Attitudes as Assets

Daniel L. Chen w/ Charlotte Cavaille, Ritesh Das, Sultan Mehmood, Shaheen Naseer, Avner Seror, Karine Van der Straeten

A Theory of Surveys

Measurement

- Talk is cheap
  - Trump, Brexit–all mispredicted
  - Sophisticated adjustments of polls still failed

Model

- Make costly the expression of moral and ideological beliefs in surveys
- Revealed preference heuristic
  - Marginal benefit of an additional "vote" scales linearly, so should the marginal cost
  - Implies quadratic costs $\sum_{i=1}^{N}(v_i^j)^2 = B$

Applications

- Preference curvature, ideal point estimation
- Polls, attitudinal surveys, World Value Survey, GSS
- Decision-making in social & political settings

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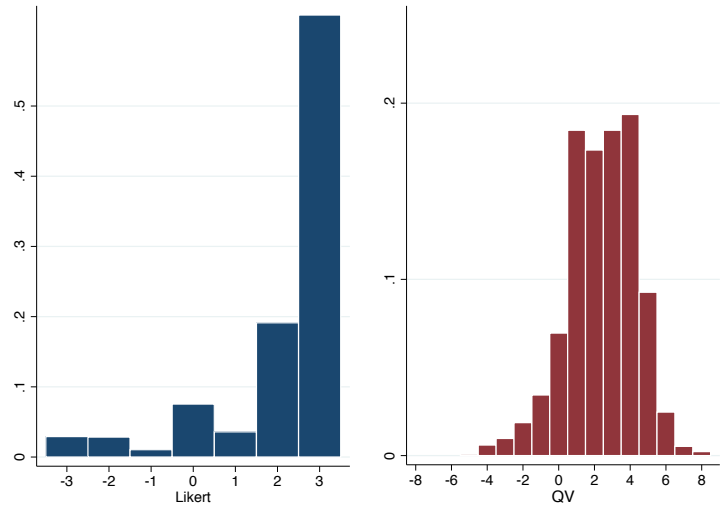
Gender equity in pay



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  - formalize conditions where Likert is superior or inferior to 'costly' expression
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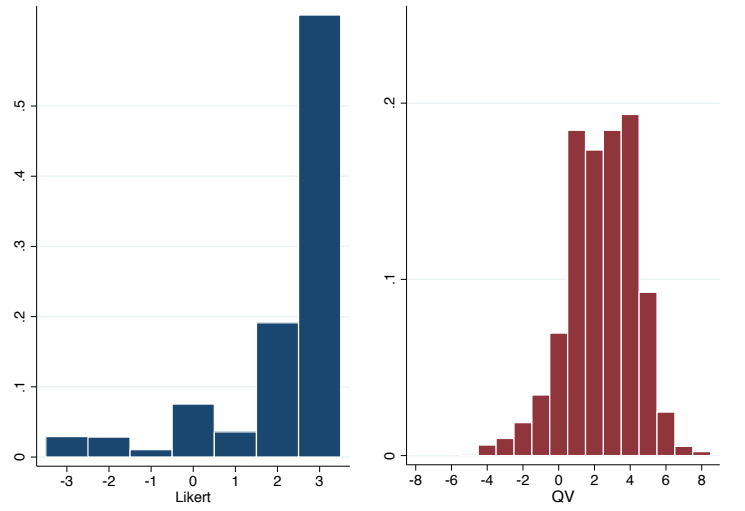

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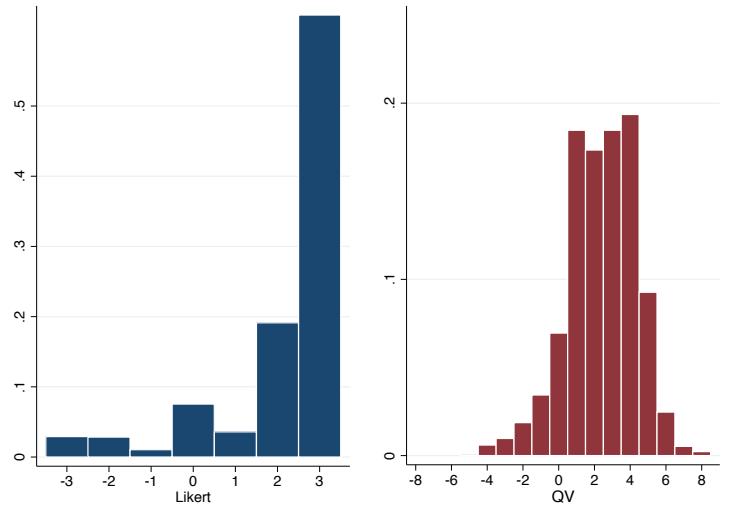

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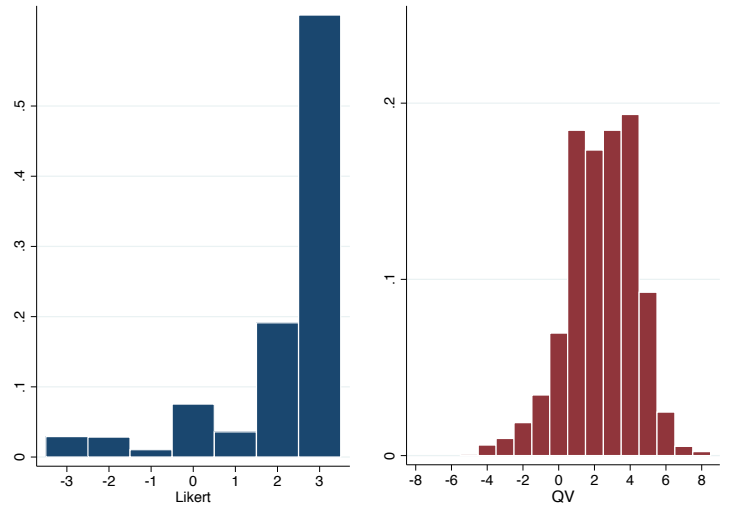

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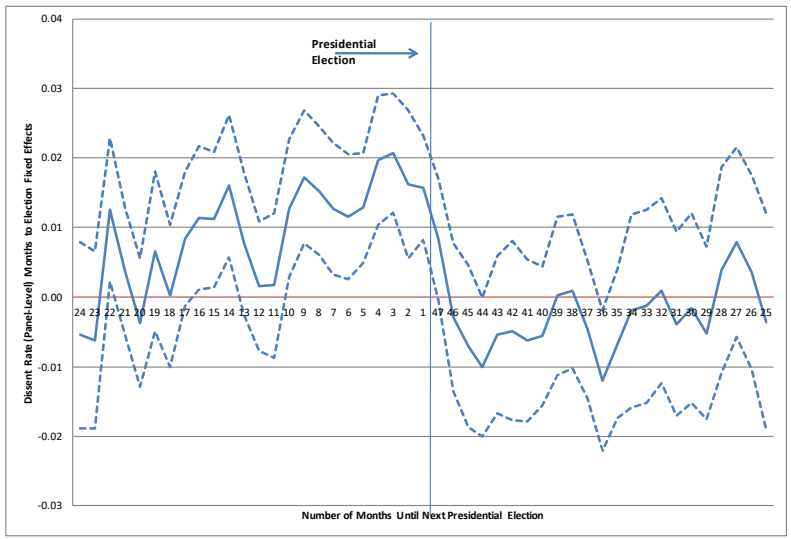
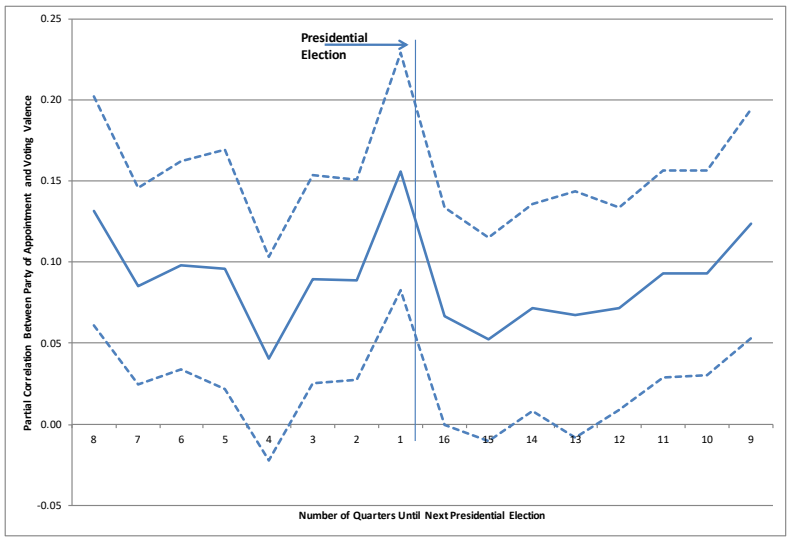
Theory

- "sincerity motive" - intrinsic motive to report true preferences
- "partisan motive" - influence policy, signaling, etc.

Figure: Electoral Cycles in U.S. Judicial Dissents and Partisan Voting (JLE 2017)



Dissents



Partisan Precedents

- If highly experienced professionals making common law precedent exhibit such a strong partisan motive
- Then lay citizens answering political surveys (a low stake decision) may also be influenced by partisan identity

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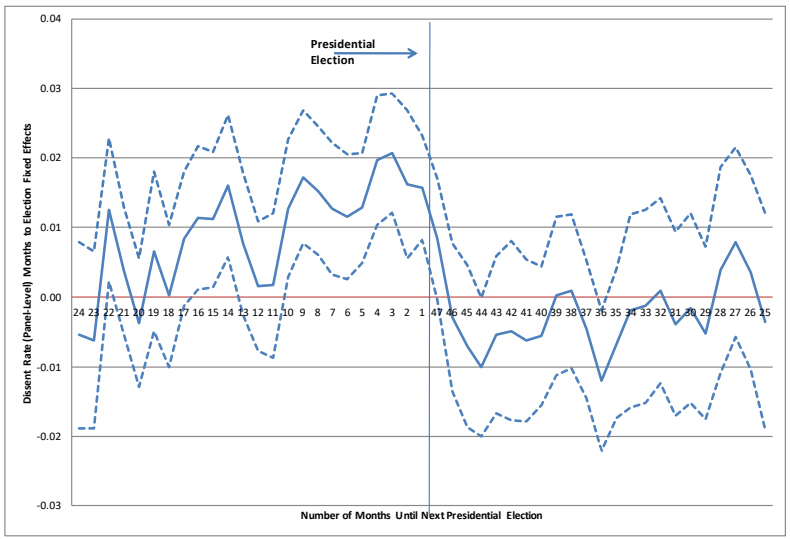

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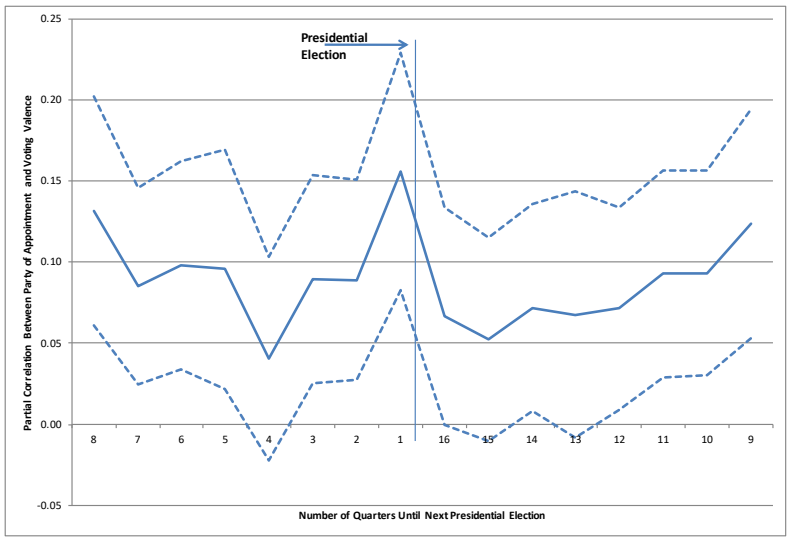

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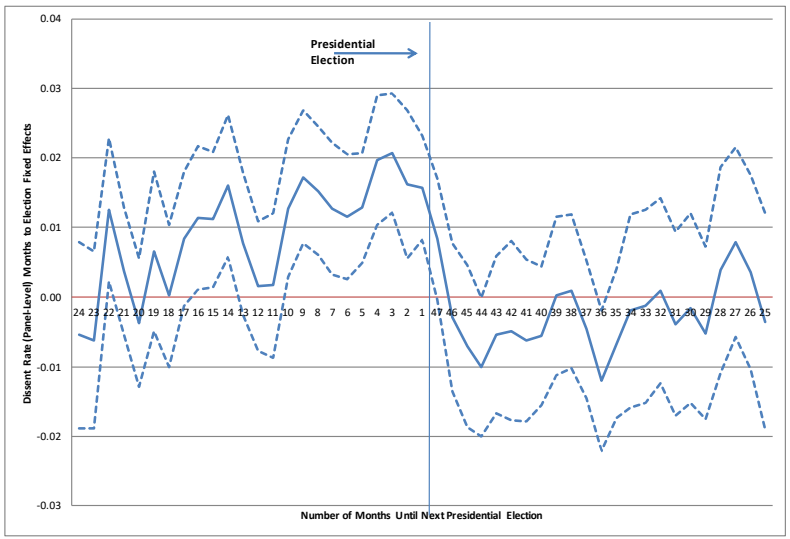

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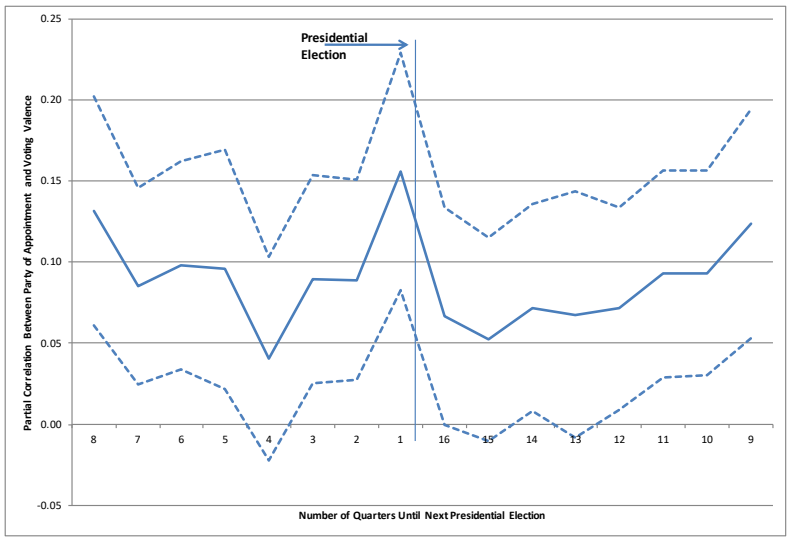

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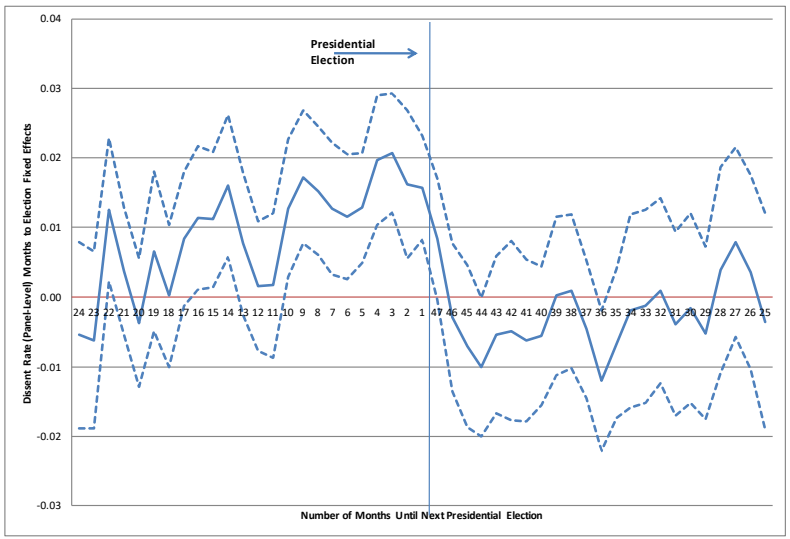

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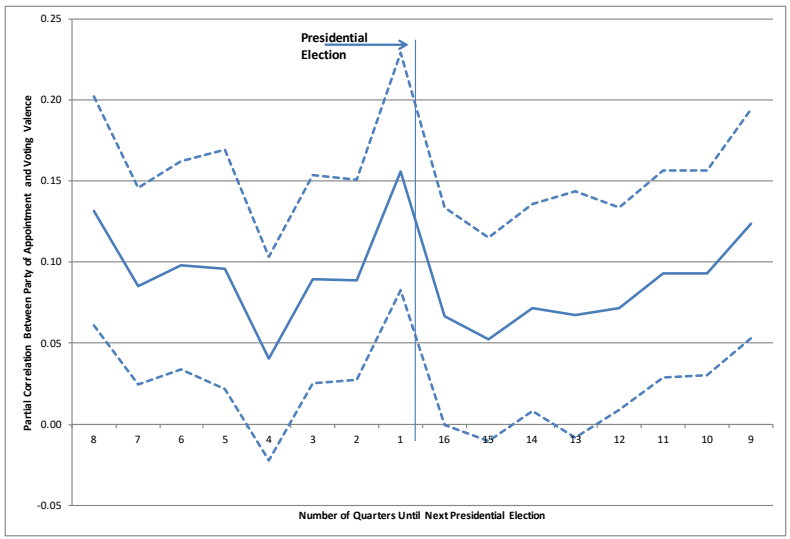

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How People Answer Surveys

We assume that, on each issue $k = 1, ..., K$, respondent i is characterized by:

- Her attitude on the issue, denoted by $x_{ik} \in [-1, +1]$
- Her signaling target, denoted by t_{ik}

We denote by $\widehat{x}_{ik}$ her observed survey answer on issue k.

How People Answer Surveys

We assume that utility V from answering the survey depends on $x_i = (x_{i1}, ..., x_{iK})$, $t_i = (t_{i1}, ..., t_{iK})$, and $\widehat{x}_i = (\widehat{x}_{i1}, ..., \widehat{x}_{iK})$ in the following way:

$$V(\widehat{x}_i) = \sum_{k=1}^{K} \left[F_{ik}\left(\widehat{x}_{ik}\right) + G_{ik}\left(\widehat{x}_{ik}\right) \right], \tag{1}$$

F_{ik} and G_{ik} are single-peaked, max at $\widehat{x}_{ik} = x_{ik}$ and $\widehat{x}_{ik} = t_{ik}$

- F_{ik} sincerity motive - intrinsic motive to report true preferences
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MICROFOUND SIGNALING TARGET

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MICROFOUND SIGNALING TARGET

Influence Motive

- If the individual wants to influence the decisions made by the government on issue k, the target is $t_{ik} = +1$ if $x_{ik} > 0$, and $t_{ik} = -1$ if $x_{ik} < 0$, and there will be a strategic inflation in the reported intensity.
  - x_{ik} is utility derived by individual i if reform k is implemented
- Assume that a survey is run to evaluate the total utility that the implementation of each of the K reforms is likely to generate.
  - Now assume that the signaling function has the following form:
  - $G_{ik}(\widehat{x}_{ik}) = x_{ik} S(\widehat{x}_{ik})$ where $S_{ik}(\widehat{x}_{ik})$ is the probability that the reform is implemented if the individual reports $\widehat{x}_{ik}$ (with $S'_{ik} > 0$)

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F_{ik}(\widehat{x}_{ik}) &= -\frac{1}{2}\gamma_{ik}(x_{ik} - \widehat{x}_{ik})^2 \text{ (quadratic sincerity motive)}, \\
S_{ik}(\widehat{x}_{ik}) &= \sigma_{ik} \times \widehat{x}_{ik} \text{ (linear policy influence)}
\end{aligned}
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- σ_{ik} captures the marginal impact of $\widehat{x}_{ik}$ on the decision
  - Recall revealed preference heuristic, MB of an additional "vote" scales linearly so should MC
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Optimal responses under Likert

$$\widehat{x}_{ik}^{L} = sign(x_{ik}) \times \min\left[\left(1 + \frac{\sigma_{ik}}{\gamma_{ik}}\right)|x_{ik}|, 1\right] \quad (2)$$

Exaggeration increases with $\frac{\sigma_{ik}}{\gamma_{ik}}$ (influence motive >> sincerity motive)

- If ratio is large, individuals locate at extremities of the scale
- When such bunching occurs (in particular if only the policy influence motive is present), the only information that can be learnt with the Likert technology is the direction of the preference; nothing can be learnt about intensity.

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Optimal responses under QV

Under Quadratic Voting, the respondent faces a "budget constraint", such that:

$$\sum_{k=1}^{k=K} \widehat{x}_{ik}^2 \leq B.$$

$$\widehat{x}_{ik}^{QV} = \text{sign}(x_{ik}) \times \min \left[\frac{1}{1 + \frac{2\lambda_i^*}{\gamma_{ik}}} \left(1 + \frac{\sigma_{ik}}{\gamma_{ik}} \right) |x_{ik}|, 1 \right], \quad (3)$$

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If influence motive is weak (i.e. $\frac{\sigma_{ik}}{\gamma_{ik}}$ close to 0), Likert scales are sufficient

- QV's budget may prevent respondents from reporting their true preferences

If influence motive is strong, QV decreases bunching at Likert extremes

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SO FAR WE HAVE THOUGHT ABOUT A SURVEY AS A REFERENDUM;

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SO FAR WE HAVE THOUGHT ABOUT A SURVEY AS A REFERENDUM;

WHAT ABOUT PARTISAN IDENTITY? (QV CAN MEASURE ISSUE IMPORTANCE)

Optimal responses under QV

Under Quadratic Voting, the respondent faces a "budget constraint", such that:

$$\sum_{k=1}^{k=K} \widehat{x}_{ik}^2 \leq B.$$

$$\widehat{x}_{ik}^{QV} = \text{sign}(x_{ik}) \times \min \left[\frac{1}{1 + \frac{2\lambda_i^*}{\gamma_{ik}}} \left(1 + \frac{\sigma_{ik}}{\gamma_{ik}} \right) |x_{ik}|, 1 \right], \tag{3}$$

- If $\sum_{k=1}^{k=K} \left(\widehat{x}_{ik}^L\right)^2 \leq B$, meaning that optimal answers under Likert are within the QV budget set, then $\widehat{x}_i^{QV} = \widehat{x}_i^L$ and $\lambda_i = 0$.
- If $\sum_{k=1}^{k=K} \left(\widehat{x}_{ik}^L\right)^2 > B$, then optimal answers under Likert are not admissible under QV, and the individual has be less extreme.

If influence motive is weak (i.e. $\frac{\sigma_{ik}}{\gamma_{ik}}$ close to 0), Likert scales are sufficient

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WHAT ABOUT PARTISAN IDENTITY? (QV CAN MEASURE ISSUE IMPORTANCE)

Empirical Criteria of Improvement

1. More predictive of behavior (Meltzer and Richard 1981, Acemoglu and Robinson 2006)
2. More stable over time (Howe and Krosnick 2017: 328)
3. More closely related to self-interest (Howe and Krosnick 2017: 332)
4. Better formed, less affected by contextual cues (i.e. less "spirit of the moment") (Converse 1964, Zaller 1994, Lenz 2013, Achen and Bartels 2017)

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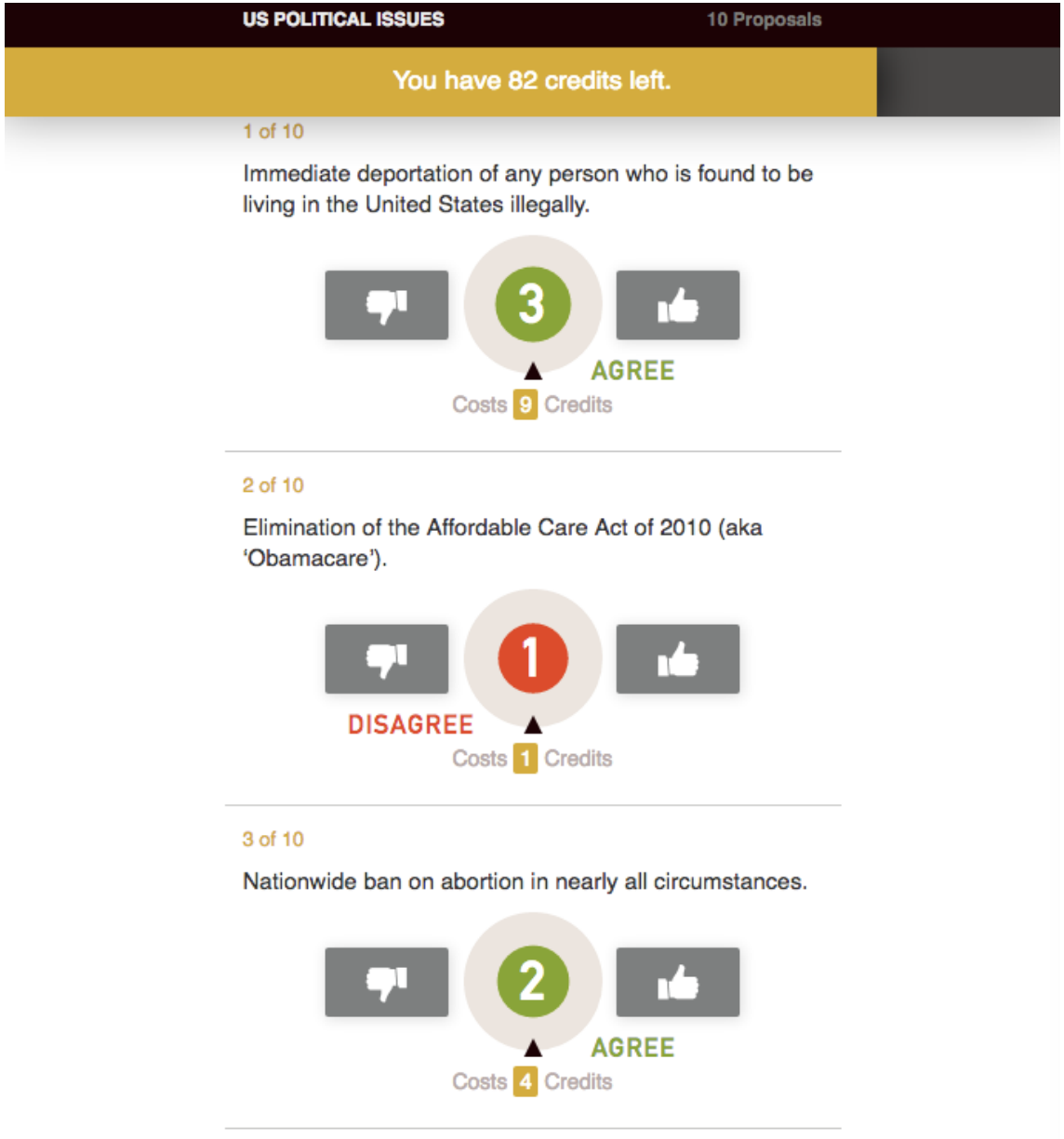
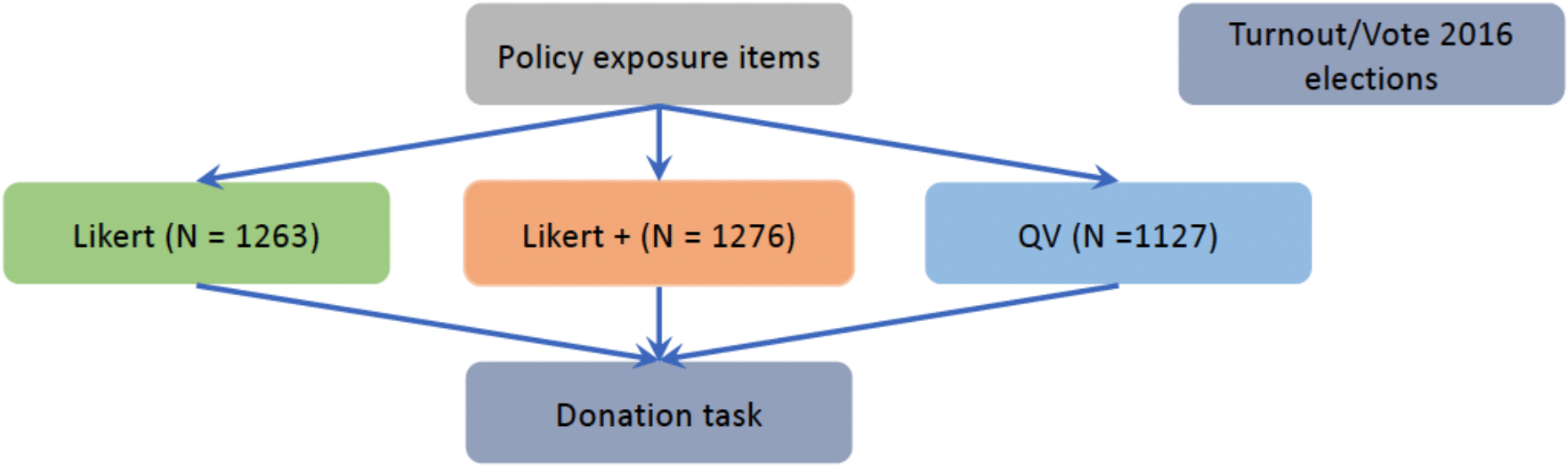
QV interface



U.S.-wide field experiment



https://osf.io/cenkg

Policy Items

- Giving same sex couples the legal right to adopt a child
- Laws making it more difficult for people to buy a gun
- Building a wall on the US Border with Mexico
- Requiring employers to offer paid leave to parents of new children
- Preferential hiring and promotion of blacks to address past discrimination
- Requiring employers to pay women and men the same amount for the same work
- Raising the minimum wage to $15 an hour over the next 6 years
- A nationwide ban on abortion with only very limited exceptions
- A spending cap that prevents the federal government from spending more than it takes
- The government regulating business to protect the environment

Donation

Please read this important information before you move to the third and last part of the survey:

At the end of the survey, the computer will randomly select **40** people among all the survey participants (40 among roughly 4000 people). Each winner will receive a bonus worth up to **$100**. Winners will be notified in the 10 days following the end of the survey.
In this section of the survey:

- We ask you to imagine that you are among the 40 lucky winners selected by the computer.
- We offer you the opportunity to donate some of the $100 bonus to one non-profit organization. What you do not donate, you can keep for yourself.
- On the next page, we provide you with more information on each organization. We then ask you whether you would like to make a donation.

If you are among the randomly chosen winners, we will pay you the bonus amount, minus your donation, in points credited to your Knowledge Panel™ account ($100 = 100,000 points).

If you would prefer to skip this part of the survey, you can do so below. Please note that respondents who do not complete this last section will not be entered into the drawing for one of the $100 bonuses.

Donation

Gun policy

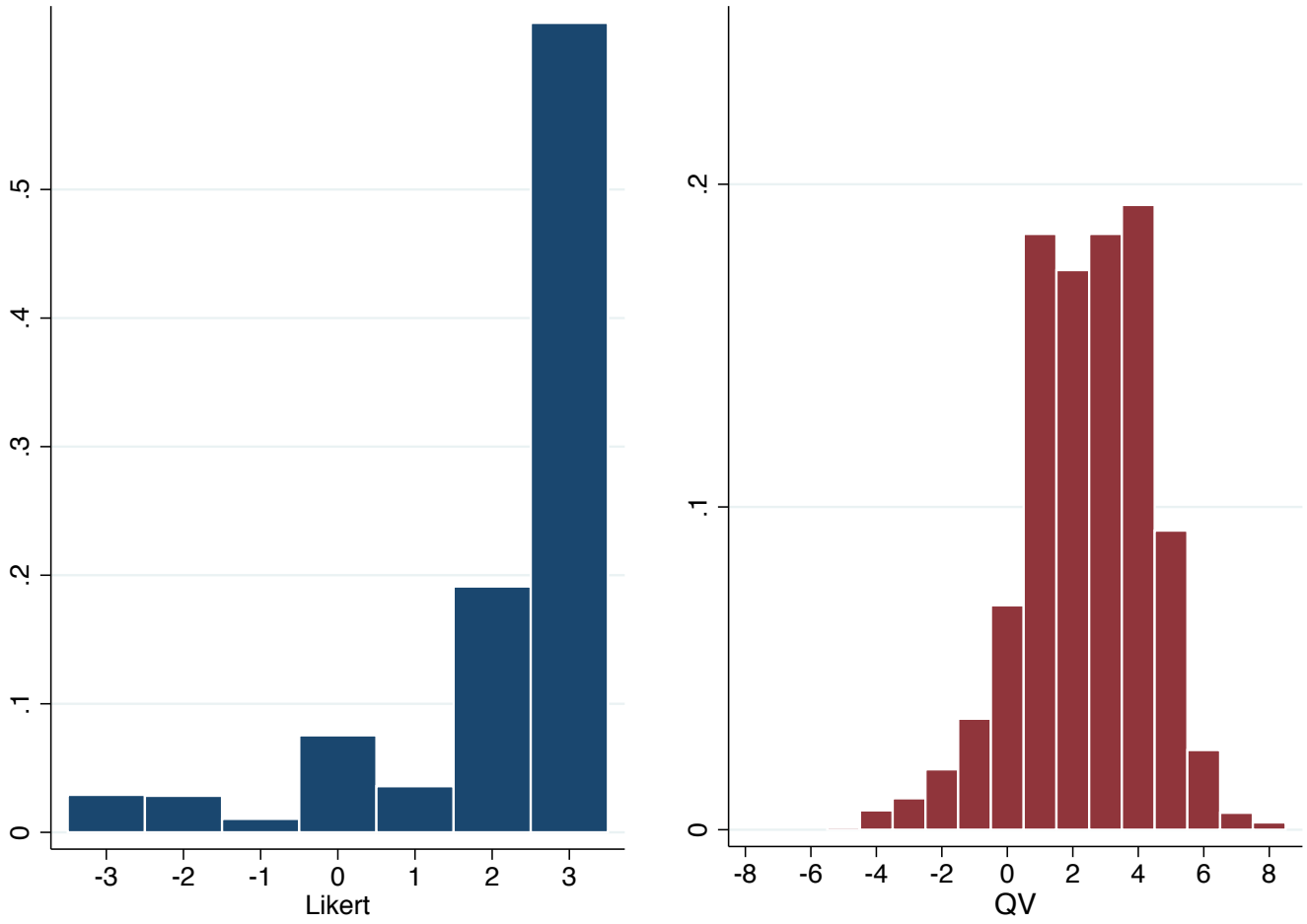
Gifford Law Center to Prevent Gun Violence : this organization **FAVORS gun control**. Its main activities include lobbying state and federal legislatures in **FAVOR** of **bills** that **regulate the purchase, possession and use of firearms.** This organization also goes to court to defend gun control laws against legal challenges from people who oppose such laws.

