Attitudes as Assets*

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Abstract

This paper introduces the Priced Survey Methodology (PSM), which identifies underlying preferences and costs of expressing them by presenting the same survey under constrained choice sets. In a field experiment with Pakistani civil servants, we randomly exposed participants to conservative, liberal, or neutral speeches. The PSM revealed that conservative speeches shifted reported attitudes rightward without altering preferences, whereas liberal speeches liberalized preferences but increased expression costs. A follow-up petition experiment confirmed these findings, with participants exposed to liberal speeches more likely to support repealing a restrictive religious law. The PSM thus isolates genuine preference shifts from expression constraints, enabling insights.
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1 Introduction

Survey data on sensitive topics, such as politics or religion, often reflect attitudes that are shaped by more than just underlying preferences. Respondents may modify their answers due to social desirability bias, self-censorship, or concerns about how acceptable certain views might seem. This makes it difficult to accurately track shifts in genuine preferences using traditional surveys. Therefore, effectively disentangling these influences requires methods capable of revealing the true preferences behind the responses.

In this paper, we use a novel approach, the Priced Survey Methodology (PSM), designed to expose underlying preferences by examining how individuals make trade-offs between different survey responses. In the PSM, participants are presented with a series of constrained choice sets, where each set requires trade-offs between answers to survey questions. This design mimics real-world decision-making environments: just as increasing consumption of one good may require reducing consumption of another, here, respondents must balance their preferences for answering questions. By observing these choices, we can infer respondents' underlying preferences.

Our approach builds on Afriat's theorem, a foundational result in revealed preference theory. Afriat's theorem establishes that if a set of decisions satisfies the Generalized Axiom of Revealed Preference (GARP), those decisions can be rationalized by a utility function that is strictly increasing, continuous, and concave. By applying this theorem to the PSM, we can recover the utility function that rationalizes a respondent's survey answers. Essentially, instead of recovering preferences over tangible assets, we recover preferences over attitudes—treating attitudes themselves as assets that individuals weigh and allocate based on their underlying preferences.

The PSM provides a powerful tool for decomposing observed treatment effects in survey responses. Specifically, it allows us to separate changes in respondents' underlying preferences from changes in the perceived costs associated with expressing those preferences. The intuition is straightforward: if a respondent's unconstrained answer to a survey differs from the answer that would maximize her utility under a constrained choice set, it suggests the presence of a psychological constraint, which the PSM can help identify. Thus, we can pinpoint whether changes in surveyed attitudes result from shifts in true preferences or adjustments in the constraints that respondents face when revealing their preferences.

We apply our framework to study attitudes about Ramadan fasting among public school teachers in Pakistan. This context is ideal for implementing the Priced Survey Methodol-

ogy for several reasons. First, Pakistanis typically report exceptionally high religiosity in surveys, with over 90% of respondents in a PEW poll stating that religion is "very important" in their lives (Pew (2018)). Understanding the factors driving these attitudes and how they translate into behaviors is crucial. Second, as educators, school teachers play a key role in shaping intergenerational attitudes toward students, making their perspectives particularly significant. Lastly, peer effects within schools are likely to be influential, allowing us to examine the mechanisms behind the impact of social dynamics on attitude formation.

In a randomized evaluation, 607 school teachers are exposed to conservative and liberal religious speeches using the medium of prominent thought leaders (*Imams*) followed by writing exercises and structured discussion. Through this field experiment, we investigate the effect of conservative and liberal religious speeches on both subjects' preferences over religious attitudes and the implicit constraint that subjects face when answering the survey.

Our first treatment group involves participants being exposed to a thought leader in Pakistan providing a liberal interpretation of the Quranic verses discussing Ramadan fasting. The thought leader encourages Muslims to postpone fasting and argues that fasting can be postponed in Ramadan both for personal and external reasons, for instance, due to the personality or "temperament" of a person or due to external circumstances such as weather and other inconveniences such as travel. Our second treatment group involves the participants watching another prominent thought leader in Pakistan providing a more conservative interpretation of Quranic verses prescribing fasting. He explicitly encourages all Muslims "not to miss a single fast in the month of Ramadan come what may". In the control group, subjects watched a video describing facts and statistics about the Pakistani economy.

To maximize the retention, comprehension, and application of the preaching, we utilized recent advances in pedagogy through the use of social-emotional learning (Schwardmann, Tripodi and van der Weele (2022)). After each speech including the control, the civil servants complete two writing exercises: a 100-word essay summarizing the message and another essay on how they may apply the lessons to their lives. They then engage in a structured discussion on the main messages provided in their treatment group.

Following the treatment phase, we implemented the PSM methodology, where subjects completed the same survey across 11 distinct choice sets.[1] The survey included the two following statements:

On a scale from 0 to 10, where 0 means "not agree at all" and 10 means "completely agree", how much do you agree with each of these statements:

- All adult Muslims should fast during Ramadan.
- Heat and weather are legitimate reasons to postpone Ramadan fasting.

In the initial round, subjects answer the two statements under the unconstrained choice set $X = \{(0, \ldots, 10); (0, \ldots, 10)\}$. In the 10 following rounds, subjects answered the two statements under restricted choice sets mimicking the standard consumption choice environment. Concretely, in one round, the choice set is $B = \{(0, 1); (1, 0)\}$, or equivalently $B = \{\mathbf{q} \in X : \mathbf{q}.\mathbf{p} = 1\}$, with the "price" vector $\mathbf{p} = (1, 1)$. The readers might have recognized the characterization of a linear budget set in the standard consumption choice environment. We then evaluated subjects' rationality, recovered their preferences, and decomposed the treatments' effects applying our theoretical results.

About ten months after the first experiment, we run a follow-up experiment with the same pool of subjects to infer both longer-term impacts and investigate if our results hold in a higher stakes setting. In the follow-up, subjects were given the opportunity to sign a Petition that opposed a conservative religious policy that bans eating, smoking, and drinking in public places during the month of Ramadan (the Ehtram-e-Ramazan Ordinance). The subjects put their decisions anonymously in sealed envelopes, which were shredded with some probability known in advance (Andreoni and Bernheim (2009); Chen and Schonger (2020)).[2]

Our main results relate to the impact of the religious messages on surveyed attitudes, preferences, and implicit constraints. The treatments' effects on surveyed attitudes are as expected. Exposure to the conservative speech increases agreement with the statement advocating for fasting during Ramadan (Statement 1) by approximately 2 points and decreases agreement with the statement supporting legitimate reasons to postpone fasting

[1] Although we conducted 17 rounds in total, our main analysis focuses on the first 10 rounds, as participants demonstrated greater rationality within this subset. Since rationality is a key condition for recovering preferences from survey responses, we restrict our primary specification to these rounds. However, all results remain robust when incorporating all 17 rounds, as detailed in the Appendix.

[2] Naturally occurring settings that emulate the shredding design include Bergstrom, Garratt and Sheehan-Connor (2009) and Choi, Van Riper and Thoyre (2012).

during Ramadan (Statement 2) by about 0.8 point. Conversely, exposure to the liberal speech decreases agreement with Statement 1 by around 2 points and increases agreement with Statement 2 by about 1.8 points. Are these effects explained by changes in preferences or changes in the implicit constraints that subjects face when answering the survey? We find that the conservative treatment effect on preferences is not significant. The conservative treatment effect on surveyed attitudes is primarily driven by changes in the constraints that subjects feel when answering the survey. Conversely, the liberal treatment effect on preferences is strong and highly significant. The liberal treatment also affects the constraints that subjects feel when answering the survey, partially offsetting the strong treatment effect on preferences.

