Measuring tastes for equity and aggregate wealth behind the veil of ignorance

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Problem: efficiency vs. equity

- How do people make trade-offs between aggregate wealth and distributional equality among social members?
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    - a small cake with an equal split

Problem: efficiency vs. equity

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  - a big cake with an uneven split
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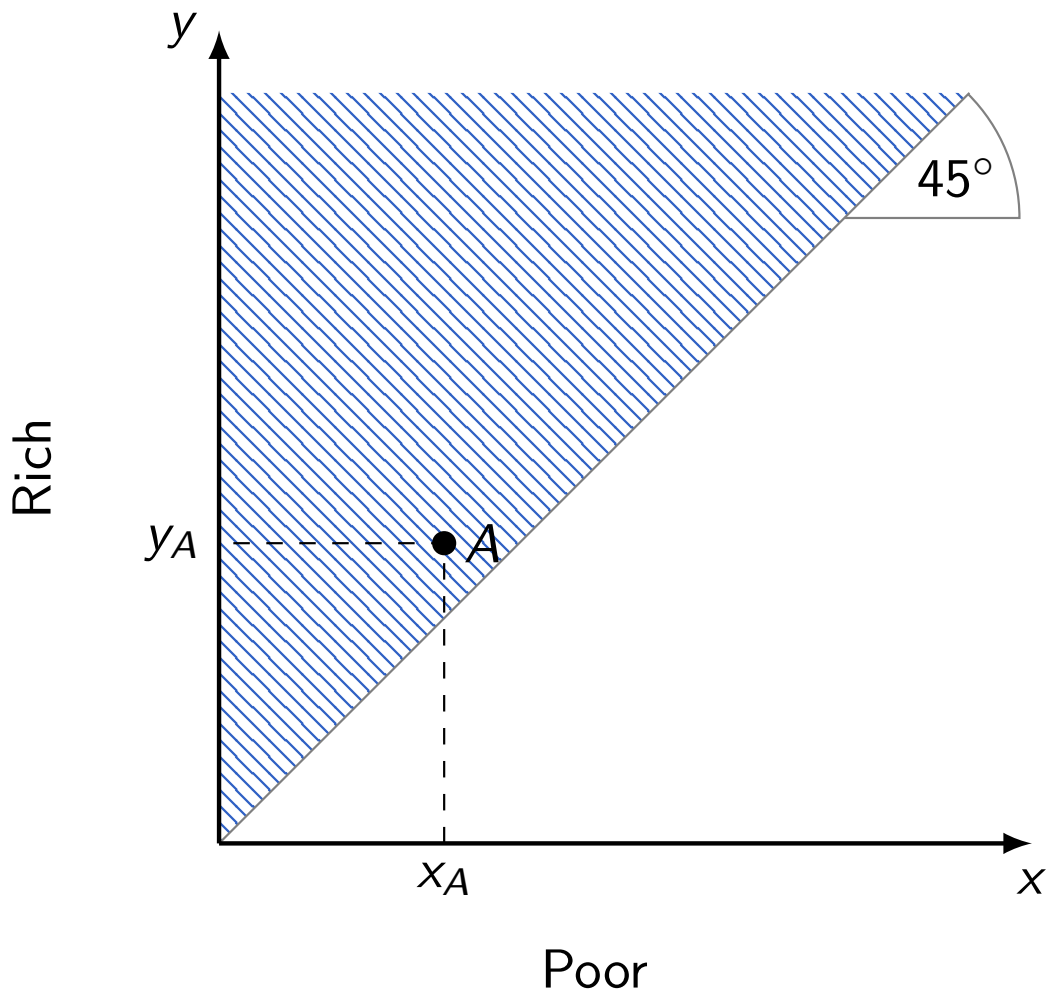
- Harsanyi's (1953) Veil of Ignorance (VoI) framework:
  - choose a wealth distribution for all social members
  - ignorant of individual position on the income ladder
  - know ex-ante that each position is equally likely

A VoI choice problem for a two-person economy



- efficiency: $x + y$
- equity: $\frac{x}{x+y}$
- trade-offs?

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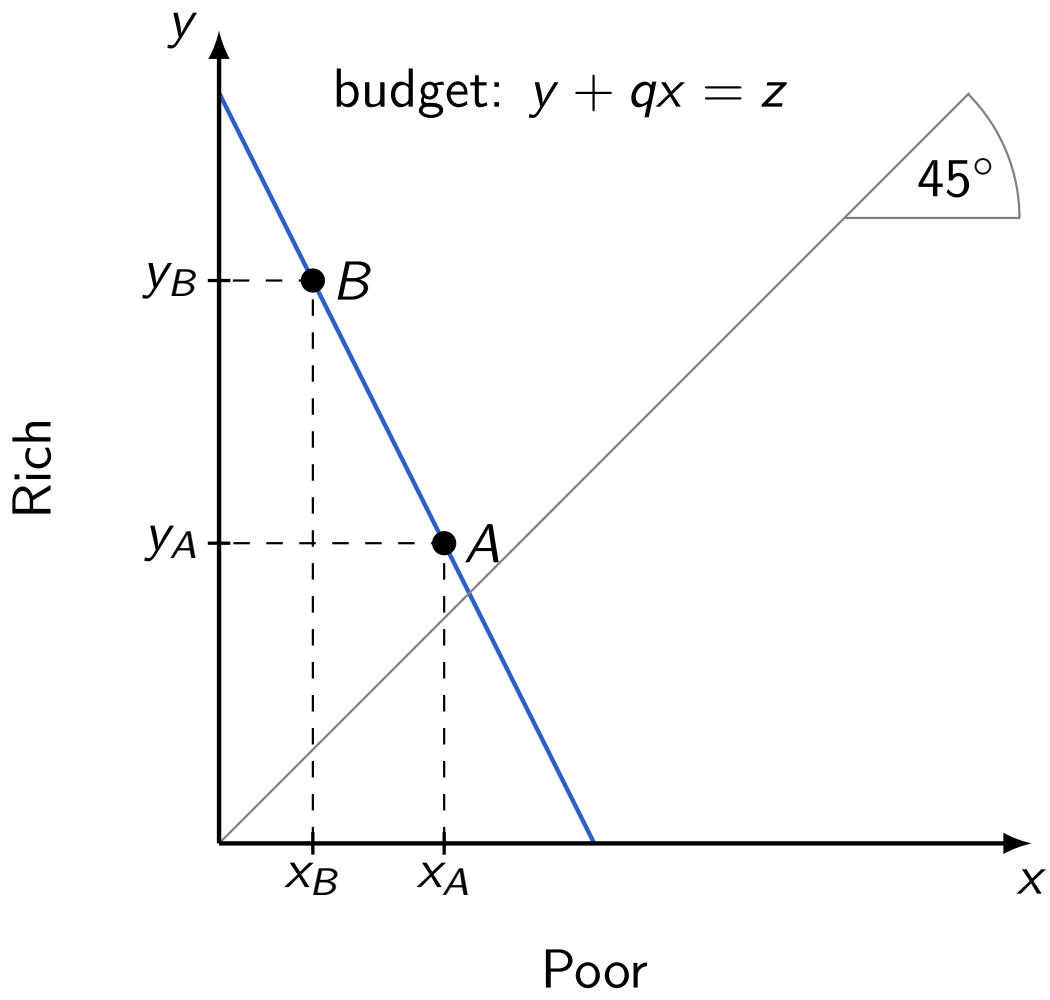

