Confronting Theory with Experimental Data and vice versa

Social Preferences

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Department of Economics
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Distributional preferences

- Distributional preferences shape individual opinions on a range of issues related to the redistribution of income.

- Examples include government-sponsored healthcare, social security, unemployment benefits, and more.

- These issues are complex and contentious in part because people promote their competing private interests.

- But people also often disagree about what constitutes a just or equitable outcome.

We thus cannot understand public opinion on a number of important policy issues without understanding the individual distributional preferences of the general population:

- Democratic voters are typically assumed to be more equality-focused than Republicans (Kuziemko, Norton, Saez, and Stantcheva, 2013).

- Optimal tax policy will depend on the distributional preferences of voters and taxpayers (Saez and Stantcheva, 2013).

Fair-mindedness and equality versus efficiency

Distributional preferences may naturally be divided into two qualitatively different components:

- The weight on own income versus the incomes of others (fair-mindedness) .
- The weight on reducing differences in incomes versus increasing total income (equality-efficiency tradeoffs).

Fair-minded people may disagree about the extent to which efficiency should be sacrificed to combat inequality, as a comparison of Harsanyi (1955) and Rawls (1971) would suggest.

For example:

- We typically associate the Democratic party with the promotion of policies which reduce inequality, and the Republican party with the promotion of efficiency.

- However, whether Democratic voters are more willing to sacrifice efficiency, and even their own income, to reduce inequality is an open question.

Distinguish fair-mindedness from preferences regarding equality-efficiency tradeoffs and accurately measuring both in a large and diverse sample of American voters.

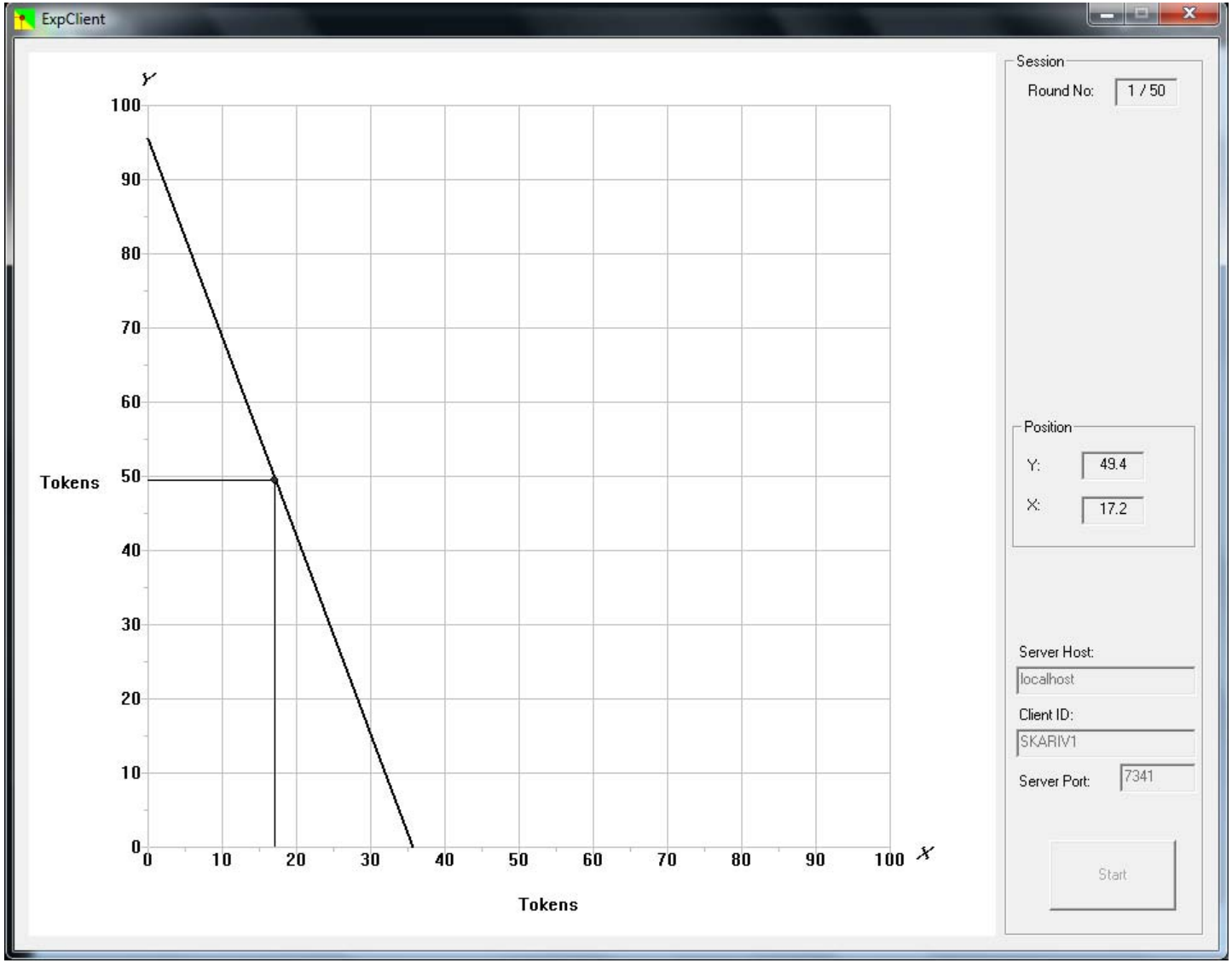
Template for analysis

[1] A generalized dictator game where each subject faces a menu of budget sets representing the feasible monetary payoffs.

[2] An incentivized experiment using the American Life Panel (ALP), a longitudinal survey administered online by the RAND Corporation.

[3] Combine data from the experiments with detailed individual demographic and economic information on panel members.

The experimental interface



A choice of the allocation (π_s, π_o) from the budget set $p_s\pi_s + p_o\pi_o = 1$ represents the payoffs to persons $self$ and $other$, respectively.

The budget line configuration allows to identify the equality-efficiency tradeoffs that subjects make in their distributional preferences:

- *decreasing* $p_s\pi_s$ when p_s/p_o *increases* indicates preferences weighted towards efficiency (increasing total payoffs)
- *increasing* $p_s\pi_s$ when p_s/p_o *increases* indicates preferences weighted towards equality (reducing differences in payoffs).

The standard model of distributional preferences

We use definitions that stem from the model of Charness and Rabin (2002) who consider the following simple formulation:

$$U_s(\pi_o, \pi_s) \equiv (\rho r + \sigma s)\pi_o + (1 - \rho r - \sigma s)\pi_s,$$

where $r = 1$ $(s = 1)$ if $\pi_s > \pi_o$ $(\pi_s < \pi_o)$ and zero otherwise. The parameters ρ and σ allow for a range of different distributional preferences:

- Proportionally increasing ρ and σ indicates a decrease in self-interestedness.
- Increasing the ratio ρ/σ indicates an increase in concerns for efficiency rather than equality.

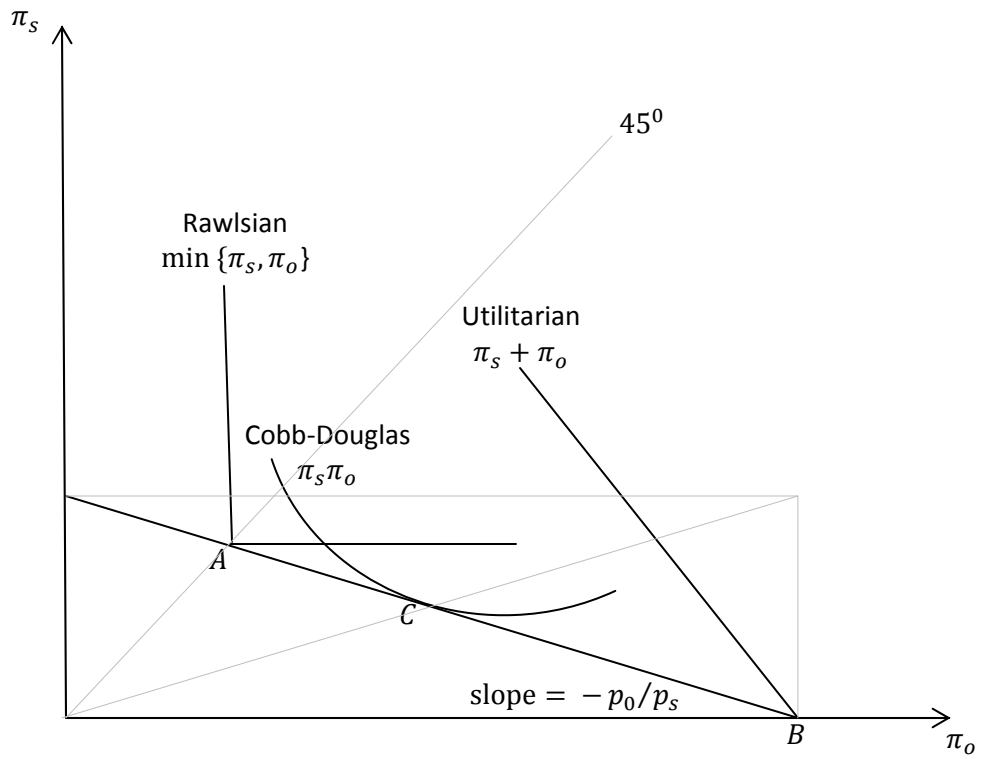
(*i*) *competitive* preferences ($\sigma \leq \rho < 0$), where utility increases in the difference $\pi_s - \pi_o$.

(*ii*) *narrow self-interest* or *selfish* preferences ($\sigma = \rho = 0$), where utility depends only on π_s.

(*iii*) *difference aversion* preferences ($\sigma < 0 < \rho < 1$), where utility is increasing in π_s and decreasing in the difference $\pi_s - \pi_o$.

(*iv*) *social welfare* preferences ($0 < \sigma \leq \rho \leq 1$), where utility is increasing in both π_s and π_o.

Prototypical fair-minded distributional preferences



A more standard model of distributional preferences

We decompose distributional preferences into fair-mindedness and equality-efficiency tradeoffs by employing constant elasticity of substitution (CES) utility functions.

The CES form is commonly employed in demand analysis. In the redistribution context, the CES has the form

$$u_s(\pi_s, \pi_o) = [\alpha(\pi_s)^\rho + (1-\alpha)(\pi_o)^\rho]^{1/\rho}$$

where α measures the indexical weight on payoffs to $self$, whereas ρ measures the willingness to trade off equality and efficiency.

If $\rho > 0$ ($\rho < 0$) a decrease in the relative price giving p_s/p_o lowers (raises) the expenditure on tokens allocated to $self$ $p_s\pi_s$:

- $\rho > 0$ indicates preferences weighted towards increasing total payoffs.
- $\rho < 0$ indicates preferences weighted towards reducing differences in payoffs.

Our experimental method generates many observations per subject, and we can therefore analyze both types of distributional preferences at the individual level.

The CES demand function is given by

$$\pi_s(p, m') = \frac{A}{p^r + A} m'$$

where

$$r = -\rho / (\rho - 1)$$

and

$$A = [\alpha / (1 - \alpha)]^{1/(1-\rho)} .$$

This generates the following individual-level econometric specification for each subject n:

$$\frac{\pi^i_{sn}}{m'^i_n} = \frac{A_n}{(p^i_n)^{r_n} + A_n} + \epsilon^i_n$$

where ϵ^i_n is assumed to be distributed normally with mean zero and variance σ^2_n.

Estimate $\hat{A}_n$ and $\hat{r}_n$ using non-linear tobit maximum likelihood, and use this to infer the values of the CES parameters $\hat{\alpha}_n$ and $\hat{\rho}_n$.

Afriat's Theorem *The following conditions are equivalent:*

- *The data satisfy GARP.*
- *There exists a non-satiated utility function that rationalizes the data.*
- *There exists a concave, monotonic, continuous, non-satiated utility function that rationalizes the data.*

Afriat's critical cost efficiency index (CCEI) *The amount by which each budget constraint must be relaxed in order to remove all violations of GARP.*

The CCEI is bounded between zero and one. The closer it is to one, the smaller the perturbation required to remove all violations and thus the closer the data are to satisfying GARP.

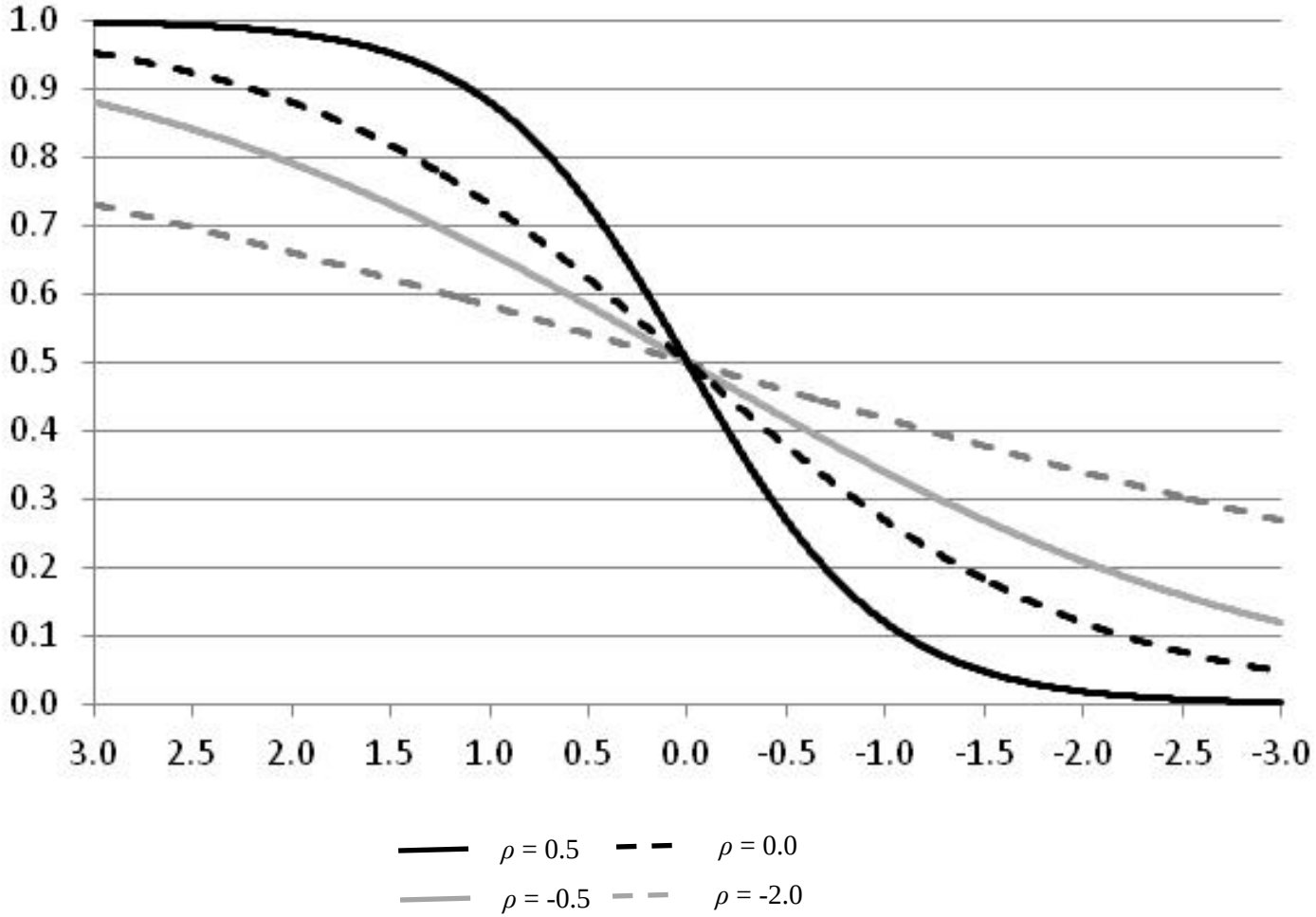
The CCEI scores in the ALP sample averaged 0.862 over all subjects, but there is marked heterogeneity in the CCEI scores within and across the demographic and economic groups:

- Subjects without college degrees waste 2.6 percentage points more of their earnings by making inconsistent choices relative to college graduates.

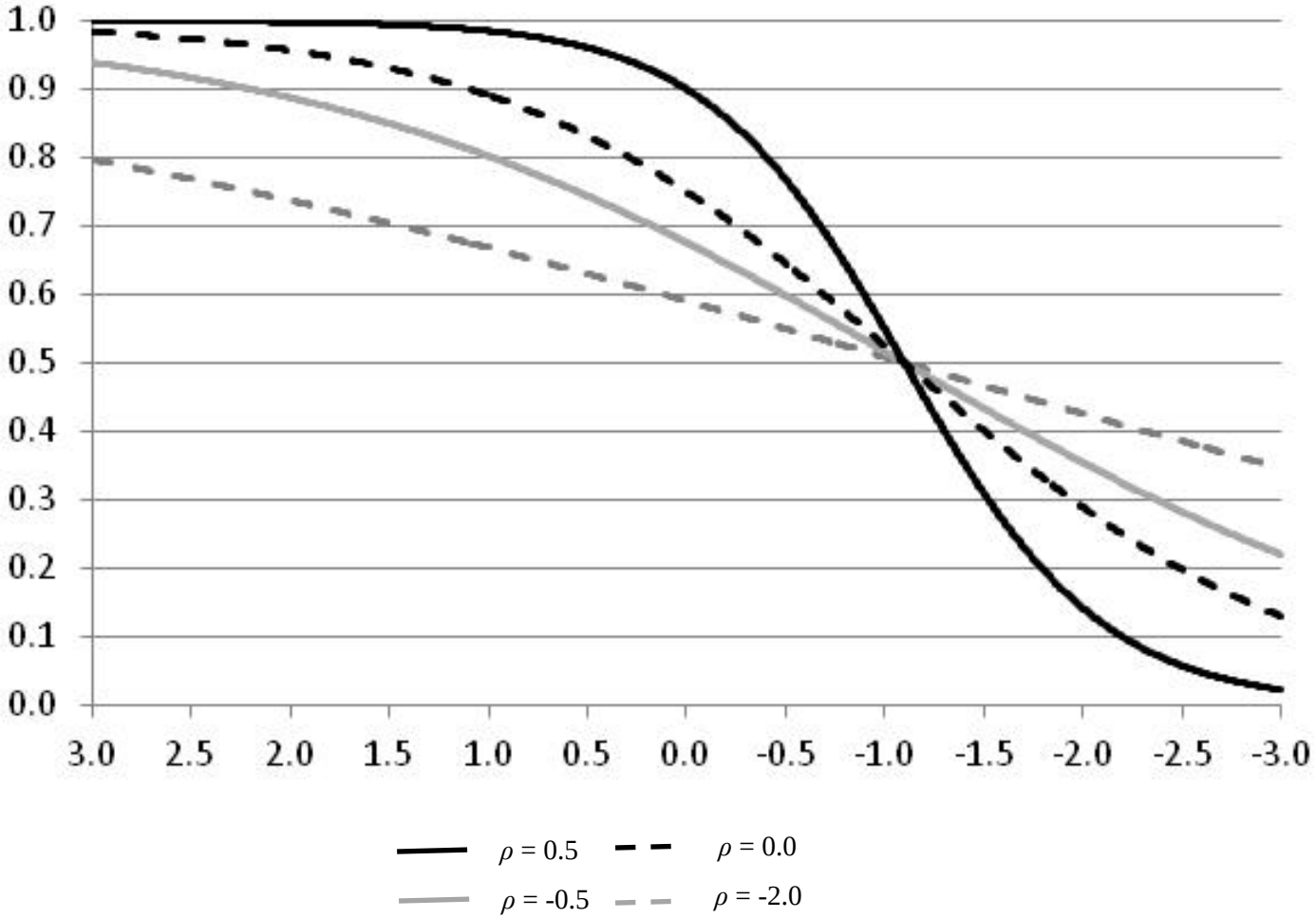
- Men are more consistent than women, and the choices of white and Hispanic subjects are more consistent than those of African Americans.

While observable attributes have predictive power in the data, marked heterogeneity remains within each demographic and economic group.

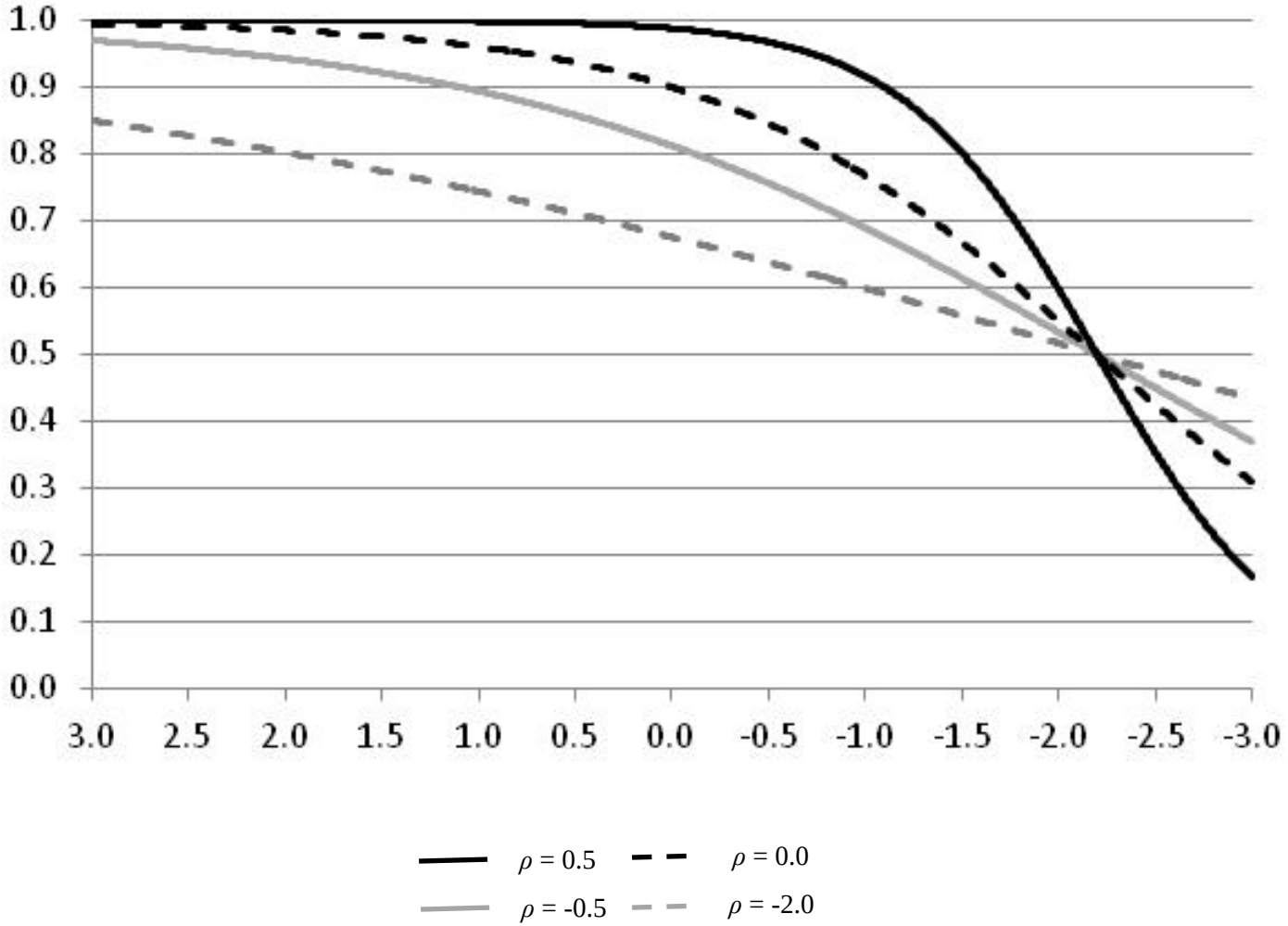
The relationship between the log-price ratio and optimal token share (α=0.5 and different values of ρ)



The relationship between the log-price ratio and optimal token share (α=0.75 and different values of ρ)

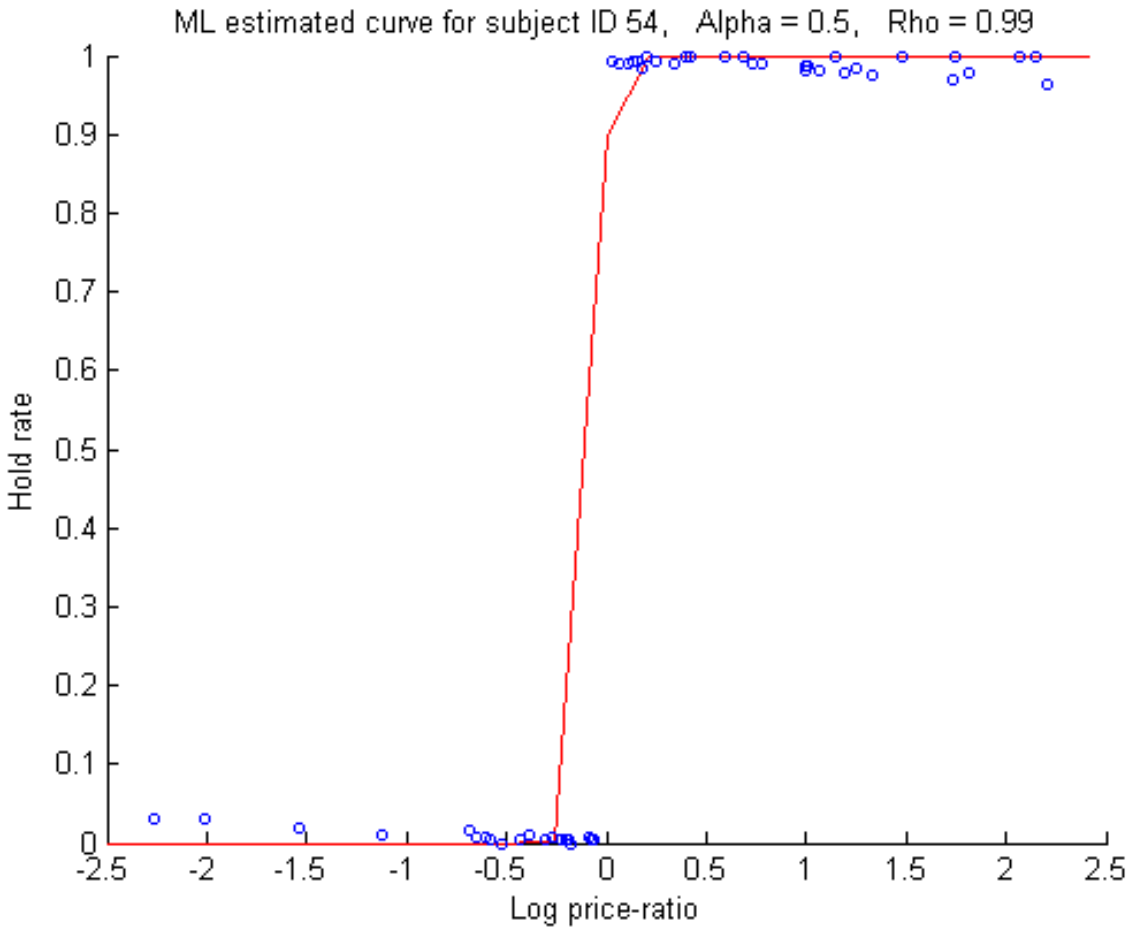


The relationship between the log-price ratio and optimal token share (α=0.9 and different values of ρ)