Our second set of results leverages the follow-up experiment. We should not expect the conservative speech to affect subjects' propensity to sign the petition since that treatment does not affect subjects' preferences. In contrast, we should expect the liberal treatment to affect subjects' propensity to sign since that treatment makes subjects' preferences more liberal. This is precisely what we find in the follow-up. Exposure to the liberal treatment increases subjects' likelihood of signing by about 40% provided that the shredding probability is at least equal to 33%. On the opposite, provided that the shredding probability is above 33%, exposure to the conservative speech has no effect on subjects' propensity to sign the petition.

We demonstrate the robustness of our findings through a series of sensitivity analyses. First, we verify that the randomly assigned groups are well-balanced across individual characteristics. Second, we examine whether subjects' rationality when responding to the PSM might influence our results. To assess rationality, we use standard measures such as the Critical Cost Efficiency Index (CCEI) from Afriat (1972), the Houtman and Maks Index,[3] and the Money Pump Index (MPI) from Echenique, Lee and Shum (2011). Our analysis shows that the average CCEI score—a measure of rationality ranging from 0 to 1—reaches 77%, with approximately one-third of subjects exhibiting full rationality when answering the PSM. Moreover, for 95% of subjects, all GARP violations could be eliminated by dropping at most 3 rounds out of 10 from their data. For 75% of subjects, dropping at most 2 rounds would suffice. These results support both the validity of the approach and the assumption that subjects exhibit monotonic preferences when responding to the survey.

[3]The Houtman and Maks Index is computed using the Gross and Kaiser (1996) algorithm. For an alternative, see, Heufer and Hjertstrand (2015).

Additionally, we examine how treatment effects would vary if more teachers within a school were treated. We find substantial variation in the fraction of treated teachers across schools, and our analysis reveals noteworthy spillover effects. Specifically, increasing the proportion of teachers exposed to conservative speech in a school decreases the agreement with conservative statements among control group teachers. For the liberal treatment, while there are no significant spillovers on surveyed attitudes, we observe that control group teachers in schools with a higher fraction of treated teachers feel more constrained in expressing liberal attitudes. These findings suggest that spillover effects on expressed attitudes predominantly occur through the constraint channel, leading to a polarization of attitudes within school regardless of the treatment type.

This paper contributes to several strands of the literature. Principally, it relates to the large body of work on social norms (e.g., Akerlof and Kranton (2000); Bisin and Verdier (2001); Shayo (2009); Bénabou and Tirole (2011); Bernheim et al. (2021); Atkin, Colson-Sihra and Shayo (2021); Acemoglu and Robinson (2021)). We contribute to this literature by demonstrating a novel methodology for recovering preferences over norms, which improves upon standard survey measures. By using the Priced Survey Methodology (PSM), we can disentangle genuine preferences from the perceived costs of expressing those preferences, thereby providing a more accurate and nuanced measurement of norms. Specifically, we contribute to the literature on changes in social norms (e.g., Bursztyn, González and Yanagizawa-Drott (2020); Bursztyn, González and Yanagizawa-Drott (2018); Giuliano and Nunn (2020)) by showing that changes in norms can be additively decomposed into two fundamental elements: one related to changes in preferences and one related to changes in the constraints of expressing these preferences.

Second, we contribute to the literature on revealed preferences (Afriat (1967); Varian (1990, 1982); Banerjee and Murphy (2005); Blundell, Browning and Crawford (2008); Crawford (2010); Choi et al. (2014); Crawford and Pendakur (2013); Crawford and De Rock (2014); Halevy, Persitz and Zrill (2018); Deb et al. (2021)), which has been primarily concerned with risk and consumption choices (e.g., Banerjee and Murphy (2005); Choi et al. (2007); Choi et al. (2014); Crawford and Pendakur (2013); Blundell et al. (2015); Halevy, Persitz and Zrill (2018)). However, many decisions are shaped by attitudes and norms. While the influence of norms on choices is well established (Guiso, Sapienza and Zingales (2003); Clingingsmith, Khwaja and Kremer (2009); Bursztyn et al. (2019); Giuliano and Nunn (2020)), transforming these intangible aspects of human subjectivity into an objective, well-measured reality is challenging. We show that the Priced Survey Methodology

(PSM) can effectively bridge this gap by revealing underlying preferences and the perceived costs of expressing them. In that sense, our work complement more specifically the Bayesian approach of Prelec (2004), who shows that biases in favor of consensus can be removed from subjective data with appropriate scoring methods. In contrast, our methodology integrates the measurement of attitudes and norms into the revealed preference framework, providing a more comprehensive understanding of how norms influence decision-making.

Third, through our application exercise in a field experiment, we contribute to the growing literature on the economics of religion (e.g., Iannaccone (1992); Iyer (2016); Becker, Rubin and Woessmann (2020)). Existing studies have documented the effect of religious leaders on political and judicial outcomes (e.g., Chaney (2013); Mehmood and Seror (2023)). We build on the existing literature by studying how conservative and liberal speeches impact religious attitudes. Our results suggest that religious fundamentalism might be sustained by preference falsification (Kuran (1997)), thereby explaining why fundamentalism often impedes the formation of true public opinion and creates a barrier to social change. Conversely, exposure to liberal interpretations of religious norms in a devout and conservative population might deeply change preferences without triggering commensurate changes in expressed opinions.

Finally, this paper contributes to the economic literature on survey research (e.g., Stantcheva (2022), Ferrario and Stantcheva (2022), Benjamin et al. (2023), D'Acunto and Weber (2024)). While survey measures are undoubtedly useful (Kaiser and Oswald (2022)), interpretation and aggregation remain challenging (Bond and Lang (2019)). To address these challenges, researchers have explored various strategies, such as designing open-ended questions (Ferrario and Stantcheva (2022)) or adjusting for scale-use heterogeneity through multiple surveys (Benjamin et al. (2023)). The PSM provides a novel solution by enabling experimenters to recover the preferences underlying survey answers. Utility parameters estimated through the PSM might better measure respondents' attitudes than direct survey responses. We contribute to the literature by showing that the PSM allows experimenters to disentangle two mechanisms influencing survey answers: changes in preferences or changes in the costs of attitudes.

Section 2 presents the experimental methodology and the theoretical foundations to recover preferences using the PSM. Section 3 presents the main experimental results, while Section 4 discusses the follow-up. Section 5 presents the robustness analysis, and Section 6 concludes.

2 Experimental Design

2.1 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 approach of the PEN network is similar to charter schools in the United States (Angrist and Pischke (2014)), where the focus is on training and managing the schools using public funds by the private actors i.e. under a public-private partnership. The network employs 607 public school teachers and 52 schools across the State of Punjab in Pakistan.

2.2 Setup

The experiment proceeds in two parts. The treatments, and the Priced Survey Methodology (PSM). Both parts are detailed below.

Part 1: Treatments

In the first part of the experiment, we randomly assign 607 public school teachers into three treatment arms with 202 assigned the conservative speech treatment, 202 to the liberal speech treatment and 203 the placebo group. All treatments including the placebo were presented to the civil servants during a live Zoom session. The video messages last about three minutes. The civil servants then completed two writing assignments in class immediately following the viewing of the speech. The first assignment involves writing 100-word takeaways from the randomly assigned speech, while the second involves writing a 100-word summary on how they may be able to apply the lessons of the video in their lives. They get 15 minutes to complete each writing assignment. Finally, participants engage in a 30-minute structured discussion on the main messages of the video, live on Zoom. The treatments were the following:

Conservative Treatment.— Our first treatment group involves the participants watching a prominent thought leader in Pakistan providing a conservative interpretation of Quranic verses prescribing fasting. He explicitly encourages all Muslims "not to miss a single fast in the month of Ramadan come what may". He argues explicitly that one needs to tolerate the heat and the weather and fast under all conditions. We use the term 'conservative' to characterize a movement within Islam that aims to return to the founding scriptures of

Islam with a literal and traditional interpretation of the Quranic verses (Phœnix (1930)). The link to the complete video of the conservative speech can be found in Figure A.1.