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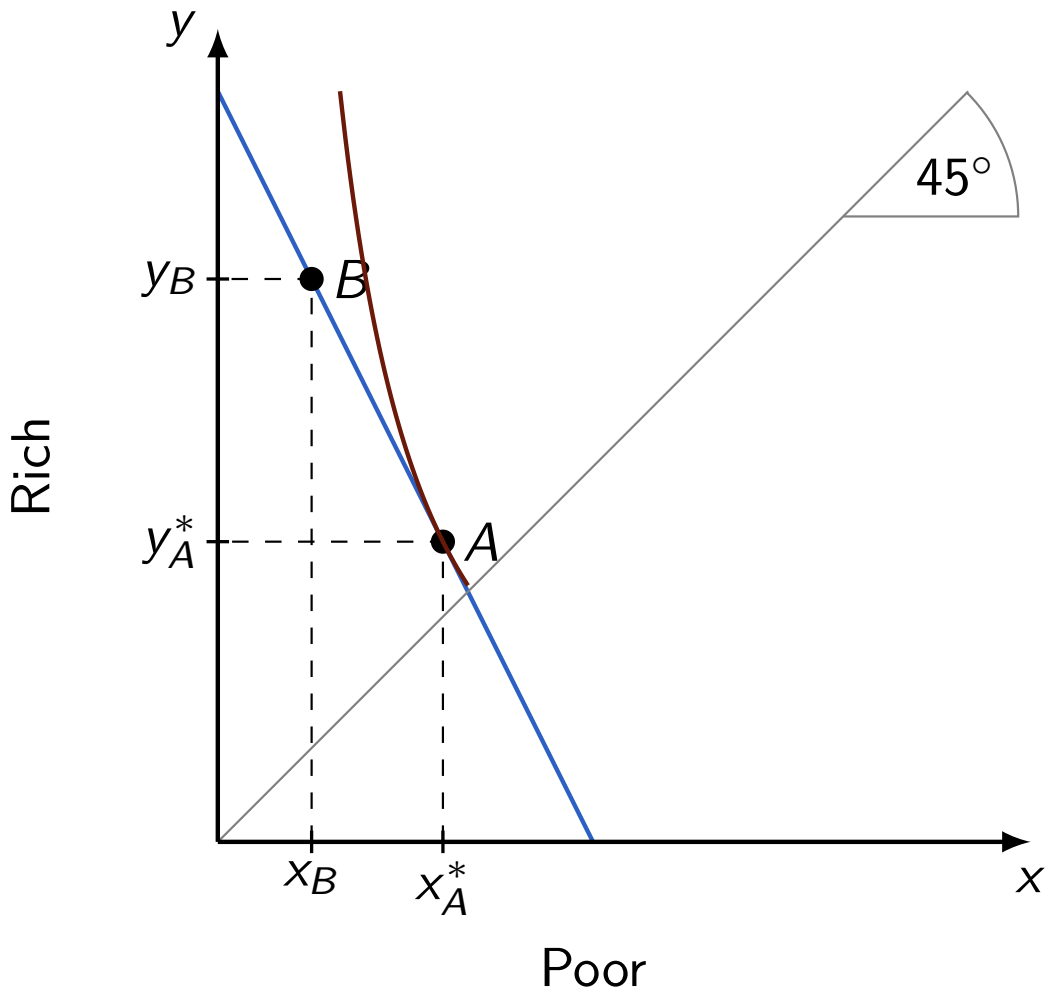
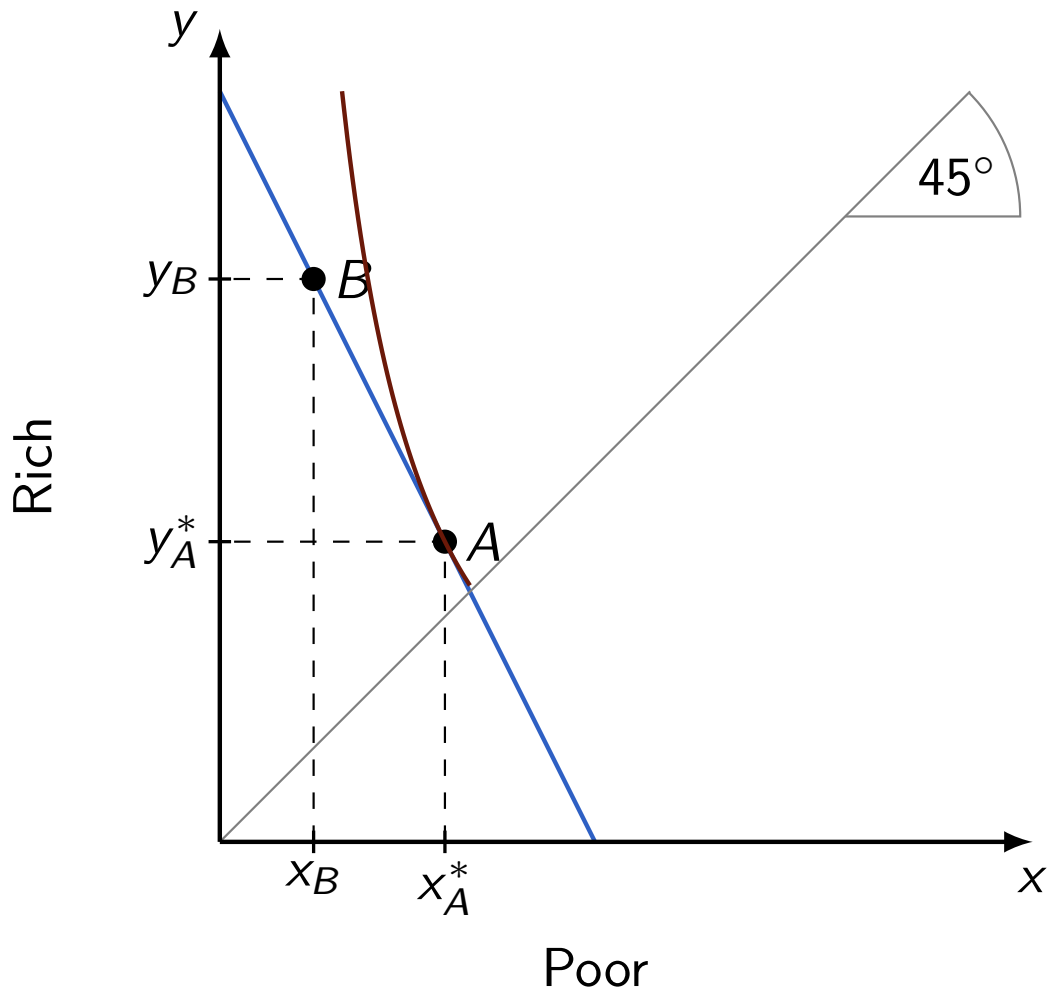
A Risk choice problem for an individual DM?



A Risk choice problem for an individual DM?



- Good state: Rich
- Bad state: Poor
- Lotteries: A and B

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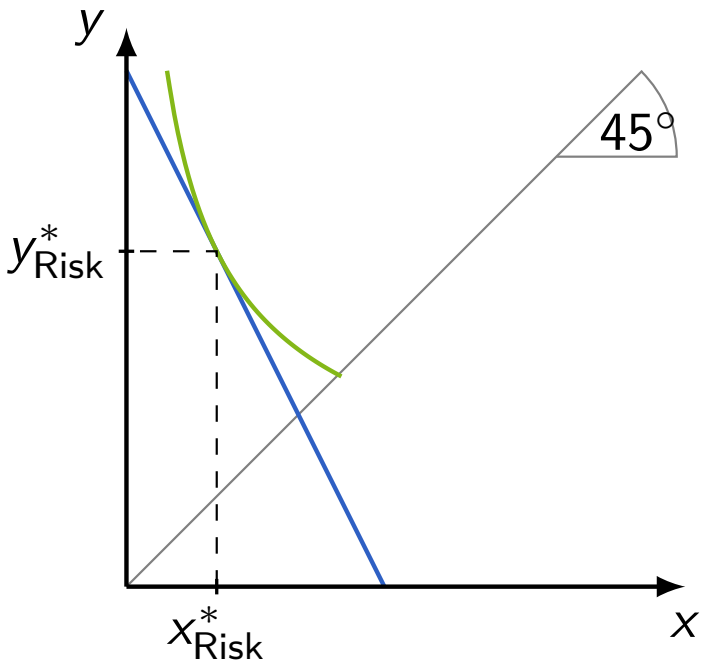
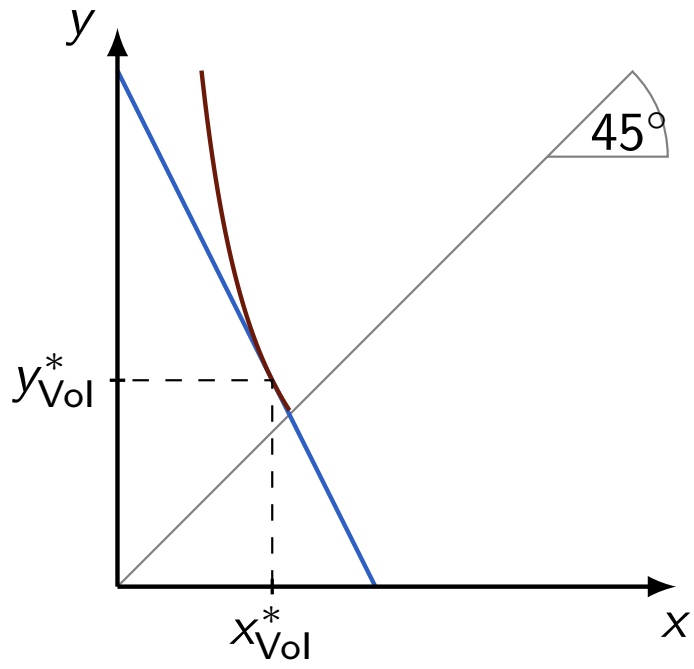
This paper:

- measure the “pure social preference”
- relationships between risk and “pure social preference”

