Disentangling Risk and Other-Regarding Preferences

Paul Feldman[1] Kristian López Vargas[2]

Texas A&M University[1]; UC, Santa Cruz[2]

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Four Empirical Regularities

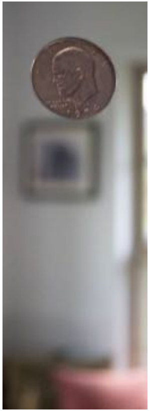
People tend to:

1. be averse to personal risks
2. care about (or compare with) others
3. dislike ex-post unfair outcomes
4. dislike ex-ante unfair risks

The first two deal with risk or others and are mostly studied in isolation from each other

The last two require thinking about risk and others jointly

Example: Ex-Post Fairness



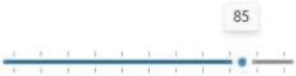
Option A	You	Your Colleague
Heads	0	80
Tails	80	0

Option B	You	Your Colleague
Heads	0	0
Tails	80	80

Example: Ex-Ante Fairness

Choose the probability of you OR your good friend getting the concert ticket.

You



Your good friend

Contributions

Theoretical

Our utility model:

1. is an **integrated approach** to study risk attitudes and other-regarding preferences.
2. **disentangles** risk from other-regarding preferences and the different components of the latter.
3. allows for **ex-post and ex-ante fairness** motives.
4. **nests** most used models of other-regarding preferences and risk attitudes.

Empirical

1. We deploy an experiment of **convex-BL** to elicit preferences over joint risks. **GUI** facilitates the elicitation of **many choices**.
2. We can measure the prevalence of **ex-post fairness**-seeking behavior and how it influences risk-taking.
3. We can measure the prevalence of **ex-ante fairness**-seeking behavior and how strongly behavior deviates from EUT.
4. Characterize peoples' attitudes in **five fundamental dimensions**.

The Model: General Expression

- We focus on the space of two-dimensional payoffs, $\mathcal{X} \times \mathcal{Y} \subset \mathbb{R}^2_+$.
- **Outcome** (x, y) represents payoffs for the DM and her counterpart, respectively.
- $\mathcal{L}$ denotes the space of lotteries over this space, $\mathcal{L} = \Delta(\mathcal{X} \times \mathcal{Y})$.
- We focus on **discrete lotteries**. Outcomes are indexed by k: $(x_1, y_1), ..., (x_K, y_K)$
- Each lottery L has a probability vector $(p_1, ..., p_K)$ and a discrete joint CDF $F_{X,Y}(x, y)$ associated with it.

General representation of our utility model:

$$U(L) = W\left[\left(p_k, g\left[x_k, y_k, D\left(F_X, F_Y\right)\right]\right)_k\right]. \quad (1)$$

The Model: General Expression

- F_X and F_Y denote the marginal CDFs of x and y, respectively, given the joint $F_{X,Y}$.
- $D(\cdot)$ is a metric in the space of discrete CDFs in $\mathcal{X} \cup \mathcal{Y}$.
- $D(\cdot)$ is a measure of ex-ante inequality.

- $g[\cdot]$ is a ***social aggregator*** modeling other-regarding preferences. Assumed to be strictly increasing in x, and non-increasing in D.

- $W[\cdot]$ is a ***risk aggregator*** capturing the *basic risk attitudes*.
- $W[(p_k, g_k)_k]$ is assumed to be continuous and supermodular in each (p_k, g_k) and increasing with respect to g_k for all k.

The Model: General Expression, Assumption & Properties

- **Assumption 1** enables **preference separation** of risk and other-regarding preferences in the Epstein-Zin sense:

$$g[z, z, D(F_Z, F_Z)] = z$$

  In fully egalitarian lotteries, $Pr[y = x] = 1$, the scale of the social aggregator is the same as the scale of consumption, and any other property of $g[\cdot]$ does not matter.

- Ex-post and ex-ante fairness-seeking behavior emerge if:
  1. ***Ex-post*** *Fairness:* $g[x, y, \cdot]$ is supermodular with respect to (x, y).
  2. ***Ex-ante*** *Fairness:* $g[\cdot, \cdot, D(F_X, F_Y)]$ is strictly decreasing in its third argument, $D(\cdot)$.

The Model: Parametrization

$$U(L) := \mathbb{E}_{F_{X,Y}}\left[\frac{1}{\gamma}\left[ax^\rho + \bar{a}y^\rho - s_\rho\theta\left(\bar{\delta}\, d(x,y) + \delta\, D(F_X, F_Y)\right)\right]^{\frac{\gamma}{\rho}}\right] \tag{2}$$

where

$$\underbrace{D(F_X, F_Y) := \int_{-\infty}^{\infty} \left(F_{X^\rho}(t) - F_{Y^\rho}(t)\right)^2 dt}_{\text{Ex-ante inequality discount}} \qquad \underbrace{d(x,y) := |x^\rho - y^\rho|}_{\text{Ex-post inequality discount}}$$

Graph

$\gamma \in (-\infty, 1]$: basic risk attitudes; $a \in [0, +\infty)$: selfishness; $\bar{a} := 1 - a$; $\rho \in (-\infty, 1]$: social substitution; $\theta \in [0, a]$: inequality aversion; δ : weight of ex-ante fairness motives; $\bar{\delta} := 1 - \delta$.

Example: FS99

Fehr and Schmidt (1999) proposed the following utility model (FS model, hereafter):

$$u(x, y) = x - \beta \max\{0, x - y\} - \alpha \max\{0, y - x\} \tag{3}$$

defined over the space of riskless payoff outcomes and with $\beta \in [0, 1)$ and $\alpha \geq \beta$. Any admissible parameterization of the FS model can be obtained in our model by setting: $\rho = 1$, $a = 1 + \frac{\alpha - \beta}{2}$ and $\theta = \frac{\alpha + \beta}{2}$. The parameters γ and δ can take any value because there is no risk; therefore, ex-post and ex-ante inequality coincide.

Experiment

- We designed and conducted an experiment with **four types of convex-BL tasks** to elicit preferences over joint risks.

- Data from **158** human participants.
- **178** choices per participant.
- Payments were based on a randomly chosen decision.
- The interface was **developed** at the UCSC LEEPS Lab.
- The experiment was conducted online at the **E2Lab** (Lima).

Experiment: Deterministic Giving

- Choose an allocation along a budget constraint.
- 50 BLs in random order.
- $D(F_X, F_Y) = d(x, y)$.
- Preferences simplify to a Kinky CES:

$$u(x,y) = [(a - s_\Delta \theta)x^\rho + (\bar{a} + s_\Delta \theta)y^\rho]^{\frac{1}{\rho}}$$

where $s_\Delta = sign(x - y)$.