Liberal Treatment.— Our second treatment group involves the participants watching another prominent thought leader in Pakistan providing a liberal interpretation of the Quranic verses discussing Ramadan fasting. He explicitly encourages all Muslims to postpone fasting, for instance, due to a personality of a person who finds it hard to fast or due to external circumstances such as weather and other inconveniences such as travel. He concludes by arguing that even the whole month of Ramadan fasting can be postponed to another month when the length of fasting is shorter and the weather milder. The link to the complete video of the liberal speech can be found in Figure A.1. Finally, both thought leaders are listed as the "500 Most Influential Muslims" in the world by the Royal Aal al-Bayt Institute for Islamic Thought in Jordan which issues this list annually.

Placebo.— Our placebo group watches a video of equal length to the liberal or conservative speech but unrelated to Ramadan fasting. This included facts and figures about the Pakistani economy. This included discussing the concept of GDP and inflation, followed by some macroeconomic trends such as GDP and inflation trends in Pakistan for the past two decades. The link to the placebo video can be found in the note to Figure A.1.

Part 2: Priced Survey Methodology

In the second part of the experiments, subjects completed a Priced Survey Methodology (PSM) that aims at measuring their preferences over religious attitudes. We implemented a PSM consisting of 10 rounds and two questions.[4] The subjects answer the same questions in the 10 rounds but face different choice sets. To answer the questions, subjects could move two sliders from a 0 default to their final answer. The two questions of the PSM were the following:

On a scale of 0 to 10, where 0 means "not agree at all" and 10 means "completely agree", how much do you agree with each of these statements:

- Statement 1: All adult Muslims should fast during Ramadan.
- Statement 2: Heat and Weather are legitimate reasons to postpone Ramadan fasting.

[4] Although we conducted 17 rounds in total, our main analysis focuses on the first 10 rounds, as participants demonstrated greater rationality within this subset. Since rationality is a key condition for recovering preferences from survey responses, we restrict our primary specification to these rounds. However, all results remain robust when incorporating all 17 rounds, as detailed in the Appendix, Table A.1.

Figure A.2 presents the screen of a respondent during a round of the PSM. In the first round, the subjects were able to choose any answer to the two questions. In the following rounds, we restricted the choice sets. Indeed, subjects have a fixed budget in tokens to allocate. Each statement has a fixed "price", which corresponds to the cost in tokens of increasing the answer to that statement. Concretely, if a subject has 4 tokens to allocate and the "price" of moving the slider associated to statement 1 is 2 tokens, then answering 1 to that statement costs 2 tokens. The subject has only 2 remaining token to allocate to question 2. Both the total budget and the "prices" vary across rounds. Finally, we only allowed participants to submit integer answers that saturate their budget constraints.

To facilitate this process, we calculated and displayed the remaining token balance on respondents' screens after each adjustment. This feature allowed participants to visually track their token expenditure in real-time. Additionally, in any given round, participants could reclaim tokens spent on previous choices by retracting their adjustments, effectively undoing earlier decisions to reallocate their resources more strategically. For instance, if a respondent initially moved the slider for statement 1 to 3 and saw "1 token remaining," she could move the slider back to 2 and see "3 tokens remaining" on her screen. Subjects could click the submit button only when their answers showed a 0 token balance.

The 10 budget sets faced by the participants are represented in Figure 1. Each line corresponds to a round. If we take the round represented by the red line, for example, then there was only two possible answers in that round: $(1, 0)$ or $(0, 1)$. In that observation, subjects only had one token to allocate, and the price of each statement was fixed to 1. In the round represented by the yellow line, subjects were able to answer either $(3, 1)$, $(3, 2)$, or $(5, 1)$. Table 1 gives a comprehensive overview of the price vectors, budgets, and choice sets for the 10 rounds.

2.3 Recovering Preferences over Attitudes

In the PSM, subjects reveal their preferences over the two statements. This section shows how to recover subjects' preferences using the PSM. Let $\mathcal{R} = \{0, \dots, 10\}$ denote the set of rounds, and $X = \{0, \dots, 10\}^2$ the set of possible answers to the survey. Round 0 is the initial round where subjects face no restriction on their answer. Let $\mathcal{I} = \{1, \dots, I\}$ denote the set of participants, $q_s^{r,i}$ the answer of participant i to statement $s \in \{1, 2\}$ in round $r \in \mathcal{R}$, and $\mathbf{q^{r,i}} = (q_1^{r,i}, q_2^{r,i})$. We drop the participant index in what follows to simplify the notations. Let $p_s^r \in \mathbb{N}_+$ and $R^r > 0$ denote respectively the price of statement s and the

budget in token associated to round r. We denote $\mathcal{B}^r \subseteq X$ the choice set of round r. $\mathcal{B}^r$ is characterized as follows:

$$\mathcal{B}^r = \{\mathbf{q} \in X : \mathbf{q}.\mathbf{p^r} = R^r\}. \tag{1}$$

For each subject $i \in \mathcal{I}$, the PSM gives a dataset $D^i = \{\mathbf{q^{r,i}}, \mathcal{B}^r\}_{r\in\mathcal{R}}$. Since subjects answer the same survey several times under different choice sets, they reveal their preferences over their surveyed attitudes. Given that the choice sets are linear, it is possible to apply the standard rationality axioms:

Definition 1 *For subject $i \in \mathcal{I}$, answer $\mathbf{q^k} \in X$ is*

1. *directly revealed preferred to answer $\mathbf{q}$, denoted $\mathbf{q^k} R^0 \mathbf{q}$, if $\mathbf{p^k q^k} \geq \mathbf{p^k q}$ or $\mathbf{q} = \mathbf{q^k}$.*
2. *directly revealed strictly preferred to answer $\mathbf{q}$, denoted $\mathbf{q^k} P^0 \mathbf{q}$, if $\mathbf{p^k q^k} > \mathbf{p^k q}$.*
3. *revealed preferred to answer $\mathbf{q}$, denoted $\mathbf{q^k} R \mathbf{q}$, if there exists a sequence of observed answers $(\mathbf{q^j}, \ldots, \mathbf{q^m})$ such that $\mathbf{q^k} R^0 \mathbf{q^j}$, $\ldots \mathbf{q^m} R^0 \mathbf{q}$.*
4. *revealed strictly preferred to answer $\mathbf{q}$, denoted $\mathbf{q^k} P \mathbf{q}$, if there exists a sequence of observed answers $(\mathbf{q^j}, \ldots, \mathbf{q^m})$ such that $\mathbf{q^k} R^0 \mathbf{q^j}$, $\ldots \mathbf{q^m} R^0 \mathbf{q}$, and at least one of them is strict.*

Below, we give the standard cyclical consistency condition due to Varian (1982):

Definition 2 *A PSM dataset $D = \{\mathbf{q^k}, \mathcal{B}^r\}_{r\in\mathcal{R}}$ satisfies the general axiom of revealed preference (GARP) if for every pair of observed answers, $\mathbf{q^k} R \mathbf{q}$ implies not $\mathbf{q} P^0 \mathbf{q^k}$.*

