Reichman University
Tiomkin School of Economics
Advanced Microeconomics
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Confronting Theory with Experimental Data and vice versa
Lectures 3 & 4: Distributional Preferences

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Distributional preferences

Distributional preferences shape individual opinions on a range of issues related to the redistribution of income – government-sponsored healthcare, social security, unemployment benefits, and more.

These issues are complex and contentious not only because people promote their competing private interests.

People who are motivated by morality (fairness) to promote the interests of others will often disagree about what constitutes a just or equitable outcome.

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.

- Alternatively, Democrats may be those who expect to benefit from government redistribution, as the median voter theorem would suggest.

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

$\Longrightarrow$ 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 of more than 5,000 individuals.

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

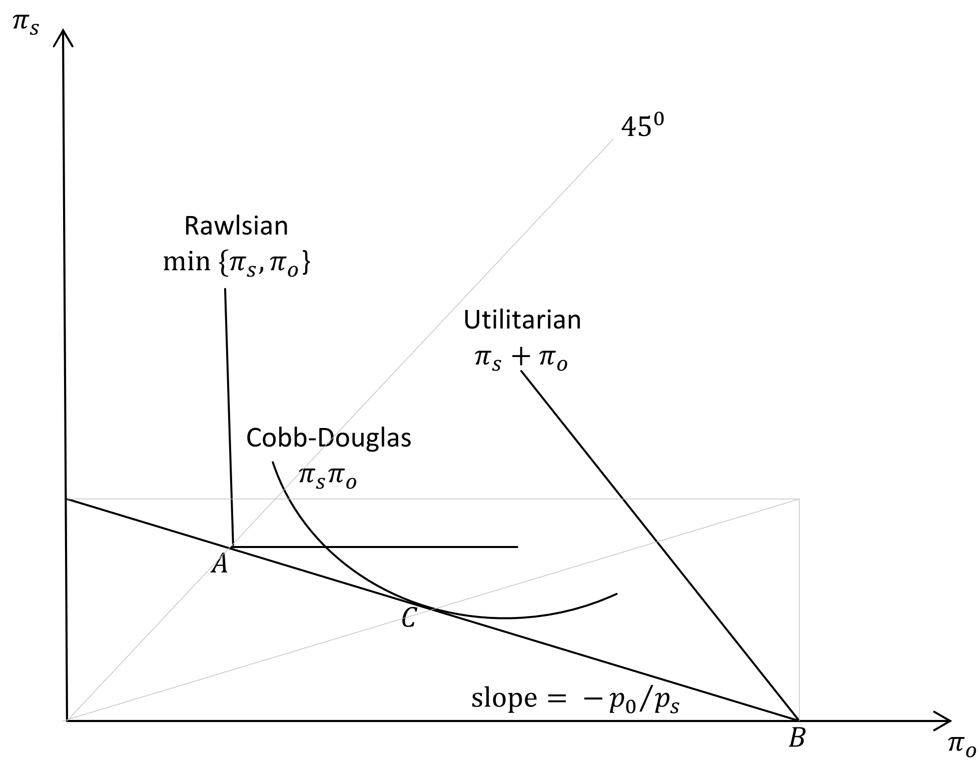
A choice of the allocation (π_s, π_o) from the budget set $p_s\pi_s + p_o\pi_o = 1$ represents the payoffs to persons $self$ and $other$, respectively.

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).

Prototypical fair-minded distributional preferences



The standard model of distributional preferences

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 decreases self-interestedness.

– increasing ρ/σ increases in concerns for efficiency versus equality.

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

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

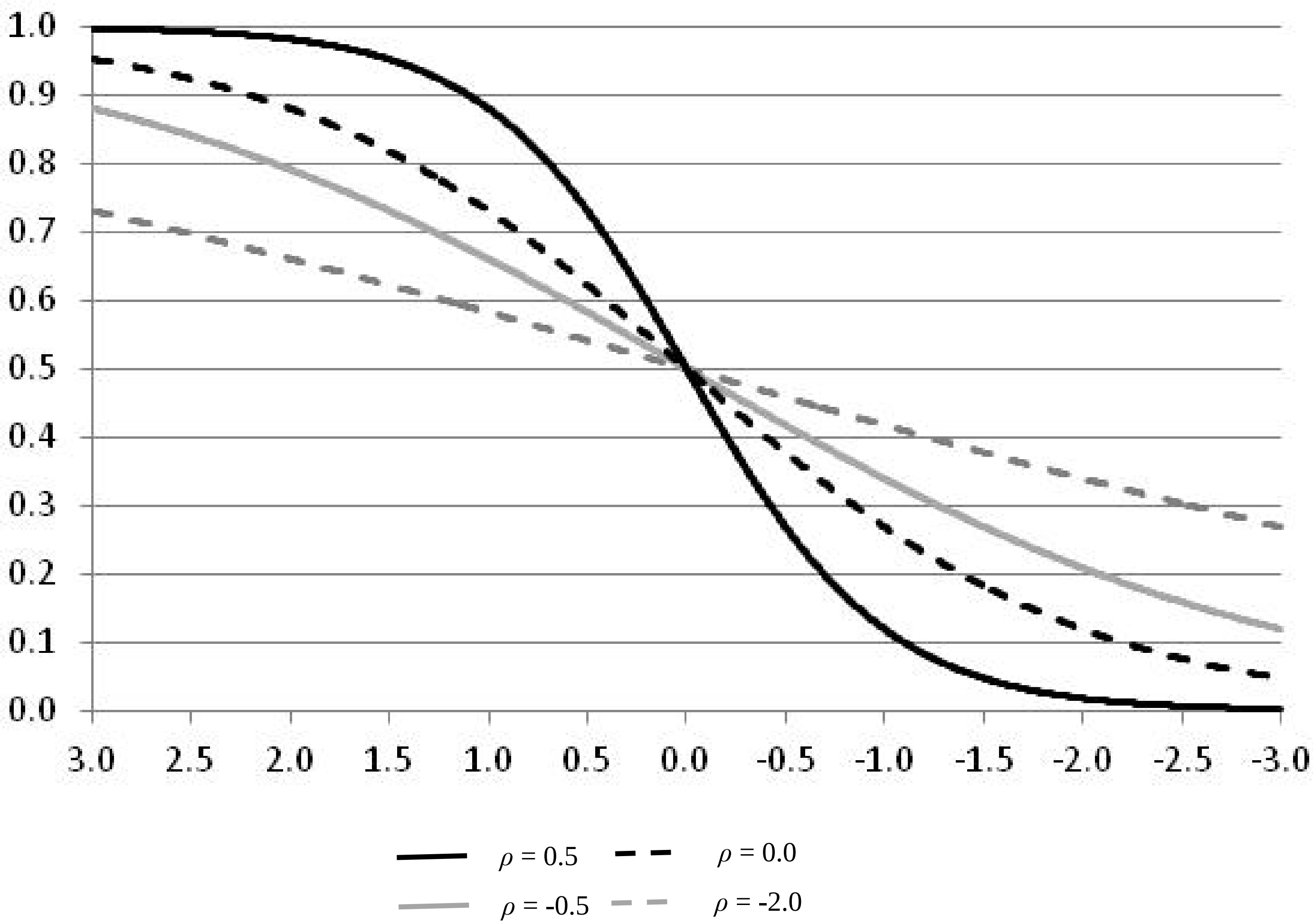
where α measures fair-mindedness (indexical weight on payoffs to $self$) and ρ measures the willingness to trade off equality and efficiency.

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

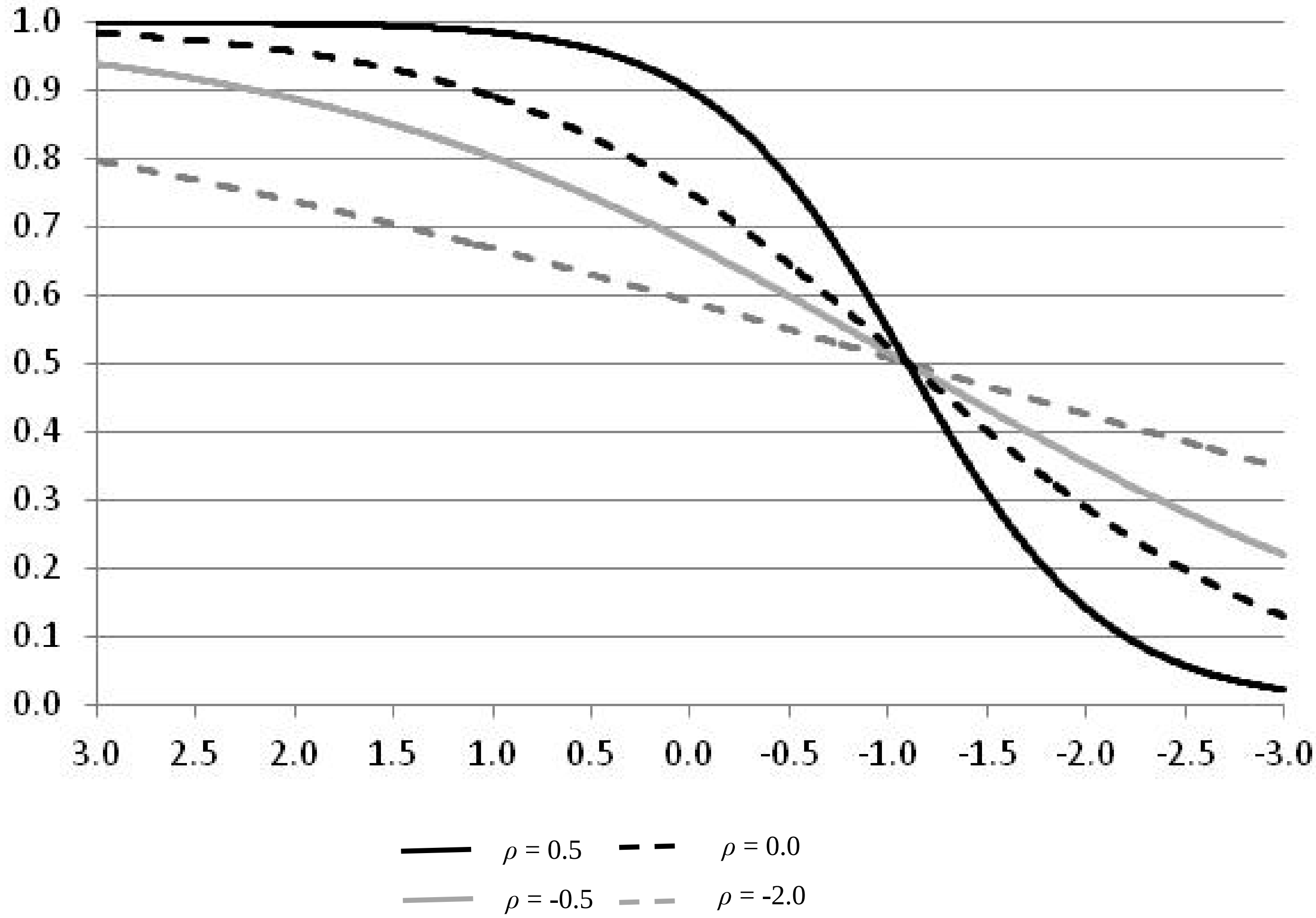
- $\rho > 0$ indicates preferences weighted towards increasing total payoffs.
- $\rho < 0$ indicates preferences weighted towards reducing differences in payoffs.

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

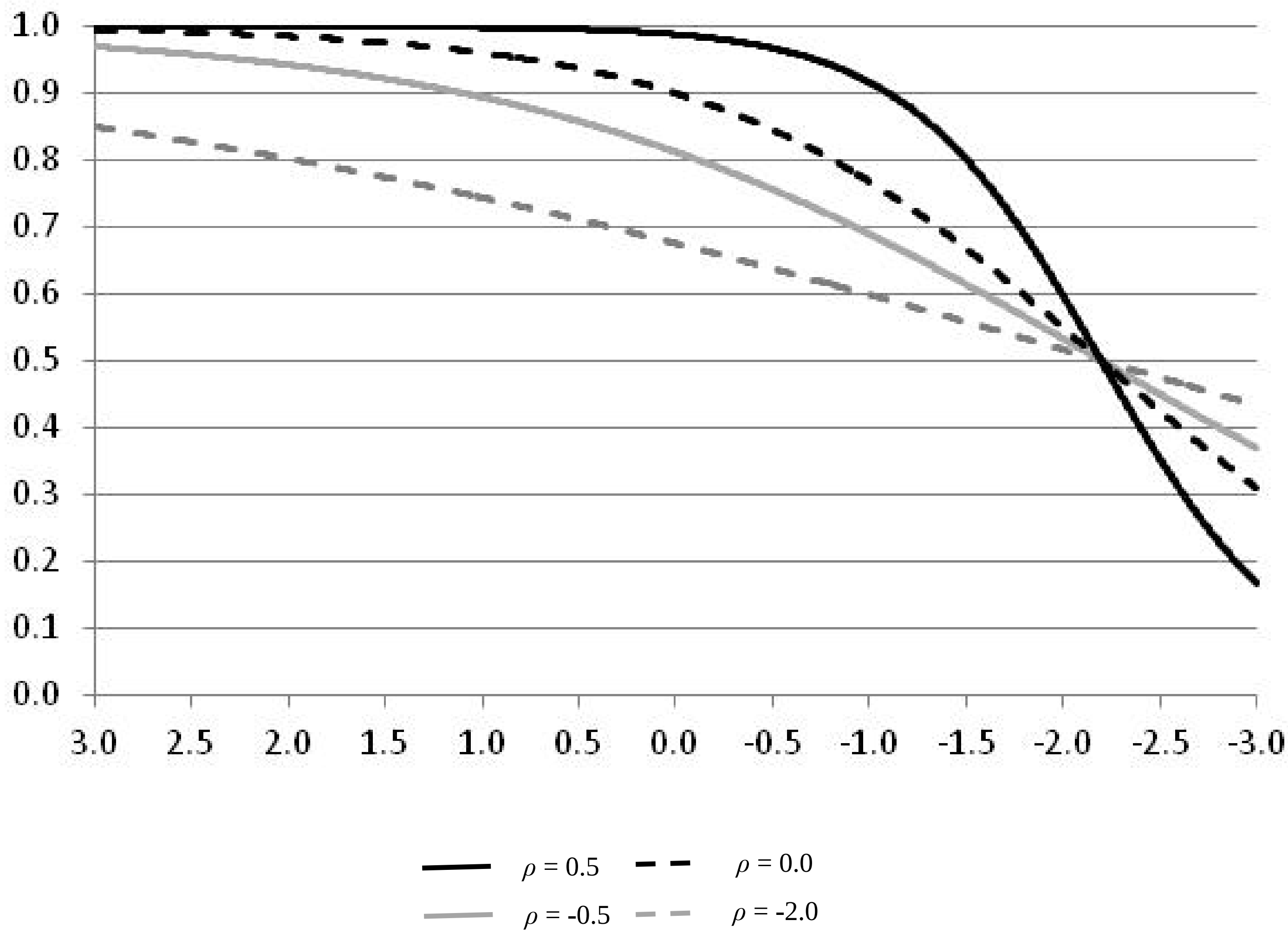
The relationship between the log-price ratio and optimal token share
(α=0.5 and different values of ρ)



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 Generalized Axiom of Revealed Preference (GARP)

The most basic question to ask about choice data is whether it is consistent with individual utility maximization:

– GARP requires that if $\pi = (\pi_s, \pi_o)$ is indirectly revealed preferred to π', then π' is not *strictly* directly revealed preferred to π.

– If π is revealed preferred to π', then π must cost at least as much as π' at the prices prevailing when π' is chosen.

GARP implies rationality in the sense of a sequence of complete, transitive (social) preference orderings.

Afriat's (1967) Theorem The following conditions are equivalent:

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

Afriat's (1972) critical cost efficiency index (CCEI)

The CCEI measures the fraction by which each budget constraint must be shifted in order to remove all violations of GARP.