Indiff. Curves Prediction

Budget constraints Descriptive graphs Rationality Examples

Experiment: Ex-Post Fair Risks

- DM chooses a portfolio of state A and B securities (same probability).
- Ex-post fairness: $Pr[x = y] = 1$; $d(\cdot) = D(\cdot) = 0$.
- Utility collapses to CRRA:

$$U(L) = \frac{1}{\gamma}\mathbb{E}_{F_X}[x^\gamma]$$

Indiff. Curves | Prediction

Budget constraints | Descriptive graphs | Rationality | Examples

Experiment: Ex-Post Unfair (but Ex-Ante Fair) Risks

- Same as before, but luck is reversed: $y_A = x_B$ and $y_B = x_A$
- Ex-post unfairness.
- Ex-ante fairness: $F_X = F_Y$; D(.)=0.
- Utility function becomes:

$$U = \frac{1}{2\gamma}\left(\left[(a - s_\Delta\theta\bar{\delta})x_A^\rho + (\bar{a} + s_\Delta\theta\bar{\delta})x_B^\rho\right]^{\frac{\gamma}{\rho}}\right) + \frac{1}{2\gamma}\left(\left[(a + s_\Delta\theta\bar{\delta})x_B^\rho + (\bar{a} - s_\Delta\theta\bar{\delta})x_A^\rho\right]^{\frac{\gamma}{\rho}}\right)$$

Indiff. Curves | Prediction

Budget constraints | Descriptive graphs | Examples

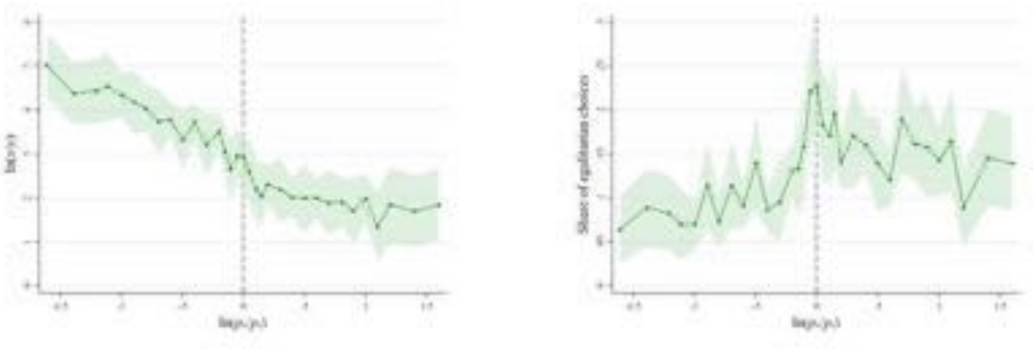
Experiment: Sharing in Chances

- Each choice context presents the DM with two fixed, mutually exclusive outcomes $A = (x_A, y_A)$ and $B = (x_B, y_B)$.
- $x_A > x_B$ and $y_B > y_A$.
- The DM chooses the probabilities of A and B, (q_A, q_B), with $q_A + q_B = 1$.
- If $\theta\delta > 0$, the model predicts $Pr[A] \in (0, 1)$ for some A, B.

Prediction

Budget constraints | Descriptive graphs

Descriptive: DetGiv

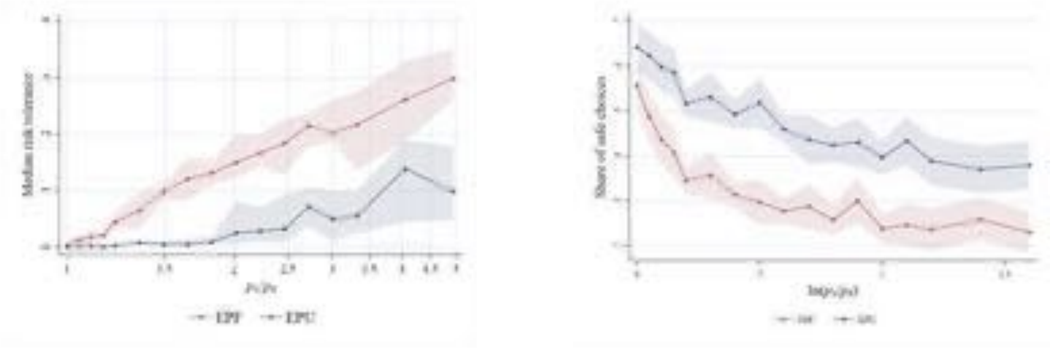


(a) Ratio of the DM's and partner's payoffs

(b) Share of egalitarian choices

Figure: Behavior under Deterministic giving. Panel(a) plots the ratio of $ln(\frac{x}{y})$ against $ln(\frac{p_x}{p_y})$. We impute $\frac{x}{y} = 0.001$ when $x = 0$,and $\frac{x}{y} = 1000$ when $y = 0$. Panel (b) plots the share of egalitarian choices. A choice is considered egalitarian when the difference between the DM's payoff and their partner's is 2 or less.

Descriptive: Ex-Post Fair and Ex-Post Unfair Risks

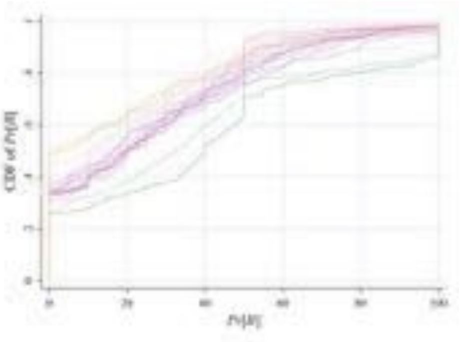


(a) Nonparametric risk tolerance measure

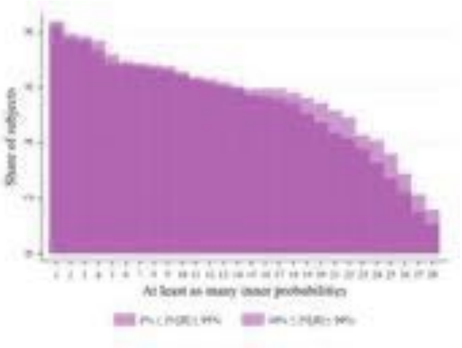
(b) Share of safe choices

Figure: Measures of Risk-Taking under EPF and EPU. Panel (a) presents the median of a nonparametric measure of risk tolerance defined as the distance, from the chosen security bundle to the safe choice as a proportion of the rational segment of the budget line. Panel (b) displays the relative frequency of safe choices–i.e., those in which $|x_A - x_B| \leq 2$ ECUs.

Descriptive Analysis: Sharing in Chances



(a) Empirical CDF of chosen Pr[B]



(b) Share of subjects with at least as many inner probabilities

Figure: Behavior under Sharing in Chances. Panel (a) shows the empirical CDF of the chosen $Pr[B]$ for each of the 28 decision tasks under SiC. Each bar in Panel (b) shows the share of subjects that chose at least as many inner probabilities as indicated in the x-axis.

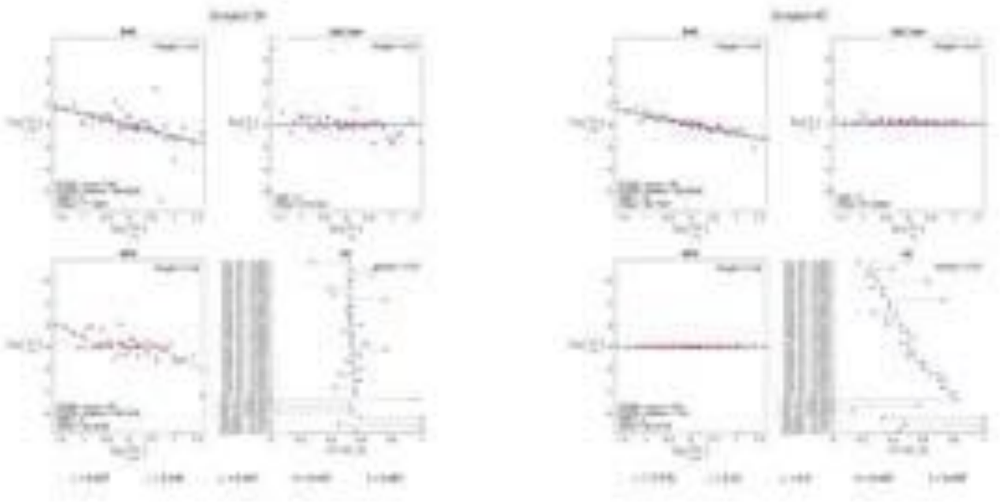
Testing Broad/Aggregate Predictions

Result 1: Most people exhibit strong ex-post fairness attitudes. Most articipants bear more risk in the EPF than in the EPU task.

Result 2: Between 50% and 70% of participants consistently exhibit ex-ante fairness-seeking behavior.

Result 3: Peoples' ex-ante fairness-seeking behavior is uncorrelated with their degree of risk tolerance.