Consider the following example, to illustrate both Definition 1, and a violation of the cyclical consistency condition of Definition 2. In round 2, from Table 1, the subject chooses one answer among the followings: $\{(0,2),(1,1),(2,0)\}$. The subject choose to answer $\mathbf{q_2} = (1,1)$. Hence, she reveals that she prefers $(1,1)$ to either $(0,2)$ or $(2,0)$. Using the notations of Definition 1, we can write this as follows: $(1,1)R^0(0,2)$, and $(1,1)R^0(2,0)$. In round 7, the subject chooses $(0,2)$ from options $\{(4,0),(2,1),(0,2)\}$. Hence, she reveals that she prefers $(0,2)$ to both $(4,0)$ and $(2,1)$: $(0,2)R^0(4,0)$, and $(0,2)R^0(2,1)$. Finally, in round 5, the subject chooses answer $(4,0)$ from the set $\{(4,0),(3,1),(2,2),(1,3),(0,4)\}$. Since answer $(1,1)$ is strictly below the budget line associated to that round, $(4,0)P^0(1,1)$. From these preference relations, we see that:

$$(1,1)R^0(0,2)R^0(4,0)P^0(1,1),$$

where the first direct preference relation stems from round 2, the second from round 7, and the last from round 5. These relations can be summarized as:

$$(1,1)R(4,0) \text{ and } (4,0)P^0(1,1),$$

a violation of the cyclical consistency condition characterized in Definition 2.

As usual in the revealed preference literature, a preference relation can be characterized through a utility function. A utility function $u : X \to \mathbb{R}$ weakly rationalizes the data if for all k and $\mathbf{y} \in X$, $\mathbf{p^k}.\mathbf{q^k} \geq \mathbf{p^k}.\mathbf{y}$ implies that $u(\mathbf{q^k}) \geq u(\mathbf{y})$. The following theorem is due to Afriat (1967):

Theorem 1 *The following conditions are equivalent:*

1. *D has a mononotonic weak rationalization.*
2. *D satisfies GARP.*
3. *There are strictly positive real numbers U^k and λ^k, for each k such that*

$$U^k \leq U^l + \lambda^l \mathbf{p^l}(\mathbf{q^k} - \mathbf{q^l}) \tag{2}$$

   for each pair of observations $(\mathbf{q^k}, \mathcal{B}^k), (\mathbf{q^l}, \mathcal{B}^l)$ in D.

4. *D has a monotonous, continuous, concave utility function that rationalizes the data.*

To the extent that D^i satisfies GARP, it is possible to recover the preferences rationalizing subject i's answers to the PSM, applying Afriat's (1967) theorem.

2.4 Treatment Effect and Decomposition

Changes in attitudes, as measured through survey questions, confounds two treatment effects. One on preferences, and one on the constraints that subjects face when they answer the survey. Below, we show that the PSM gives a way to disentangle these two treatment effects.

Consider first Figure 2. The first panel represents the answer of subject $i \in \mathcal{I}$ to a survey $\mathbf{q^{i,0}}$. The second panel represents the highest indifference curve going through $\mathbf{q^{i,0}}$. The last panel represents the budget constraint that can be inferred, given subject i's utility function u^i. Indeed, provided that D^i satisfies GARP, it is possible to interpret $\mathbf{q^{i,0}}$

as the outcome of a utility-maximizing behavior under a certain choice set $\mathcal{B}^0$ that may not be identical to the unconstrained set X. Indeed, subject i might feel compelled to choose from a restricted set of answers by psychological or social factors. Concretely, a subject might feel compelled to answer in a way that reflects the message she heard, or refrain from expressing her true attitudes because they are far from those of her colleagues.

Formally, we interpret $\mathbf{q^{i,0}}$ as solving the following optimization problem:

$$\mathbf{q_{i,0}} = \underset{\mathbf{q}\in\mathbb{R}^2_+}{\arg\max}\, u_i(\mathbf{q}) \text{ subject to } \mathbf{p^i}.\mathbf{q} \leq 1 \tag{3}$$

where $u_i(.)$ is i's utility function over attitudes, estimated with the PSM, and $\mathbf{p^i} = \{p_1^i, p_2^i\}$ is the vector of implicit prices of i's attitudes, as represented in the last panel of Figure 2. The implicit budget is normalized to 1 without loss of generality in (3). Vector $\mathbf{p^i}$ is an aggregate measure of the constraints impeding subject i from answering 10 to both statements.

The assumption that the unconstrained response is always 10 stems from the monotonicity of preferences. Relaxing this assumption would require extending Afriat's theorem to recover non-monotonic preference orderings. In our case, however, this limitation is likely not a major issue, as the two statements in the PSM reflect widely accepted and recognized religious rules, making them relatively uncontroversial. Additionally, the average response to these statements is 7 in the control group, indicating that participants generally agree with them. Moreover, during the 10 constrained rounds, subjects cannot give a score higher than 4 to either statement 1 or statement 2, which supports the assumption that their preferences remain monotonic within the constrained choice sets. We will further verify this assumption by analyzing subjects' rationality across the constrained rounds later on.

Let T_i be a dummy variable that equals to 1 if subject i is randomly assigned to a given treatment group and 0 otherwise. We define the following variables:

$$\mathbf{q^i} = \begin{cases} \mathbf{q_1^{i,0}} & \text{if } T_i = 1 \\ \mathbf{q_0^{i,0}} & \text{if } T_i = 0, \end{cases}$$

and the following linear specification:

$$\mathbf{q^i} = \boldsymbol{\alpha} + \boldsymbol{\beta} T^i + X_i^{'}\mu + \boldsymbol{\eta_i}. \tag{4}$$

Parameter $\boldsymbol{\beta}$ measures the average treatment effect on subjects' attitudes, as reported in a standard Likert scale survey with our two statements. $\boldsymbol{\eta_i} = \{\eta_{i,s}\}_{s\in\{1,2\}}$ is a vector of random variables, X_i a vector of individual-level controls, and $\boldsymbol{\alpha_1} \in \mathbb{R}^2$. Regression (4) confounds the treatment effect on preferences from the treatment effect on implicit prices. We introduce the following additional variables, leveraging the PSM:

$$\mathbf{y^i} = \begin{cases} \arg\max_{\mathbf{q}\in\mathbb{R}^2_+ : \mathbf{q}.\overline{\mathbf{p}}^{\mathbf{0}} \leq 1} u^i(\mathbf{q}) & \text{if } T^i = 1 \\ \mathbf{q_0^{i,0}} & \text{if } T^i = 0 \end{cases}$$

where $\overline{\mathbf{p}}^{\mathbf{0}}$ corresponds to the representative implicit price vector for the control group, and u^i to the utility of subject i over the two statements. When i belongs to the control group, $\mathbf{y^i}$ is equal to i's answer to the survey. When i belongs to the treatment group though, $\mathbf{y^i}$ is equal to the answer that i would have provided if she was maximizing her utility under the representative implicit prices faced by the subjects in the control group. Hence, measuring the treatment effect on $\mathbf{y^i}$ instead of $\mathbf{q^i}$ keeps the treatment effect of implicit prices relatively constant. The associated linear regression is:

$$\boldsymbol{y^i} = \boldsymbol{\alpha_1} + \boldsymbol{\beta_1} T^i + X_i^{'}\mu + \boldsymbol{\epsilon^i}, \tag{5}$$

where $\boldsymbol{\beta_1}$ measures the average treatment effect on preferences, keeping implicit prices relatively fixed, $\boldsymbol{\epsilon^i}$ is a vector of random variables, and $\boldsymbol{\alpha_1} \in \mathbb{R}^2$. Similarly, we define variable