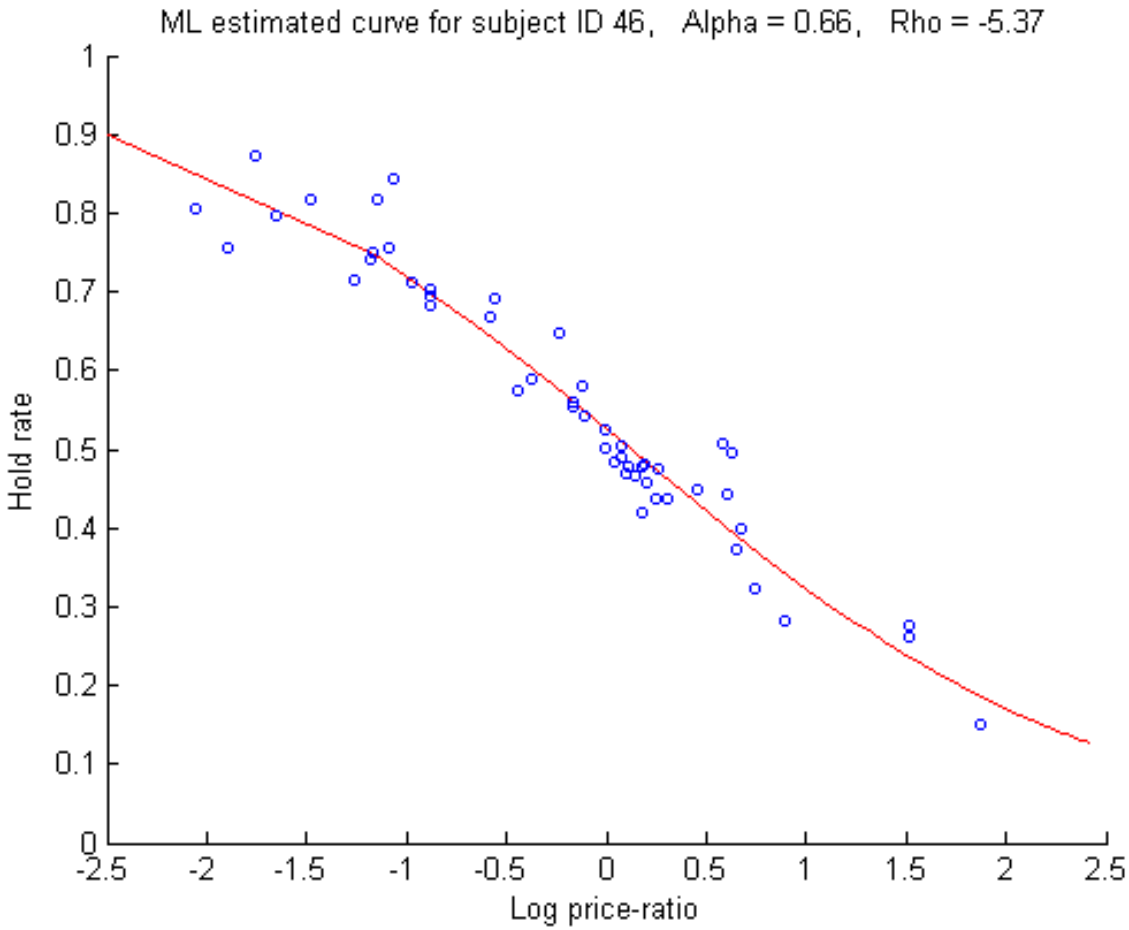


The estimated fraction of budget kept for illustrative subjects

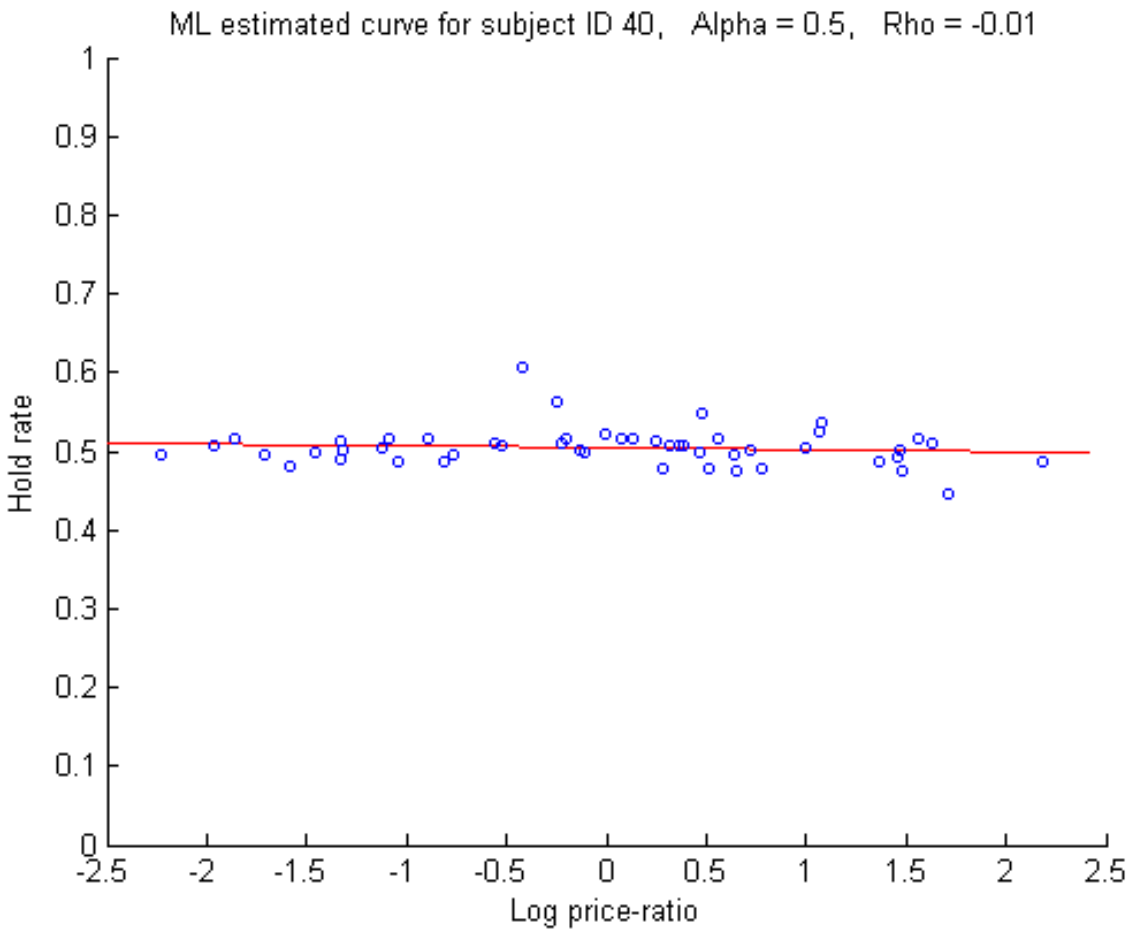
Utilitarian



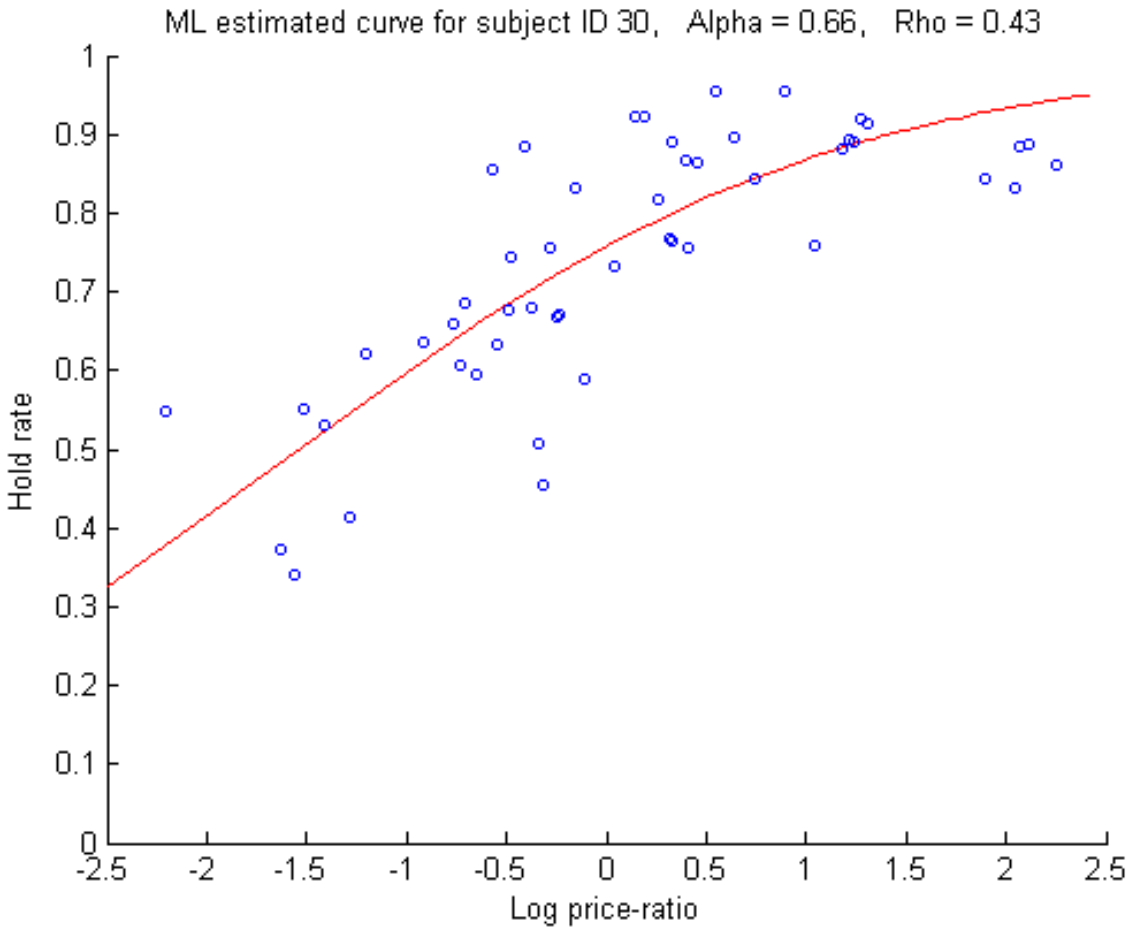
Rawlsian


ML estimated curve for subject ID 46, Alpha = 0.66, Rho = -5.37
Hold rate
Log price-ratio
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

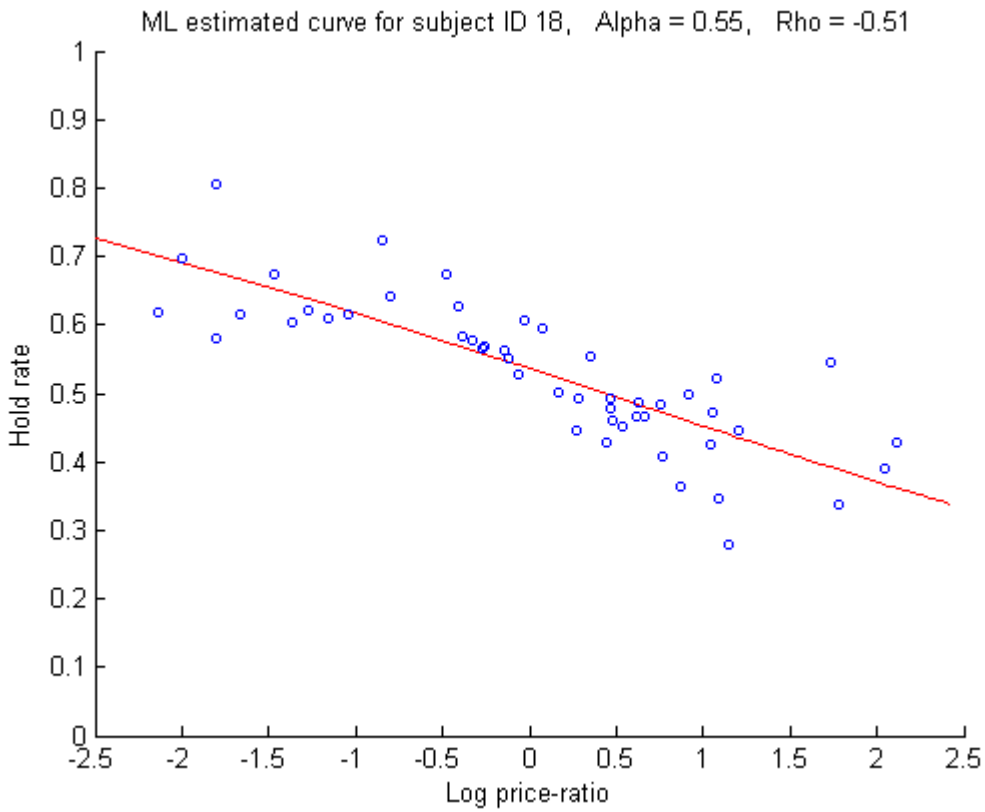
Cobb-Douglas



Preference for increasing total payoffs (efficiency)



Preference for reducing differences in payoffs (equality)

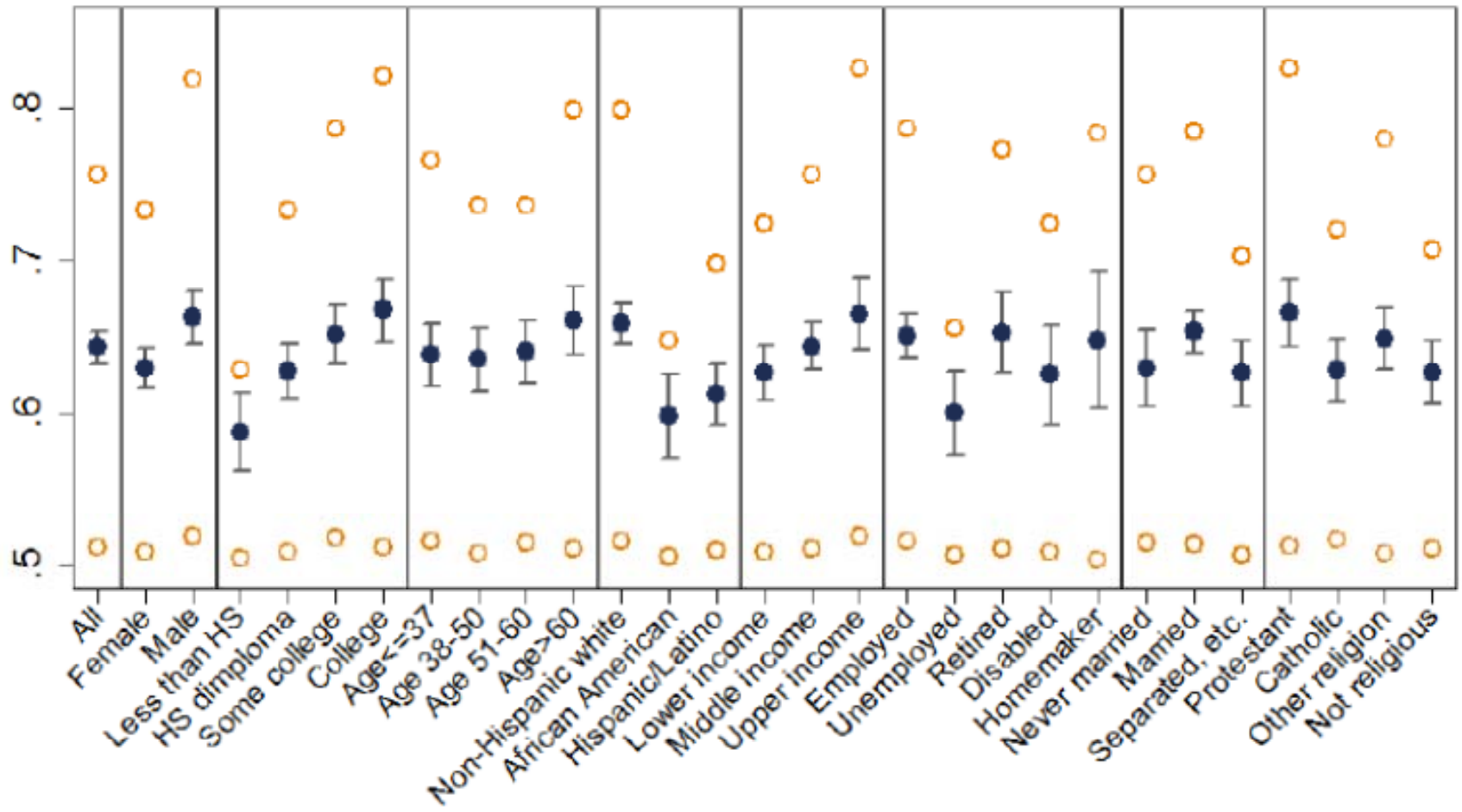


Distributional preference types

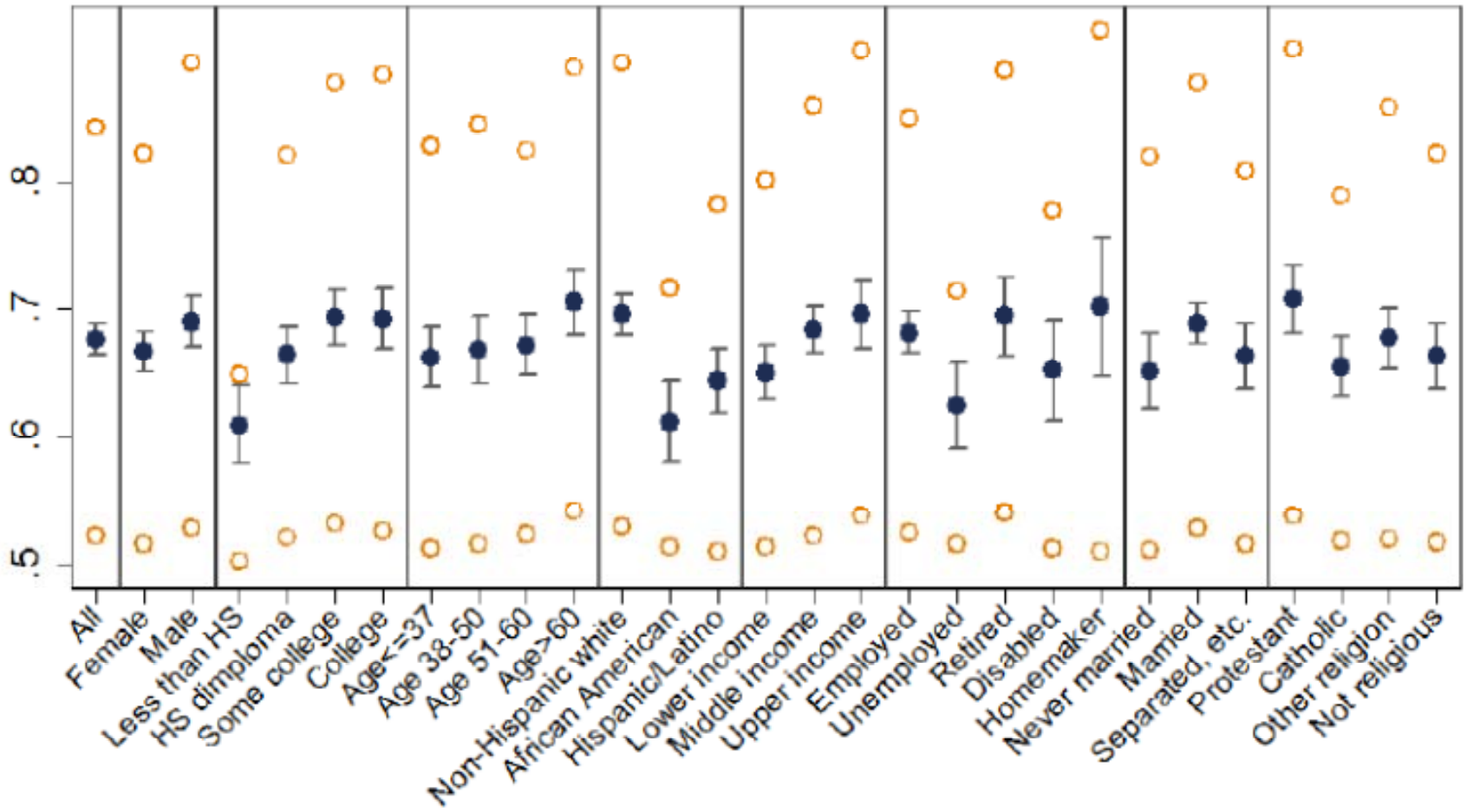
	Fair-Minded	Intermediate	Selfish	All Subjects
Equality-Focused	6.3	14.6	3.6	24.5
Intermediate	14.7	24.5	8.0	47.1
Efficiency-Focused	12.0	13.0	3.5	28.4
All Subjects	32.9	52.0	15.1	100.0

The numbers indicate the percentage of subjects in each cell. We classify a subject as fair-minded if we cannot reject the null hypothesis that $\hat{\alpha}_n = 1/2$; similarly, a subject is classified as selfish if we cannot reject the null that $\hat{\alpha}_n = 1$ (both tests are at the 10 percent level, though the test for selfishness is one-sided since $\hat{\alpha}_n = 1$ at the boundary of the parameter space). One subject who had many revealed preference violations is classified as both fair-minded and selfish, and is therefore included in the intermediate category. We classify a subject as equality-focused or efficiency-focused if we can reject the hypothesis that $\hat{\rho}_n = 0$ at the 10 percent level using a one-sided test. When we can reject the null in favor of the alternative hypothesis that $\hat{\rho}_n$ is less (greater) than 0, we classify a subject as being focused on equality (efficiency).

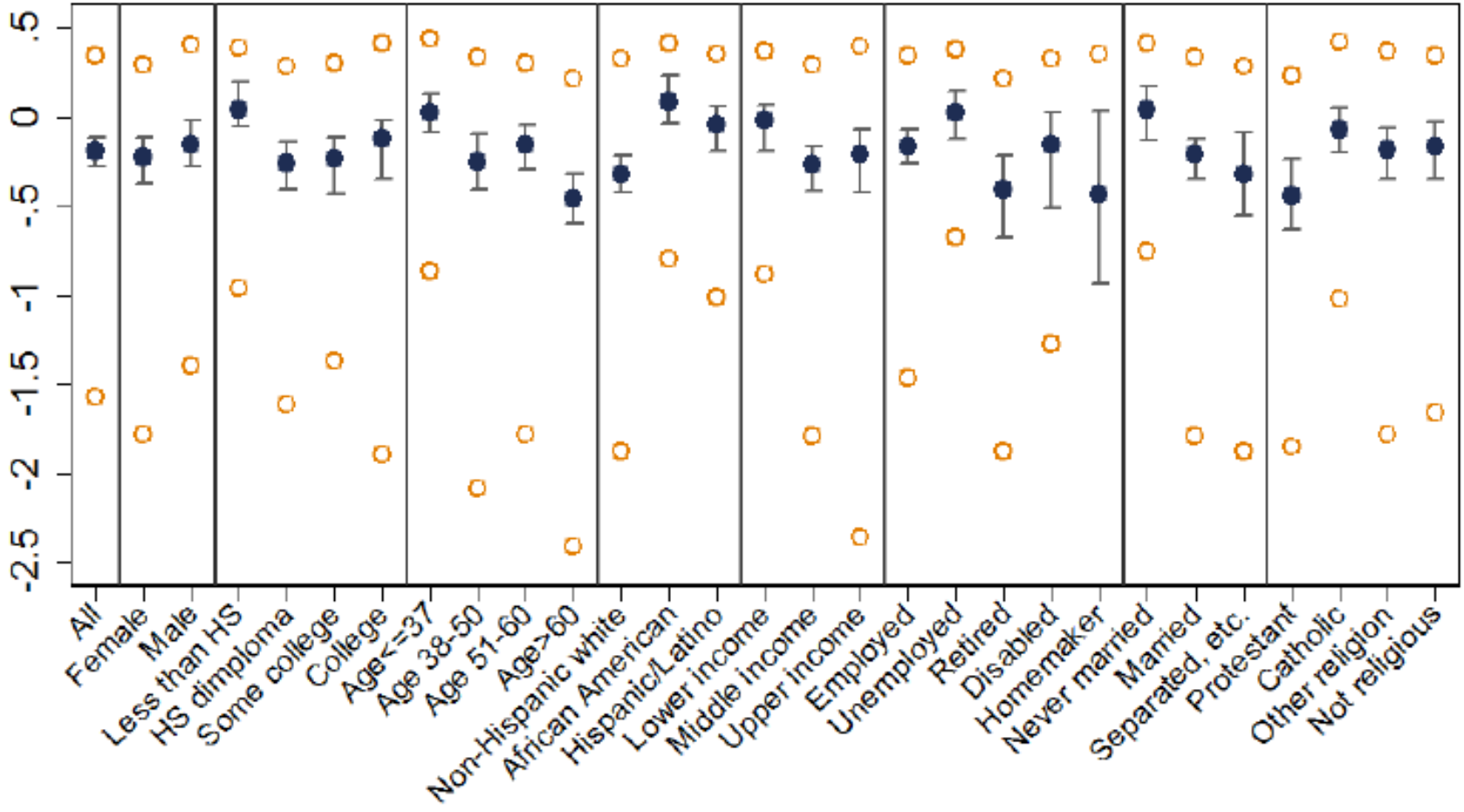
Average fraction of tokens kept by sub group



The mean estimated fair-mindedness by sub-group



The median estimated equality-efficiency tradeoff by sub-group



Distributional preferences and voting behavior

- It is natural to examine the empirical relationship between distributional preferences and subjects' political decisions.

- Whether efficiency-focused distributional preferences are associated with political support for government redistribution is an open question.

- Democrats are not more averse to inequality than Republicans – they instead look more favorably on government intervention in general.

- We explore the link between equality-efficiency tradeoffs and political behavior by looking at voting decisions in the 2012 presidential election.

OLS regressions of likelihood of voting for Obama in 2012

	— Without State FEs —			— With State FEs —		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All Subjects						
$\hat{\rho}_n$	-0.003	.	.	-0.005*	.	.
	(0.003)			(0.003)		
Decile of $\hat{\rho}_n$	.	-0.009	.	.	-0.013**	.
		(0.006)			(0.006)	
ρ_{high} (i.e. $\hat{\rho}_n \geq 0$)	.	.	-0.045	.	.	-0.068**
			(0.033)			(0.034)
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
State of Residence FEs	No	No	No	Yes	Yes	Yes
Observations	766	766	766	766	766	766
Panel B: Non-Selfish Subjects						
$\hat{\rho}_n$	-0.004	.	.	-0.006*	.	.
	(0.003)			(0.003)		
Decile of $\hat{\rho}_n$	.	-0.012**	.	.	-0.016**	.
		(0.006)			(0.006)	
ρ_{high} (i.e. $\hat{\rho}_n \geq 0$)	.	.	-0.057*	.	.	-0.077**
			(0.034)			(0.035)
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
State of Residence FEs	No	No	No	Yes	Yes	Yes
Observations	734	734	734	734	734	734

OLS regressions of likelihood of being a Democrat

	— Without State FEs —			— With State FEs —		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All Subjects						
$\hat{\rho}_n$	-0.002	.	.	-0.005	.	.
	(0.003)			(0.003)		
Decile of $\hat{\rho}_n$	.	-0.014*	.	.	-0.02***	.
		(0.007)			(0.007)	
ρ_{high} (i.e. $\hat{\rho}_n \geq 0$)	.	.	-0.075*	.	.	-0.104**
			(0.04)			(0.042)
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
State of Residence FEs	No	No	No	Yes	Yes	Yes
Observations	528	528	528	528	528	528
Panel B: Non-Selfish Subjects						
$\hat{\rho}_n$	-0.003	.	.	-0.005	.	.
	(0.003)			(0.003)		
Decile of $\hat{\rho}_n$	.	-0.016**	.	.	-0.023***	.
		(0.007)			(0.008)	
ρ_{high} (i.e. $\hat{\rho}_n \geq 0$)	.	.	-0.087**	.	.	-0.112**
			(0.041)			(0.044)
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
State of Residence FEs	No	No	No	Yes	Yes	Yes
Observations	505	505	505	505	505	505

Exposure to economic conditions and redistributive decisions

Surveys respondents' attitudes toward redistributive policies change in response to economic shocks:

- A drop in household income, a (subjective) decrease in employment security, and the actual loss of a job all increase support for government welfare programs (Margalit, 2013).

- By contrast, lower support for government redistribution during recessions based on responses to the General Social Survey (Kuziemko, 2011).

How did the Great Recession impact distributional preferences?

We assess the relationship between exposure to different economic conditions and redistributive decisions:

- Boom $\longrightarrow$ money drops from the sky $\longrightarrow$ who will get the lion's share of the gains.
- Recession $\longrightarrow$ losses relative to past levels $\longrightarrow$ who is going to take the biggest cut.

How distributional preferences are affected by the 'loss' frame of recession versus the 'gain' frame of an economic boom?

Identification concerns

[1] Exogenous variation in exposure to economic contraction is rare and limited in scope, and we cannot conduct experiments on the US economy.

[2] Many other societal shifts may be coincident with macroeconomic changes, making it difficult to disentangle the effects of different factors.

[3] Differential selection across economic conditions, or factors other than the recession, may be driving results.

There are three elements to our approach that, we argue, allow us to credibly relate macroeconomic conditions to individual behavior:

- A subject pool that is drawn primarily from a large and diverse student body, the socioeconomic composition of which is held relatively constant by the admissions office.

- Combine student admissions and financial aid data with a broad range of survey responses about the experience of students and postgraduate activities.