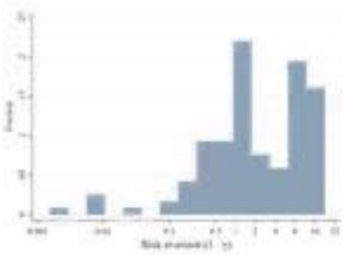
Subjects' Choices: predicted vs. actual decisions



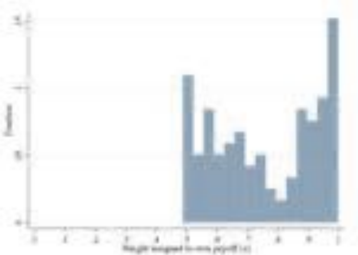
Parameter	Percentile 3	10	25	33	50	66	75	90	97
Relative risk aversion									
$1-\gamma$	0.007	0.209	0.695	0.989	1.698	8.382	11.064	16.977	21.748
Selfishness									
a	0.500	0.522	0.592	0.636	0.754	0.891	0.928	0.987	1.000
Elasticity of social substitution									
$1/(1-\rho)$	0.116	0.312	0.483	0.691	1.390	2.561	6.873	209.0	2,318
Inequality aversion									
θ	0.000	0.002	0.030	0.052	0.114	0.227	0.265	0.408	0.487
θ/a	0.000	0.002	0.033	0.054	0.156	0.328	0.412	0.760	0.970
Kink in deterministic social preferences at $x=y$									
$\frac{(a+\theta)(\bar{a}+\theta)}{(\bar{a}-\theta)(a-\theta)}$	1.027	1.312	2.725	4.988	21.81	82.51	307.2	5,851	36×10^7
Measures of ex-ante inequality concerns									
δ	0.000	0.003	0.033	0.072	0.209	0.557	0.770	0.970	0.999
δ if $\theta>0.01$	0.000	0.002	0.028	0.047	0.172	0.527	0.799	0.979	0.999
$\theta\delta$	0.000	0.000	0.001	0.002	0.009	0.031	0.083	0.224	0.297
$\theta\delta/a$	0.000	0.000	0.001	0.003	0.010	0.047	0.147	0.306	0.568
Measures of ex-post inequality concerns									
$1-\delta$	0.001	0.030	0.230	0.428	0.791	0.922	0.967	0.997	1.000
$1-\delta$ if $\theta>0.01$	0.001	0.021	0.201	0.428	0.828	0.936	0.972	0.998	1.000
$\theta(1-\delta)$	0.000	0.000	0.006	0.013	0.045	0.091	0.150	0.361	0.436
$\theta(1-\delta)/a$	0.000	0.000	0.007	0.015	0.053	0.124	0.253	0.722	0.857
Kink in ex-post unfair lotteries at $x_A=x_B$									
$\left[\frac{1+2\theta(1-\delta)}{1-2\theta(1-\delta)}\right]^2$	1.000	1.001	1.045	1.109	1.439	2.084	3.454	38.38	210.8

Notes: The table reports the results for the 118 rational subjects. All values have been rounded to the third decimal. For θ and δ, we also report the results for the sub-sample of rational subjects with non-negligible inequality aversion ($\theta > 0.01$, $n = 99$).

Model Results: Distribution of estimated parameters (1)

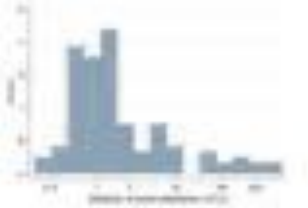


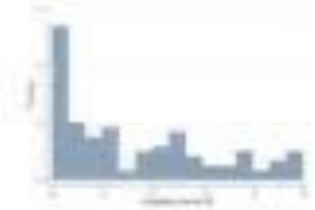
(a) Basic risk aversion



(b) Selfishness

Model Results: Distribution of estimated parameters (2)





Alternative Parametrization: GEIA

- $\mathbb{E}u(x, y)$ can "explain" ex-post fairness seeking, but not ex-ante.
- $u(\mathbb{E}x, \mathbb{E}y)$ can "explain" ex-ante fairness seeking, but not ex-post.
- Can a convex combination "explain" both?

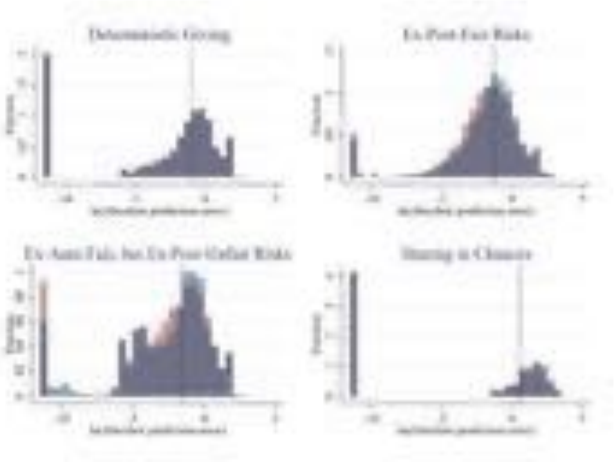
$$U(L) = \delta u(\mathbb{E}x, \mathbb{E}y) + (1 - \delta)\mathbb{E}u(x, y) \tag{4}$$

- Fudenberg and Levine (2012), Saito (2013), Brock et al. (2013), etc.
- Big prediction: **individuals with higher ex-ante fairness motivations will be more tolerant to risks**.

Contrasting Predictive Power

- We fit the model at the individual level for both GEIA and our model.
- We leave five choices out of the estimation to do **out of sample prediction** exercises.
- We compare the mean square error by task.
- Our model outperforms GEIA in risky tasks.

Predictive Power Comparison



Kernel Density Figure

Conclusions 1

We propose a utility framework and a parametrization that:

1. Is one step toward a **unified framework** for studying risk and social preferences jointly.
2. This framework **disentangles** risk attitudes from other-regarding preferences (analogous to time-risk).
3. **Generalizes** many models of risk-less other-regarding preferences and risk attitudes.
4. Contemplates **ex-post and ex-ante fairness** in a principled manner.

Conclusions 2

1. Our **experiment** allows us to **characterize the interactions and entanglement** between risk and other-regarding preferences.

2. For most participants, **ex-post inequality** aversion impacts risk attitudes substantially.

3. Between 50 and 70% consistently exhibit **ex-ante fairness-seeking** behavior.

4. Our structural individual analysis allows us to characterize the participants' sample in five fundamental dimensions of basic risk attitudes, selfishness, social substitution, inequality aversion, and ex-ante/ex-post orientation.

5. We test a key prediction of the alternative GEIA model (namely, ex-ante fairness motivations are positively linked with risk tolerance). We do not find supporting evidence.