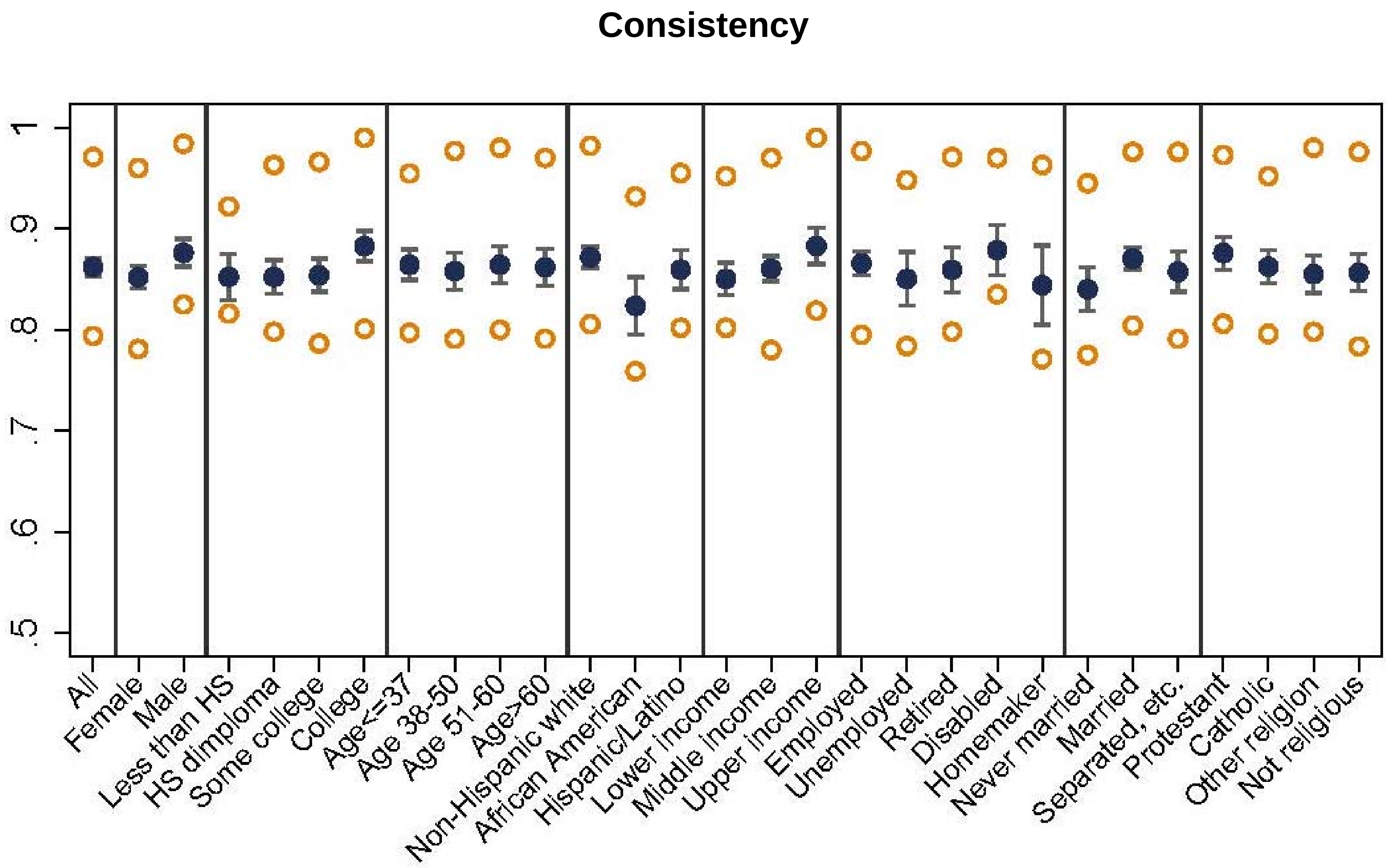
- The CCEI is between 0 and 1 – indices closer to 1 mean the data are closer to perfect consistency with GARP and hence with utility maximization.

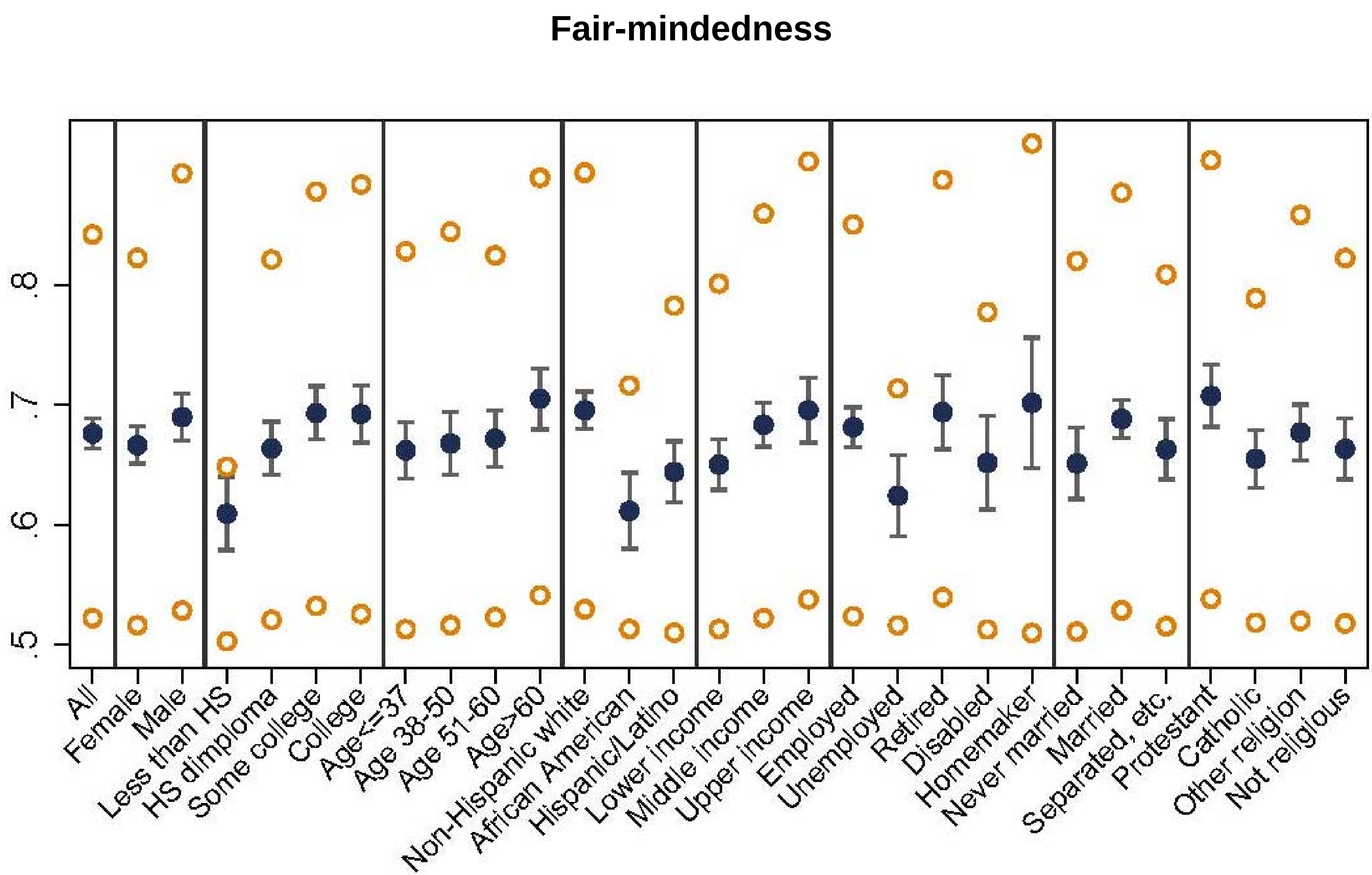
Because our subjects make choices in a wide range of budget sets, our data provides a stringent test of utility maximization.

Two observations:

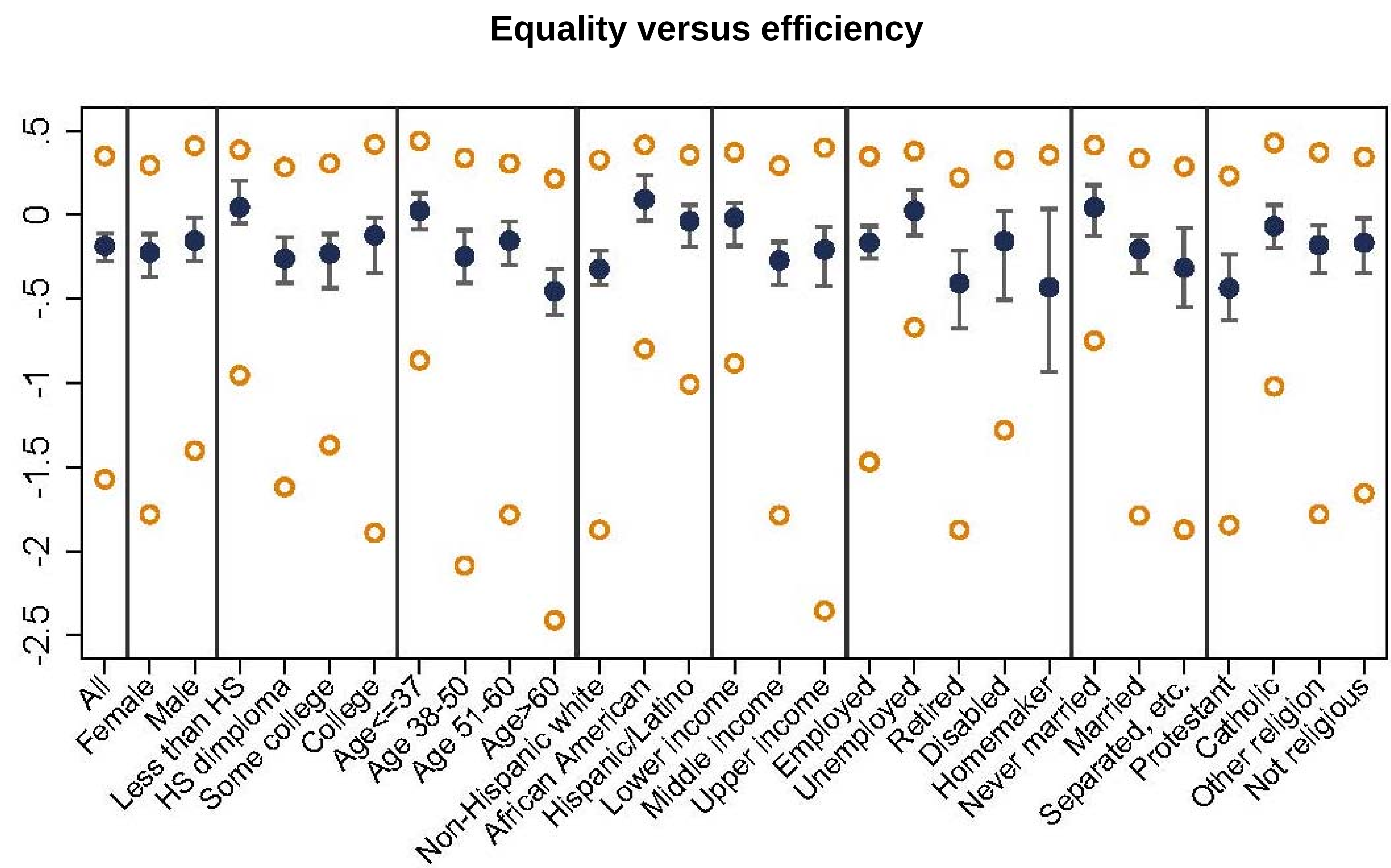
[1] Most subjects' CCEI scores are sufficiently close to one to justify treating the data as utility-generated, and Afriat's theorem tells us that $u_S(\pi_S, \pi_O)$ that rationalizes the data can be chosen to be well-behaved – increasing, continuous and concave.

[2] In the case of two goods, consistency and budget balancedness imply that demand functions must be homogeneous of degree zero. If we add separability and homotheticity (HARP), then $u_S(\pi_S, \pi_O)$ must be a member of the CES family.


Consistency
.5
.6
.7
.8
.9
1
All
Female
Male
Less than HS
HS dimploma
Some college
College
Age<=37
Age 38-50
Age 51-60
Age>60
Non-Hispanic white
African American
Hispanic/Latino
Lower income
Middle income
Upper income
Employed
Unemployed
Retired
Disabled
Homemaker
Never married
Married
Separated, etc.
Protestant
Catholic
Other religion
Not religious



Fair-mindedness
.5
.6
.7
.8
All
Female
Male
Less than HS
HS dimploma
Some college
College
Age<=37
Age 38-50
Age 51-60
Age>60
Non-Hispanic white
African American
Hispanic/Latino
Lower income
Middle income
Upper income
Employed
Unemployed
Retired
Disabled
Homemaker
Never married
Married
Separated, etc.
Protestant
Catholic
Other religion
Not religious

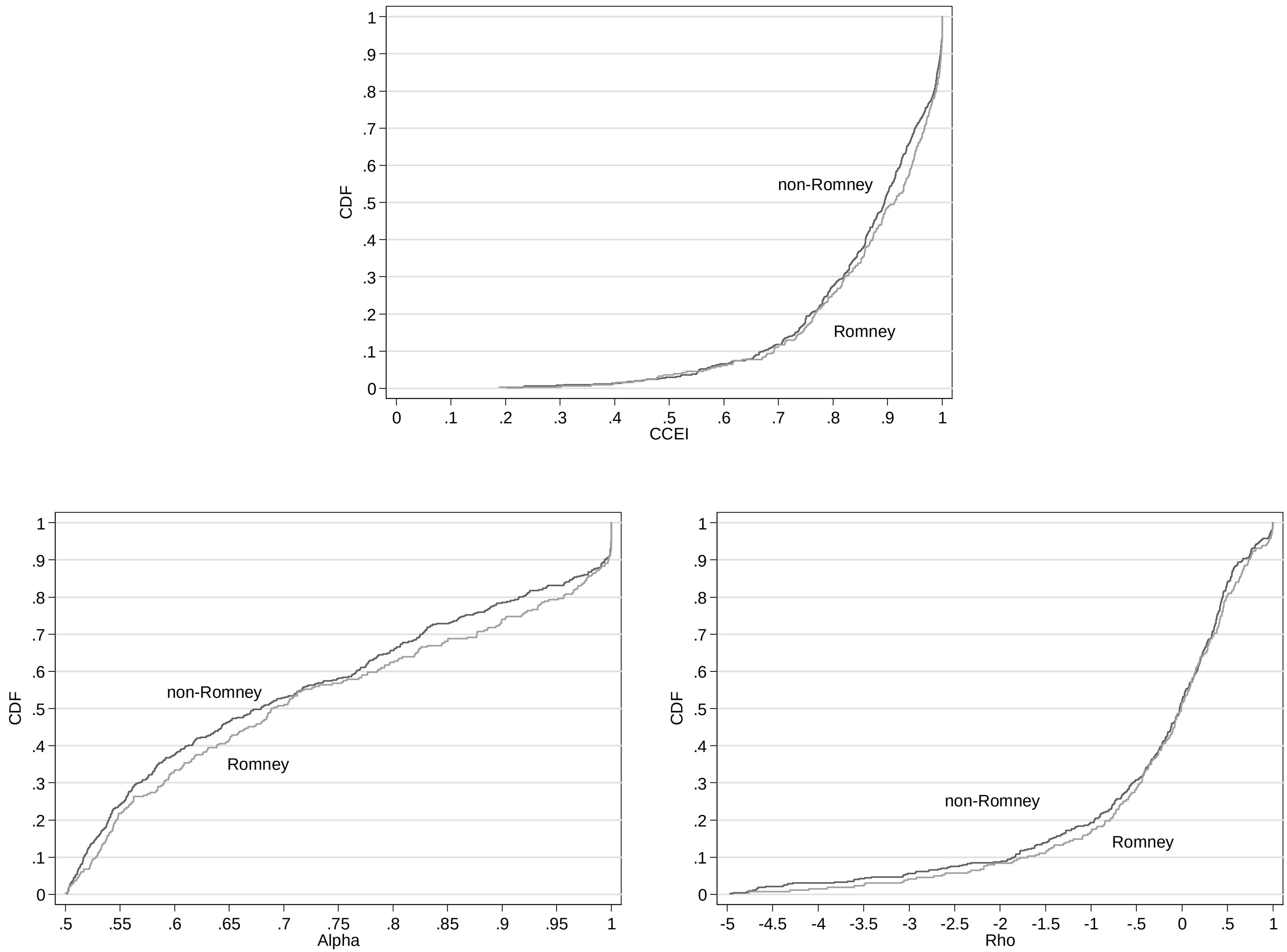

Equality versus efficiency
.5
0
-.5
-1
-1.5
-2
-2.5
All
Female
Male
Less than HS
HS dimploma
Some college
College
Age<=37
Age 38-50
Age 51-60
Age>60
Non-Hispanic white
African American
Hispanic/Latino
Lower income
Middle income
Upper income
Employed
Unemployed
Retired
Disabled
Homemaker
Never married
Married
Separated, etc.
Protestant
Catholic
Other religion
Not religious