$$\mathbf{x^i} = \begin{cases} \mathbf{q_1^{i,0}} & \text{if } T^i = 1 \\ \arg\max_{\mathbf{q}\in\mathbb{R}^2_+ : \mathbf{q}.\mathbf{p^i} \leq 1} \overline{u}^1(\mathbf{q}) & \text{if } T^i = 0, \end{cases}$$

where $\overline{u}^1$ is the representative utility of the subject in the treatment group. When i belongs to the treatment group, $\mathbf{x^i}$ is equal to i's answer to the survey. When i belongs to the control group though, $\mathbf{x^i}$ is equal to the answer that i would have provided if she was maximizing the representative preferences of the treatment group under her own implicit price constraint. Hence, measuring the treatment effect on $\mathbf{x^i}$ instead of $\mathbf{q^i}$ keeps the effect of preferences relatively constant. In the following regression, $\boldsymbol{\beta_2}$ measure the average treatment effect on implicit prices, keeping preferences relatively fixed:

$$\boldsymbol{x^i} = \boldsymbol{\alpha_2} + \boldsymbol{\beta_2} T^i + X_i^{'}\mu + \boldsymbol{\mu^i}, \tag{6}$$

with $\boldsymbol{\mu^i}$ a vector of random variables, and $\boldsymbol{\alpha_2} \in \mathbb{R}^2$.

Decomposition. Below, we show that in a slightly simplified approach, it is possible to additively decompose $\boldsymbol{\beta}$ into two components. One measuring the treatment effect on preferences, and one measuring the treatment effect on prices. We define the counterfactual $\hat{\mathbf{q}}$ as follows:

$$\hat{\mathbf{q}} = \underset{\mathbf{q} \in \mathbb{R}^2_+ : \mathbf{q}.\overline{\mathbf{p}}^{\mathbf{0}} \leq 1}{\arg\max} \ \overline{u}^1(\mathbf{q}),$$

with $\overline{u}^1$ the representative utility in the treatment group, and $\overline{\mathbf{p}}^{\mathbf{0}}$ the representative implicit price vector in the control group. $\hat{\mathbf{q}}$ represents the hypothetical answer of a respondent maximizing the representative utility function of treated subjects facing the implicit price constraint of the subjects in the control group. We build the following variables,

$$\mathbf{y^i}(\hat{\mathbf{q}}) = \begin{cases} \hat{\mathbf{q}} \text{ if } T^i = 1 \\ \mathbf{q_0^{i,0}} \text{ if } T^i = 0 \end{cases} \quad \text{and } \mathbf{x^i}(\hat{\mathbf{q}}) = \begin{cases} \mathbf{q_1^{i,0}} \text{ if } T^i = 1 \\ \hat{\mathbf{q}} \text{ if } T^i = 0 \end{cases}$$

and deduce the following result:

Fact 1 ***Decomposition.*** *The treatment effect $\boldsymbol{\beta}$ can be additively decomposed into two vectors, $\boldsymbol{\beta} = \boldsymbol{\beta_1}(\hat{\mathbf{q}}) + \boldsymbol{\beta_2}(\hat{\mathbf{q}})$ with $\boldsymbol{\beta_1}(\hat{\mathbf{q}})$ the average treatment effect associated with the estimation of*

$$\boldsymbol{y_i}(\hat{\mathbf{q}}) = \boldsymbol{\alpha_1}(\hat{\mathbf{q}}) + \boldsymbol{\beta_1}(\hat{\mathbf{q}})T_i + X_i^{'}\mu + \boldsymbol{\epsilon_i}(\hat{\mathbf{q}}), \tag{7}$$

and $\boldsymbol{\beta_2}(\hat{\mathbf{q}})$ the average treatment effect associated with the estimation of

$$\boldsymbol{x_i}(\hat{\mathbf{q}}) = \boldsymbol{\alpha_2}(\hat{\mathbf{q}}) + \boldsymbol{\beta_2}(\hat{\mathbf{q}})T_i + X_i^{'}\mu + \boldsymbol{\mu_i}(\hat{\mathbf{q}}), \tag{8}$$

with $\boldsymbol{\mu_i}(\hat{\mathbf{q}})$ and $\boldsymbol{\epsilon_i}(\hat{\mathbf{q}})$ two vectors of i.i.d random variables.

Proof. The proof directly follows from the observation that $\mathbf{y^i}(\hat{\mathbf{q}}) + \mathbf{x^i}(\hat{\mathbf{q}}) = \mathbf{q^i} + \hat{\mathbf{q}}$. ■

Vector $\boldsymbol{\beta_2}(\hat{\mathbf{q}})$ measures the treatment effect on preferences, while $\boldsymbol{\beta_1}(\hat{\mathbf{q}})$ measures the treatment effect on implicit prices. Comparing regression (5) with regression (7) (or regression (6) with regression (8)), the key difference is that in the former case, the counterfactual is unique, while in the latter it is subject-specific. As a result, regression (7) may provide a better estimation of the treatment effect, although $\boldsymbol{\beta_1}$ and $\boldsymbol{\beta_2}$ are less directly comparable to the overall treatment effect $\boldsymbol{\beta}$.

3 Results

Balance and Attrition. Table 2 reports the results of the balance check on those randomly assigned to the conservative and liberal speeches. Differences across treatment and control groups are small in magnitude, and statistically no different from zero, suggesting that the randomization was effective at creating balance. Importantly, we also measured subjects' fasting propensity before treatment and found no statistical differences between treated and untreated subjects.

Rationality. To assess subjects' rationality when responding to the PSM, we computed four indices. First, we calculated the likelihood that a subject would violate the Generalized Axiom of Revealed Preference (GARP). Then, we computed three inconsistency measures: the Critical Cost Efficiency Index (CCEI) from Afriat (1972), the Money Pump Index (MPI) from Echenique, Lee and Shum (2011), and the Houtman and Maks Index.[5] Both the CCEI and the Houtman and Maks Index are among the most prevalent measures of rationality in experimental and empirical studies. The CCEI captures the degree to which subjects' decisions are consistent with utility-maximizing behavior by indicating how much observed choices must be "deflated" to eliminate any GARP violations. The Houtman and Maks Index, meanwhile, identifies the largest subset of a subject's decisions that satisfies GARP. The MPI quantifies the severity of GARP violations by assessing the potential for "money-pumping," or irrational behavior that could lead to exploitable decision patterns. Each of these indices measures rationality on a scale from 0 to 1. Higher scores on the CCEI and Houtman and Maks Index indicate more rational behavior, while higher MPI scores signal greater irrationality.

The descriptive statistics on subjects' rationality are presented in Table 3. Column (1) shows that 36% of subjects exhibit fully rational behavior when completing the PSM. Column (2) reports an average CCEI score of 77%. For comparison, Choi et al. (2014) found an average CCEI score of 88% in a portfolio choice experiment, a setting more typical of consumption choice studies. Column (3) indicates that for 95% of subjects, all GARP violations could be eliminated by dropping at most 3 rounds out of 10 from their data. Furthermore, for over 75% of subjects, dropping just 2 rounds would suffice. This suggests that while the average CCEI score is lower than what is generally observed in consumption choice experiments, the lower score may be driven by a small number of

[5]The Houtman and Maks index is computed using the Gross and Kaiser (1996) algorithm. For an alternative, see, Heufer and Hjertstrand (2015).

rounds with rationality violations. This is consistent with columns (4) and (5), which show that the bounds of the MPI index—used to measure the severity of irrational behavior—are relatively high among subjects who exhibit rationality violations.