6. In predictive power, our model outperforms so far all models, including the original EIA and the GEIA.

Appendix

An Alternative Model - Saito (2013)

- In this model, decision utility is given by:

$$U(L) = \delta' u(\mathbb{E}[x], \mathbb{E}[y]) + (1 - \delta')\mathbb{E}[u(x, y)] \quad (5)$$

- Prediction: The more ex ante fairness oriented the more risk tolerant

Disentangling Preferences - Saito (2013)

Table: Descriptive Table of parameters

Parameter	N	$p10$	$p25$	$p50$	$p75$	$p90$
γ	118	-186.583	-5.171	-0.85	0.079	0.65
a	118	0.501	0.532	0.731	0.925	0.98
ρ	118	-0.883	-0.404	0.248	0.883	0.994
θ	118	0	0.01	0.107	0.291	0.471
$\theta \mid \theta > 0.01$	88	0.038	0.08	0.183	0.373	0.486
δ	118	0	0.007	0.062	0.348	0.584
$\delta \mid \theta > 0.01$	88	0	0.007	0.042	0.293	0.45
$\delta \times \theta$	118	0	0	0.002	0.034	0.144

Ex Ante Fairness Motive

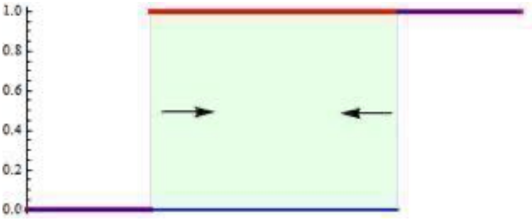


Figure: CDF under Deterministic Scenario (Blue: DM, Red: DM's partner)

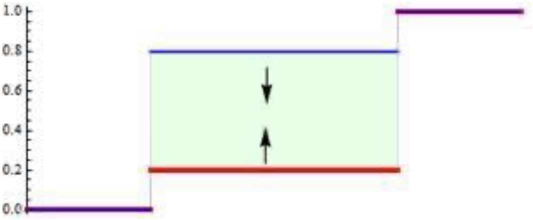
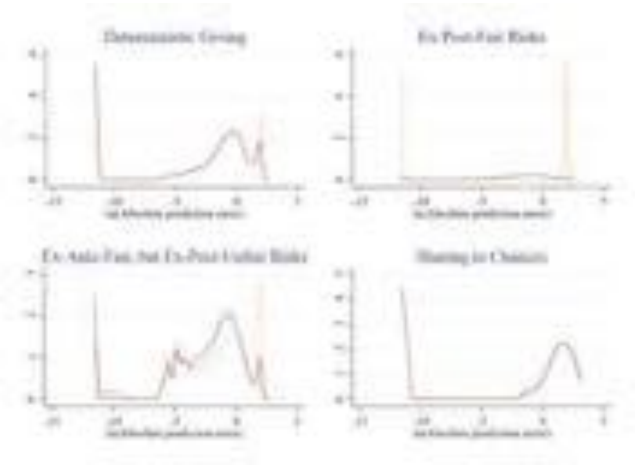


Figure: CDF under ex-ante unfair risk (Blue: DM, Red: DM's partner

- The horizontal movement suggested by the arrows decreases ex-post inequality.
- The vertical movement suggested by the arrows decreases ex-ante inequality.

Go back: Model

Predictive Power Comparison (kernel density)



Go back: Histogram

Indifference curves under Deterministic Giving

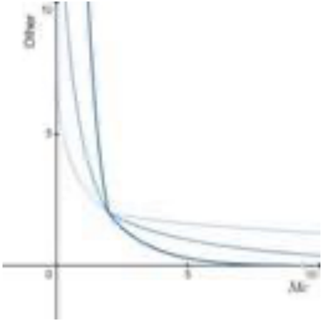


Figure: Deterministic Giving when a is increasing (darker)

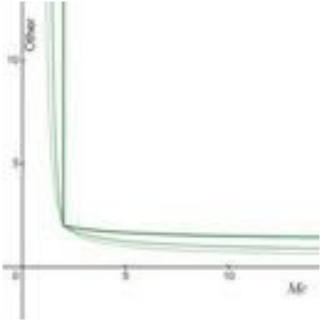


Figure: Deterministic Giving when θ is increasing (darker)

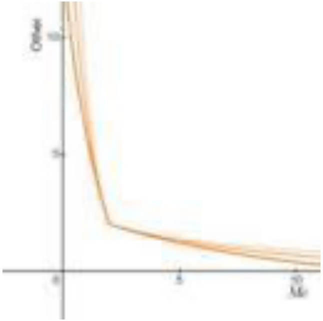


Figure: Deterministic Giving when ρ is increasing (darker)

Go Back: Design DetGiv

Indifference curves under Ex-post Fairness and Unfairness

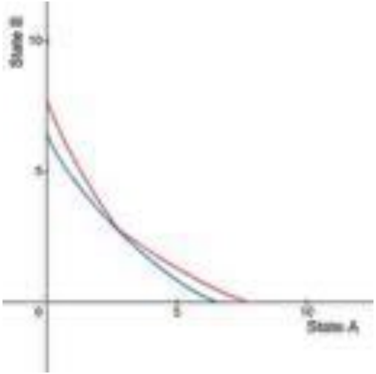


Figure: Indifference curves under EPF (blue) and EPU (red)

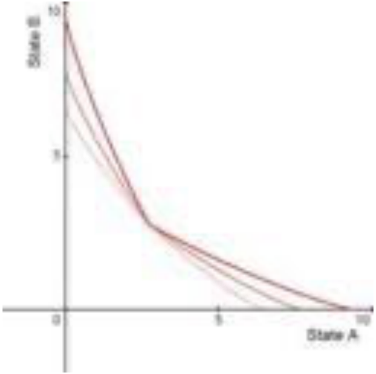


Figure: EPU when $\theta\bar{\delta}$ is increasing (darker)

Go Back: Design EPF

Go Back: Design EPU

Model Predictions (1): No Risk / Deterministic Preferences

1. $D(F_X, F_Y) = d(x, y)$ and, then, preferences can be represented by:

$$u(x,y) = [(a - s_{\Delta}\theta)x^{\rho} + (\bar{a} + s_{\Delta}\theta)y^{\rho}]^{\frac{1}{\rho}} \tag{6}$$

   where $s_{\Delta} = sign(x - y)$. Kinky CES.

2. Nests widely used social-preferences functions (FS99, CR03, AM03, FKM07, CF07)
3. Optimal behavior when facing a convex budget $m = p_x x + p_y y$:

$$\frac{x}{y} = \left[\min\left\{\max\left\{1, \frac{p_x}{p_y}\frac{\bar{a} - \theta}{a + \theta}\right\}, \frac{p_x}{p_y}\frac{\bar{a} + \theta}{a - \theta}\right\}\right]^{\frac{1}{\rho - 1}} \tag{7}$$

Go Back: Design Detgiv

Model Predictions (2): Risks Are Ex-Post Fair

1. If $x = y$ with certainty, then $d(\cdot) = D(\cdot) = 0$. That is, we also have ex-ante fairness.
2. Utility collapses to CRRA:

$$U = \frac{1}{\gamma}\mathbb{E}\left(x^{\gamma}\right) \quad (8)$$

3. If there are two equally likely states A and B, and DM faces a convex budget for A and B securities; $m = p_A x_A + p_B x_B$, optimal behavior is given by:

$$\frac{x_A}{x_B} = \left(\frac{p_A}{p_B}\right)^{\frac{1}{\gamma-1}} \quad (9)$$

Go Back: Design EPF

Model Predictions (2): Risks Are Ex-Post Fair

1. If $x = y$ with certainty, then $d(\cdot) = D(\cdot) = 0$. That is, we also have ex-ante fairness.
2. Utility collapses to CRRA:

$$U(L) = \frac{1}{\gamma}\mathbb{E}_{F_X}[x^{\gamma}] \tag{10}$$

3. If there are two equally likely states A and B, and DM faces a convex budget for A and B securities; $m = p_A x_A + p_B x_B$, optimal behavior is given by:

$$\frac{x_A}{x_B} = \left(\frac{p_A}{p_B}\right)^{\frac{1}{\gamma-1}} \tag{11}$$

Go Back: Design EPF

Model Predictions (3): Risks Are **Ex-Ante Fair**, But **Ex-Post Unfair**

1. Consider two equally likely states A and B, and DM faces a convex budget for A and B securities; $m = p_A x_A + p_B x_B$. However, luck is reversed between agents: $y_A = x_B$ and $y_B = x_A$.
2. If we define $x = x_A / x_B$ and $p = p_A / p_B$. Optimal behavior can be written as:

$$x = \left[\min\left\{\max\left\{1, \underline{H}(x,p)\right\}, \overline{H}(x,p)\right\}\right]^{\frac{1}{\rho-1}} \tag{12}$$

where:

$$\underline{H}(x,p) = p\frac{V_+(\bar{a}+\theta\bar{\delta}) + (a+\theta\bar{\delta})}{V_+(a-\theta\bar{\delta}) + (\bar{a}-\theta\bar{\delta})} \qquad V_+(x) = \left(\frac{x^\rho(a-\theta\bar{\delta}) + (\bar{a}+\theta\bar{\delta})}{x^\rho(\bar{a}-\theta\bar{\delta}) + (a+\theta\bar{\delta})}\right)^{\frac{\gamma}{\rho}-1}$$

$$\overline{H}(x,p) = p\frac{V_-(\bar{a}-\theta\bar{\delta}) + (a-\theta\bar{\delta})}{V_-(a+\theta\bar{\delta}) + (\bar{a}+\theta\bar{\delta})} \qquad V_-(x) = \left(\frac{x^\rho(a+\theta\bar{\delta}) + (\bar{a}-\theta\bar{\delta})}{x^\rho(\bar{a}+\theta\bar{\delta}) + (a-\theta\bar{\delta})}\right)^{\frac{\gamma}{\rho}-1}$$