You can find more information on this organization by copying and pasting this link into a separate browser tab or window: http://lawcenter.giffords.org/

Institute for Legislative Action: this organization **OPPOSES gun control**. Its mains activities include lobbying state and federal legislatures to **OPPOSE bills** that **regulate the purchase, possession and use of firearms.** This organization also provides voters with information on candidates' position on gun control, encouraging them to vote for candidates that oppose gun control.

You can find more information on this organization by copying and pasting this link into a separate browser tab or window: https://www.nraila.org/

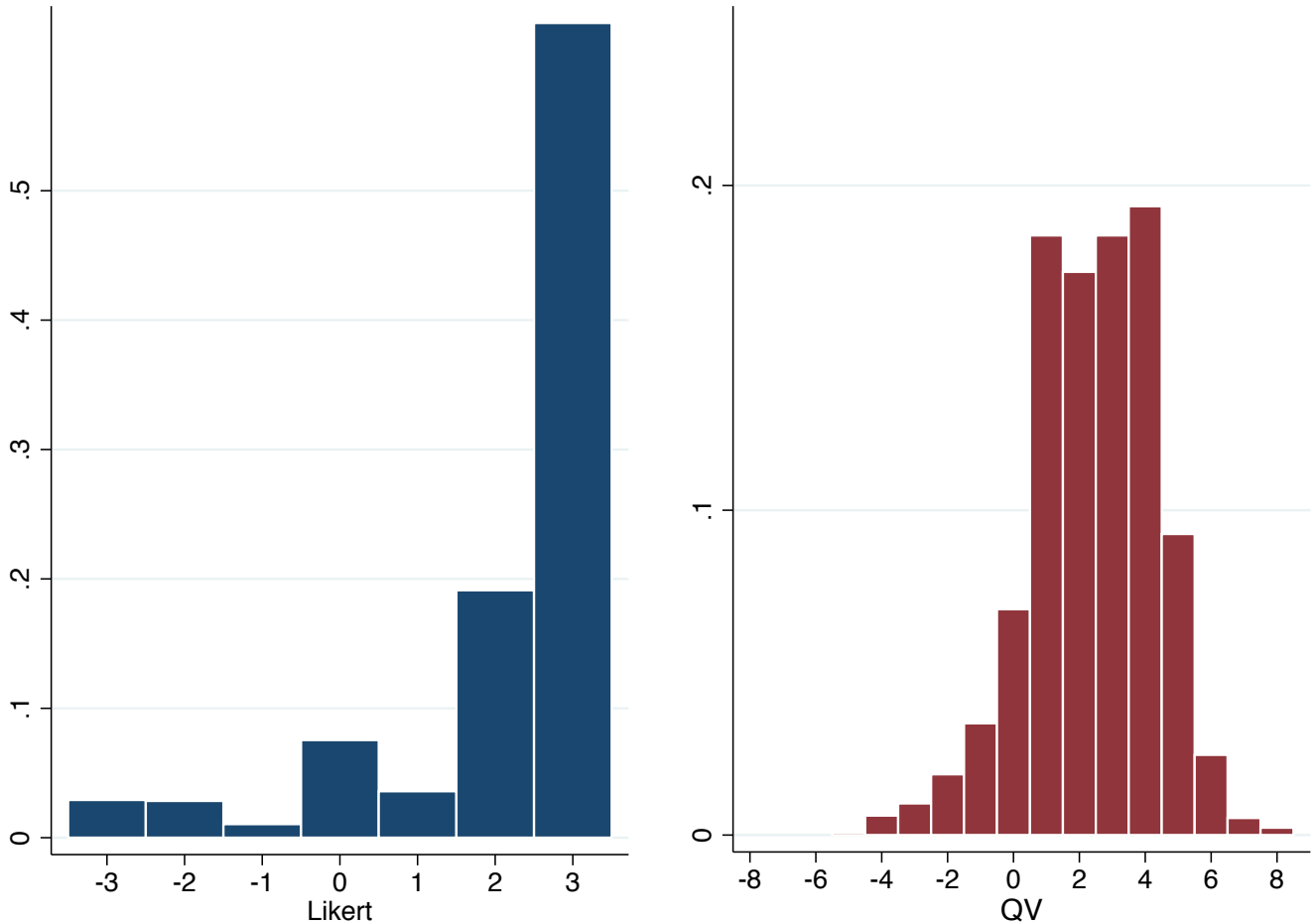
QV vs. Likert: Equal Pay



Do you favor or oppose requiring employers to pay women and men the same amount for the same work?

- With Likert, responses are strongly right-skewed
- With quadratic costs, less so

QV vs. Likert: Equal Pay



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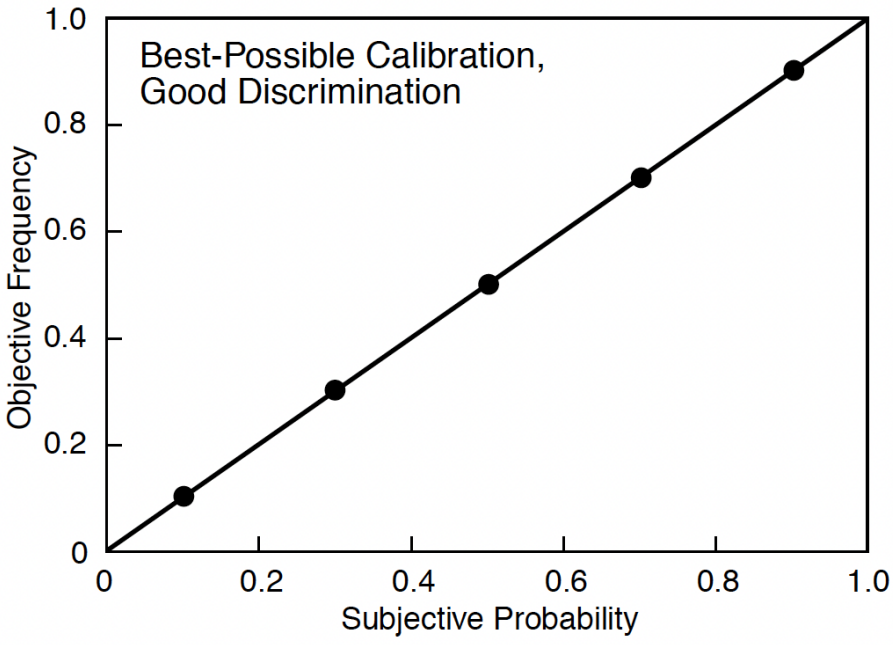
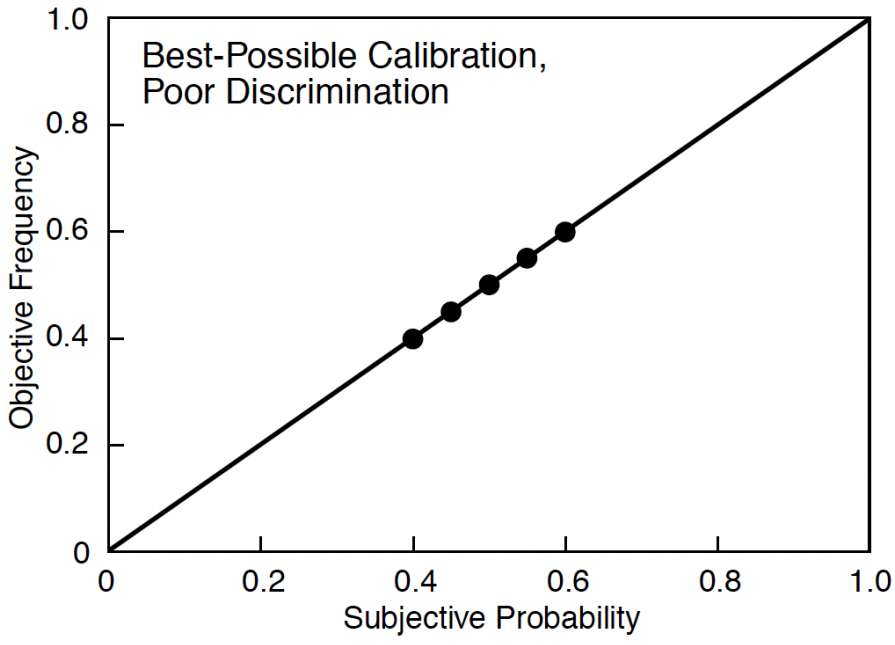
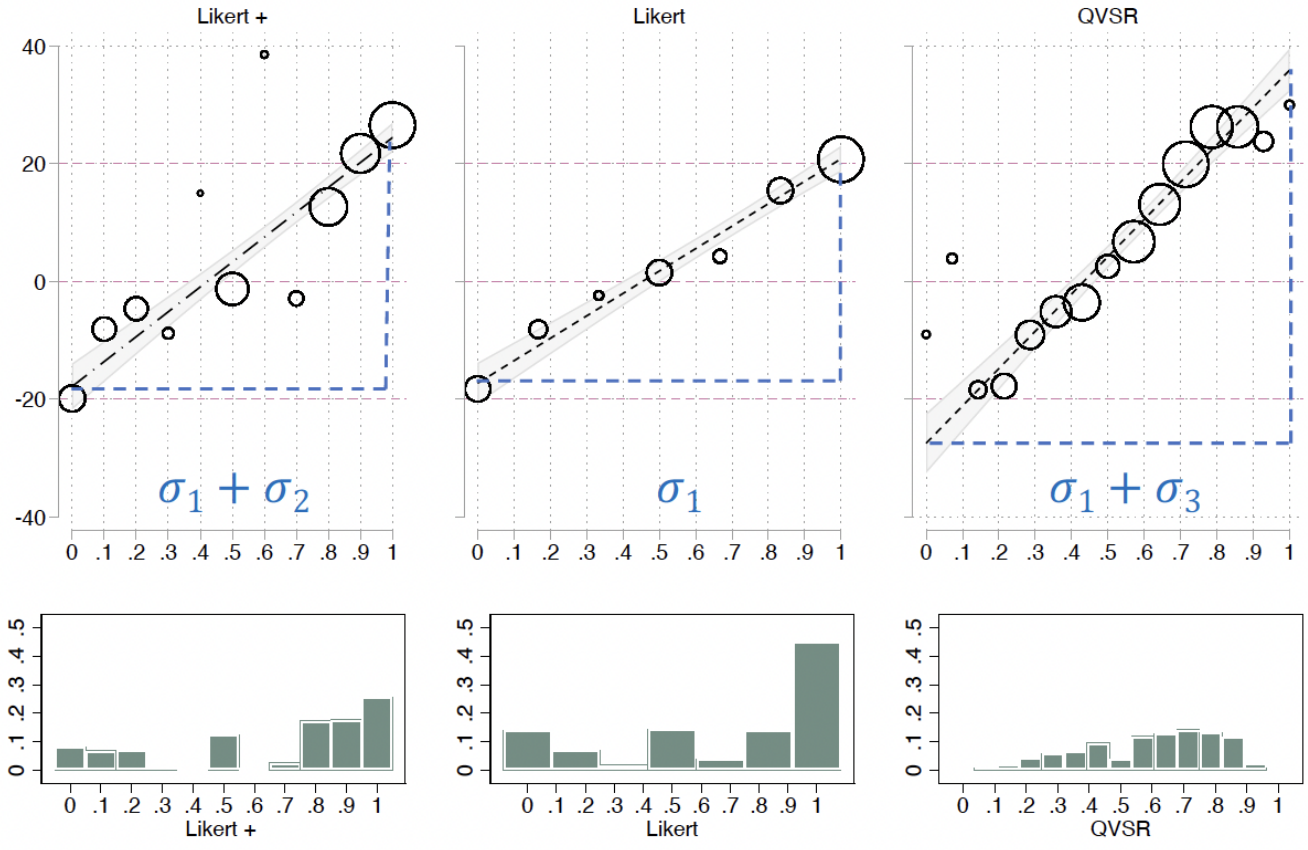
DOES THE SURVEY DISCRIMINATE BETWEEN INDIVIDUALS AND EXPLAIN GREATER VARIANCE?

Calibration and Discrimination (Tetlock 2006)





Laws making it more difficult for people to buy a gun



Y-axis: Donation, X-axis: Survey responses (0,1) normalized,

Circles size proportional to observations

- Likert (center) exhibits bunching, i.e. less ability to discriminate
- QVSR (right) exhibits variance in Y, i.e. greater ability to calibrate

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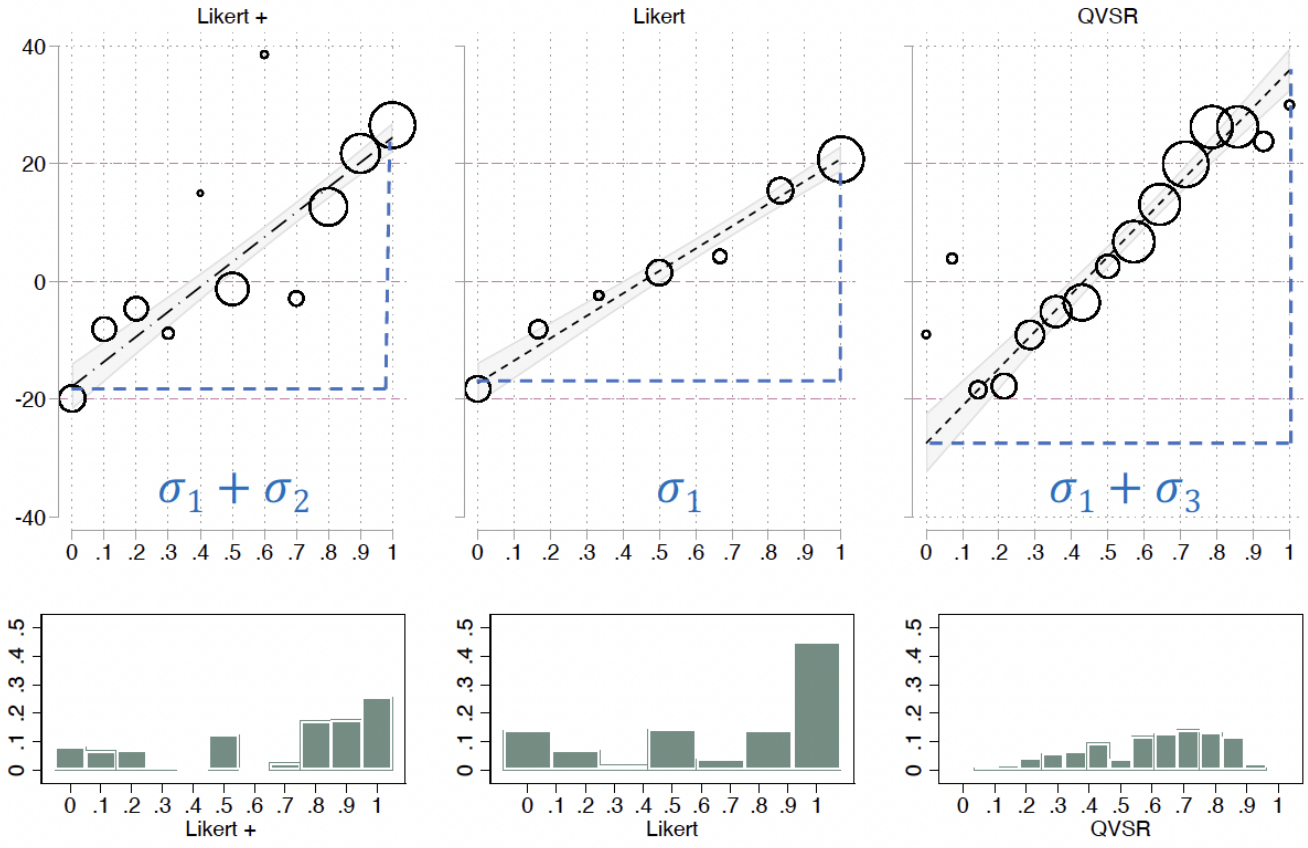

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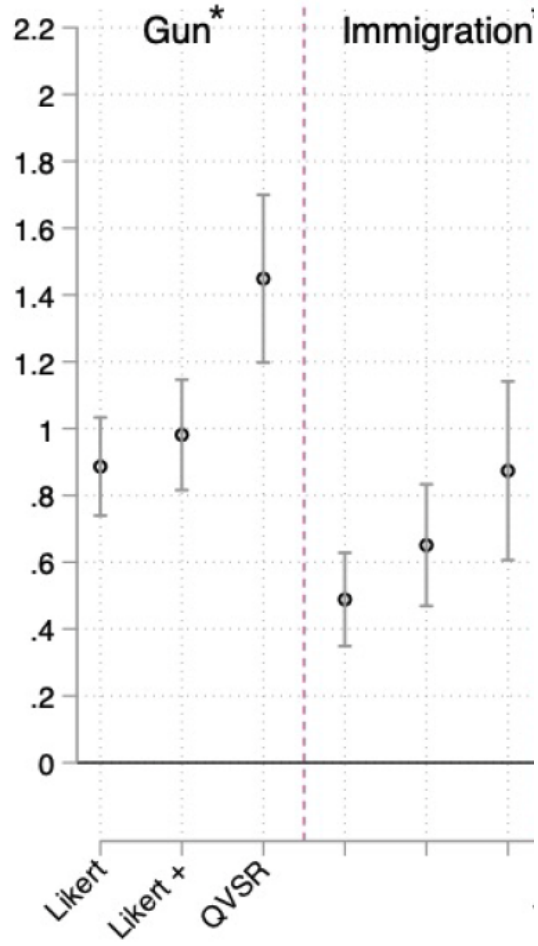
Calibration



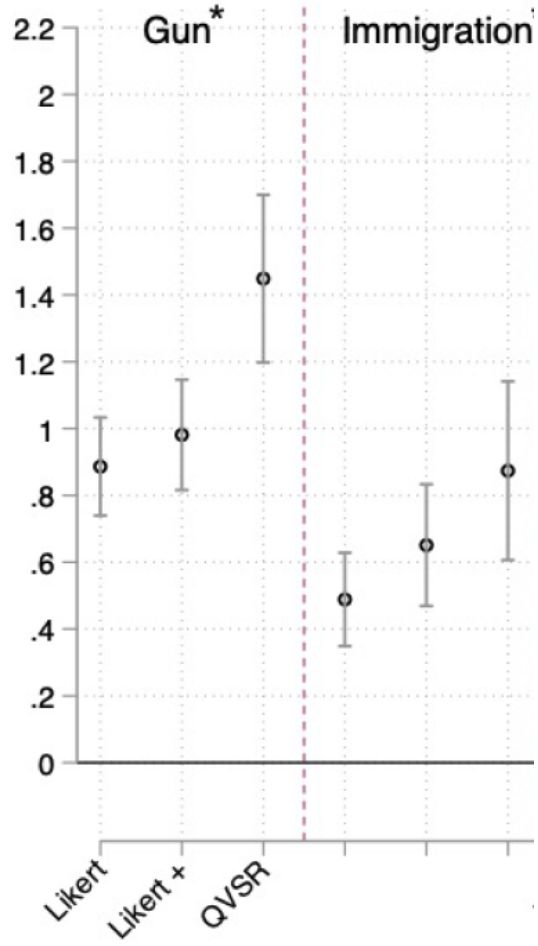
Y-axis: Coefficient of regression of behavioral outcome and survey response,

X-axis: Survey method

- Increase in responses from 0 to 1 is associated with Y standard deviation increase predicted gun / immigration donation.

QVSR IS BETTER AT PREDICTING DONATIONS, WHAT ABOUT REVEALING SELF-INTEREST?

Calibration



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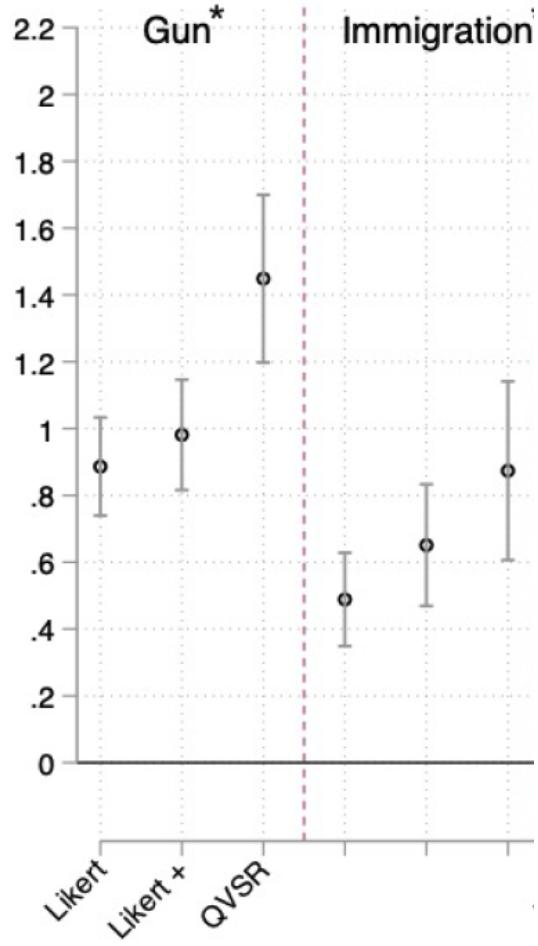

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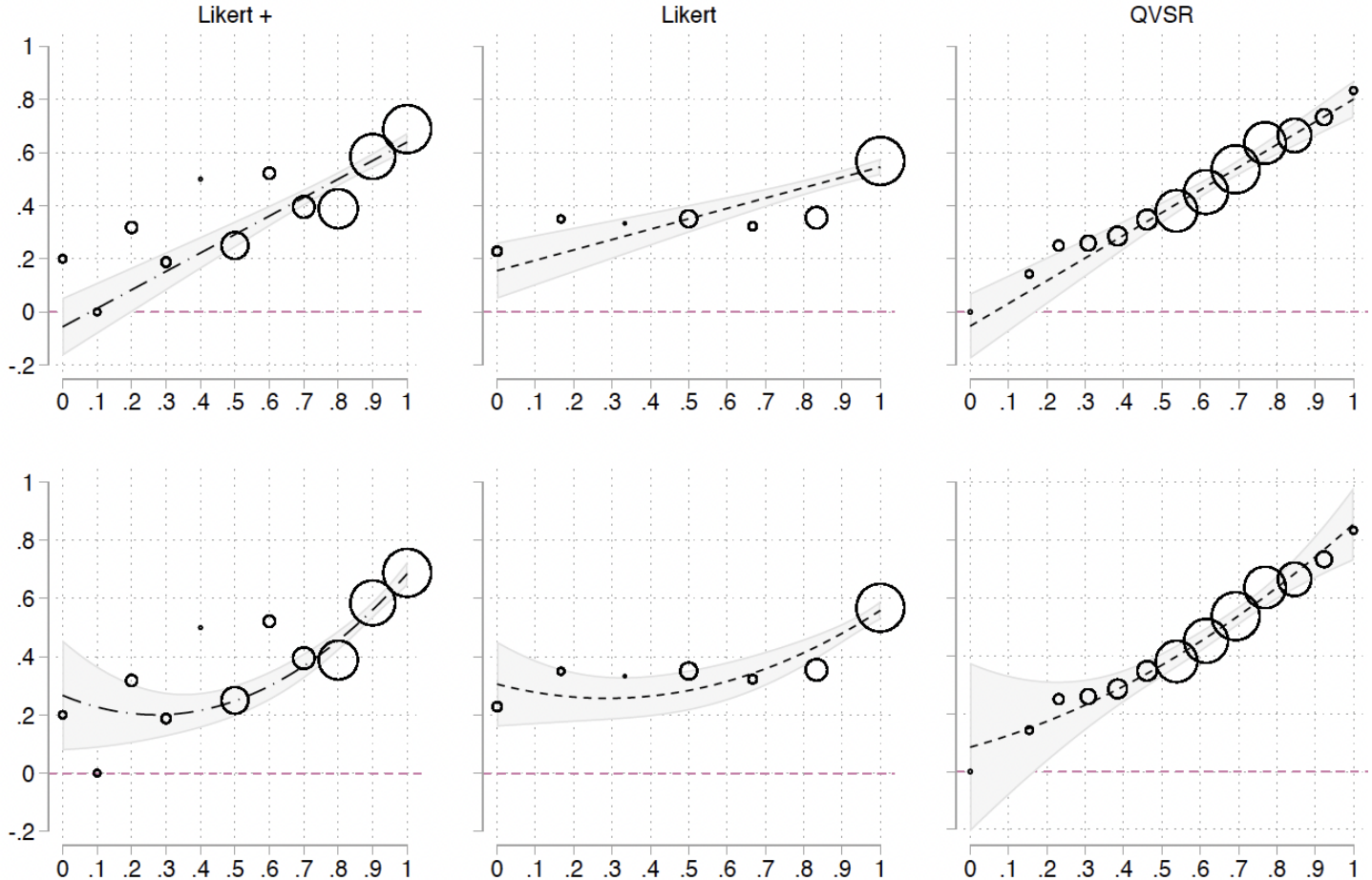
Requiring employers to pay women and men the same amount for the same work



Y-axis: Gender (female = 1, 0 otherwise), X-axis: Survey responses (0,1) normalized,

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- More calibration with quadratic fit in lower panel

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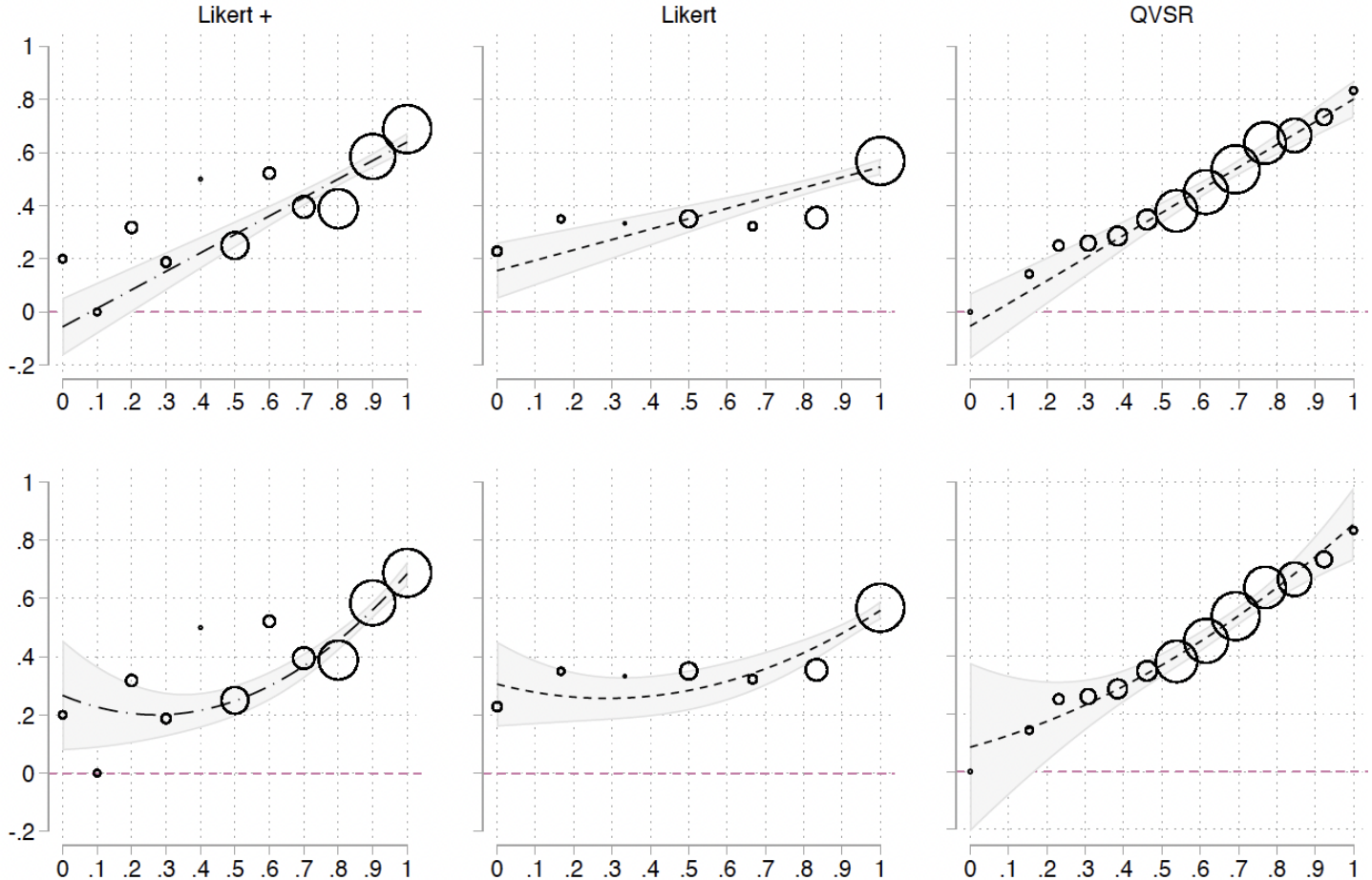

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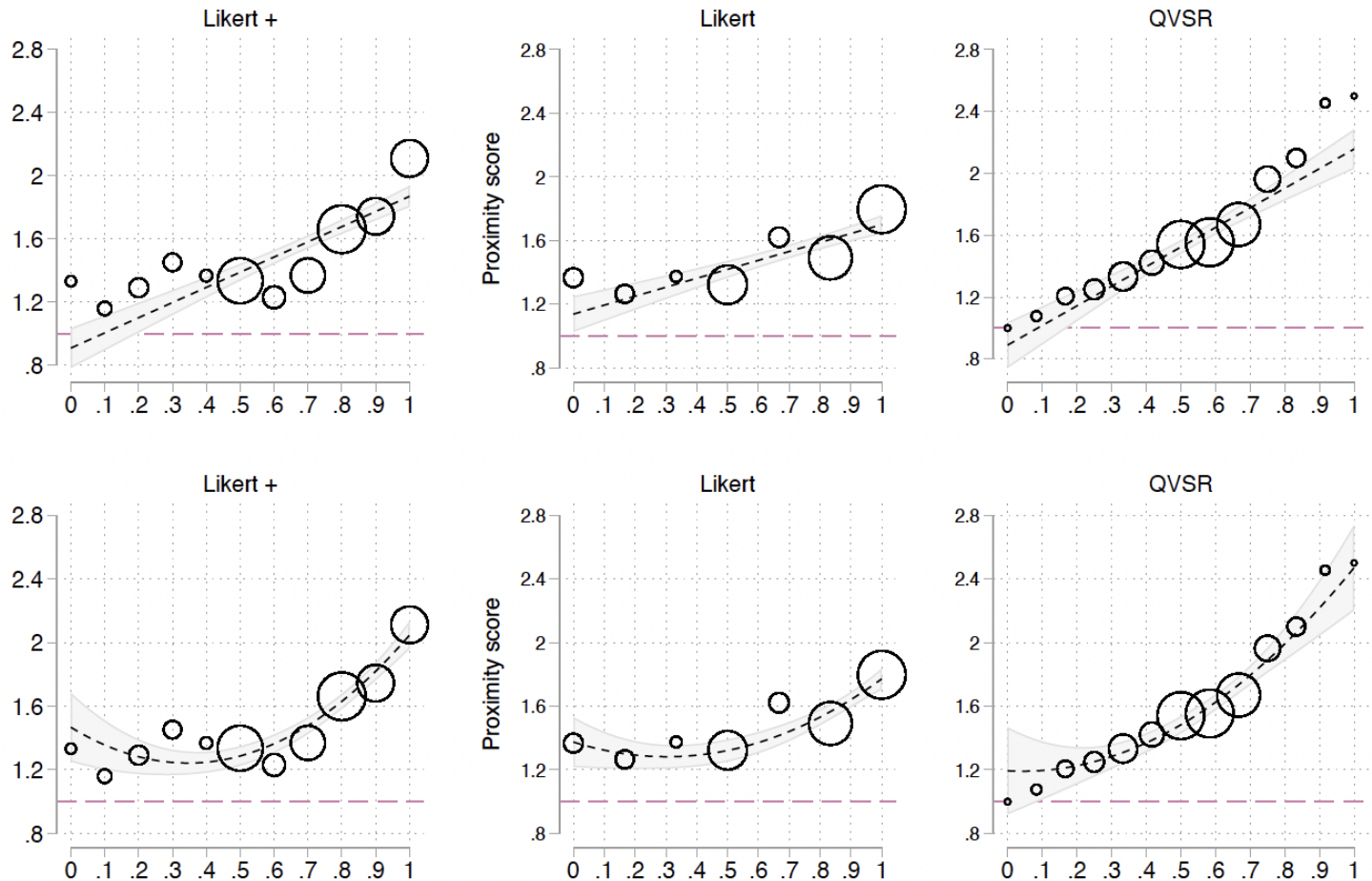
Requiring employers to offer paid leave to parents of new children