Distributional Preferences and Voting Behavior

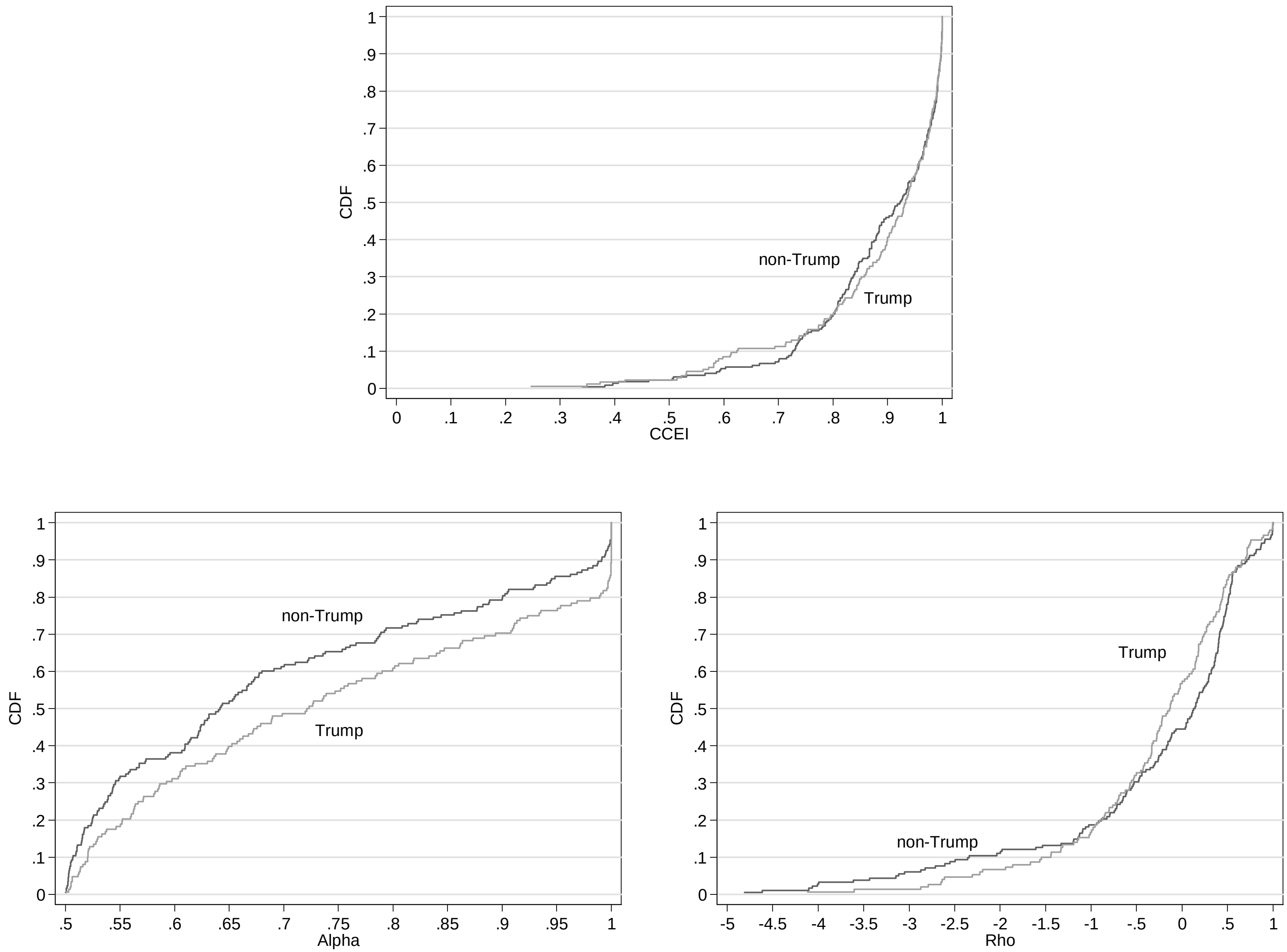
Make Me Great Again

"I've been greedy. I'm a businessman… Take, take, take. Now I'm going to be greedy for the United States" (President Donald Trump campaign speech and the crowd cheered wildly).

Romney versus non-Romney voters



Trump versus non-Trump voters



OLS Regressions of Likelihood of Voting for Trump

	Dept. var: Voted for Trump								Romney
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\hat{\alpha}$_n2	0.377***	0.356***	0.265**	0.209					
	[0.120]	[0.123]	[0.129]	[0.138]					
$\hat{\rho}$_n2		0.00306		0.00523					
		[0.00364]		[0.00384]					
Decile of $\hat{\alpha}$_n2					0.0256***	0.0256***	0.0179**	0.0173*	
					[0.00853]	[0.00855]	[0.00895]	[0.00899]	
Decile of $\hat{\rho}$_n2						-0.00344		0.00685	
						[0.00836]		[0.00826]	
Decile of $\hat{\alpha}$_n1									-0.0114
									[0.00748]
Decile of $\hat{\rho}$_n1									0.0141*
									[0.00728]
CCEI	No	No	Yes	Yes	No	No	Yes	Yes	Yes
Demographics	No	No	Yes	Yes	No	No	Yes	Yes	Yes
State FE	No	No	Yes	Yes	No	No	Yes	Yes	Yes
Observations	403	403	403	403	403	403	403	403	578
R2	0.0231	0.0247	0.357	0.361	0.0220	0.0224	0.357	0.358	0.247

The Distributional Preferences of Elites

The distributional preferences of law students

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

– All eight sitting Supreme Court Justices (as well as Garland and Gorsuch nominated to succeed Scalia) 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 before Donald Trump are graduates of Yale or Harvard.

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

The distributional preferences of medical students

Patients rely on physicians to act in their best interest, healthcare systems rely on physicians to efficiently ration limited care, and physicians must balance these often conflicting imperatives against their own self-interest.

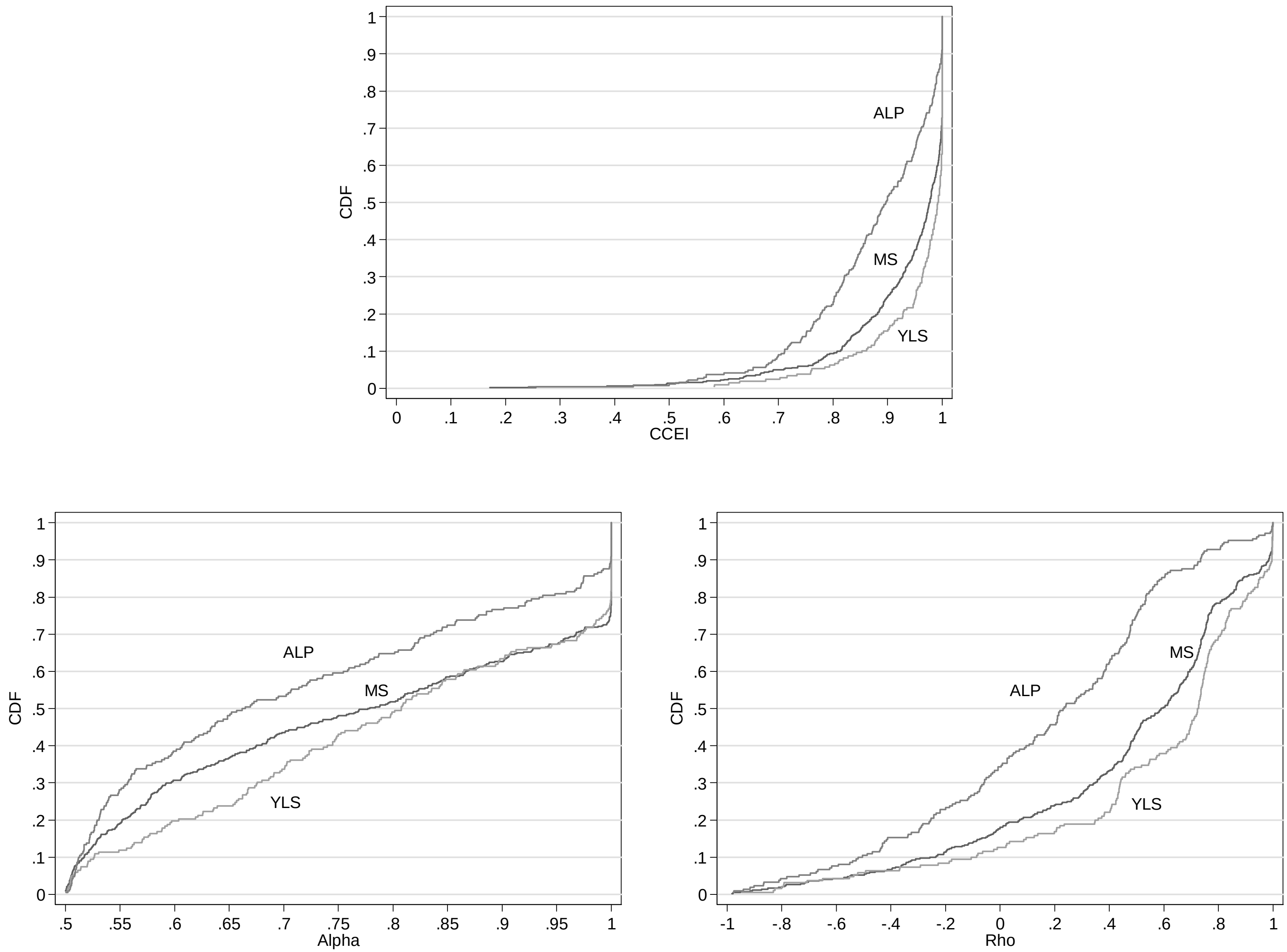
The distributional preferences of physicians thus have profound implications for patient outcomes and wellbeing, as well as the success of reforms attempting to provide more equitable, higher quality and more efficient healthcare.

Physicians' fair-mindedness – the concern for patient health and wellbeing beyond own self-interest – has been reinforced by ethical guidelines such as in the Hippocratic Oath.

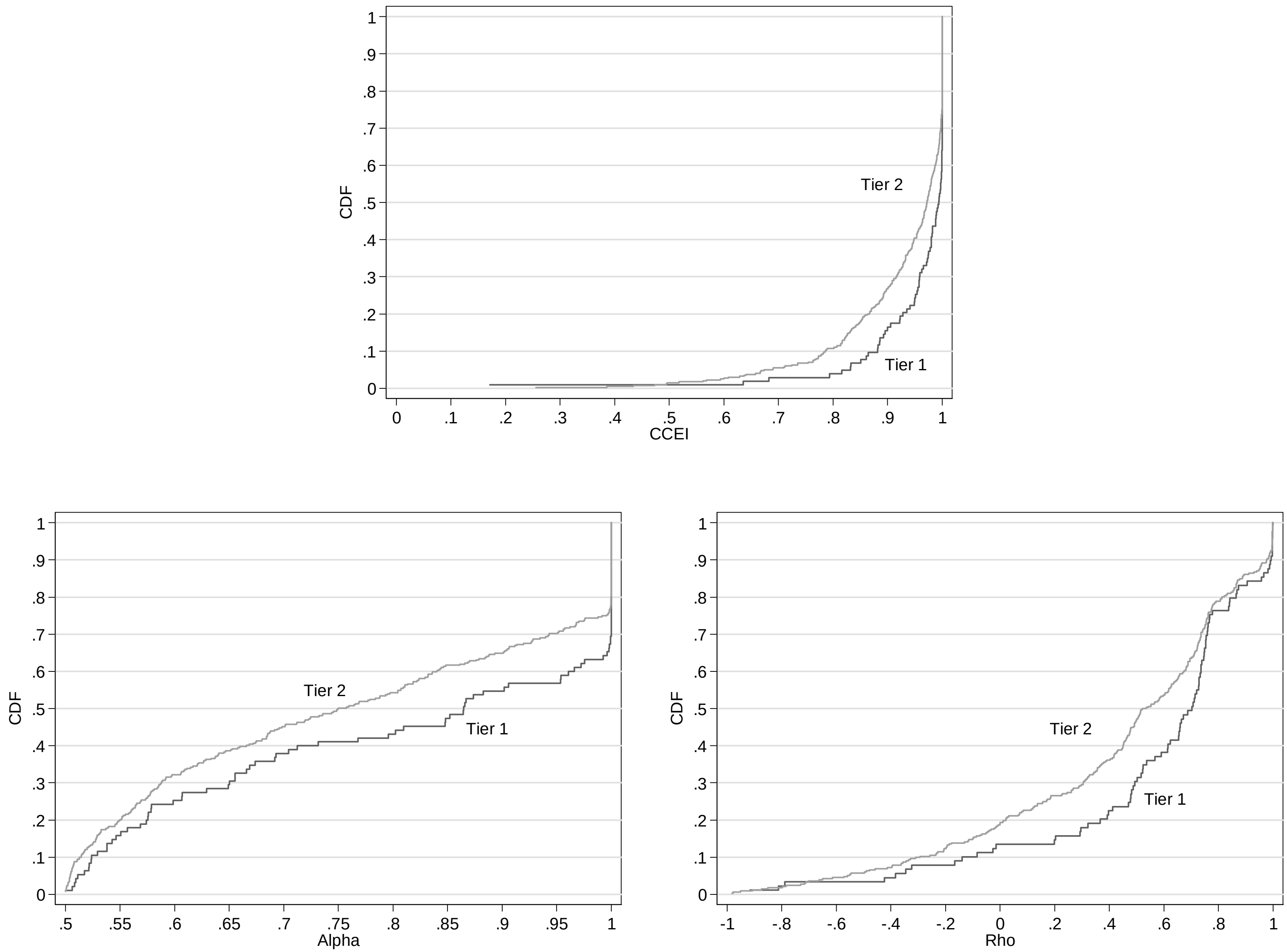
"…the behavior expected of sellers of medical care is different from that of business men in general…His behavior is supposed to be governed by a concern for the customer's welfare which would not be expected of a salesman." (Kenneth Arrow, 1963)

"…medicine is one of the few spheres of human activity in which the purposes are unambiguously altruistic." (Editors, *New England Journal of Medicine*, 2000)

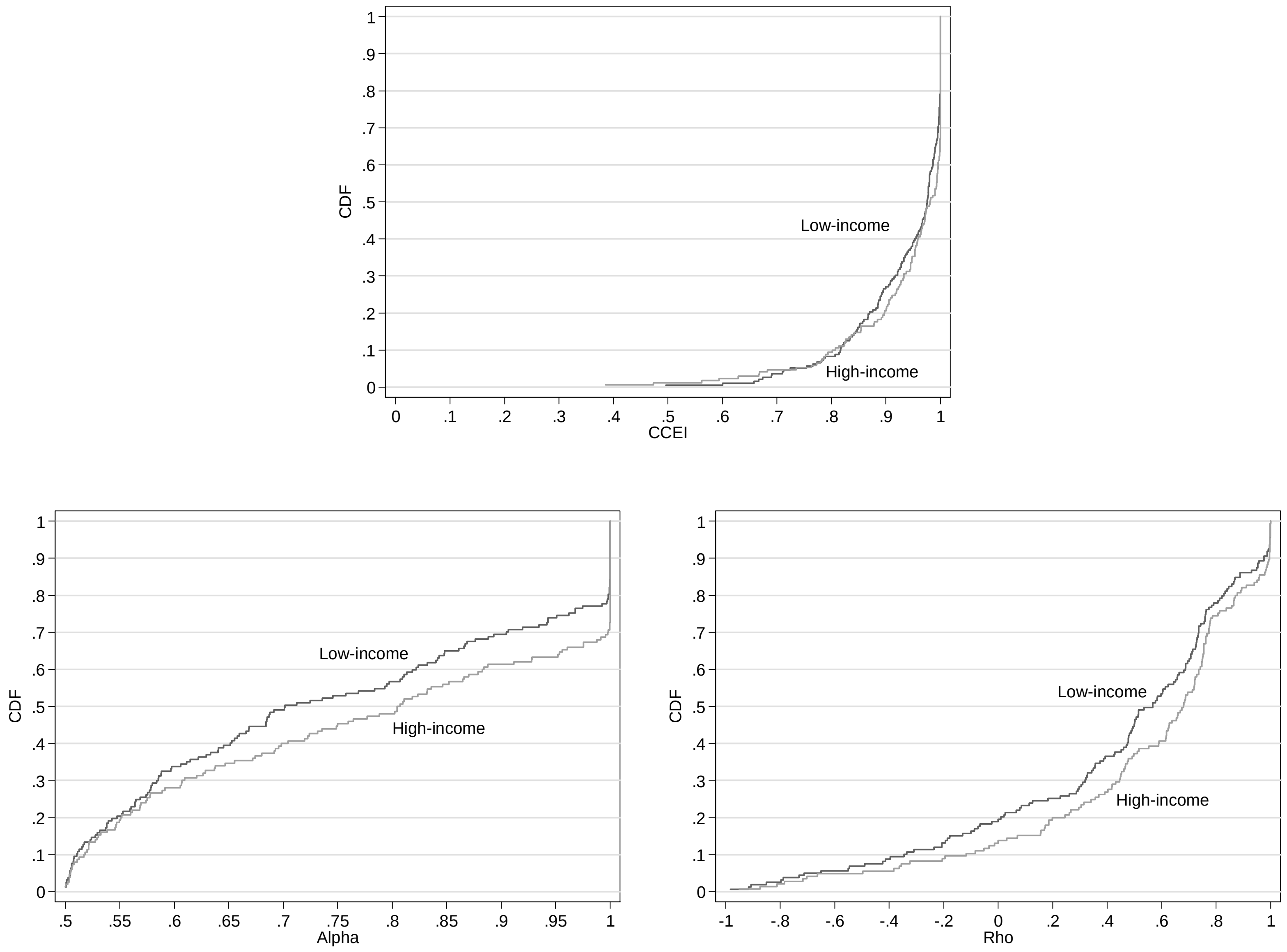
Law students, medical students and the general population



Tier 1 versus tier 2 medical schools



Low-income (<$300K) versus high-income medical specialties



What should we look for in a President?