Remedy: paired choice problems

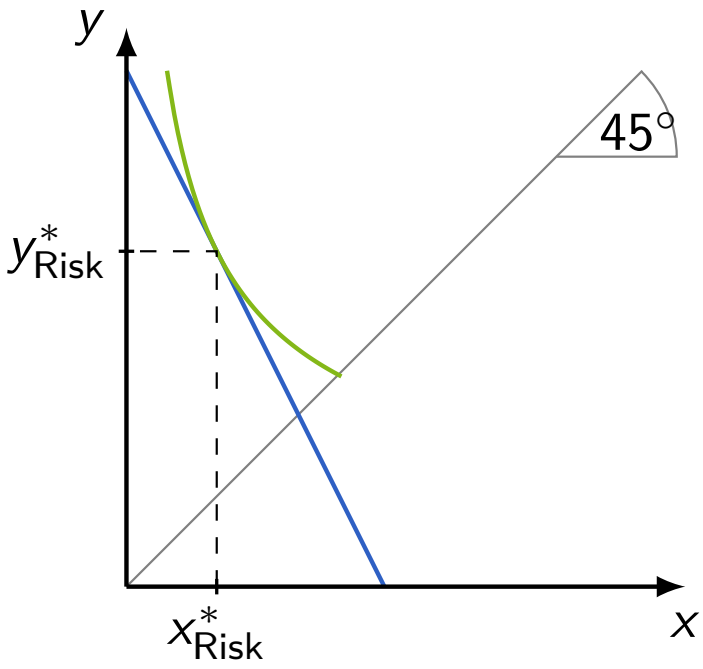


(a) Risk Problem

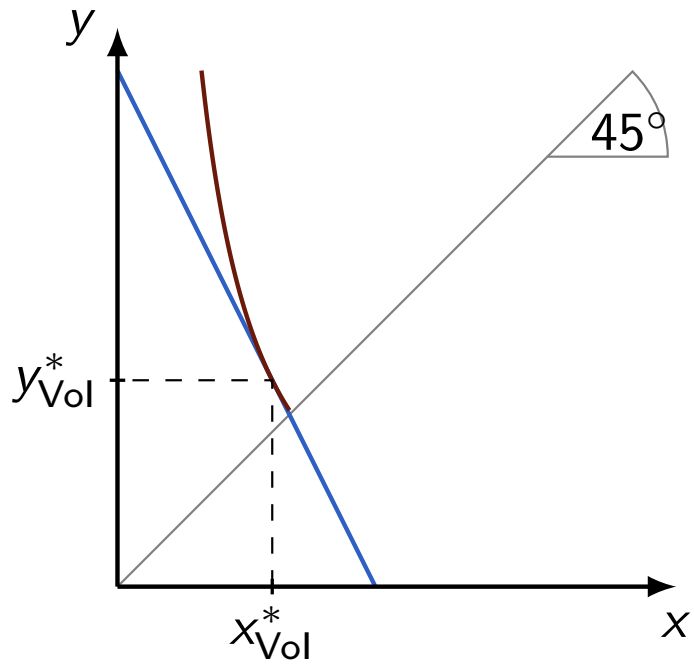


(b) Vol Problem

Remedy: paired choice problems



(c) Risk Problem



(d) Vol Problem

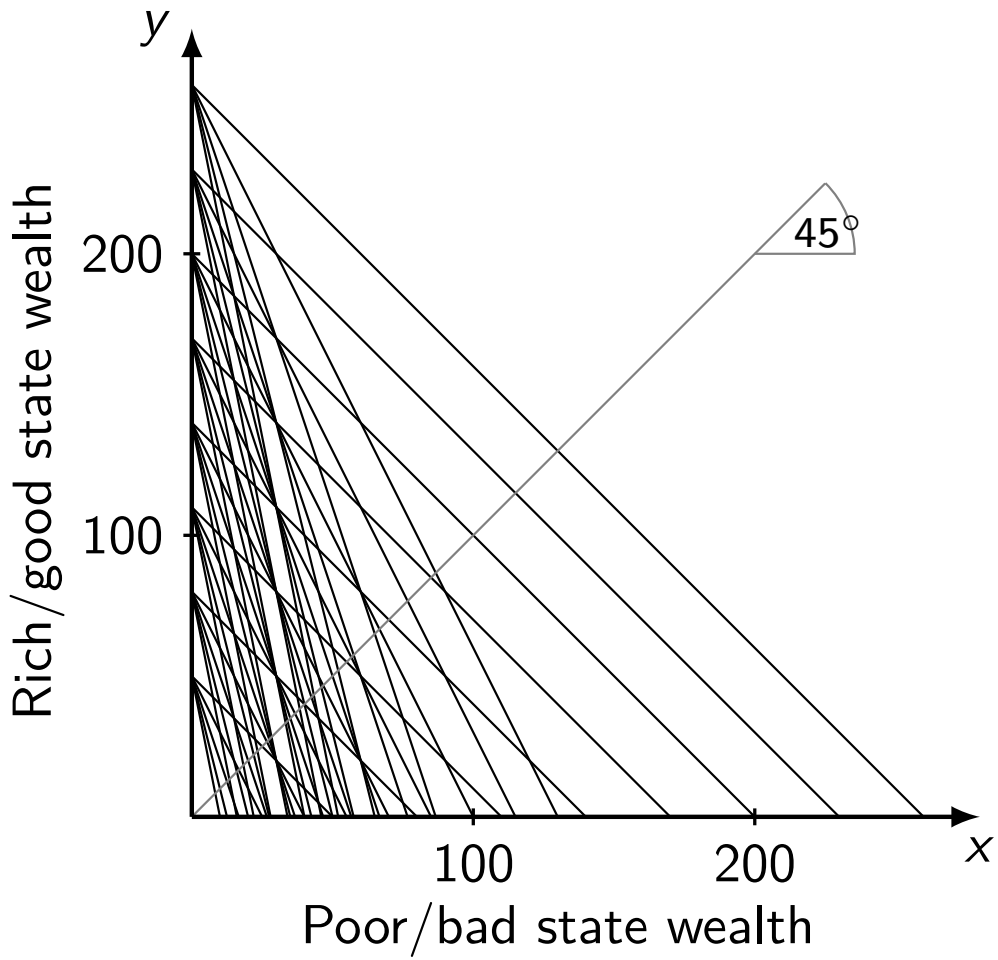
A classification of social preferences:

- equity-preferring: $x^*_{\text{Risk}} < x^*_{\text{Vol}}$
- socially agnostic: $x^*_{\text{Risk}} = x^*_{\text{Vol}}$
- efficiency-preferring: $x^*_{\text{Risk}} > x^*_{\text{Vol}}$

Induced budget experiment

we create forty budget sets $y + qx = z$, where

- expenditure $z \in \{50, 80, 110, 140, 170, 200, 230, 260\}$ and
- price $q \in \{1, 2, 3, 4, 5\}$.

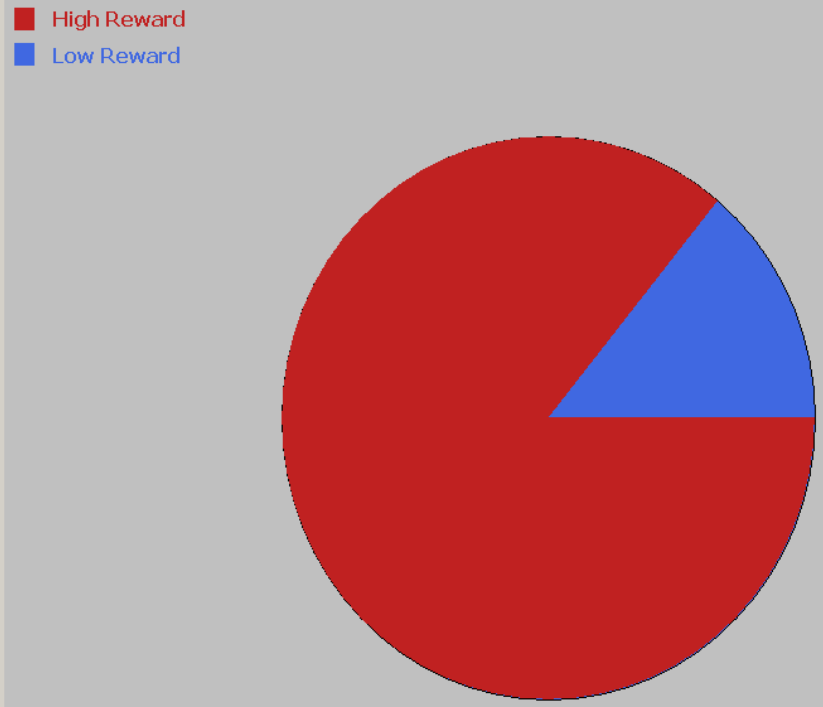


Experimental interface

Current Stage is: *Stage 1*

Period *2* of *8*

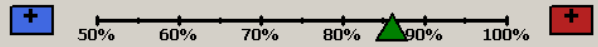
00:13



Payoffs for Low and High Reward are shown in the following table:

Low%	High%	Low$	High$	Total$
18%	82%	19.47	88.70	108.17
17%	83%	18.94	92.45	111.39
16%	84%	18.37	96.43	114.80
15%	85%	17.76	100.66	118.42
14%	86%	17.12	105.16	122.28
13%	87%	16.43	109.97	126.40
12%	88%	15.70	115.12	130.81
11%	89%	14.91	120.63	135.54
10%	90%	14.06	126.56	140.62