Go Back: Design EPU

Model Predictions (3): Risks Are **Ex-Ante Fair**, But **Ex-Post Unfair**

1. Consider two equally likely states A and B, and DM faces a convex budget for A and B securities; $m = p_A x_A + p_B x_B$. However, luck is reversed between agents: $y_A = x_B$ and $y_B = x_A$.
2. If we define $x = x_A / x_B$ and $p = p_A / p_B$. Optimal behavior can be written as:

$$x = \left[\min\left\{\max\left\{1, \underline{H}(x,p)\right\}, \overline{H}(x,p)\right\}\right]^{\frac{1}{\rho-1}} \tag{13}$$

where:

$$\underline{H}(x,p) = p\frac{V_+(\bar{a}+\theta\bar{\delta}) + (a+\theta\bar{\delta})}{V_+(a-\theta\bar{\delta}) + (\bar{a}-\theta\bar{\delta})} \qquad V_+(x) = \left(\frac{x^\rho(a-\theta\bar{\delta}) + (\bar{a}+\theta\bar{\delta})}{x^\rho(\bar{a}-\theta\bar{\delta}) + (a+\theta\bar{\delta})}\right)^{\frac{\gamma}{\rho}-1}$$

$$\overline{H}(x,p) = p\frac{V_-(\bar{a}-\theta\bar{\delta}) + (a-\theta\bar{\delta})}{V_-(a+\theta\bar{\delta}) + (\bar{a}+\theta\bar{\delta})} \qquad V_-(x) = \left(\frac{x^\rho(a+\theta\bar{\delta}) + (\bar{a}-\theta\bar{\delta})}{x^\rho(\bar{a}+\theta\bar{\delta}) + (a-\theta\bar{\delta})}\right)^{\frac{\gamma}{\rho}-1}$$

Go Back: Design EPU

Model Predictions (4): Ex-Ante Fairness Dilemmas

- Two states (A, B), fixed payoffs $(x_A, y_A); (x_B, y_B)$.
- State outcomes are not Pareto ranked ($x_A > x_B$ and $y_B > y_A$)
- DM chooses $Pr[A]$ represented below by q

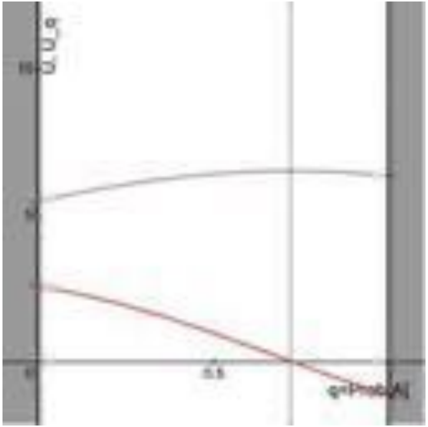
$$D(q) = s_\rho((\tilde{y}_A^\rho - y_A^\rho + x_A^\rho - \tilde{x}_A^\rho)q^2 + (\tilde{x}_B^\rho - x_B^\rho + y_B^\rho - \tilde{y}_B^\rho)(1-q)^2 + (\tilde{x}_A^\rho - \tilde{x}_B^\rho)(1-2q)^2 + s_\Delta(\tilde{x}_A^\rho - \tilde{y}_B^\rho))$$

$$V(q|S) = a x_S^\rho + \bar{a} y_S^\rho - s_\rho \theta(\bar{\delta}|x_S^\rho - y_S^\rho| - \delta D(q))$$

$$q = \frac{f(V(q|B)) - f(V(q|A)) - f_1(V(q|B))V_q(q|B)}{f_1(V(q|A))V_q(q|A) - f_1(V(q|B))V_q(q|B)}$$

where: $f(w) = \frac{w^\gamma}{\gamma}$. For $z_1 \in \{x_A, y_B\}$ and $Z = \{x_A, x_B, y_A, y_B\}$, $\tilde{z}_1 \equiv \min(z_1, \max(Z \setminus z_1))$. Likewise, for $z_2 \in \{x_B, y_A\}$, $\tilde{z}_2 \equiv \max(z_1, \min(Z \setminus z_2))$. Go Back: Design SC

Utility and Marginal utility under Sharing in Chances



Go Back: Design SC

Scenarios faced by subjects (1)

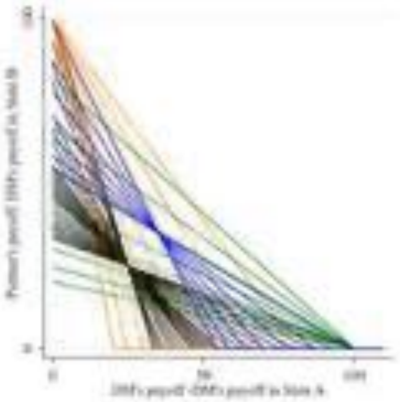


Figure: Budget constraints under Deterministic Giving, EPF and EPU

Go Back: Design

Scenarios faced by subjects (2)

