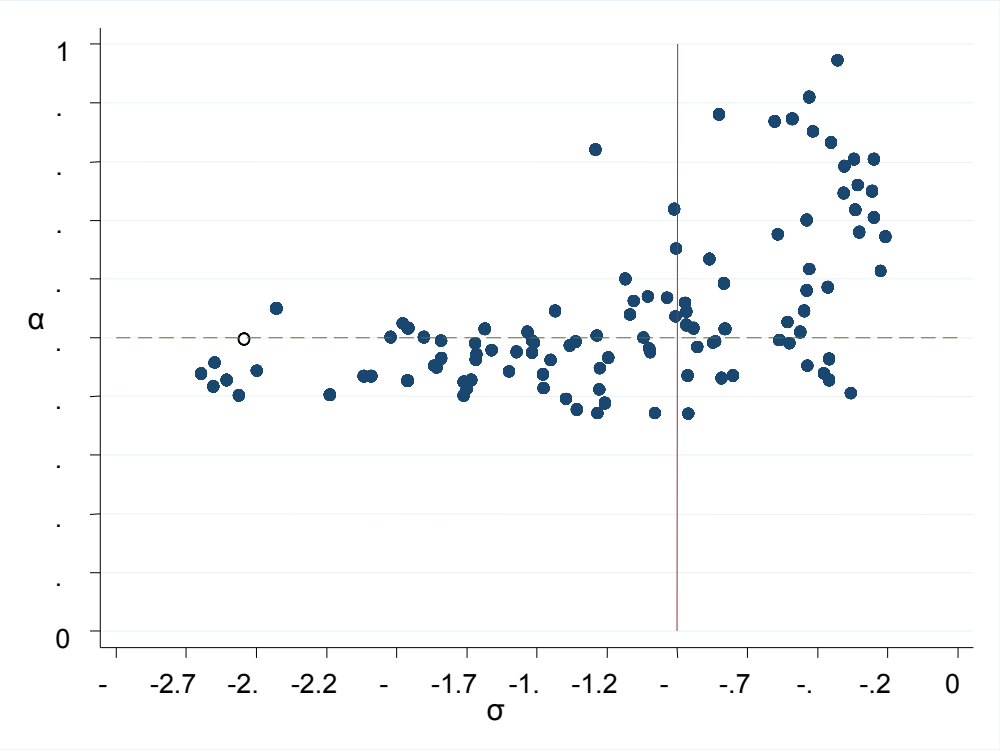
(5) $\dfrac{\pi_{a,n}^t}{m_n^t}=\dfrac{g_n}{(p_n^t)^{r_n}+g_n}+\varepsilon_n^t$,

where *t* indicate the number of round and ε_n^t is an i.i.d. error term. Then we can recover ρ_n and α_n by $\rho_n=-r_n/(1-r_n)$ and $\alpha_n=g_n^{(1-\rho_n)}/(g_n^{(1-\rho_n)}+1)$.

Among the 138 subjects whose utility functions have been estimated, twenty-three have an elasticity (absolute value) of 0.25 or smaller. That is, they have very strong preferences for equality. We call them strong equality believers thereafter.

Symmetrically, there are six people who have an elasticity (absolute value) of 4 or larger and thus strongly prefer efficiency to equality. We call them strong efficiency believers thereafter. The rest of the subjects are to be called moderates. Figure 5 presents the joint distribution of σ and α for those moderates. In the CES utility function of (3), α has the interpretation of the share of expenditure A obtains. It is interesting to find that for the subjects inclining to prefer efficiency to equality ($\sigma <$ -1), their α's are close to 0.5, whereas for the subjects inclining to prefer equality to efficiency ($\sigma >$ - 1), their α's are mostly larger than 0.5. In a sense, α determines the levels of allocation that the SP prefers, and σ measures the sensitivity of his allocations in response to price changes. Therefore, it seems that there is a tradeoff between the level and the sensitivity of allocation.

Figure 5. The joint distribution of σ and α (-4 $<\sigma <$ -0.25)



.