Y-axis: Proximity to Childbirth (= 1 if no young child and no plans to have any in future, = 2 young children but no plans to have more, = 3 if children planned or just had a child), X-axis: Survey responses (0,1) normalized,

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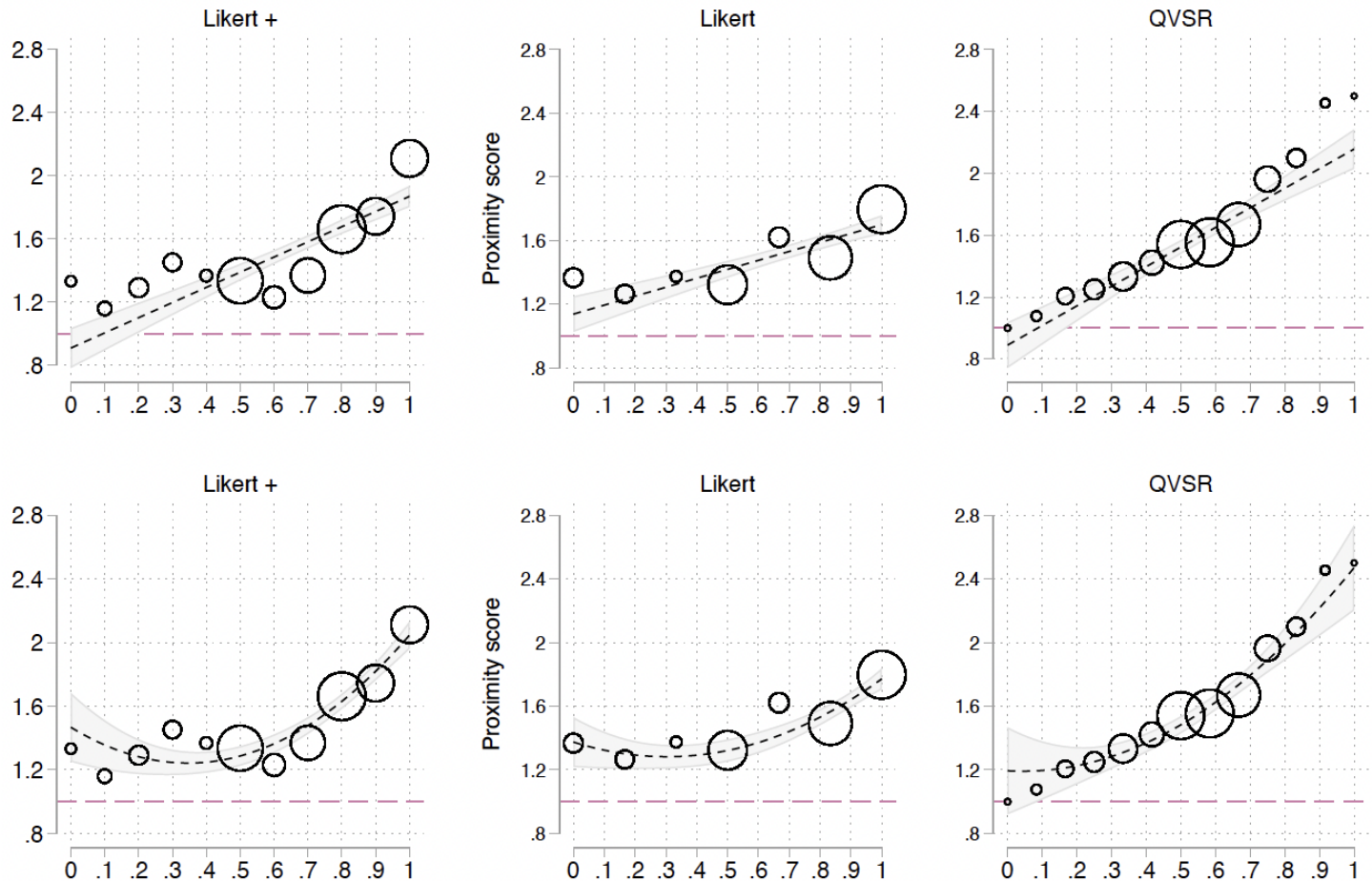

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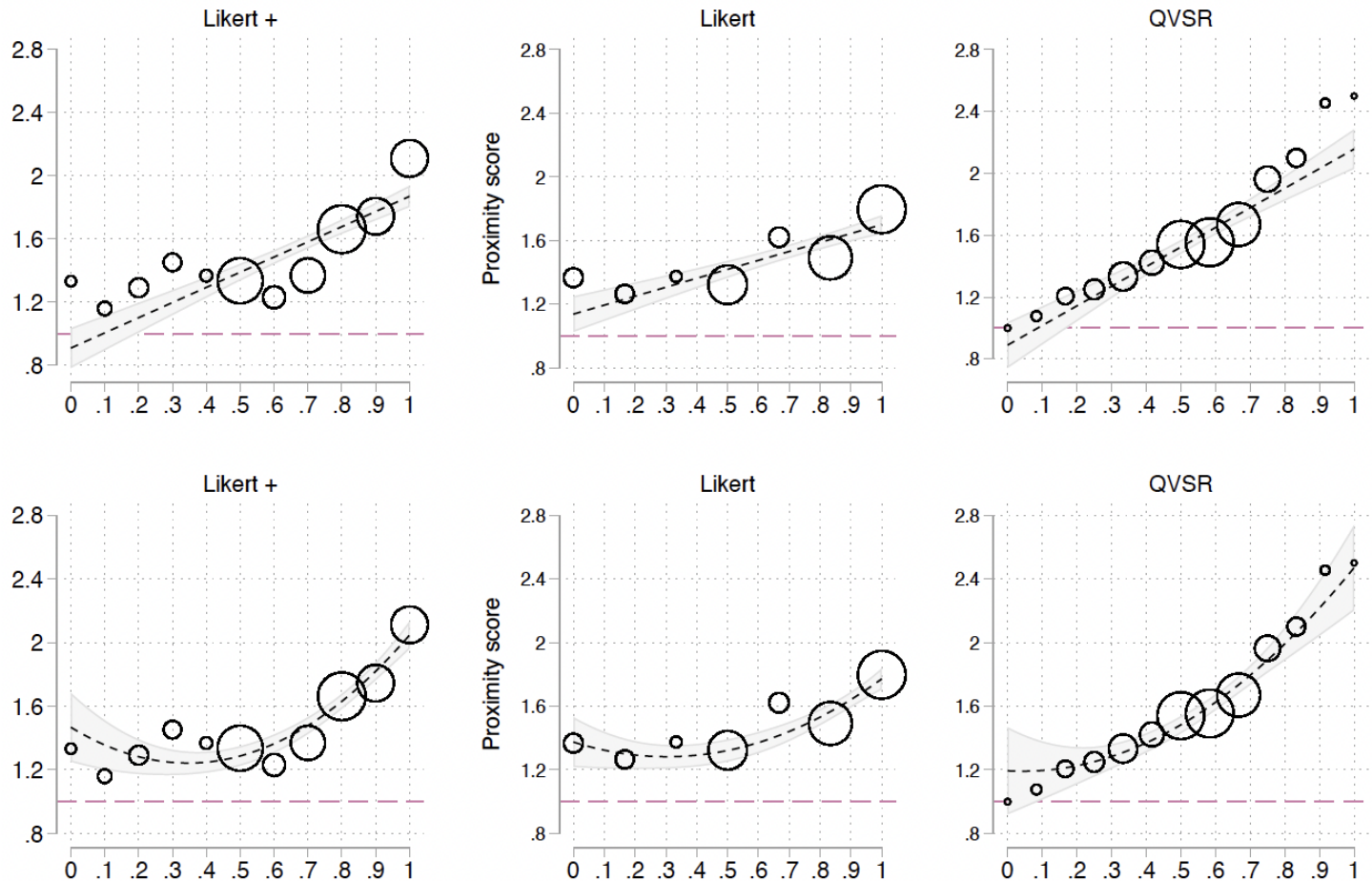

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Shannon Entropy

	Likert	Likert +	QVSR
Same sex right to adopt	1.62	2.16	2.24
Make it difficult to buy gun	1.57	2.00	2.40
Wall on the US Border	1.57	2.18	2.52
Paid leave	1.59	2.04	2.03
Preferential hiring of blacks	1.58	1.94	2.27
Pay women and men the same	1.00	1.71	2.02
Minimum wage to $15 an hour	1.67	2.14	2.24
Ban on abortion	1.55	2.13	2.48
Cap on federal spending	1.47	1.98	2.02
Regulation for environment	1.61	1.83	2.10

- doubling the entropy when it comes to questions like gender equity
- where there can be a strong social norm in expected survey response

Seemingly Unrelated Regression - Donations

	QVSR (=1) vs. Likert (=0) b/se	Likert+ vs. Likert b/se	QVSR vs. Likert+ b/se
Gun	0.55***	0.10	0.43**
	(0.14)	(0.10)	(0.15)
Immigration control	0.45***	0.19	0.25
	(0.13)	(0.10)	(0.14)

Coefficients report interaction between survey response and a dummy variable identifying the survey method, e.g., for gun donation, the difference between the coefficient for Likert and that for QVSR is equal to 0.55 in predicting gun donations in standardized units.

- QVSR outperforms Likert in predicting donations
- QVSR's relative performance to Likert is greater than its relative performance to Likert+

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Seemingly Unrelated Regression - Material Self-Interest

	QVSR (=1) vs. Likert (=0) b/se	Likert+ vs. Likert b/se	QVSR vs. Likert+ b/se
Female	0.67***	0.31**	0.30*
	(0.14)	(0.11)	(0.14)
Black	0.24**	0.13*	0.10
	(0.07)	(0.05)	(0.08)
Proximity to Childbirth	0.23**	0.22**	0.03
	(0.09)	(0.07)	(0.09)
Not Born Again	0.20*	-0.05	0.27**
	(0.08)	(0.06)	(0.09)
No Guns at Home	0.31***	0.01	0.29**
	(0.09)	(0.07)	(0.09)
Immigrant Background	-0.04	-0.01	-0.02
	(0.05)	(0.03)	(0.05)
Lesbian/Gay	0.12**	0.01	0.12**
	(0.05)	(0.03)	(0.04)
N	1503	1594	1537
F-test	56.50	13.18	21.73

Coefficients report interaction between survey response and a dummy variable identifying the survey method.

- QVSR outperforms Likert in predicting exposure proxy
- Likert+ outperforms Likert in predicting exposure proxy
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Making costly the expression of moral and ideological beliefs in surveys

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- SUBSTANTIVE UPSHOT: Long-standing debate on material self-interest's impact on policy preferences may need to be revisited

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Willingness To Say

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- Survey design often approximates a prediction problem: the goal is to select instruments that best predict the value of an unobserved construct or a future outcome.
- Can machine learning help choose among competing instruments?

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  - Estimate "treatment" effect on the Brier score PREDICTION ACCURACY
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  - Maps covariates to a treatment that results in best Brier score
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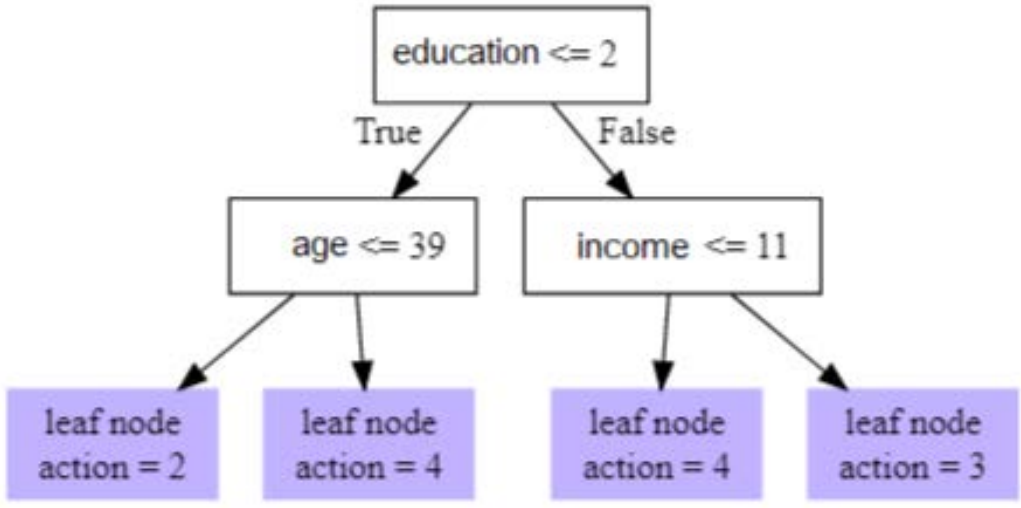
Hypothetical Policy Tree



Decision tree using education and age to assign one of four possible actions: 1 (assign to Likert), 2 (Likert+), 3 (QVSR), and 4 (QVSRN WILLINGNESS TO PAY TO SAY)

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FOCUS ON EDUCATION, SINCE A PROMINENT CONCERN IS COGNITIVE DEMAND OF QVSR

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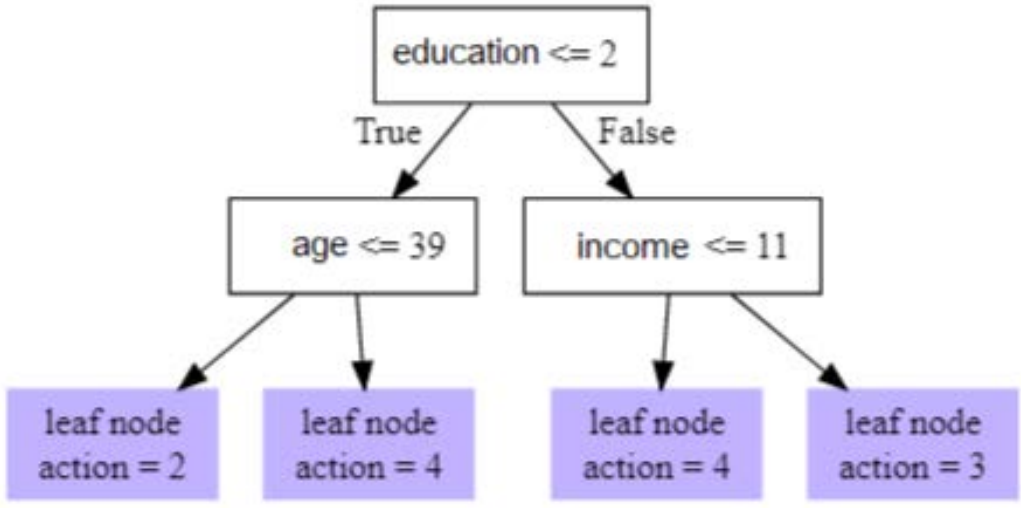

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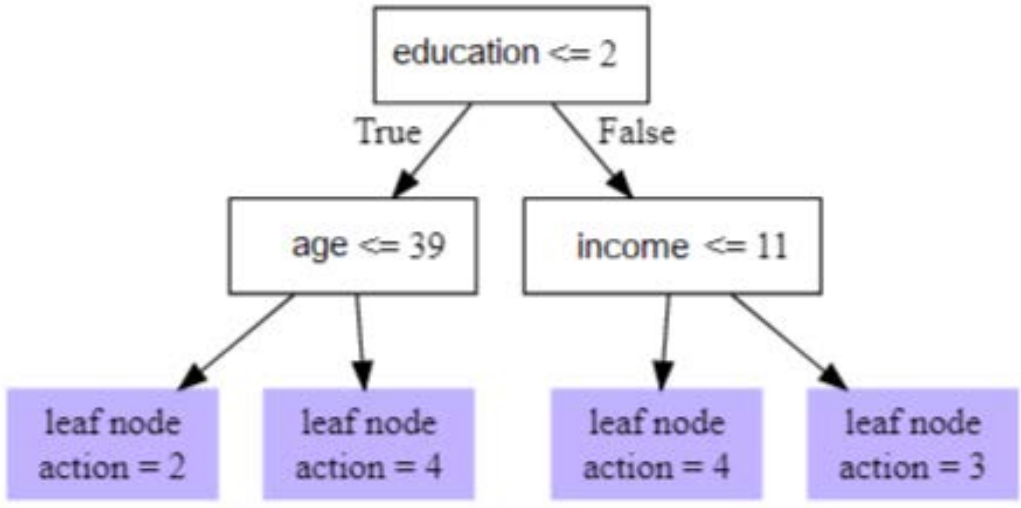

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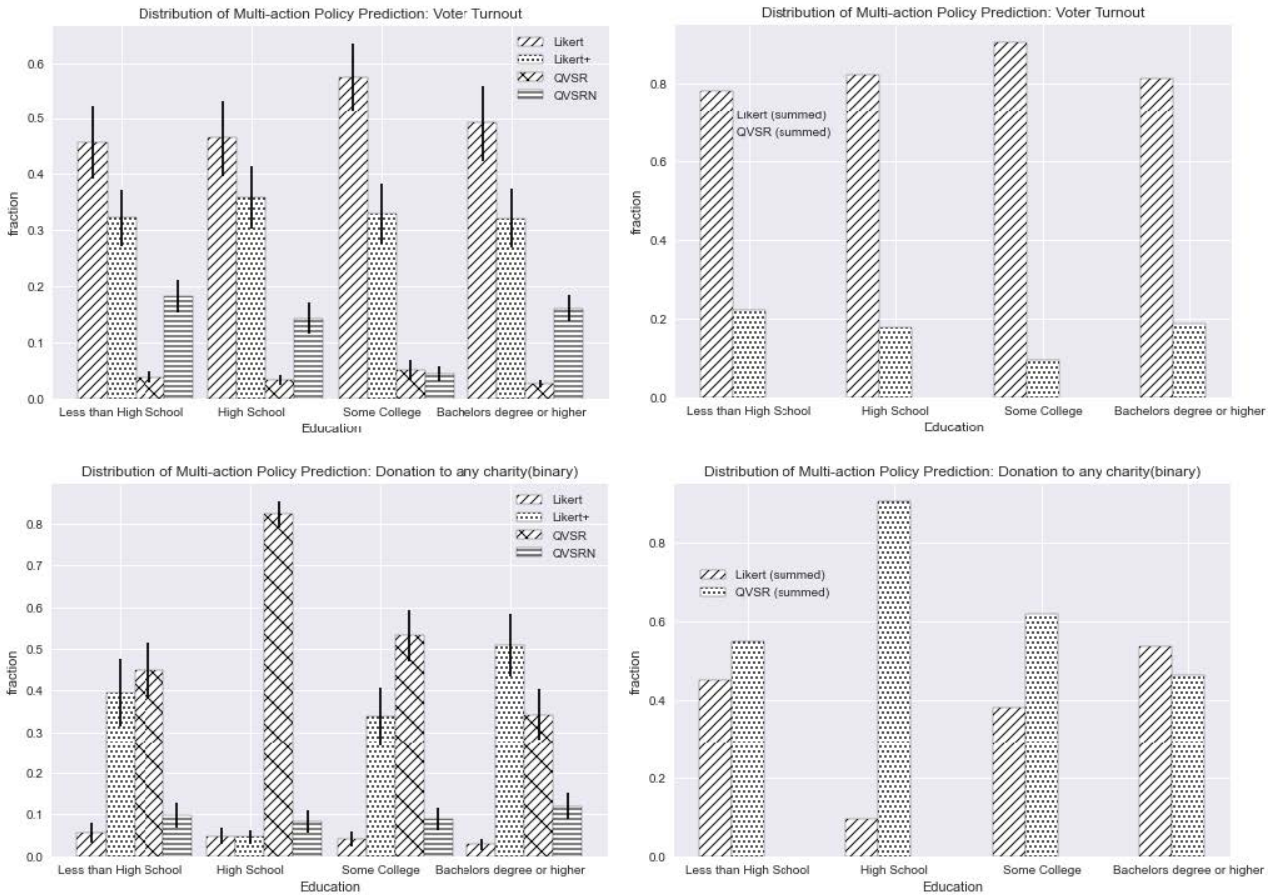
Optimal Assignment based on Education



Each panel plots, by education level, % of respondents assigned to a given survey method.

Top row is voter turnout and bottom row is donation.

- QVSR outperforms Likert for the majority of respondents in predicting donations, especially for intermediate education levels
- Likert appears better for voter turnout across all education levels

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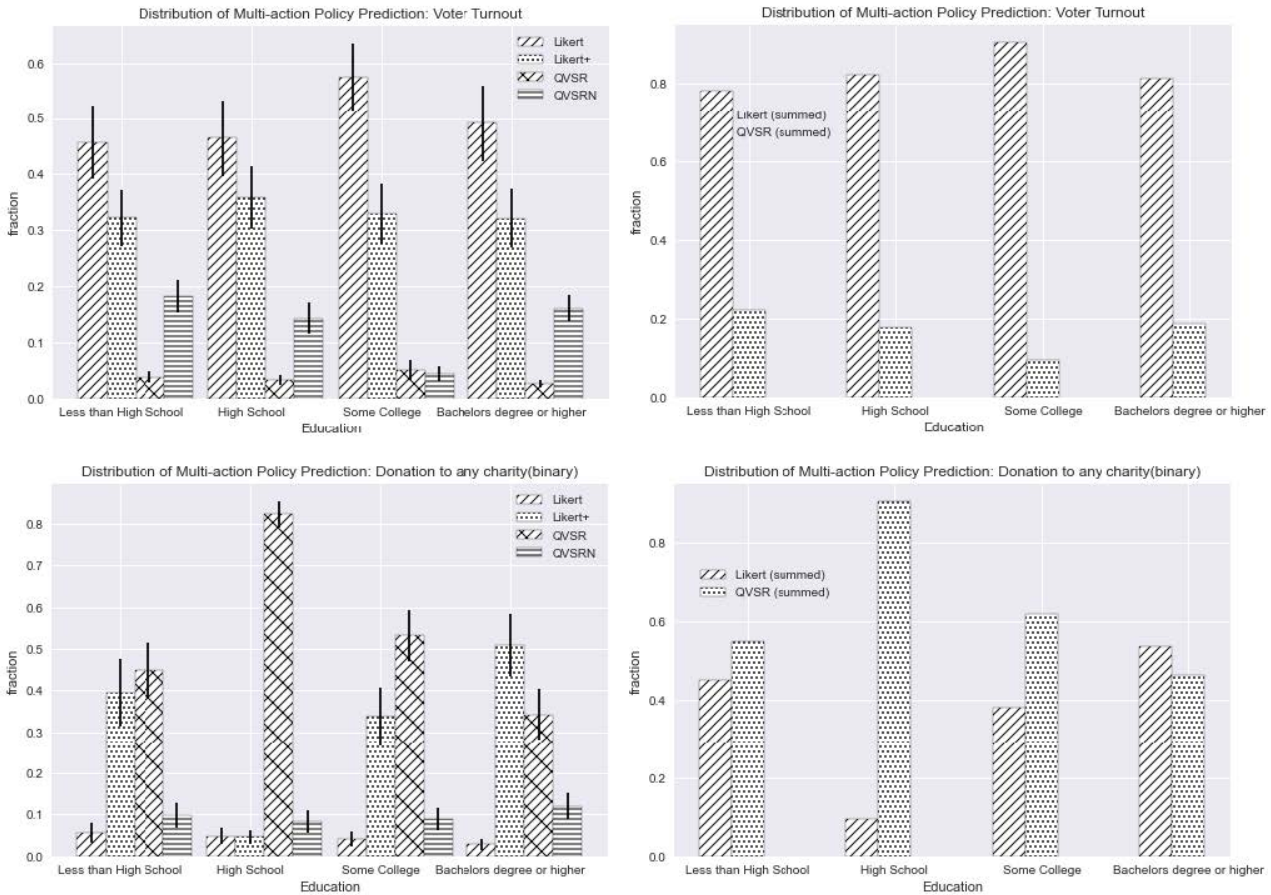

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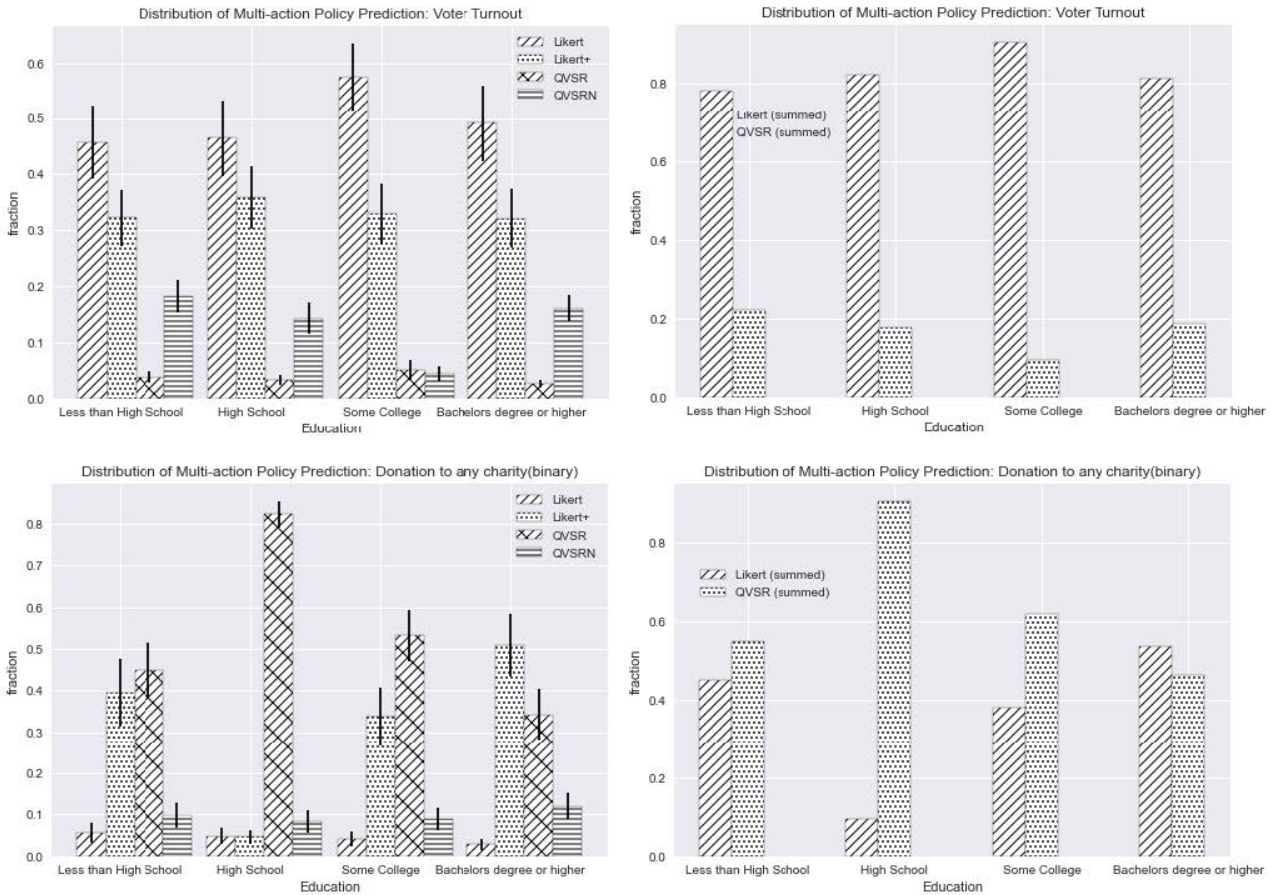

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Willingness To Say

- Likert may be sensitive to partisan signaling,
  - which may better predict turnout
- QVSR may be more sensitive to single-issues,
  - which may better predict donations
- Survey design can be a treatment and prediction problem, where the goal is to select "instruments" that best predict offline indicators.
- Survey "Instruments" broadly conceptualized:
  - survey method,
  - questions asked,
  - data merged,
  - information interventions (LIKE THOSE THAT AFFECT TURNOUT), etc.
- Offline indicators can broadly conceptualized
  - retrodiction (DEMOGRAPHICS),
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Signpost

- Applications
  - Changes in menu: CONSIDERATION SETS, SLUTSKY MATRIX
  - Affecting policymaking: RESPONSIVENESS
  - Enhancing legitimacy: DIGITAL DEMOCRACY
- Theory
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Attitudes as Assets

The basis of economics is choice.

In the neoclassical approach, choices are interpreted as resulting from the maximization of a utility function. . .

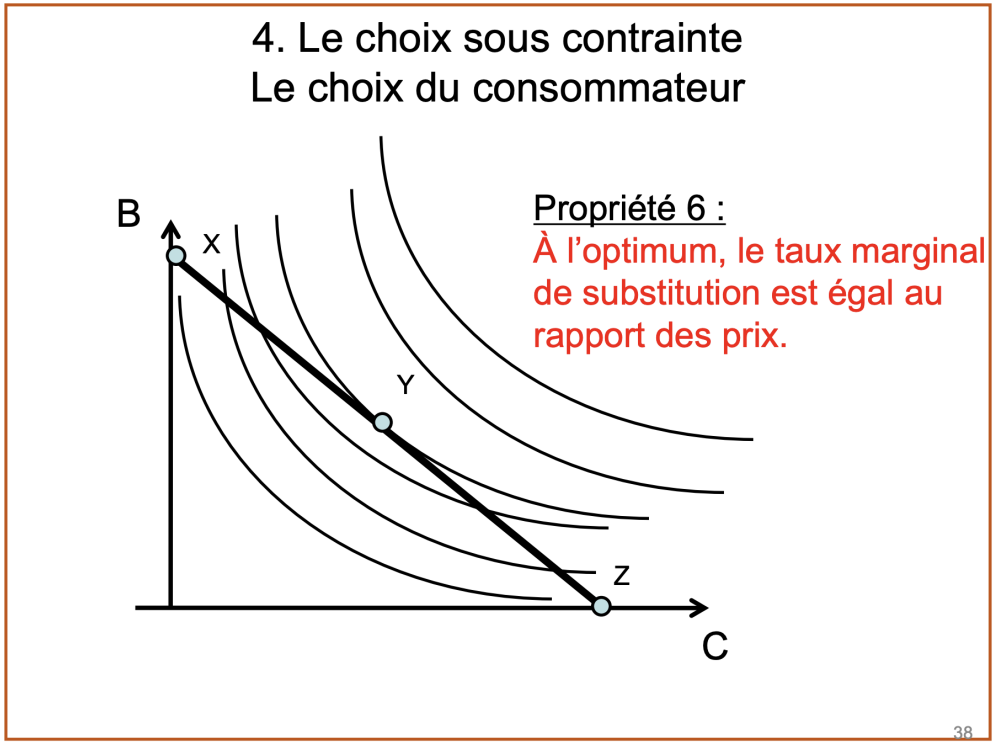

Figure: Introduction to Economics

Motivations

Much of the decisions we make are shaped by our attitudes rather than scarce resources.

> According to Chave (1928), an attitude is a "complex of feelings, desires, fears, convictions, prejudices or other tendencies that have given a set or readiness to act to a person."

The influence of attitudes on choices is well established

> Economic History (Long-term persistence studies), Experimental Economics (Cultivating attitudes, changing norms...)

Motivations

The expression of attitudes, often measured through surveys, is

i. highly context-dependent
ii. affected by a variety of psychological and physiological factors, which we do not entirely comprehend.

A need to conceptualize and combine these factors in a unified framework has long been an intellectual enterprise of social scientists.

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Contribution

We advance a framework to conceptualize and measure attitudes, which gives one solution to the previous challenges.

- **Attitudes are like assets.** They are durable and private goods that can be leveraged in various decisions.
- We have preferences over attitudes, and face a price constraint when we express them.
  - **Preferences**: a relatively enduring subjective organization of attitudes. In sum, worldviews, social norms...
  - **Prices**: expressing attitudes is costly. The price of attitudes capture the aggregate effect of all the (non-preferences based) forces that affect a decision.