Campaigns for the Presidency place a great deal of emphasis on the "character" of the candidates – but why?

Why should voters care if a candidate

- has an illicit affair
- smokes in secret
- invests aggressively
- exaggerates athletic accomplishments

(to mention just a few characteristics that have made headlines in recent memory)?

Moral issues aside, such personal choices would seem to matter only if it provides a guide to policy choices – and it might because such behaviors are risky.

- What these personal choices have in common is that they involve (personal) risk – to the candidate's marriage, health, finances, reputation – and policy choices also involve risk.
- Putting forward both tax reform and civil rights legislation simultaneously (as John Kennedy did) risks accomplishing neither; blockading Soviet ships bound for Cuba (as Kennedy also did) risks war.

- $\Rightarrow$ A candidate's (past and present) attitude toward risk in the personal domain may provide clues to the candidate's attitude toward risk in the policy domain if there is a linkage between these attitudes.

- $\Rightarrow$ This paper formalizes this issue and establishes such a linkage. However, in order to use this linkage, a voter would need to observe an enormous – perhaps impossible – amount about the candidate's behavior/preferences.

Background

In a classic book *The Presidential Character* (1972), the political scientist James Barber argues that the character of the President is central to the success or failure of the Presidency:

> Character is the force, the motive power, around which the person gathers his view of the world, and from which his style receives its impetus. The issues will change; the character of the president will not.

Barber argues in particular that candidate's character provides "a realistic estimate of what will endure into a man's White House years," and that "the personal past foreshadows the presidential future."

A number of Presidents – both real and fictional – and Presidential aides agree with Barber:

> With all the power that a President has, the most important thing to bear in mind is this: You must not give power to a man unless, above everything else, he has character. Character is the most important qualification the President of the United States can have. – Richard Nixon

The fictional President, portrayed by Michael Douglas in the film *The American President* (1995):

> For the past several months ... [my opponent] ... has suggested that being President of this country was, to some extent, about character ... I have been President for three years and two days and I can tell you without hesitation that being President of this country is entirely about character. – Andrew Shepard

A Special Assistant to Ronald Reagan (who believed that "you can tell a lot about a fella's character by his way of eating jelly beans"):

> In a president, character is everything. A president does not have to be brilliant... He does not have to be clever; you can hire clever... But you cannot buy courage and decency, you cannot rent a strong moral sense. A president must bring those things with him... He needs to have a "vision" of the future he wishes to create. But a vision is worth little if a president does not have the character – the courage and heart – to see it through. – Peggy Noonan

⇒ Neither Barber nor Noonan nor the quoted Presidents define character but Barber (explicitly) and the others (implicitly) argue that character is established in the personal domain early in life.

⇒ The argument would seem coherent – and of use to voters – only if the candidate's (future) choices in the policy domain can be inferred from the candidate's (past) choices in the personal domain.

Framework

- Consider a $\mathcal{DM}$ characterized by a fixed preference relation $\succeq$ over the set $L(\Omega)$ of (finite) lotteries on a set Ω of *social states*.
  - (We assume that Ω is finite to avoid subtle issues about the topology of Ω and the continuity of $\succeq$.)

- A subset $P \subset \Omega$ have consequences only for the $\mathcal{DM}$ – these are *personal states* – while Ω/P have consequences both for the $\mathcal{DM}$ and for others.

- We do not observe the entire preference relation $\succeq$ on $L(\Omega)$ but only some portion of it...

In our main theoretical result – and in our experimental work – we assume that we can observe the restriction $\succeq_0$ of $\succeq$ to

$$[L(P) \times L(P)] \cup [\Omega \times \Omega]$$

i.e. comparisons between social states – including personal states – and comparisons between personal lotteries, but not comparisons between social states and personal lotteries.

We ask: in what circumstances does $\succeq_0$ admit a *unique* extension to the preference relation $\succeq$ over the full domain of lotteries $L(\Omega)$ on social states?

We assume that the $\mathcal{DM}$ has a preference relation $\succeq$ on $L(\Omega)$ that satisfies the familiar requirements:

– Completeness, Transitivity, Continuity, Reduction of Compound Lotteries and the Sure Thing Principle.

These imply that we may – and do – identify the lottery $\sum_i p_i \omega$ with the certain state ω.

Throughout, we also assume that $\succeq$ obeys the following requirement, which we call *State Monotonicity*.

State Monotonicity

If $\omega_i, \omega'_i \in \Omega$ for $i = 1, \ldots k$, $\omega_i \succeq \omega'_i$ for each i and $p = (p_1, \ldots, p_k)$ is a probability vector, then

$$\sum_{i=1}^{k} p_i \omega_i \succeq \sum_{i=1}^{k} p_i \omega'_i$$

(State Monotonicity is *equivalent* to a condition that Grant et al (1992) call Degenerate Independence.)

All (?) decision-theoretic models that have been proposed as alternatives to Expected Utility of which we are aware obey State Monotonicity.

Independence

If $W_i, W_i' \in L(\Omega)$ for $i = 1, \ldots k$, $W_i \succeq W_i'$ for each i and $p = (p_1, \ldots, p_k)$ is a probability vector, then

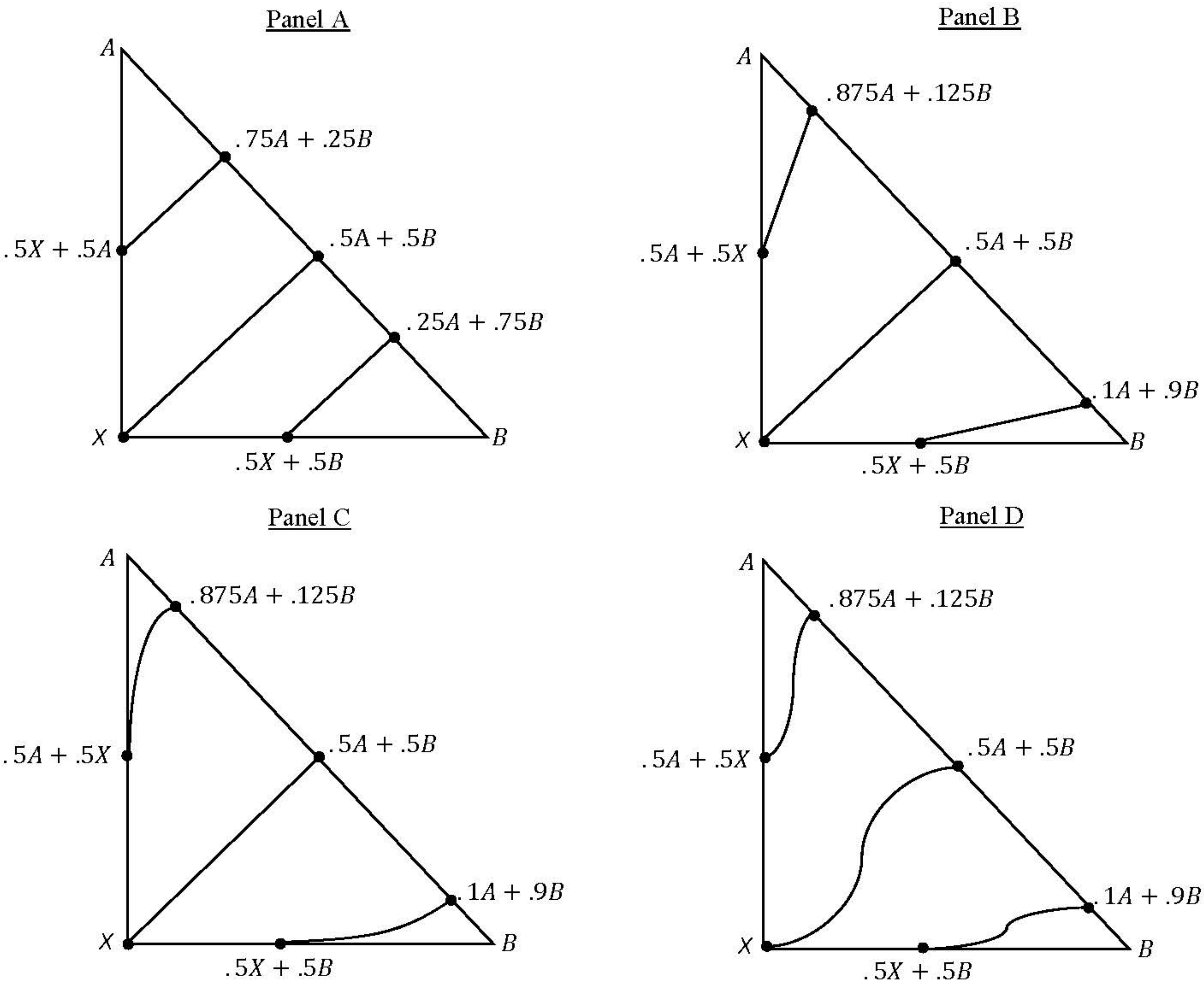
$$\sum_{i=1}^{k} p_i W_i \succeq \sum_{i=1}^{k} p_i W_i'$$

Independence posits comparisons between *lotteries over lotteries*, while State Monotonicity only posits comparisons between *lotteries over states*.

To see what State Monotonicity does and does not imply, suppose $\Omega = \{A, X, B\}$ where $A \succ X \succ B$ and picture again the Marschak-Machina triangle:

– State Monotonicity ($+$ Transitivity and the Sure Thing Principle) entails that $\succeq$ is increasing (from bottom to top) along vertical lines and decreasing (from left to right) along horizontal lines.

The indifference curves of $\succeq$ must be "upward sloping" (pointing northeast in the triangle) but can otherwise be quite arbitrary.



Panel A
A
.75A + .25B
.5X + .5A
.5A + .5B
.25A + .75B
X
B
.5X + .5B
Panel B
A
.875A + .125B
.5A + .5X
.5A + .5B
.1A + .9B
X
B
.5X + .5B
Panel C
A
.875A + .125B
.5A + .5X
.5A + .5B
.1A + .9B
X
B
.5X + .5B
Panel D
A
.875A + .125B
.5A + .5X
.5A + .5B
.1A + .9B
X
B
.5X + .5B

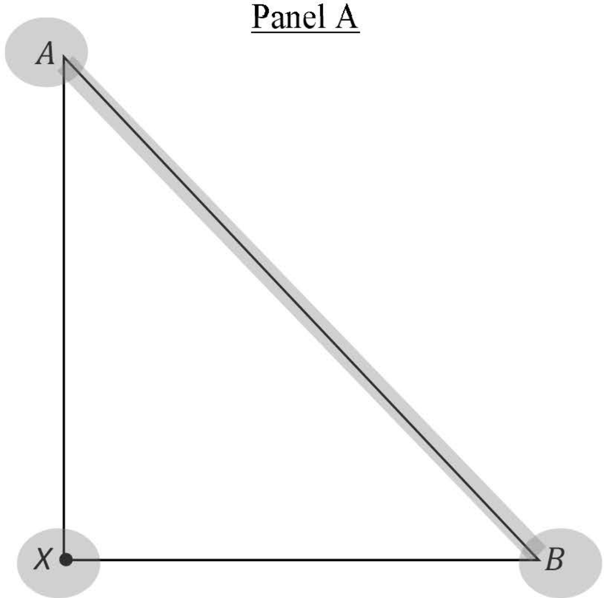
Suppose that A, B are personal states and X is a social state (and hence is not equivalent to any personal state):

– If we observe $\succeq_0$ we observe the ordering $A \succ_0 X \succ_0 B$ and the ordering of lotteries between A, B – but no others.

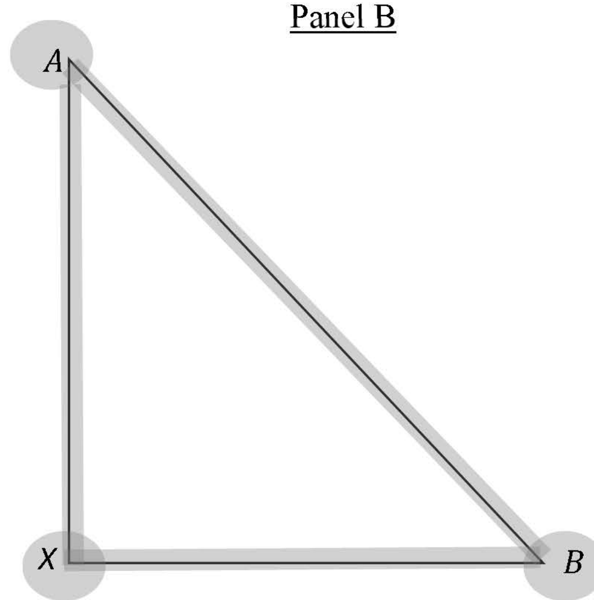
– State Monotonicity assures that from these observations we can *infer* the ordering of lotteries between A, X and lotteries between X, B.

– Continuity assures us that X is indifferent to *some* lottery $aA + (1 - a)B$ – but we do not observe *which lottery*.

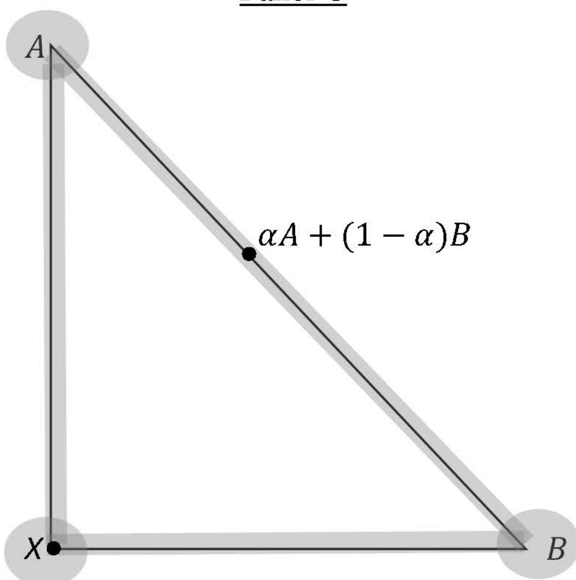
Panel A



Panel B



Panel C



Deducing preferences

We ask: If we observe the sub-preference relation $\succeq_0$ can we *deduce* the entire preference relation $\succeq$?

Theorem *Assume that the $\mathcal{DM}$'s preference relation $\succeq$ satisfies Completeness, Transitivity, Continuity, Reduction of Compound Lotteries, the Sure Thing Principle and State Monotonicity.*

In order that $\succeq$ can be deduced from $\succeq_0$ it is necessary and sufficient that the $\mathcal{DM}$ finds every social state $\omega \in \Omega \setminus P$ to be indifferent to some personal state $\tilde{\omega} \in P$.

$\Downarrow$ To see that this condition is sufficient, assume that every social state ω admits a personal state equivalent $\tilde{\omega}$.

- State Monotonicity implies that $\sum p_i \omega_i \sim \sum p_i \tilde{\omega}_i$ for every lottery $\sum p_i \omega_i \in L(\Omega)$.

- Transitivity implies that for any two lotteries $\sum p_i \omega_i, \sum q_j \omega_j$

$$\sum p_i \omega_i, \succeq \sum q_j \omega_j \Leftrightarrow \sum p_i \tilde{\omega}_i \succeq \sum q_j \tilde{\omega}_j \Leftrightarrow \sum p_i \tilde{\omega}_i \succeq_0 \sum q_j \tilde{\omega}_j .$$

That is, $\succeq$ can be deduced from $\succeq_0$.

$\Uparrow$ To see that this condition is necessary, we need to be sure that the preference relation we construct obeys Continuity and State Monotonicity.

- $\succeq$ is continuous (by assumption) and $L(\Omega)$ can be identified with a finite-dimensional simplex, which is a separable metric space.

- Use Debreu's (1954) representation theorem to find a utility function $u : L(\Omega) \rightarrow \mathbb{R}$ that represents $\succeq$, that is

$$\forall \Gamma, \Gamma' \in L(\Omega) : \Gamma \succeq \Gamma' \Leftrightarrow u(\Gamma) \geq u(\Gamma').$$

  WLOG, assume that the range of u is contained in the interval $[0, 1]$.

Construct a new utility function $U : L(\Omega) \to \mathbb{R}$ that agrees with u on $L(P)$ and induces the same ordering as u on Ω but does not induce the same ordering as u on $L(\Omega)$.

- $\Omega = \{A, X, B\}$, $P = \{A, B\}$ and $A \succ X \succ B$ – generalizes to the general setting with more than three states.

- Continuity guarantees that there is some $\gamma \in (0, 1)$ such that

$$X \sim \gamma A + (1 - \gamma)B$$

  equivalently,

$$u(X) = u(\gamma A + (1 - \gamma)B).$$

We construct U on $L(\Omega)$ that [1] agrees with u on $L(P)$, and [2] induces the same ordering as u on Ω

$$U(A) > U(X) > U(B).$$

But

$$U(X) \neq u(X) = u(\gamma A + (1 - \gamma)B)$$

so that the preference relation $\succeq_U$ induced by U does not agree with $\succeq$ on $L(\Omega)$.