Table 3. Subjects' characteristics and their allocations

	(1)		(2)		(3)		(4)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Price	-63.45***	[1.385]	-64.75***	[1.446]	-63.45***	[1.379]	-64.75***	[1.438]
Budget	0.15***	[0.005]	0.15***	[0.005]	0.15***	[0.005]	0.15***	[0.005]
Female	22.78***	[7.496]	16.40**	[7.831]	31.93***	[7.992]	20.32**	[8.387]
Age	3.19	[2.371]	1.3	[2.428]	2.08	[2.562]	0.17	[2.631]
PKU student	27.54***	[9.356]	28.91***	[9.836]	23.02**	[9.654]	24.67**	[10.114]
Graduate	-23.12**	[10.304]	-30.20***	[10.729]	-24.61**	[10.799]	-29.54***	[11.300]
Student leader	-25.29***	[7.397]	-30.04***	[7.677]	-25.25***	[7.631]	-33.96***	[7.933]
Economics major	4.96	[16.386]	-1.92	[17.373]	15.95	[17.164]	9.16	[18.183]
Other social sciences majors	36.67**	[14.829]	41.55***	[15.591]	44.57***	[15.050]	45.73***	[15.783]
Engineering majors	24.83*	[13.656]	24.27*	[14.504]	32.25**	[14.031]	29.38**	[14.859]
Humanities majors	34.73**	[16.722]	47.79***	[17.755]	41.80**	[16.988]	60.04***	[18.186]
Northern China	29.86***	[7.566]	29.91***	[7.975]	27.46***	[7.827]	29.40***	[8.304]
Family income					-9.23**	[4.624]	-10.07**	[4.935]
Expected future income					-14.88***	[4.625]	-17.00***	[4.936]
Father's education					-2.6	[5.065]	-0.38	[5.322]
Mother's education					4.19	[4.467]	8.99*	[4.841]
Father works in government					-10.31	[14.480]	-25.74*	[15.369]
Mother works in government					39.64**	[16.345]	41.29**	[16.522]
"Income redistribution is justified"					6.07*	[3.599]	6.98*	[3.787]
"Being poor is due to bad luck"					3.59	[2.746]	3.18	[2.953]
"Being rich is due to good luck"					-0.4	[2.631]	-0.21	[2.800]
Constant	171.61***	[54.906]	225.29***	[56.474]	240.76***	[64.226]	290.99***	[65.836]
R^2	0.461		0.477		0.467		0.487	
CCEI ≧ 0.8	NO		YES		NO		YES	
Number of subjects	157		139		157		139	
Observations	3,140		2,780		3,140		2,780	

Notes: *** p<0.01, ** p<0.05, * p<0.1.

3.3 Subjects' characteristics and their choices

To further check the consistency of our experimental results, we run several OLS regressions of B's allocation on a set of the subjects' characteristics as well as the price and budget. The results are presented in Table 3. The first regression includes all the subjects with valid data. In addition, only the variables describing the subjects' background information are included as right-hand variables. The second regression repeats the first one but excludes the subjects whose CCEI scores are less than 0.8. That is, it is run on the subjects whose choices satisfy or almost satisfy the GARP. The third and fourth regressions repeat the first and second regressions, respectively, with the expectation of income, family income, parent backgrounds, and the subjects' political attitudes added as right-hand-side variables.

The first result we have noticed is that the coefficient of the budget does not change across the four regressions. The average participant allocates 0.15 units more to B when the budget increases by one unit. The coefficient of the price changes slightly depending on whether subjects with CCEI scores lower than 0.8 are excluded. This shows that less rational subjects had slightly different understandings of the price than more rational subjects when they made their allocations. The average rational subject reduces B's share 65 units when the price of equality increases by one (that is, when B's abilities to convert resources into income decreases by the order of one time relative to A's), whereas the number is reduced to 63 units when the less rational subjects are included.

Among the results of the other variables, several confirm the existing literature. For example, female students are more likely to prefer equality than male students and students with higher family income or higher expected personal income tend to prefer efficiency over equality. As far as majors are concerned, students of economics major prefer efficiency more than students of other majors.[6] Students from natural sciences

[6] There is a literature on the systematic differences between economics students and students of other majors. For a review, see Fisman, Kariv, and Markovits (2009). In their own experiment, Fisman, Kariv, and Markovits (2009) found that subjects exposed to instructors who stressed traditional economic ideas displayed a greater emphasis on

(the default group in the regressions) are as efficiency-loving as economics students. Students majoring in other social sciences rank the next, and students in humanity majors are the most equality-preferring group.

We also have several new findings, some of which may be specific to the Chinese settings. We find that student leaders and graduate students are more likely than other students to give B smaller allocations. This might be explained by those students' stronger personal abilities. Students need to compete, in many cases fiercely, to become a leader or to get into the graduate school. Having accomplished those things must have made them to trust more in personal achievements. A somewhat surprising finding is that parents' educational achievements do not affect a subject's choices, but father and mother's occupations make a difference, albeit in the opposite directions: if the father is a public servant, a subject is more likely to prefer efficiency (although this result is not robust); but if the mother is a public servant, a subject is more likely to prefer equality.

We have also found several interesting results on the relationship between subjects' subjective political attitudes and their allocations. In our background information survey, we asked the subjects three subjective questions adapted from Corneo and Fong (2008): Do you think that the government should tax the rich and help the poor with tax revenues? Do you agree that the poor become poor mainly because they have bad lucks, not because they are lazy? Do you agree that the rich become rich mainly because they have good lucks, not because they have worked hard? We asked the subjects to choose from values of 1 to 7 with higher values indicating stronger positive answers to the questions. Hereafter, we will refer to the first question "preference for redistribution" and the second and third questions "beliefs in luck". Our results show that a stronger preference for redistribution leads to a slightly higher allocation to B in both regressions 3 and 4, but beliefs in luck do not make a significant difference. Those results are different from Corneo and Fong (2008)'s

efficiency (increasing total payoffs) relative to those exposed to instructors who stressed ideas from the humanities.

result of survey data that attitudes toward redistribution are significantly correlated with subjective political beliefs. This difference may be explained by the discrepancies between people's opinions and actions. In a questionnaire study, the subjects are only expressing their opinions; in an experimental study, real money is involved and the subjects do not necessarily follow closely what they believe in.