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The Experimental Methodology

We propose a novel methodology inspired of experiments on revealed preferences.

- We offer subjects repeated opportunities to allocate a fixed amount of tokens for holding different attitudes.
- Expressing an attitude is like buying an asset to a price that is experimentally set.
- On a scale that measures the intensity of an attitude, the higher the expressed attitude, the costlier it is to buy that attitude.
- We recover the shadow prices of attitudes by observing answers to standard Likert scale questions.

Data: Setup

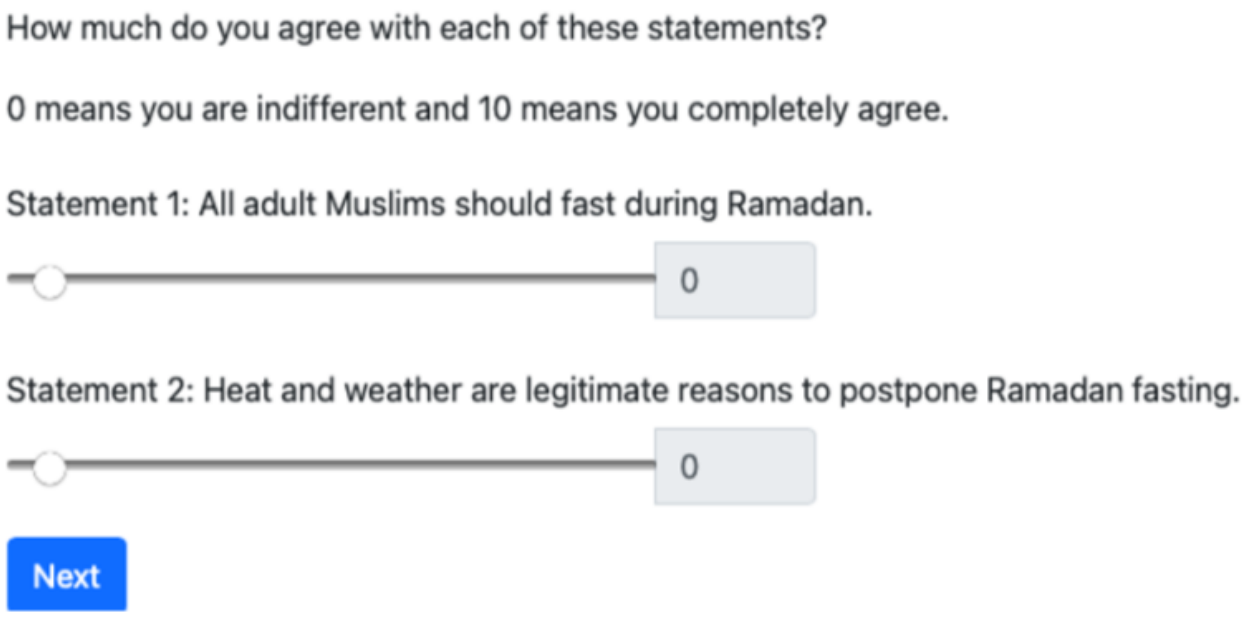

Figure: Likert Scale Survey

Data: Setup

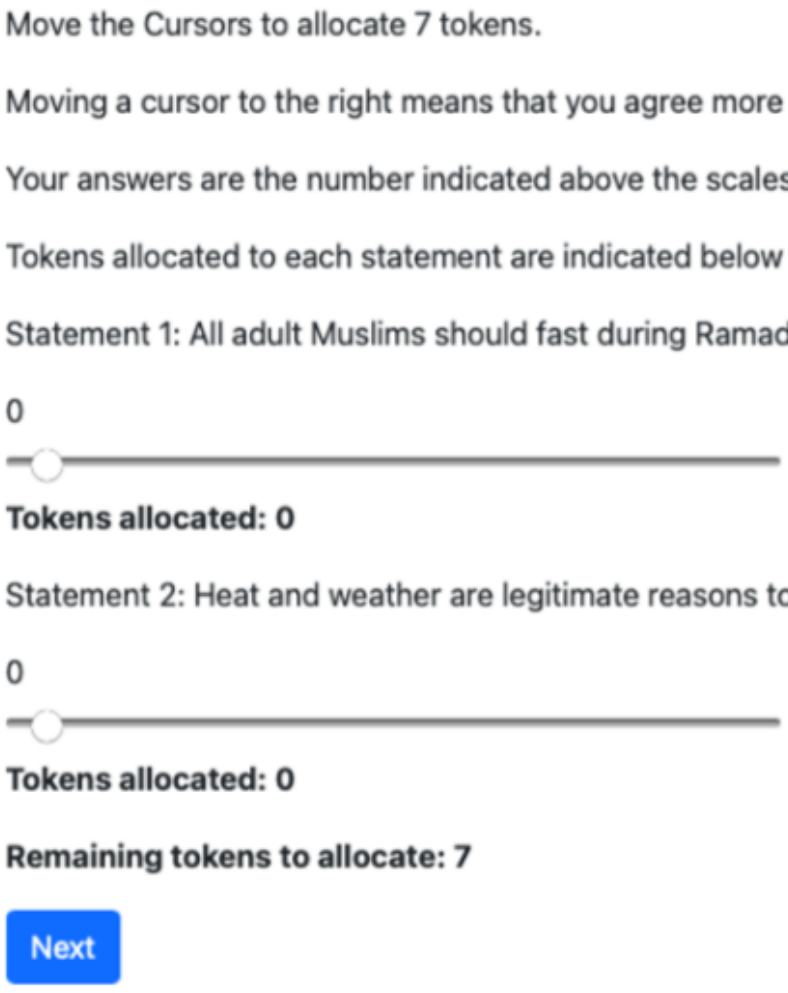

Figure: Experimental Methodology

Theoretical Contributions

We adopt both a parametric approach and a non-parametric approach in the paper to recover prices and preferences. There are many applications. . .

One major application relates to the mechanisms explaining changes in attitudes.

- We show that changes in attitudes can be additively decomposed into two components:
  i. One related to changes in the prices of attitudes.
  ii. One related to changes in preferences.
  iii. The decomposition is derived through both a parametric approach and a non-parametric approach.

Empirical Contributions

We apply our framework on attitudes about Ramadan fasting. We investigate the effect of conservative and liberal religious preaches on attitudes.

i. Civil servants were exposed to contentious conservative and liberal religious preaches.

ii. We find that exposure to the conservative preach increases conservative attitudes, and exposure to the liberal preach decreases conservative attitudes. . .

iii. But the mechanisms explaining the two results are very different!
   - Exposure to the conservative preach does not change subjects' preferences but makes it less costly to express conservative attitudes.
   - Exposure to the liberal preach makes subjects' preferences more liberal, while it also makes it more costly to express liberal attitudes.

Literature

1. This paper contributes to the large literature on social norms, their origins, persistence, and malleability (Akerlof and Kranton (2000), Bisin and Verdier (2001), Shayo (2009), Benabou and Tirole (2011), Bernheim et al. (2021)...

   - We leverage existing research on revealed preferences to further our understanding of attitudes, and norms (e.g., Afriat (1967), Varian (1982, 1990), Halevy et al. (2018), Deb et al. (2022)).

2. This paper contributes to the literature on changes in attitudes (Bursztyn et al. (2018), (2020), Giuliano and Nunn (2020):

   - We show that changes in attitudes can be additively decomposed into two fundamental elements.

3. This paper contributes to the literature on the economics of religion (Iannaccone (1992), Chaney (2013), Iyer (2016), Becker et al. (2020), Mehmood and Seror (2022)):

   - We study how online preaches by prominent Imams impact religious attitudes.

Theory: Set-up

- Let $\mathscr{I} = \{1, \ldots I\}$ denote a set of subjects, $\mathscr{S} = \{1, \ldots S\}$ a set of statement and $\mathscr{K} = \{1, \ldots K\}$ the index set of observations.
- In observation k, each subject i is asked to divide a budget R_k between the statements in $\mathscr{S}$ on an integer scale from 1 to $N > 1$. Let $X(s) = \{1, \ldots, N\}$ the scale associated to statement s, and $X =_s X(s)$.
- Answering the statements in costly and $p_{k,s}$ denotes the price of marginally increasing the answer in statement s and observation k. $\mathrm{p_k} = \{p_{k,s}\}_{s \in S}$ is the price vector in observation k.
- We denote $q^i_{k,s} \in X(s)$ subject i's answer to statement s in observation k and $\mathrm{q^i_k} = \{q^i_{k,s}\}_{s \in S}$. The choice set of observation k can be defined as follows:

$$B^k = \{q \in X \text{ such that } q.p^k \leq R^k\}. \tag{4}$$

The similarity with the standard consumption choice environment is clear from equation (4). It is as if subjects were “buying" goods when they express their attitudes.

Theory

Let $D_i = \{q_k^i, B^k\}_{k \in \mathscr{K}}$ denote the set of data observed for subject i. We denote q_0^i subject i's answers to the standard survey of Likert scale questions (without constraints on the choice set).
Assumption: For any observation $k \in \mathscr{K}$, $q_0^i \notin B^k$.

- One key aspect of our experimental methodology is that $\geq$ does not constitute an exogenous pre-order of the set of possible survey answers X as respondents have ideal points when answering surveys.
- Given that q_0^i never belongs to the choice sets, respondents should seek to give answers as close as possible to q_0^i in the observation set, and should therefore saturate their budget constraints.
- In more formal terms: Under Assumption 1, $\geq$ is an exogenous pre-order of B^k, for any $k \in \mathscr{K}$

Parametric Recoverability of Preferences

Under Assumption 1, rationalizability axioms used in the standard consumption choice environment can be applied:

Definition

Let $v \in [0,1]^K$. For subject $i \in \mathscr{I}$, an observed bundle $q_{i,k} \in \{1,\ldots,N\}^S$ is

1. v-directly revealed preferred to a bundle $q \in \{1,\ldots,N\}^S$, denoted $q_{i,k} R^0_{D,v} q$, if $v_k p_{i,k} q_{i,k} \geq p_{i,k} q$ or $q = q_{i,k}$.
2. v-strictly directly revealed preferred to a bundle $q \in \{1,\ldots,N\}^S$, denoted $q_{i,k} P^0_{D,v} q$, if $v_k p_{i,k} q_{i,k} \geq p_{i,k} q$.
3. v-revealed preferred to a bundle $q_k \in \{1,\ldots,N\}^S$, denoted $q_{i,k} R_{D,v} q$, if there exists a sequence of observed bundles $(q_j, q_k, \ldots, q_m)$ such that $q_{i,k} R^0_{D,v} q_j, \ldots q_m R^0_{D,v} q$.

- v_k: minimum difference between the expenditure on bundle $q_{i,k}$ and the expenditure on bundle q before q can be considered worse than the observed choice.

Parametric Recoverability of Preferences

Definition

Let $\mathrm{v} \in [0,1]^K$. A dataset D_i satisfies the general axiom of revealed preference given v ($\mathrm{GARP_v}$) if for every pair of observed bundles, $\mathrm{q_{i,k}} R_{\mathrm{v}} \mathrm{q}$ implies not $\mathrm{q} P^0_{D,\mathrm{v}} \mathrm{q_{i,k}}$.

We can apply a slightly extended version of Afriat's theorem (due to Halevy et al. (2018)):

Theorem

The following conditions are equivalent:

1. *There exists a nonsatiated utility function that* v*-rationalizes the data.*
2. *The data satisfy* $GARP_{\mathrm{v}}$.
3. *There exists a continuous, monotone, and concave utility function that* v*-rationalizes the data.*

Theory

Provided that subjects are rational when answering the K surveys, their choices can be rationalized by a monotonic, concave, continuous utility function:

$$q_k^i =_{q \in B^k} u^i(q).$$

Extending this logic, when subject i answers q_0^i to the initial survey, knowing her utility u^i we can infer the *shadow price* associated with q_0^i:

$$q_0^i =_{q \in B^0} u^i(q).$$

with $B^0 = \{q \in X, q.p^i \leq 1\}$. Here, p^i is the shadow price of answering q_0^i

for subject i. p_s^i corresponds to the cost that subject i feels when she marginally increases her attitude about statement s.

Theory

The basic idea here is that two subjects might give the same answer q_0^i, but would feel different costs for doing so.

$\rightarrow$ A subject might feel that the price of answering a liberal question to a survey is high, so her attitude reflects this price constraint rather than her liberal preferences...

Take a treatment affecting attitudes. Will this treatment affect attitudes by (primarily) changing prices or preferences?

- Answering this question might turn out important, as price and preferences capture two distinct influences on choices.
- Preferences reflect an enduring organization of attitudes. Prices reflect constraints affecting answers during the experiment.

- $\rightarrow$ Filtering out price influence might help filter standard biases in experimental designs.
- Below, we show that it is possible to disentangle the influence of an experimental treatment on prices and preferences.

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Graphic intuition

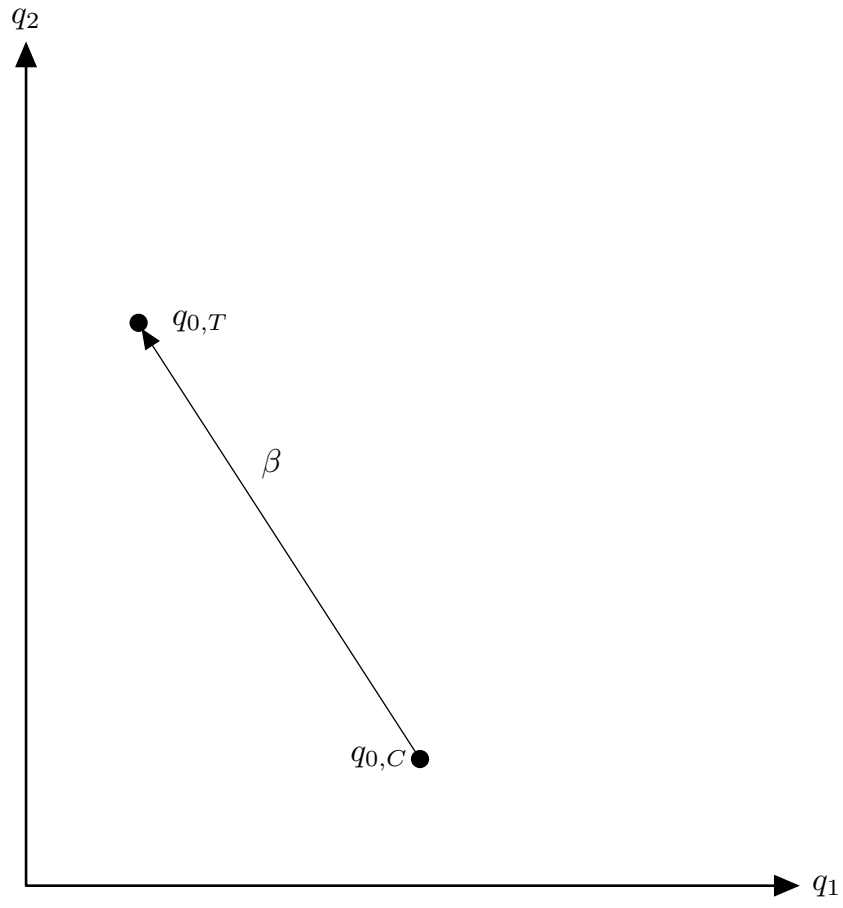


Figure: Average Treatment Effect

Graphic intuition

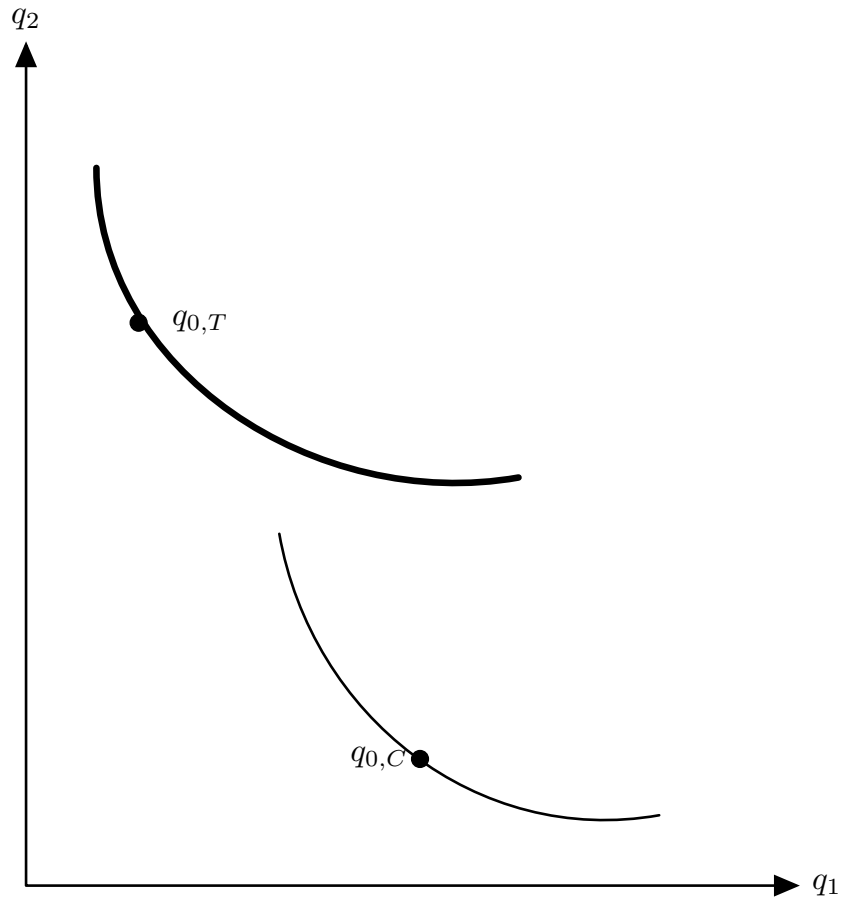


Figure: Step 1: Recovering (average) Preferences of the Treated and Untreated (Applying Afriat's theorem, using our experimental design)

Graphic intuition

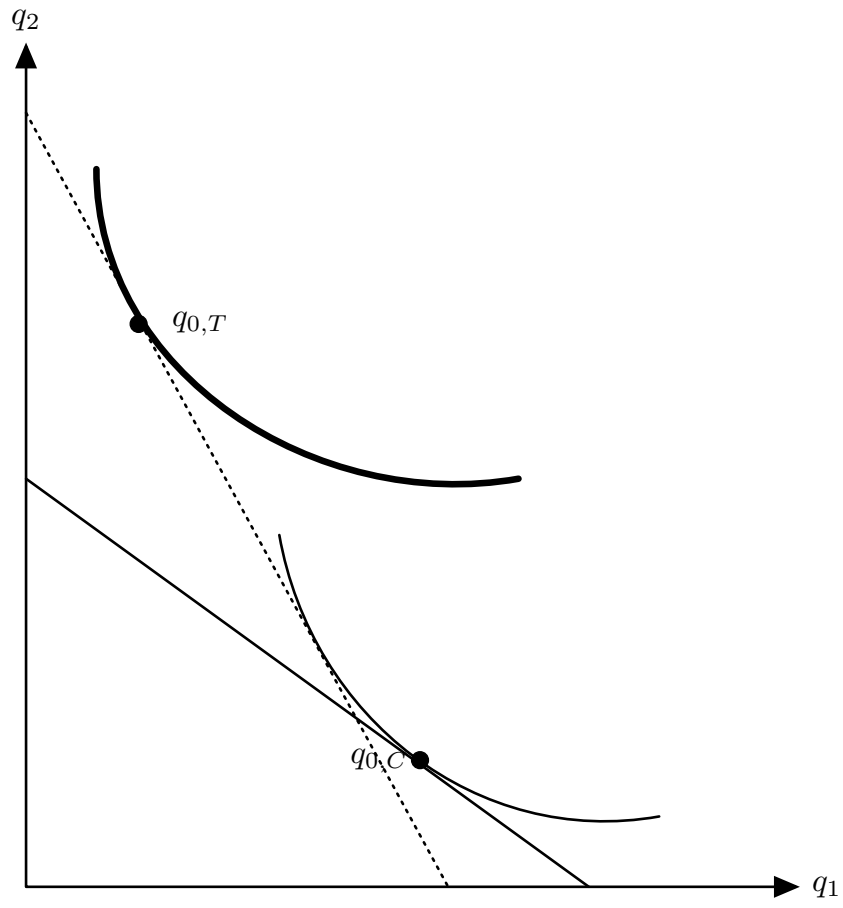


Figure: Step 2: Recovering the shadow prices associated with the average attitude and preferences of the treated and untreated.

Graphic intuition

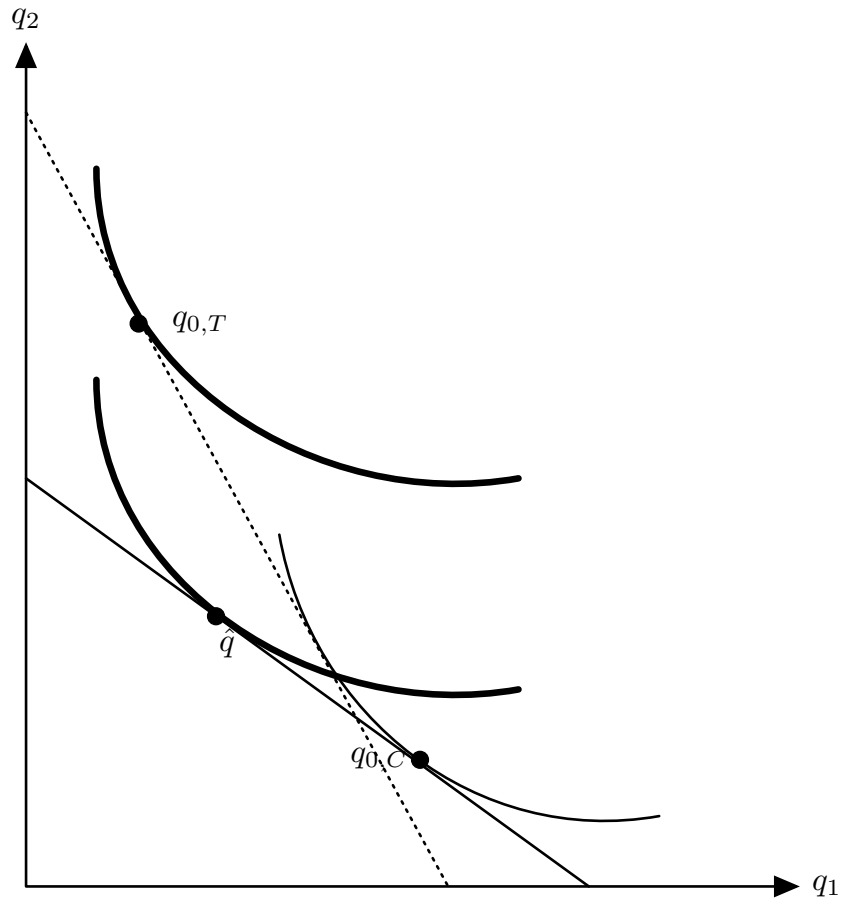


Figure: Step 3: Recovering the counterfactual $\hat{q}$, which corresponds to the attitudes expressed by a hypothetical individual with the average preferences of the treated facing the shadow prices of the untreated.

Graphic intuition

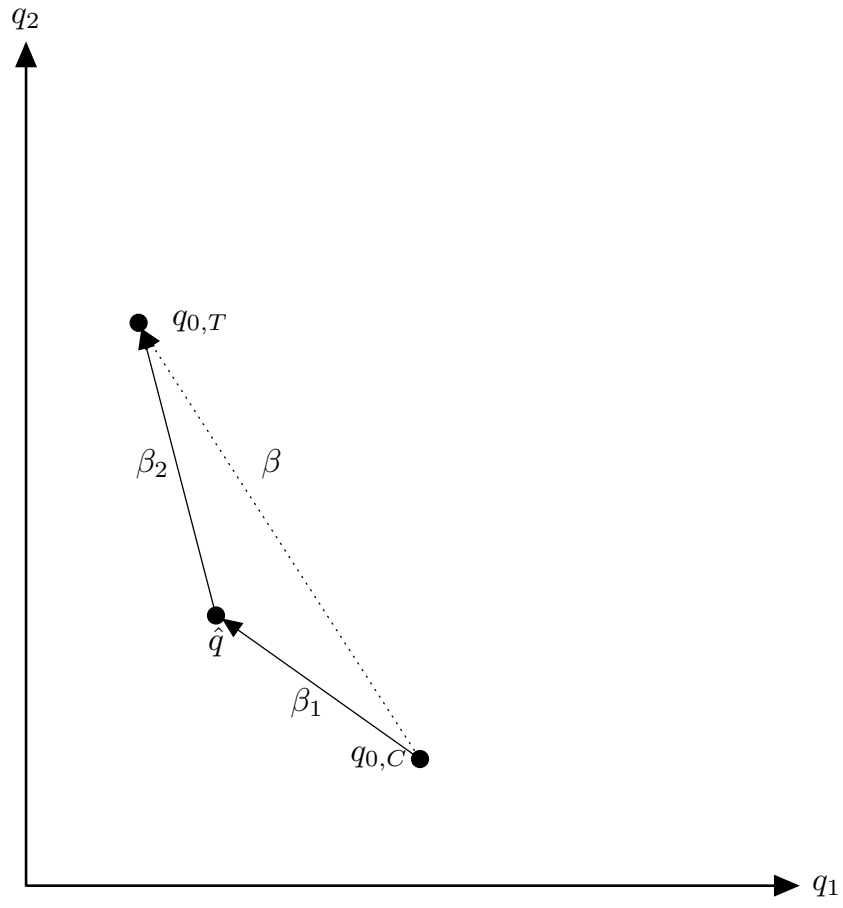


Figure: Decomposing the Average Treatment Effect

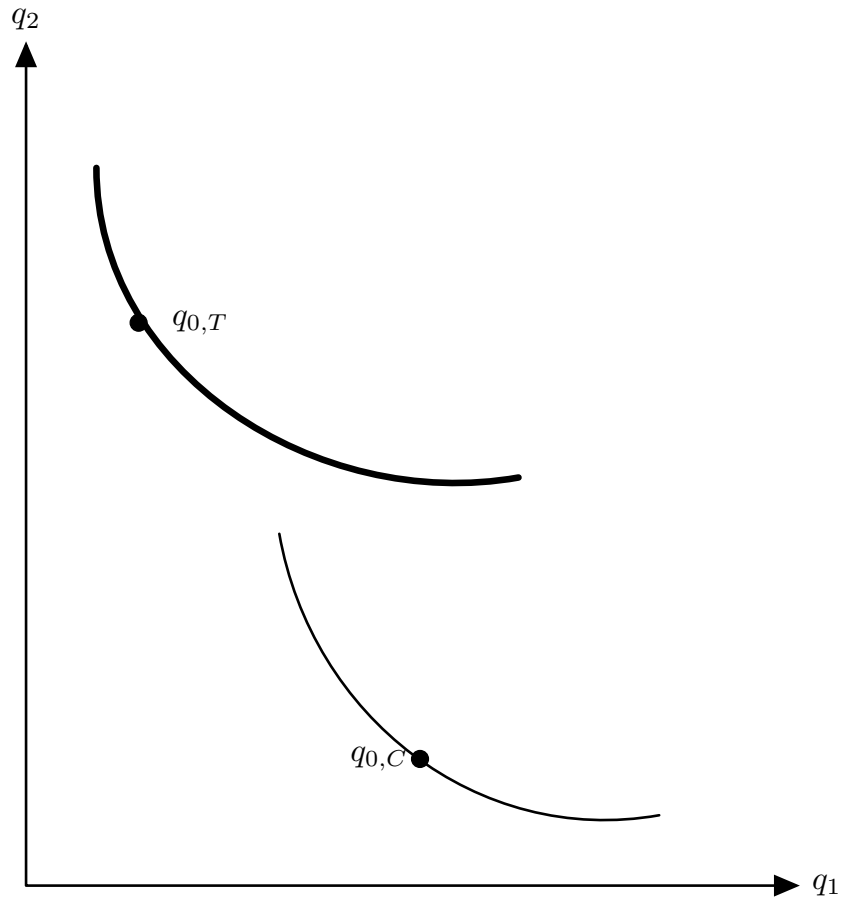
Decomposition

- The average treatment effect β on respondents' attitudes is additively decomposed in two elements:

$$\beta = \beta_1 + \beta_2$$

- β_1 corresponds to the average treatment effect on preferences.
- β_2 corresponds to the average treatment effect on shadow prices.

Graphic intuition



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Budget Constraints

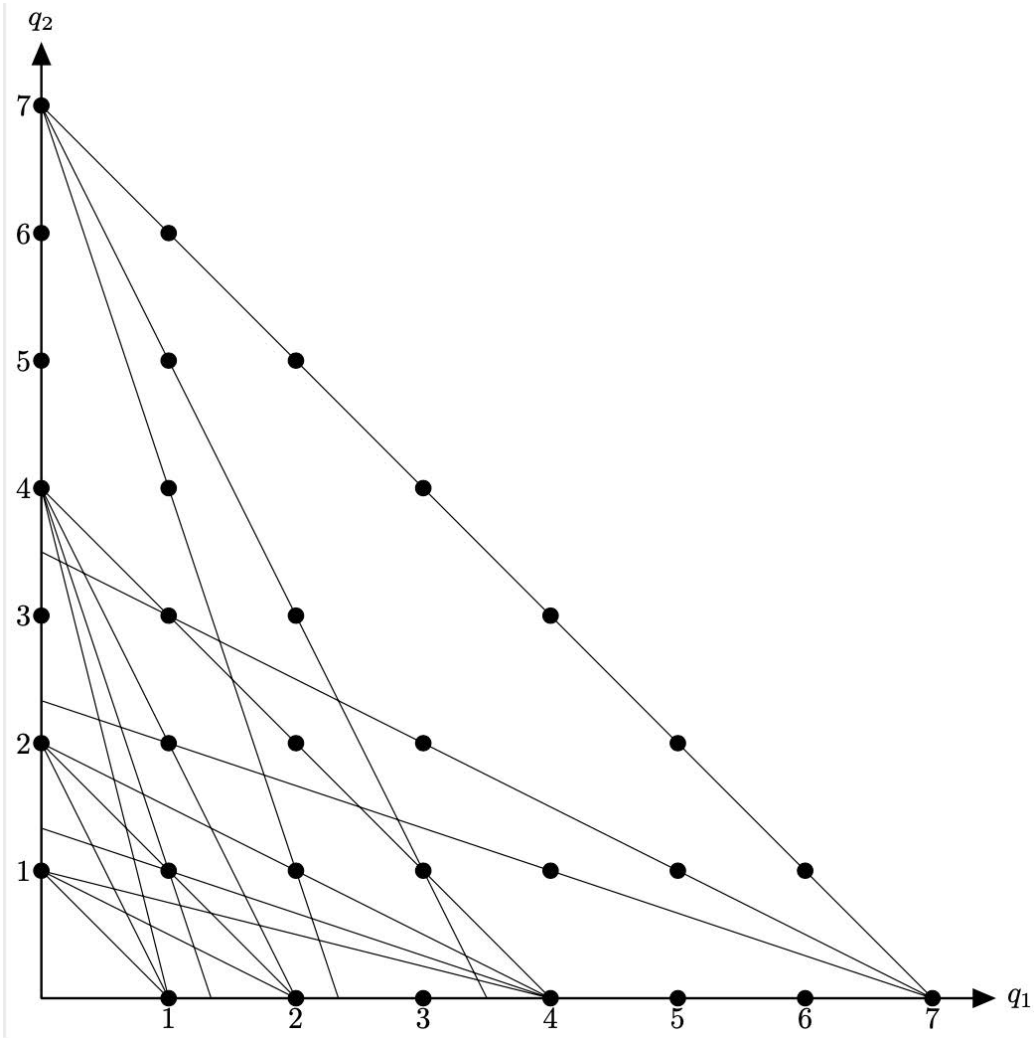


Figure: The horizontal axis represents a subject's answer to statement 1, while the vertical axis represents a subjects' answer to statement 2. The line represents the various budget constraints. Each point in the figure on a budget constraint represents a possible answer.

Data: Setup

All respondents completed 16 times the previous survey under 16 different choice sets.