Treatment Effects. The impact of the conservative and liberal speeches on attitudes is evaluated using the linear regressions (4), (5), (6), (7), and (8). In all regressions, the treatment variable T^i is either the conservative or the liberal treatment. In all regressions, the vector of individual controls X_i includes age, marital status, and prior education. We cluster standard errors at the individual level.

To run regressions (5), (6), (7), and (8), we first need to estimate subjects' individual utility functions, using their answers to the PSM. Leveraging the dataset $D^i = \{\mathbf{q_r^i}, \mathbf{p_r^i}\}_{r\in\mathcal{R}}$ for each subject $i \in \mathcal{I}$, , we estimate a CES utility u^i through non-linear least square techniques:[6]

$$u^i(\mathbf{q^i}) = \left(a^i {q_1^i}^{\rho^i} + (1-a^i){q_2^i}^{\rho^i}\right)^{1/\rho^i}. \tag{9}$$

Parameter $a^i \in [0,1]$ gives the relative important of answering statement 1 for subject i. Concretely, a subject that only cares about statement 1 will always prioretize answering that statement relative to the other. Parameter ρ^i captures the convexity of subject i's preferences through the elasticity of substitution $\sigma^i = 1/(\rho^i - 1)$.

Given equation (3), we can characterize subject i's implicit price vector $\mathbf{p^i} = (p_1^i, p_2^i)$ as follows:

$$p_1^i = \frac{1}{q_1^{i,0} + q_2^{i,0}\frac{1-a^i}{a^i}\left(\frac{q_1^{i,0}}{q_2^{i,0}}\right)^{1/\sigma^i}} \text{ and } p_2^i = \frac{1 - p_1^i q_1^{i,0}}{q_2^{i,0}} \tag{10}$$

when $q_s^{i,0} \neq 0$ for any $s \in \{1,2\}$. To deal with corner answers, we assume that

$$p_s^i = 10000 \text{ and } p_z^2 = 1/q_z^{i,0} \tag{11}$$

when $q_s^{i,0} = 0$, $q_z^{i,0} \neq 0$, while we dropped the 9 observations such that $q_1^{i,0} = q_2^{i,0} = 0$. The implicit price p_s^i is set to a high value when $q_s^{i,0} = 0$.[7]

Last, in treatment group g, we characterize the representative utility parameters as the parameters that best fit the set of subjects in group g. Formally, $(\overline{a}^g, \overline{\rho}^g)$ solve the following optimization:

$$(\overline{a}^g, \overline{\rho}^g) = \arg\min_{(a,\rho)} - \sum_{i\in g, s\in\{1,2\}} (q_s^{i,0} - \hat{q}_s^0)^2,$$

[6]For alternatives to the NLLS, see, Halevy, Persitz and Zrill (2018).
[7]We chose a 10000 threshold.

where $\hat{\mathbf{q}}^{\mathbf{0}} = (\hat{q}_1^0, \hat{q}_2^0) = \arg\max_{\mathbf{q}\in X}(aq_1^\rho + (1-a)q_2^\rho)^{1/\rho}$. Finally, we characterize $\overline{\mathbf{p}}^{\mathbf{g}}$, the representative implicit price vector in group g, as the price vector under which respondents' average answer in group g maximizes the representative utility of that group under the constraint $\overline{\mathbf{p}}^{\mathbf{g}}.\mathbf{q} \leq 1$:

$$\overline{\mathbf{q}}^{\mathbf{g},\mathbf{0}} = \arg\max_{\mathbf{q}\in\mathbb{R}_+^2} \overline{u}^g(\mathbf{q}) \text{ subject to } \overline{\mathbf{p}}^{\mathbf{g}}.\mathbf{q} \leq 1.$$

From this point, we can compute variables $\mathbf{x^i}$, $\mathbf{y^i}$, $\mathbf{x^i}(\hat{\mathbf{q}})$, $\mathbf{y^i}(\hat{\mathbf{q}})$, and estimate the regressions (5), (6), (7), and (8),

Table 4 gives the estimation of regressions (4), (5), and (6). From columns (1) and (2), the treatment effects on subjects' surveyed attitudes are as expected. Exposure to the conservative speech increases agreement with the statement advocating for fasting during Ramadan (Statement 1) by approximately 2 points. Conversely, it decreases agreement with the statement that supports legitimate reasons to postpone fasting during Ramadan (Statement 2) by about 0.8 point. Exposure to the liberal speech has the opposite effect, decreasing agreement with Statement 1 by around 2 points and increasing agreement with Statement 2 by about 1.8 points.

Are the treatment effects reported in columns (1) and (2) explained by changes in preferences or changes in the implicit prices of attitudes? Strikingly, from columns (3) and (4), the conservative treatment does not affect preferences, as the treatment effect on $\mathbf{y^i}$ is not significant. Changes in the implicit prices of attitudes are driving the treatment effect on surveyed attitudes. At the opposite, the liberal treatment effect on preferences is strong and highly significant. Comparing the results from columns (3) and (4) with the results of columns (1) and (2), it seems that changes in surveyed attitudes are much weaker than changes in preferences. Columns (7) and (8) confirm that the changes in the implicit prices of attitudes tend to partially offset the strong changes in preferences induced by the liberal treatment.

Tables 5 and 6 report the decomposition for the conservative and liberal treatments, respectively. The results are consistent with the patterns highlighted in Table 4. The conservative treatment effect seems to work essentially through the price channel. At the opposite, the liberal treatment has a strong and significant effect on preferences. Changes in implicit prices induced by the liberal treatment tend to partially offset the treatment effect on preferences. The counterbalancing effect implied by changes in implicit prices is strong too. Comparing column (4) to column (2) of Table 6, the subjects in the liberal

treatment would answer that they agree about 2.4 points more with the second statement, provided that the prices of attitudes remained unaffected by the treatment. As these subjects agree only 1.8 points more with that statement. Self-censorship or social pressure might reduce subjects' propensity to report more liberal attitudes, following the treatment.

4 Follow-up Experiment with Petitions to Legislature

From the previous section, we know that the liberal treatment makes subjects' preferences more liberal but increases the constraints they face when expressing liberal attitudes. Conversely, the conservative treatment does not fundamentally change subjects' preferences but decreases the constraints they face when expressing conservative attitudes. Our follow-up design aims to test whether these patterns hold in a high-stakes environment. We combine a high-stakes context with a shredding experiment, as we hypothesize that varying shredding probabilities alter the psychological constraints subjects feel when making decisions. The higher the shredding probability, the lower the psychological constraint on adopting behavior consistent with their preferences.

The follow-up experiment was conducted on the same pool of subjects about ten months after the initial experiment. Participants were asked whether they would be willing to sign a petition to repeal the Ehtram-e-Ramazan Ordinance, which we, the experimenters, would send to the Parliament of Pakistan. They were given two templates, which they could fill out individually in a separate room in sealed envelopes. They were informed that they could leave one or both templates blank.

The first template included the petition's text as shown in Appendix B. The second template included the same text but with a note informing respondents that this petition, if filled, would be shredded with a certain probability. Participants placed the two templates in separate sealed envelopes, which were given to the experimenters. The content of the envelopes was later observed by the experimenters, and the second template was shredded according to the specified probability. Finally, participants were evenly divided into five groups, each associated with a different shredding probability: 1%, 5%, 33%, 66%, and 100%.

Table 7 presents the results. Provided that the shredding probability is 66% or higher, the conservative treatment has a null effect on respondents' likelihood of signing the petition. Conversely, provided that the shredding probability is 66% or higher, the liberal treatment significantly increases the likelihood of signing, from 25% at a 66% shredding

probability to 38% at 100%. Interestingly, the liberal treatment does not decrease the psychological barrier of acting differently from the control when the shredding probability is lower than 33%. This suggests a strong offsetting effect of the treatment on the constraint, beyond what we found in the previous section.