4. The willingness to pay for equality of abilities

Except those who have extreme preferences for efficiency, i.e., those who have utilitarian utility functions, the subjects lose utility when the price of equality p increases. This loss of utility is what the subjects are willing to pay to get rid of the price change, or the increase of inequality in A and B's abilities to convert resources into their income. That is, it is the equivalent variation (EV) for a price change.

In this section, we adopt two methods to calculate the EV. One is a parametric approach based on the CES utility function, and the other is a nonparametric approach for small changes in the price of equality. In both cases, we restrict our analysis to the subjects whose CCEI scores are 0.8 or larger.

4.1 Parametric estimations

Our parametric estimation is based on the individual utility functions we estimated in Section 3.2. We distinguish between three groups of subjects: strong equality believers whose utility function can be approximated by the Rawlsian utility function, strong efficiency believers whose utility function can be approximated by the utilitarian utility function, and the moderates who have the ordinary CES utility function. With those utility functions, global measures are possible for the EV regardless of the changes of the budget.

Let m^0 be the original budget, p^0 be the original price, $p^1 > p^0$ be the new price, and u^1 be the utility level under p^1. The willingness to pay to avoid a larger inequality of abilities is the EV defined below:

(6) $EV = m^0 - E(p^0, u^1)$.

Specifically, for strong equality believers, their EVs can be represented by

(7) $EV = \frac{p^1 - p^0}{p^1 + 1} m^0$.

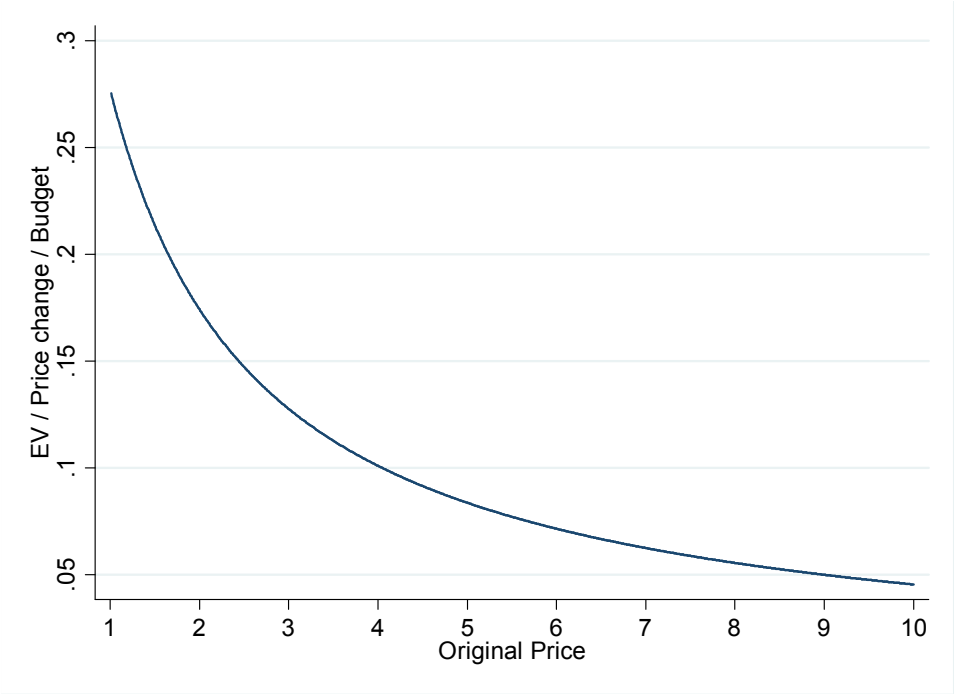
For the moderates, their EVs can be represented by

(8) $EV = [1 - (\frac{g + (p^0)^r}{g + (p^1)^r})^{\frac{1}{r}}] m^0$,

where g and r are the same as defined in (4). The strong efficiency believers have zero EV for any price changes. To get rid of the issue of scale, we will present the results of EV/m^0 subsequently. From (7) and (8) we know that this ratio is independent of m^0, but declines in p^0. Note that the EVs measured by both equations are global measures, namely, they are valid for any changes in the price.

For each p^0, we first use equations (7) and (8) to calculate EV/m^0 for each subject for a price change of one unit (i.e., from p^0 to $p^1 = p^0 + 1$), and then take their average to get the overall EV/ m^0. The results are presented in Figure 6 against the original price p^0. The willingness to pay for equality declines rapidly as the price increases. The average participant is willing to pay 27.5% of his budget to get rid of a one unit increase of the price when the price is 1, but his willingness declines to below 10% when the price is larger than 4.