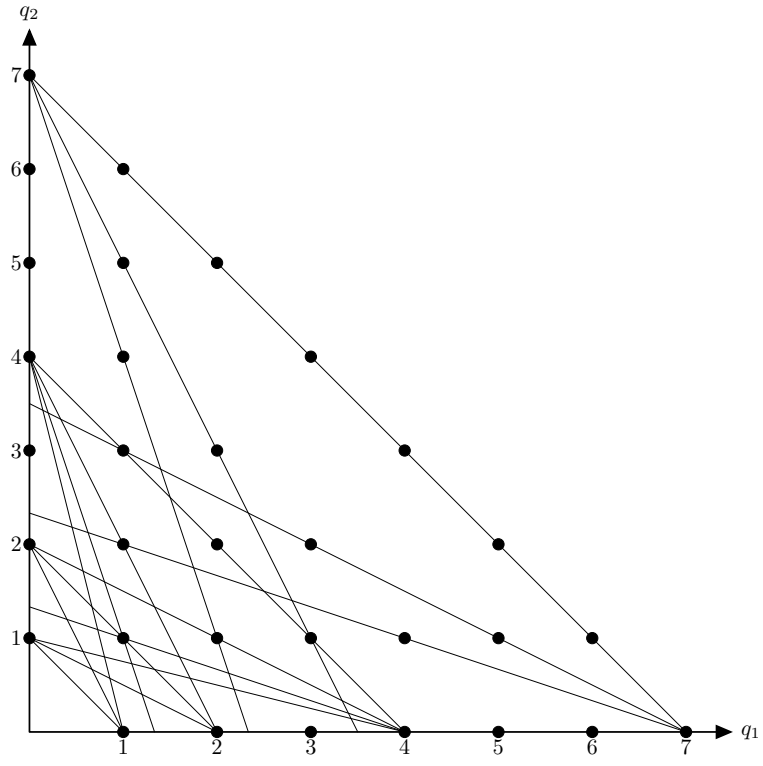
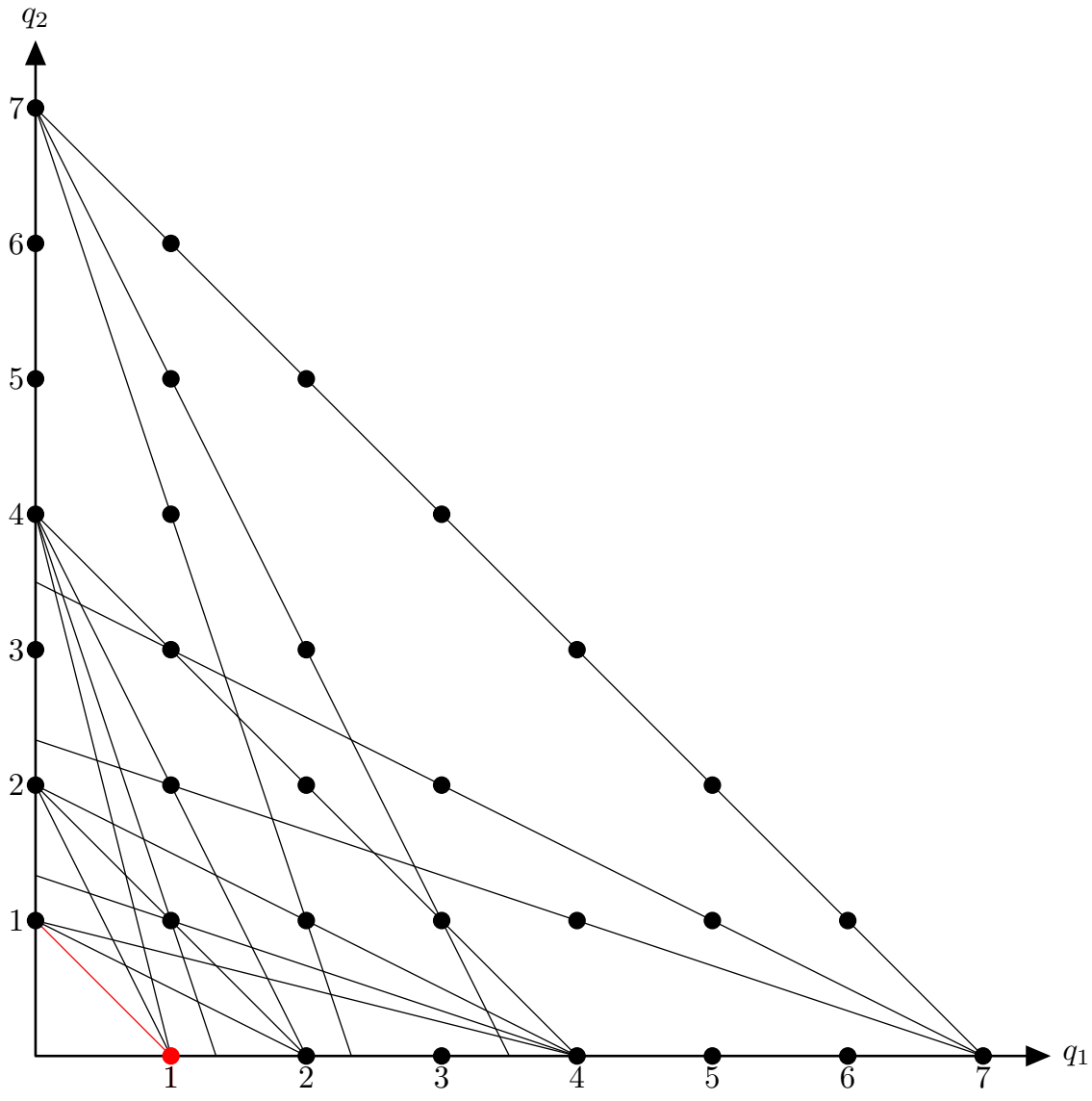


Figure: Choice sets

Example: Respondent 1



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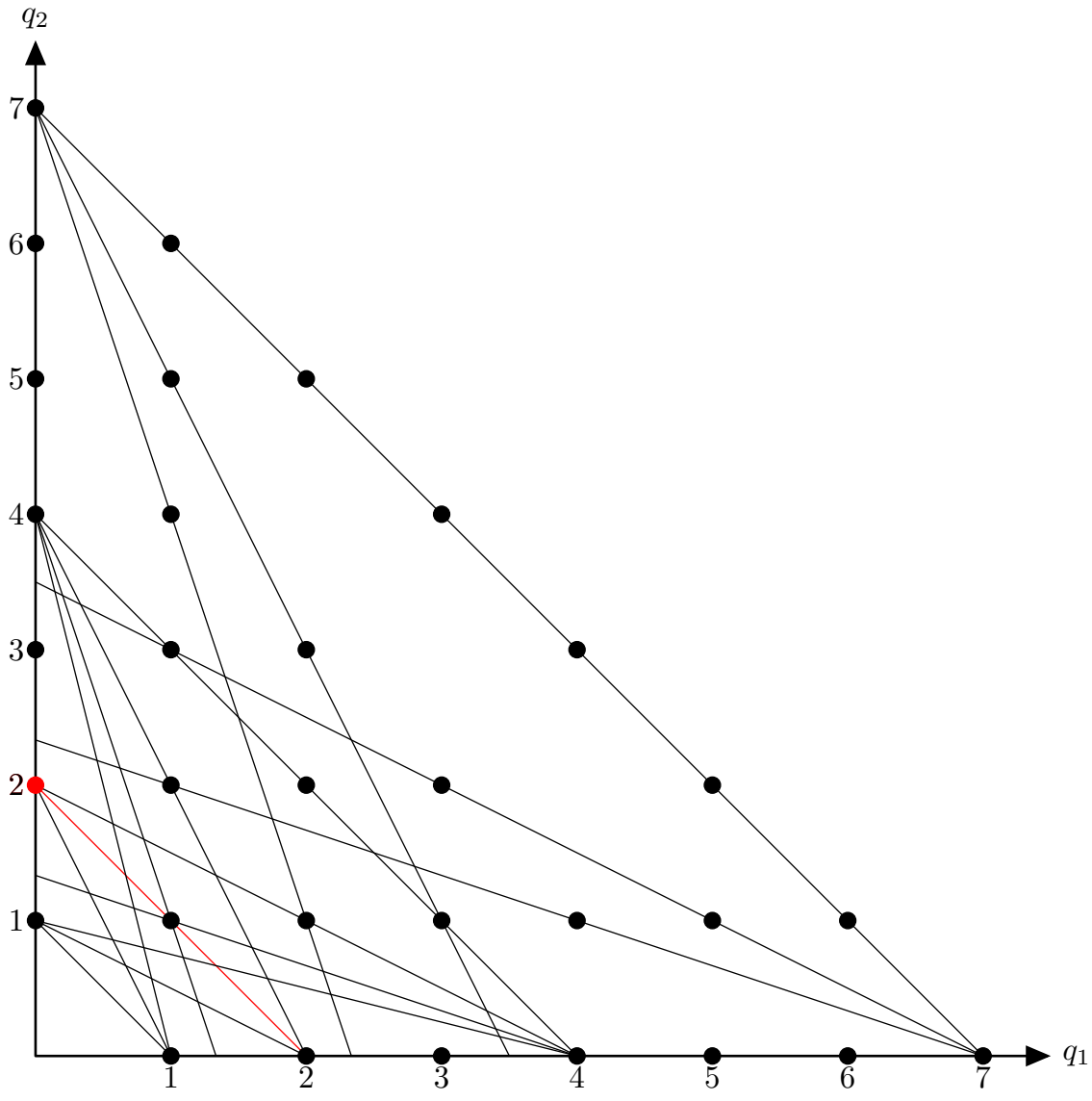

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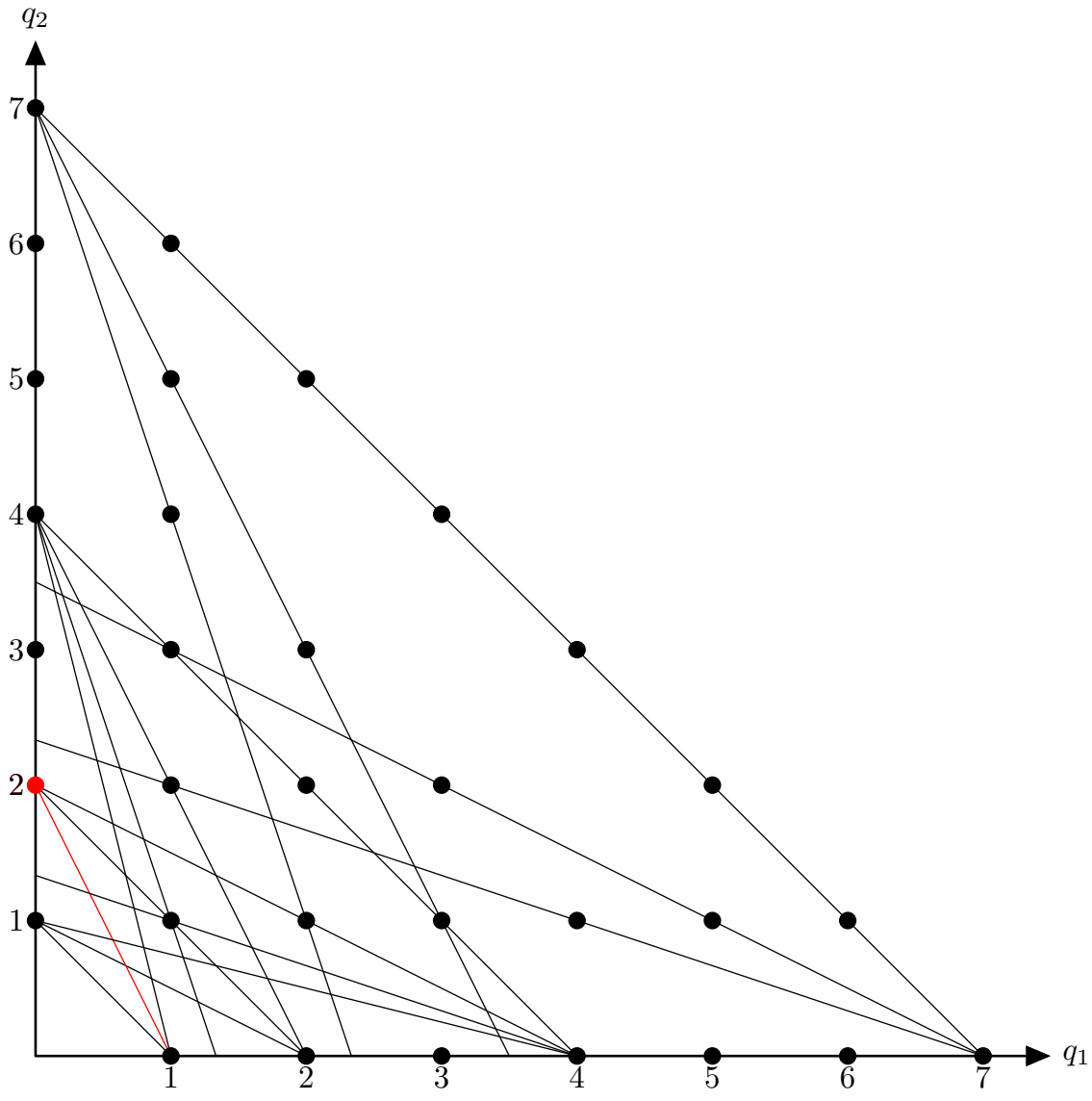

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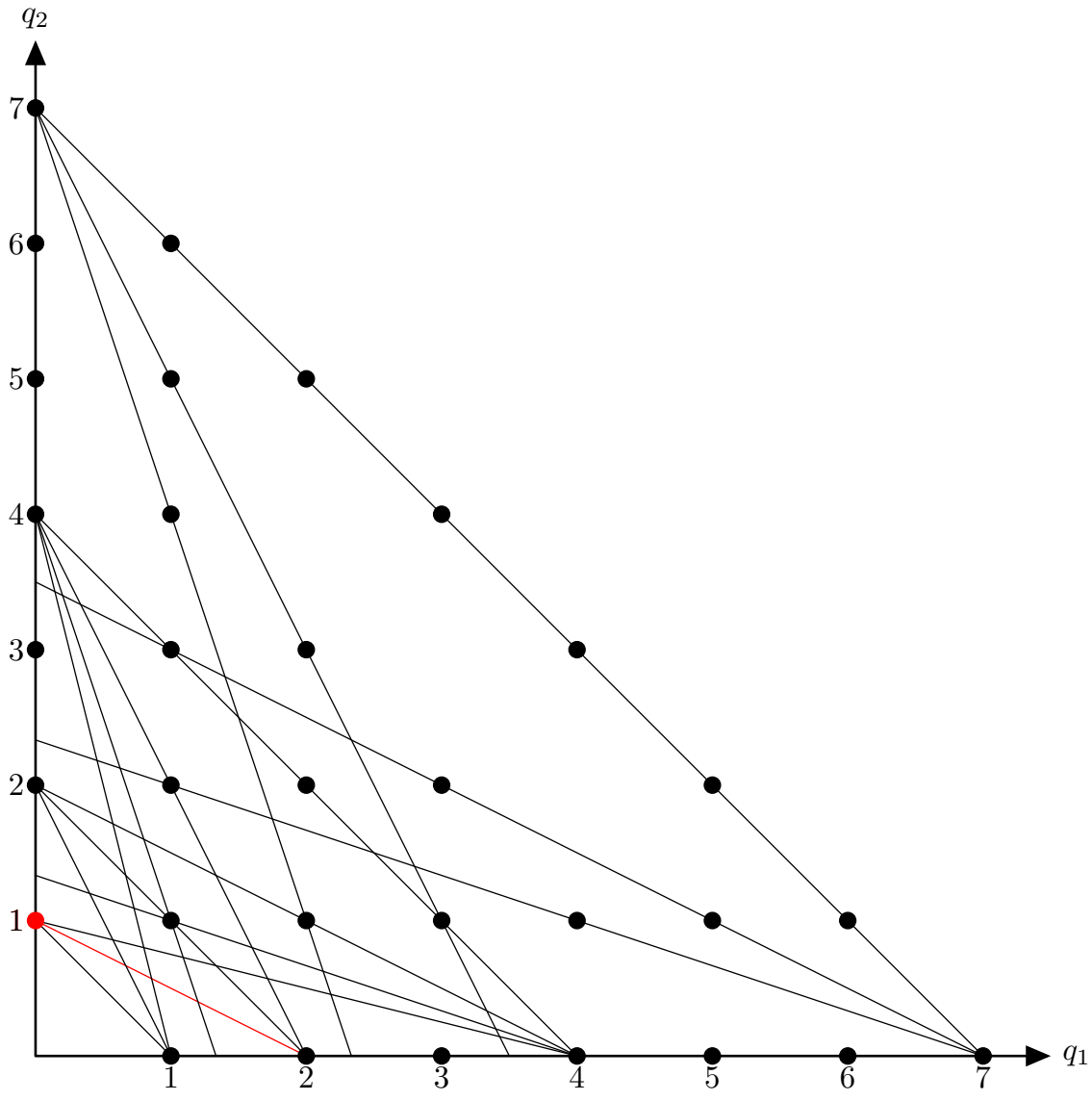

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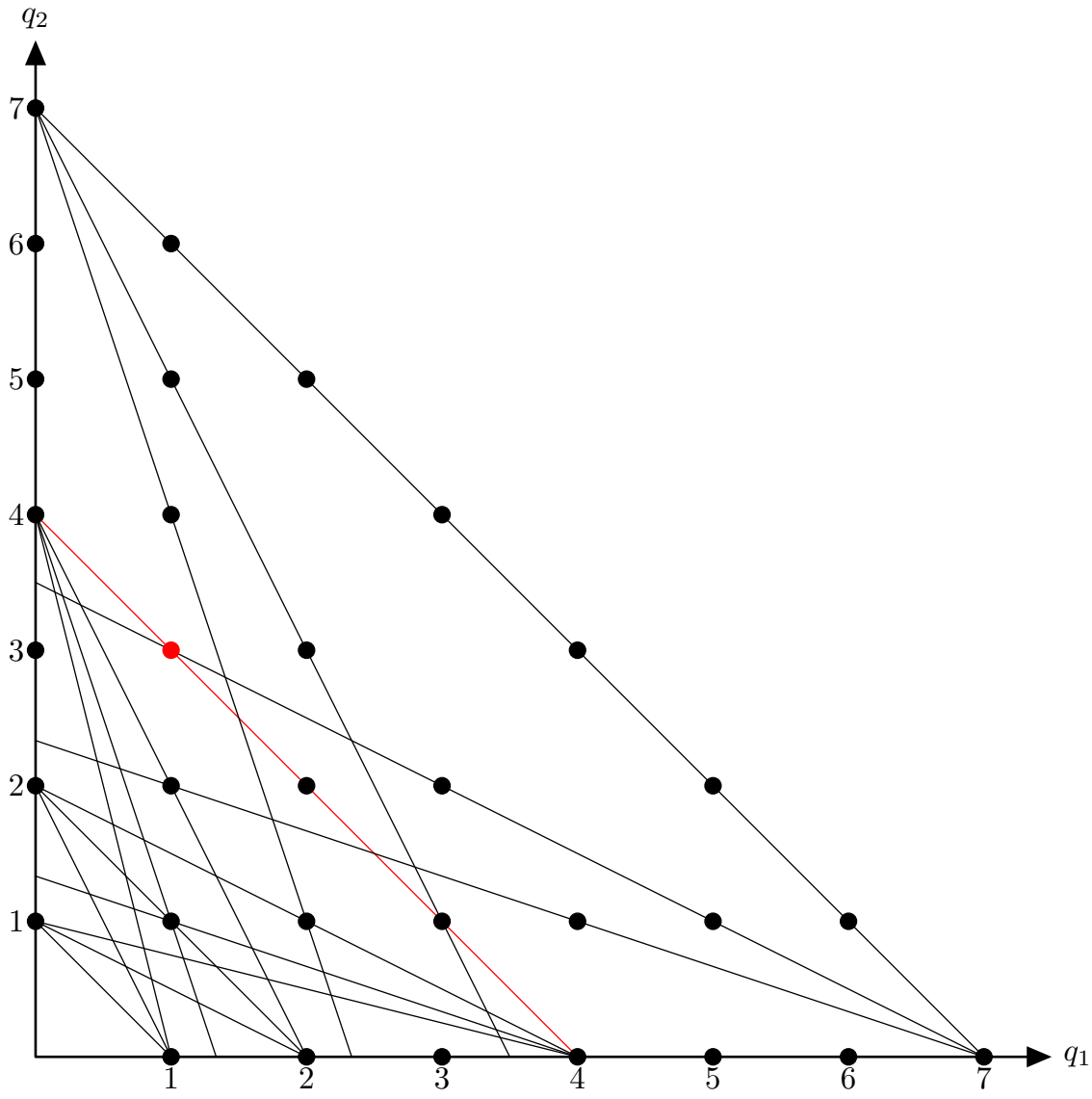
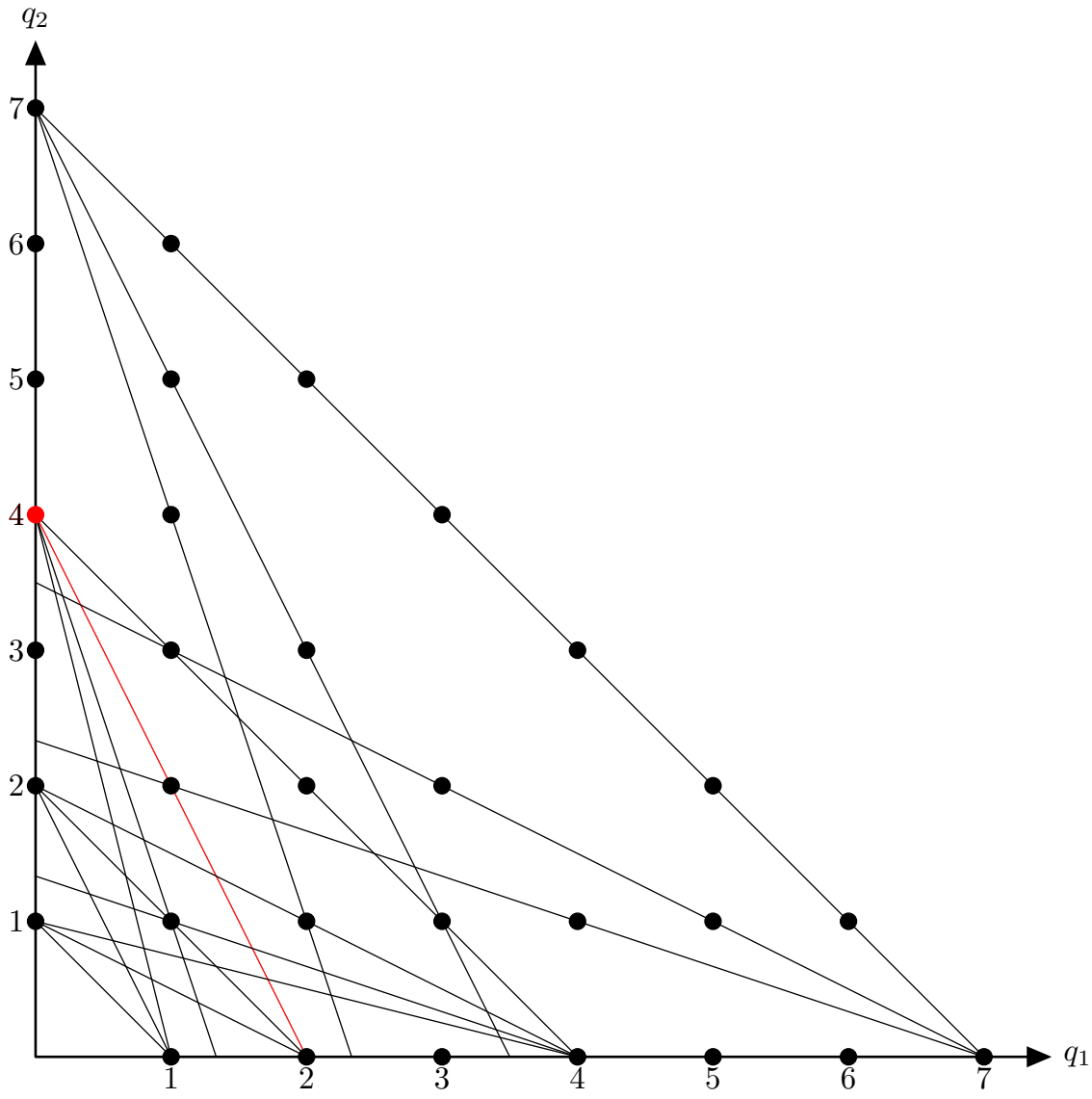


Example: Respondent 1



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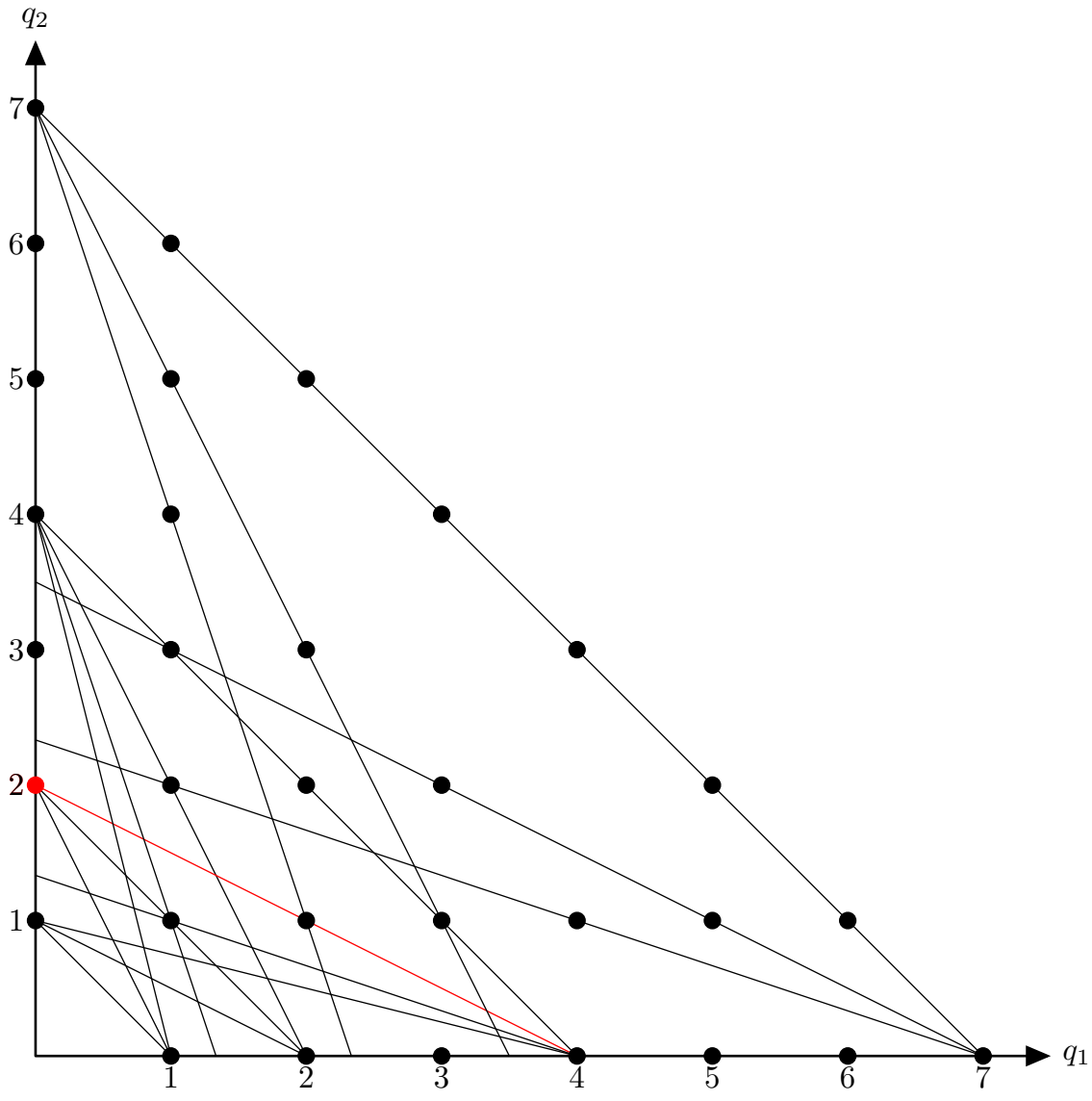
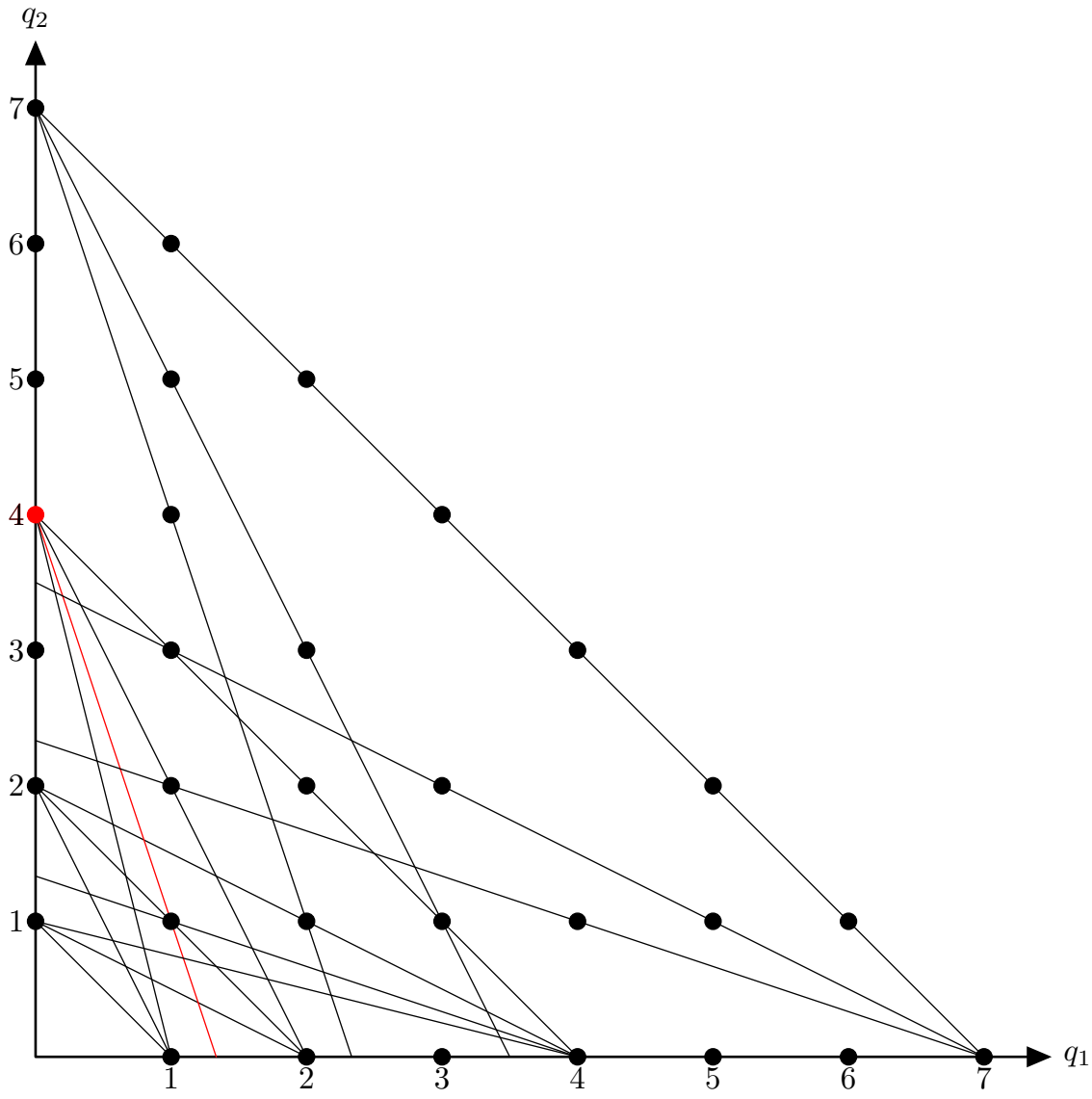