To construct U, define two auxiliary functions f, g:

$$\begin{aligned} f(aA + xX + bB) &= u(aA + xA + bB) \\ g(aA + xX + bB) &= u(aA + xB + bB) \end{aligned}$$

for every lottery $aA + xX + bB \in L(\Omega)$. Because u is continuous, f and g are continuous.

f (g) is constant (strictly increasing) on vertical lines and strictly decreasing (constant) on horizontal lines so $\lambda f + (1 - \lambda) g$ is strictly increasing on vertical lines and strictly decreasing on horizontal lines for every $\lambda \in (0, 1)$.

Define the utility function

$$U = \lambda f + (1 - \lambda) g$$

and let $\succeq_U$ be the preference relation induced by U.

- U agrees with u on $L(P)$ and $\succeq_U$ is an extension of $\succeq$

$$U(A) = u(A) > U(X) = \lambda u(A) + (1 - \lambda) u(B) > u(B) = U(B)$$

- To show that $\succeq_U \neq \succeq$, choose λ so that

$$U(X) = \lambda f(X) + (1 - \lambda) g(X) = \lambda u(A) + (1 - \lambda) u(B) \neq u(X).$$

Testable implications

- In the experiment there is a subject *self* (the $\mathcal{DM}$) and an (unknown) *other*.

- The set of social states Ω consists of *monetary* payout pairs (a, b), where $b \geq 0$ is the payout for *self* and $a \geq 0$ is the payout for *other*.

- We restrict the set $L(\Omega)$ of lotteries on the set Ω of social states to binary equiprobable lotteries

$$\mathbb{L} = \{\frac{1}{2}(a, b) + \frac{1}{2}(c, d)\}.$$

! $\mathbb{L}(\Omega)$ is a 4-dimensional convex cone, which cannot be presented to subjects in an experiment in an obvious way...

Within $\mathbb{L}$ we distinguish three 2-dimensional sub-cones:

$$\mathcal{PR} = \{\tfrac{1}{2}(0, b) + \tfrac{1}{2}(0, d)\} = \mathbb{L}(P)$$
$$\mathcal{SC} = \{\tfrac{1}{2}(a, b) + \tfrac{1}{2}(a, b)\} = \Omega$$
$$\mathcal{SR} = \{\tfrac{1}{2}(a, b) + \tfrac{1}{2}(b, a)\} = \mathbb{L}(\mathrm{Perm}(\Omega))$$

where $\mathrm{Perm}(\Omega)$ is the set of permutations of Ω.

We can interpret choice in each domain – Personal Risk, Social Choice, Social Risk – by making an obvious identification:

$$\begin{aligned}\langle x, y\rangle &\mapsto \tfrac{1}{2}(0, x) + \tfrac{1}{2}(0, y)\\ (x, y) &\mapsto \tfrac{1}{2}(x, y) + \tfrac{1}{2}(x, y)\\ [x, y] &\mapsto \tfrac{1}{2}(x, y) + \tfrac{1}{2}(y, x)\end{aligned}$$

where $\langle x, y\rangle$, (x, y), $[x, y]$ represent a personal lottery in $\mathcal{PR}$, a social state in $\mathcal{SC}$, a social lottery in $\mathcal{SR}$, respectively.

Let $\succeq$ be a preference relation on $\mathbb{L}$ and write $\succeq_{\mathcal{PR}}$, $\succeq_{\mathcal{SC}}$, $\succeq_{\mathcal{SR}}$ for its restrictions to $\mathcal{PR}$, $\mathcal{SC}$, $\mathcal{SR}$, respectively.

– If we observe $\succeq_{\mathcal{PR}}$ and $\succeq_{\mathcal{SC}}$, and if every social state is indifferent to some personal state (a condition that is determined completely by $\succeq_{\mathcal{SC}}$), then we can deduce $\succeq_{\mathcal{SR}}$.

– But to test this implication, we need to know, for each social state, a *particular* personal state to which the social state is indifferent...

! Test w/out making additional assumptions about the form, parametric or otherwise, of the underlying preferences.

In our experiments, subjects select a bundle of commodities from a standard budget set:

$$\mathcal{B} = \{(x, y) \in \Omega : p_x x + p_y y = 1\}$$

where $p_x, p_y > 0$ and the $\mathcal{DM}$ can choose any allocation $(x, y) \geq 0$ that satisfies this constraint.

For two classes of subjects – *selfish* and *impartial* – we can construct a formal nonparametric test:

- $\succeq_{\mathcal{SC}}$ in the Social Choice domain are *selfish* if $(x, y) \sim_{\mathcal{SC}} (0, y)$ and *impartial* if $(x, y) \sim_{\mathcal{SC}} (y, x)$ for all $(x, y) \in \Omega$.

If preferences $\succeq_{\mathcal{SC}}$ are selfish then preferences $\succeq_{\mathcal{PR}}$ in the Personal Risk domain coincide with preferences $\succeq_{\mathcal{SR}}$ in the Social Risk domain.

$\Longrightarrow$ If $\succeq_{\mathcal{SC}}$ are selfish then choice behavior in the Personal Risk domain and choice behavior in the Social Risk domain coincide

$$[x, y] \in \arg\max(\mathcal{B})$$
$$\Updownarrow$$
$$\langle x, y \rangle \in \arg\max(\mathcal{B})$$

If preferences $\succeq_{\mathcal{SC}}$ in the Social Choice domain are impartial then $\succeq_{\mathcal{SC}}$ coincide with preferences $\succeq_{\mathcal{SR}}$ in the Social Risk domain.

$\Longrightarrow$ If $\succeq_{\mathcal{SC}}$ are impartial then choice behavior in the Social Choice domain and choice behavior in the Social Risk domain coincide

$$(x, y) \in \operatorname{arg\,max}(\mathcal{B})$$
$$\Updownarrow$$
$$\langle x, y \rangle \in \operatorname{arg\,max}(\mathcal{B})$$

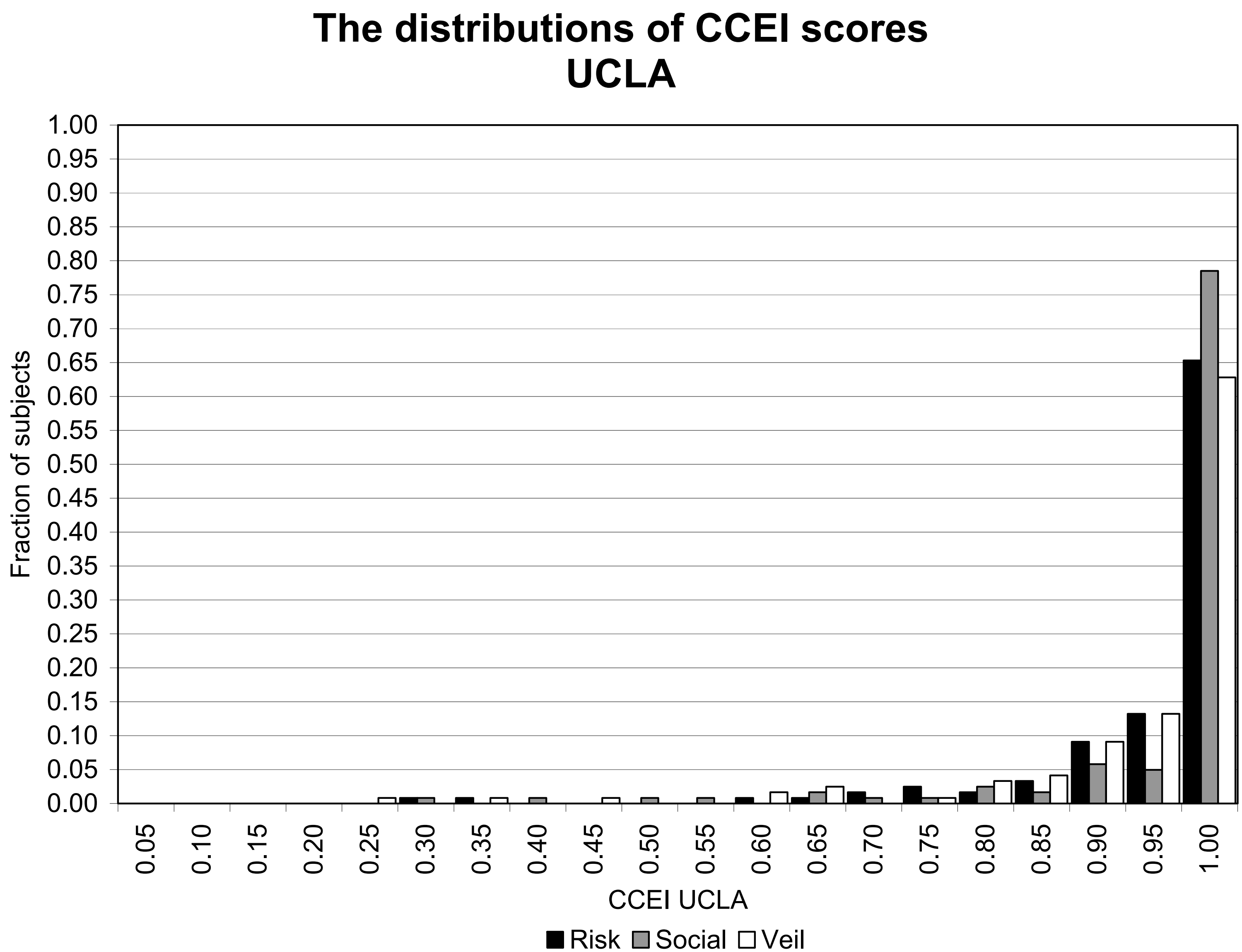
The experiment

1. Each experimental subject faced 50 independent budget lines in each of the three treatments.

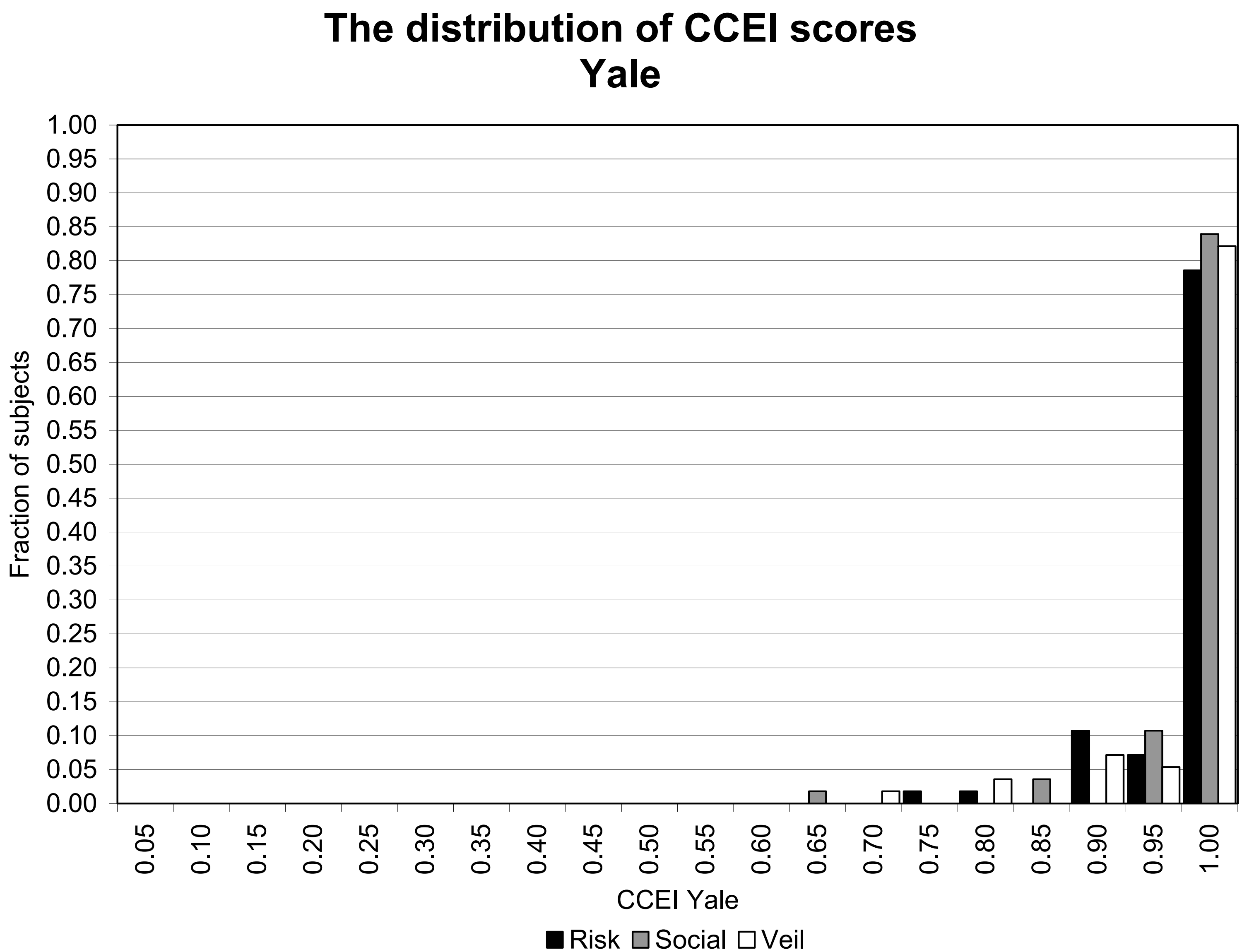
2. Budget lines intersected with at least one axis at or above the 50 token level and intersect both axes at or below the 100 token level.

3. Subjects faced the exact same 50 budget lines in each treatment, but randomly ordered between treatments.

4. The order of the experimental treatments was counterbalanced across sessions (to balance out treatment order effects).



The distributions of CCEI scores
UCLA
Fraction of subjects
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
0.50
0.55
0.60
0.65
0.70
0.75
0.80
0.85
0.90
0.95
1.00
CCEI UCLA
Risk
Social
Veil


The distribution of CCEI scores
Yale
Fraction of subjects
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50 0.55 0.60 0.65 0.70 0.75 0.80 0.85 0.90 0.95 1.00
CCEI Yale
Risk
Social
Veil

Individual behavior

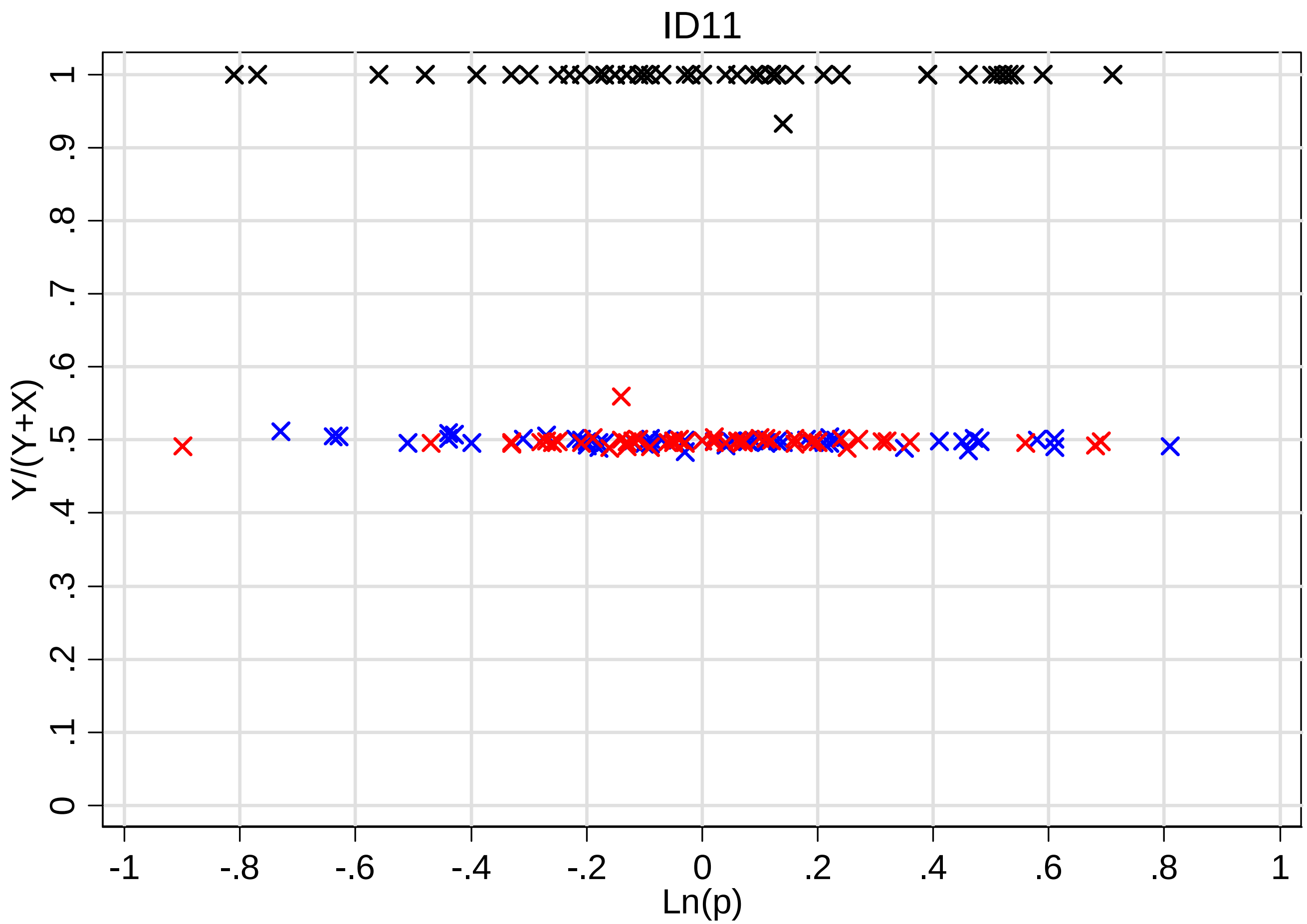
- The aggregate data tell us little about the choice behavior of individual subjects.