Figure 6. Parametric estimation for the willing to pay



4.2 Nonparametric estimations

With nonparametric estimation, in theory we can only get local measures of the EV for small changes of the price and the budget. Let m^1 be the new budget. Then the EV is

(9) $EV = E(p^0, u^0) - E(p^0, u^1) - (m^0 - m^1) \approx [(\pi_A^0 - \pi_A^1) + p^0(\pi_B^0 - \pi_B^1)] - (m^0 - m^1)$.

Because we have 20 sets of prices and budgets in the experiment, we can calculate 19 values of the EV. For each price, we estimate the EV for each participant and then take the average of the estimates. Because the price changes between different rounds of the experiment were different, we divide the resulted average EV by the price change to get the EV for a price change of one unit. As in the parametric estimation, we should divide the EV by m^0 to make it a relative measure with respect to the SP's budget. However, the income changes are very large between some rounds and using m^0 is impropriate because we have to take out the gap between m^0 and m^1 to get EV, as shown in equation (9). Therefore, we divide the EV by m^1.

Figure 7 draws our results of EV/price change/budget against the starting prices. Compared with the results of the parametric estimation, the willingness to pay for

equal abilities declines even more rapidly. When the price is 1, the average subject is shown to be willing to pay 43% of his budget to avoid a one unit increase of the price. When the price is doubled, the willingness to pay is halved, and by the time the price passes 4, the willingness to pay declines to below 10%, just like what is found in the parametric estimation. However, the higher willingness to pay when the price is small might be caused by the linearization assumed when we divide the EVs by price changes. To confirm this conjecture, we obtain the parametric estimates for a price change of 10% (i.e., from p^0 to $p^1 = p^0 + 0.1p^0$) and then divide them by the price changes (i.e., $0.1p^0$) to convert them back to the estimates for a price change of one unit. The results are presented in Figure 8. It turns out that the curve in this figure is almost a smoothed version of the curve in Figure 7, thus confirming our conjecture.

Figure 7. Nonparametric estimation for the willing to pay

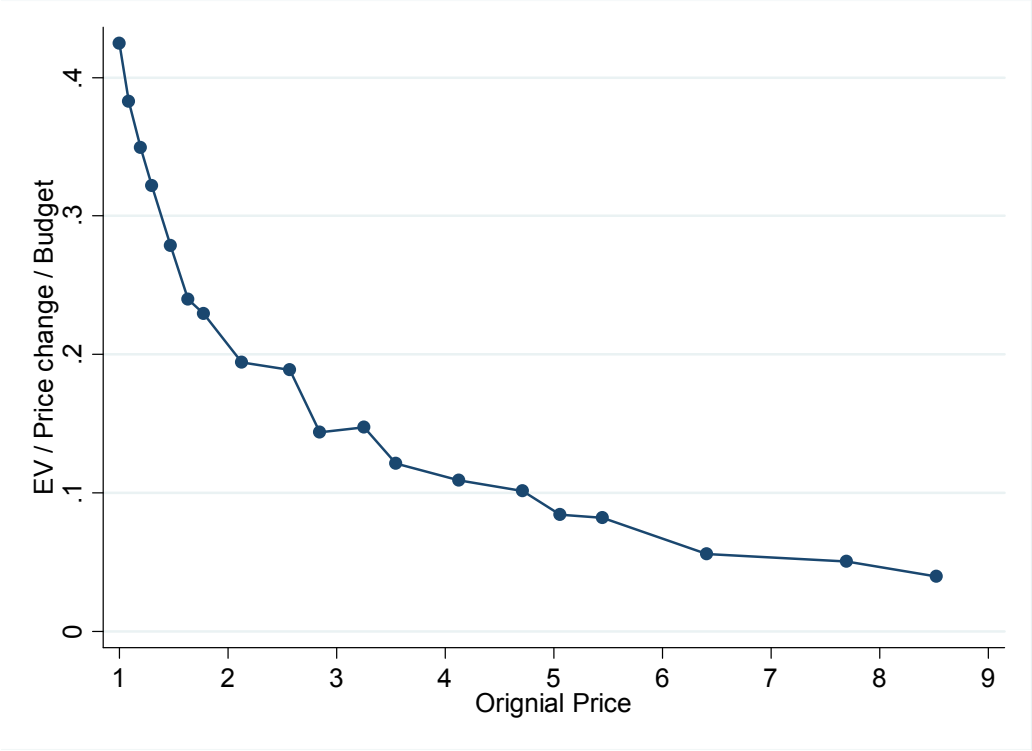
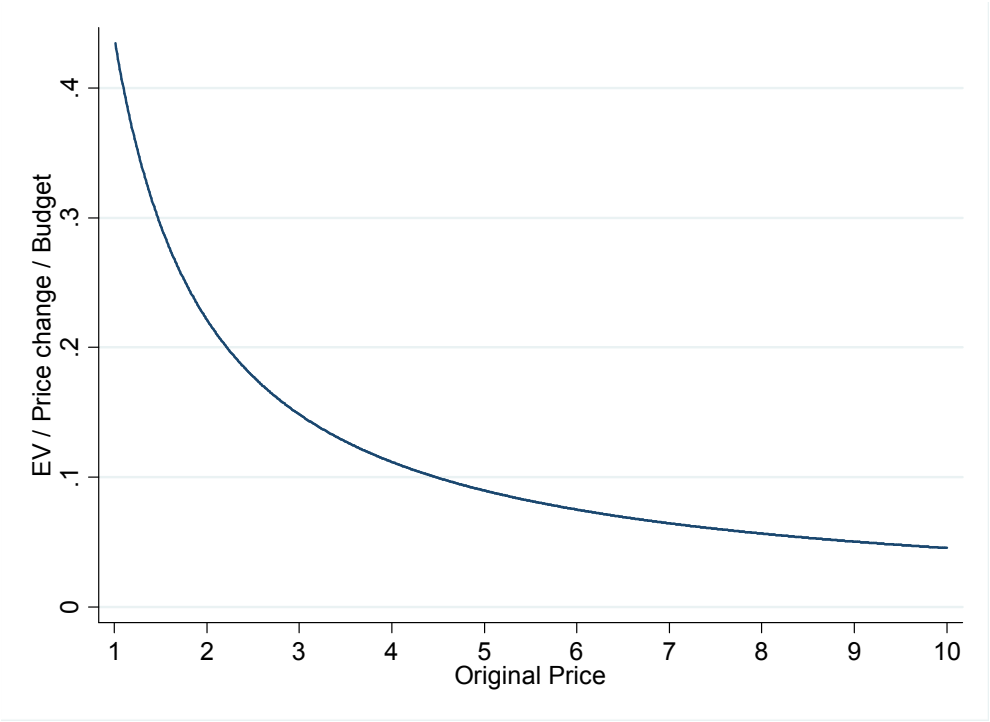