5 Robustness Analysis

Spillover effects. - To test for the existence of spillovers, we use the data to examine how the treatment effects vary with the proportion of treated teachers within a school. Figure A.3 illustrates substantial variation in the fraction of treated teachers across schools. In Table A.2, we reproduce regressions (4), (6), and (5) while controlling for the fraction of treated teachers across schools and the interaction between treatment and this fraction.

First, from column (1), increasing the fraction of respondents exposed to the conservative speech in a given school decreases the agreement with statement 1 in the control group. Are these spillovers explained by changes in preferences or changes in psychological constraints? From columns (3), (4), (5), and (6), it is evident that the spillovers primarily operate through the constraint channel. Respondents in the control group, teaching in schools with more teachers exposed to the conservative speech, feel more constrained in expressing conservative attitudes.

The results are similar for the liberal treatment. From columns (1) and (2), there are no significant spillovers on the surveyed attitudes of the liberal treatment. However, this does not imply the absence of spillovers on subjects' preferences and constraints. From columns (3), (4), (7), and (8), we find no spillovers on preferences. However, respondents in the control group, teaching in schools with more teachers exposed to the liberal speech, tend to feel significantly more constrained when expressing liberal attitudes.

Overall, there appear to be some spillover effects on expressed attitudes, primarily operating through the constraint channel rather than the preferences channel. Both treatments seem to polarize attitudes, indicating similar spillover effects.

Social Desirability. - To measure subjects' propensity to give socially desirable answers, we added three survey questions to our experiments (Crowne and Marlowe (1960)). These questions are the following:

Do you agree with this statement about yourself?

(a) I am never jealous of another person's good fortune Yes/No

(b) I am always a good listener Yes/No

(c) I am never angry, or I have never been angry. Yes/No

Table A.3 reports the regression results when we include three additional controls in the regressions corresponding to subjects' answers to the previous questions. The treatment effects remain unaltered.

6 Conclusion

This paper investigates whether individuals' surveyed attitudes genuinely reflect their true preferences, especially on sensitive topics like politics and religion. To tackle this, we introduce the Priced Survey Methodology (PSM), a novel approach designed to disentangle true preferences from the perceived costs of expressing them. The PSM involves presenting subjects with the same survey under a series of constrained choice sets, mimicking standard choice environments, and applying standard rationality axioms to their responses to reveal their underlying preferences.

Using the PSM, we demonstrate that changes in surveyed attitudes can be decomposed into changes in underlying preferences and changes in the perceived costs of expressing these preferences. This decomposition is crucial for understanding whether shifts in attitudes are due to genuine changes in preferences or to alterations in the social or psychological costs associated with expressing those preferences.

We deployed our experimental methodology in a field experiment in Pakistan, conducting a randomized controlled trial with civil servants. Through our treatments, we explored the impact of religious speeches by prominent imams—conservative and liberal—on attitudes. Our findings reveal that conservative speeches increase the cost of expressing liberal attitudes without significantly altering underlying preferences, while liberal speeches significantly liberalize preferences but also increase the perceived cost of expressing them.

One important question remains unanswered in this paper: What factors drive the perceived costs of expressing certain attitudes? Our approach treats these costs as exogenous, inferred from subjects' choices. However, this abstraction leaves aside the exact mechanisms that influence these costs. Future research can extend our approach by modeling the endogenous determination of these perceived costs, considering the interplay between individual preferences, social influences, and institutional factors. Such an extension would

provide a more comprehensive understanding of how social norms evolve and persist, and how interventions can effectively shape public attitudes.

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Tables and Figures

Table 1: Round to Choice Sets mapping

Round r	Price Vector $\mathbf{p^r}$	Budget R^r	Choice set $\mathcal{B}^{\mathbf{r}}$
1	(1,1)	1	$\{(1,0),(0,1)\}$
2	(1,1)	2	$\{(2,0),(1,1),(0,2)\}$
3	(2, 1)	2	$\{(1,0),(0,2)\}$
4	(1, 2)	2	$\{(2,0),(0,1)\}$
5	(1,1)	4	$\{(4,0),(3,1),\ldots,(0,4)\}$
6	(2, 1)	4	$\{(2,0),(1,2),(0,4)\}$
7	(1, 2)	4	$\{(4,0),(2,1),(0,2)\}$
8	(3, 1)	4	$\{(1,1),(0,4)\}$
9	(1, 3)	4	$\{(4,0),(1,1)\}$
10	(4, 1)	4	$\{(1,0),(0,4)\}$

Table 2: Balance test

	(1) Years of Education	(2) Married	(3) Specialization in Languages	(4) Specialization in Sciences	(5) Specialization in Social Sciences	(6) Specialization in Teaching	(7) Teaching Experience	(8) Teaching Hours (avg.)	(9) Class Size	(10) Gender	(11) Age
Conservative	-0.114	-0.013	0.059	-0.018	-0.004	-0.040	0.100	0.760*	0.425	-0.003	-0.360
	(0.192)	(0.062)	(0.044)	(0.009)	(0.030)	(0.055)	(0.407)	(0.375)	(2.593)	(0.055)	(0.768)
Liberal	-0.037	-0.034	0.075	0.012	-0.028	-0.026	-0.362	0.201	1.282	0.068	0.565
	(0.195)	(0.061)	(0.043)	(0.011)	(0.029)	(0.056)	(0.413)	(0.351)	(2.696)	(0.058)	(0.787)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	598	598	598	598	598	598	598	598	598	598	598

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, in (6) — binary variable equal to 1 if specialization in teaching and 0 otherwise, in (7) — years of teaching, in (8) — average hours of teaching, in (9) - the number of students per class, in (10) — binary variable equal to 1 if teacher is a female, in (11) the age of the teacher. The full sample includes 201 subjects in the control group, 202 in the fundamentalist treatment group and 200 in the liberal treatment group. As demonstrated in Section 2 subjects whose Likert scale answers correspond to corner solutions of the maximization problem had to be excluded in order to run the decomposition. This represented 100 observations out of the 604 initial observations. The sample remains balanced. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Summary Statistics: Rationality with PSM data

	(1) GARP	(2) CCEI	(3) HM Index	(4) min(MPI)	(5) max(MPI)
Mean	0.36	0.77	0.89	0.10	0.35
Std	0.48	0.24	0.11	0.12	0.29
p5	0.00	0.50	0.70	0.00	0.00
p25	0.00	0.50	0.80	0.00	0.00
p50	0.00	0.75	0.90	0.07	0.38
p95	1.00	1.00	1.00	0.33	0.67

Notes: We restrict the data to the 10 first rounds of the PSM for all subjects. Column 1 reports summary statistics on a variable equal to 0 if GARP is violated, and 1 otherwise. Column 2 reports summary statistics on the CCEI index (Afriat (1972)). Column 3 reports summary statistics on the Houtman and Maks Index. Columns 4 and 5 report summary statistics on the bounds of the MPI index (Echenique, Lee and Shum (2011)).