- 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.

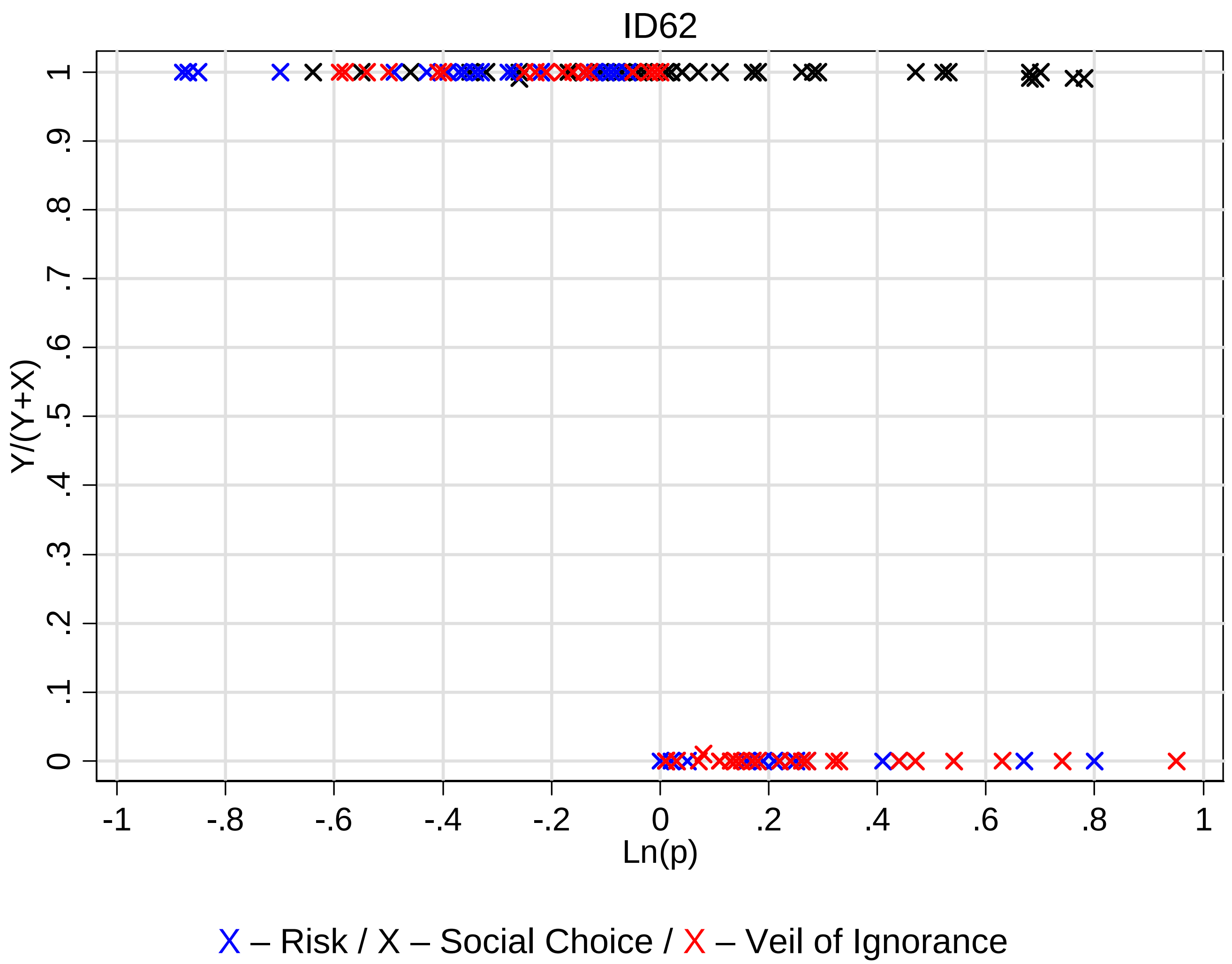
- There is no taxonomy that allows us to classify all subjects unambiguously.

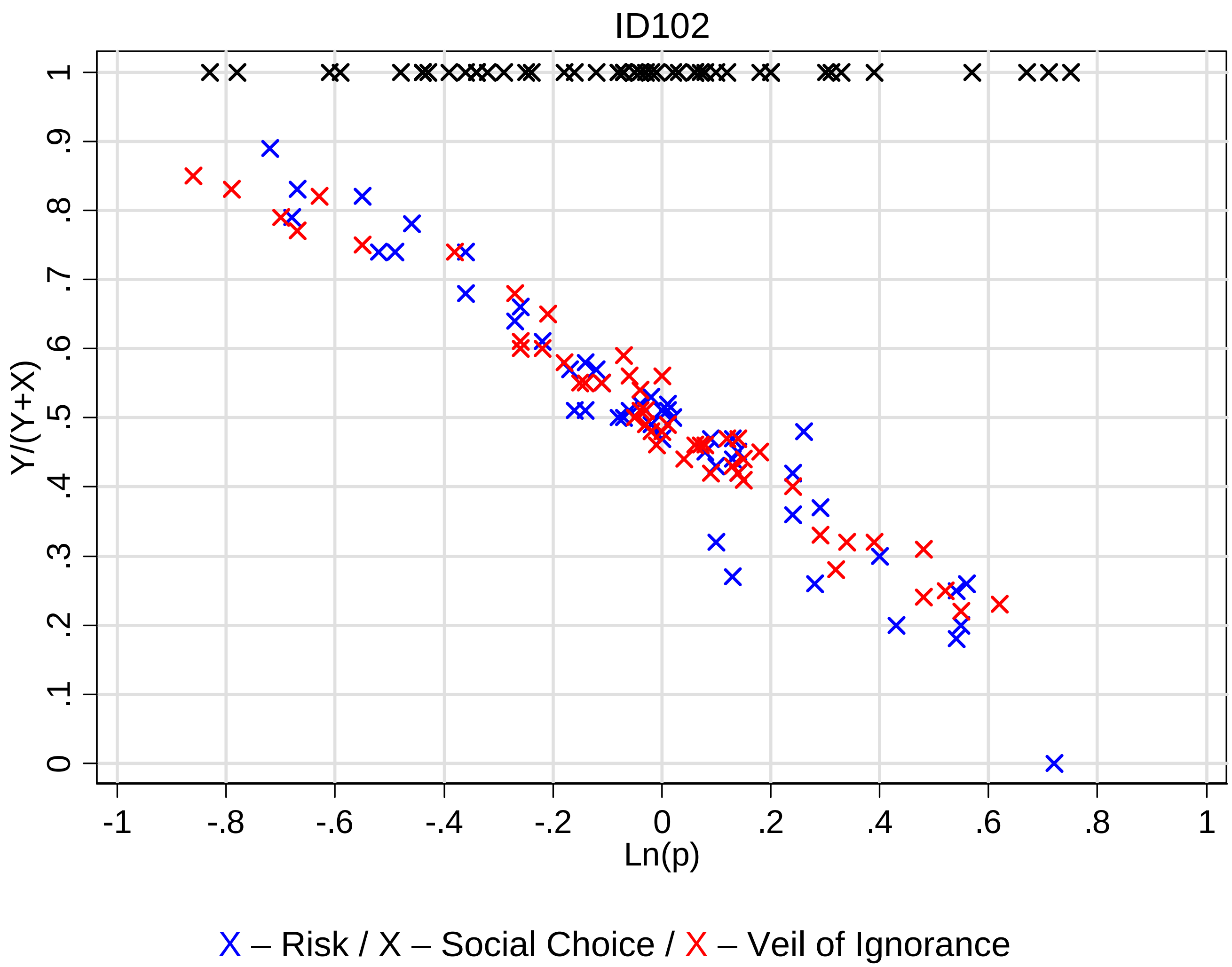
- The characteristic of all our data is striking regularity *within* subjects and heterogeneity *across* subjects.

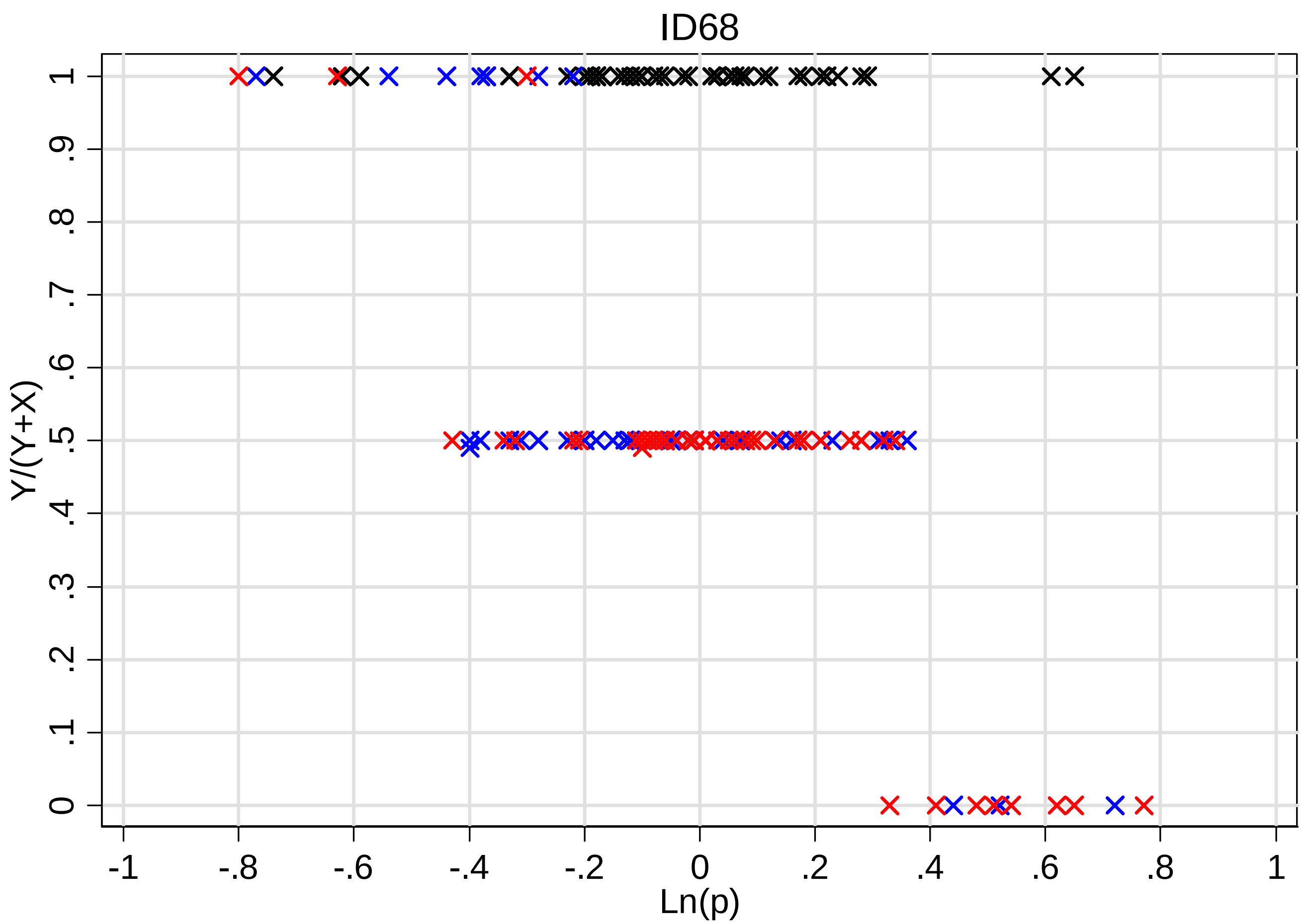
The relationship between the log-price ratio and the token share



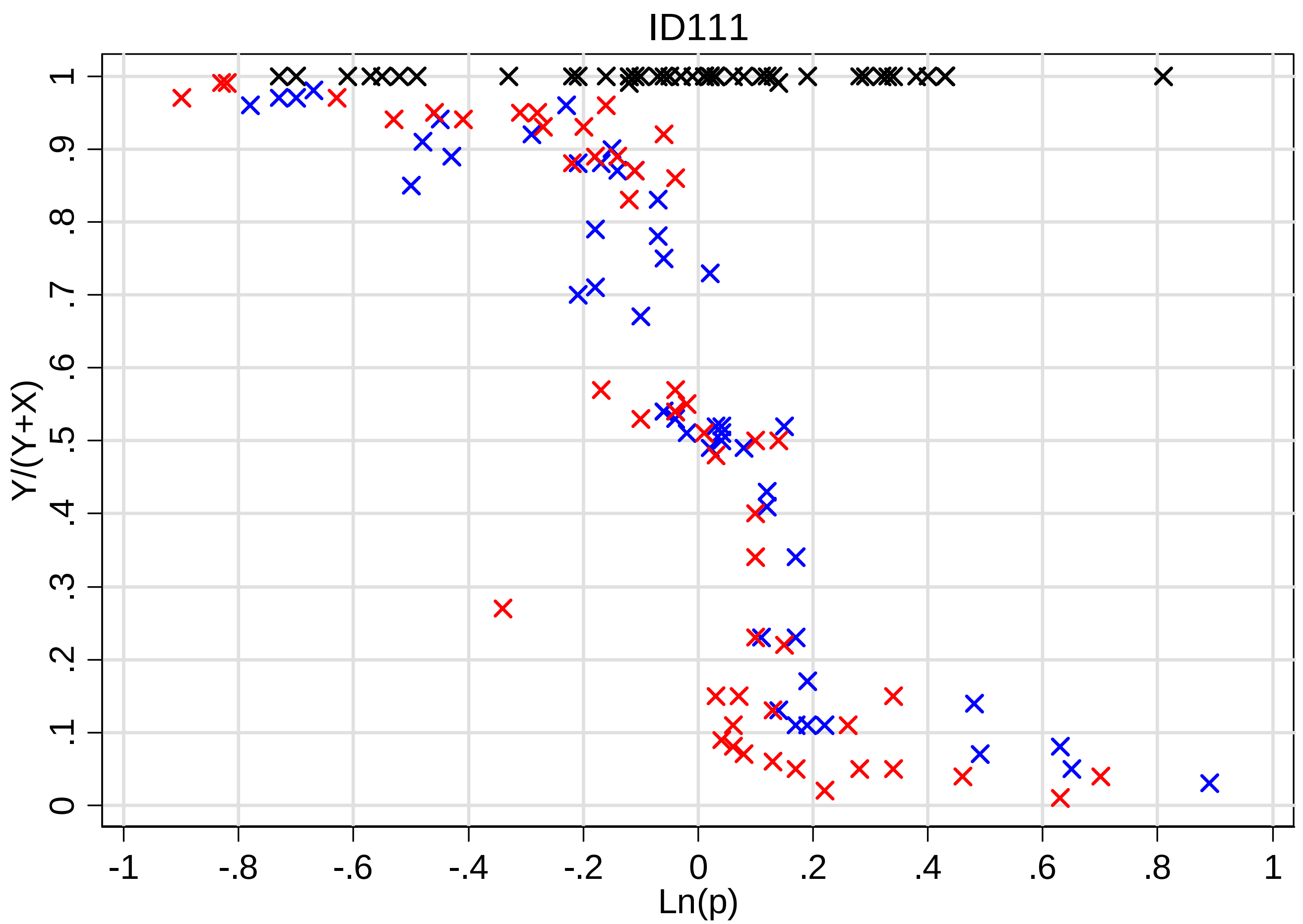
X – Risk / X – Social Choice / X – Veil of Ignorance


ID62
1
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
Y/(Y+X)
-1
-.8
-.6
-.4
-.2
0
.2
.4
.6
.8
1
Ln(p)
X – Risk / X – Social Choice / X – Veil of Ignorance