Example: Respondent 1



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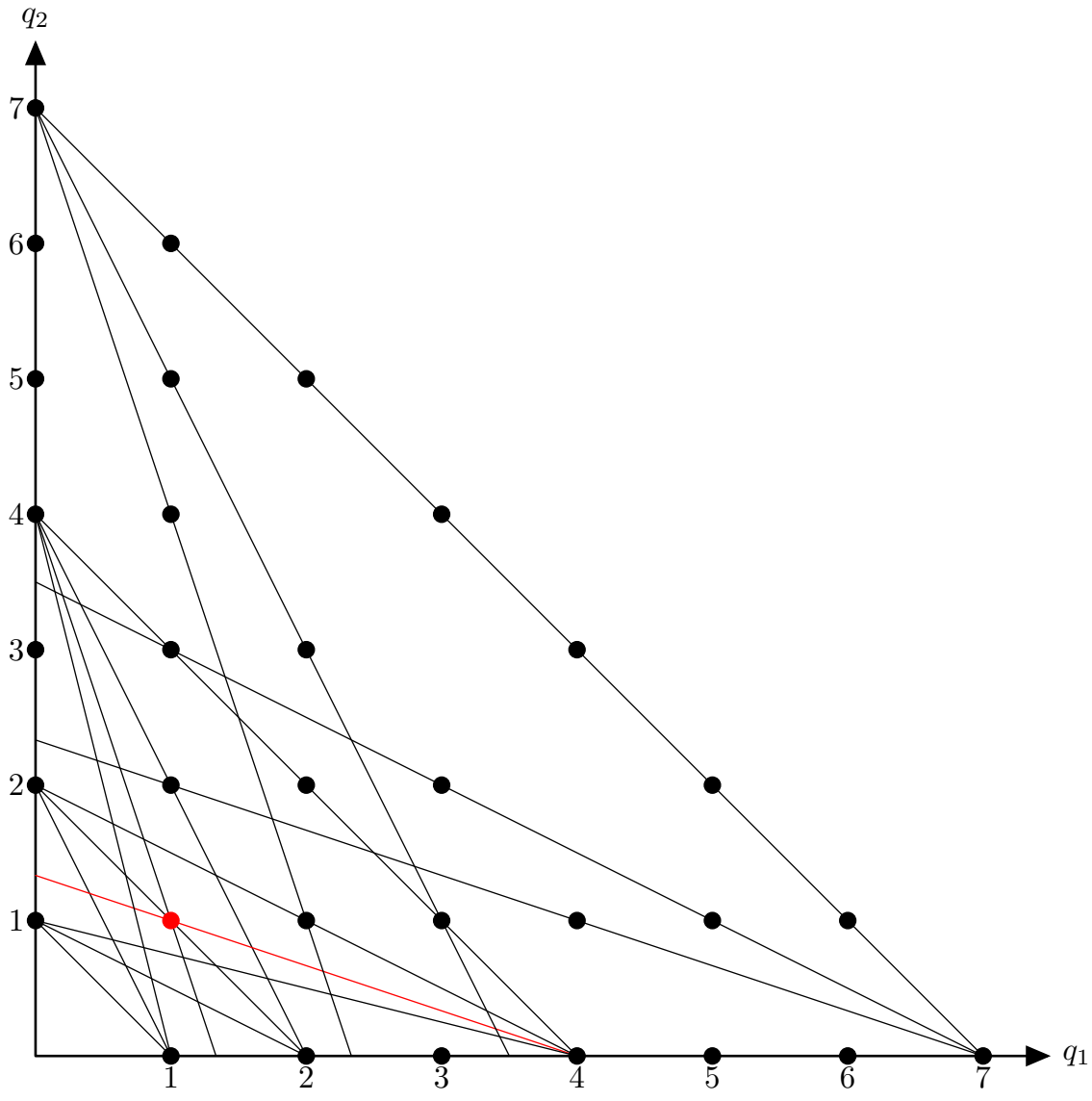

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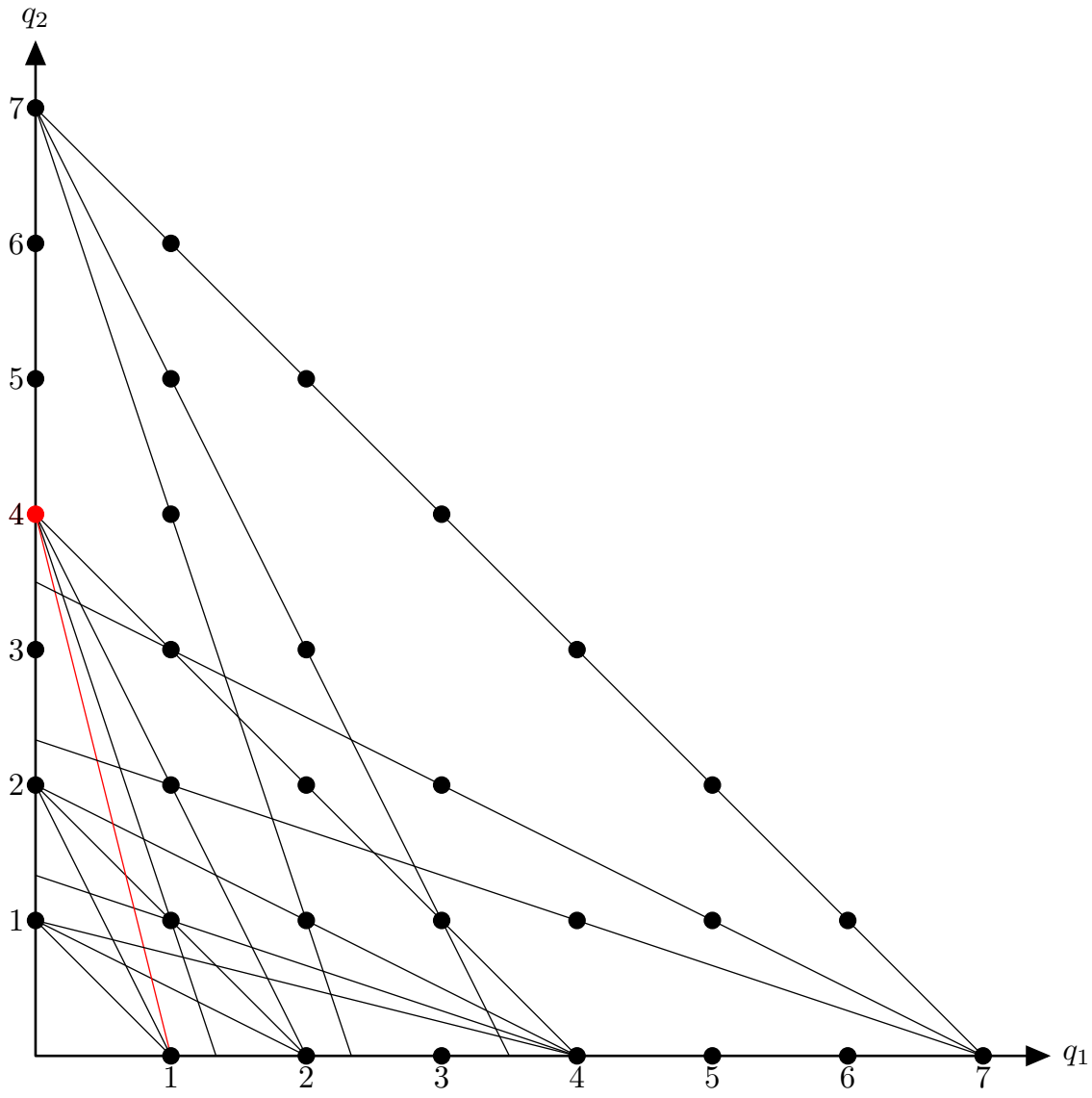

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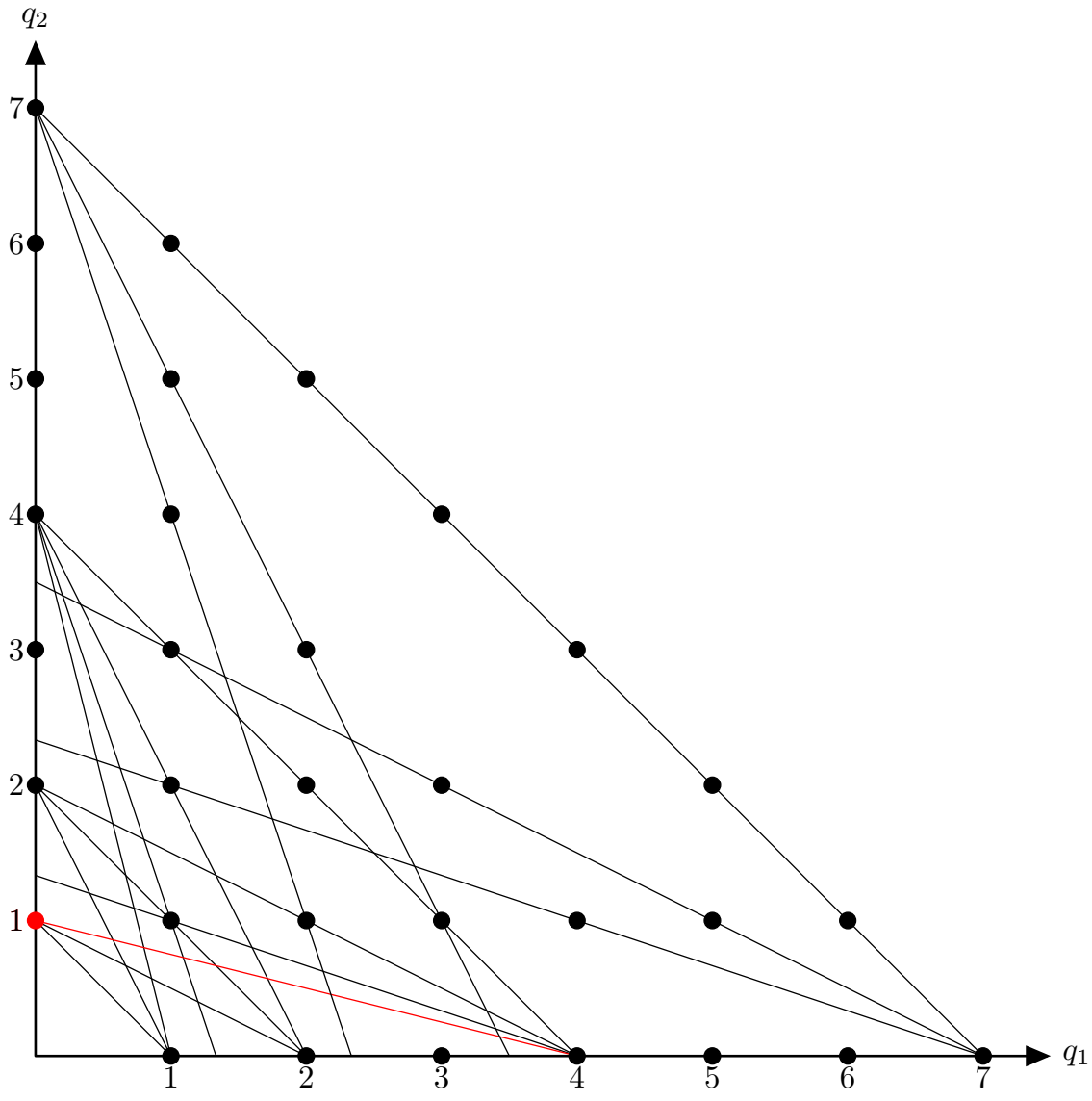

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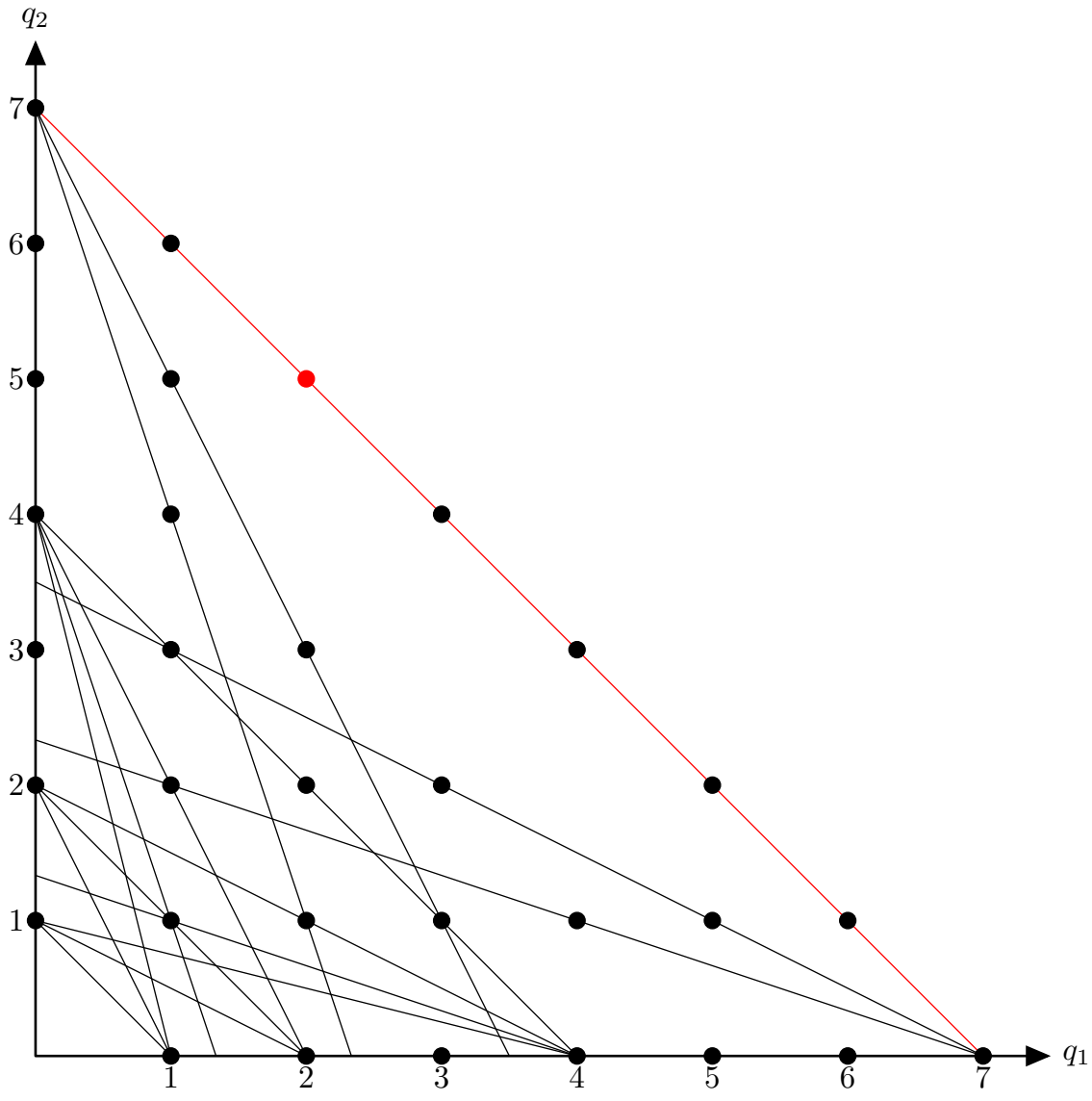

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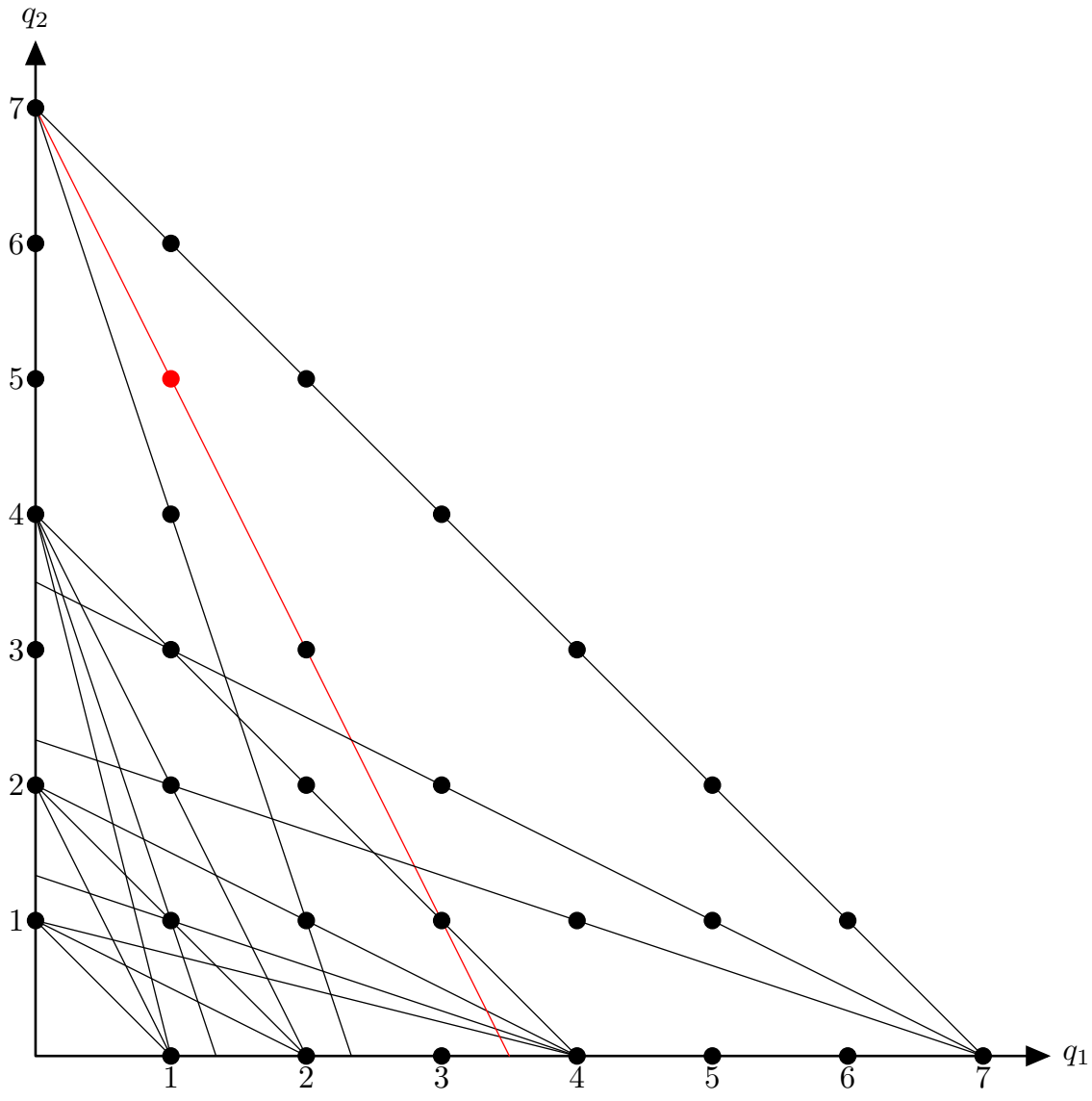

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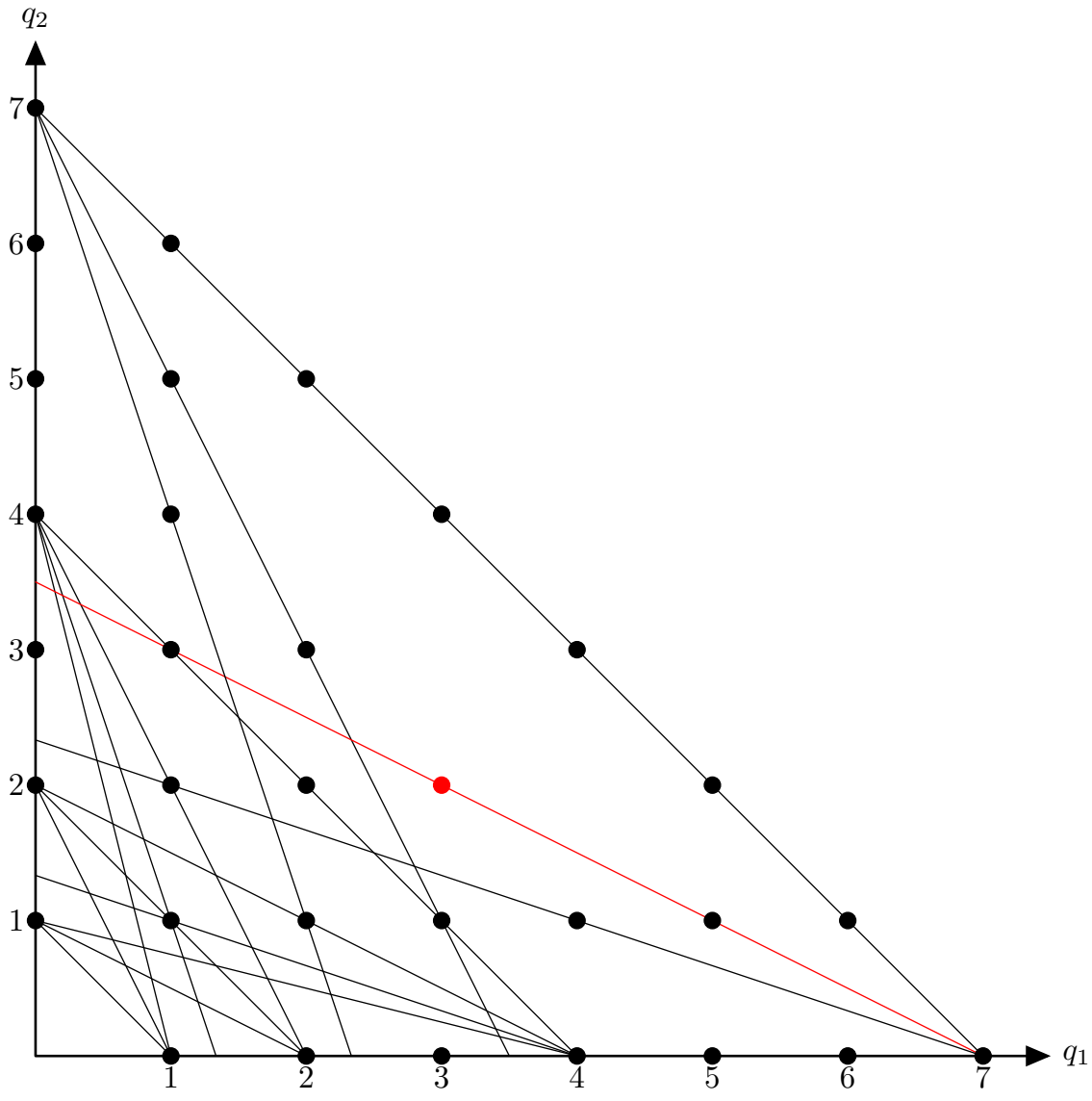

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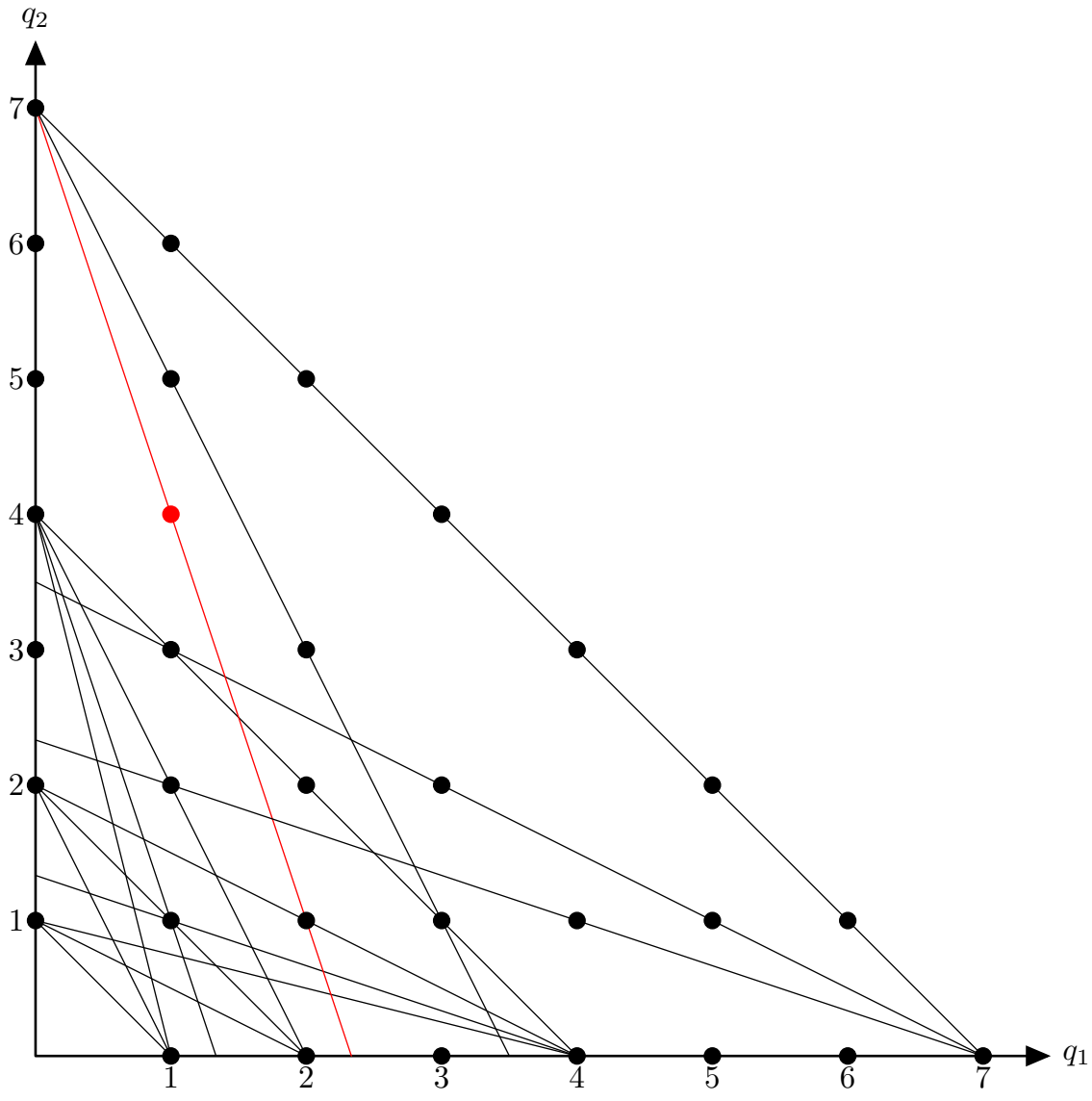

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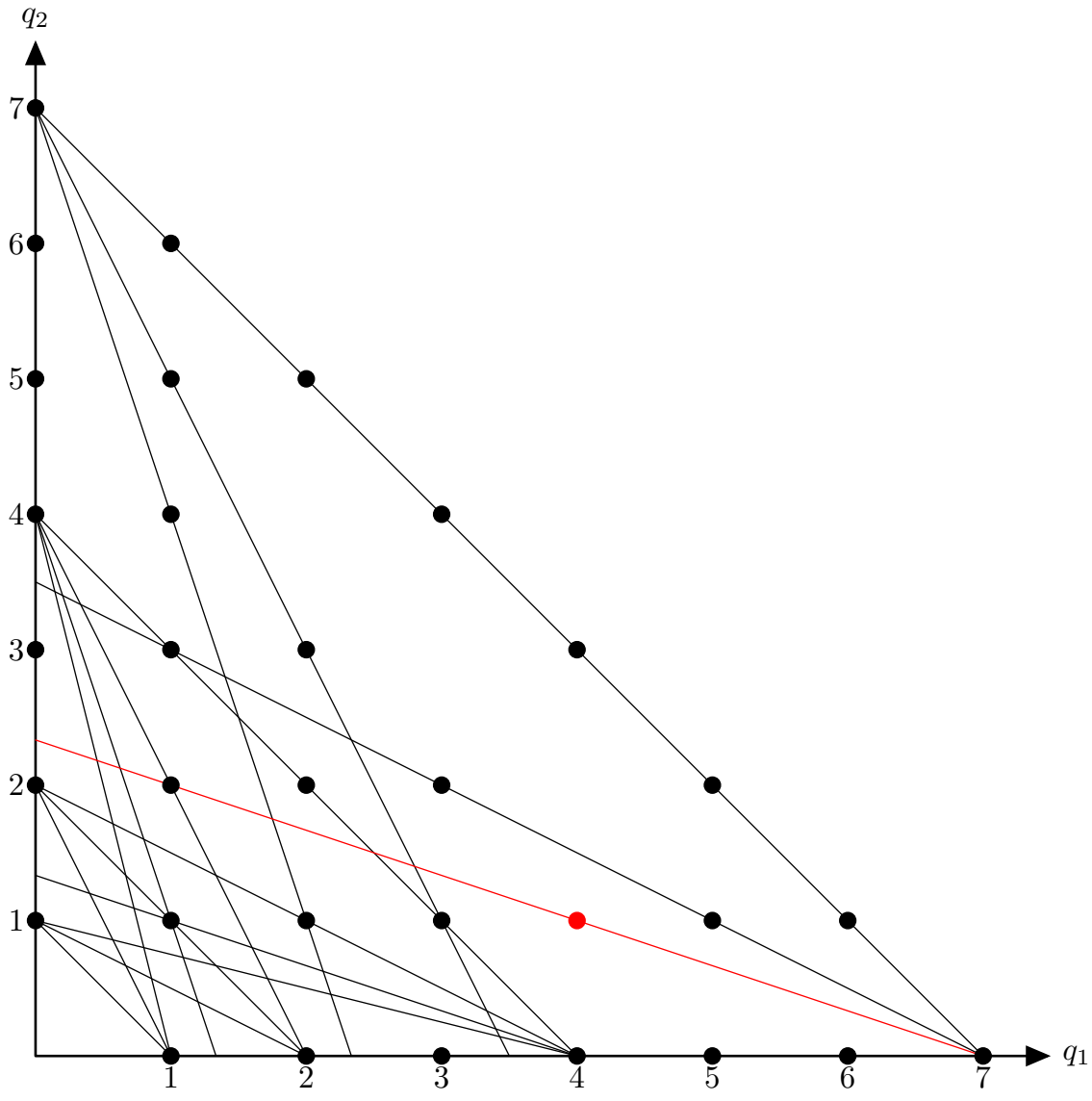


Estimation

- For each respondent i, we estimate a CES utility function rationalizing her answers:

$$U^i(q^1, q^2) = (\alpha^i q^{1\rho^i} + (1-\alpha^i) q^{2\rho^i})^{1/\rho^i}.$$

- In round k respondent i's predicted answer to question 1 is:

$$(q_k^1, q_k^2) =_{q \in B^k} U^i(q^1, q^2),$$

Dropping the i index for simplicity, we get:

$$q_k^1 = \left(\frac{\alpha}{p_k^1}\right)^\sigma \frac{R_k}{\alpha^\sigma {p_k^1}^{1-\sigma} + (1-\alpha)^\sigma {p_k^2}^{1-\sigma}}$$

and

$$q_k^2(p_k^1, p_k^2, R_k) = \frac{R_k - p_k^1 q_k^1}{p_k^2}.$$

- We use NLLS optimization to estimate σ^i and α^i for each respondent and compute the decomposition of the treatment effect.

Data: Sample

- Our sample consists of the largest network of teachers in Pakistan: the Progressive Education Network (PEN).
- The PEN network aims to improve the quality of education and teaching in Pakistani government schools via a public-private partnership.
- The network employs 607 public school teachers and 52 schools across the State of Punjab in Pakistan.

Data: Experimental Setup

- We randomly assign 607 public school teachers into three treatment arms with 202 assigned the conservative treatment, 202 the liberal treatment and 203 the placebo message.
- All treatments including the placebo were presented to the civil servants during a live zoom session. The video messages last about three minutes long each including the placebo.
- To reinforce the message of the video, each group completes two writing exercises and a structured individual discussion within the treatment arm.

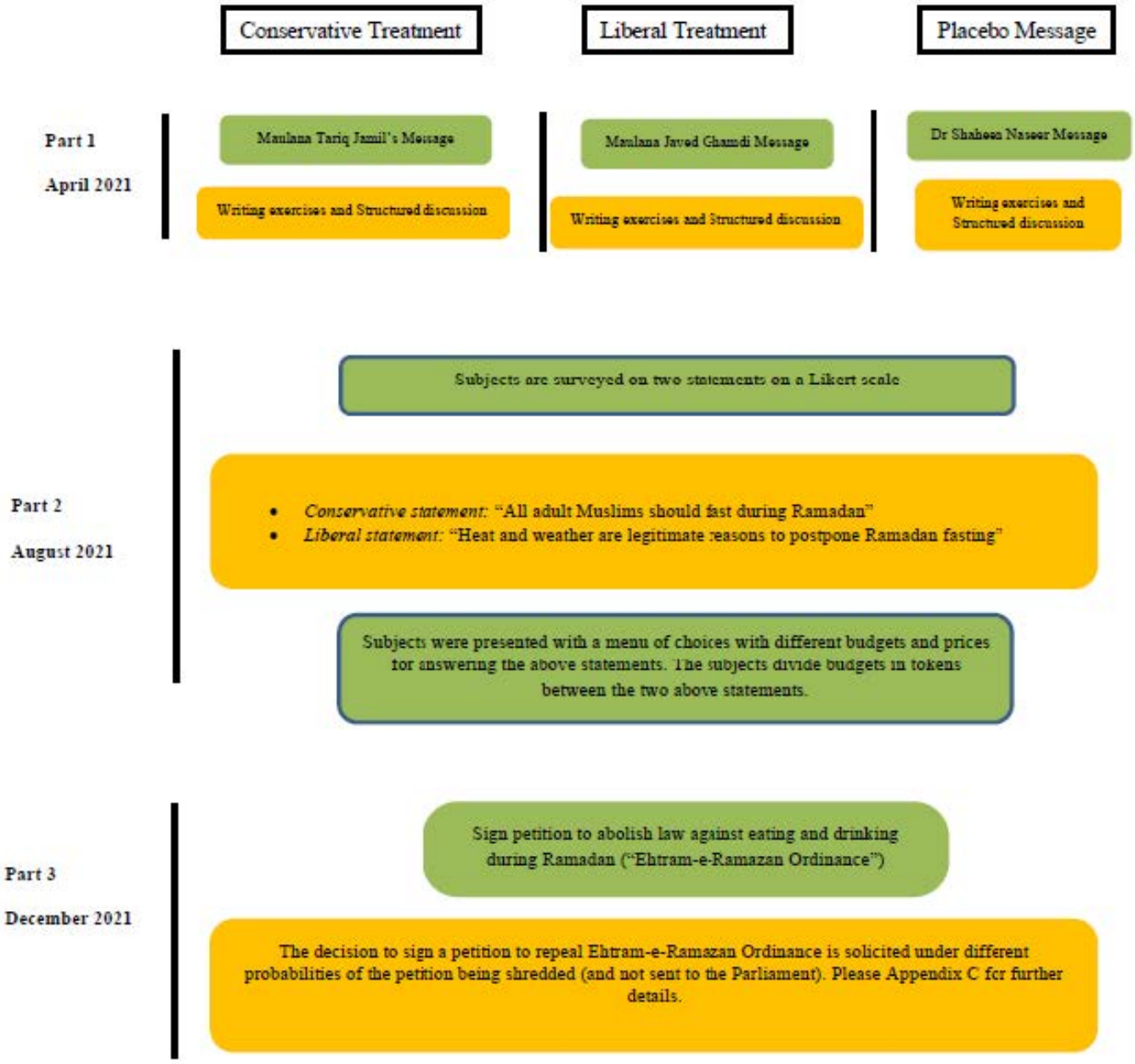
Conservative Treatment

Figure: Screenshot of the conservative preach by prominent Imam Moulana Tariq Jamil

Liberal Treatment

Figure: Screenshot of the liberal preach by prominent Imam Javed Ahmed Ghamdi

Timeline


Conservative Treatment
Liberal Treatment
Placebo Message
Part 1
April 2021
Maulana Tariq Jamil's Message
Writing exercises and Structured discussion
Maulana Javed Ghamdi Message
Writing exercises and Structured discussion
Dr Shaheen Naseer Message
Writing exercises and Structured discussion
Part 2
August 2021
Subjects are surveyed on two statements on a Likert scale
Conservative statement: "All adult Muslims should fast during Ramadan"
Liberal statement: "Heat and weather are legitimate reasons to postpone Ramadan fasting"
Subjects were presented with a menu of choices with different budgets and prices for answering the above statements. The subjects divide budgets in tokens between the two above statements.
Part 3
December 2021
Sign petition to abolish law against eating and drinking during Ramadan ("Ehtram-e-Ramazan Ordinance")
The decision to sign a petition to repeal Ehtram-e-Ramazan Ordinance is solicited under different probabilities of the petition being shredded (and not sent to the Parliament). Please Appendix C for further details.