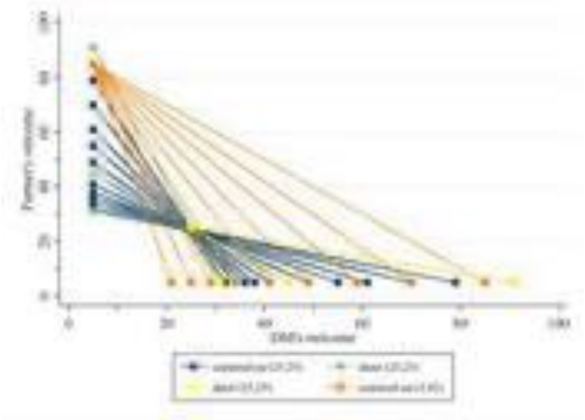


Figure: Budget constraints under Sharing in chances

Go Back: Design SC

Descriptive Stats: Deterministic Giving

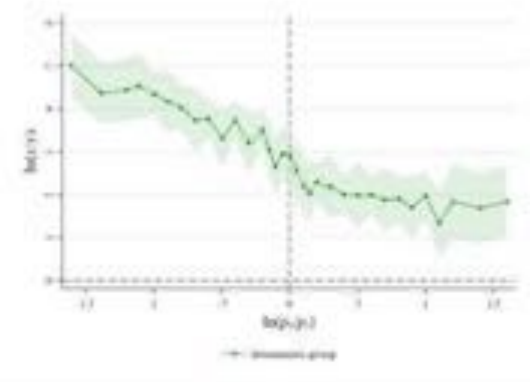


Figure: Ratio of payoffs

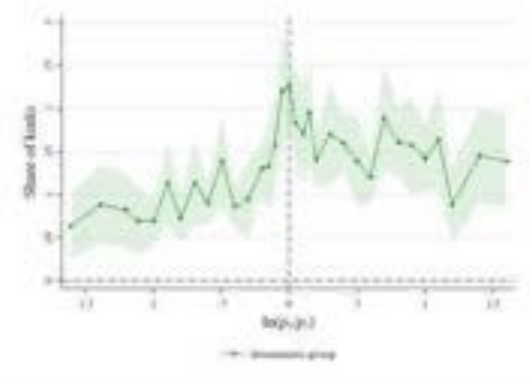


Figure: Share of igualitarian choices

See Design DetGiv

Descriptive Stats: Ex-Post Fairness and Unfairness

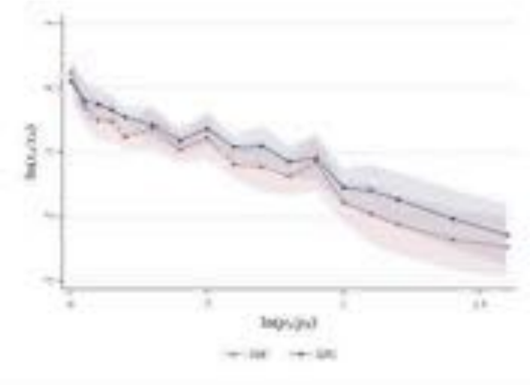


Figure: Ratio of own payoffs under states A and B

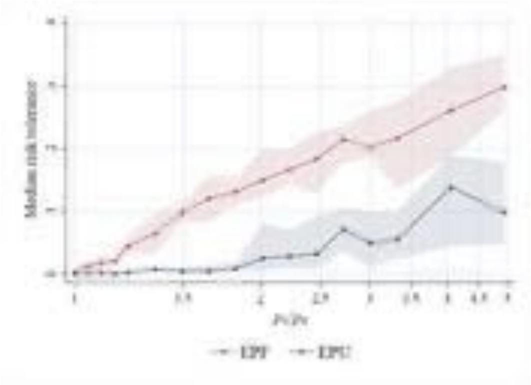


Figure: Parameter-free measure of risk tolerance

Go Back: Design EPF | Go Back: Design EPU | See Result 1

Descriptive Stats: Sharing in Chances

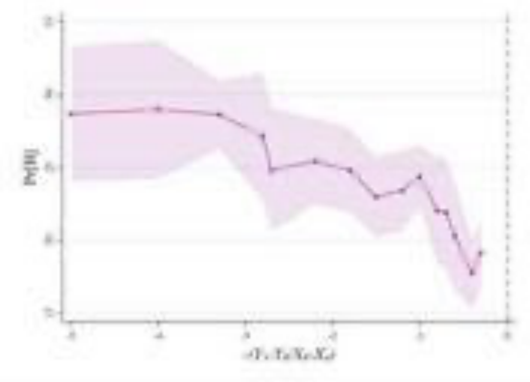


Figure: $Pr[B]$ chosen

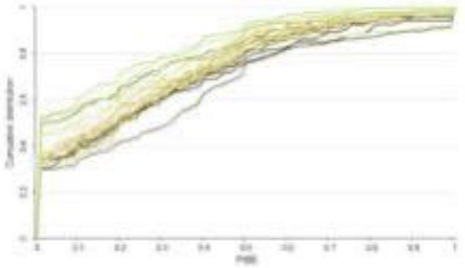


Figure: Cumulative Distribution Function of $Pr[B]$ (from brown to green: $\frac{-(y_A - y_B)}{x_B - x_A}$ closer to zero)

See Design SC

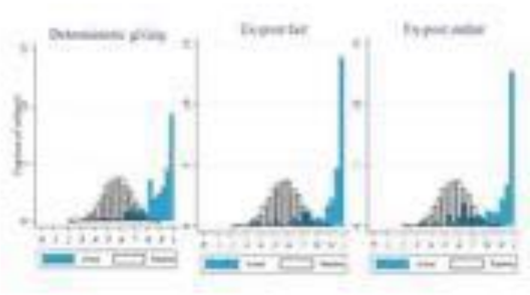
See Result 2

Rationality Testing

- We test rationality in two different settings: risk-related decision-making (where there is ex-post fairness or unfairness) and deterministic giving.
- We measure the extent of GARP violations through Afriat's critical cost efficiency index (CCEI).
- We only run the model for subjects whose CCEI score is above 0.7 in each task mentioned. This threshold was decided considering the distribution of scores by synthetic subjects making random choices (N=10000).
- Out of the 158 subjects, 118 subjects have a higher CCEI score.

Go back: Estimation

Distributions of Afriat's Critical Cost Efficiency Index (CCEI)



Go back: Design Detgiv | Go back: Design EPF | Go back: Design EPU | Go back: Estimation

Estimation strategy (Preliminary)

- We are able to **characterize and disentangle** different components of risk attitudes and other-regarding preferences.

- We fit our proposed model for each individual.
  1. We use ex-post fair tasks to estimate γ.
  2. We use ex-post unfair and dictator games to estimate ρ, α and θ, δ.
- We restrict our sample to **individuals whose choices are relatively consistent with GARP** (114 out of 158).