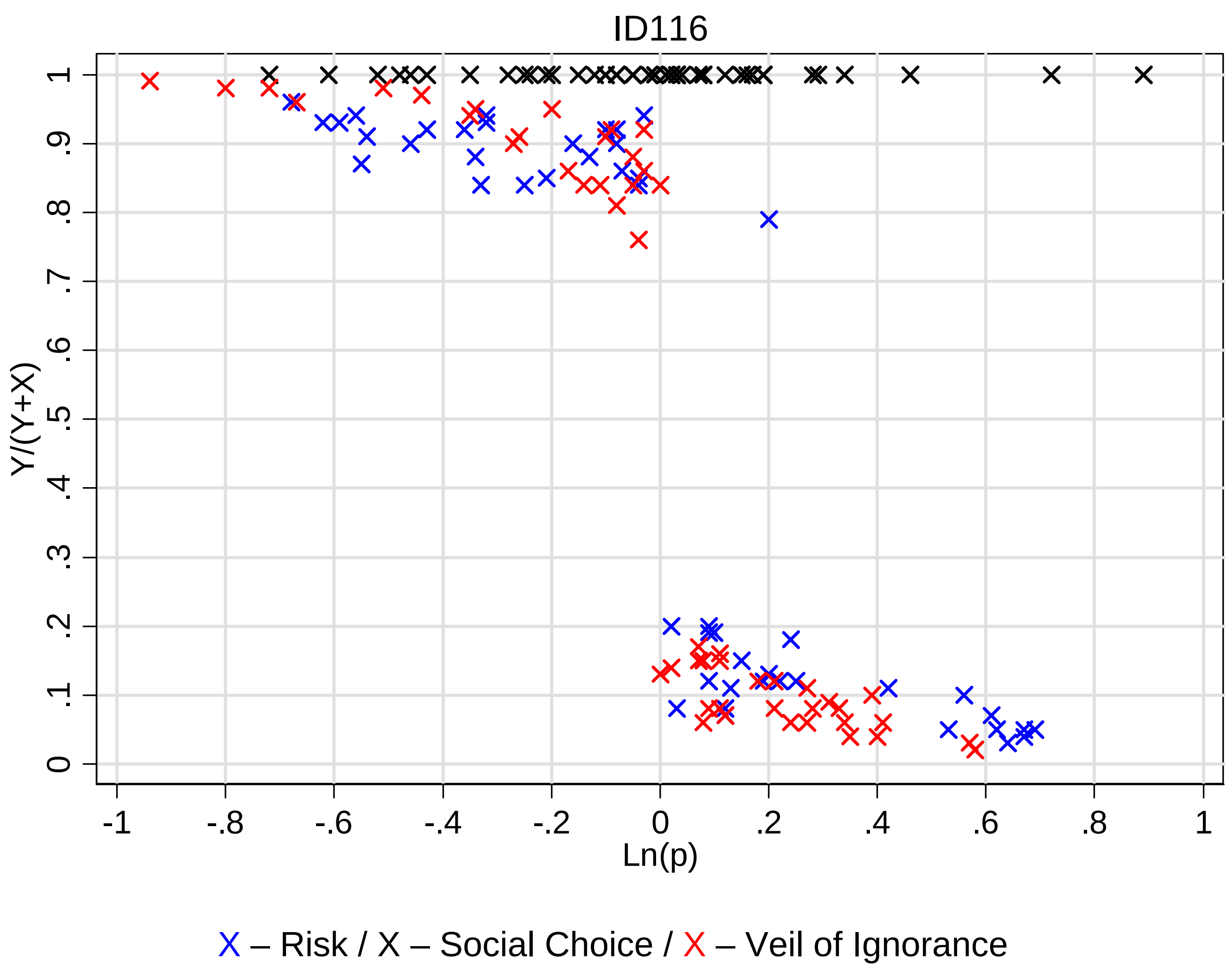

ID102
Y/(Y+X)
1
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
-1
-.8
-.6
-.4
-.2
0
.2
.4
.6
.8
1
Ln(p)
X – Risk / X – Social Choice / X – Veil of Ignorance

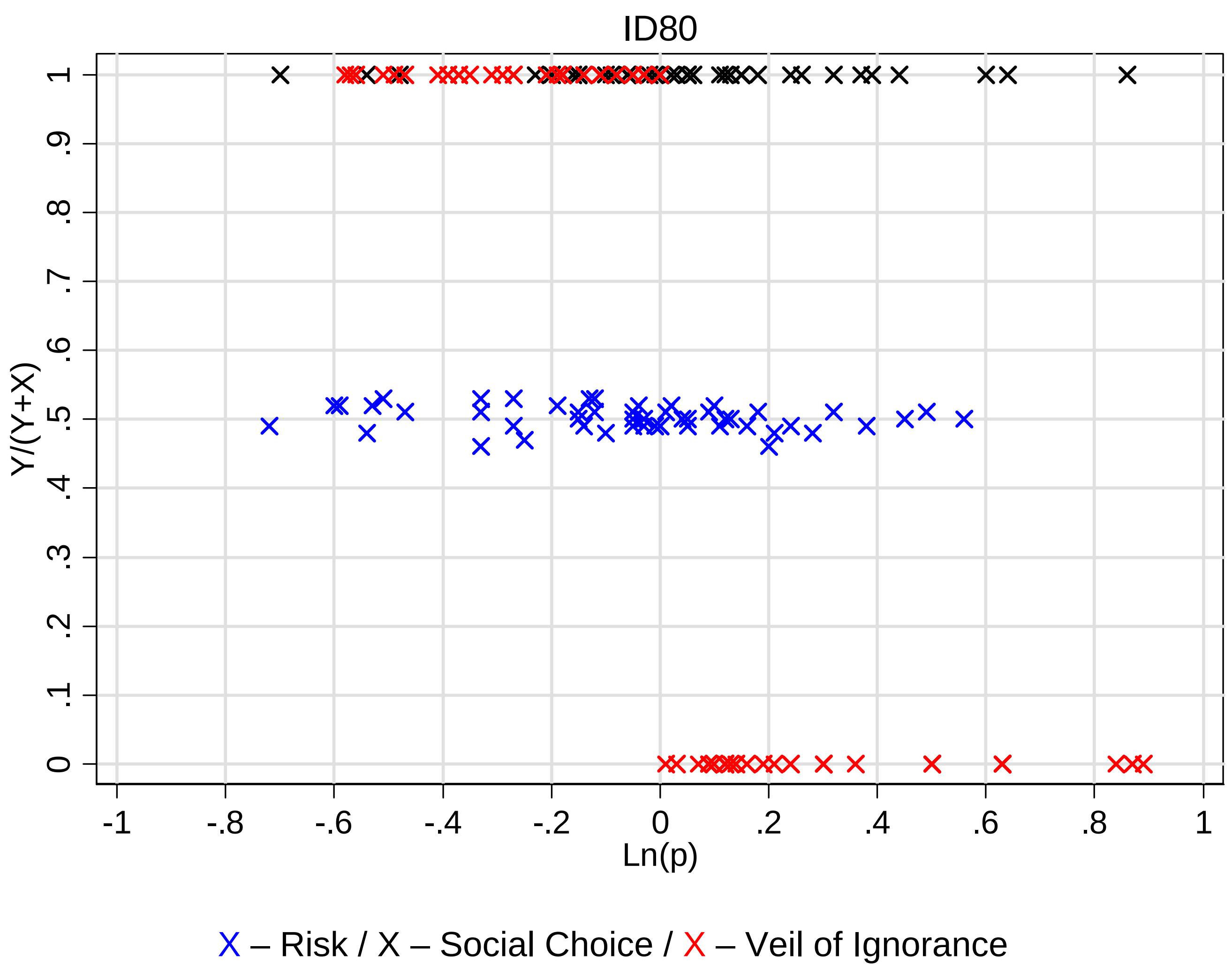


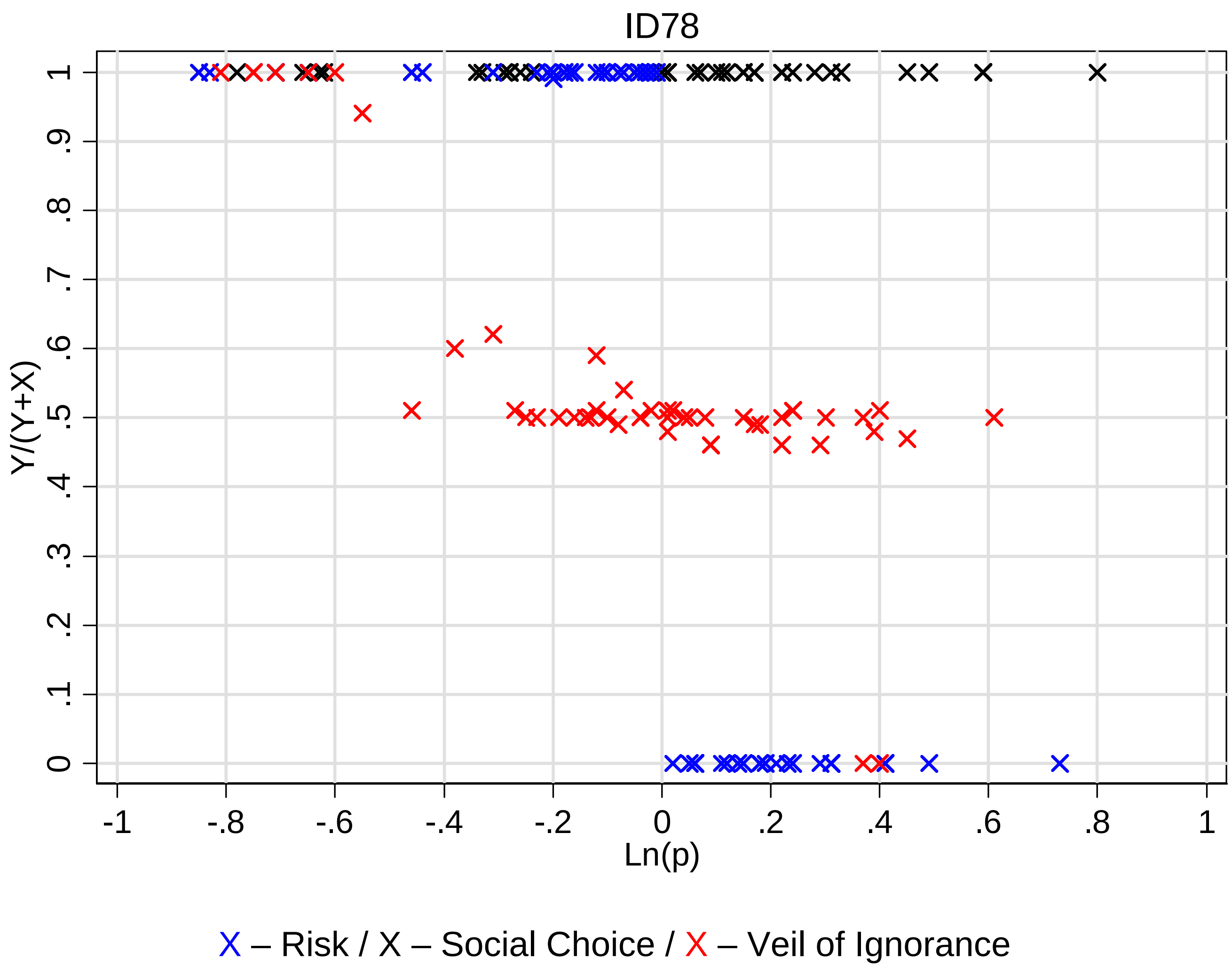
X – Risk / X – Social Choice / X – Veil of Ignorance

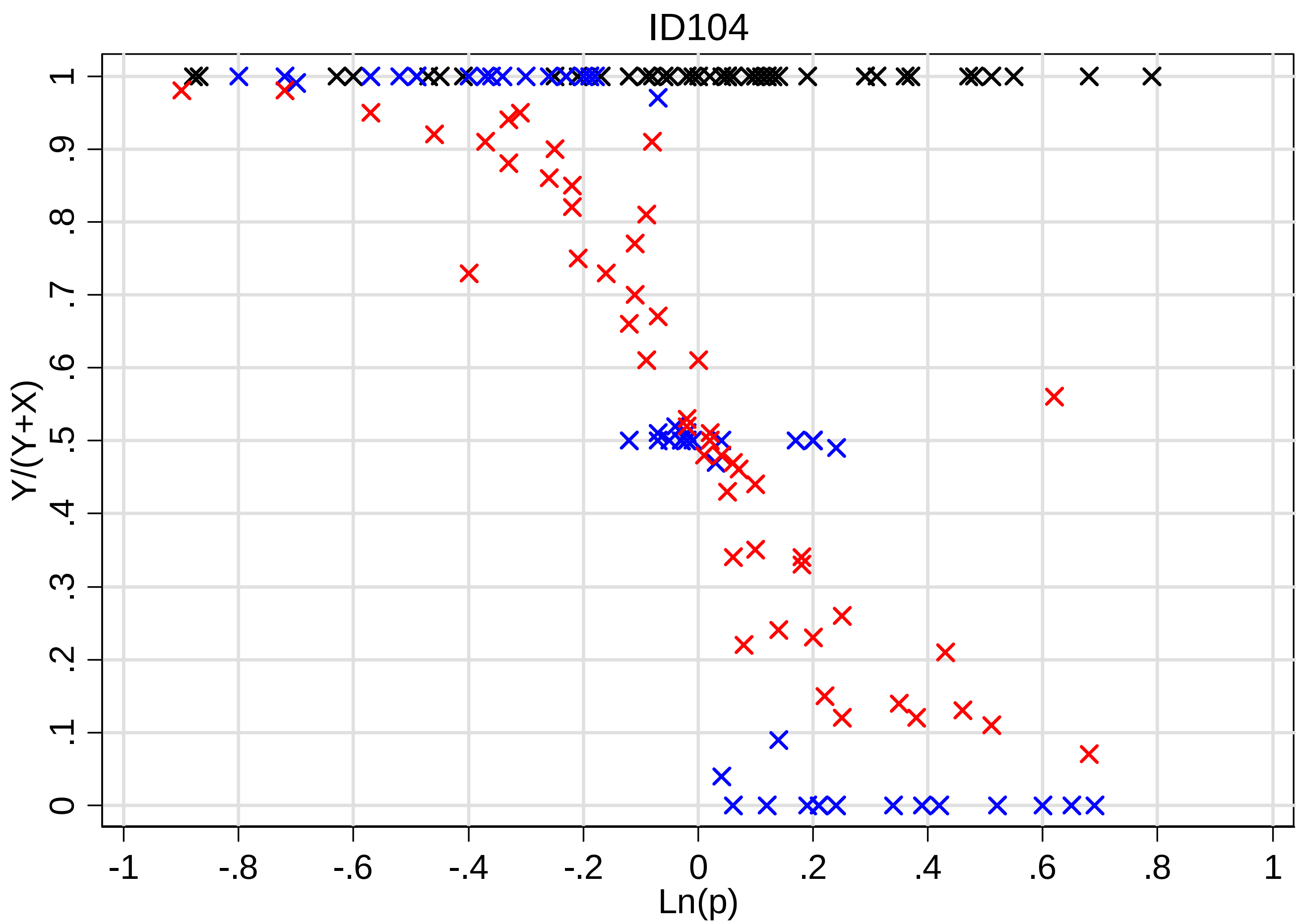


X – Risk / X – Social Choice / X – Veil of Ignorance

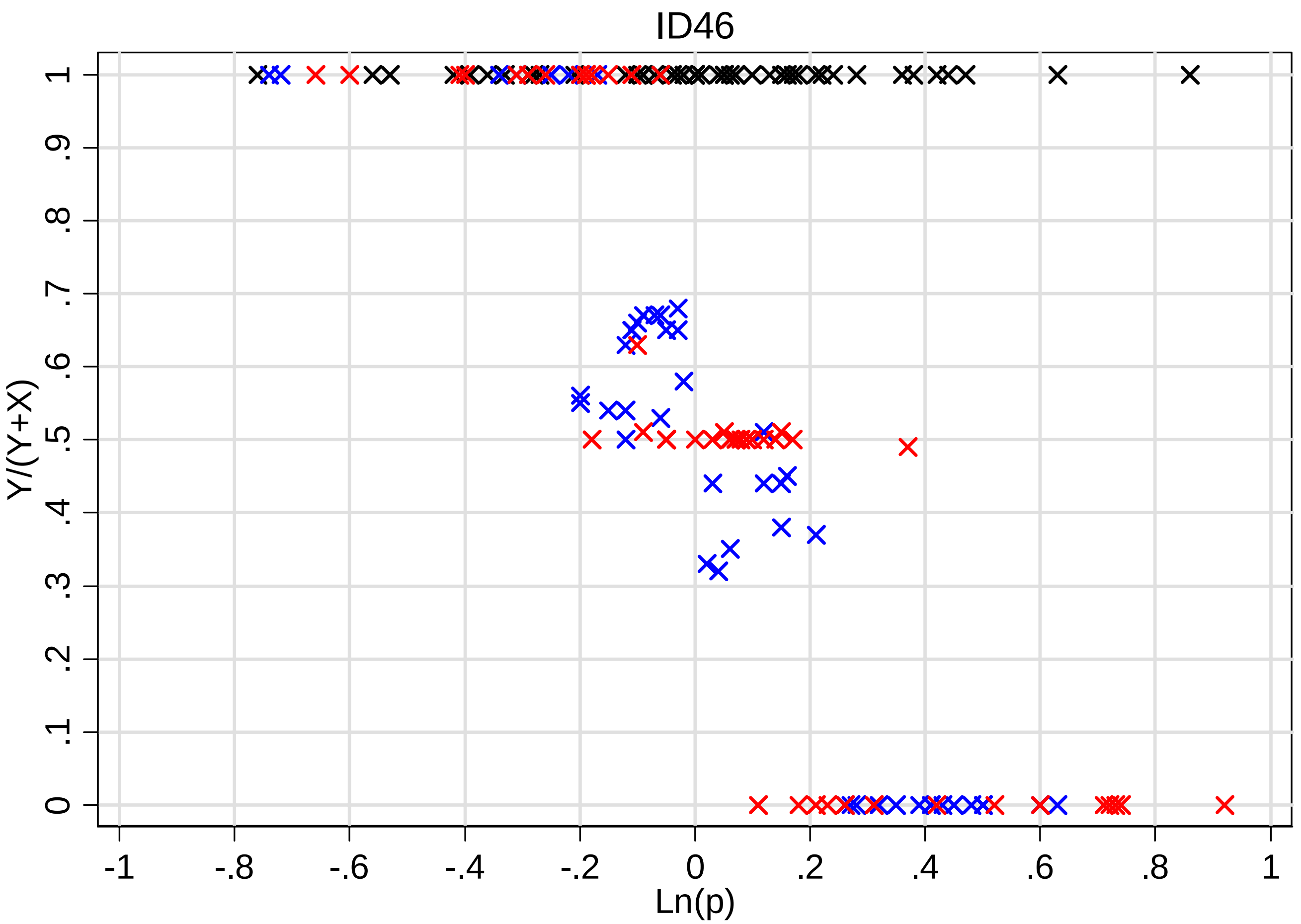

ID116
Y/(Y+X)
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
-1
-.8
-.6
-.4
-.2
0
.2
.4
.6
.8
1
Ln(p)
X – Risk / X – Social Choice / X – Veil of Ignorance