Figure 8. Parametric estimation for the willingness to pay with linearization



In the real world, people with different income levels or political convictions may have quite different ideas on income redistribution. It is thus interesting to see whether those factors affect the shape of the curve in Figure 7. For that, we estimate the following equation using individual data:

(10) $E_{ik} = \alpha_0 + \alpha_1(1/p_k) + \alpha_2(1/p_k) \times I_i + e_{ik}$.

In the equation, E_{ik} is the ith subject's EV/price change/budget between round k and round $k + 1$, p_k is the price of round k, I_i is a variable for the ith subject's family income, preference for redistribution, or beliefs in luck, and e_{ik} is an i.i.d. error term. We take the inverse of the price to simulate the curve shown in Figure 7. Table 4 presents the results of several regressions. In Regression (1), I_i is family income as defined before (taking values 1 to 6);[7] in Regressions (2) – (4), I_i are, respectively, preference for redistribution, belief that being poor is due to bad lucks, and belief that being rich is due to good lucks, all taking values 1 to 7. The parameter of our interests, α_2, is highly significant in the first three regressions and marginally significant in the

[7] There were no subjects who put their family income at the highest category.

last regression. Subjects with higher family income have faster declining willingness to pay (Regression (1)), and subjects with stronger preferences for redistribution or stronger beliefs in luck (Regressions (2)-(4)) have slower declining willingness to pay. The gap between the subjects from the least wealthy families (I_i = 1) and the subjects from the most wealthy families (I_i = 6) is 0.048, implying that the rate of decline of the richest group is 11% ($=0.048 \div 0.442$) faster than the rate of decline of the poorest group. The gaps defined by the preference for redistribution are much larger. Those who strongly agree with redistribution (I_i = 7) are shown to have their willingness to pay decline 21% slower than the rate of decline of the subjects who strongly disagree with redistribution. However, the gaps defined by the beliefs of luck are much smaller; the corresponding figures are 14% and 7%, respectively. The result that the preference for redistribution is the most significant factor altering the rate of decline is consistent with the subjects' "correct" understanding that the experiment was about the equality-efficiency tradeoff.

Table 4. Family income, political attitudes, and the willingness to pay

Variables	(1)		(2)		(3)		(4)	
$1/p_k$	0.442**	[0.013]	0.350**	[0.016]	0.369**	[0.013]	0.397**	[0.011]
$(1/p_k) * I_i$	-0.008**	[0.003]	0.011**	[0.003]	0.009**	[0.002]	0.004*	[0.002]
Constant	0.003	[0.003]	0.003	[0.003]	0.003	[0.003]	0.003	[0.003]
R^2	0.634		0.636		0.636		0.634	

Notes: The number of subjects is 139, and the number of observations is 2641. In Regression (1), I_i is family income (taking values 1-6); in regressions (2) – (4), I_i are answers (taking values 1-7) to the three attitude questions on taxation and redistribution, relation between bad luck and poverty, and relation between good luck and wealth. *** p<0.01, ** p<0.05, * p<0.1.