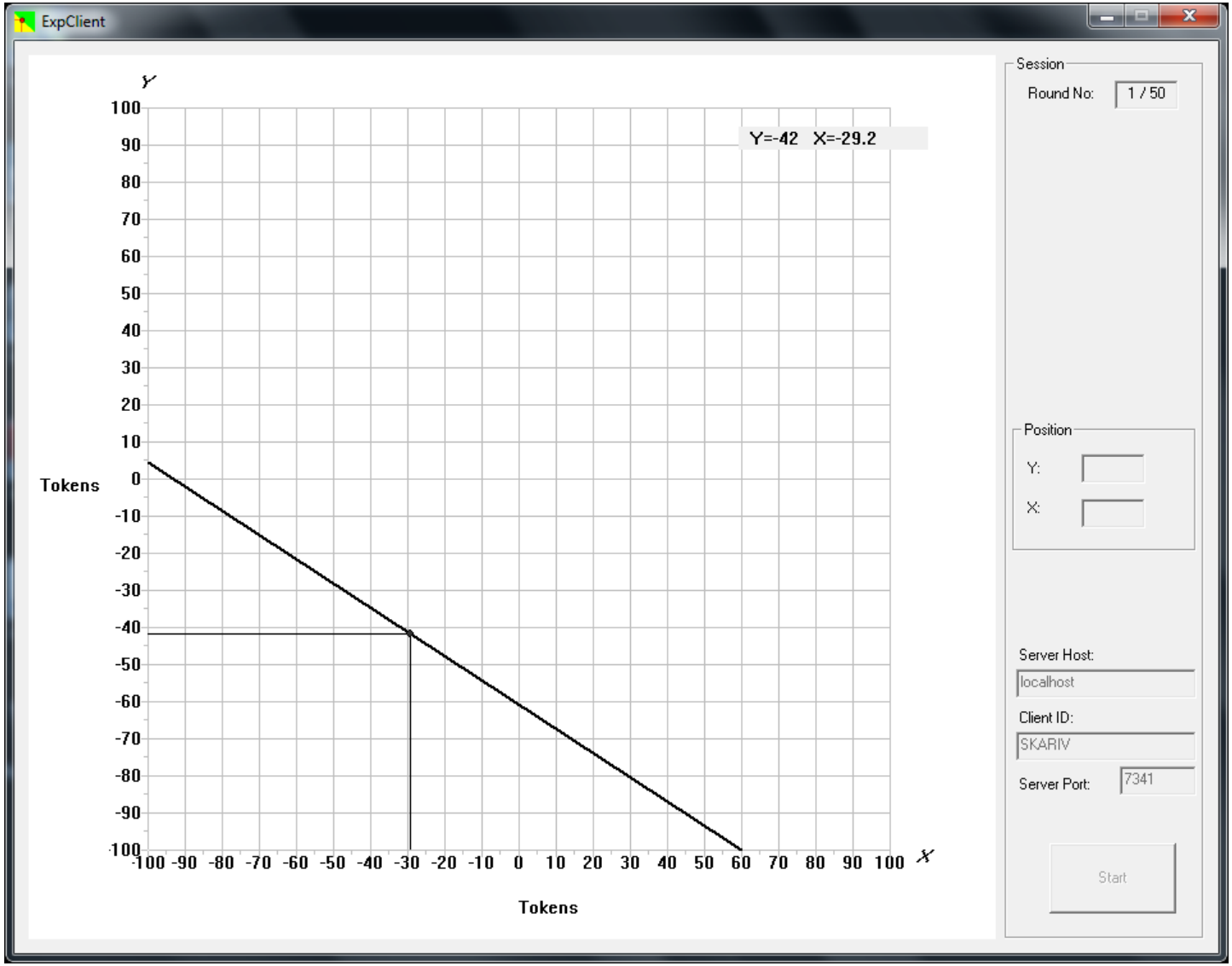
- Simulate recessionary conditions in the laboratory and compare the impact of the experimental treatment is to that of the real-world recession.

[1] Students faced higher student-loan debts and weakened job prospects during and after the recession than in the preceding years.

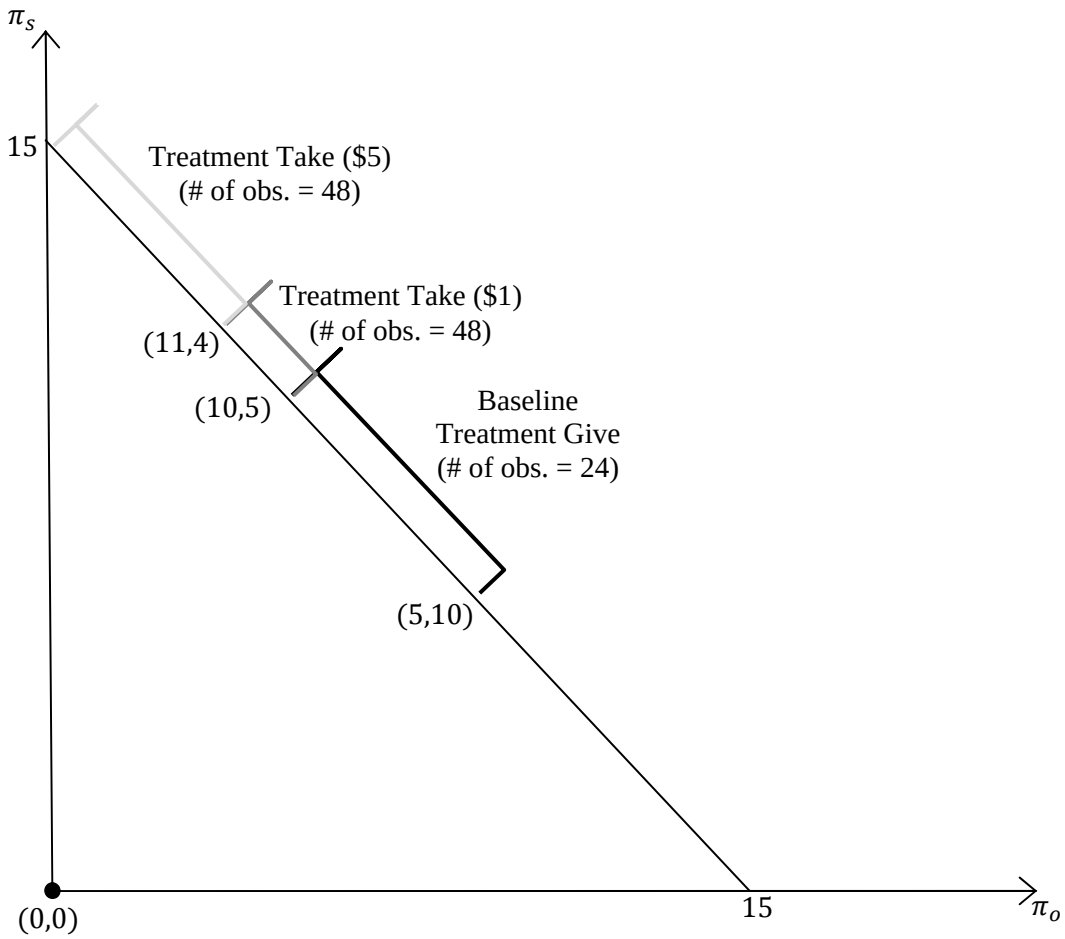
[2] The makeup of the student body, students' overall social and academic experiences, opinions about student life, and perceptions of campus climate fluctuated very little.

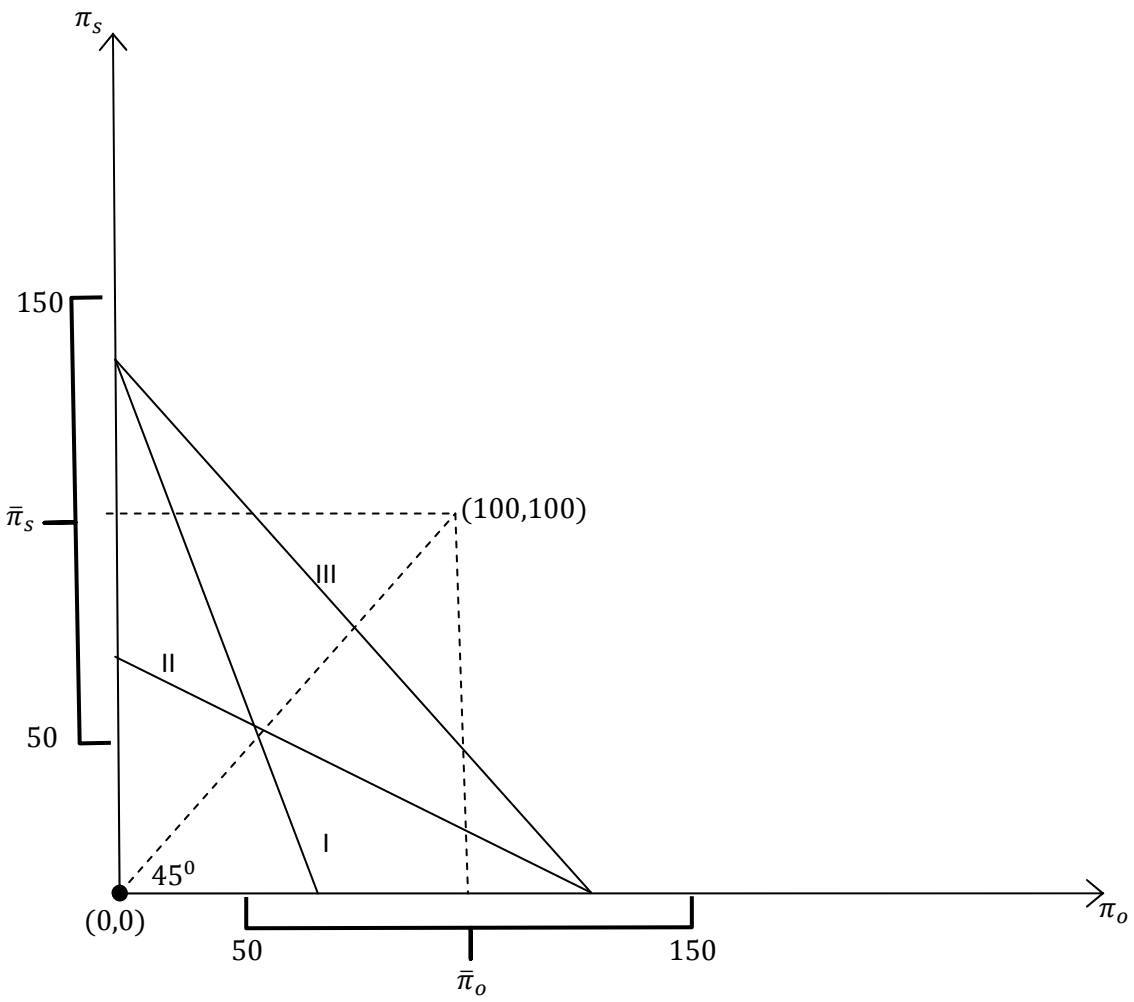
[3] Both real-world and lab-simulated recessionary conditions are associated with comparable shifts, though the impact of the experimental treatment is relatively modest.

The Loss experimental treatment

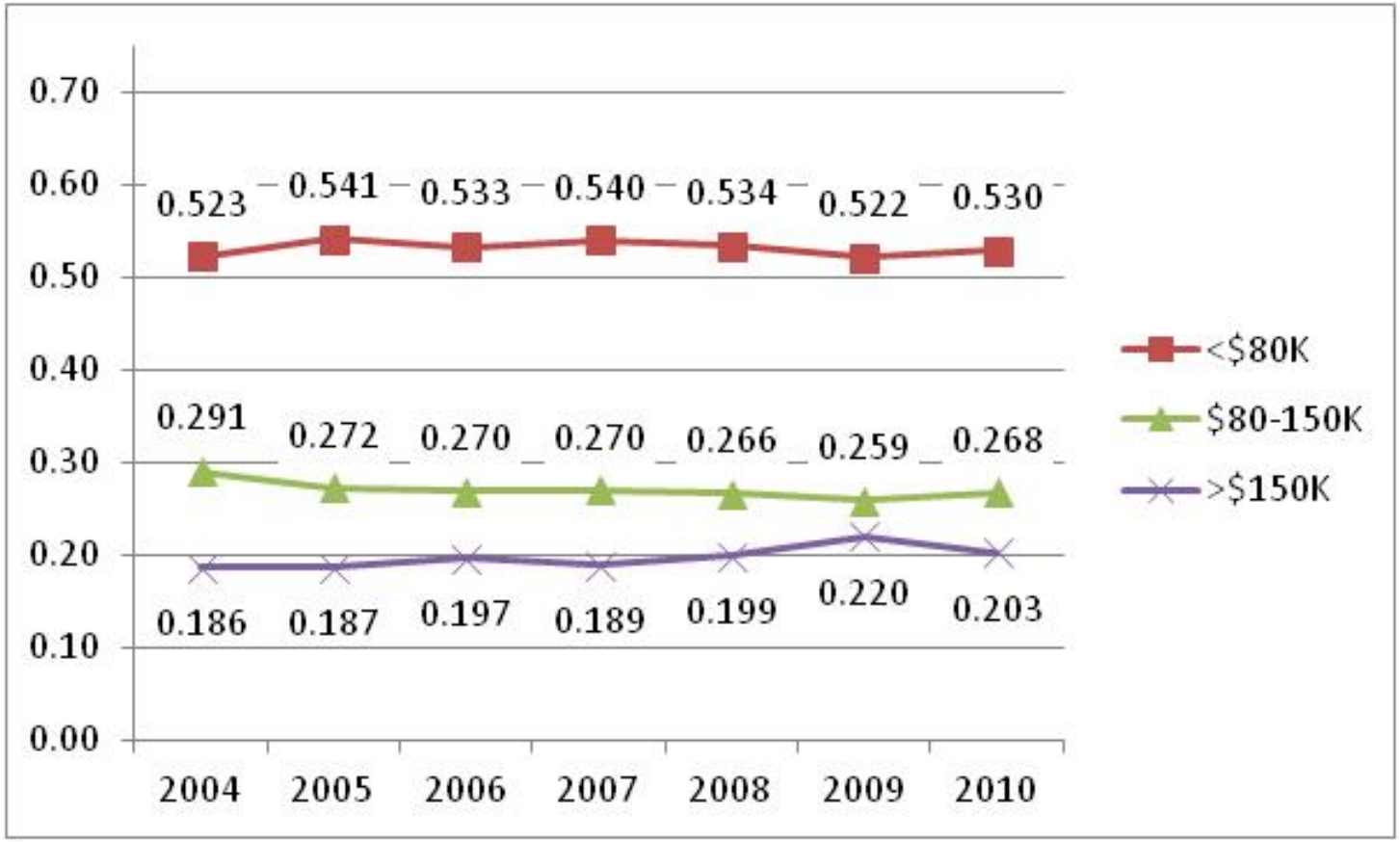


The Loss experimental treatment compared to List (*JPE*, 2007)

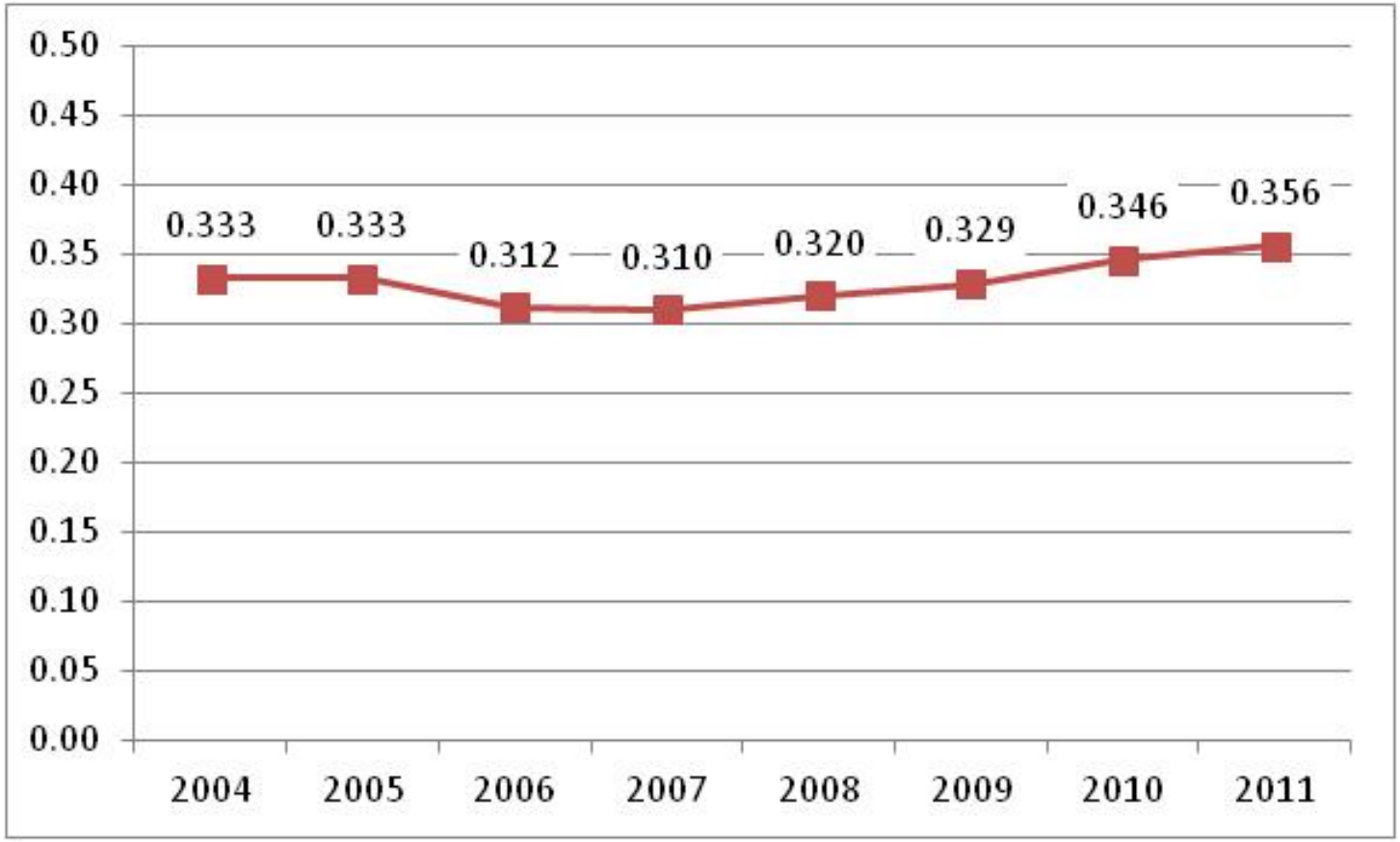



π_s
150
$\bar{\pi}_s$
50
(100,100)
III
II
I
45^0
(0,0)
50
150
$\bar{\pi}_o$
π_o

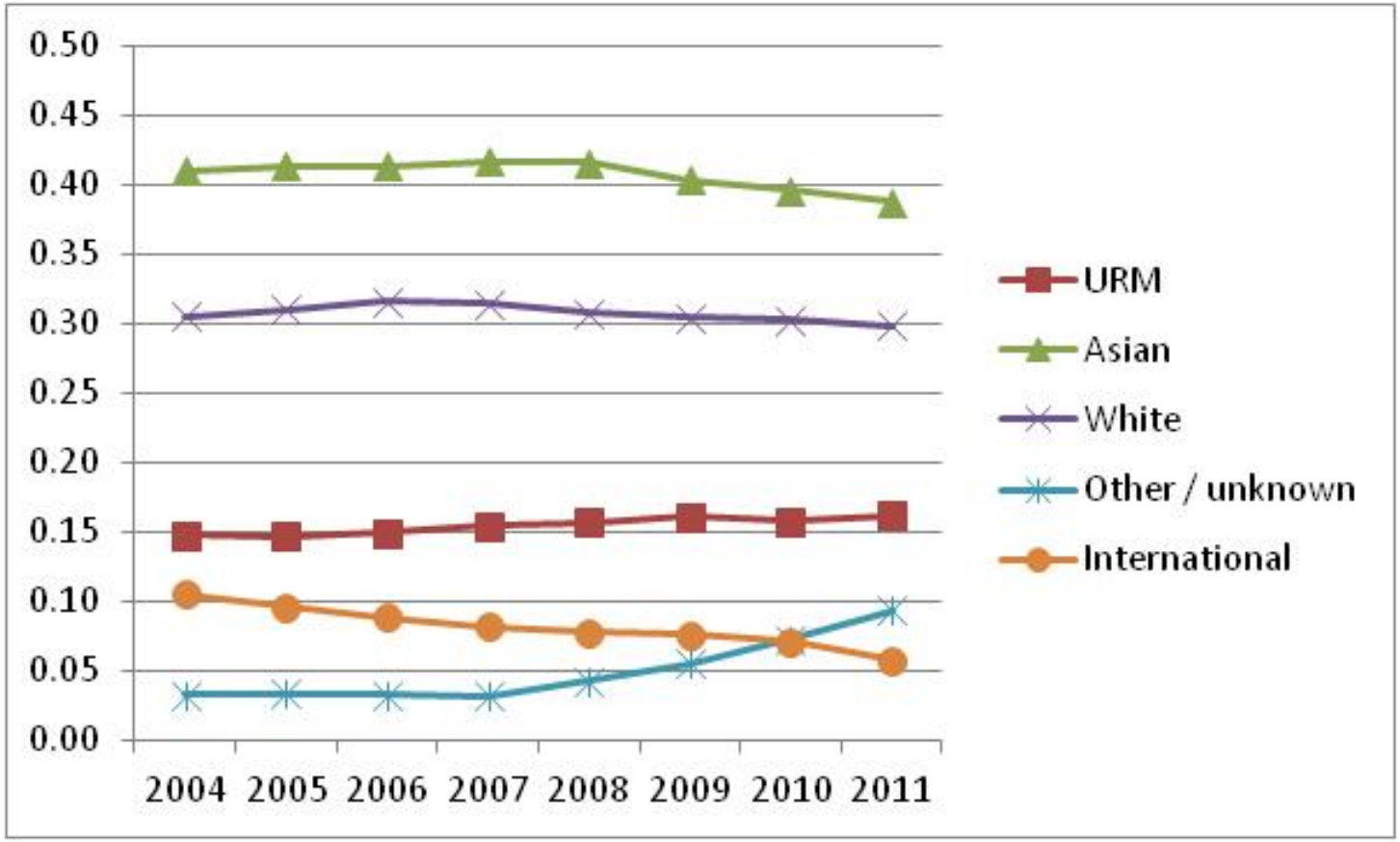
Undergraduate student self-reported family income
(2010-11 inflation adjusted dollars)



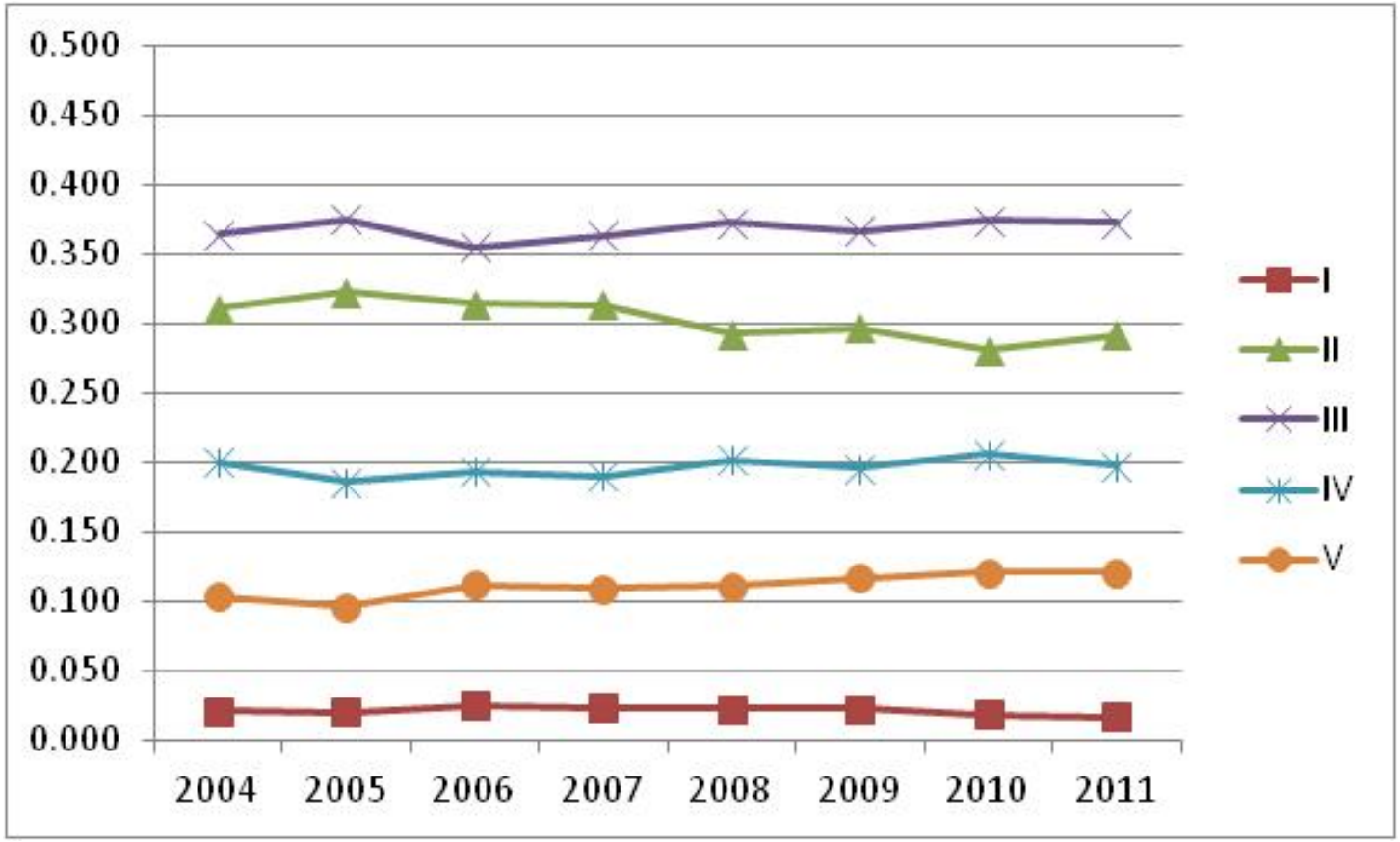
UC Berkeley undergraduate students receiving Federal Pell Grants (family incomes generally less than $45,000 a year)



Ethnic distribution of UC Berkeley undergraduate enrollment

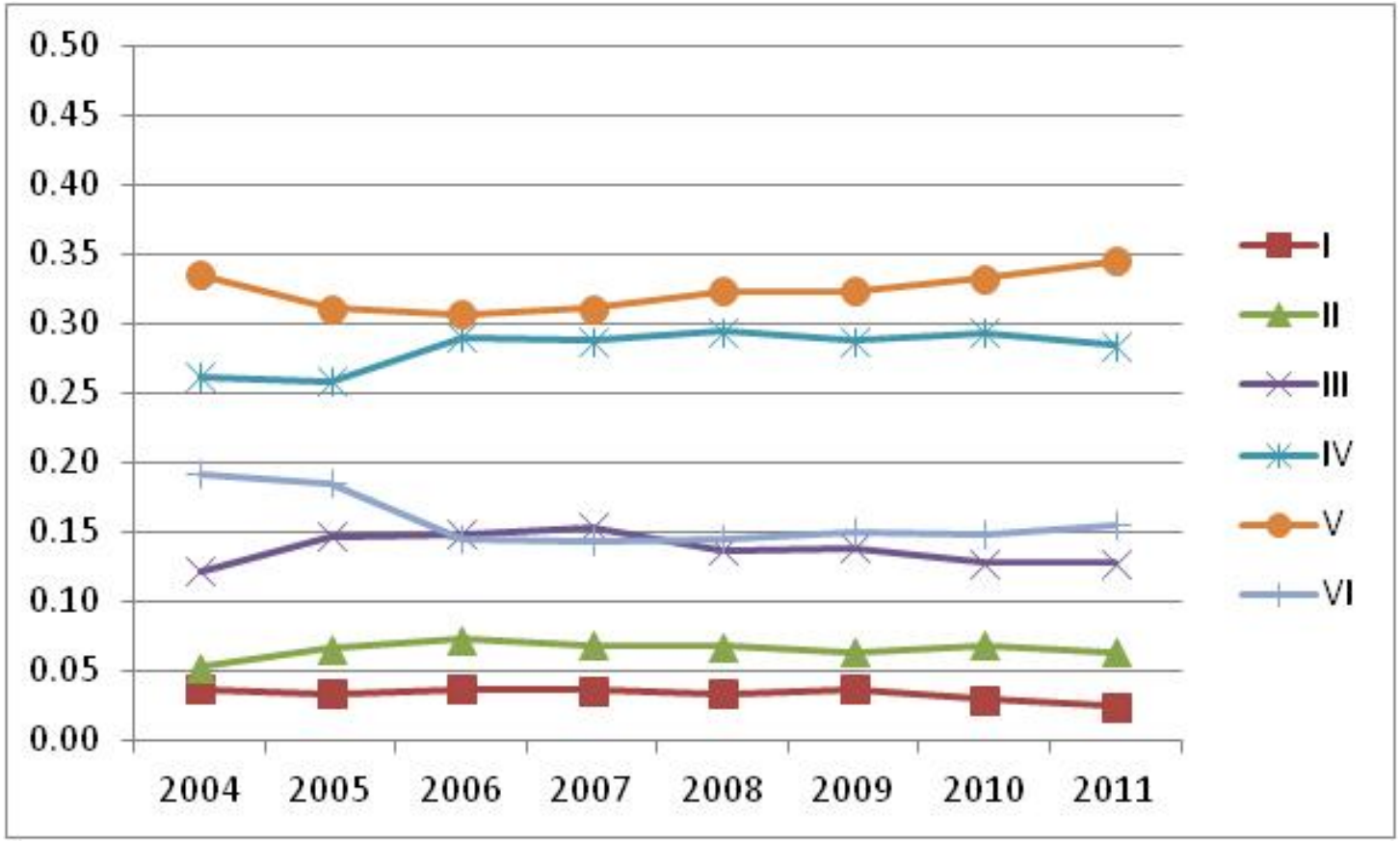


Self-reported social class when growing up
(University of California undergraduate experience survey)