Results

Results from sessions in San Diego

Results: Descriptive Stats: Deterministic Giving

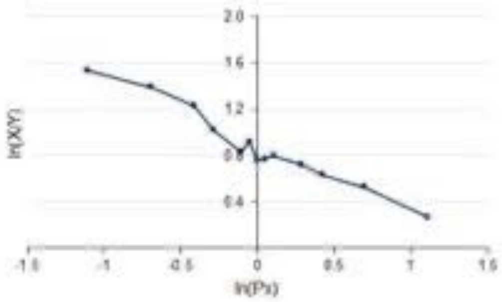


Figure: Ratio of payoffs

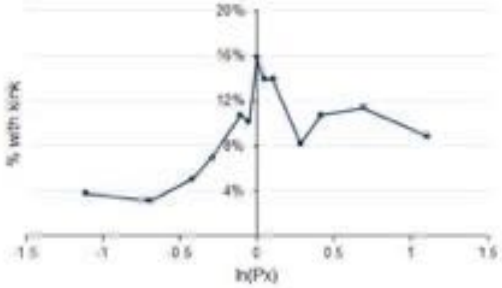


Figure: Share of choices at kink

See Table

Results: Descriptive Stats: Ex-Post Fairness and Unfairness

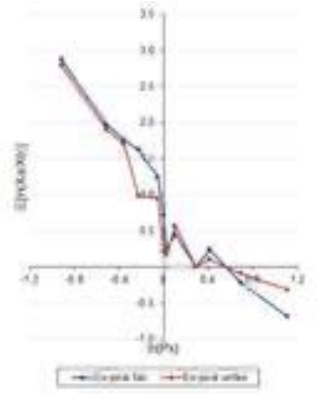


Figure: Ratio of own payoffs under states A and B

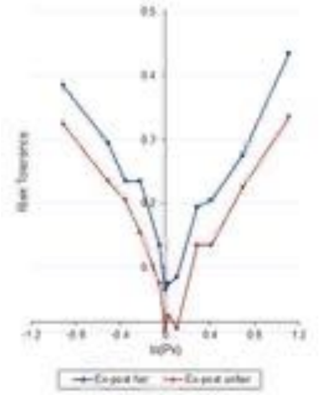


Figure: Parameter-free measure of risk tolerance

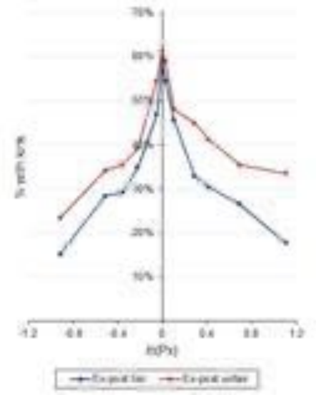


Figure: Share of choices at kink

See Table

Results: Descriptive Stats: Sharing in Chances

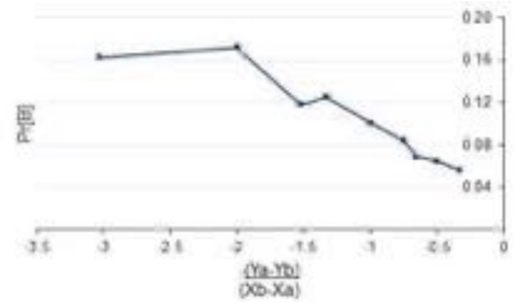


Figure: $Pr[B]$ chosen

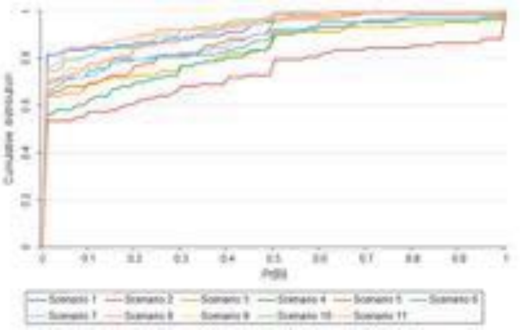


Figure: Cumulative Distribution Function of $Pr[B]$

See Table

Descriptive Stats: Determistic Giving

Table: Deterministic Giving

M	Px	Mean(X)	Mean(Y)	sd(x)	sd(Y)	$\frac{\text{Mean(X)}}{\text{Mean(Y)}}$	Egalitarian Choice	% of kink
33.25	0.33	79.36	7.07	26.14	8.62	11.23	25.00	0.04
37.50	0.50	59.62	7.69	17.82	8.91	7.75	25.00	0.03
41.50	0.66	51.36	7.61	13.59	8.96	6.75	25.00	0.05
43.75	0.75	46.28	9.02	13.11	9.84	5.13	25.00	0.07
47.50	0.90	41.61	10.06	11.27	10.14	4.14	25.00	0.11
48.75	0.95	41.05	9.74	10.71	10.18	4.21	25.00	0.10
50.00	1.00	39.37	10.63	11.06	11.06	3.70	25.00	0.16
51.32	1.05	38.85	10.54	10.57	11.09	3.69	25.03	0.14
52.78	1.11	37.37	11.28	10.61	11.81	3.31	25.01	0.14
58.33	1.33	35.14	11.62	9.97	13.24	3.02	25.03	0.08
62.88	1.52	34.08	11.10	8.44	12.82	3.07	24.95	0.11
75.00	2.00	30.17	14.65	9.13	18.26	2.06	25.00	0.11
100.76	3.03	27.07	18.78	8.28	25.05	1.44	25.00	0.09

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Descriptive Stats: Ex-post Fairness and Ex-post Unfairness

Table: Ex-post Fairness and Ex-post Unfairness

Context		Choices Ex-Post Fair			Choices Ex-Post Unfair		
M	P_x	X_a	Risk Tol	% of kinks	X_a	Risk Tol	% of kinks
35.0	0.4	47.83	0.37	0.15	46.88	0.31	0.23
40.0	0.6	36.71	0.28	0.28	35.35	0.22	0.34
42.5	0.7	32.93	0.22	0.29	33.02	0.19	0.35
45.0	0.8	31.81	0.22	0.35	29.87	0.14	0.39
48.8	0.95	29.18	0.12	0.47	27.74	0.06	0.54
50.0	1	26.35	0.05	0.59	24.72	-0.01	0.61
50.8	1.03	23.95	0.06	0.54	25.08	0.01	0.59
52.8	1.11	23.40	0.07	0.46	25.36	-0.01	0.48
58.3	1.33	20.86	0.18	0.33	22.22	0.12	0.45
62.9	1.51	20.46	0.19	0.30	22.03	0.12	0.41
75.0	2	18.59	0.26	0.27	19.64	0.21	0.35
100.8	3.03	14.55	0.42	0.18	17.12	0.32	0.34

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Descriptive Stats: Sharing in chances

Table: Sharing in chances

Decision Context					Choices			
Xa	Ya	Xb	Yb	-(Ya-Yb) / (Xb-Xa)	Prob(B)	sd	% with 0.95>Pr[B]>0.05	% with 0.90>Pr[B]>0.10
25	25	5	45	-1.00	6.45	15.37	16.5	15.53
45	5	25	25	-1.00	26.26	35.98	33.01	29.13
31.6	5	5	85.6	-3.03	16.25	27.86	30.10	25.24
35	5	5	65	-2.00	17.18	26.23	37.86	33.98
38.2	5	5	55.3	-1.52	11.82	20.14	31.07	30.10
40	5	5	51.7	-1.33	12.54	23.78	27.18	23.30
45	5	5	45	-1.00	10.10	17.90	29.13	27.18
51.7	5	5	40	-0.75	8.40	17.03	26.21	21.36
55.3	5	5	38.2	-0.66	6.87	13.32	25.24	24.27
65	5	5	35	-0.50	6.45	13.98	20.39	18.45
85.6	5	5	31.6	-0.33	5.60	13.90	16.50	14.56

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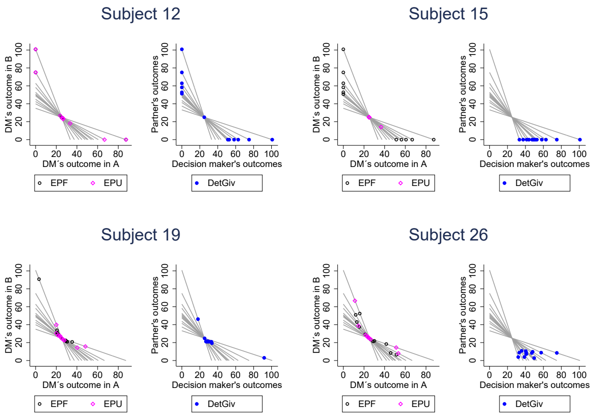
Subjects Choices Examples



Model Results: Distribution of parameters

Table: Descriptive Table of parameters (San Diego)

Parameter	*N*	Mean	*sd*	*p*10	*p*50	*p*90
γ	97	-1.115	3.295	-9.773	0.190	0.935
a	66	0.765	0.209	0.491	0.755	1
ρ	65	0.010	1.599	-1.422	0.440	1
θ	66	0.093	0.161	0.000	0.000	0.430
$\theta \mid \theta > 0$	26	0.242	0.179	0.033	0.236	0.481
δ	66	0.413	0.485	0.000	0.000	1
$\delta \mid \theta > 0$	26	0.356	0.459	0.000	0.000	1

Model Results: Distribution of parameters (1)

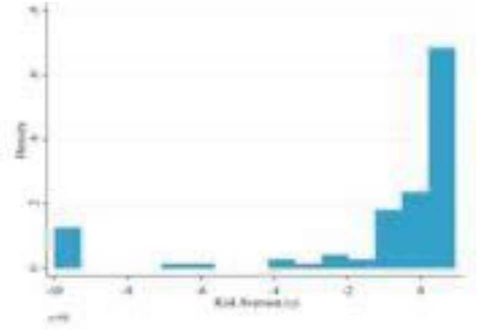


Figure: Distribution of γ

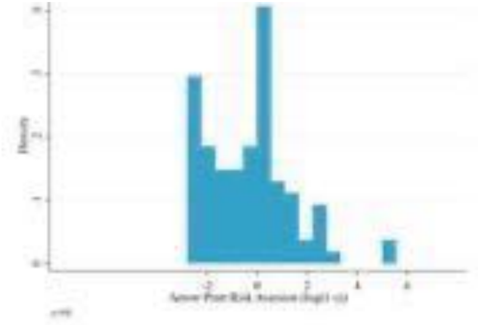


Figure: Distribution of Arrow-Pratt Measure

Model Results: Distribution of parameters (2)