5. Conclusions

The divinity game introduced by this paper is an extension of the modified dictator game, featuring a social planner's decision to distribute resources to two subjects with different levels of abilities to convert the resources into their own

income. We have studied the social planner's willingness to pay to avoid increases in the inequality of income abilities. We find that the willingness to pay declines fast when the gap of abilities increases. In addition, this decline is only marginally affected by subjects' attitudes on the relations between luck and wealth and weakly affected by family income, but is significantly affected by their attitudes on taxation and redistribution.

The divinity game offers us an opportunity to isolate the equality-efficiency tradeoff from other factors affecting subjects' distributive decisions. Our experimental findings based on this game make two contributions to the literature of redistribution and persistent inequality.

As we pointed out in the introduction, the existing theoretical and empirical literature suggests that background inequality --- inequality unrelated to personal efforts --- is less tolerated by people and thus offers a stronger moral ground to argue for a correction. While our results from the divinity game do not refuse this proposition, they do call for cautions when it comes to the real political support for redistribution to correct background inequality. When the inequality becomes more significant, people's support can decrease very fast.

As a corollary to this conclusion, our results also shed lights on the causes of persistent inequality in countries with high levels of inequality. Our finding suggests that when the initial inequality of abilities is large, the willingness to pay to correct it could be uniformly small across income and political groups. Therefore, redistribution may not happen to correct the inequality of abilities when groups of people with strong redistributive preferences are absent. As a result, inequality may persist.

References:

1. **Afriat, Sidney N.** "The Construction of a Utility Function from Expenditure Data." *International Economic Review,* 1967, *8(1)*, pp 67-77.

2. **Afriat, Sidney N.** "Efficiency Estimation of Production Functions." *International Economic Review,* 1972, *13(3)*, pp 568-98.

3. **Amiel, Yoram; Creedy, John and Hurn, Stan.** "Measuring Attitudes Towards Inequality." *Scandinavian Journal of Economics*, 1999, *101*, pp. 83-96.

4. **Andreoni, J. and Miller, J.** "Giving According to Garp: An Experimental Test of the Consistency of Preferences for Altruism." *Econometrica*, 2002, *70(2)*, pp. 737-53.

5. **Banerjee, Abhijit V. and Newman, Andrew.** "Poverty, Incentives, and Development." *American Economic Review*, 1994, *84(2)*, pp. 211-15.

6. **Bernasconi, Michele.** "How should income be divided? Questionnaire evidence from the theory of 'Impartial Preferences." *Journal of Economics*, 2002, *9*, *Supplement 1*, pp. 163-195.

7. **Bolton, Gary E. and Ockenfels, Axel.** "Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments - Comment." *American Economic Review*, 2006, *96*(5), pp. 1906-11.

8. **Bosmans, Kristof and Schokkaert, Erik.** "Social welfare, the veil of ignorance and purely individual risk: An empirical examination." in Frank Cowell (ed.) *Inequality, Welfare and Income Distribution: Experimental Approaches (Research on Economic Inequality, Volume 11)*, Emerald Group Publishing Limited, 2004. pp. 85-114.

9. **Cappelen, Alexander W.; Hole, Astri D.; Sørensen, Erik Ø.; Tungodden, Bertil.** "The Pluralism of Fairness Ideals: An Experimental Approach." *American Economic Review*, 2007, *97(3)*, pp. 818-27.

10. **Carlsson, Frederick; Daruvala, Dinky and Johansson-Stenman, Olof.** "Are People Inequality-Averse, or Just Risk-Averse?" *Economica*, 2005, *72*, pp. 375-96.

11. **Charness, Gary and Rabin, Matthew.** "Understanding Social Preferences with Simple Tests." *Quarterly Journal of Economics*, 2002, *117(3)*, pp. 817-69.

12. **Corneo, Giacomo and Fong, Christina M.** "What's the Monetary Value of Distributive Justice?" *Journal of Public Economics* 2008, *92*, pp. 289-308.

13. **Croson, Rachel and Konow, James.** "Social preferences and moral biases." *Journal of Economic Behavior & Organization*, 2009, *69*, pp. 201–12.

14. **Dworkin, Ronald.** *Sovereign Virtue: The Theory and Practice of Equality*. Cambridge: Harvard University Press, 2000.

15. **Dworkin, Ronald.** "What Is Equality? Part 2: Equality of Resources." *Philosophy and Public Affairs*, 1981, *10*, pp. 283-345.

16. **Engelmann, Dirk and Strobel, Martin.** "Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments." *American Economic Review*, 2004, *94(4)*, pp. 857-69.

17. **Engelmann, Dirk and Strobel, Martin.** "Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments - Reply." *American Economic Review*, 2006, *96(5)*, pp. 1918-23.