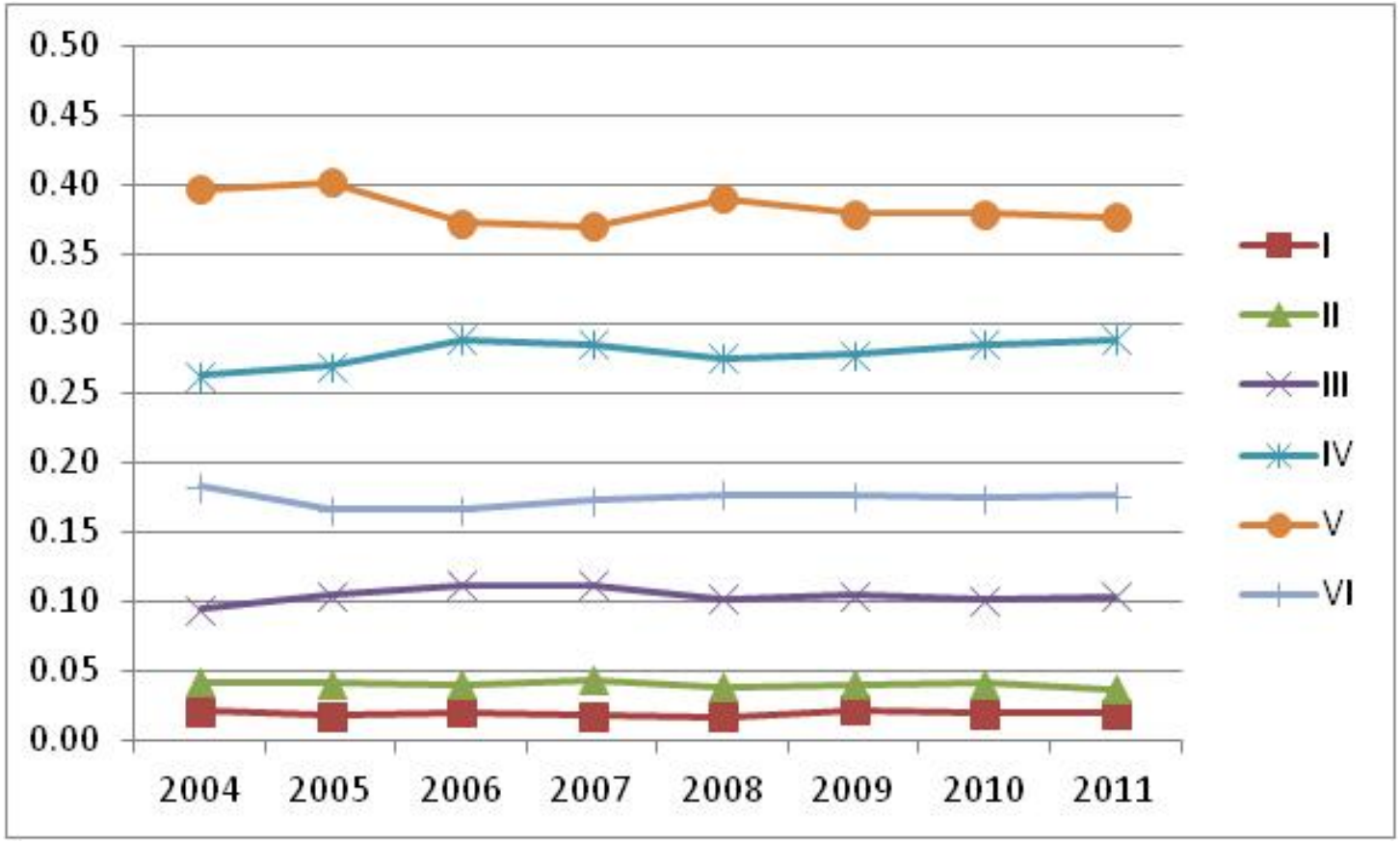
[I] Wealthy [II] Upper- or professional-middle [III] Middle-class
[IV] Working-class [V] Low-income or poor

Overall social experience at UC Berkeley
(University of California undergraduate experience survey)



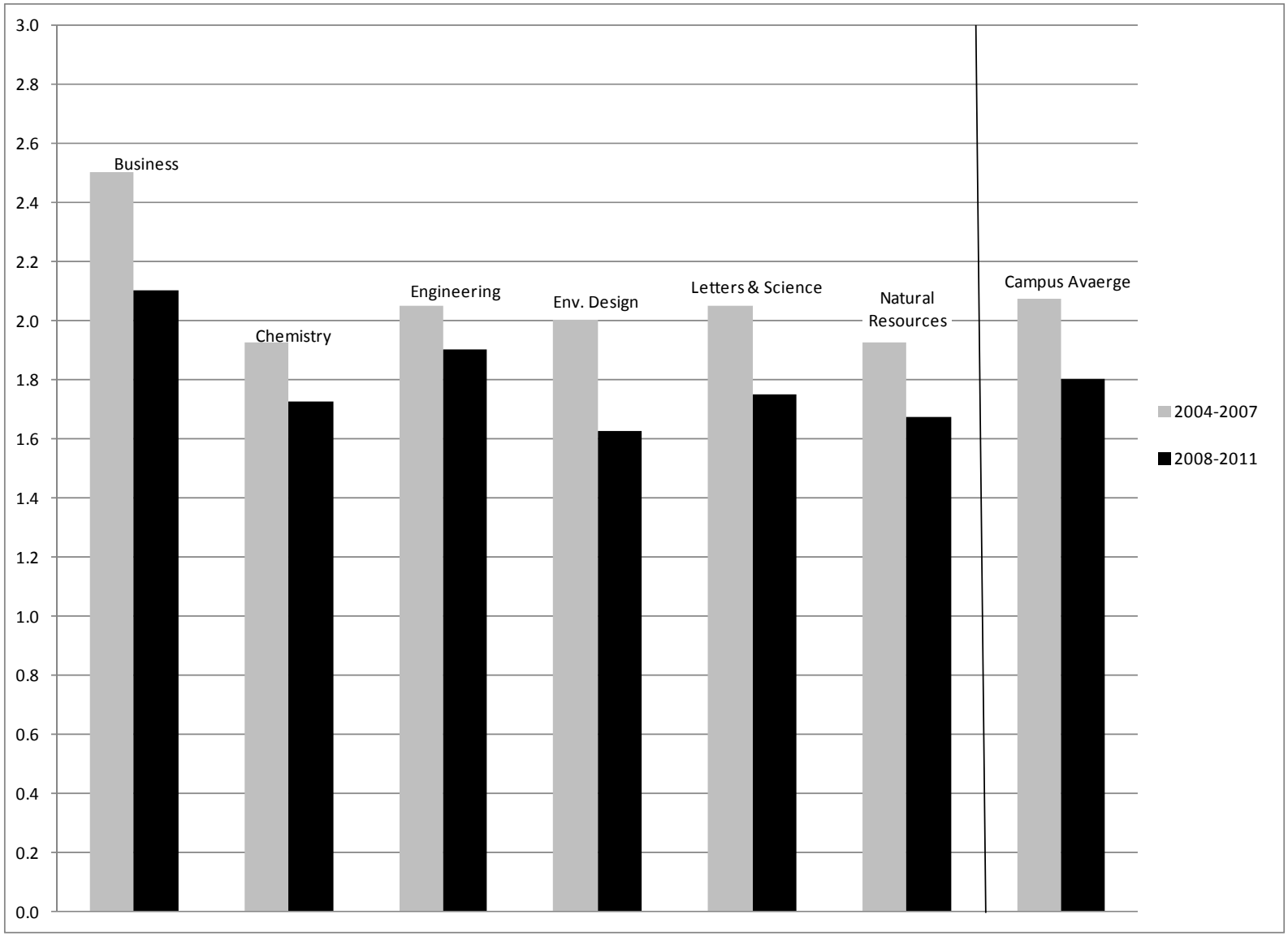
[I] Very dissatisfied [II] Dissatisfied [III] Somewhat dissatisfied
[IV] Somewhat satisfied [V] Satisfied [VI] Very satisfied

Overall academic experience at UC Berkeley
(University of California undergraduate experience survey)

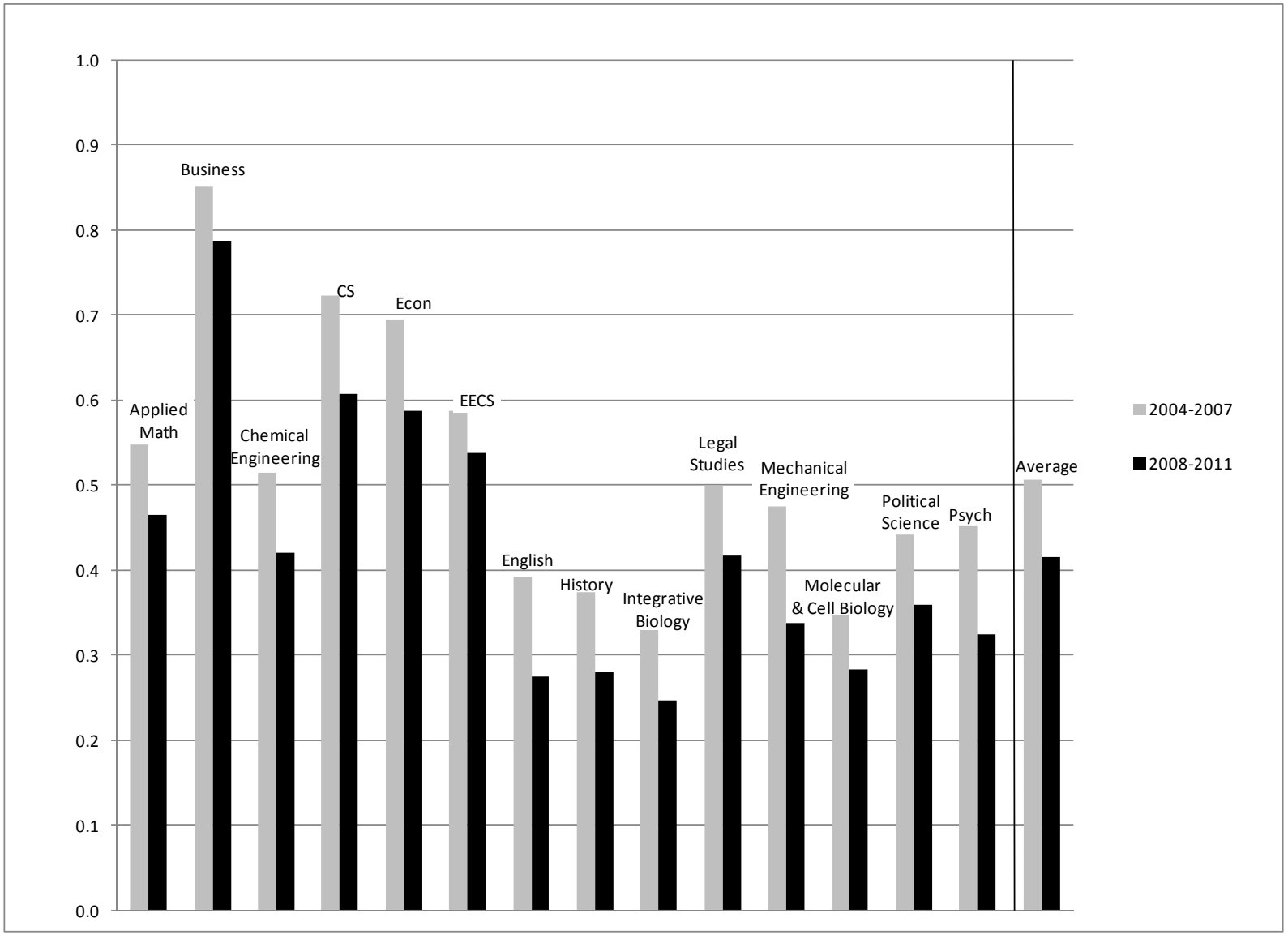


[I] Very dissatisfied [II] Dissatisfied [III] Somewhat dissatisfied
[IV] Somewhat satisfied [V] Satisfied [VI] Very satisfied

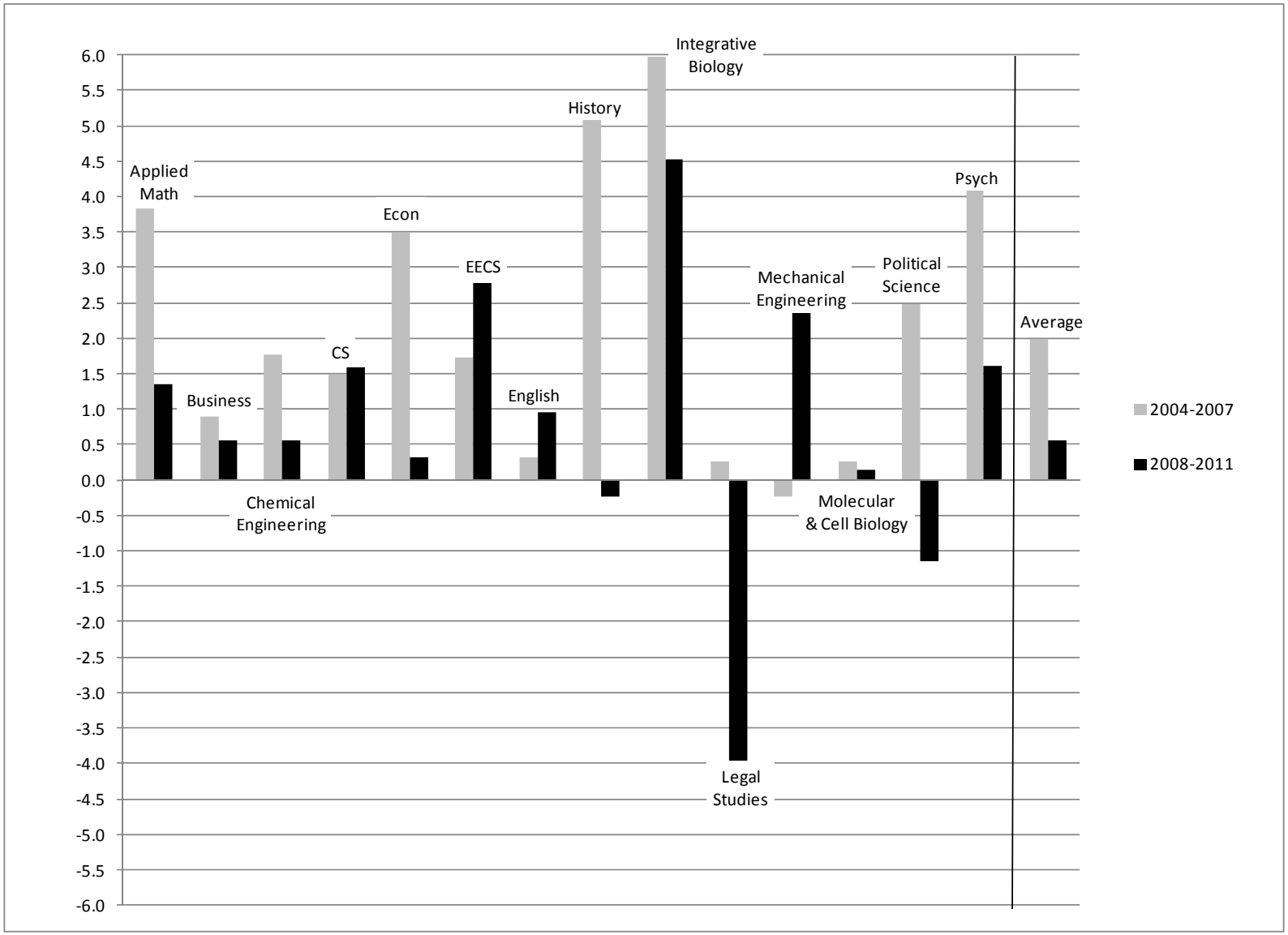
Job offers received by UC Berkeley students at graduation



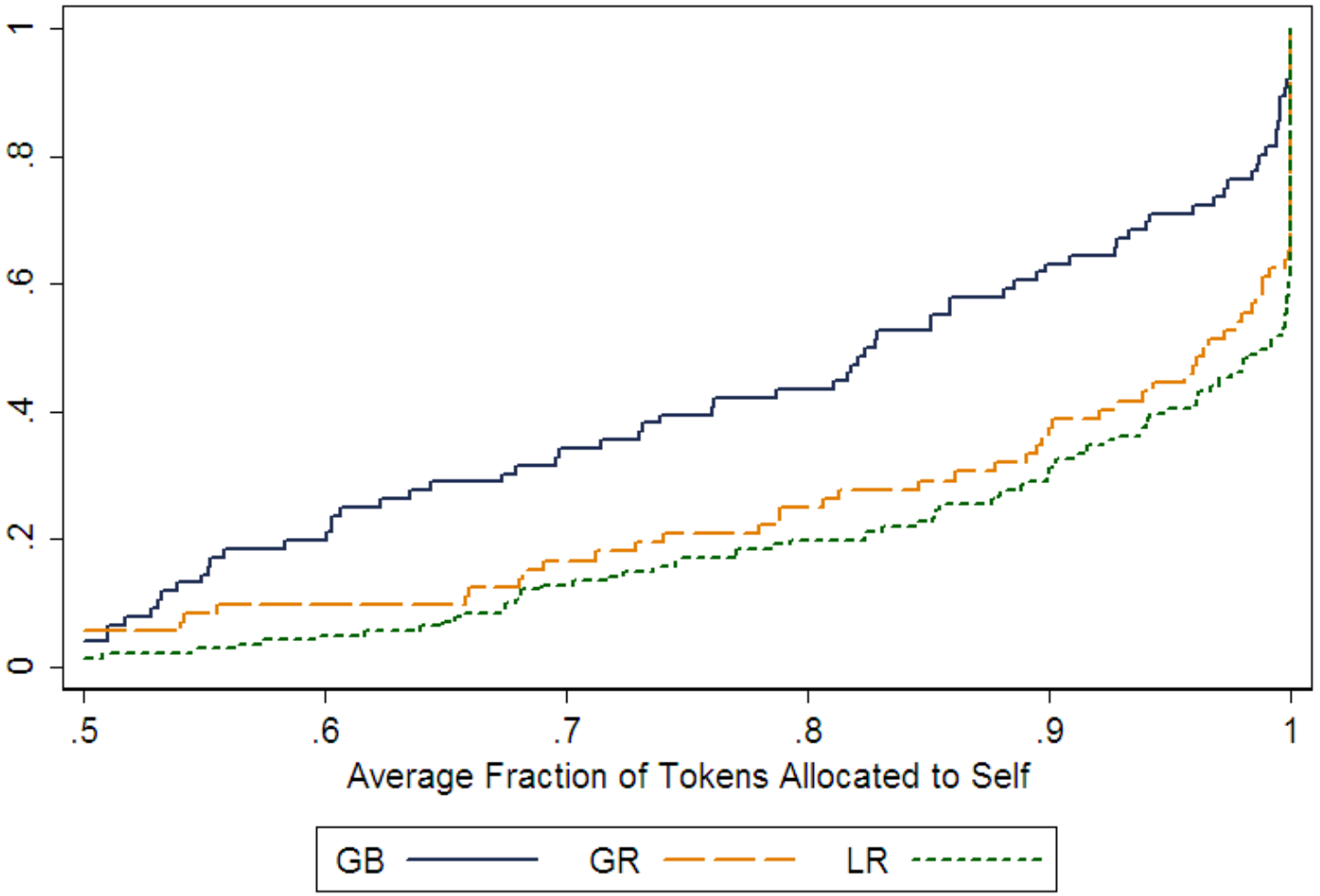
Employment rate of UC Berkeley students after graduation



Real growth of starting salaries for UC Berkeley graduates

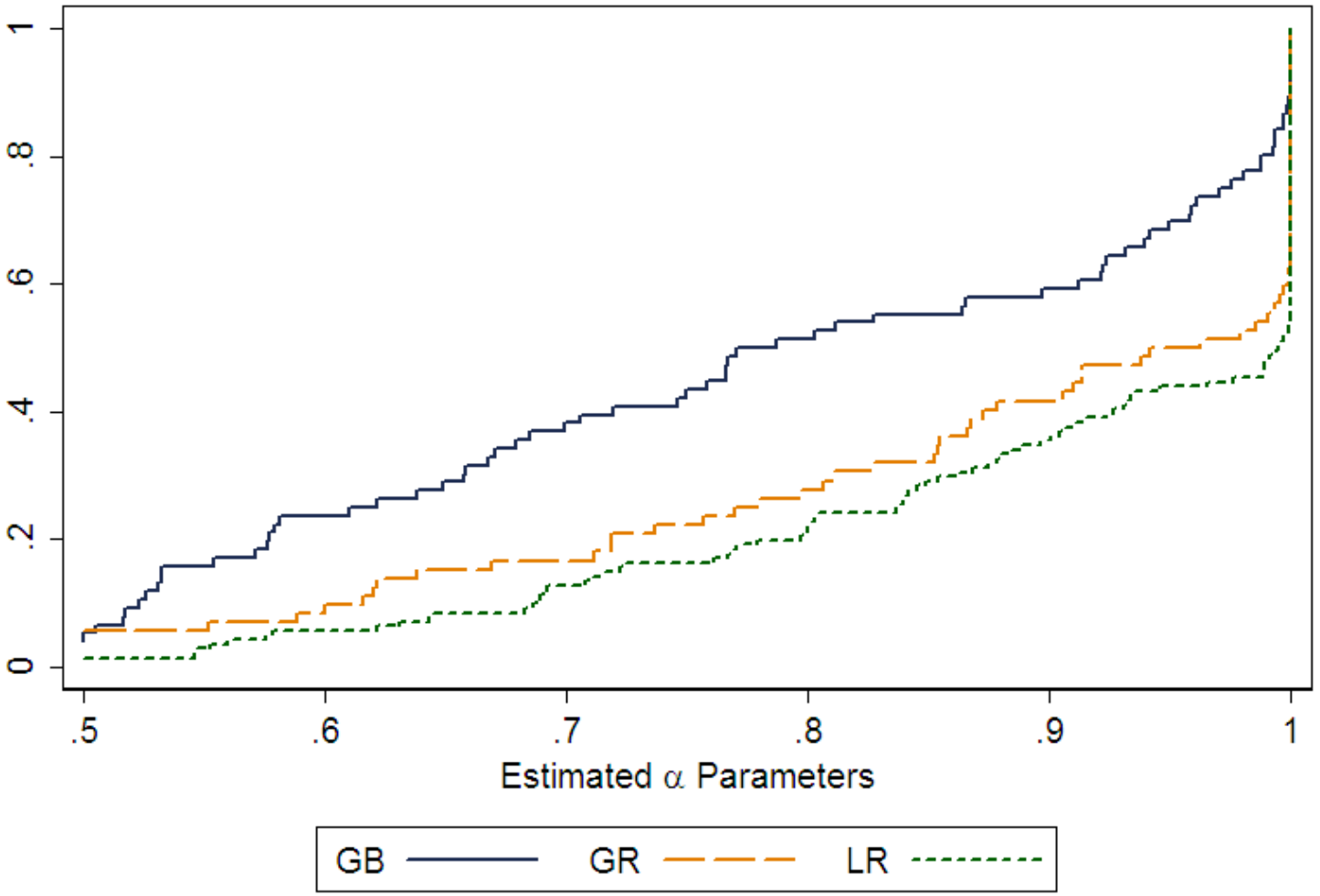


The distributions of the fraction tokens kept



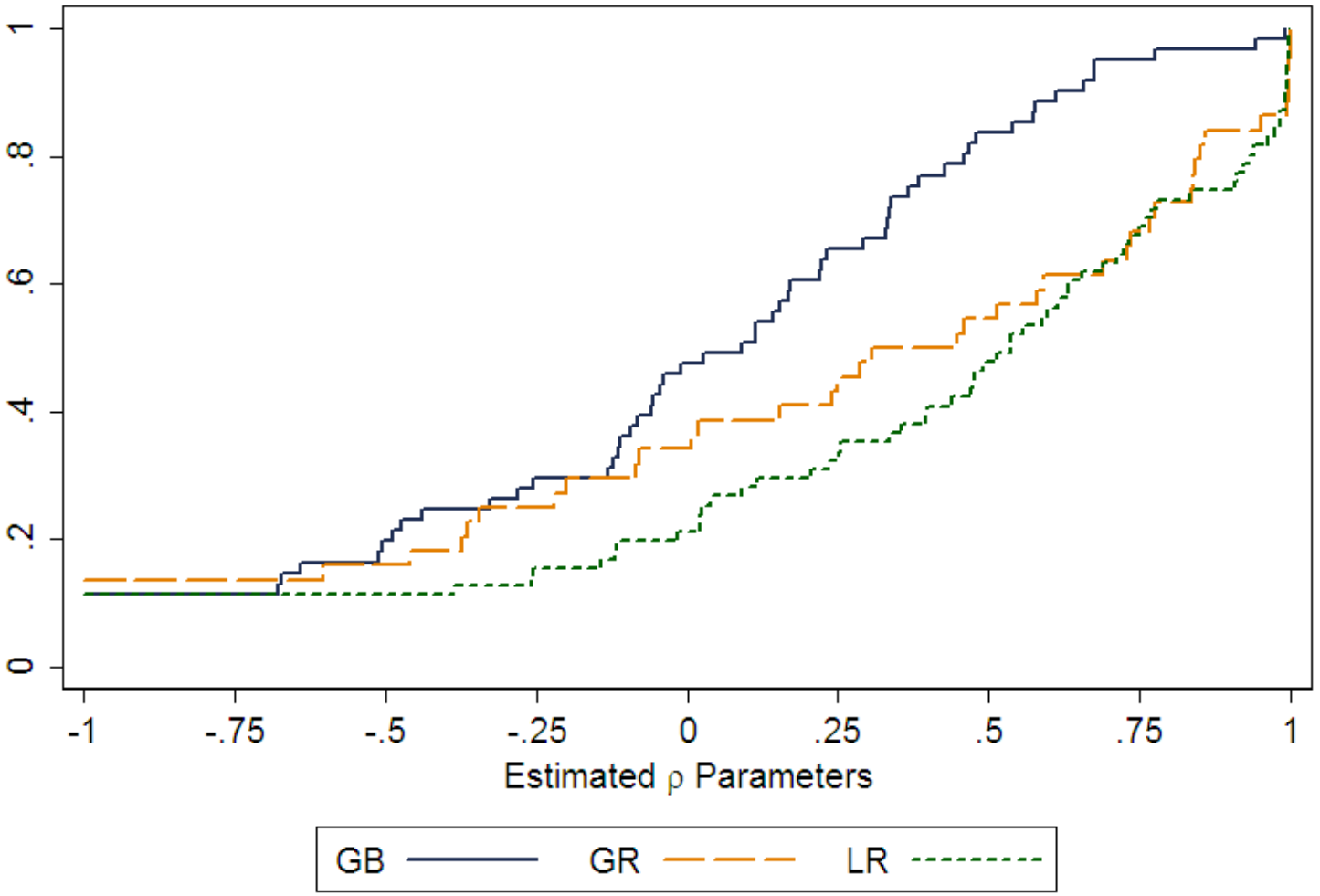
Note: the share of tokens allocated to self is less than 0.5 for 6 of 289 subjects.

The distributions of the individual-level *α* estimates



Note: 6 of 289 estimated α parameters are less than 0.5.

The distributions of the individual-level *ρ* estimates



Note: 18 of 176 estimated ρ parameters are less than -1.

The distributional preferences of an elite

Elite law students hold especial interest because they assume positions of substantial power in national and indeed global social, economic and political affairs:

- All nine sitting Supreme Court Justices and two of the past three Presidents (as well as a frontrunner to become the next President) are graduates of either Yale or Harvard Law Schools.

- Over the past century more than half of the presidents attended Yale, Harvard or Princeton, and the last four are graduates of Yale or Harvard.

The distributional preferences of YLS students will likely exercise a major influence over public and private orderings in the United States.

- YLS subjects show markedly higher consistency than ALP subjects and, to a lesser extent, also relative to UCB subjects, and the vast majority make decisions that are perfectly consistent.

- YLS subjects are substantially less fair-minded than the ALP subjects, but display similar levels of fair-mindedness relative to the UCB subjects.

- YLS subjects are far more inclined to favor efficiency over equality relative to both the ALP and UCB subject pools, (although self-identified as much more supportive of the Democratic Party than the general population).

Distinguishing social preferences from preferences for altruism

- Distributional preferences may be divided into two qualitatively different types which we call *preferences for altruism* and *social preferences*.

- Social preferences and distributional preferences are used interchangeably in the literature and our usage is not quite standard.

- Nevertheless, the distinctions that we draw are straightforward and capture important differences.

- *Preferences for altruism*
  - tradeoffs between the payoffs to $self$ and the payoffs to $others$.

- *Social preferences*
  - tradeoffs between the payoffs to $others$ (i.e. all persons except $self$).

A common assumption used in demand analysis allows for a clear demarcation between social preferences and preferences for altruism:

Independence *For any* π_S, π'_S, *and profiles* $\pi_O = (\pi_A, \pi_B)$ *and* π'_O

$u_S(\pi_S, \pi_O) > u_S(\pi_S, \pi'_O)$ *if and only if* $u_S(\pi'_S, \pi_O) > u_S(\pi'_S, \pi'_O)$.

If the independence property is satisfied, then the utility function $u_S(\pi_S, \pi_O)$ is (weakly) *separable*.