Your current choice is: 86% for High and 14% for Low

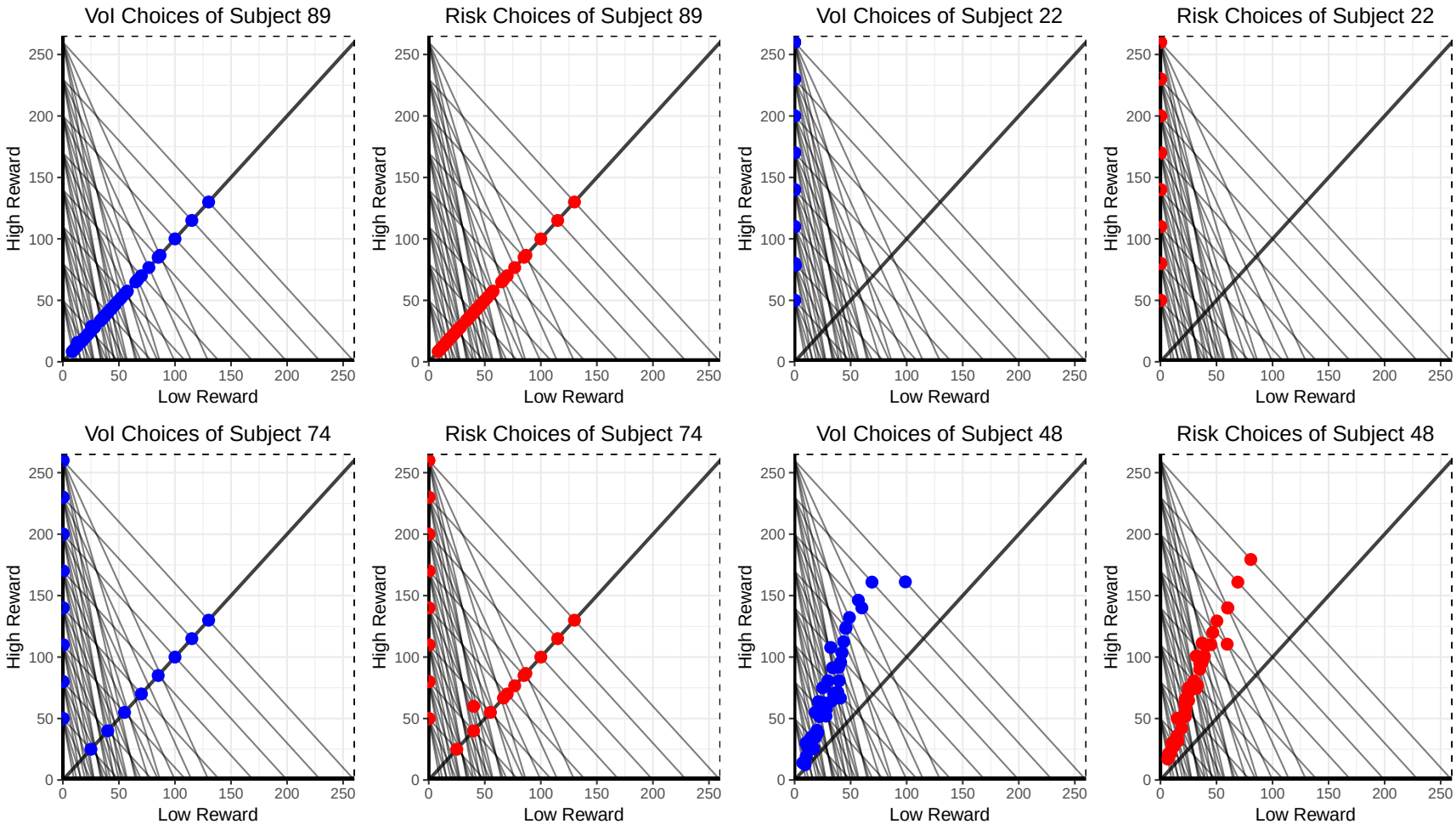


Confirm and Leave

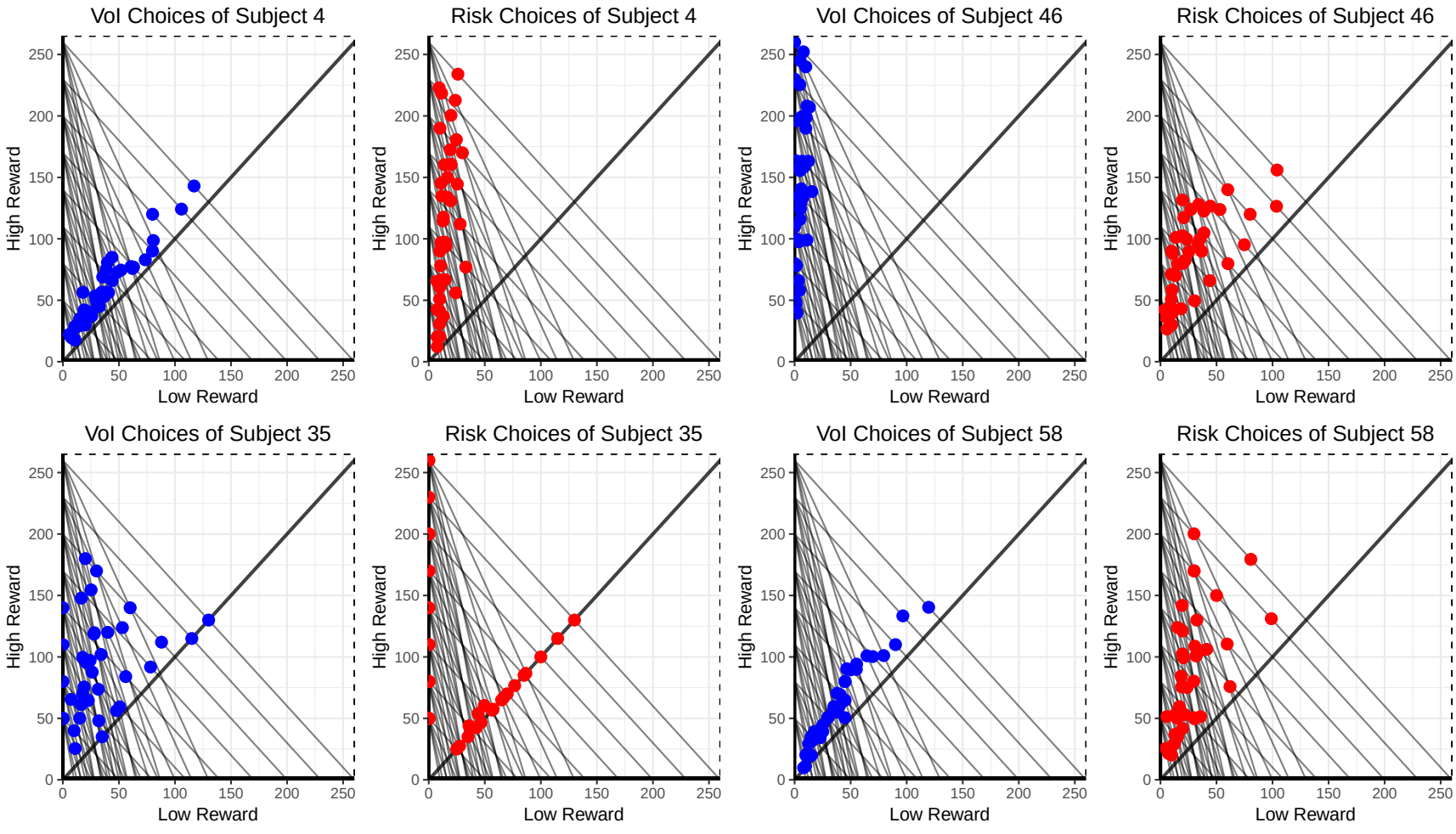
Experimental procedures

- 10 sessions totalling 92 subjects
- Subjects recruited from undergraduate and master students at Xiamen University
- Within-subject design with paired choice problems
  - 40 choices per subject for Risk treatment
  - 40 choices per subject for VoI treatment
- One of 80 choices is randomly selected for payment
- Randomization fiesta: interface, treatment order, budget order, slider's initial location, random match for VoI
- Duration of each session is 100 minutes on average and average payment is 55+10 Yuan

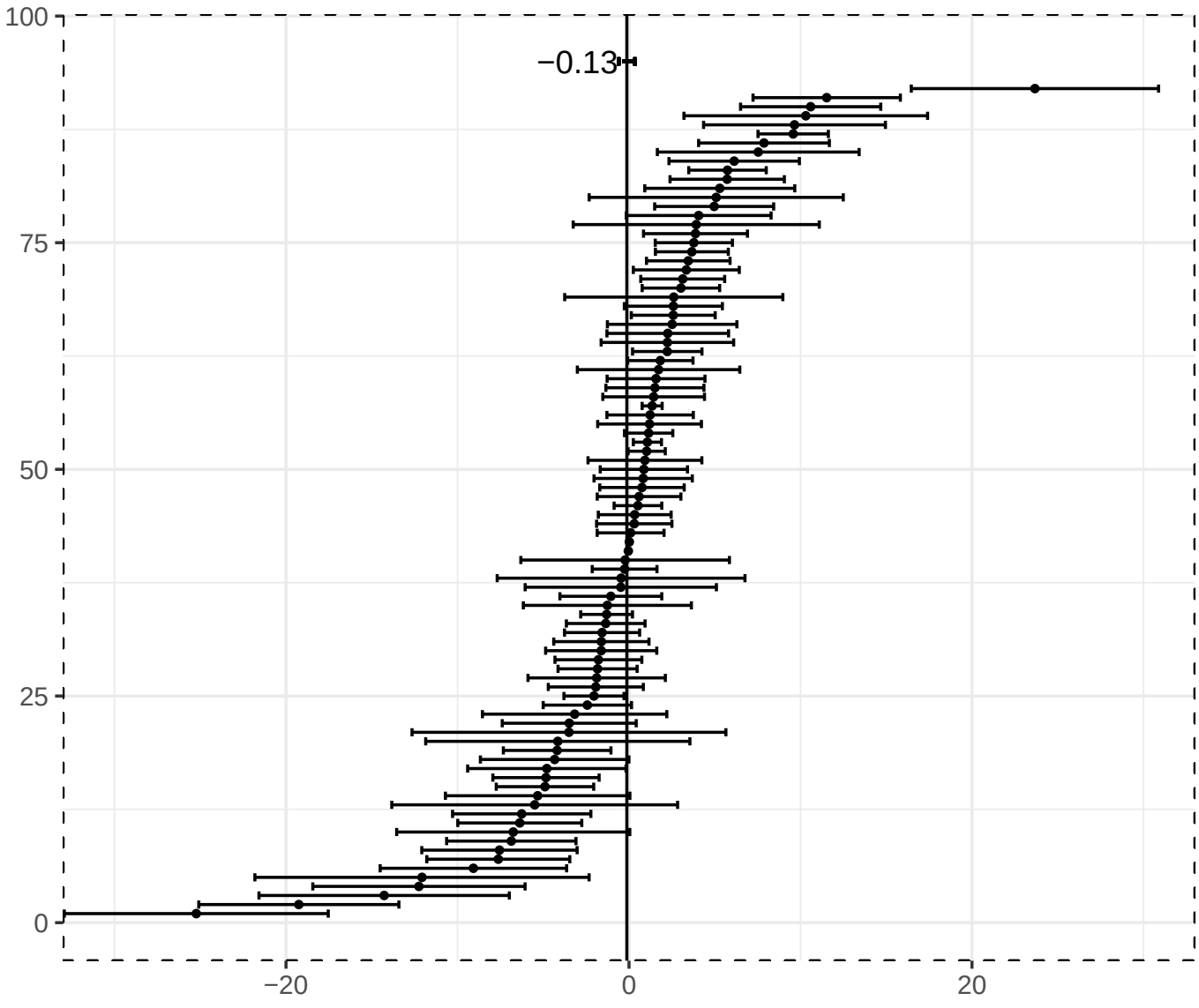
Choices by illustrative subjects: similar choices



Choices by illustrative subjects: different choices



The BIG takeaway: individual treatment effects



$x_{\text{Vol}} - x_{\text{Risk}}$: mean and 95% confidence interval for each subject