18. **Fisman, Raymond; Kariv, Shachar and Markovits, Daniel.** "Individual Preferences for Giving." *American Economic Review*, 2007, *97(5)*, pp. 1858-76.

19. **Fisman, Raymond; Kariv, Shachar and Markovits, Daniel.** "Exposure to Ideology and Distributional Preferences," 2009, working paper.

20. **Frohlich, Norman and Oppenheimer, Joe A.** *Choosing Justice: An Experimental Approach to Ethical Theory*. Berkeley U. California Press, 1992.

21. **Frohlich, Norman and Oppenheimer, Joe A.** "Preferences for Income Distribution and Distributive Justice: A Window on the Problems of Using Experimental Data in Economics and Ethics " *Eastern Economic Jounal,* 1994, *20(2)*, pp. 147-55.

22. **Frohlich, Norman; Oppenheimer, Joe A. and Eavey, Cheryl L.** "Laboratory Results on Rawls's Distributive Justice." *British Journal of Political Science*, 1987, *17(1)*, pp. 1-21.

23. **Galor, Oded; Moav, Omer and Vollrath, Dietrich.** "Inequality in Land Ownership, the Emergence of Human Capital Promoting Institutions and the Great Divergence." *Review of Economic Studies*, 2009, *76(1)*, pp. 143-79.

24. **Johansson-Stenman, O.; Carlsson, F. and Daruvala, D. .** "Measuring Future Grandparents' Preferences for Equality and Relative Standing." *Economic Journal*, 2002, *112*, pp. 362-83.

25. **Konow, James.** "Accountability and Cognitive Dissonance in Allocation Decisions." *American Economic Review*, 2000, *90(4)*, pp. 1072-1091.

26. **Michelbach, Philip A; Scott John T.; Matland Richard E.; Bornstein, Brian H.** " Doing Rawls Justice: An Experimental Study of Income Distribution Norms " *American Journal of Political Science,* 2003, *47(3)*, pp. 523-39.

27. **Mitchell, George; Tetlock, Philip E.; Mellers, Barbara A. and Ordonez, Lisa.** "Judgments of Social Justice: Compromises between Equality and Efficiency." *Journal of Personality and Social Psychology*, 1993, *65(4)*, pp. 629-39.

28. **Mitchell, Gregory; Tetlock, Philip E.; Newman, Daniel G. and Lerner, Jennifer S.** "Experiments Behind the Veil: Structural Influences on Judgments of Social Justice." *Political Psychology*, 2003, *24(3)*, pp. 519-47.

29. **Pirttilä, Jukka and Uusitalo, Roope.** "A 'Leaky Bucket' in the Real World: Estimating Inequality Aversion Using Survey Data." *Economica*, 2010, *77*, pp. 60-76.

30. **Scott, John T.; Matland, Richard E.; Michelbach, Philip A. and Bornstein, Brian H.** "Just Deserts: An Experimental Approach to Distributive Justice." *American Journal of Political Science*, 2001, *45*(3), pp. 749-67.

31. **Sen, Amartya.** *Commodities and Abilities*. Oxford: Oxford University Press, 1985.

32. **Sen, Amartya.** *Development as Freedom*. New York: Knopf, 1999.

33. **Traub, Stefan; Seidl, Christian and Schmidt, Ulrich.** "An Experimental Study on Individual Choice, Social Welfare, and Social Preferences." *European Economic Review*, 2009, *53,* pp. 385-400.

34. **Traub, Stefan; Seidl, Christian; Schmidt, Ulrich and Levati, MariaVittoria.** "Friedman, Harsanyi, Rawls, Boulding – or Somebody Else? An Experimental Investigation of Distributive Justice." *Social Choice and Welfare*, 2005, *24*, pp. 283-309.

35. **Varian, Hal.** "The Nonparametric Approach to Demand Analysis", *Econometrica* 1982, *50*, 945-973.

Appendix 1:

Instruction

Welcome to the experiment!

Attention:

Your payoff will depend partly on your own decision and the decisions of the other participants. Therefore it is very important that you read these instructions carefully.

During the experiment you are not allowed to talk or give any hints to the other participants, and please do not look at other participants' computer screens. Otherwise you may be excluded from the experiment and refused all payments.

All of your decisions will be anonymous. Your answers in the questionnaire will be confidential, too.

Before the experiment begins, you will have a simple quiz. The quiz is just to make sure that you have understood the instructions and will not affect your payments.

At the end of the experiment, please be quietly seated and wait for your payments. You can leave the room after receiving payments. Your payments will be confidential.

You will receive 10 Yuan as a participation fee (simply for showing up on time). You will receive more payments in the experiment. We talk about tokens instead of Yuan in the experiment. At the end of the experiment, the total amount of tokens obtained during the experiment will be converted to Yuan at an exchange rate of

50 Tokens = 1Yuan

Your decision problem:

In this experiment, you will participate in 20 rounds of independent decisions that share a common form. In each round each participant will be randomly assigned to a three-person group. There will be a new randomization of groups in each round. In each round everyone will not be able to know who are his/her partners in his/her group.