There exists a *subutility* function $w_S(\pi_O)$ and a *macro* function $v_S(\pi_S, w_S)$ with v_S strictly increasing in w_S such that

$$u_S(\pi_S, \pi_O) \equiv v_S(\pi_S, w_S(\pi_O)).$$

- This formulation makes it possible to represent distributional preferences in a particularly convenient manner.

- The macro function v_S represents preferences for altruism, whereas the subutility function w_S represents social preferences.

- Separability imposes convenient (but specific and quit restrictive) patterns on demand behavior (Karni and Safra 2002).

Econometric specification

Suppose that w_S and v_S are members of the CES family:

$$w_S(\pi_O) = [\alpha' (\pi_A)^{\rho'} + (1 - \alpha')(\pi_B)^{\rho'}]^{1/\rho'}$$

and

$$v_S(\pi_S, w_S) = [\alpha (\pi_S)^{\rho} + (1 - \alpha) [w_s (\pi_O)]^{\rho}]^{1/\rho}$$

A family of CES functions that embed preferences for altruism and social preferences in a particularly convenient manner

$$U_S = [\alpha(\pi_S)^{\rho} + (1 - \alpha)[\alpha'(\pi_A)^{\rho'} + (1 - \alpha')(\pi_B)^{\rho'}]^{\rho/\rho'})]^{1/\rho}$$

The solution to the subutility maximization problem is given by

$$\pi_A(p_O, m_O) = \left[\frac{g'}{(p_B/p_A)^{r'} + g'}\right] \frac{m_O}{p_A}$$

where

$$r' = -\rho' / \left(1 - \rho'\right),$$

$$g' = \left[\alpha' / \left(1 - \alpha'\right)\right]^{1/\left(1-\rho'\right)}$$

and $m_O = p_O \pi_O$ is the total expenditure on tokens given to $others$.

The solution to the macro utility maximization problem is then given by

$$\pi_S(p, m) = \left[\frac{g}{q^r + g}\right] \frac{m}{p_S}$$

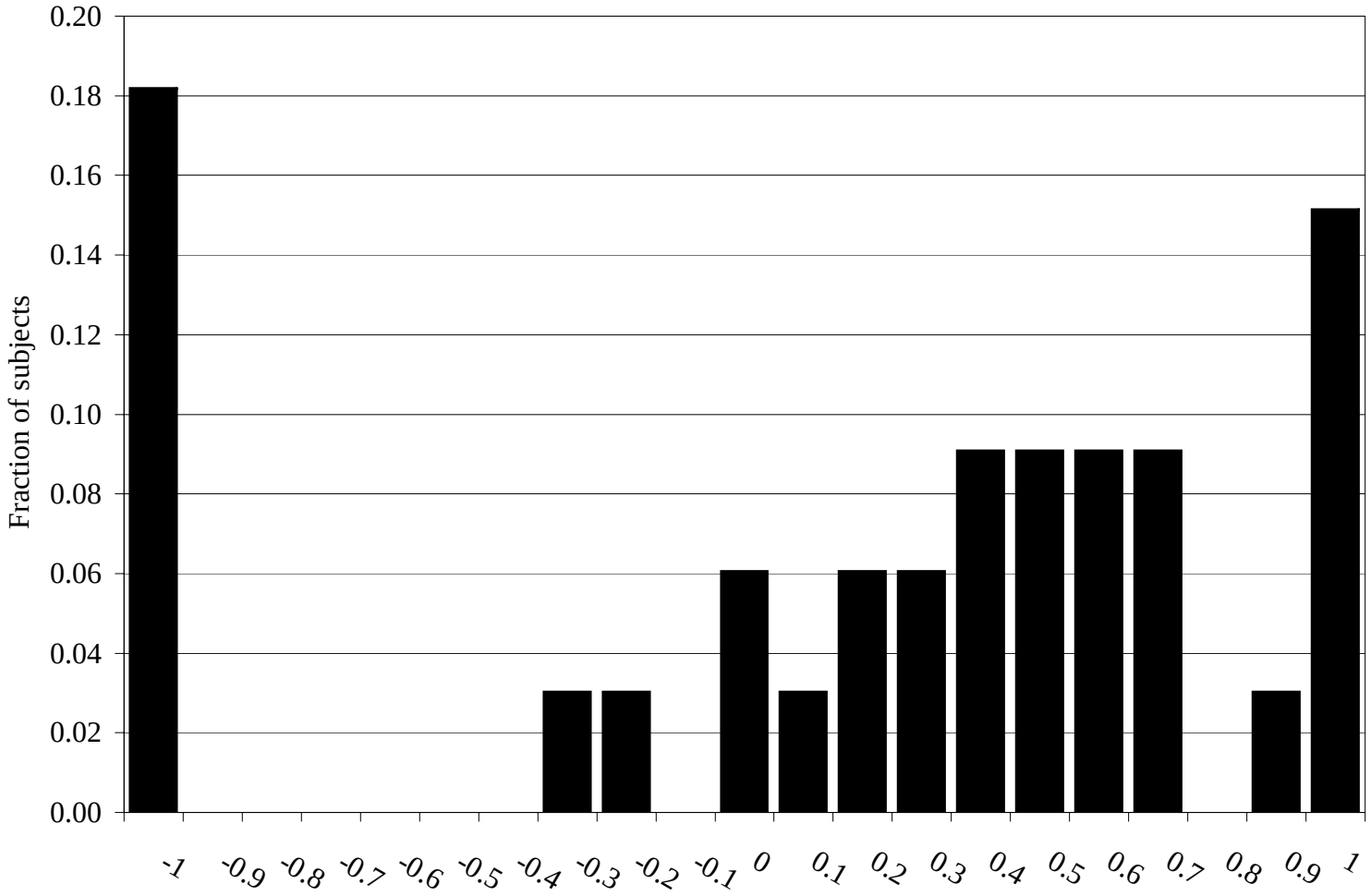
where

$$r = -\rho/(1 - \rho),$$

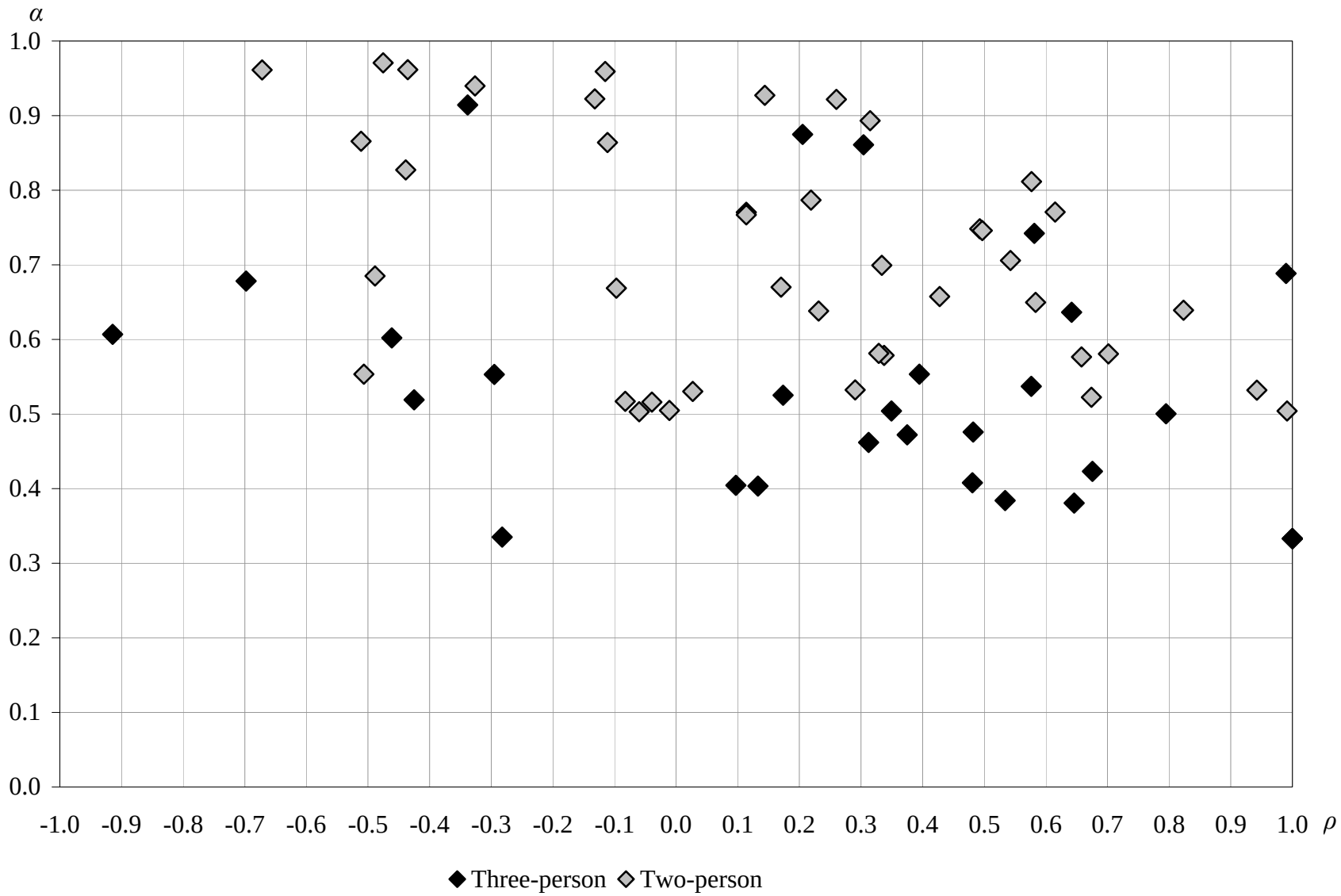
$$g = [\alpha/ (1 - \alpha)]^{1/(1-\rho)}$$

and q is a *weighted relative price of giving*.

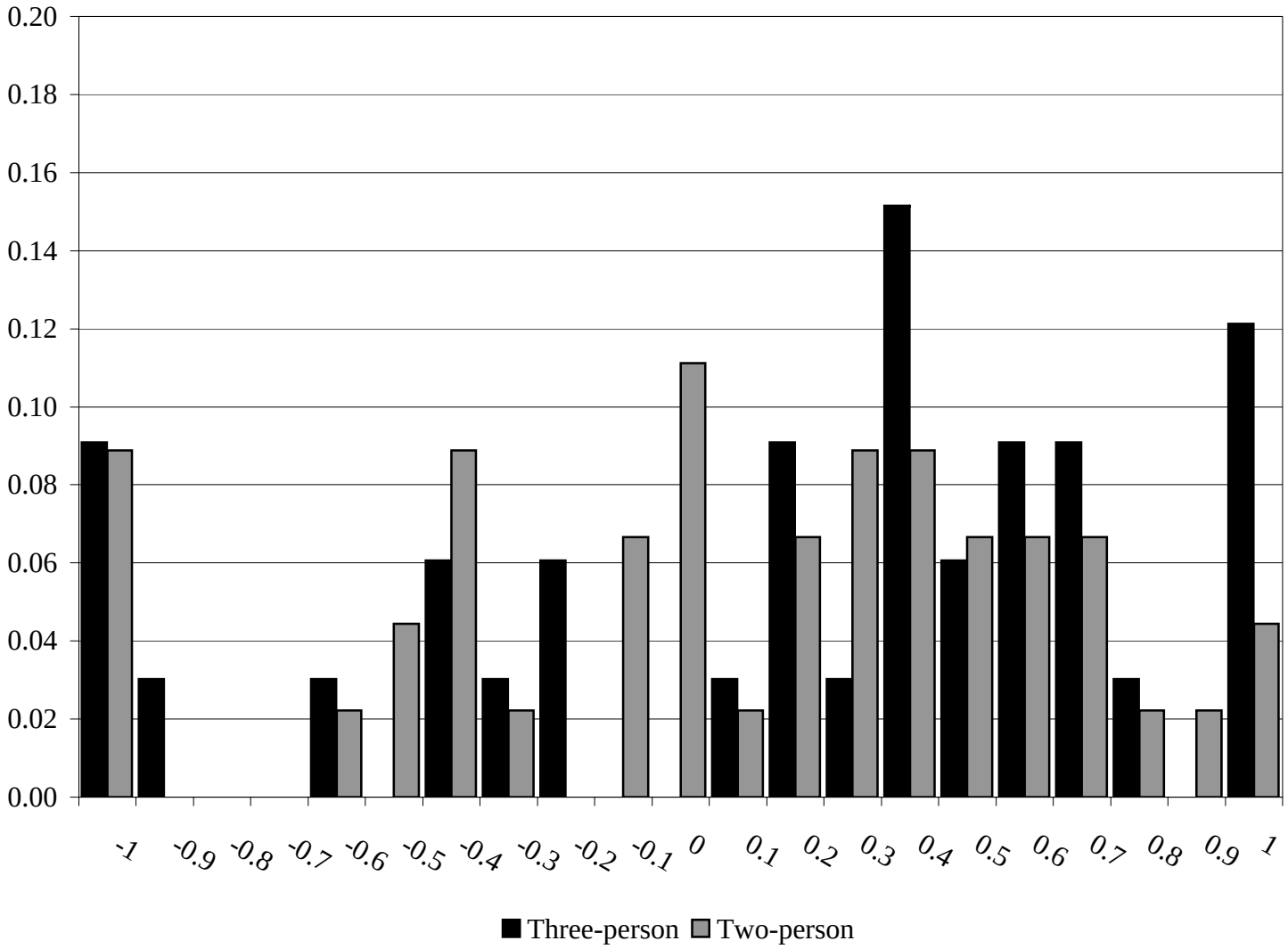
The distribution of the subutility CES parameter ρ'



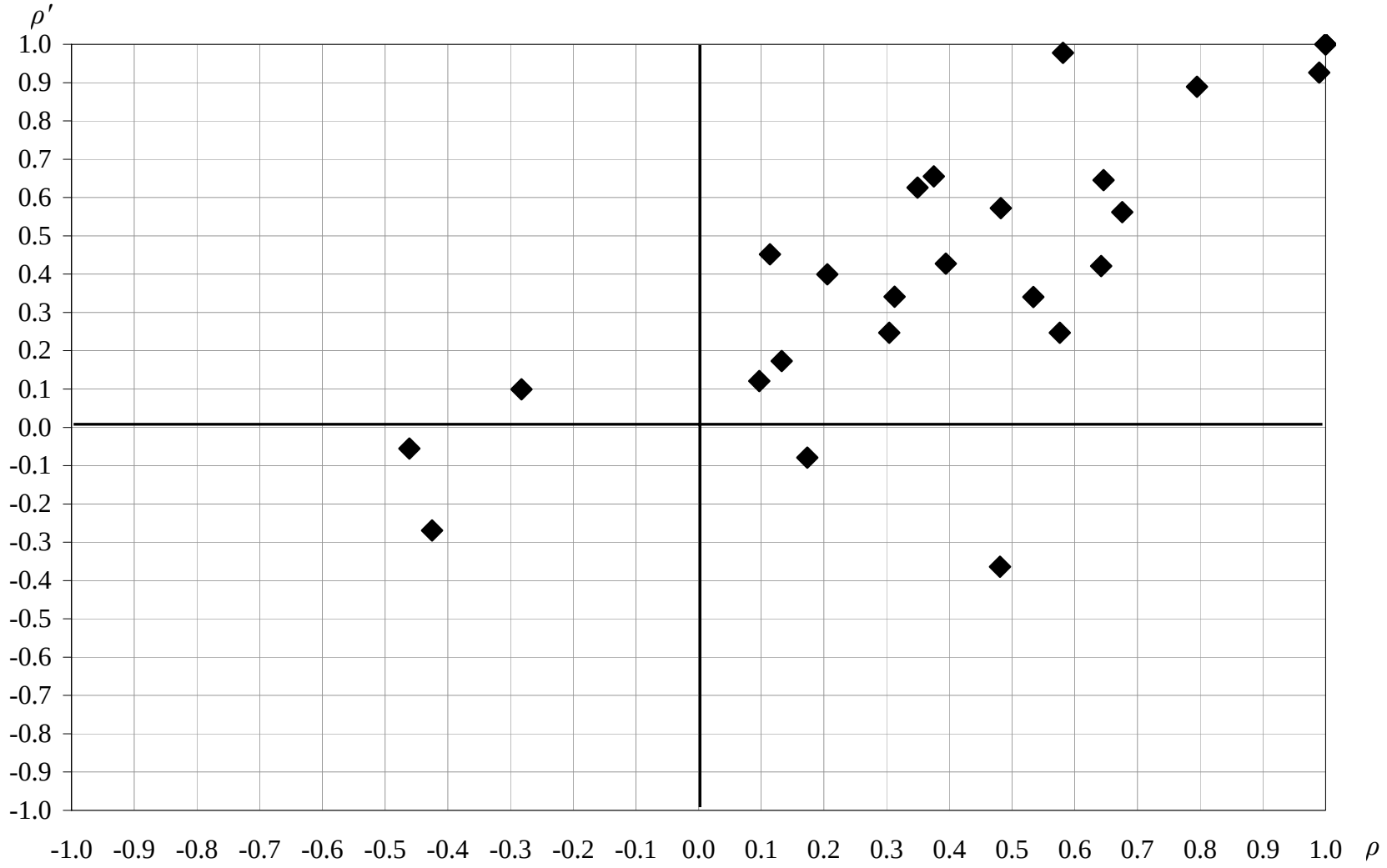
Scatterplot of the CES estimates ρ and α in the three- and two-person experiments



The distribution of the CES parameter ρ in the three- and two-person experiments



Scatterplot of the CES estimates ρ and ρ'



Moral preferences

Harsanyi and Rawls argue for theories of *social justice* (equivalently, *fairness*) based on the choices that agents would make for society in the *original position*, behind a *veil of ignorance*.

> *. . . without knowing their own social and economic positions, their own special interests in the society, or even their own personal talents and abilities (or their lack of them).* – Harsanyi (1975) –

Harsanyi and Rawls come to quite different conclusions, not because they view the original position differently, but because they treat uncertainty quite differently (Rawls denies orthodox decision theory).

Harsanyi's (1953, 1955) model for moral value judgments

Suppose an agent wants to make a moral value judgment about the relative merits of two alternative social systems.

> *. . . act in such a way as if he assigned the same probability to his occupying each social position under either system. . .*
>
> *. . . then, he would clearly satisfy the impartiality and impersonality requirements to the fullest possible degree.* – Harsanyi (1978) –

The agent has two different sets of preferences: *personal preferences* and *moral preferences* (preferences in the original position).

Two observations

[1] Both Harsanyi and Rawls insist that moral preferences must conform to certain rationality requirements, and hence must have a special form – as opposed to personal preferences, which merely reflect taste.

[2] Harsanyi and Rawls – and many other writers – view the original position as a purely hypothetical environment, and hence view moral preferences as a purely intellectual construct.

Our point of departure from the work of Harsanyi and Rawls – and the enormous literature they spawned – comes from two observations:

[1] Choice behavior/preferences *behind* the veil of ignorance can be decomposed into choice behavior/preferences *in front of* the veil of ignorance:

> choices that involve only personal consumption under uncertainty and choices that involve social consumption – but no uncertainty.

[2] Choices behind the veil of ignorance *can* be presented – and choices in the other two environments as well – in a controlled *laboratory* setting.

$\Rightarrow$ The linkage between preferences behind and in front of the veil of ignorance provides new ways of interpreting the theory of justice:

> not just as a *normative* theory, but also as a *descriptive* theory and even as a *prescriptive* theory.

$\Leftarrow$ This linkage means that moral preferences *cannot* occupy such a privileged position – modulo certain assumptions, they are completely determined by risk preferences and social preferences.

Template for analysis

- Consider choice behavior by a single agent in each of three environments.
- Each choice has consequences for *self* (the agent) and for an (unknown) *other*.
- We consider only environments that involve binary choices and equiprobable lotteries.
- The results extend to more general choices and lotteries, and to unknown probabilities as well.

Consider lotteries over outcomes $[a, b]$, where a is consumption for *self* and b is consumption for *other*.

For our purposes, it suffices to consider binary lotteries with equal probabilities:

$$(.5)[a, b] + (.5)[c, d]$$

where $a, b, c, d \geq 0$. Write $\mathcal{L}$ for the space of all such lotteries, and identify $\mathcal{L}$ with the convex cone $\mathbb{R}^4_+$.

Define closed convex subcones of $\mathcal{L}$:

$$\begin{aligned}
\mathcal{R} &= \{(.5)[a,0] + (.5)[c,0]\}, \\
\mathcal{S} &= \{(.5)[a,b] + (.5)[a,b]\}, \\
\mathcal{M} &= \{(.5)[a,b] + (.5)[b,a]\}.
\end{aligned}$$

We can interpret choice in each of the environments as choice in one of the corresponding cones by making an obvious identification:

– Risk: identify $\mathbb{R}^2_+$ with $\mathcal{R}$ by

$$(x, y) \mapsto (.5)[x, 0] + (.5)[y, 0].$$

– Social: identify $\mathbb{R}^2_+$ with $\mathcal{S}$ by

$$(x, y) \mapsto (.5)[x, y] + (.5)[x, y].$$

– Moral: identify $\mathbb{R}^2_+$ with $\mathcal{M}$ by

$$(x, y) \mapsto (.5)[x, y] + (.5)[y, x],$$

which coincides *exactly* with Harsanyi's (1953, 1955) formalization of the original position.

Research questions

[1] What is the relationship between moral preferences and personal/social (altruistic) preferences?

[2] How can behavior behind [Harsanyi's] veil of ignorance be characterized experimentally?

[3] Is behavior behind a veil of ignorance consistent with the utility maximization model?

[4] Can the underlying moral preferences be recovered from observed choices?

Assumptions

Given a preference relation $\succeq$ on $\mathcal{L}$, write $\succeq_{\mathcal{R}}$, $\succeq_{\mathcal{S}}$, $\succeq_{\mathcal{M}}$ for its restrictions to $\mathcal{R}$, $\mathcal{S}$, $\mathcal{M}$, respectively.

$[i]$ $\succeq$ satisfies the usual requirements: completeness, transitivity, reflexivity, continuity, and the Sure Thing Principle.

$[ii]$ $\succeq$ satisfies (weak) *independence*:

$$\begin{aligned} [a,b] \;\succeq\; & \mathcal{S}[a',b'] \text{ and } [c,d] \succeq_{\mathcal{S}} [c',d'] \\ \Rightarrow\; & (.5)[a,b] + (.5)[c,d] \succeq (.5)[a',b'] + (.5)[c',d'] \end{aligned}$$

(*not* the usual independence axiom and does not have the usual consequences).

Next, we make two assumptions about *social* preferences:

$[iii]$ **Worst outcome**: $[a, b] \succeq_{\mathcal{S}} [0, 0]$ for every $[a, b] \in \mathcal{S}$.

$[iv]$ **Self-regarding**: for each outcome $[a, b]$ there is an outcome $[s, 0]$ such that $[s, 0] \succeq_{\mathcal{S}} [a, b]$.

$[i]$ and $[ii]$ are rationality requirements (should not necessarily be given any philosophical interpretation).

$[iii]$ and $[iv]$ limit the extent to which the *self* is (respectively) spiteful or altruistic toward *other*; they seem very natural requirements but they are not entirely innocuous.

Result: Every preference relation $\succeq$ on $\mathcal{L}$ that satisfies $[i]$-$[iv]$ is determined by its restrictions $\succeq_{\mathcal{R}}$and $\succeq_{\mathcal{S}}$.

Proof: Fix an outcome $[x, y]$. Because $\succeq_{\mathcal{S}}$ is self-regarding, there is some s such that $[s, 0] \succeq_{\mathcal{S}} [x, y]$.

Define the *selfish equivalent* of $[x, y]$ by

$$\sigma[x, y] = \inf\{s : [s, 0] \succeq_{\mathcal{S}} [x, y]\}.$$

Continuity and worse outcome guarantee that $[\sigma[x, y], 0] \sim_{\mathcal{S}} [x, y]$, and by construction,

$$[a, b] \sim_{\mathcal{S}} [\sigma[a, b], 0] \text{ and } [c, d] \sim_{\mathcal{S}} [\sigma[c, d], 0].$$

independence guarantees that

$$(.5)[a,b] + (.5)[c,d] \sim (.5)[\sigma[a,b],0] + (.5)[\sigma[c,d],0].$$

Hence

$$\begin{array}{rcl} (.5)[a,b] + (.5)[c,d] & \succeq & (.5)[a',b'] + (.5)[c',d'] \\ & \Updownarrow & \\ (.5)[\sigma[a,b],0] + (.5)[\sigma[c,d],0] & \succeq & \mathcal{R}(.5)[\sigma[a',b'],0] + (.5)[\sigma[c',d'],0] \end{array}$$

which decomposes preferences over $\mathcal{L}$ into preferences over $\mathcal{S}$ (selfish equivalents) and preferences over $\mathcal{R}$, as desired.

Given a linear budget constraint, we identify choice behavior in the Social Choice environment as

- *selfish* if the choice subject to every budget constraint is of the form $[y, 0]$ – giving nothing to *other*.

- *symmetric* if (a, b) is chosen subject to $px+qy \leq w$ iff (b, a) is chosen subject to the mirror-image budget constraint $qx + py \leq w$.

Corollary I: If the preference relation $\succeq$ satisfies $[i]$ and $[ii]$ and choice behavior in the $\mathcal{S}$ is selfish then choice behavior in $\mathcal{R}$ coincides with choice behavior in $\mathcal{M}$.

Proof: Monotonicity and continuity guarantee that purely selfish behavior implies that $[x, 0] \sim_{\mathcal{S}} [x, y]$ for every x, y. independence implies that

$$(.5)[y, 0] + (.5)[x, 0] \sim (.5)[x, y] + (.5)[y, x].$$

It follows immediately that $\succeq_{\mathcal{R}}$ and $\succeq_{\mathcal{M}}$ coincide from whence choices in the Risk and Veil of Ignorance environments coincide, as asserted.

Corollary II: If the preference relation $\succeq$ satisfies $[i]$ and $[ii]$ and choice behavior in $\mathcal{S}$ is symmetric, then choice behavior in $\mathcal{S}$ coincides with choice behavior in $\mathcal{M}$.

Proof: Suppose that (a, b) is chosen from some budget set B for the Social Choice environment, so that (b, a) is chosen in the mirror image budget set B'.

Say that (c, d) is chosen from the budget set B for the Veil of Ignorance environment, and that $(c, d) \neq (a, b)$.

Because $(c, d) \in B$, it follows that

$$(.5)[c, d] + (.5)[d, c] \succ_{\mathcal{M}} (.5)[a, b] + (.5)[b, a].$$

independence implies that

$$[c, d] \succ_{\mathcal{S}} [a, b] \text{ or } [d, c] \succ_{\mathcal{S}} [b, a],$$

which is inconsistent with the fact that (a, b) (resp. (b, a)) is chosen from the budget set B (resp. B').

It follows that risk attitude is irrelevant in the Veil of Ignorance environment, as asserted.

Experimental analysis

- Subjects in the experiments were recruited from all classes at UCLA and Yale Law School.

- Each decision problem is presented as a choice from a two-dimensional budget line.

- A choice (x, y) from the budget line represents an allocation between accounts x, y (corresponding to the horizontal and vertical axes).

- Choices are made through a simple point-and-click design using a graphical computer interface.