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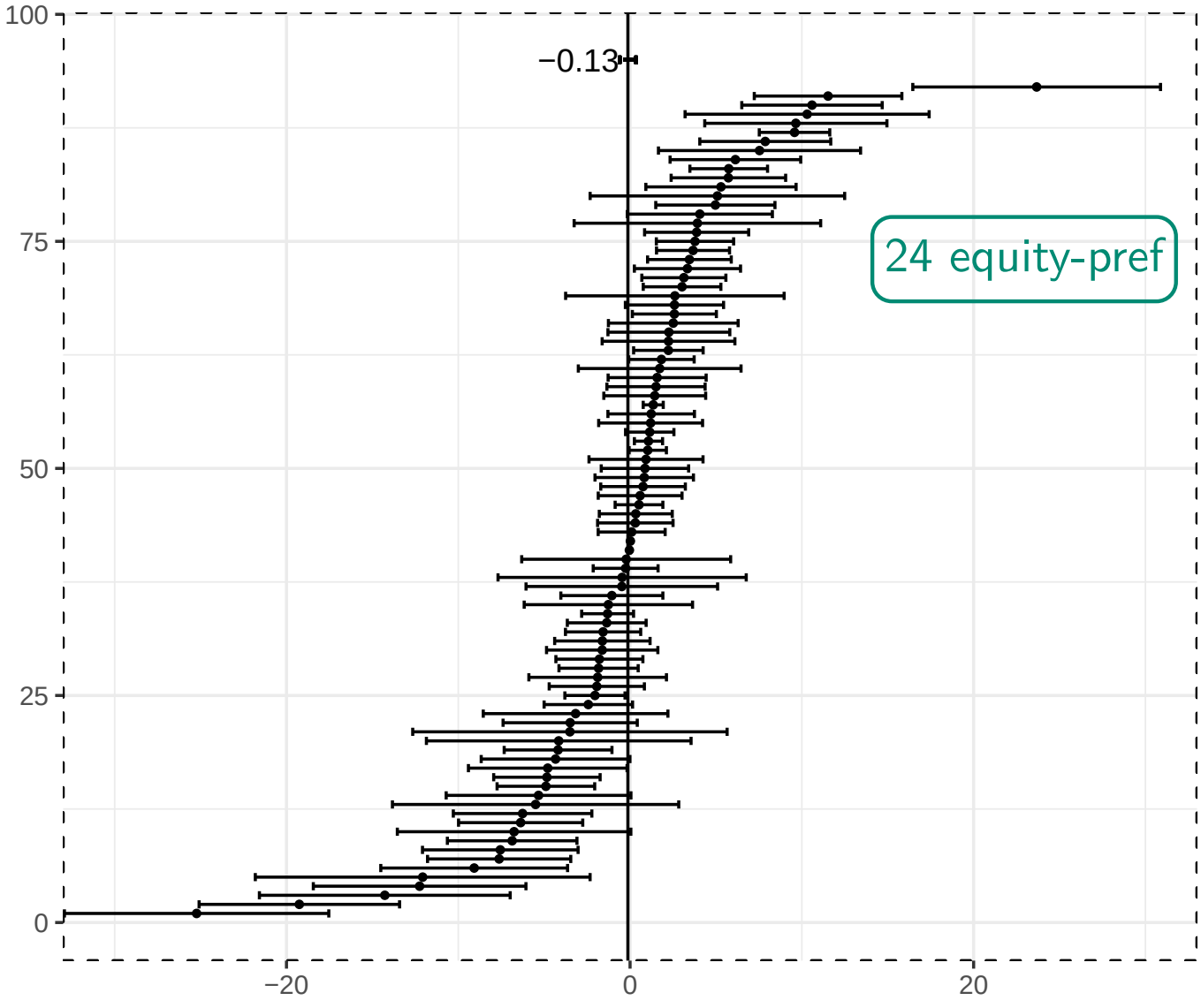

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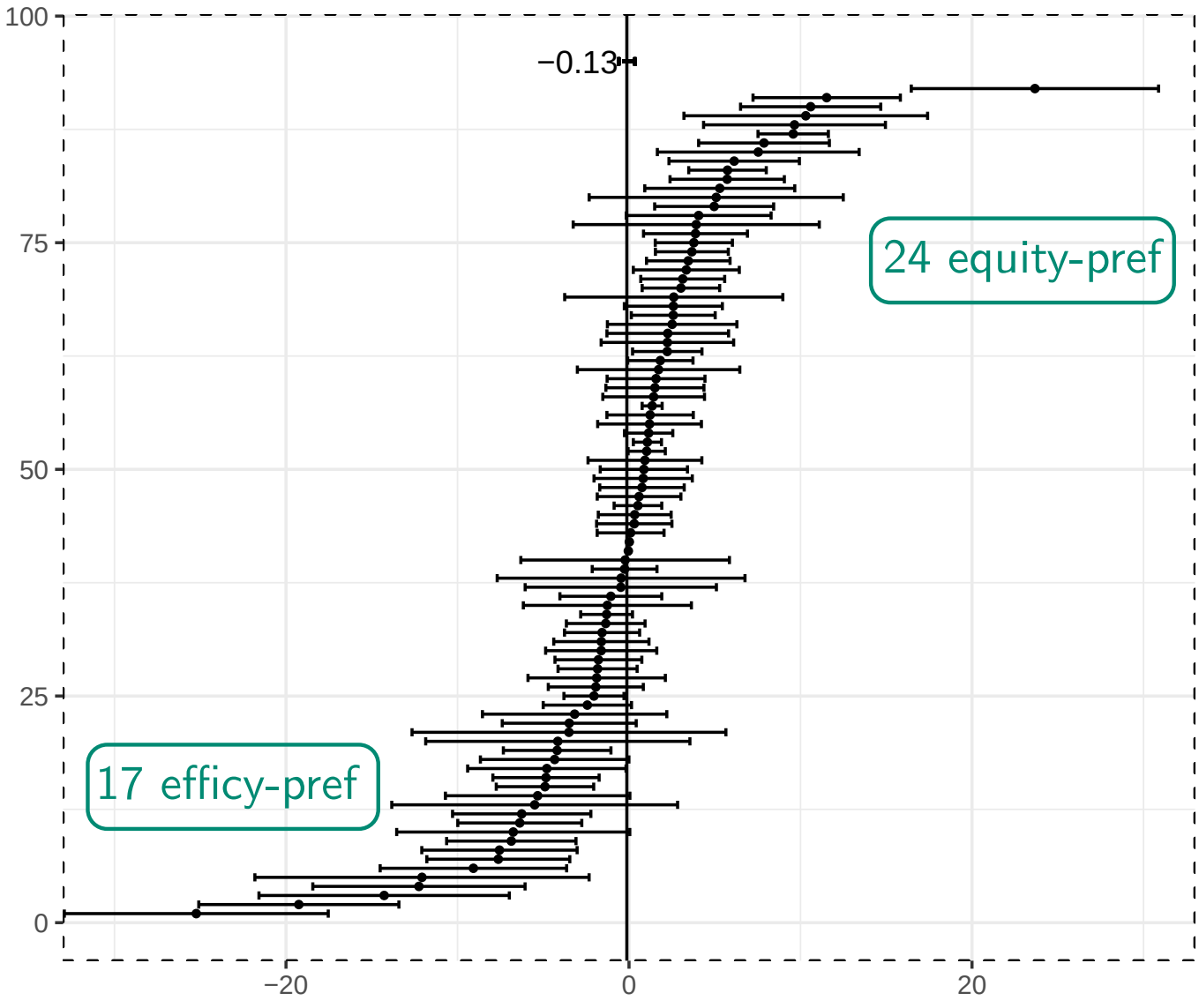

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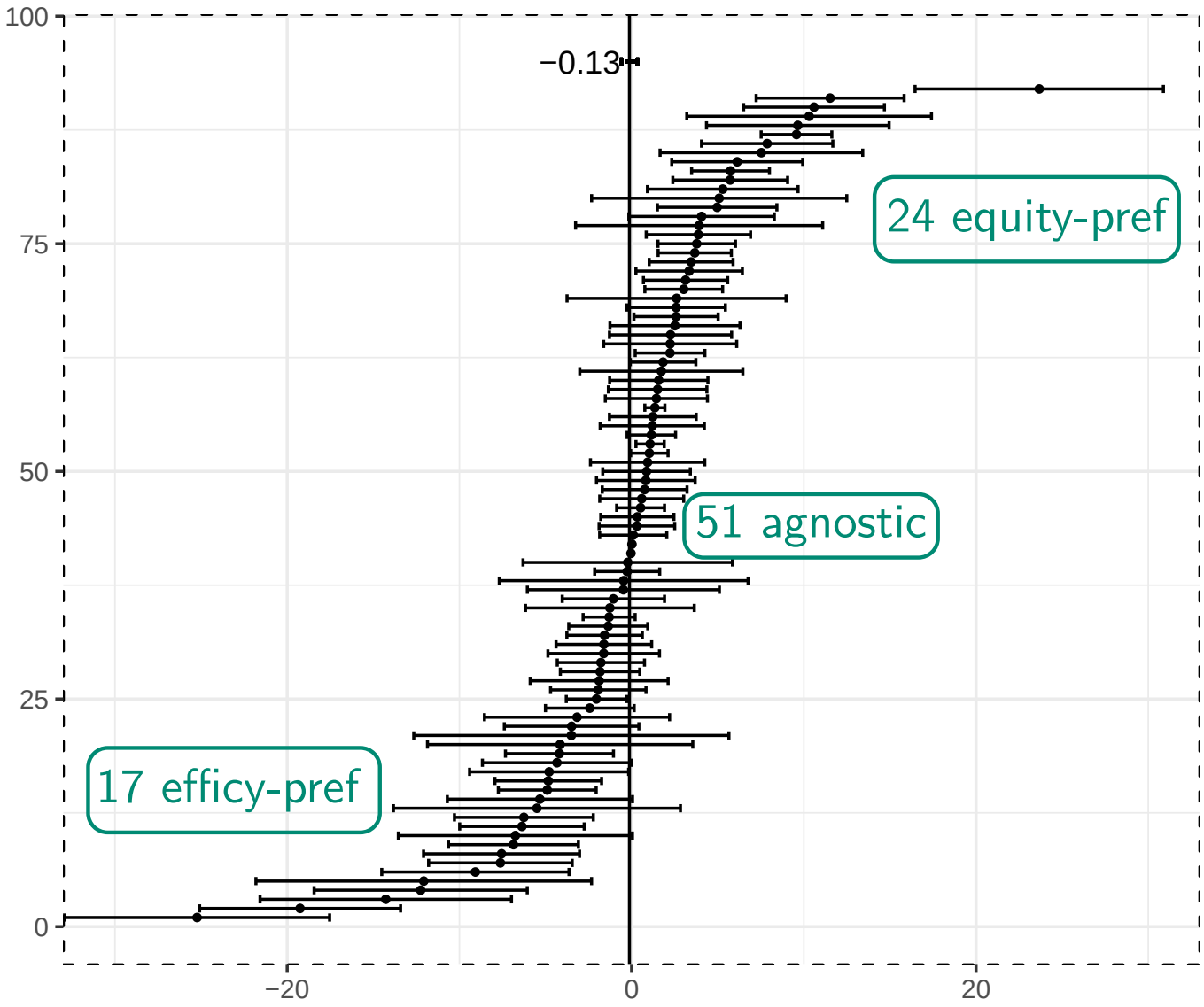