ID80
Y/(Y+X)
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
-1
-.8
-.6
-.4
-.2
0
.2
.4
.6
.8
1
Ln(p)
X – Risk / X – Social Choice / X – Veil of Ignorance

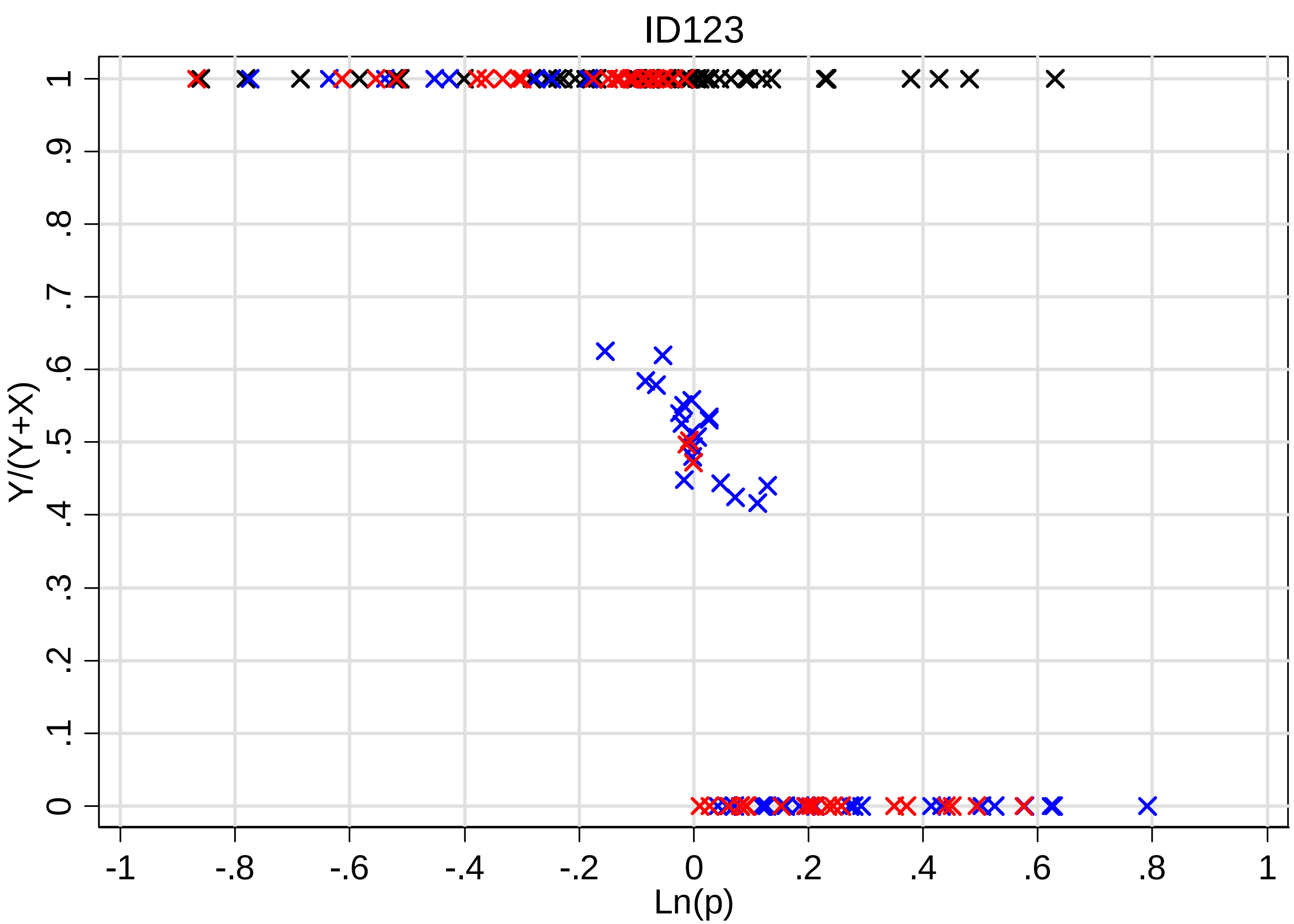

ID78
Y/(Y+X)
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
-1
-.8
-.6
-.4
-.2
0
.2
.4
.6
.8
1
Ln(p)
X – Risk / X – Social Choice / X – Veil of Ignorance



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



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



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

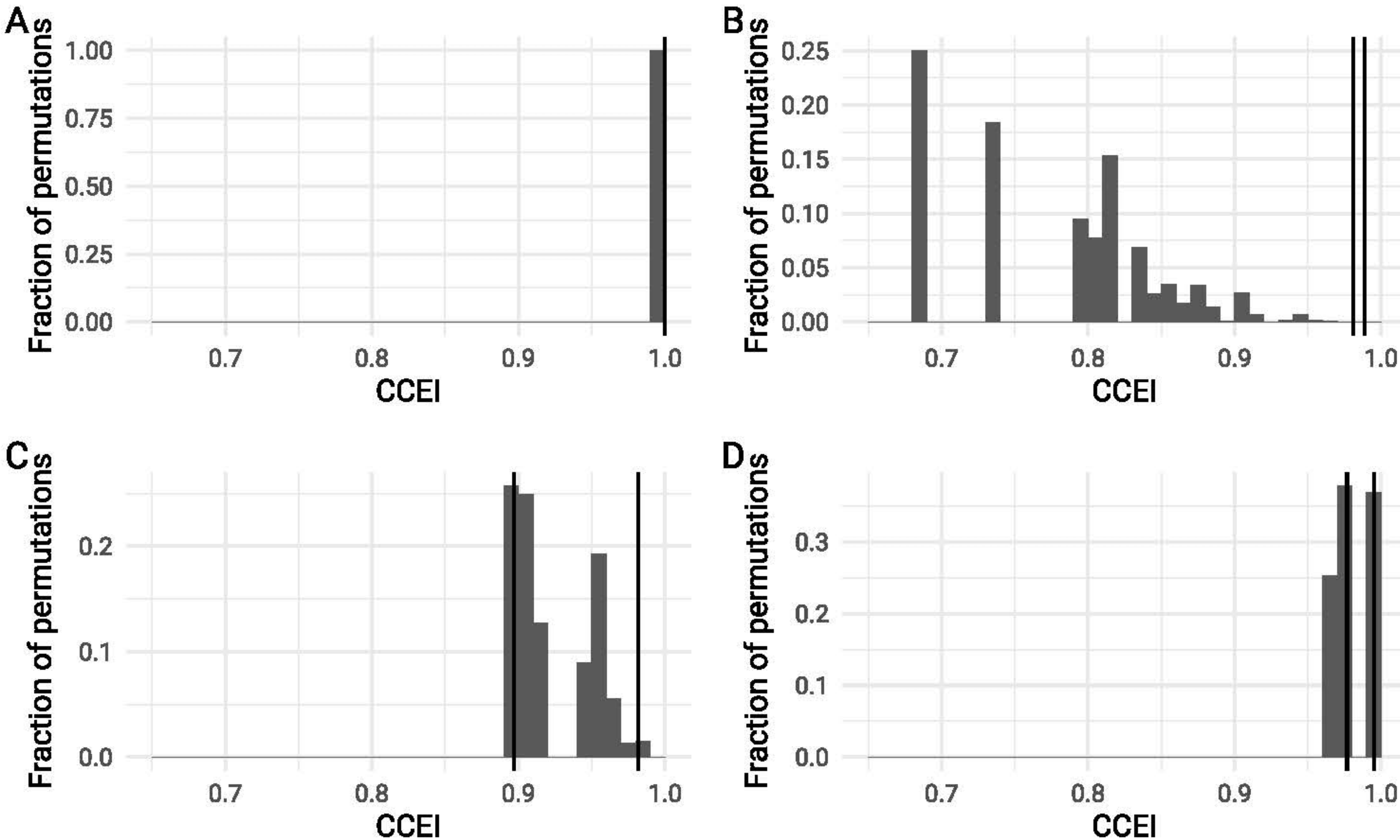
Testing the theory

To test whether preferences in two domains i and j are the same (for a given subject) $\succeq_i = \succeq_j$:

1. Permute (rearrange) the choices from the two domains (from a given budget line) and compute the CCEI for each permutation.

2. Compare the distribution of permuted CCEI scores to the actual CCEI scores in the two domains, denoted by e_i and e_j.

Under the null hypothesis that the preferences in two domains coincide $\succeq_i = \succeq_j$, we can exchange the chosen allocations on each budget line without (significantly) reducing the consistency of choices with GARP.


A
B
C
D
Fraction of permutations
CCEI
1.00
0.75
0.50
0.25
0.00
0.25
0.20
0.15
0.10
0.05
0.2
0.1
0.0
0.3
0.7
0.8
0.9
1.0

Significance level	Rejection criterion		
	Combined Bonferroni-corrected	p^-	p^+
1%	0.107	0.049	0.107
5%	0.197	0.082	0.180
10%	0.205	0.115	0.230

Observing more

In our main theoretical result – and in the experiment – we assume that we can observe the restriction $\succeq_0$ of $\succeq$ to

$$[L(P) \times L(P)] \cup [\Omega \times \Omega] .$$

Assume that we can observe the restriction $\succeq_1$ of $\succeq$ to

$$[\Omega \cup L(P)] \times [\Omega \cup L(P)],$$

that is, we observe only the $\mathcal{DM}$'s comparisons between social states and personal lotteries.

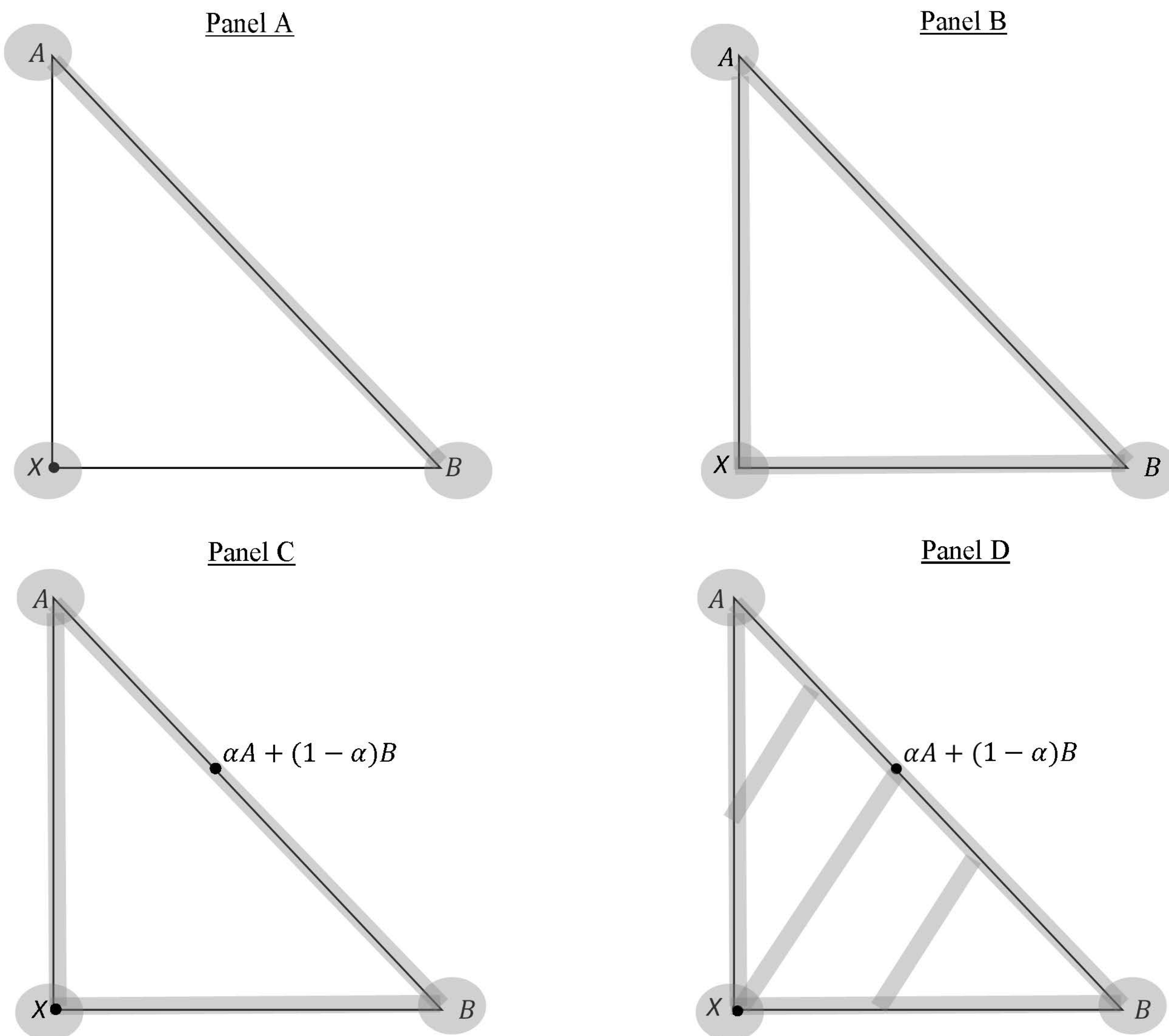
! Observing $\succeq_1$ is of no use at all:

– To deduce $\succeq$ from $\succeq_1$ it is necessary and sufficient that the $\mathcal{DM}$ finds every social state to be indifferent to some personal <u>state</u> – as for $\succeq_0$.

!! If $\succeq$ obey Independence then observing comparisons between social states and personal lotteries becomes very useful:

– To deduce $\succeq$ from $\succeq_1$ it is necessary and sufficient that the $\mathcal{DM}$ finds every social state to be indifferent to some personal <u>lottery</u>.

(A much weaker condition than that every social state be indifferent to some personal state.)


Panel A
A
X
B
Panel B
A
X
B
Panel C
A
$\alpha A + (1-\alpha)B$
X
B
Panel D
A
$\alpha A + (1-\alpha)B$
X
B

Concluding remarks

"... I am talking about professional mistakes. The other kinds of mistakes ... are none of your business." – Paul Krugman –

- This point of view seems reasonable when applied to Krugman, who is not a candidate for any public office, much less the Presidency.

- But if "mistakes" are the consequences of attitudes toward risk and attitudes toward personal risk are indicative of attitudes toward social risk, then this point of view would seem mistaken...

- But it can be dangerously easy to err and infer too much from a linkage that is too weak or observation that is too imperfect.

- During (and after) the 1992 presidential campaign, stories were widely told about Bill Clinton's choices in the personal domain, which – aside from its moral content – were surely quite risky.

"... it may well be that this is one case where private behavior does not give an indication of how a politician will perform in the arena."
– Newsweek (1994) –