Data: Setup

After being subject to one of the three treatments, each subject was surveyed on two statements on her religious attitudes four months later. The two statements are the followings:

1. *Conservative statement:* "All adult Muslims should fast during Ramadan"
2. *Liberal statement:* "Heat and weather are legitimate reasons to postpone Ramadan fasting"

Data: Setup

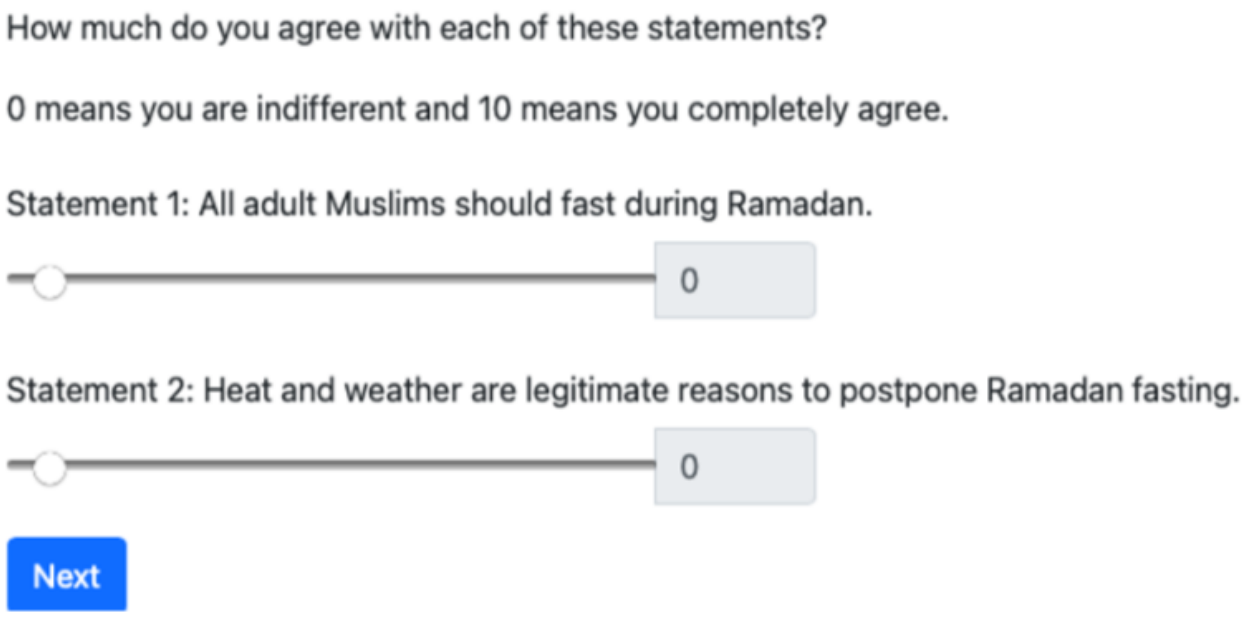


Figure: Likert Scale Survey

Data: Setup

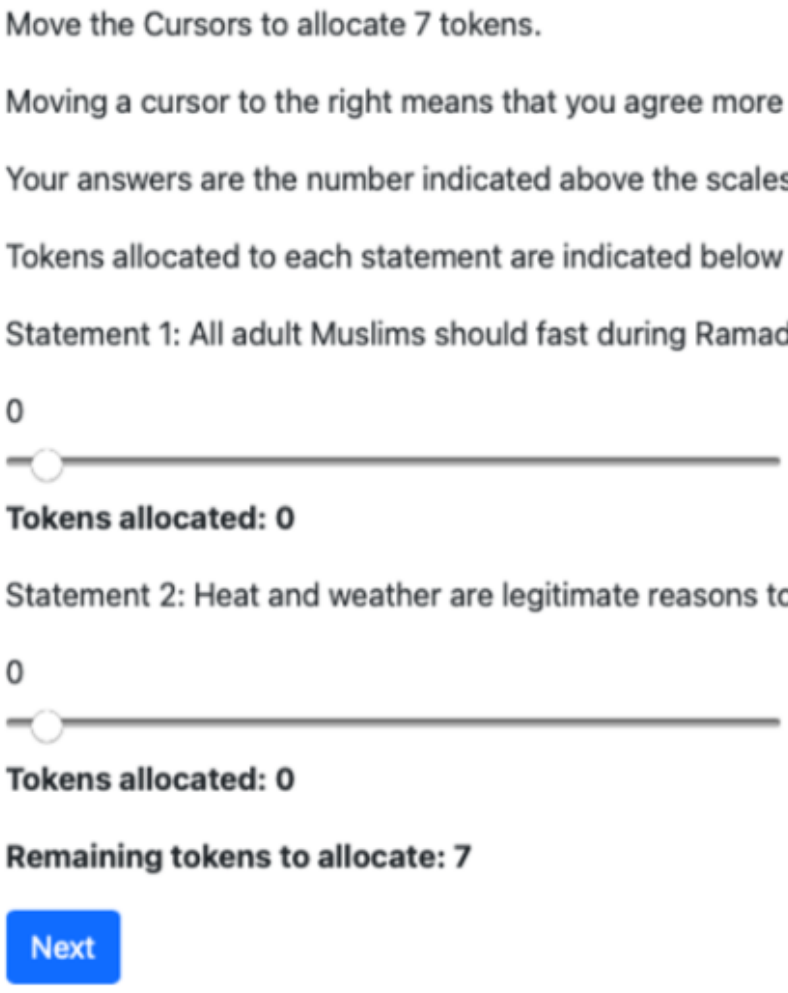


Figure: Experimental Methodology

Empirical Specification

The impact of the conservative and liberal treatments can be evaluated in a simple regression framework. For each individual-level outcome, the estimation equation is:

$$q_{i,0} = \alpha + \beta \text{Conservative}_i + \gamma \text{Liberal}_i + X_i' \mu + \varepsilon_i$$

- $q_{i,0}$: subject i's responses to the two statements in the Likert scale survey.
- Conservative_i: dummy equal to one if i is randomly assigned to the conservative treatment. Liberal_i: dummy equal to one if i is randomly assigned to the conservative treatment.
- X_i is a vector of individual-level controls, which includes age, marital status and prior education.

Balance and Attrition:

	(1) Years of Education	(2) Married	(3) Spec-n in Languages	(4) Spec-n in Sciences	(5) Spec-n in Soc. Sciences	(6) Spec-n in Teaching	(7) Teaching Experience	(8) Teaching Hours (avg.)	(9) Class size	(10) Gender Female	(11) Age
Conservative treatment	-0.110	-0.00811	0.0584	-0.0183*	-0.00375	-0.0403	0.0980	0.636*	0.0648	0.0127	-0.318
	(0.191)	(0.0619)	(0.0436)	(0.00937)	(0.0299)	(0.0541)	(0.402)	(0.346)	(2.583)	(0.0553)	(0.764)
Liberal treatment	-0.0273	-0.0315	0.0721*	0.0118	-0.0276	-0.0329	-0.391	0.135	0.925	0.0742	0.599
	(0.193)	(0.0602)	(0.0429)	(0.0110)	(0.0289)	(0.0557)	(0.409)	(0.339)	(2.674)	(0.0572)	(0.778)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	604	604	604	604	604	604	604	604	604	604	604

Standard errors are clustered at the individual level. The dependent variable in column (1) is schooling years, in (2) — binary variable equal to 1 if married and 0 otherwise, in (3) — binary variable equal to 1 if specialization is in Languages and 0 otherwise, in (4) — binary variable equal to 1 if specialization is in Sciences and 0 otherwise, in (5) — binary variable equal to 1 if specialization is in Social Sciences and 0 otherwise. The full sample includes 201 subjects in the control group, 203 in the conservatively treated group and 200 in the liberally treated group. *p<.05; **p<.01; ***p<.001

Figure: Balance test

Main results

	(1)	(2)
	Conservative statement	Liberal statement
Conservative treatment	1.709***	-0.978***
	(0.192)	(0.293)
Liberal treatment	-1.926***	1.281***
	(0.262)	(0.313)
Mean dep. variable	7.158	4.190
Observations	504	504

Robust standard errors in parentheses. The dependent variables for conservative and liberal treatments are conservative and liberal statements in Likert scale respectively: "All adult Muslims should fast during Ramadan" and "Heat and weather are legitimate reasons to postpone Ramadan fasting". Subjects whose Likert scale answers correspond to a corner solution of the maximization problem are excluded. *p<.05; **p<.01; ***p<.001

Figure: Impact of the Treatments on Conservative and Liberal Attitudes

Main result

- Exposure to conservative preach:
  - increases conservative attitudes by about 1.7 points on the 1-10 Likert scale associated with the conservative statement.
  - decreases liberal attitudes by about 1.2 points, as measured by the liberal statement.
- Exposure to the liberal preach:
  - decreases conservative attitudes by about 2 points
  - increases liberal attitudes by about 1.3 points.

It is not clear whether the results are driven by changes in subjects' preferences or by price changes associated with expressing religious opinions...

- We implemented a parametric version of our decomposition by estimating a CES utility function and following the steps of the theory...

Main result: Parametric Decomposition

	(1)	(2)	(3)	(4)	(5)	(6)
	Conservative Overall effect	Conservative Preferences	Conservative Shadow budget	Liberal Overall effect	Liberal Preferences	Liberal Shadow budget
Conservative treatment	1.709***	0.0654	1.643***			
	(0.192)	(0.176)	(0.0779)			
Liberal treatment				1.281***	1.774***	-0.493**
				(0.313)	(0.241)	(0.200)
Mean dep. var.	8.164	8.164	8.164	4.735	4.735	4.735
Observations	323	323	323	339	339	339

Robust standard errors in parentheses. The dependent variables for conservative and liberal treatments are conservative and liberal statements in Likert scale respectively. The overall effect of each treatment is decomposed into the effect due to the change in preferences and due to the change in shadow budget. In columns (1), (2), and (3), the sample considered includes all the subjects in the conservative treatment and in the control group. In column (4), (5), and (6), the sample considered includes all the subjects in the liberal treatment and in the control group. Subjects whose Likert scale answers correspond to a corner solution of the maximization problem are excluded.
*p<.05; **p<.01; ***p<.001

Figure: Decomposition

Main result: Illustration

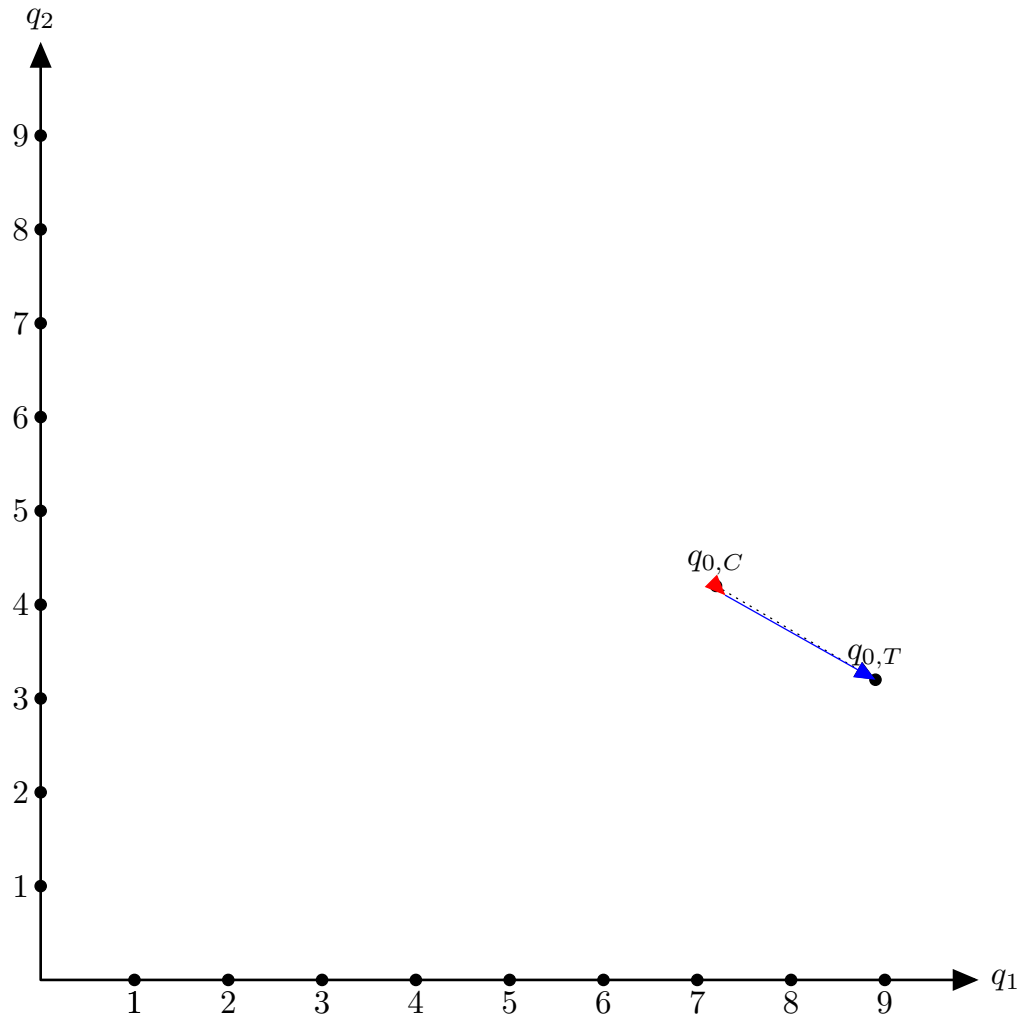


Figure: Decomposition: Conservative Treatment

Main result: Illustration

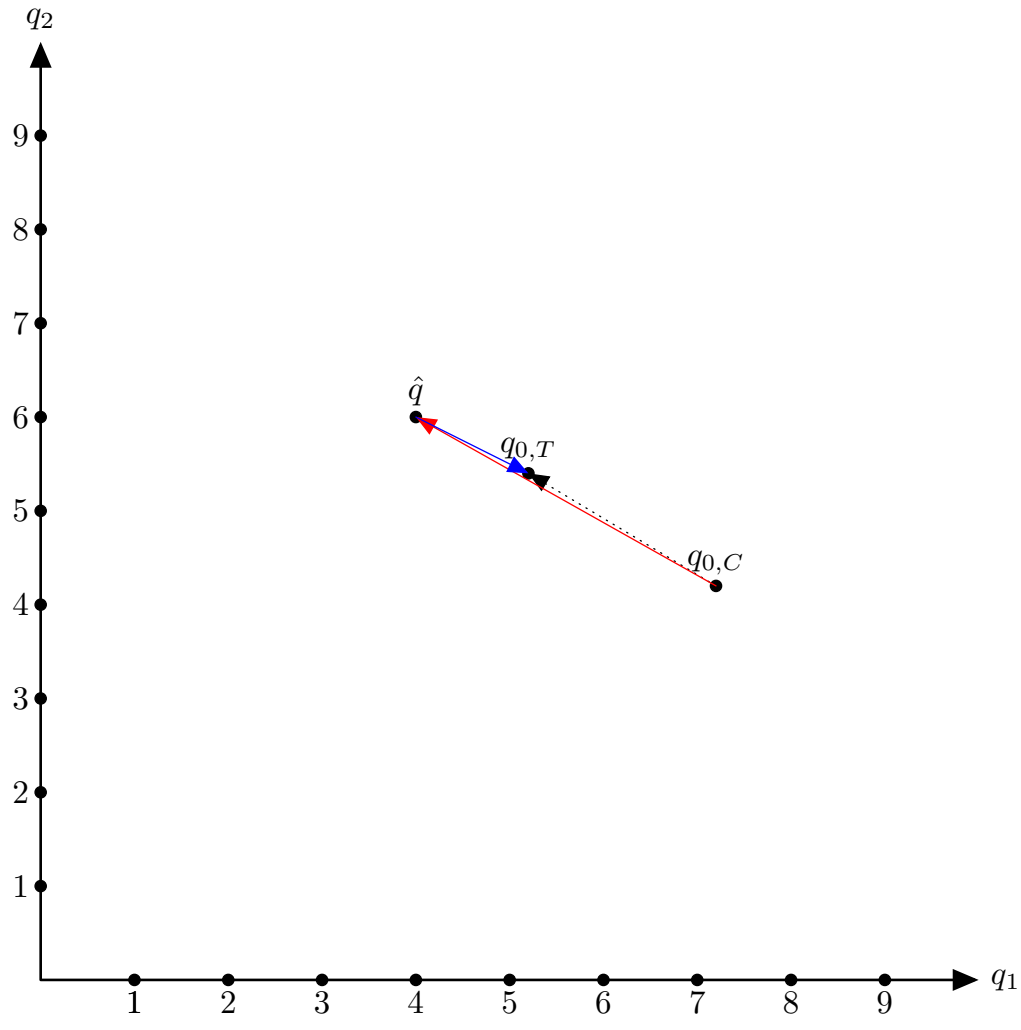


Figure: Decomposition: Liberal Treatment

Main result: Decomposition

- Exposure to conservative preach has no significant effect on subjects' preferences.
  - Subjects express more conservative attitudes in this treatment because they face a higher cost of disagreeing with the conservative statement.
- Exposure to the liberal preach makes subjects' preferences more liberal, while it also makes it more costly to express liberal attitudes (possibly due to self-censorship), as opposed to conservative attitudes.
  - Comparing column (5) to column (4) of Table 3, the subjects in that treatment would answer that they agree 37% more with the liberal statement, provided that the prices of expressing religious attitudes remained unaffected by the treatment...
  - These subjects agree only 20% more with the Likert scale liberal statement, following the treatment.

Follow-up

The decomposition gives two key insights regarding the treatment effects.

1. Exposure to the liberal preach makes subjects' preferences more liberal.
2. Exposure to the conservative preach increases the cost of disagreeing with a conservative opinion but does not fundamentally affect preferences.

To test the validity of the decomposition, we conducted a follow-up experiment on the same pool of subjects about ten months after the experiment.

Follow-up: Setup

- Civil servants were given the opportunity to sign a Petition to the Pakistani parliament to abolish laws preventing eating or drinking during the Ramadan ritual fast (abolish The Ehtram-e-Ramazan Ordinance).
- Each subject could then put her decision in a sealed envelope, which was shredded with some probability known in advance.
  - Chen and Schonger (2022) used the shredding design to detect deontological motivations

Working hypothesis:
The price of expressing a liberal opinion by signing the petition is a function of the shredding probability. The higher the shredding probability, the lower the price of expressing a liberal opinion.

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Follow-up: Results

Table 4: Petition opposing Ramadan Law with a probability of shredding

	(1) Shredded 1%	(2) Shredded 5%	(3) Shredded 33%	(4) Shredded 66%	(5) Shredded 100%
Liberal treatment	0.0708	0.101	0.388**	0.355*	0.373*
	(0.0497)	(0.147)	(0.148)	(0.166)	(0.158)
Fundamentalist treatment	-0.371*	-0.368**	-0.0912	0.163	0.169
	(0.161)	(0.128)	(0.170)	(0.159)	(0.149)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes
Observations	121	121	121	122	122

Standard errors are clustered at the individual level. The dependent variables correspond to the results of the experiment when the probability of the petition being shredded equal to 1%, 5%, 33%, 66% and 100%. Liberal Treatment is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from the liberal Imam. Fundamentalist Treatment is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from the relatively more fundamentalist Imam. Controls include Years of Education, Married, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure: Follow-up

Results Analysis: Rationality

These results are consistent with the decomposition. If exposure to the liberal speech affects subjects' preferences, it should affect their propensity to sign the petition when the shredding probability is high enough.

- In contrast, exposure to the fundamentalist speech does not change subjects' preferences although it makes non-fundamentalist attitudes more costly.
- Hence, provided that this price effect is compensated by a sufficient decrease in the price of the liberal attitude (i.e., the shredding probability is sufficiently high), then we should not expect the fundamentalist speech to affect subjects' propensity to sign the petition.

Robustness Analysis: Rationality

If the treatments impact subjects' rationality, treatment effects on subjects' preferences and imputed prices on the one hand, and on subjects' rationality on the other would be confounded.

- In order to verify whether the decomposition results are driven by the treatment effects on rationality, we run the decomposition analysis in a sample of almost rational subjects.
- These are defined as subjects for which the minimum number of observations that need to be dropped in order to satisfy GARP is at most 2.
  - We also compute Afriat's (1972) Critical Cost Efficiency Index (CCEI). It measures the minimum budget adjustment needed for the data set to satisfy GARP.
  - The index increases from 0 to 1 as a subject becomes more rational. In the context of this experiment, the CCEI can be interpreted as an upper bound of the fraction of income that a subject is "wasting" by expressing inconsistent attitudes.
  - Third, we compute a "trembling hand" rationality index equal to 1 if the subject is fully rational or made only one inconsistent choice, and 0 otherwise.

Robustness Analysis: Spillovers

If there are spillovers across treated and control teachers within a school, with some control teachers also getting treated, we would then underestimate the true effect of the treatments.

- To test for the existence of spillovers, we use the data to examine how the treatment effects would vary if more teachers within a school were treated.
- We find that there are no spillovers of either the conservative or liberal treatment.

Robustness Analysis: Experimenter-demand

Our results are also unlikely to be explained by experimental demand.

1. Exposure to the liberal and conservative preaches prompts responses in different dimensions.
2. The impact on preferences is observed up to a year after the treatment, which is difficult to reconcile with experimenter demand arguments.
3. Petitions to the parliament are high-stakes, having real social, political and reputational costs.
4. We use the Marlowe-Crowne social desirability scale, a survey module developed by social psychologists to rigorously measure a person's propensity to give socially-desirable answers (Crowne and Marlowe, 1960).
   - When we discard individuals who score high on their social desirability scale, the results remain essentially identical.
   - Crowne and Marlowe: I am never jealous of another person's good fortune / I am always a good listener / I am never angry, or I have never been angry.

Attitudes as Assets

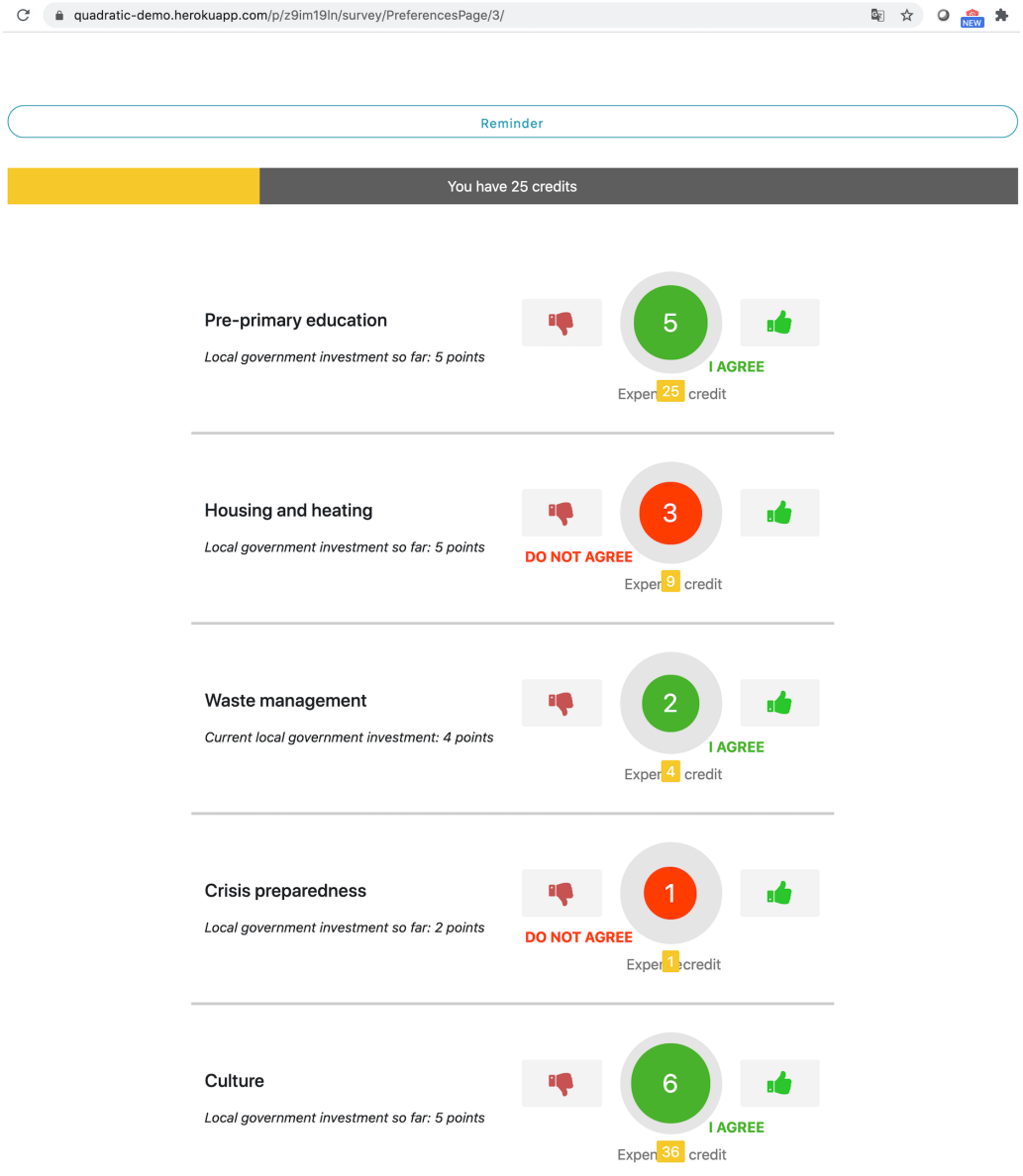
- We introduce a novel methodology to study preferences over attitudes.
- We show that changes in attitudes can be additively decomposed into changes in prices and changes in preferences.
- We test our experimental methodology in a field experiment, exploring the impact of religious preaches on attitudes:
  - Exposure to the conservative preach does not affect subjects' preferences but it makes it less costly to express conservative attitudes.
  - Exposure to the liberal preach makes subjects' preferences more liberal.
- We assess the validity of our results through a follow-up experiment with high-stake decisions.

Signpost

- Applications
  - Changes in menu: CONSIDERATION SETS, SLUTSKY MATRIX
  - Affecting policymaking: RESPONSIVENESS
  - Enhancing legitimacy: DIGITAL DEMOCRACY

Modular and Extensible

Estonian IE of public-facing dashboard for local government accountability



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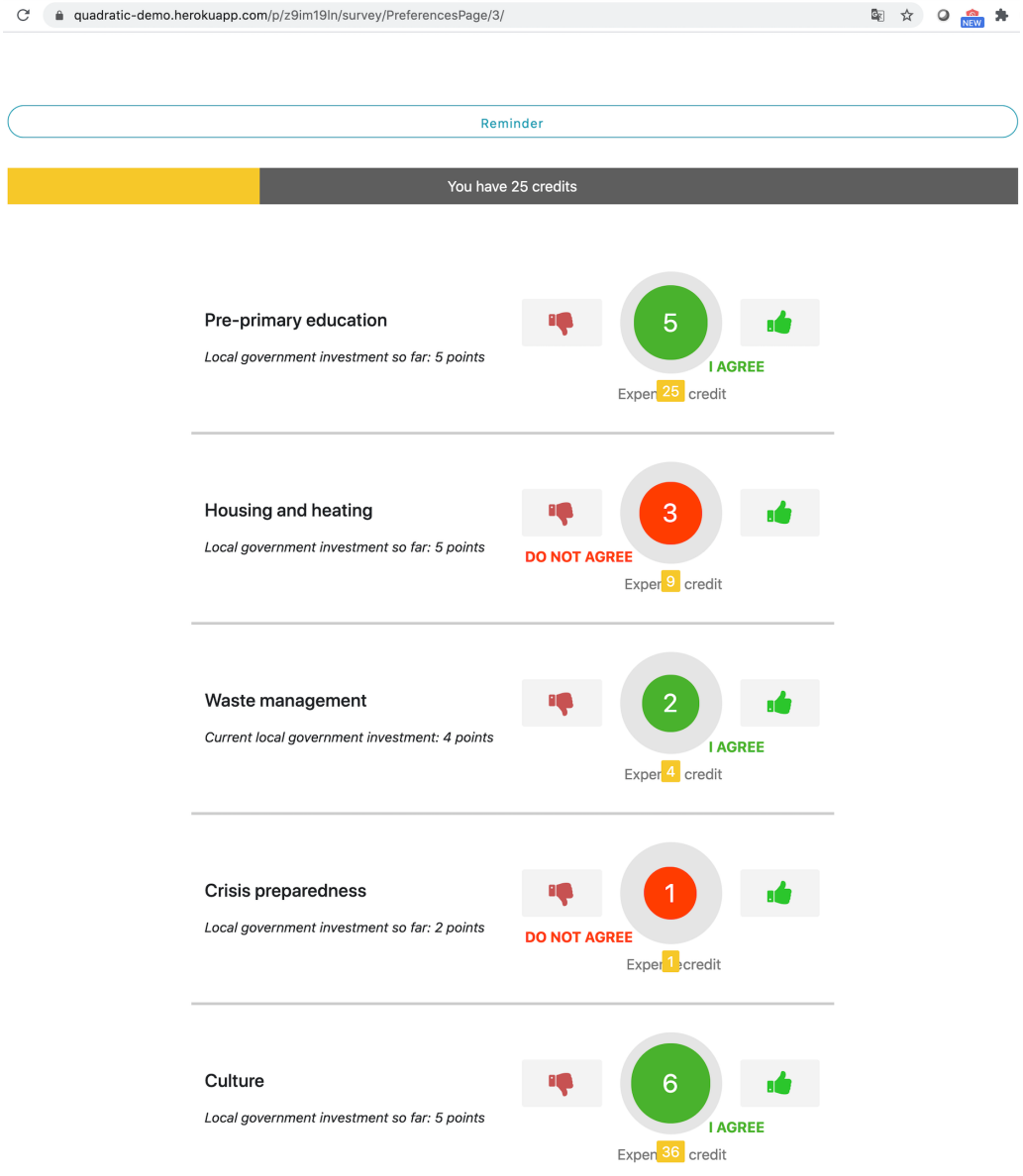
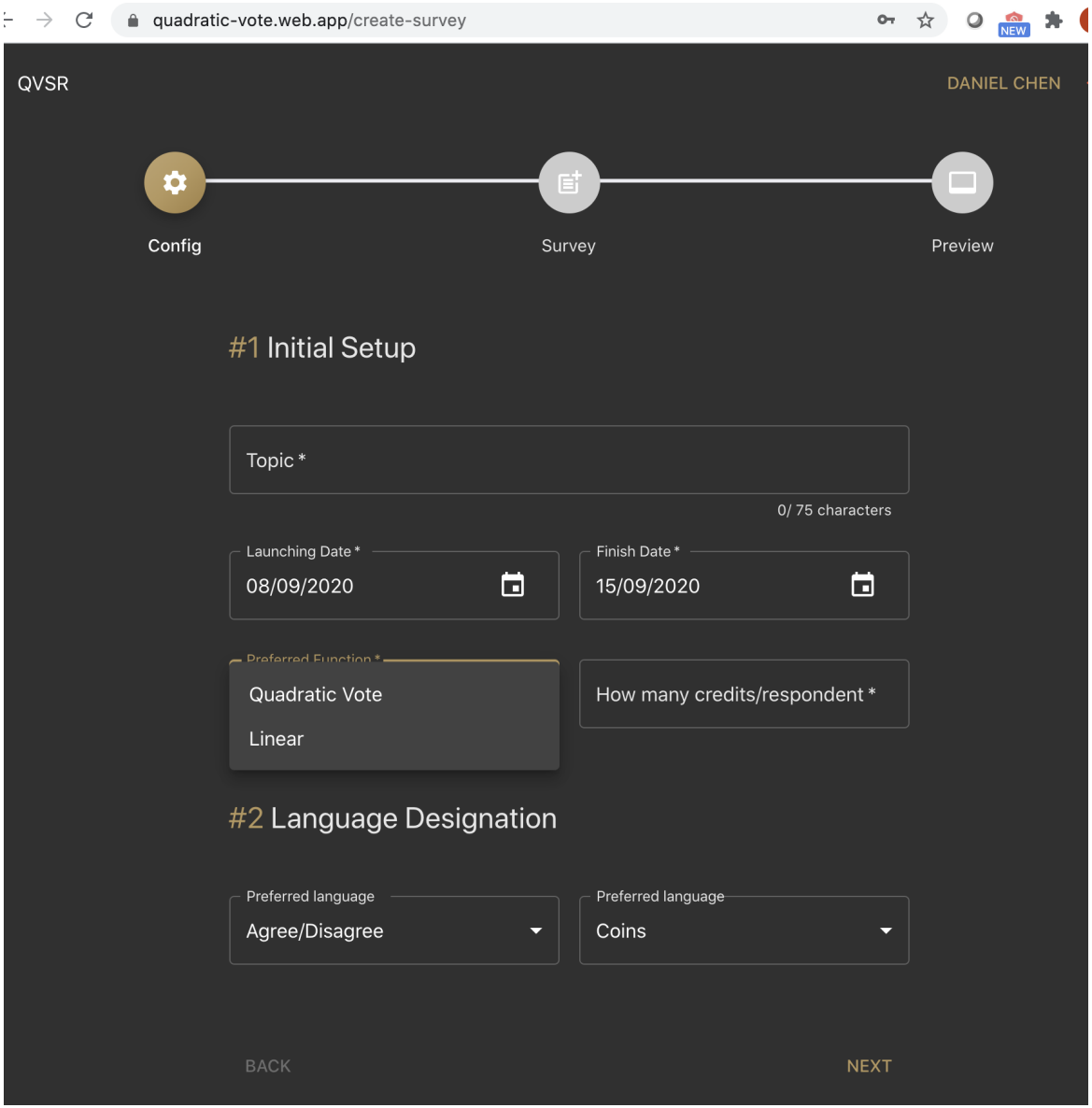