$x_{\text{Vol}} - x_{\text{Risk}}$: mean and 95% confidence interval for each subject

Reduced form demand curves by clusters

	Dependent variable: x_{VoI} and x_{Risk}					
	Equity	Agnostic	Efficiency	Equity	Agostic	Efficiency
Constant	28.32**	29.79**	29.45**	11.34**	11.90**	14.90**
	(1.77)	(1.40)	(2.33)	(1.29)	(1.35)	(1.20)
Price	−9.57**	−10.06**	−10.24**	−5.32**	−5.59**	−6.60**
	(0.76)	(0.58)	(0.98)	(0.52)	(0.45)	(0.59)
Expenditure	0.20**	0.20**	0.21**	0.20**	0.20**	0.21**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Constant*D_{VoI}	5.13**	0.08	−9.06**	5.13**	0.08	−9.06**
	(1.21)	(0.97)	(2.28)	(1.21)	(0.97)	(2.28)
Price*D_{VoI}	−1.93**	0.11	3.71**	−1.93**	0.11	3.71**
	(0.42)	(0.41)	(0.91)	(0.42)	(0.41)	(0.91)
Expenditure*D_{VoI}	0.04**	−0.004	−0.07**	0.04**	−0.004	−0.07**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$D_{p=1}$				21.22**	22.37**	18.20**
				(2.03)	(2.08)	(2.49)
Observations	1,920	4,080	1,360	1,920	4,080	1,360
R^2	0.72	0.62	0.58	0.72	0.62	0.58
Adjusted R^2	0.72	0.62	0.58	0.72	0.62	0.58
Note:	*p<0.05; **p<0.01					

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- Risk reduced demand curves are the same for three clusters.
- VoI reduced demand curves differ across three clusters.

Misclassification due to large variations?

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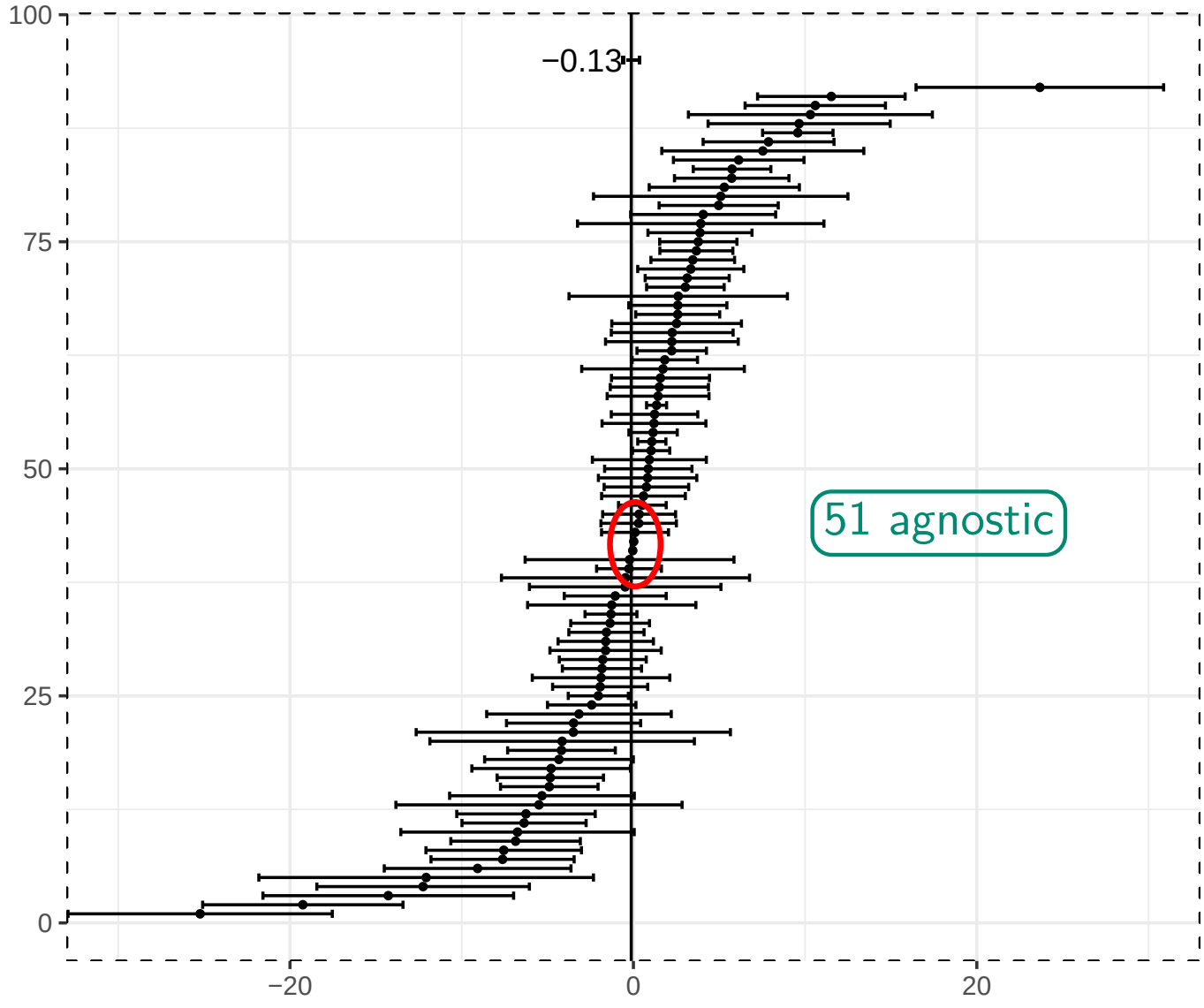

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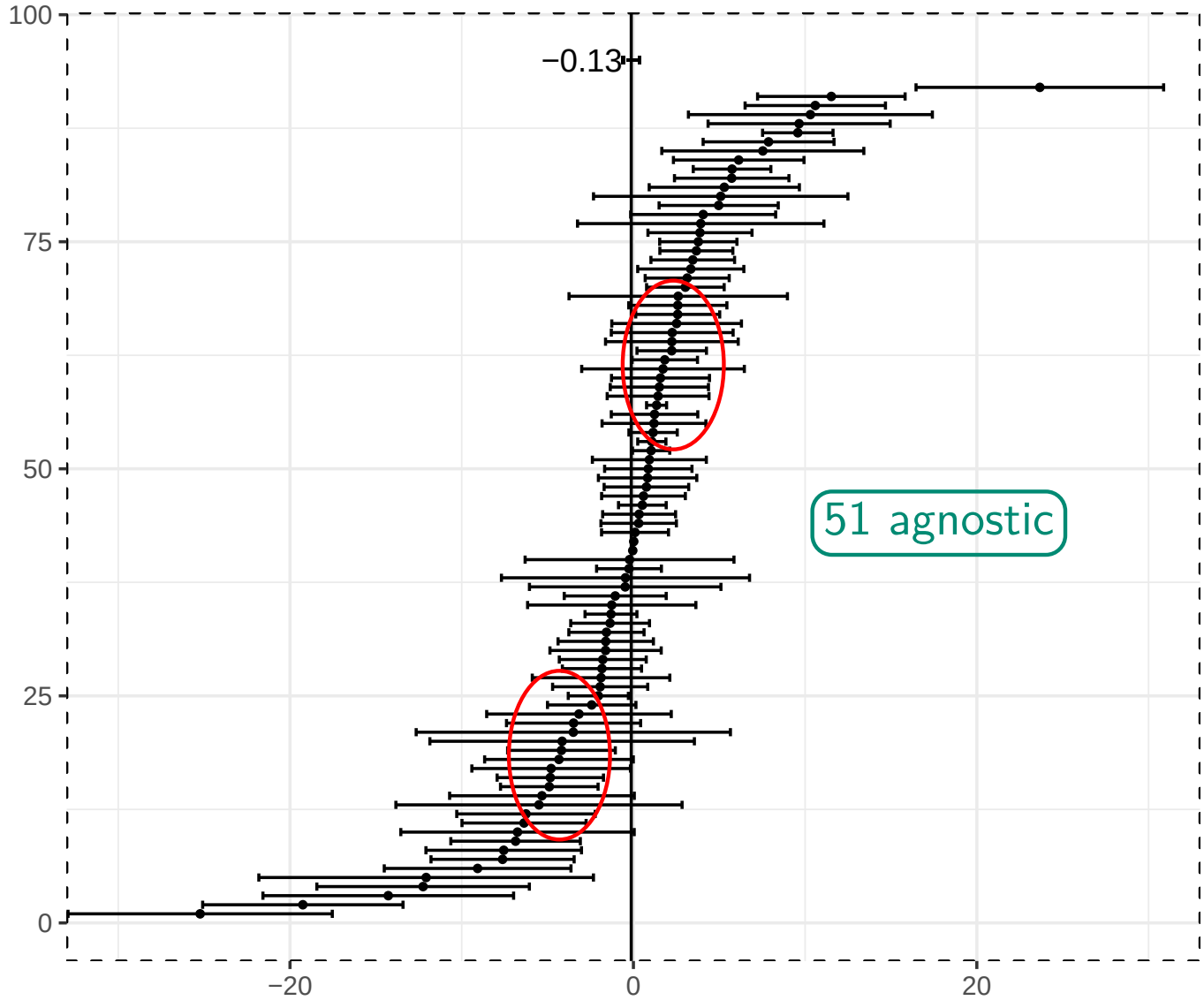