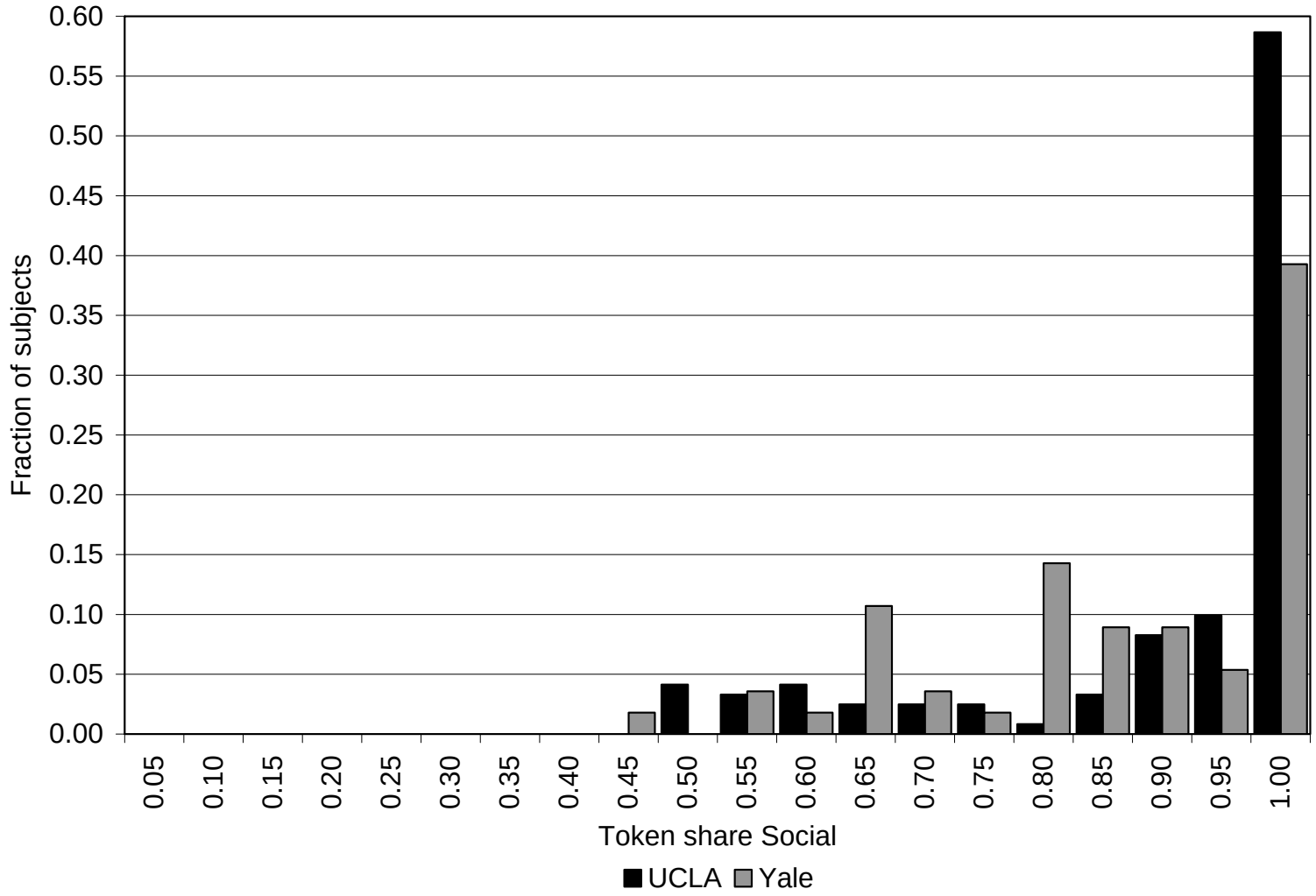
The actual payoffs of a particular choice in a particular environment/treatment are determined by the allocation to the x and y accounts:

- Risk: involves only pure risk; it is identical to the (symmetric) risk experiment of Choi, Fisman, Gale & Kariv (*AER*, 2007).

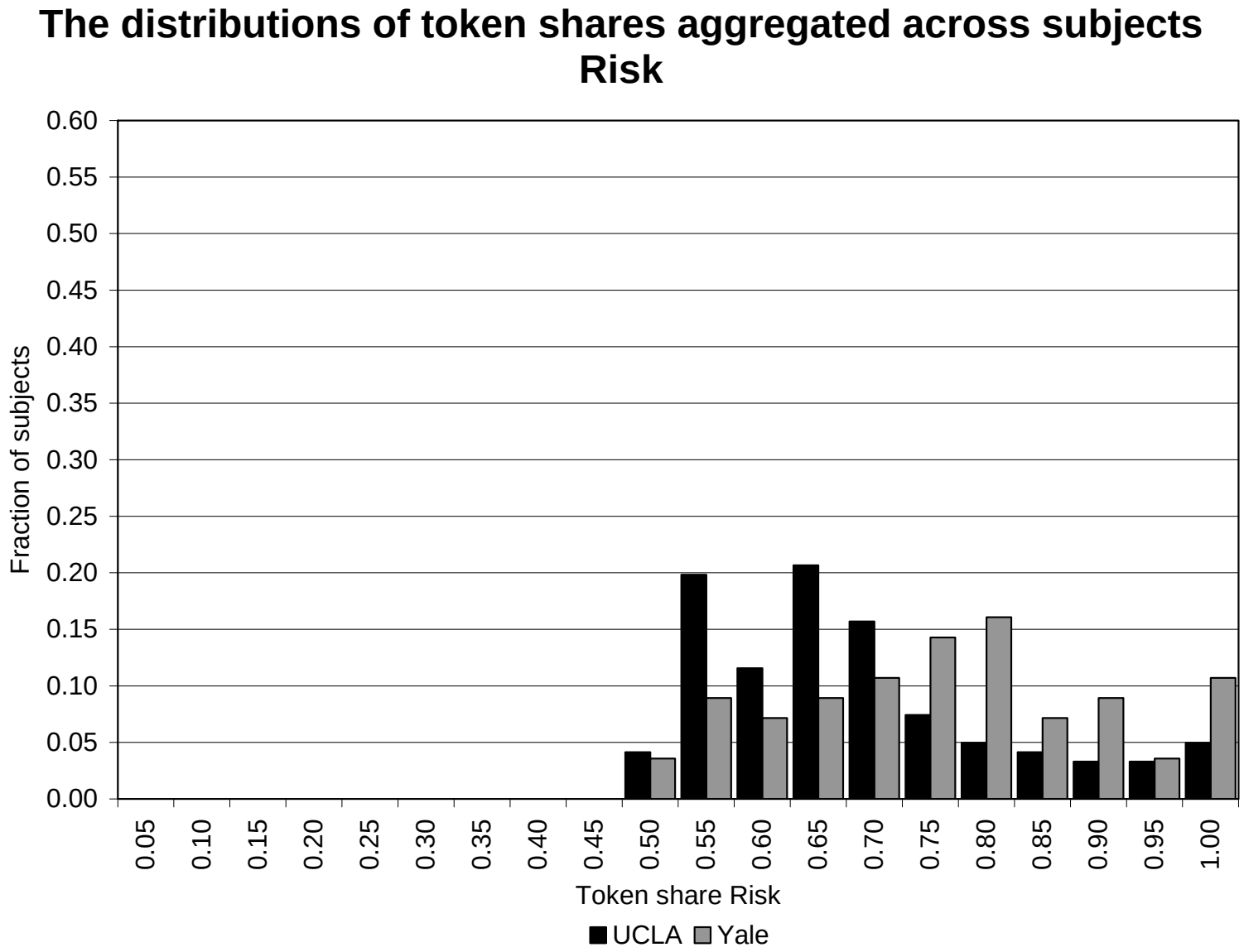
- Social Choice: involves only altruism; it is identical to the (linear) two-person dictator experiment of Fisman, Kariv & Markovits (*AER*, 2007).

- Veil of Ignorance: involves equiprobable binary lotteries over symmetric pairs of consumption for *self* and for *other*.

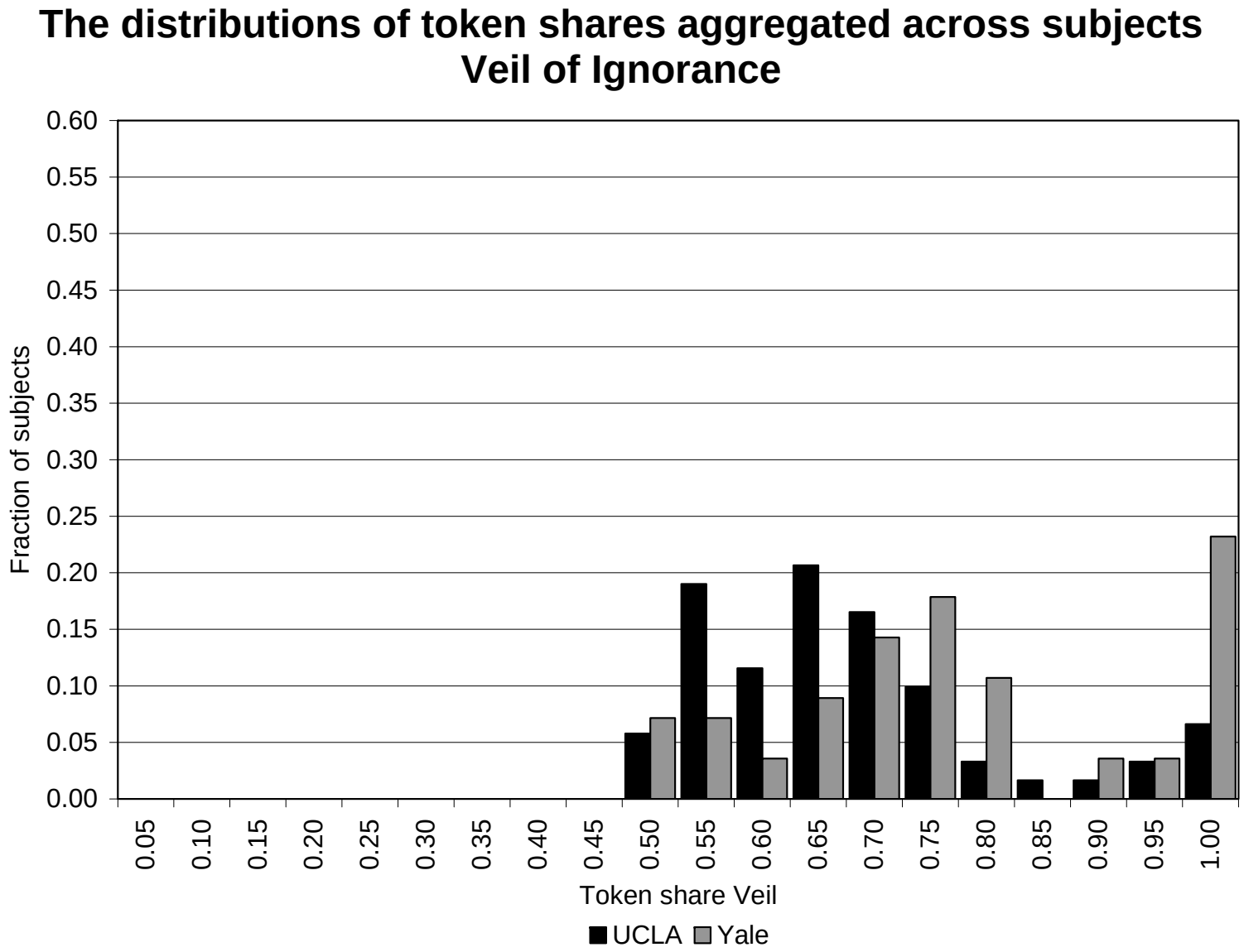
The distributions of token shares aggregated across subjects
Social Choice



The tokens kept as a fraction of the sum of the tokens kept and given to other.

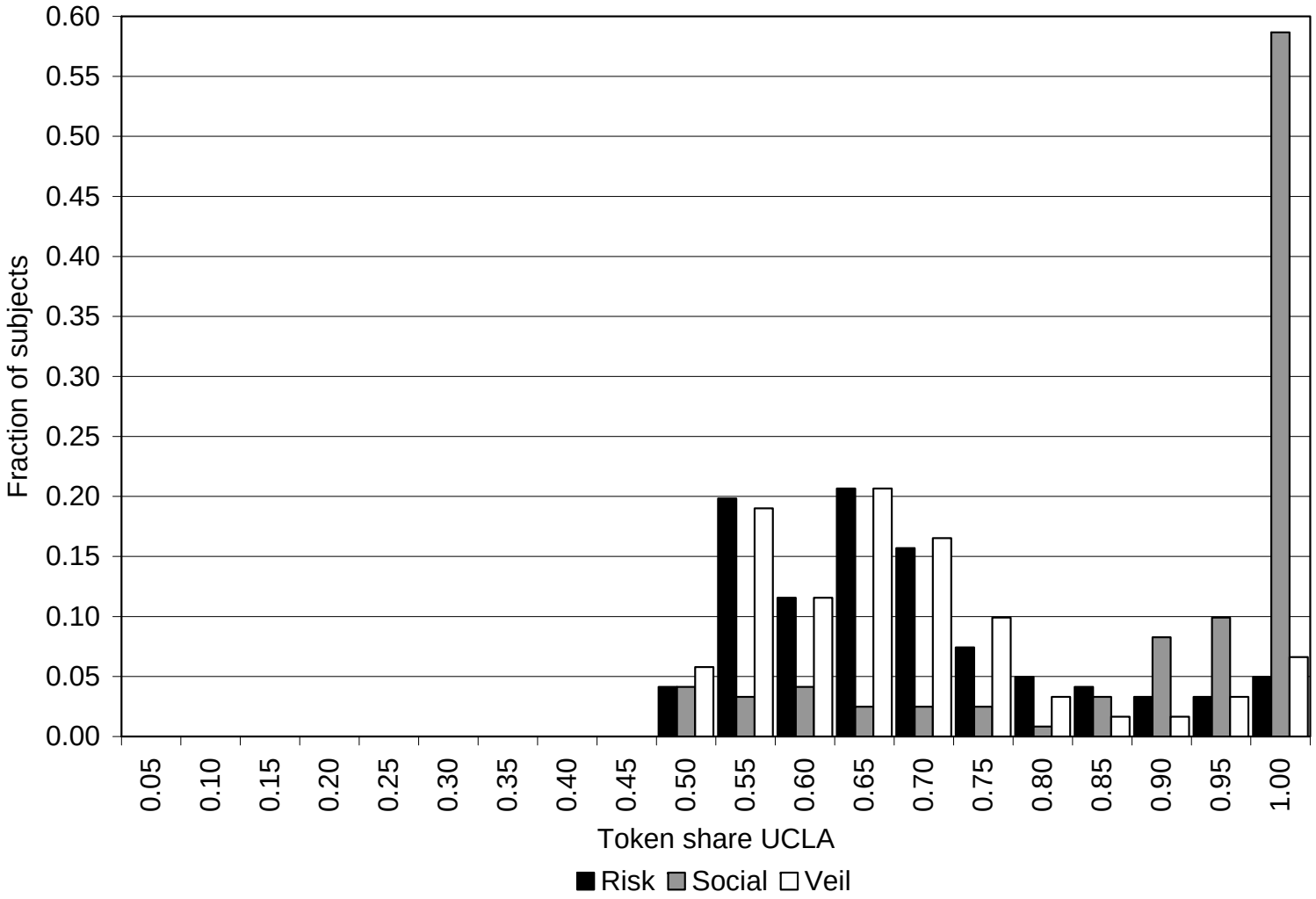


The fraction of tokens allocated to the cheaper account.



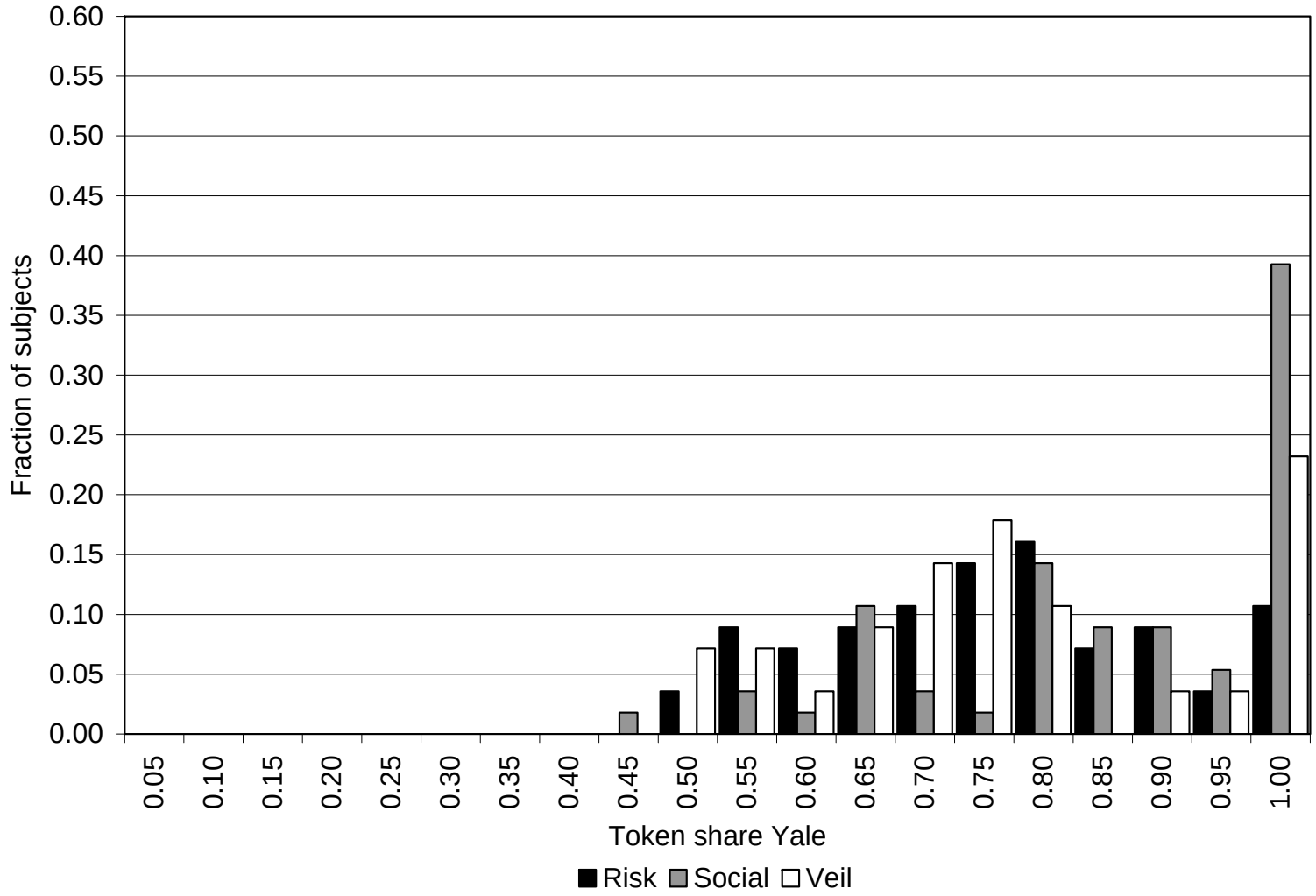
The fraction of tokens allocated to the cheaper account.

The distributions of token shares aggregated across subjects
UCLA



Social: fraction of tokens kept by self. Risk and Veil: fraction of tokens allocated to the cheaper account.

The distributions of token shares aggregated across subjects
Yale



Social: fraction of tokens kept by self. Risk and Veil: fraction of tokens allocated to the cheaper account.

Individual behavior

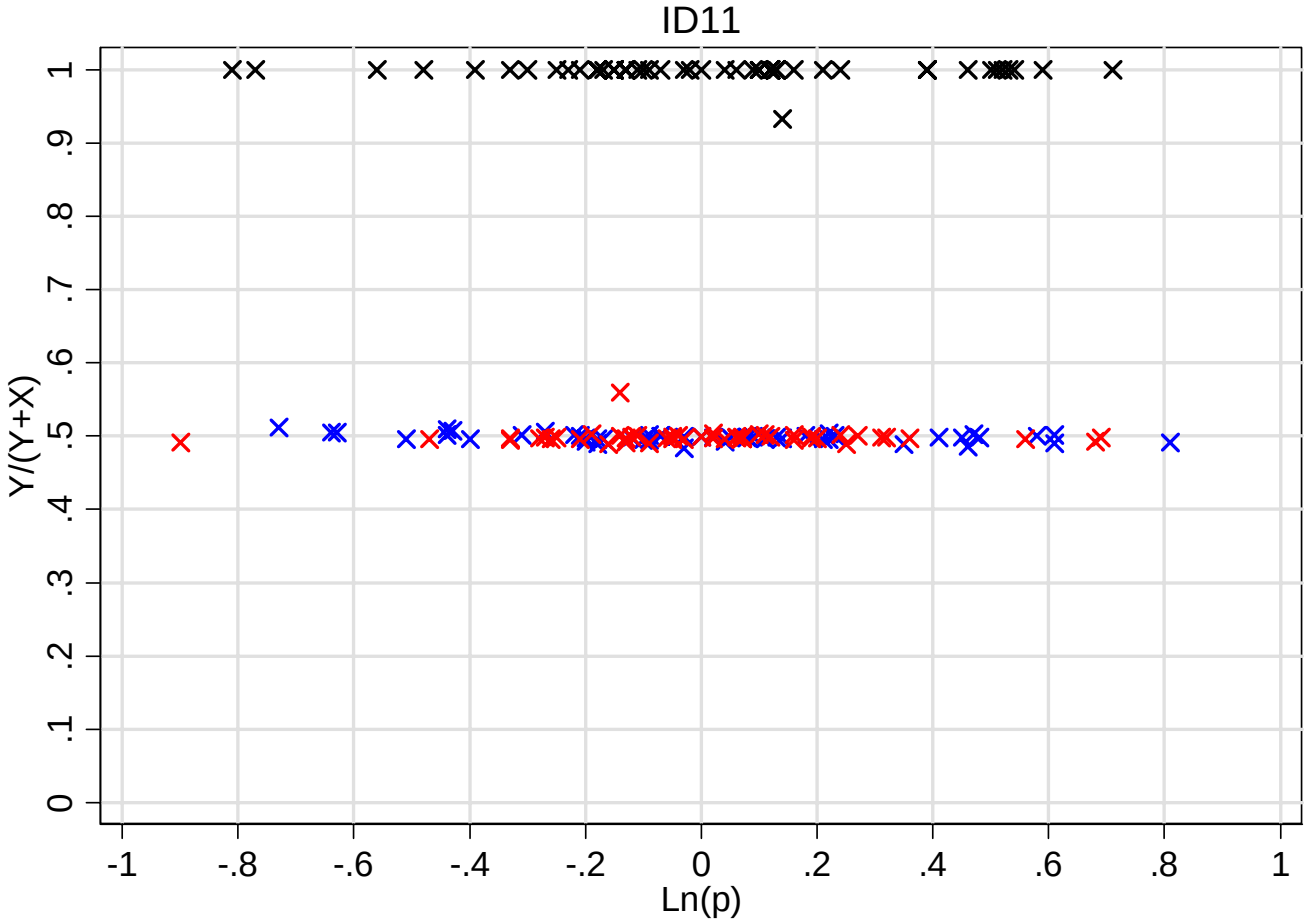
- The aggregate data tell us little about the choice behavior of individual subjects.

- Scatterplots of all choices of illustrative subjects – each entry plots $y/(x+y)$ as a function of $\log(p_x/p_y)$ in a particular treatment.

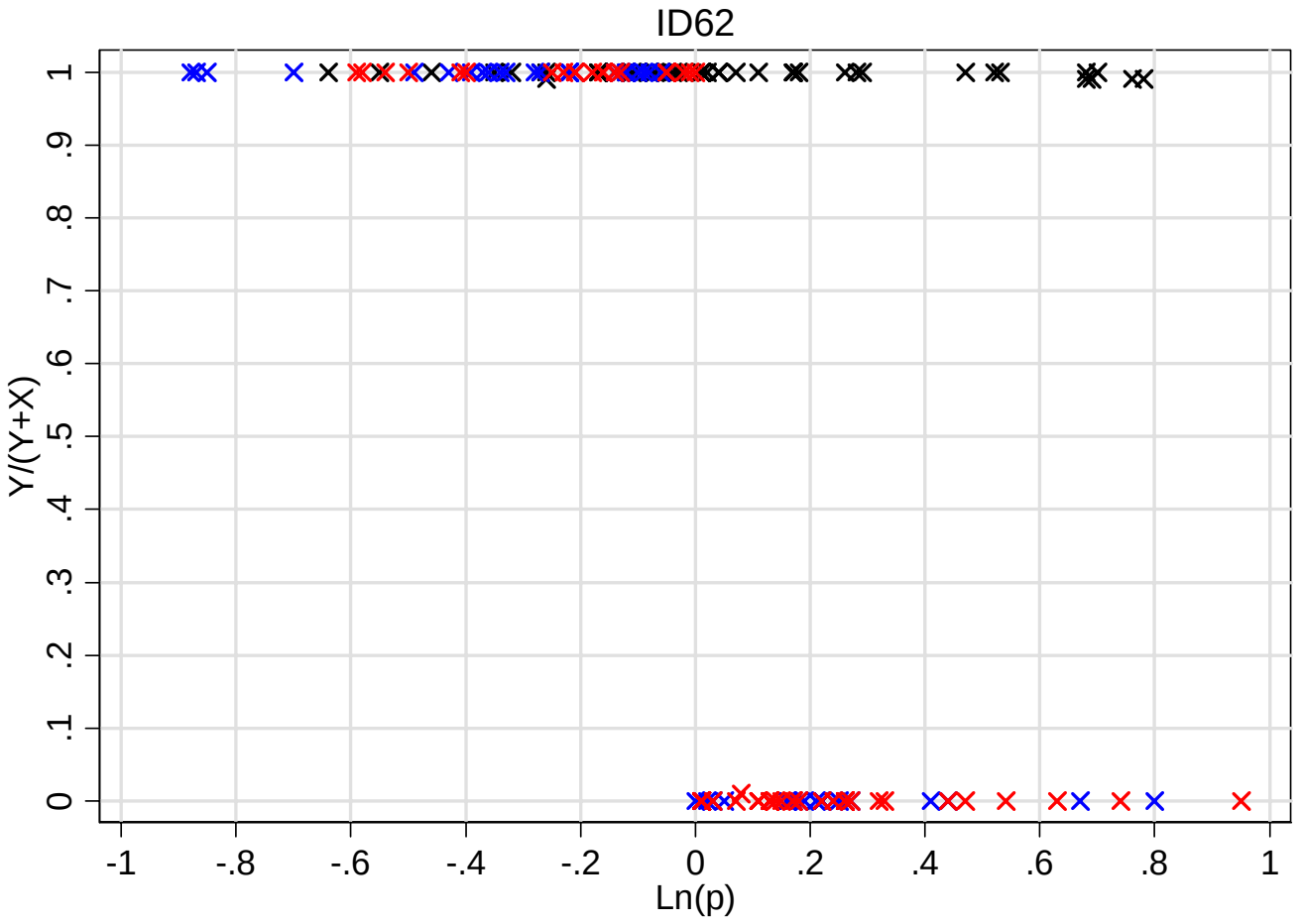
- There is no taxonomy that allows us to classify all subjects unambiguously.

- The characteristic of all our data is striking regularity *within* subjects and heterogeneity *across* subjects.