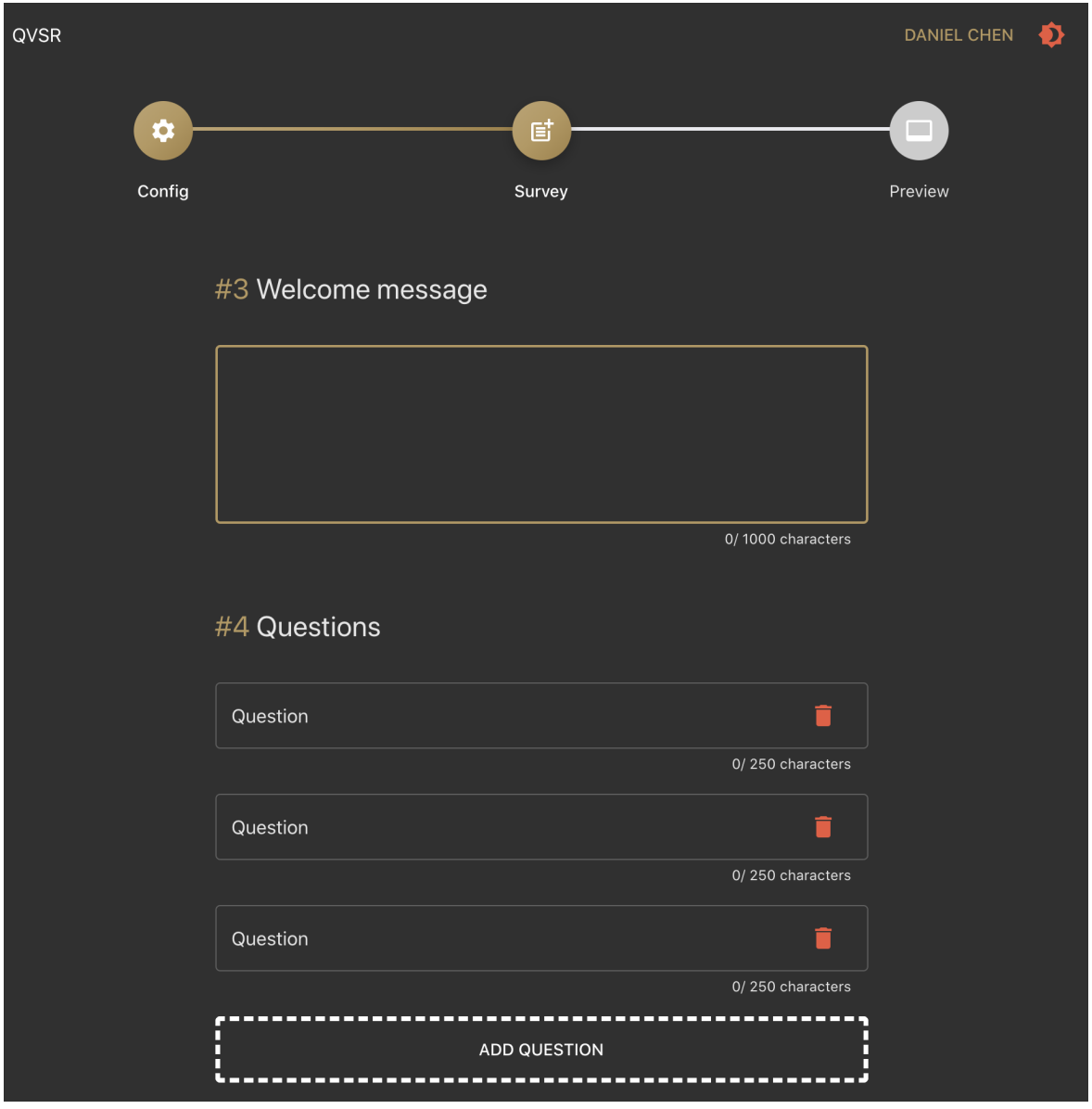
Self-service Quadratic Voting

Giving civil servants and citizens the ability to ask questions of each other

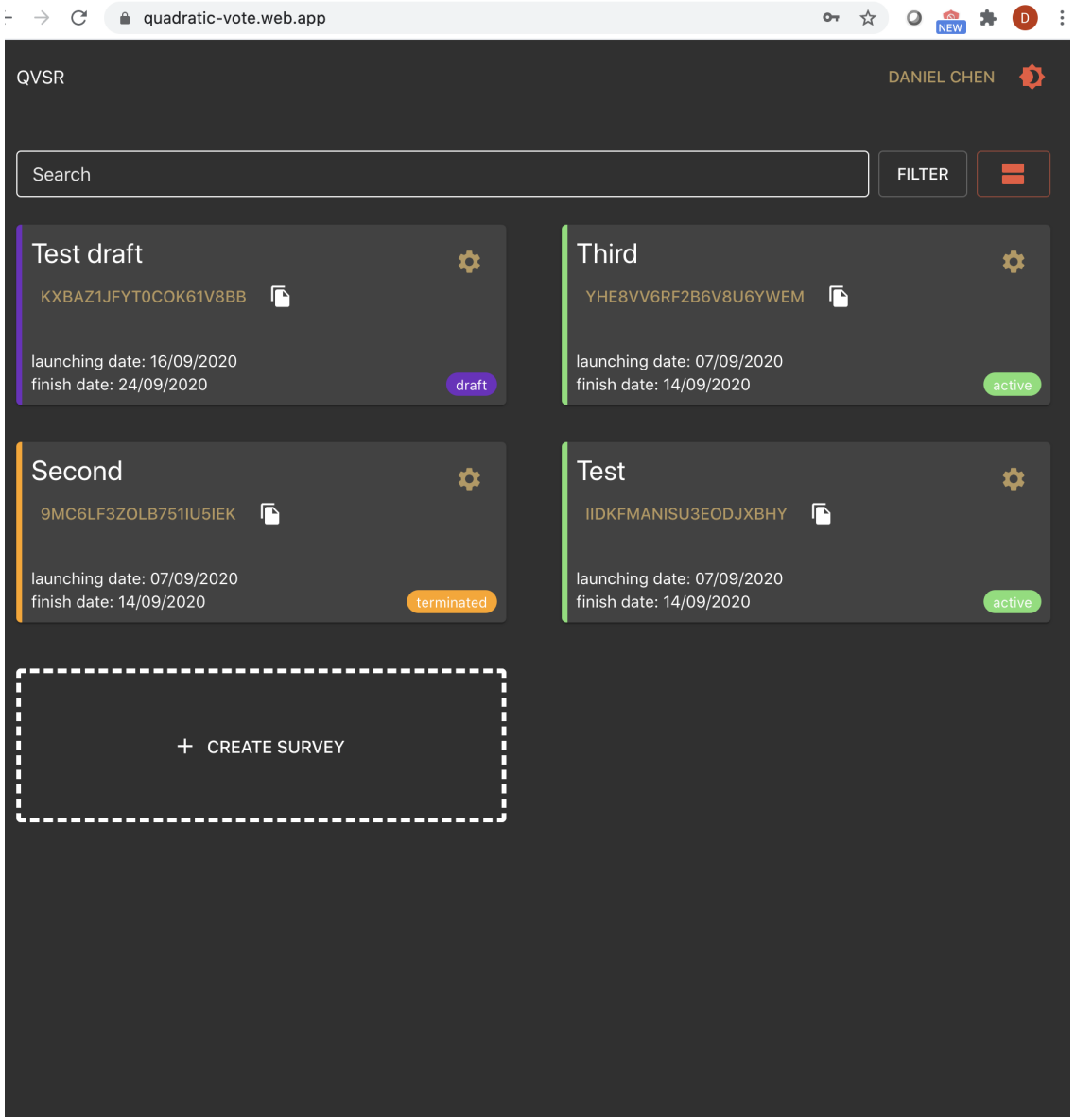


Civicbase.io (AI Magazine 2023)

Self-service Quadratic Voting

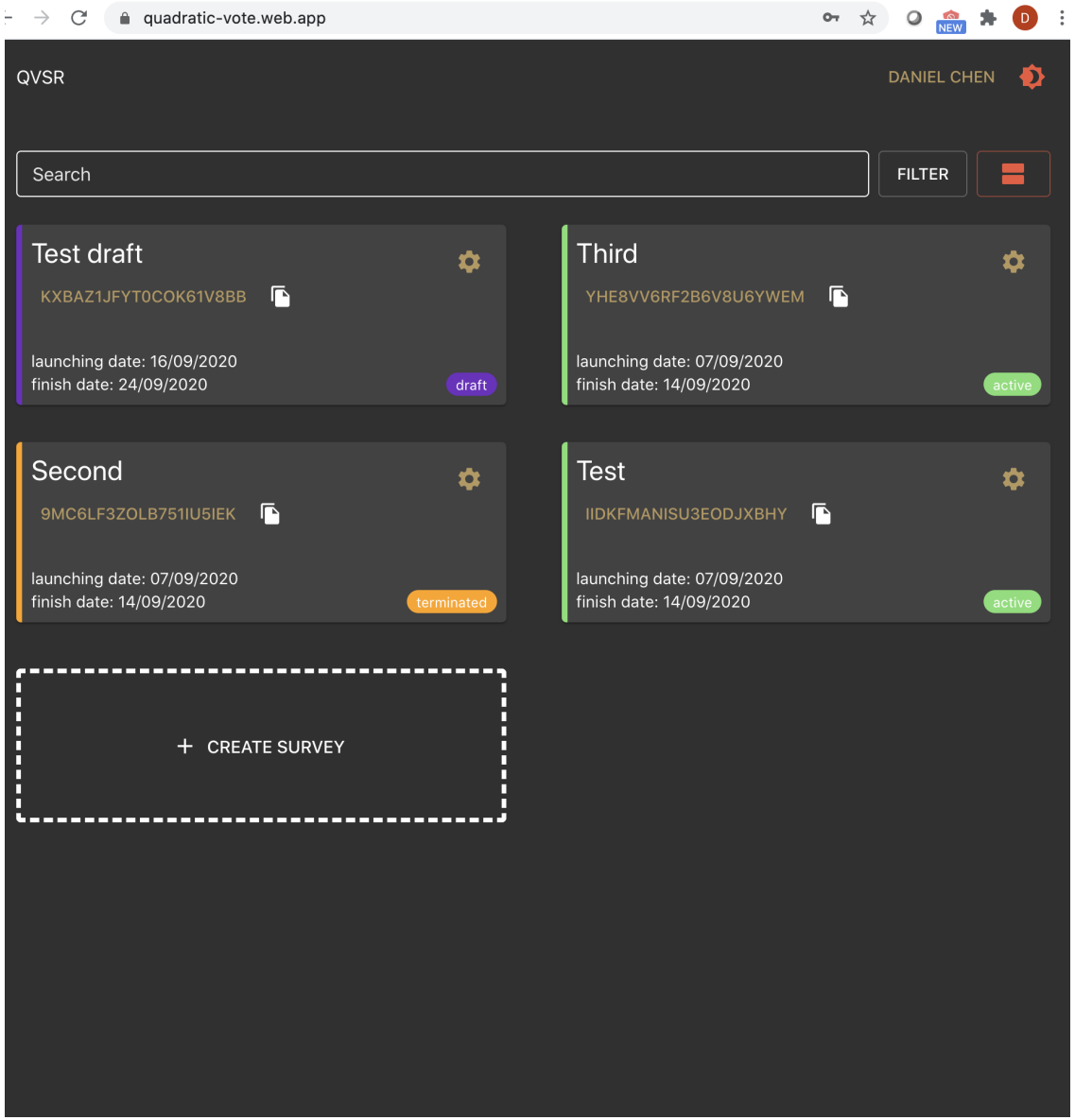


Self-service Quadratic Voting



- Australia: Field Experiment with Policymakers

Self-service Quadratic Voting



- Australia: Field Experiment with Policymakers

4 usage scenarios

- Attitudinal Surveys
  - World Value Survey, GSS, stated preferences, ANES
- Preference Curvature
  - for a deontologist, preferences are lexicographic (duty first)
    - approximately concave
    - when it comes to moral and ethical issues, individuals perceive a concave cost of deviating from what they believe is right
  - affects ideal point estimation
- Prediction
  - behavior, elections, costly acts
- Integration with polls
  - experimental research, or point-in-time representative surveys

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- Attitudinal Surveys
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- Preference Curvature
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   - Spurious inferences of actual behavior
   - Biased treatment effects
2. Preference intensity and curvature—has implications for important real-world decision making
   - Complements alternative methods
     - List Method (identifies one at a time, statistically approximate)
     - Bayesian Truth Serum (complex and cognitively demanding)
     - Shredding Criterion (expensive, identifies one particular preference)
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Additional material

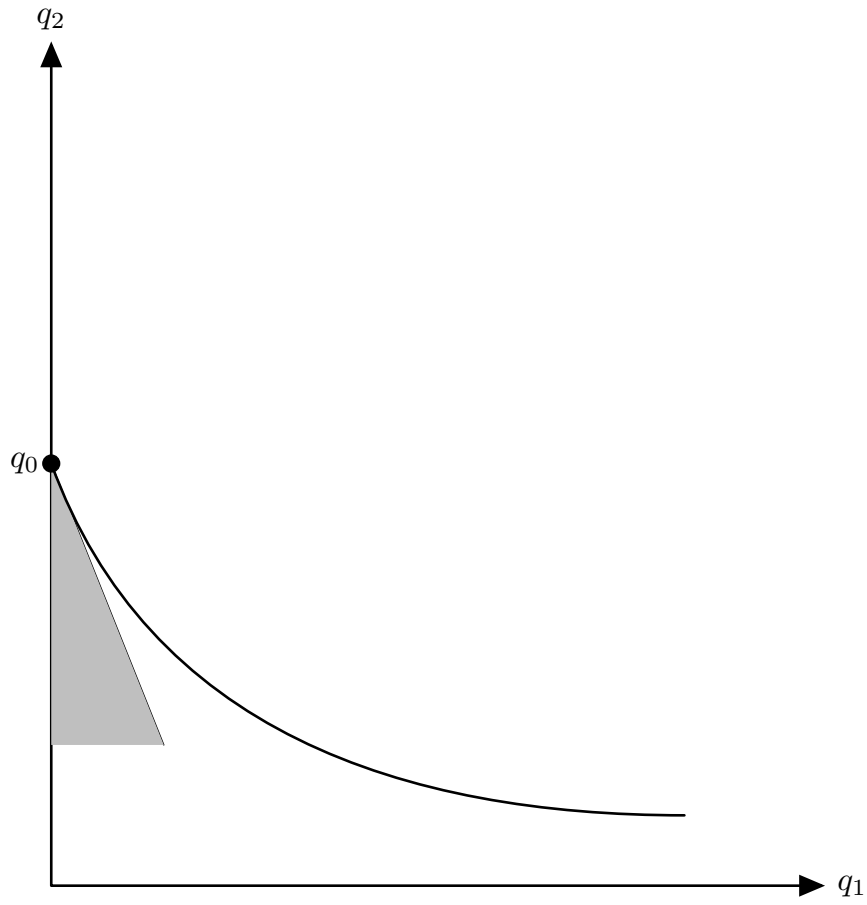

Figure: Any price vector in the grey area would sustain q_0

Some theoretical criteria of improvement

- If the α_{ik} are the same for all issues for an individual, and
- If the partisan targets are more extreme than the respondents' true views ($|t_{ik}| > |x_{ik}|$), QV will move answers in the correct direction
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  - In that sense, QV will not perform better than Likert.
- If $Cov(\alpha_{ik}, \beta_{ik}) < 0$, more votes on issues with strong sincerity motive
  - If someone cares strongly about some issues (high α_{ik}), but not others
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Changes in the menu

- Consider a set of N propositions and a budget of B. Individuals allocate votes subject to the constraint that

$$\sum_{i=1}^{N}(v_i^j)^2 = B$$

- Changes in the menu
  - Number of issues
  - Types of issues (high/low salience, complements/substitutes)
  - Numeraire (to conjoin separate QV blocks)

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Changes in the menu

- Does removal of 1 item result in this rescaling?
  - If $\lambda = 1.7$, then 5 votes scales to 8.5 and 3 votes scales to 5
  - Numerical approximation means weaker statistical tests

Changes in the menu

- Are issues complements or substitutes?
  - Left shoe and right shoe are complements, so the effective price of a pair of shoes is doubled, we should observe half the votes on both
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- Does doubling the value of a numeraire good lead to reduction of all other votes by one-half?
  - Marginal costs double, so votes should scale down by a half
  - Numeraire good can be a less partisan issue (e.g., campaign spending)
  - Can also be **monetary** (e.g., chances at a 1/100 lottery of winning $5)
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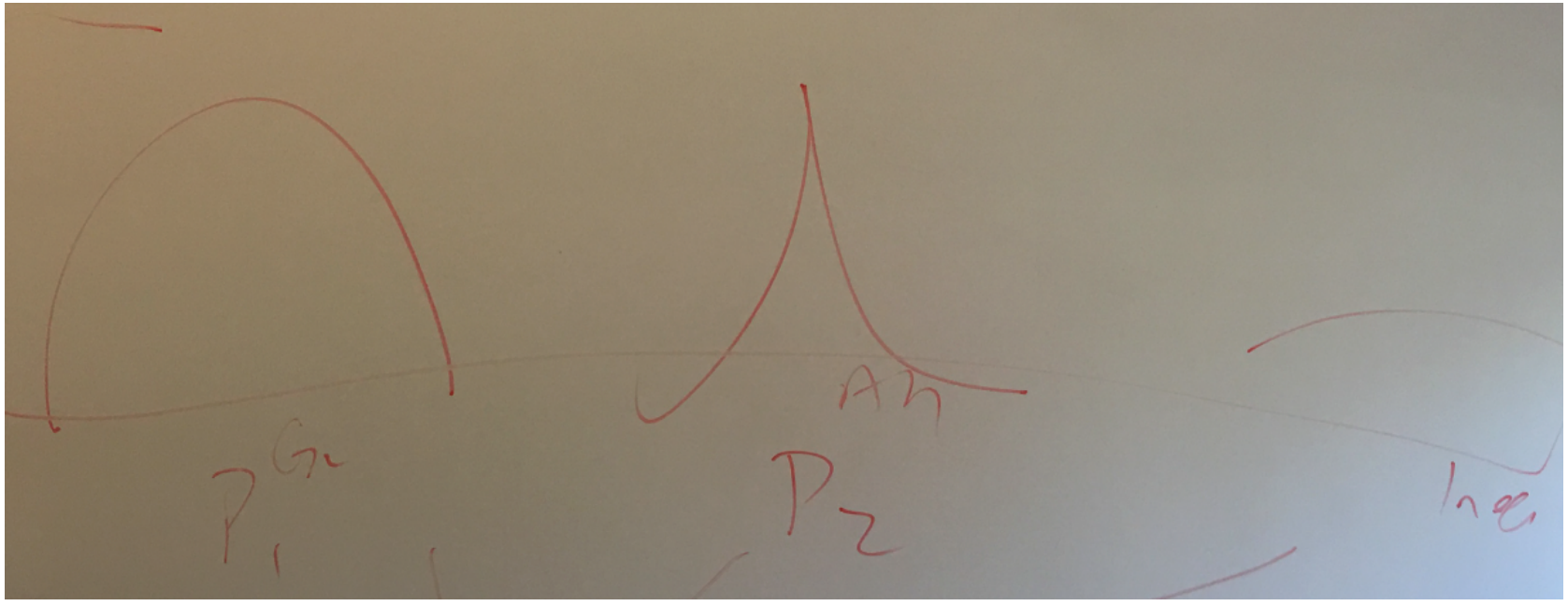

Identify curvature of costs by **randomly varying the cost of votes**

- If 2x-value numeraire, ↑marginal benefit to not expressing true $\preceq$'s
  - Convex costs: if marginal costs to not expressing true preferences are ↗ (Left), people switch to cast 1/2 fewer votes for policy X
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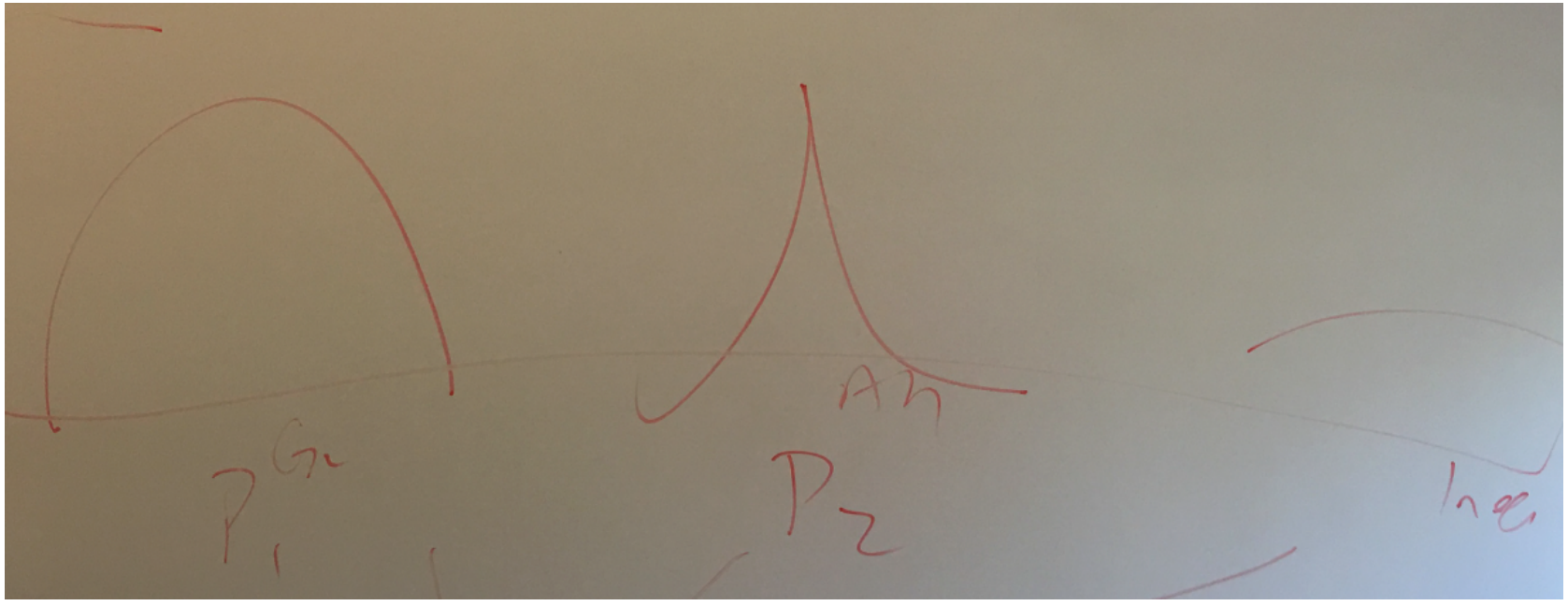

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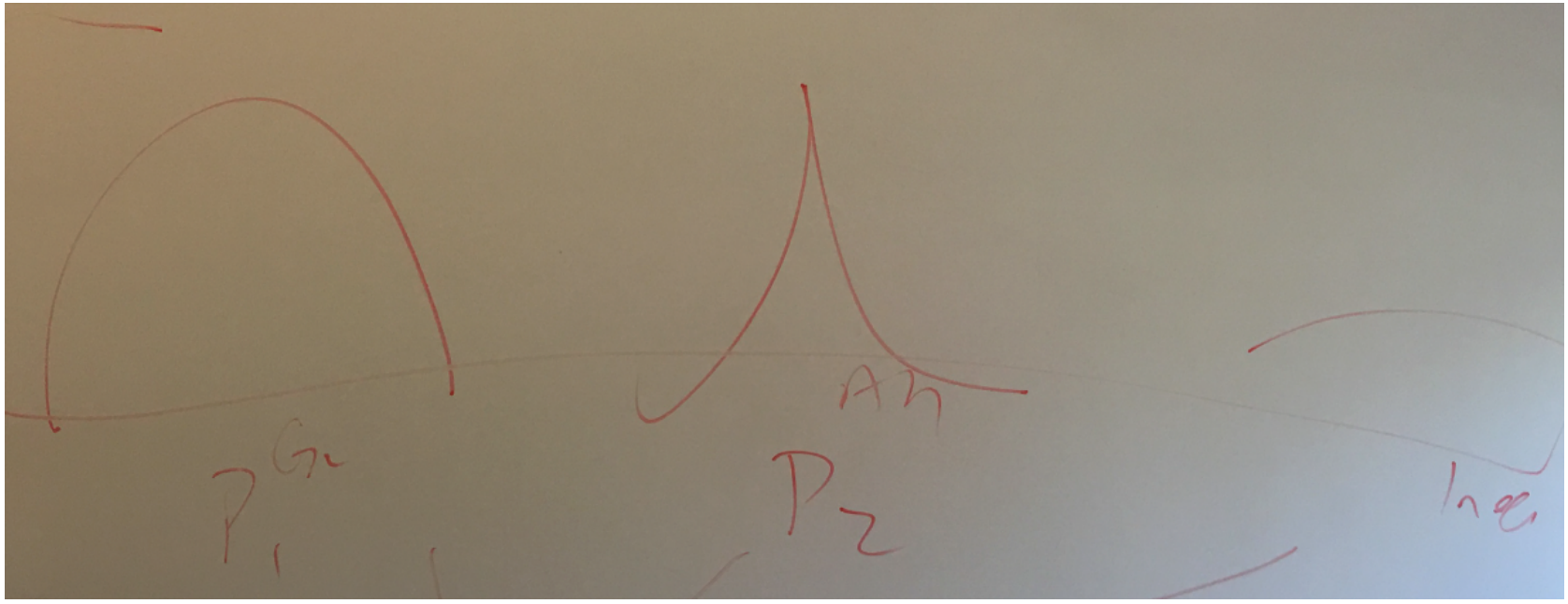

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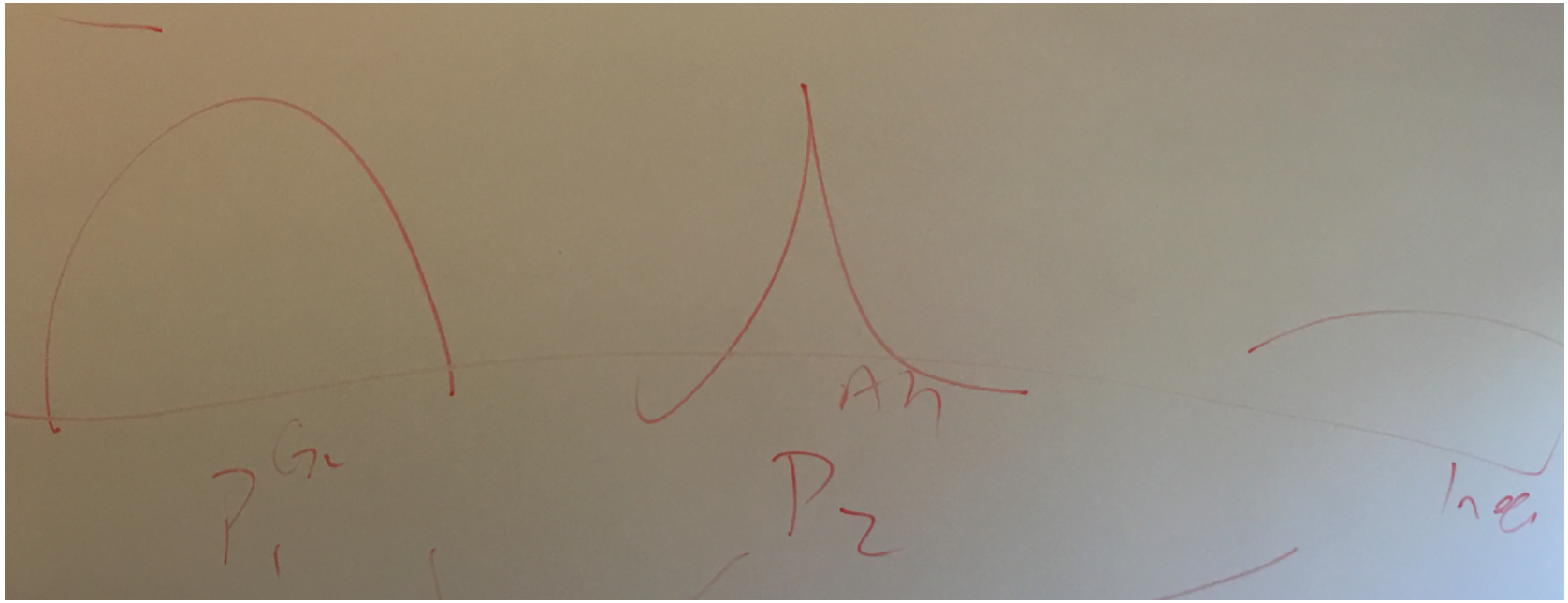

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Attitudes

- Are you willing to have public goods for immigrants?
- Information treatment:
  - Are you willing to have public goods for immigrants type X?
  - Are you willing to have public goods for immigrants type Y?
- Incentives treatment:
  - If the budget comes from your taxes?
  - If the budget comes from philanthropist?

Attitudes

- Consider the following utility:
-
$$U_v = \alpha \pi_v + V$$
  - where π_v represents the individual's **beliefs** about 'productivity' of immigrant and V represents **taste** for immigrant apart from the economic consequences
    - α represents stakes
- Individuals will choose immigrant F over M if and only if

$$\alpha (\pi_F - \pi_M) \geq d$$

  where $d \equiv M - F$ is the relative taste for immigrant M
- Information can be used to update one's beliefs about $\pi_F - \pi_M$
  - Any changes in behavior are due to information
- Incentives erode the effect of taste on choices ($\pi_F - \pi_M > \frac{d}{\alpha}$)
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  - Any changes in behavior are due to information
- Incentives erode the effect of taste on choices ($\pi_F - \pi_M > \frac{d}{\alpha}$)
  - Any changes in behavior are due to preferences

Attitudes

- Consider the following utility:
- $$U_v = \alpha \pi_v + V$$
  - where π_v represents the individual's **beliefs** about 'productivity' of immigrant and V represents **taste** for immigrant apart from the economic consequences
    - α represents stakes
- Individuals will choose immigrant F over M if and only if

$$\alpha (\pi_F - \pi_M) \geq d$$

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- Is Likert or QV a better predictor of response to treatment?
  - If Likert is cheap talk:
    - uncorrelated with anything
  - If QV reveals concave preferences:
    - taste-based discrimination? Higher d, responds more to incentives
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