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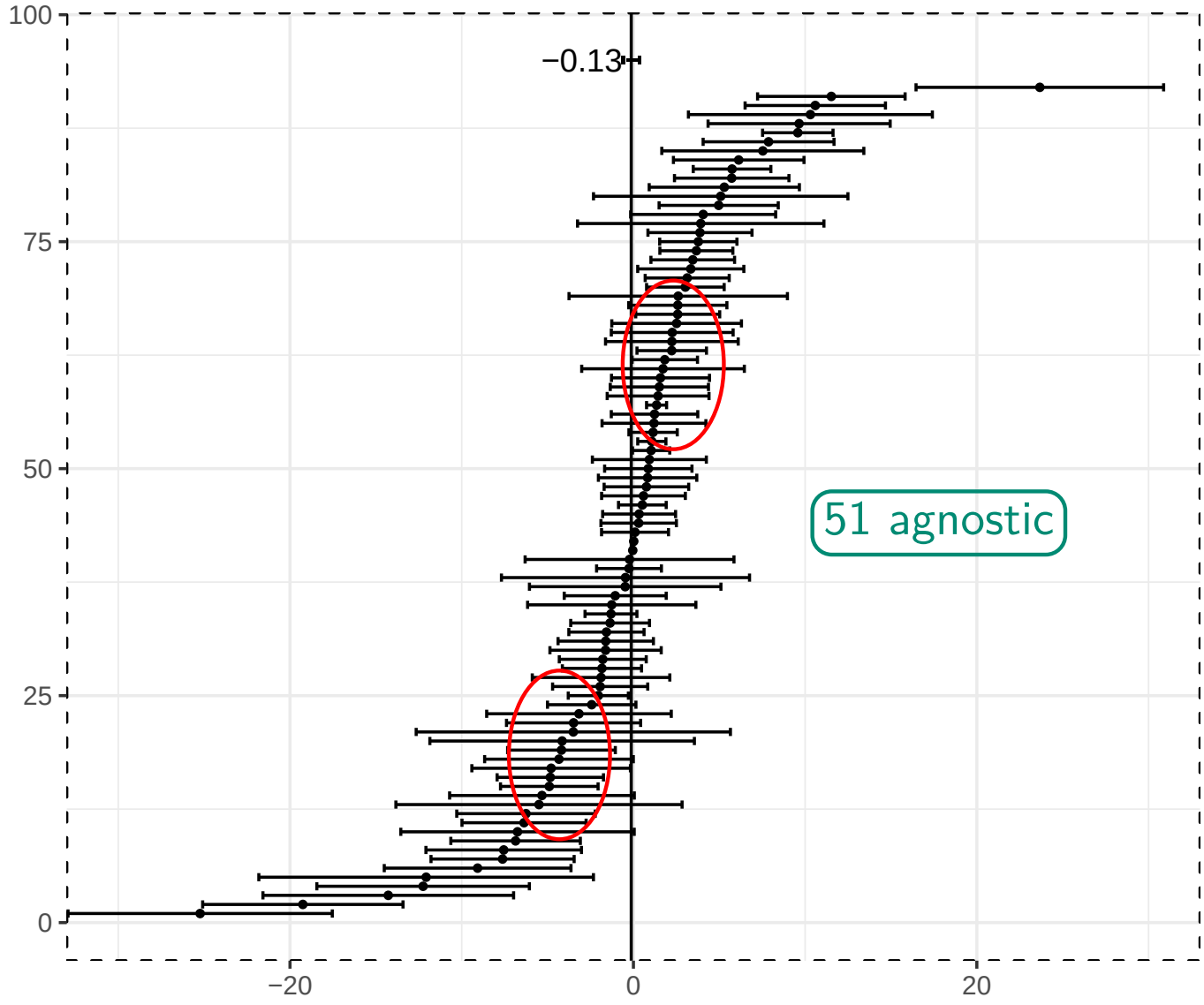


Can we do better in classifying social preference types?

Roadmap for further analyses

- non-parametric revealed preference analyses
  - rationality: GARP violation, Afriat's CCEI and its power
  - homotheticity: HARP violation, HEI and its power
  - Classification: **relative convexity of Risk versus Vol indifference curves**
- parametric structure estimation analyses
  - rational choices $\Leftrightarrow$ maximize a well-behaved utility function
  - Classification: **relative concavity of Risk versus Vol utility functions**

Conclusion

- We construct an instrument to measure individual's preference over the trade-off between equity and efficiency behind VoI.
- Both risk and social preferences are highly heterogeneous, but consistent with maximizing (maybe) non-homothetic utilities.
- Individual risk preferences are uncorrelated with social preferences over efficiency and equity.
- Aggregate level: socially agnostic
- Individual level: clear clusters of equity-preferring, efficiency-preferring and socially agnostic
- Classification: statistical, non-parametric and parametric

Thank you for your attention!

Contributions to the literature

- Three DM's perspectives in eliciting social preferences:
  - as a dictator in front of a VoI: multiple motives include warm glow, selfish, efficiency, equity, maxmin ect.
    – Engelmann and Strobel (2004); Charness and Rabin (2002)
  - as a disinterested social planner behind a VoI: problem of incentive compatibility
    – Traub et al. (2005,2009); Hong et al. (2015)
  - as a society member behind a VoI:
    – Frignani and Ponti (2012): binary choices
    – Schildberg-Horisch (2010): fixed trade-offs

- Elicitation methods with linear budget experiments:
  - elicit social preferences with the dictator game: Andreoni and Miller (2002); Fisman et al. (2007).
  - elicit risk preferences: Choi et al. (2007, 2014)

CCEI for participants and random choices

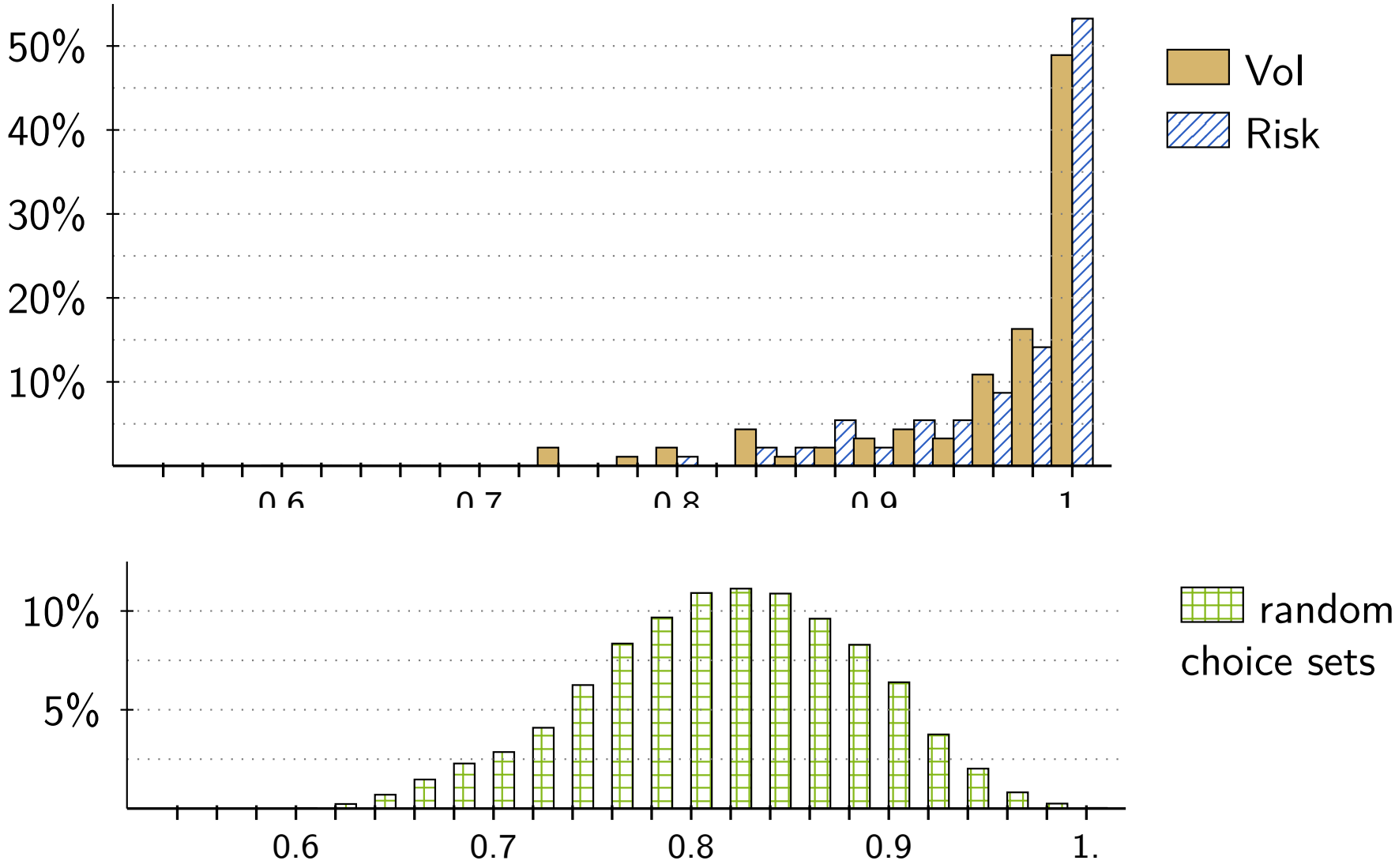


Figure: Histogram of the CCEI for 92 subjects and for 10,000 random choices over the budget sets.