The relationship between the log-price ratio and the token share



X – Risk / X – Social Choice / X – Veil of Ignorance



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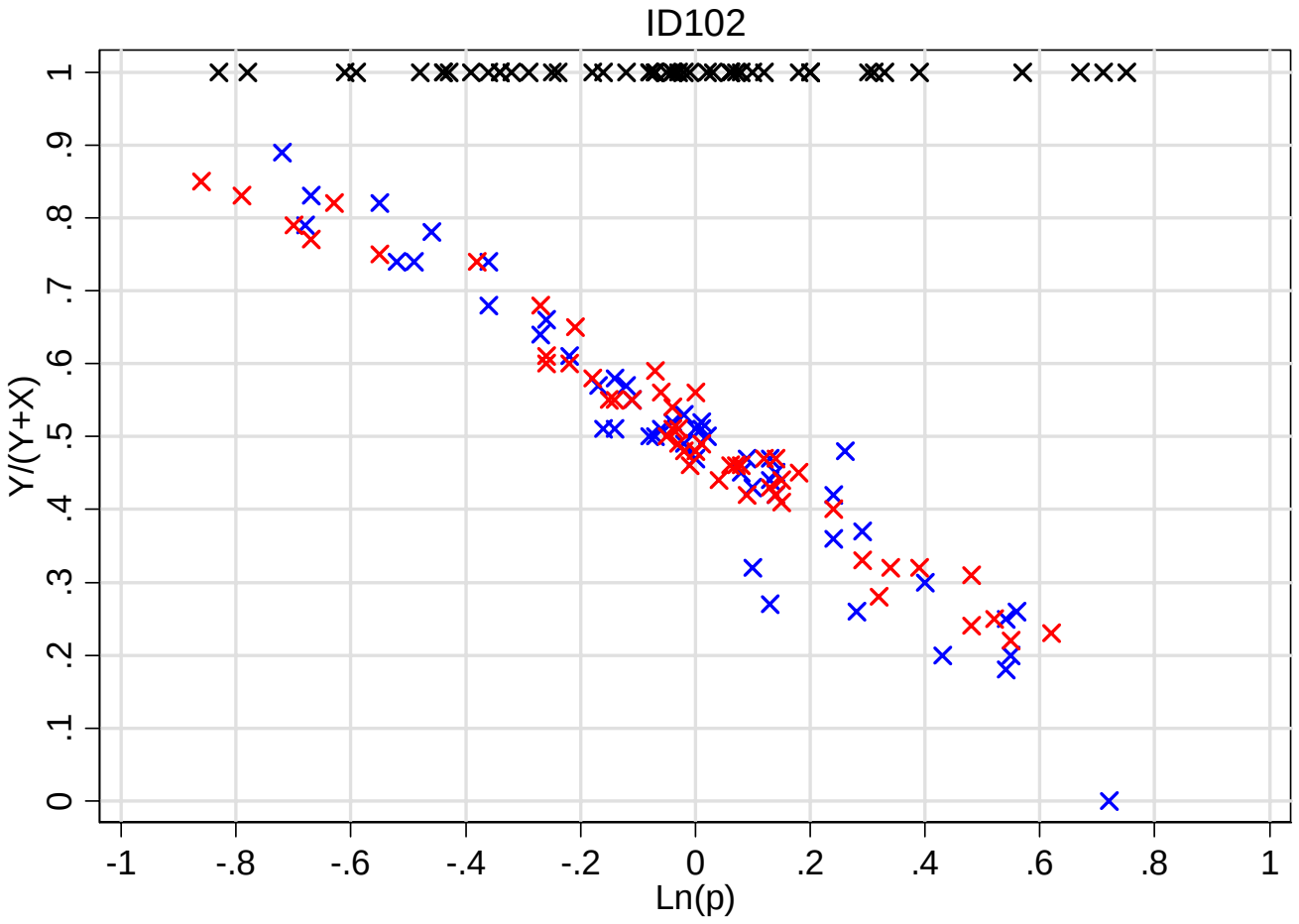

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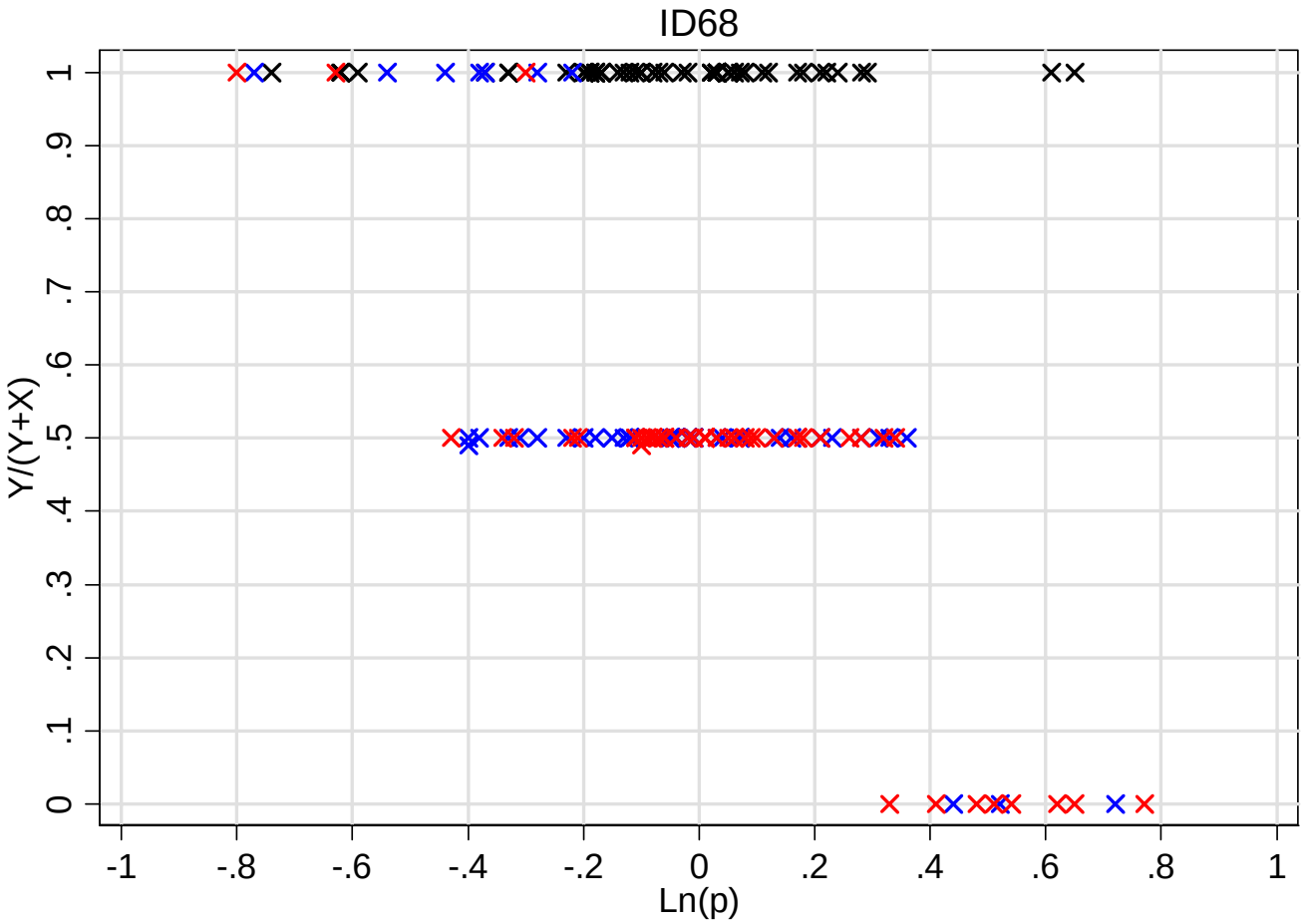

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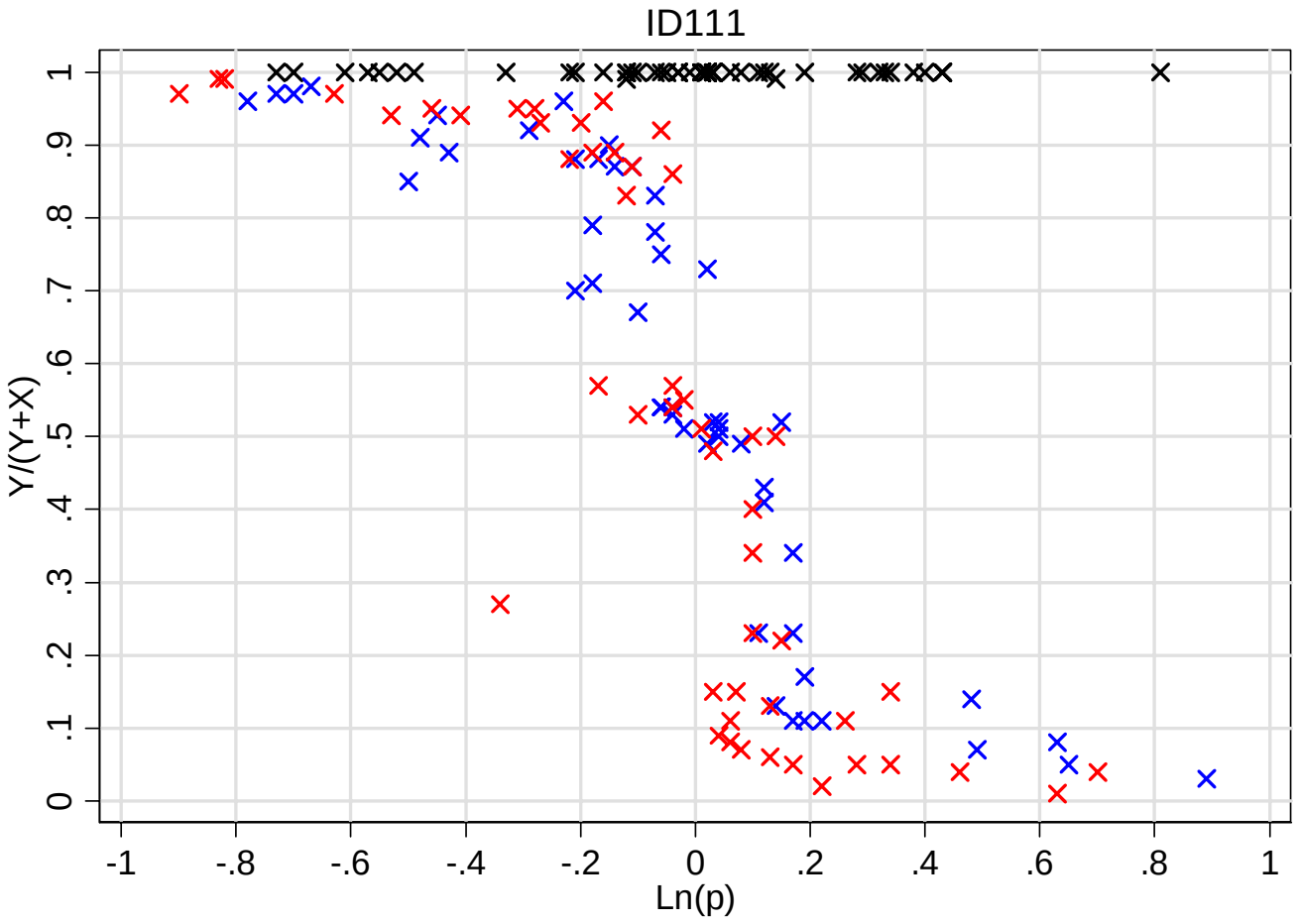

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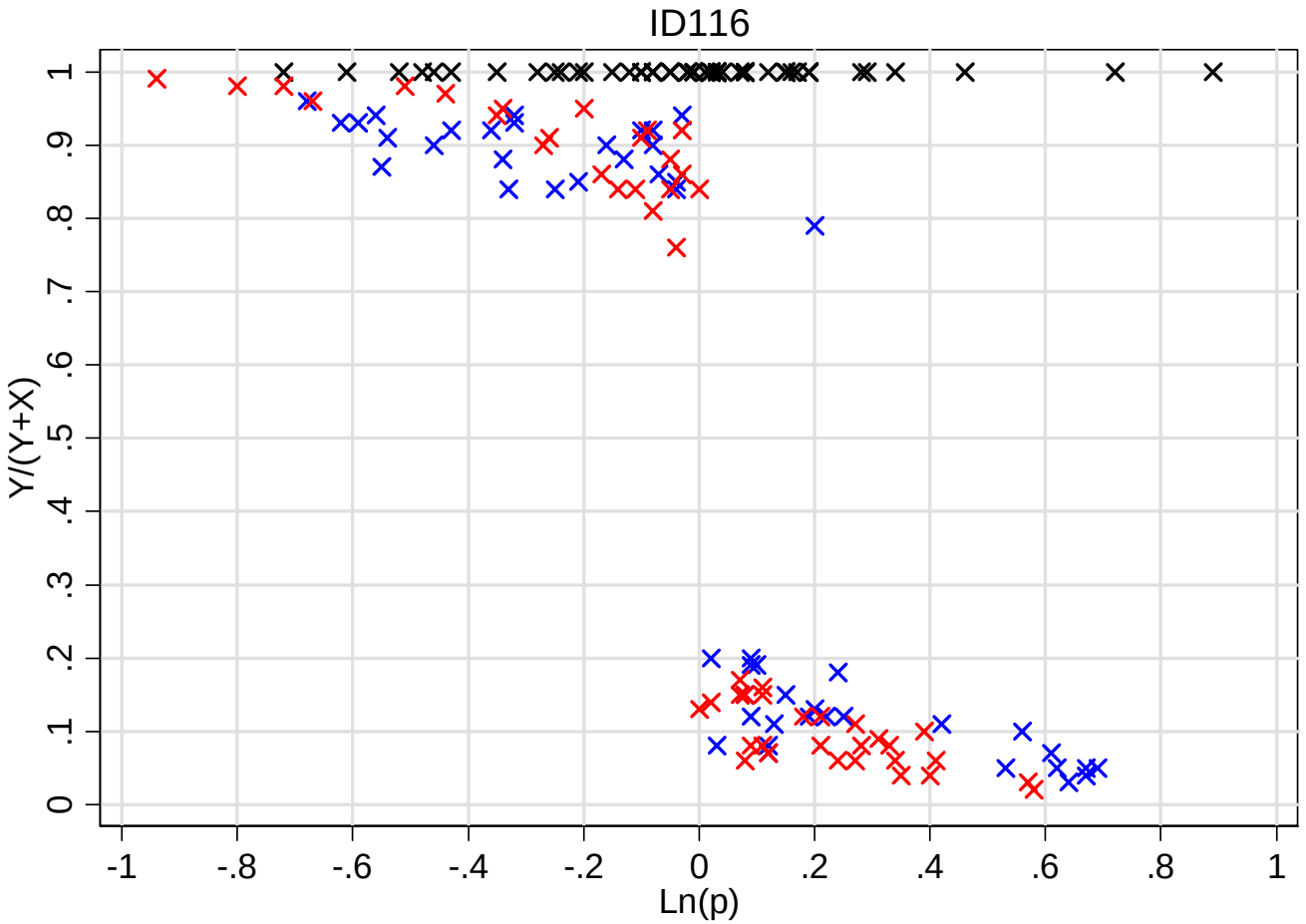

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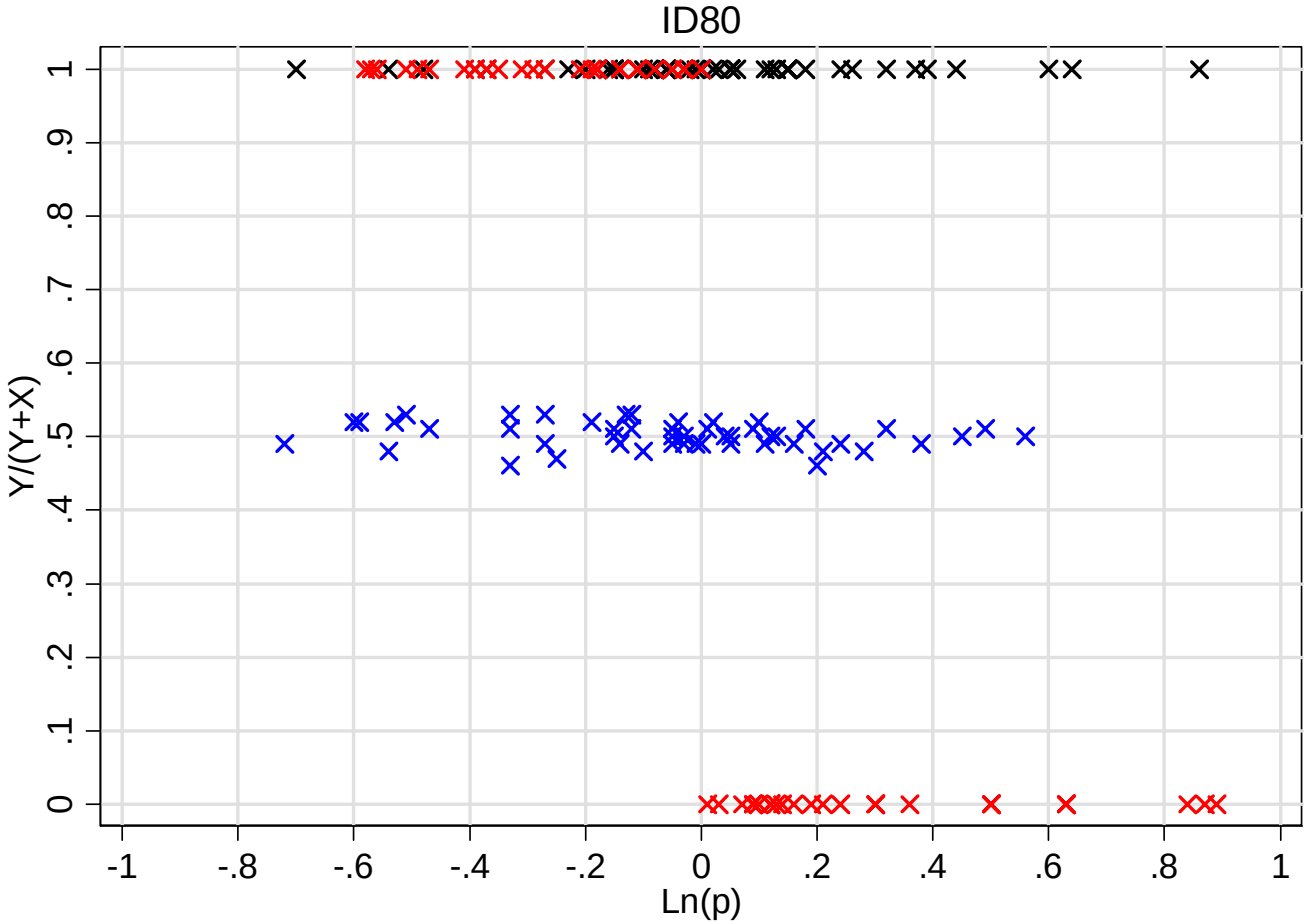

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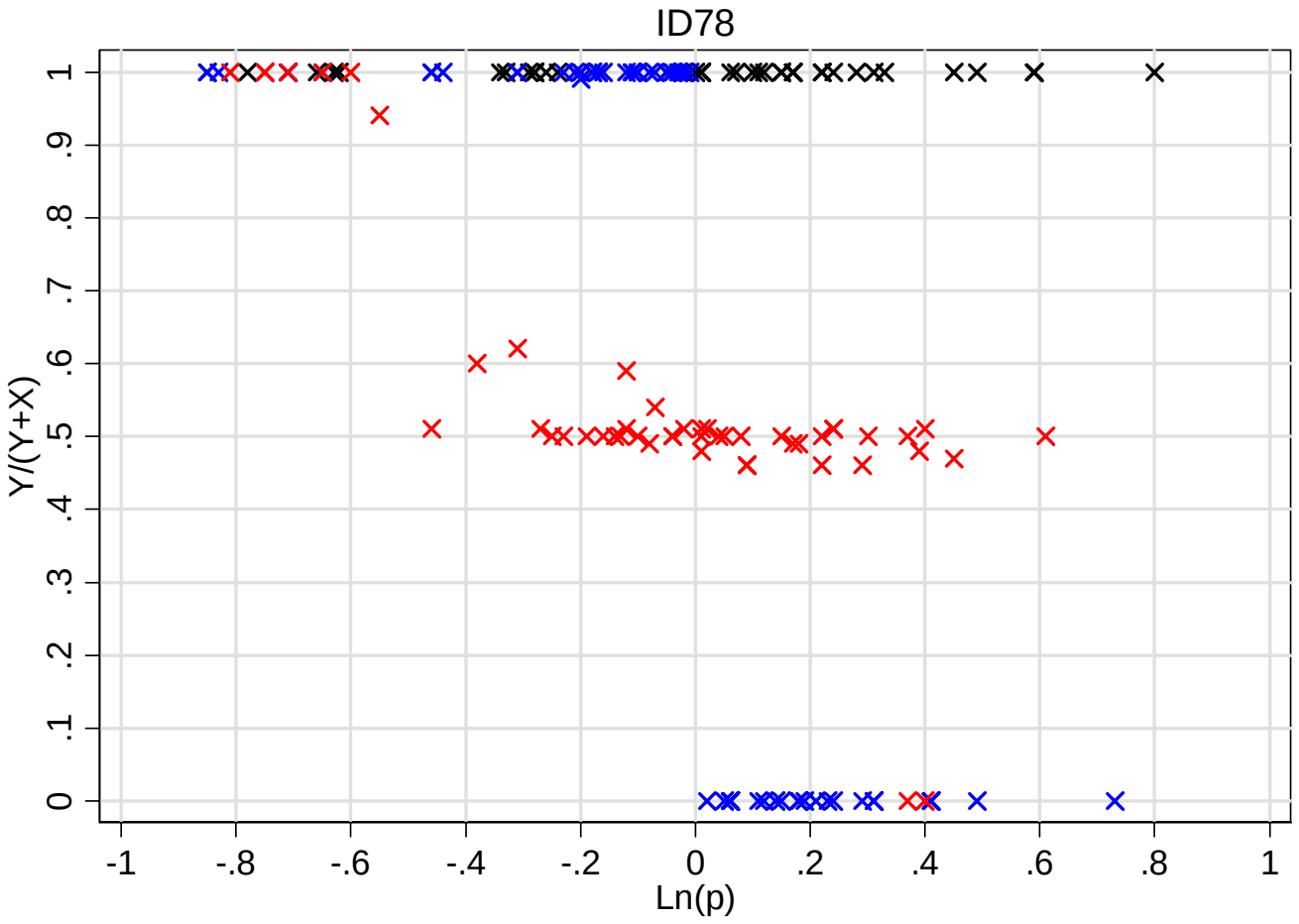

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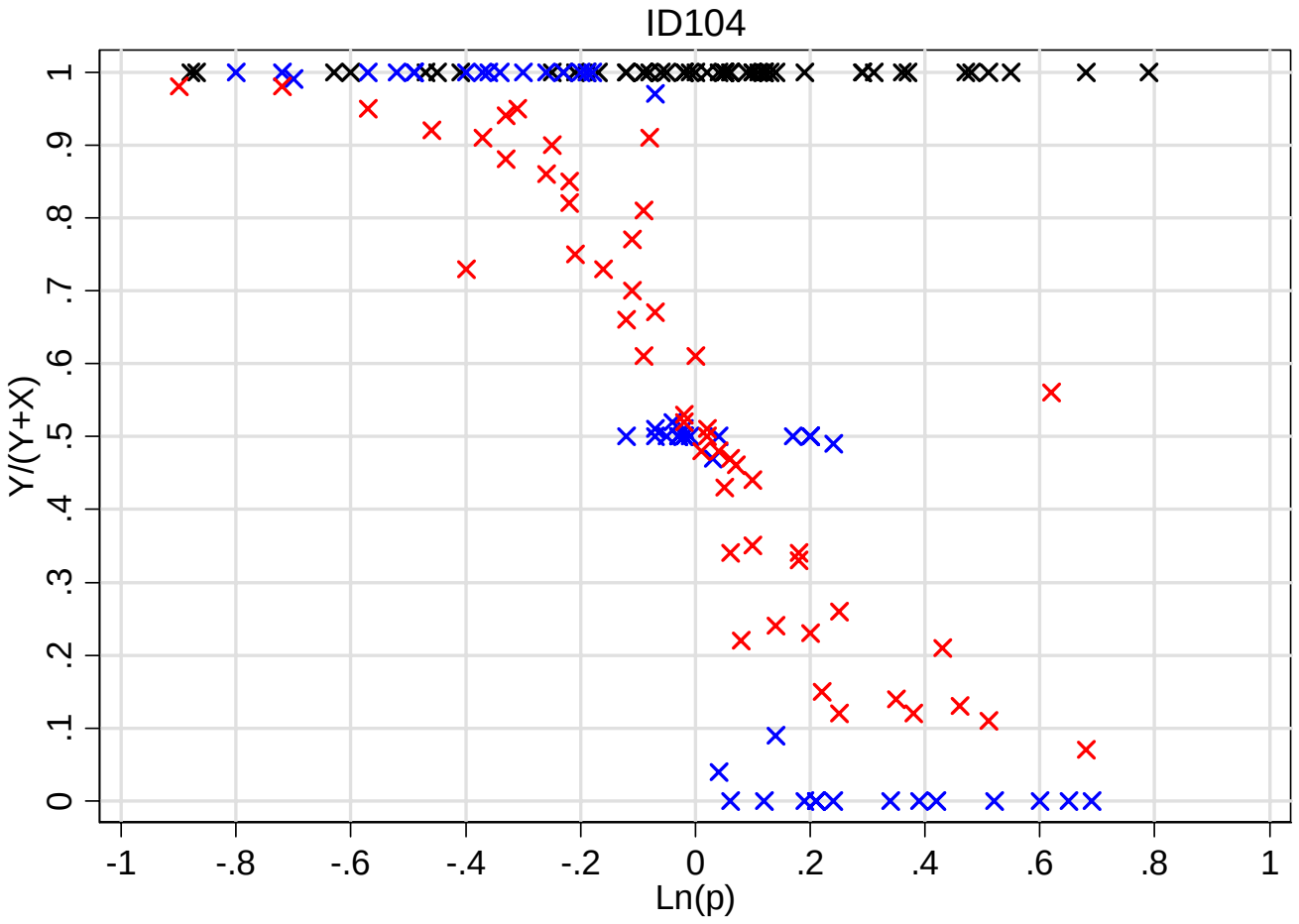

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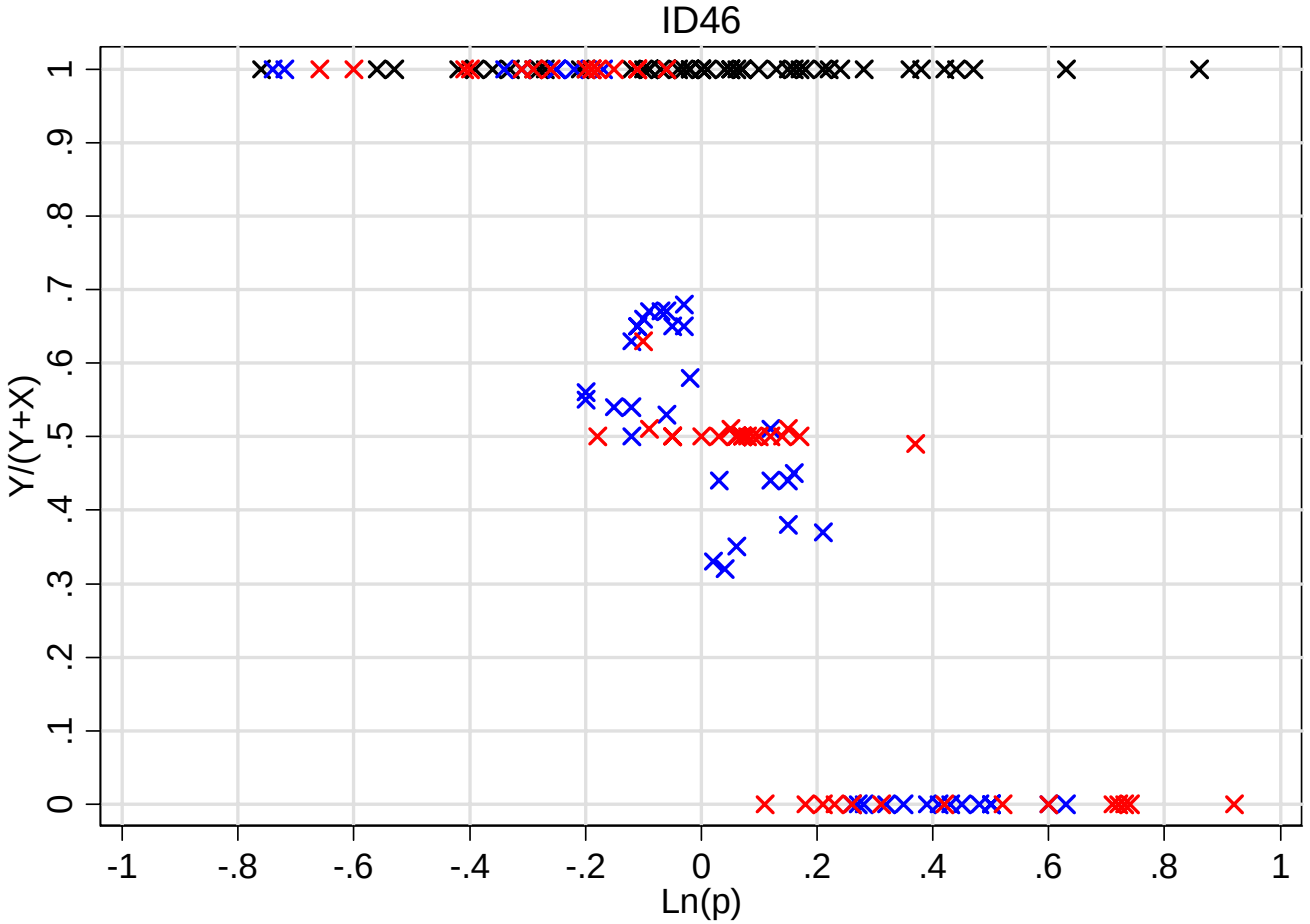

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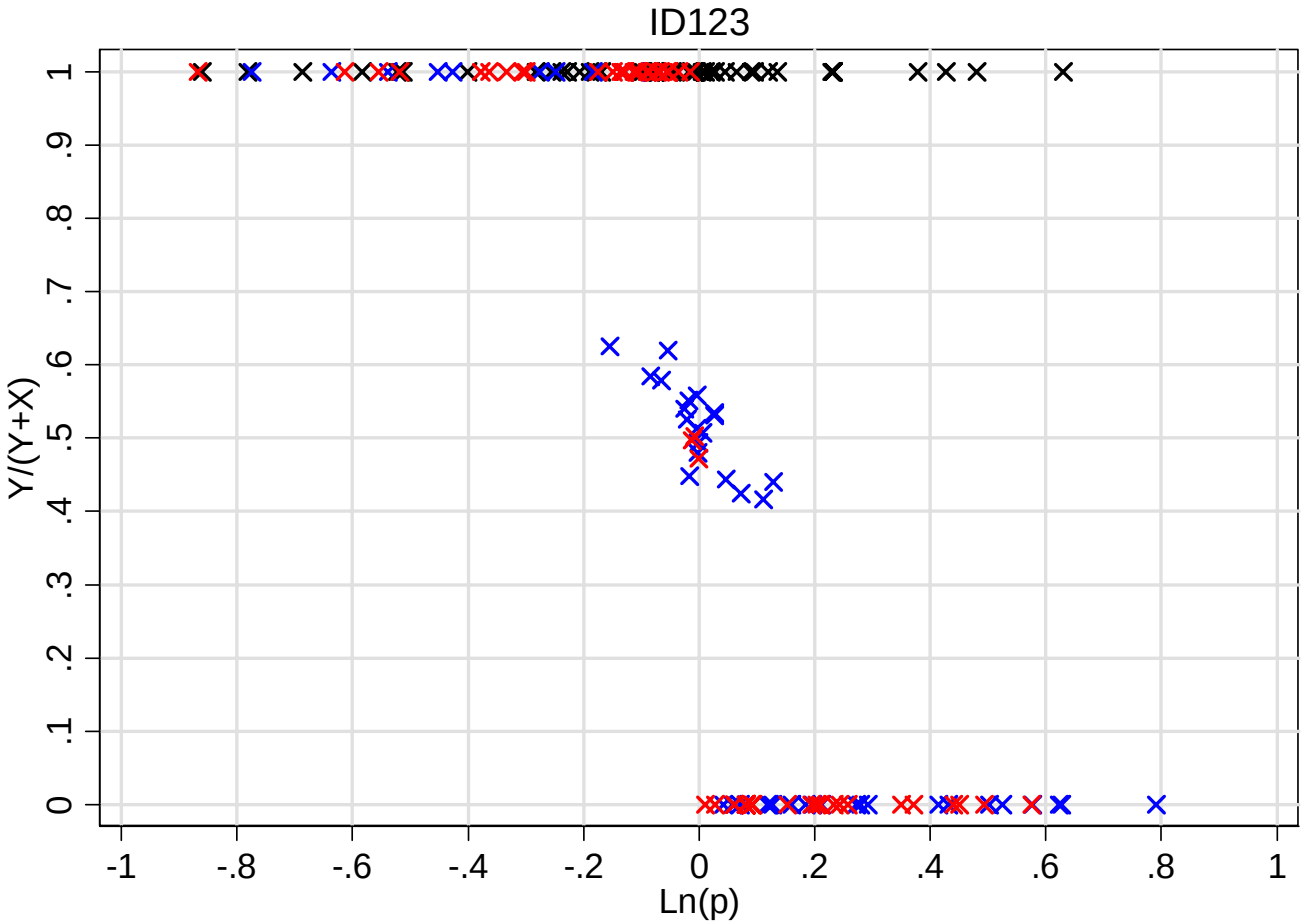