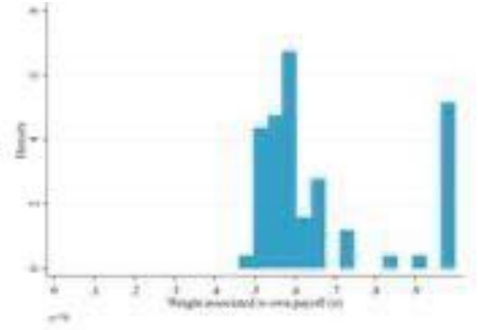


Figure: Distribution of ρ

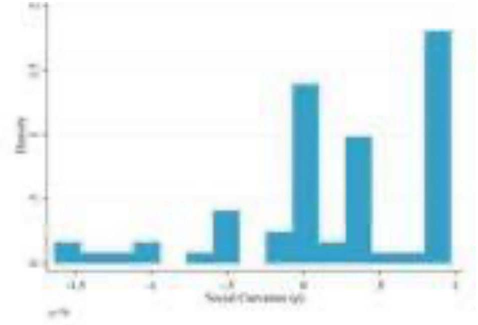


Figure: Distribution of weight of own payoff (α)

Model Results: Distribution of parameters (3)

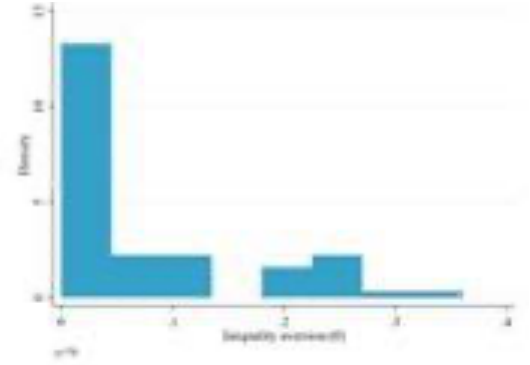


Figure: Distribution of inequality aversion (θ)

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Model Results: Distribution of parameters (4)

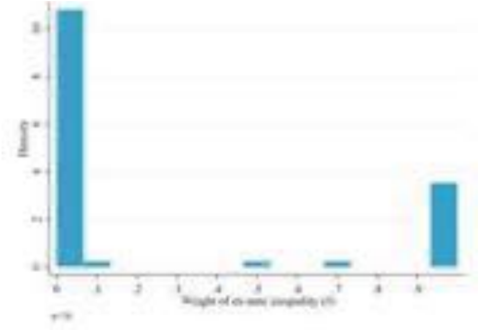

Figure: Distribution of weight of ex-ante inequality-EPU (δ)

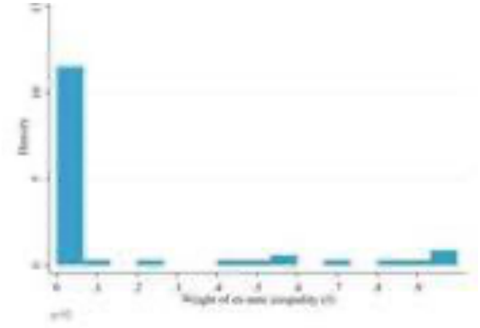

Figure: Distribution of weight of ex-ante inequality-SC (δ)

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Naive estimation of risk aversion

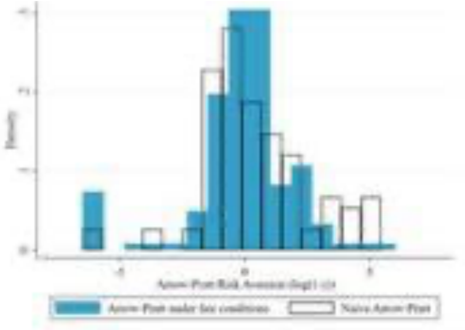

Figure: Distributions of Arrow-Pratt Measures of Risk Aversion

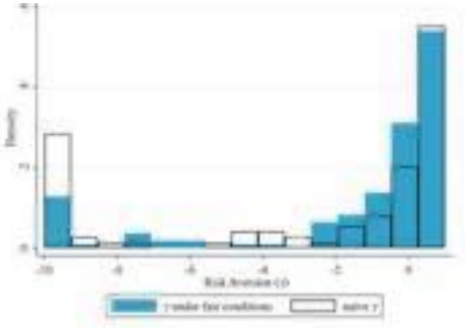

Figure: Distributions of γ

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Testing EIA

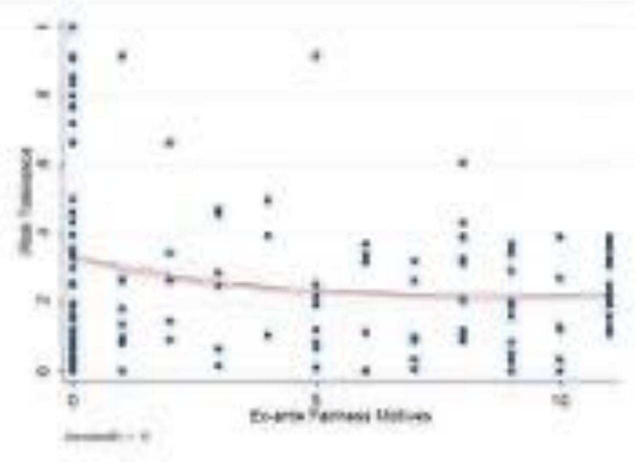

Figure: Locally weighted regression of risk tolerance on ex-ante fairness motives (number of times $0.05 < Pr[B] < 0.95$)

Testing EIA

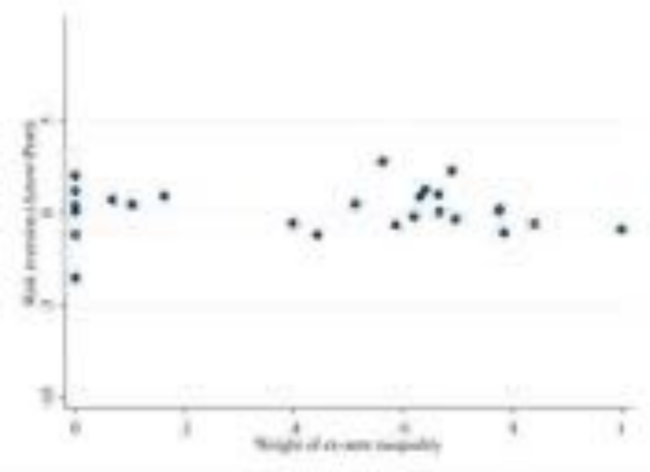

Figure: Scatter of ex-ante inequality weight and Arrow-Pratt Measure

Testing the competing model (GEIA)'s prediction

Interaction between risk attitudes and ex-ante fairness motives: individuals with higher ex ante fairness motivations will be more tolerant to risks.

- We define a parameter-free measure of ex-ante fairness concerns: average distance of chosen $Pr[B]$ from the nearest extreme (0 or 1).
- We regress parameter-free measure of risk tolerance against a parameter-free measure of ex-ante fairness concerns. We find no evidence in favor of the prediction. (coefficient $-.000469$, p-value $= 0.381$.

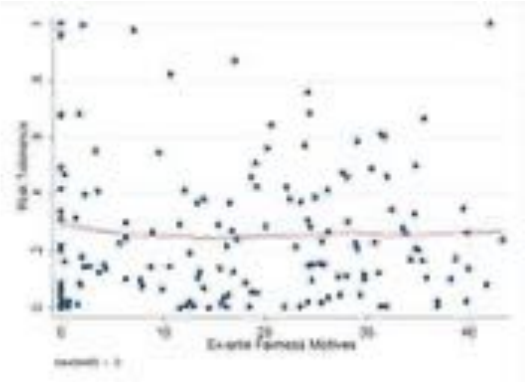

Figure: Non parametric regression of risk tolerance on ex-ante fairness motives.