HEI for participants and random choices

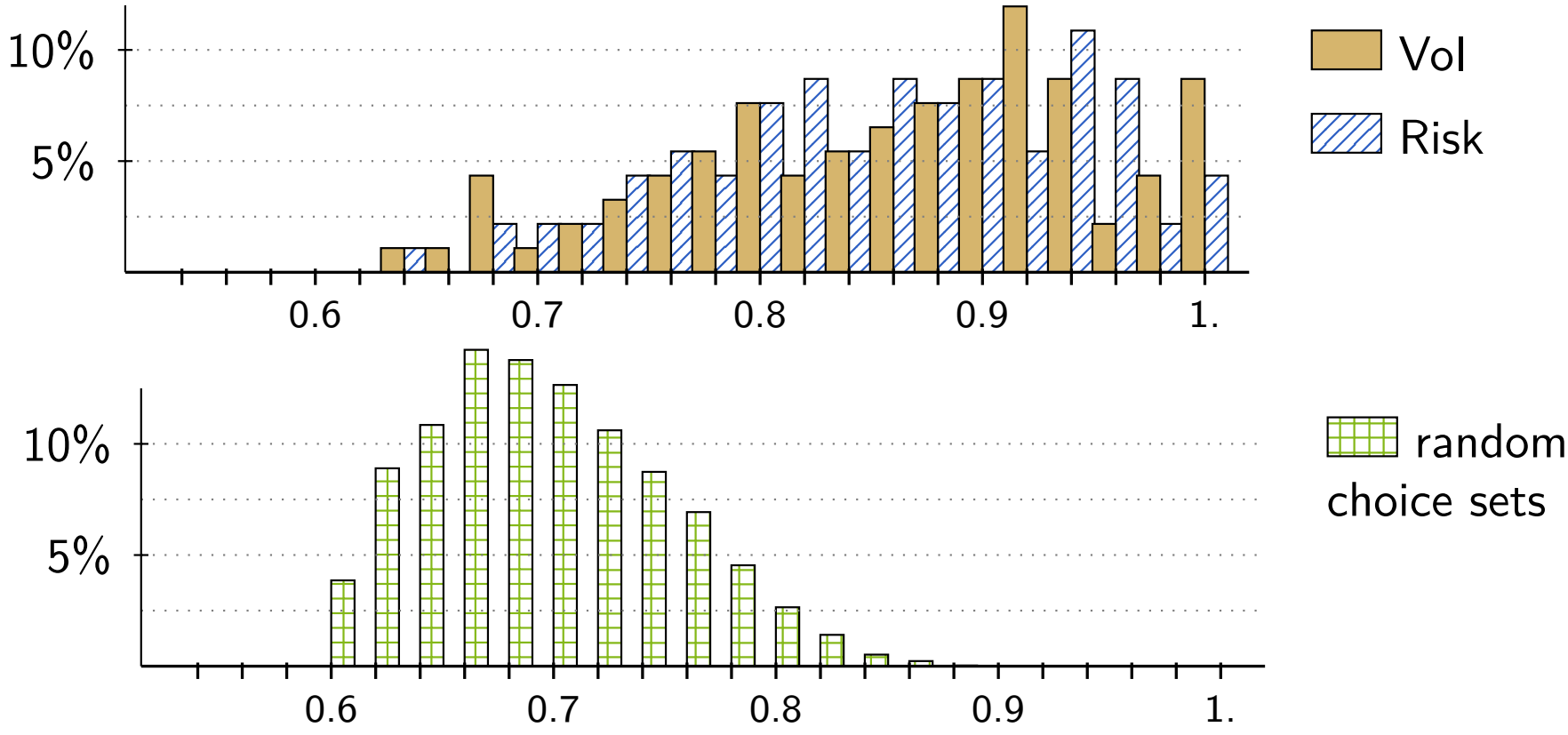


Figure: Histogram of the HEI for 92 subjects and for 10,000 random choices over the budget sets.

A revealed preference comparison of relative convexity of Risk versus VoI indifference curves

Partially Revealed More Convex (PRMC) is a binary relationship to compare local convexity.

- two lotteries: $S : (4, 6)$ and $R : (2, 14)$
- Alice prefers $S \succ R$
- Bob prefers $R \succ S$
- whose indifference curve is more convex at S?

In our within-subject design, Alice and Bob correspond to either Risk-self or VoI-self of the same DM.

- Risk-PRMC: S is a choice in Risk task $\Rightarrow$ efficiency-preferring
- VoI-PRMC: S is a choice in VoI task $\Rightarrow$ equity-preferring

Classifications based on curvature comparisons

Compare global convexity?

- unorderable: Risk-PRMC and VoI-PRMC hold at least once;
- effciency-preferring: Risk-PRMC holds at least once while VoI-PRMC never holds;
- equity-preferring: VoI-PRMC holds at least once while Risk-PRMC never holds;
- socially agnostic: Risk-PRMC and VoI-PRMC never hold.

different			similar
efficiency-preferring	equity-preferrring	un-ordable	socially agnostic
26 (28.3%)	30 (32.6%)	20 (21.7%)	16 (17.4%)

Structure estimation of a subjective EU model

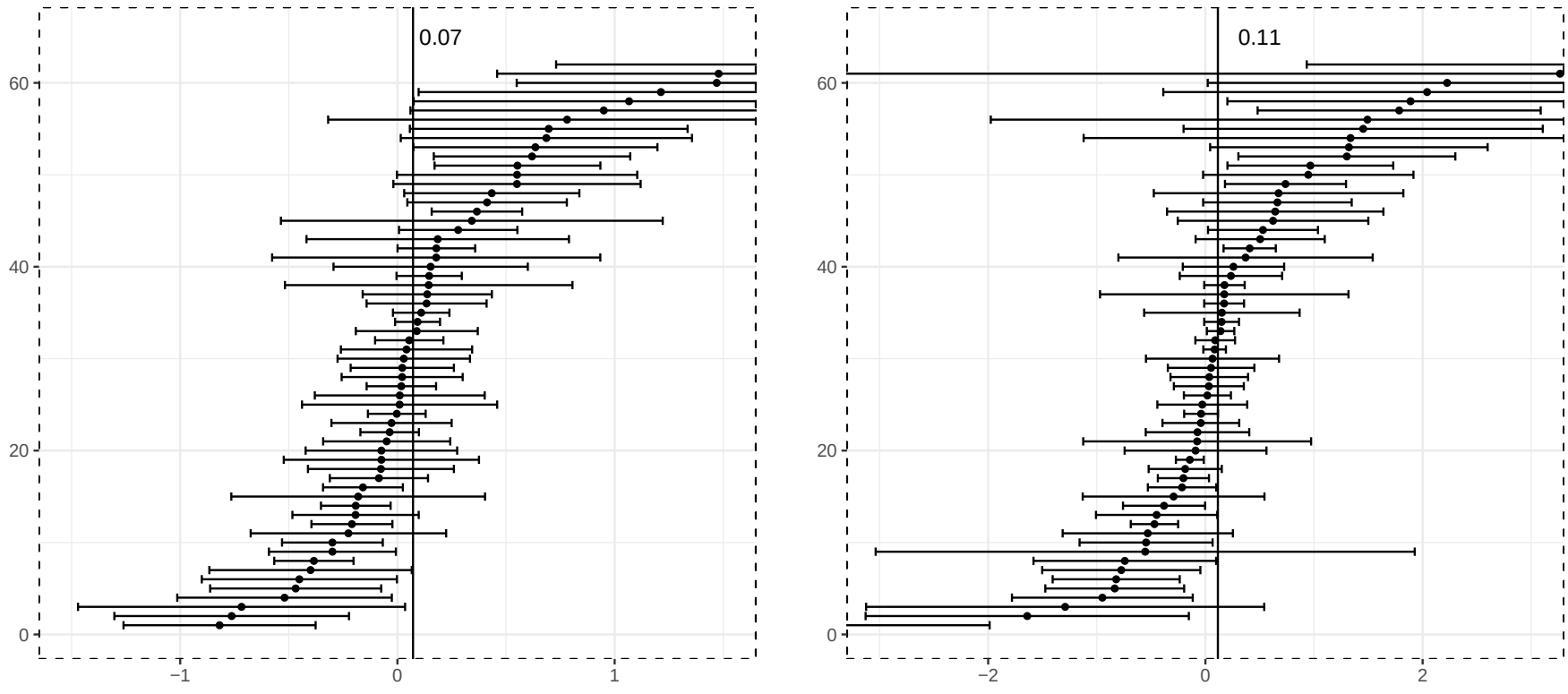
- maximize a subjective expected utility model $\alpha u(x) + u(y)$
- assume CRRA utility function: $u(x) = \frac{x^{1-\rho_i}}{1-\rho_i}$
- VoI treatment dummy $\rho_{\text{VoI}} = \rho_{\text{Risk}} + D_{\text{VoI}} \cdot \rho_{\text{diff}}$
- solving UMP yields the optimal allocation choices:

$$\ln(x^*/y^*) = \begin{cases} \ln(\omega) & \text{if} \quad \ln(\alpha) - \rho \ln(\omega) \leq \ln(q), \\ -\frac{1}{\rho}\left[\ln(q) - \ln(\alpha)\right] & \text{if} \quad \ln(\alpha) < \ln(q) < \ln(\alpha) - \rho \ln(\omega), \\ 0 & \text{if} \quad \ln(q) \leq \ln(\alpha). \end{cases}$$

- estimate α, ρ_{Risk} and ρ_{diff} for each subject

$$\min \sum_{j=1}^{80} \left[\ln\left(\frac{x^j}{y^j}\right) - \ln\left(\frac{x^{j*}}{y^{j*}}\right) \right]^2$$

Classifications based on curvature differences ρ_{diff}



(a) EU model

(b) SEU model

Figure: The estimated curvature differences ρ_{diff} based on (e) expected utility and (f) subjective expected utility model for each participant.