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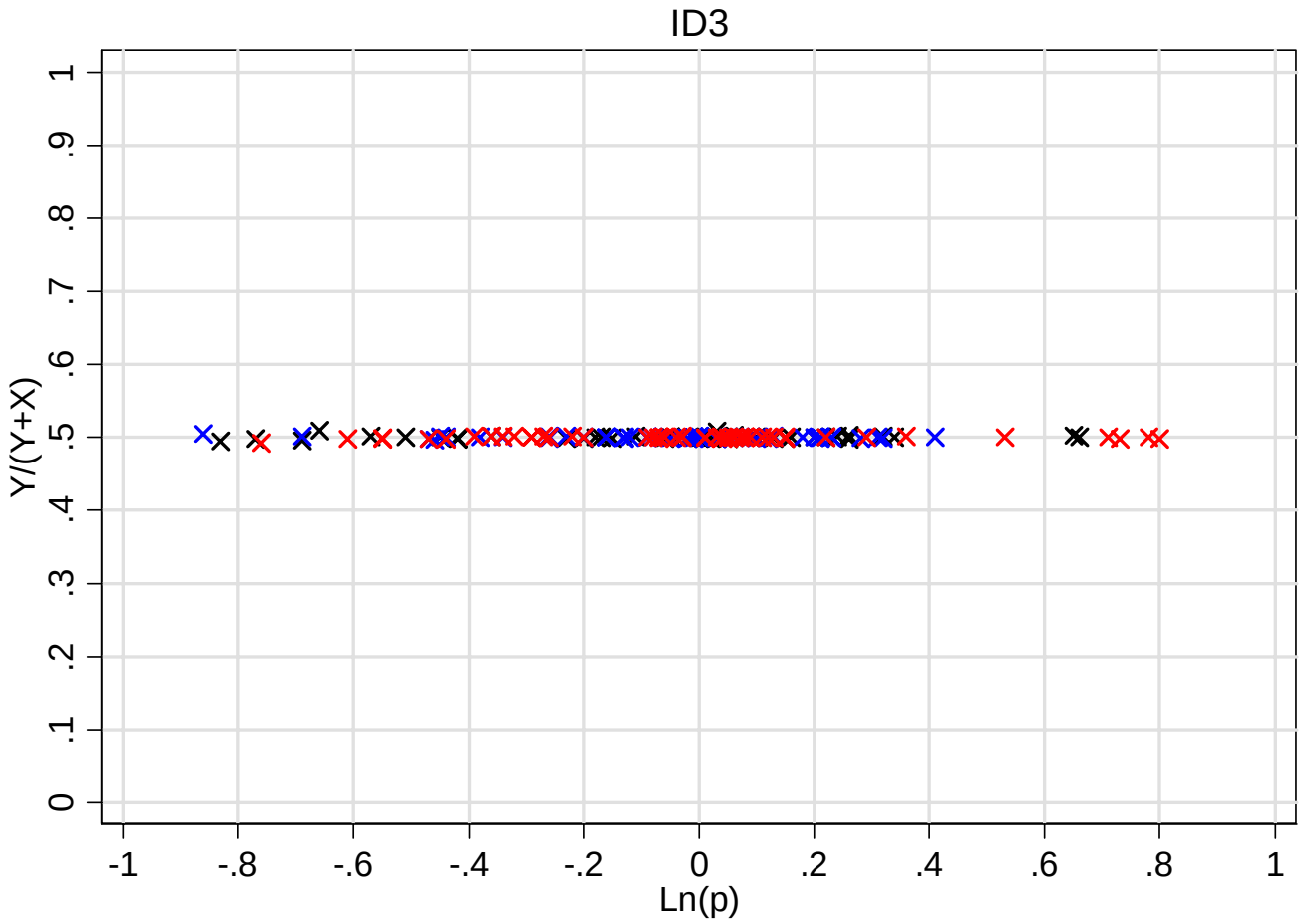

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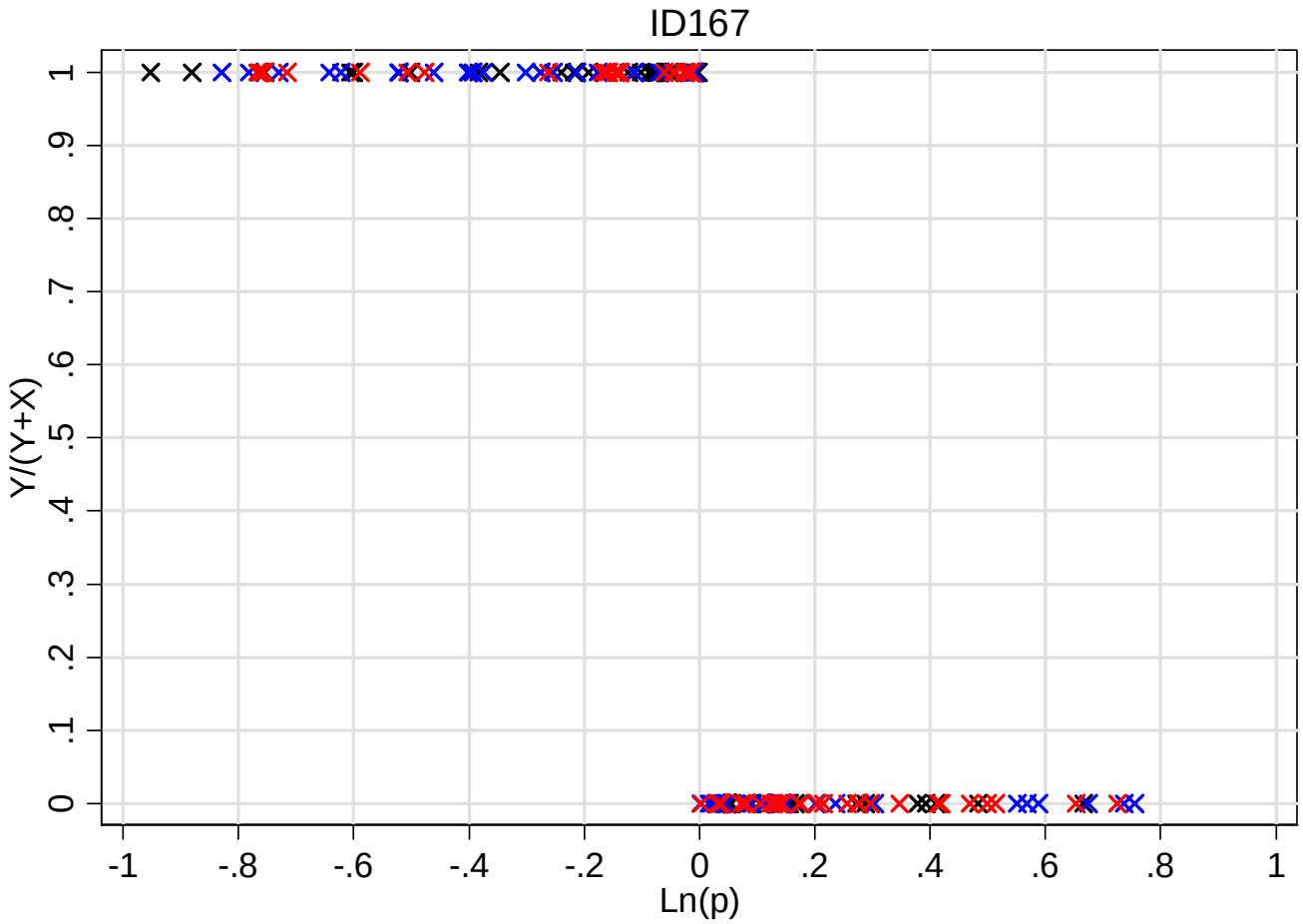

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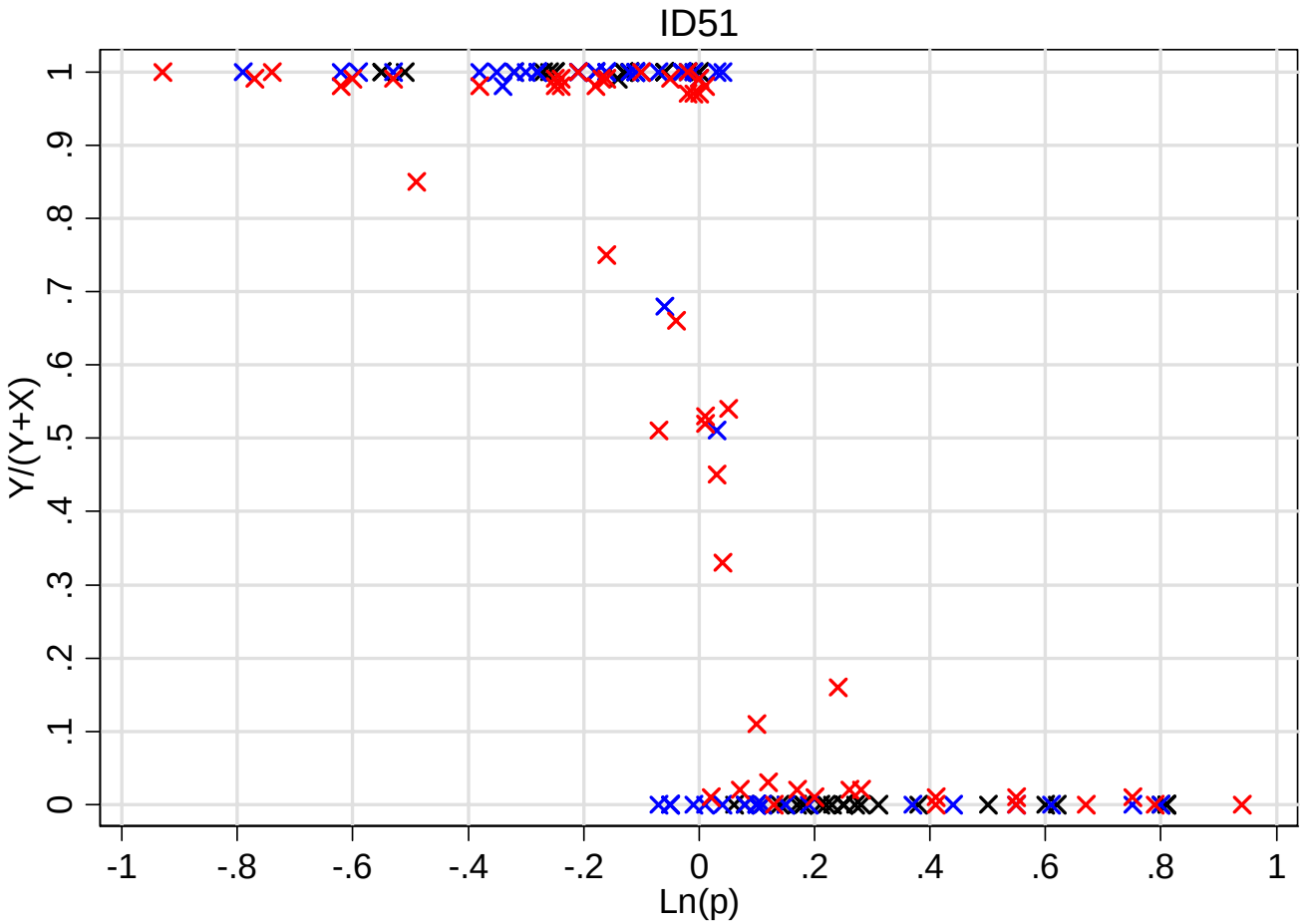

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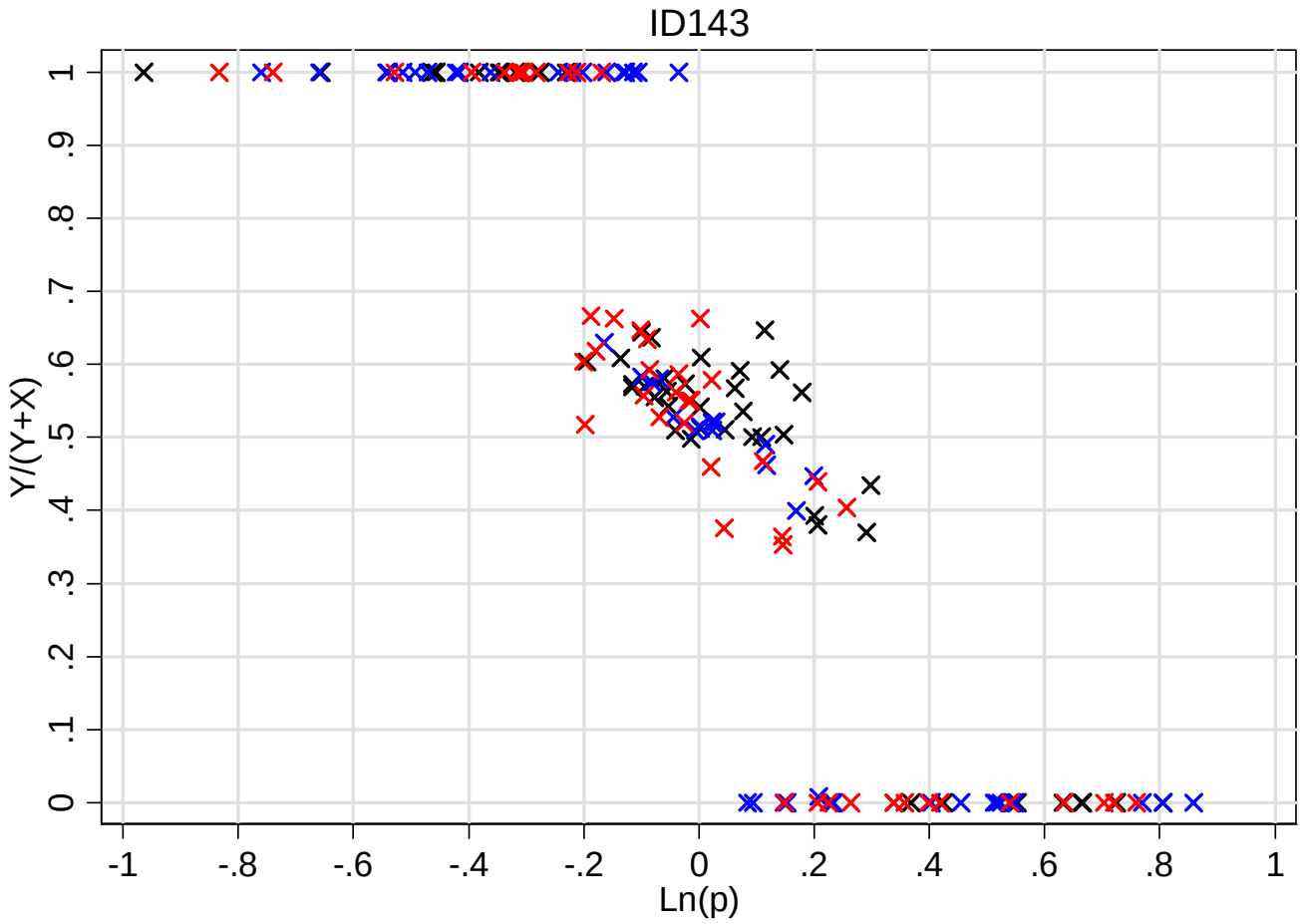

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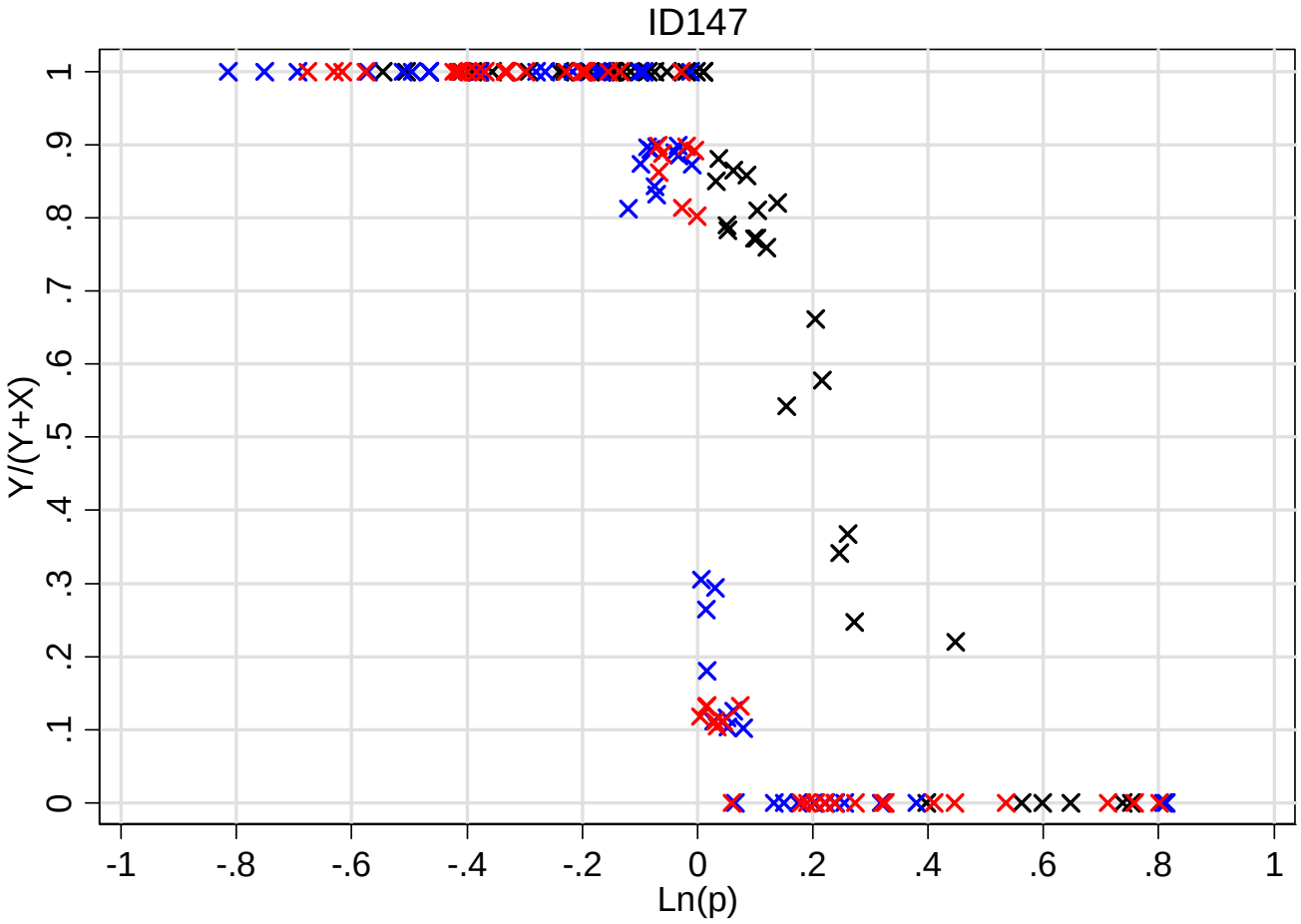

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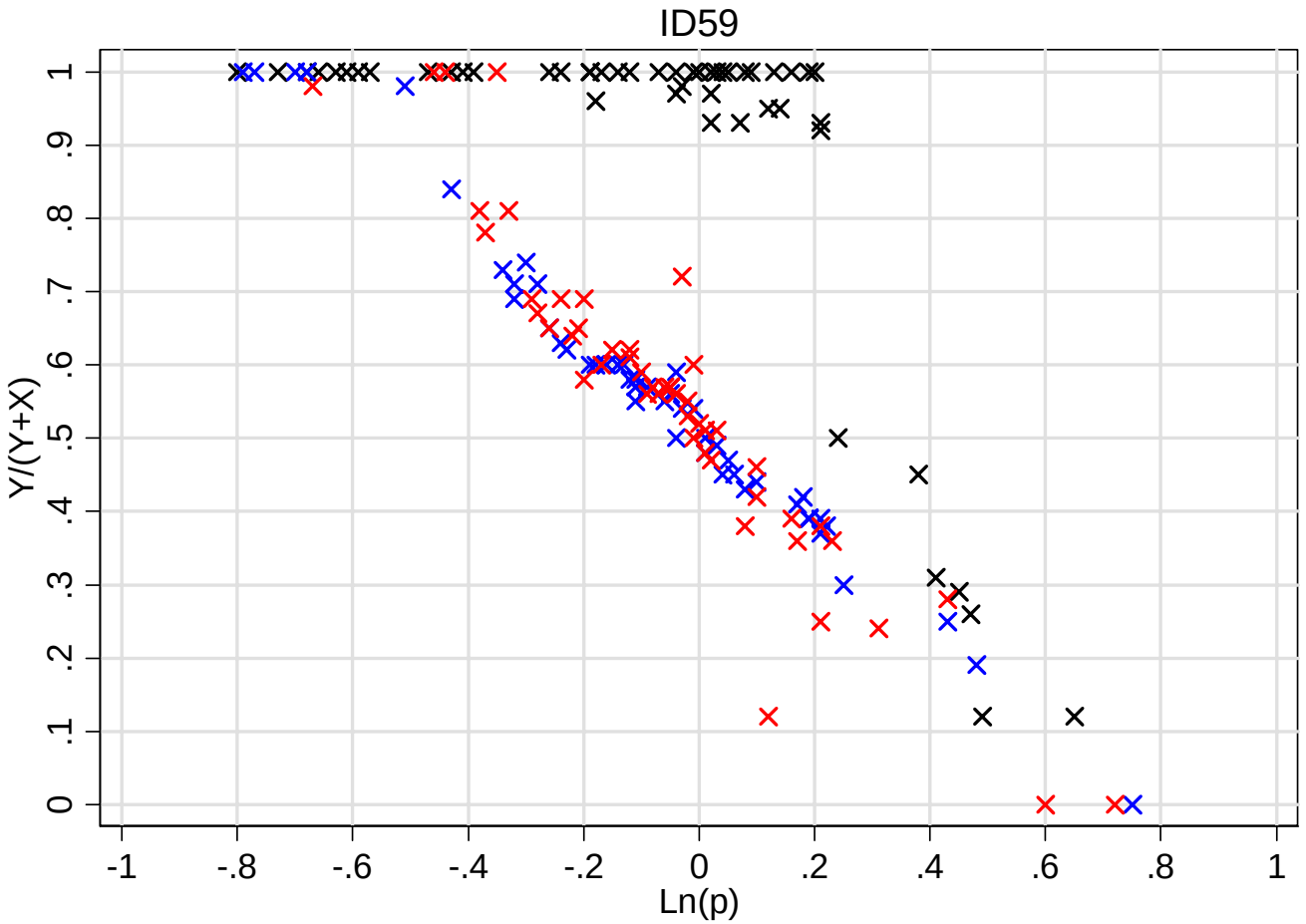


X – Risk / X – Social Choice / X – Veil of Ignorance

Testing the theory

- Many selfish subjects seem to display the same choice behaviors in the Risk and Veil of Ignorance environments, but a substantial number do not.

- Because of the nature of the data, "flexible" functional forms do not provide a plausible fit for the data.

- No satisfactory formulation to explain the "switching" between stylized behavior patterns exhibited by many subjects.

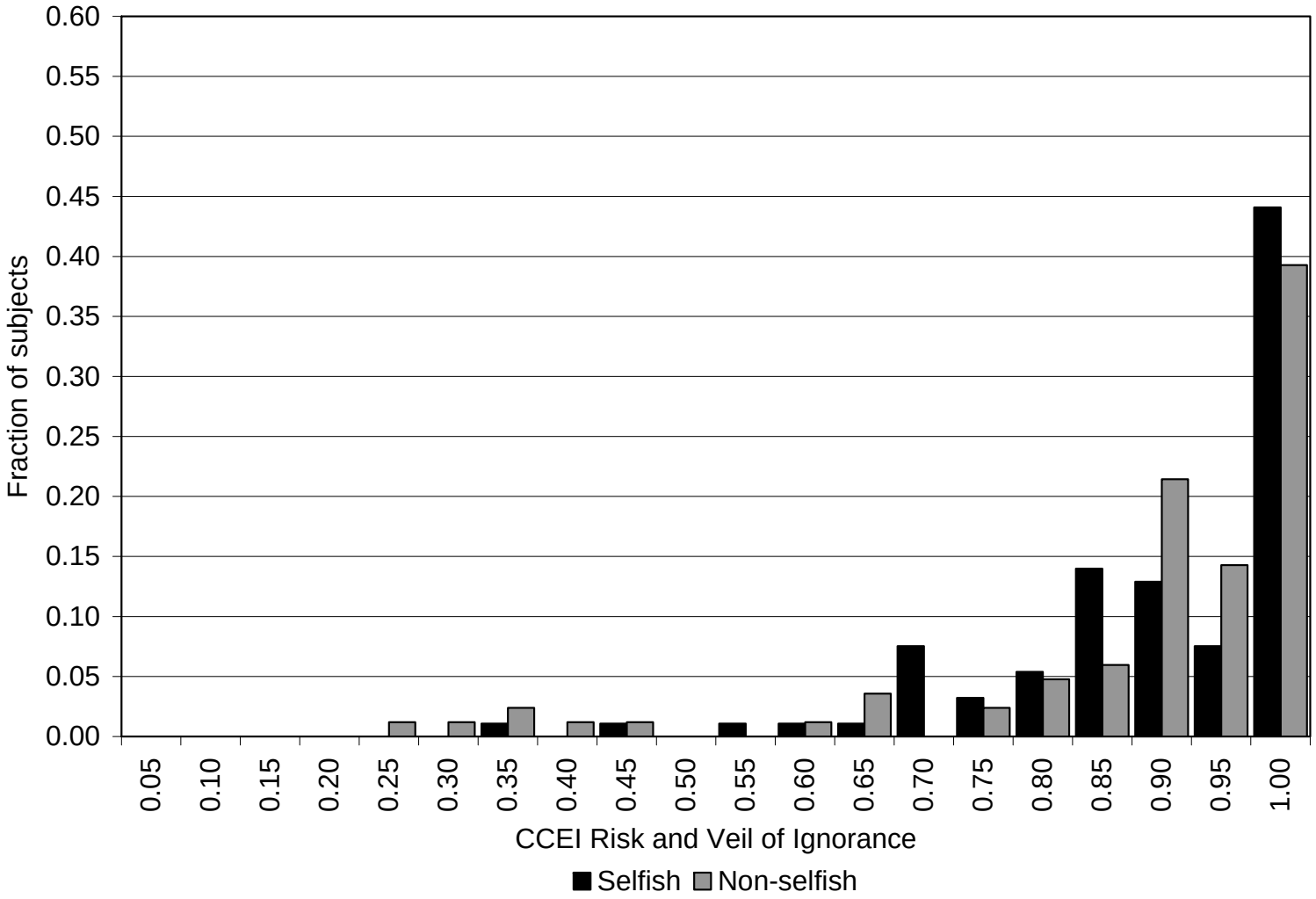
- Parametric approaches may be possible – keeping in mind that individual behaviors are extremely heterogeneous.

Non-parametric econometric approaches

Revealed preference

- The ratio of the CCEI score for the combined data set to the *minimum* of the CCEI scores for the separate data sets.
- A measure of the extent to which choice behaviors in any two environments coincide.
- Unfortunately, this test is weak – cannot discriminate between Risk and Veil of Ignorance behavior of selfish and non-selfish subjects.

The distributions of CCEI scores for the combined data set



Kolmogorov-Smirnov type tests

- A two-sample Kolmogorov-Smirnov tests of the equality of distributions of token and budget shares.

- The test is sensitive to differences in both location and shape of the empirical cumulative distribution functions of the two samples.

- Generalize the univariate Kolmogorov-Smirnov statistics for bivariate samples (Adler and Brown, 1986).

- There are subjects who fail Corollary I (selfish but display different behaviors in the $\mathcal{R}$ and $\mathcal{M}$) and others who fail Corollary II.

- These subjects might have preferences over $\mathcal{L}$ that do not obey independence (or might not be consistent with utility maximization).

- Individual preferences are very heterogeneous, ranging from utilitarian to Rawlsian.

- Actual preferences "mix-and-match" behavior in ways that no extant theory would regard as justified.