In each round you will be asked to allocate tokens between the two other persons, named thereafter A and B, in your group. We refer the person you allocate more tokens to as A and the other person B. Their tokens allocated by you are π_A and π_B. You will be asked to determine the total of their tokens

$F = \pi_A + \pi_B$.

and the difference of their tokens

$E = \pi_A - \pi_B$ ($\pi_A \geq \pi_B$).

Apparently, $\pi_A = (F + E) / 2$, and $\pi_B = (F - E) / 2$.

Your choices of F and E are subject to a constraint in the form of

$F = n + bE. \quad 0 \leq E \leq F.$

The constraint will be showed on the computer screen with m and b replaced by actual numbers. In each round, the value of n and b will change. You need to refer to the specific constraint to make your decisions on F and E.

In each round, you are only asked to input the value of E. The program will calculate the value of F according to your choice of E and show it simultaneously on the screen. Meanwhile, the value of π_A and π_B will also be shown. You can try to input different values of E and observe E, F, π_A and π_B. Your decisions will not be submitted until you click the "Confirm" button. So you can wait for your satisfying choices to click the "Confirm" button.

You and other participants will not begin another round of decisions until everyone has finished the last one. So if you have made your decision, please wait for others patiently. The number of rounds of decisions you have completed and the decision time you have used for the current round will be showed on the top of the screen.

To get you acquainted with the experiment, you will have 3 practicing decision problems. During the practice your decisions will not affect you or any other participants' payoffs. When the experiment begins, please make your decisions seriously.

Payoffs:

Your payoffs are determined as follows. At the end of the experiment, the computer will randomly select one round of decisions out of the 20 rounds to determine all the participants' payoffs. In each group formed in that round, one participant's decision will be randomly selected to become the social planner whose decision decides the payoffs of the other two participants. The computer will randomly choose one of the other two participants in the group to be role A and the other role B. Role A and Role B will receive the tokens the social planner allocated to them respectively, while the social planner will receive a fixed payoff (the amount will remain unknown until the experiment ends).

Please notice: you may be randomly selected to be the social planner. Even if you are not selected, your decision will not reduce your own payoff. Therefore, you can imagine you are the social planner. As each round has an equal chance to be chosen as the round to determine participants' payoffs and you have an equal chance to be chosen as the other two participants to become the social planner, it is essential that you make decisions seriously in every round of decisions.

Remarks:

At the end of the experiment, the following information will be showed on your computer screen: the round of decisions randomly selected by the computer to determine the payoffs, the values of F and E and the constraint they satisfy, your role in your group, and your payoff. You will then be asked to fill a questionnaire. You can leave after you finish the questionnaire and get your payment.

Now, let us take a small quiz and then start the experiment.

Quiz:

1. Will you know other participants' decisions in the experiment?

A. Yes. B. No.

2. If you are chosen to become the social planner, will your decision in that round affect your own payoffs?

A. Yes. B. No.

3. If you are NOT chosen to become the social planner, will your decisions reduce your payoffs?

A. Yes. B. No.

4. If you are chosen to become the social planner, is your payoff unknown until the experiment ends?

A. Yes. B. No.

Appendix 2:

Questionnaire

1. Experiment Number:_____

2. Name:_____

3. Year of Birth:_____

4. Are you in any program of double majors? (1) Yes (2) No

5. If you are in any double major programs, please name them:
_____

6. (If your answer to question 4 is "Yes") The year you enter into the double major program was:_____

7. Have you studied any courses in economics? (1) Yes (2) No

8. Have you been a leader of a student association?
(1) Yes
(2) No

9. (If your answer to question 8 is "Yes") Name the organization in which you have been a leader :_____

10. How many times have you voluntarily helped others? _____

11. Which province do you come from? _____

12. Father's occupation (if your father is retired, name the last occupation before he retired):_____

13. Mother's occupation (if your mother is retired, name the last occupation before she retired):_____

14. Father's last degree:_____

15. Mother's last degree:_____

16. Which income group do you regard your family is in?

1 2 3 4 5 6 7

Very poor ○ ○ ○ ○ ○ ○ ○ Very rich

17. Which income group do you expect to be in after ten years?

	1	2	3	4	5	6	7	
Very poor	○	○	○	○	○	○	○	Very rich

18. Do you agree with the idea that the government should tax the rich and subsidize the poor?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

19. Do you agree with the idea that poor people become poor mainly because they have a bad luck, not because they do not work hard?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

20. Do you agree with the idea that rich people get rich mainly because they are lucky, and not because they work hard?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

21. By which reasons do you decide your previous three answers?

22. By which reasons do you think others decide their answers?

23. What do you think is the objective of the experiment?

24. Please write down any questions or suggestions to this experiment.