Table 4: Impact of the Religious Speeches on Attitudes

	(1) q_1^0	(2) q_2^0	(3) y_1	(4) y_2	(5) x_1	(6) x_2	(7) x_1	(8) x_2
conservative	1.844***	-0.795***	-0.158	0.212	1.361***	-0.715**		
	(0.221)	(0.281)	(0.208)	(0.232)	(0.203)	(0.337)		
liberal	-1.981***	1.758***	-5.392***	5.622***			1.293***	1.407***
	(0.222)	(0.282)	(0.209)	(0.234)			(0.321)	(0.317)
Constant	6.274***	7.225***	6.469***	4.472***	7.674***	6.971***	3.994	10.294***
	(1.507)	(1.916)	(1.421)	(1.586)	(1.588)	(2.640)	(2.852)	(2.821)
Observations	594	594	594	594	396	396	391	391

We restrict the data to the 10 first rounds of the PSM for all subjects. Robust standard errors in parentheses. Columns (1) and (2) correspond to the estimation of regression (4). Columns (3) and (4) to regression (5), and columns (5) and (6) to regression (6). Controls include Years of Education, Marital status, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Impact of the Conservative Speech: Decomposition

	(1) q_1^0	(2) q_2^0	(3) y_1	(4) y_2	(5) x_1	(6) x_2
Conservative	1.834***	-0.753***	0.317*	-0.675***	1.517***	-0.078
	(0.185)	(0.277)	(0.171)	(0.222)	(0.070)	(0.164)
Observations	396	396	396	396	396	396

Robust standard errors in parentheses. Columns (1) and (2) correspond to the estimation of regression (4). Columns (3) and (4) to regression (7), and columns (5) and (6) to regression (8). Controls include Years of Education, Marital status, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Impact of the Liberal Speech: Decomposition

	(1) q_1^0	(2) q_2^0	(3) y_1	(4) y_2	(5) x_1	(6) x_2
Liberal	-1.958***	1.760***	-1.375***	2.407***	-0.583***	-0.647***
	(0.265)	(0.305)	(0.173)	(0.224)	(0.200)	(0.209)
Observations	391	391	391	391	391	391

Robust standard errors in parentheses. Columns (1) and (2) correspond to the estimation of regression (4). Columns (3) and (4) to regression (7), and columns (5) and (6) to regression (8). Controls include Years of Education, Marital status, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Follow-up Results

	(1) Shredded 0%	(2) Shredded 5%	(3) Shredded 10%	(4) Shredded 33%	(5) Shredded 66%	(6) Shredded 100%
Liberal	0.061	0.006	0.003	0.252**	0.254**	0.382***
	(0.047)	(0.105)	(0.097)	(0.099)	(0.115)	(0.121)
Conservative	-0.345***	-0.468***	-0.328***	-0.271***	0.034	0.031
	(0.047)	(0.122)	(0.099)	(0.100)	(0.107)	(0.104)
Constant	0.235	0.692	-0.335	1.230**	-0.332	0.719
	(0.320)	(1.199)	(0.634)	(0.619)	(0.669)	(0.767)
Observations	607	121	121	121	122	122
R^2	0.146	0.208	0.218	0.371	0.152	0.146

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 0%, 1%, 5%, 33%, 66% and 100%. Liberal is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from the liberal Imam. Conservative is a dummy variable equal to 1 when the individual is randomly assigned to take a lecture from the relatively more conservative 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 1: Choice Sets Across Rounds

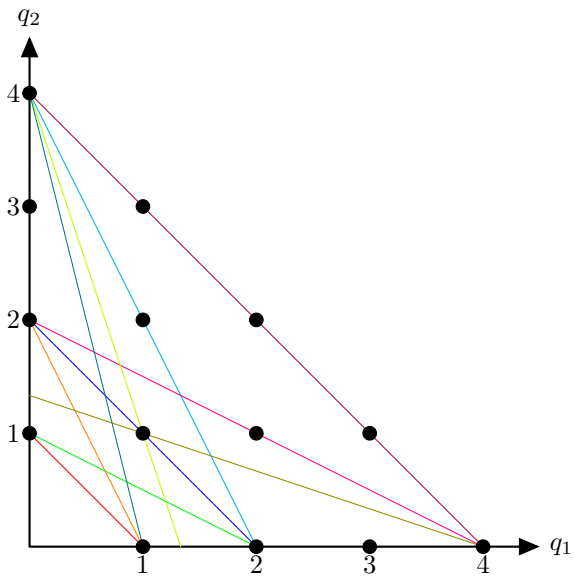
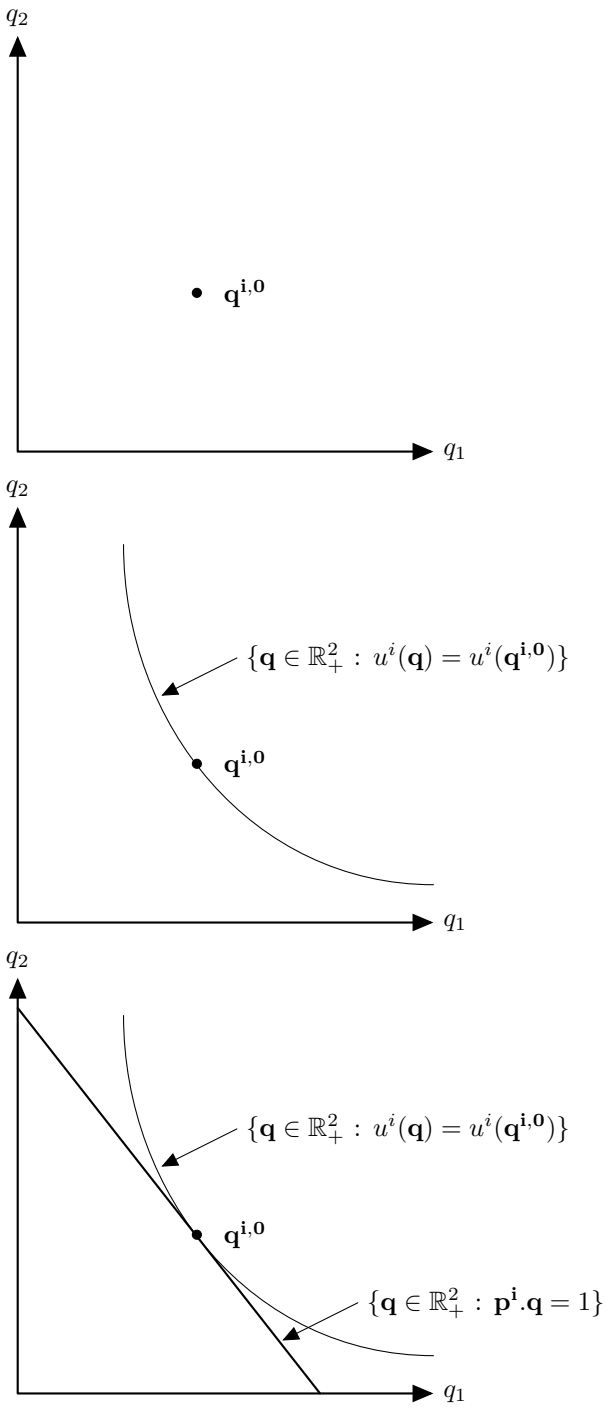


Figure 2: Implicit Constraints in Survey Answers.



Online Appendices to "Attitudes as Assets"

A Additional Tables and Figures

Figure A.1: Religious Speeches with English Subtitles



(a) Conservative Speech



(b) Liberal Speech

Panel A provides a screen shot from the conservative speech presented to the civil servants assigned the conservative treatment. Full conservative speech by Moulana Tariq Jamil can be accessed HERE. Panel B provides a similar video for liberal speech. Full liberal speech by Moulana Javed Ghamdi can be accessed HERE. The placebo group receives a similar length video description inflation in Pakistan. Full placebo message by Dr Shaheen Naseer can be accessed HERE.

Figure A.2: Experimental Methodology

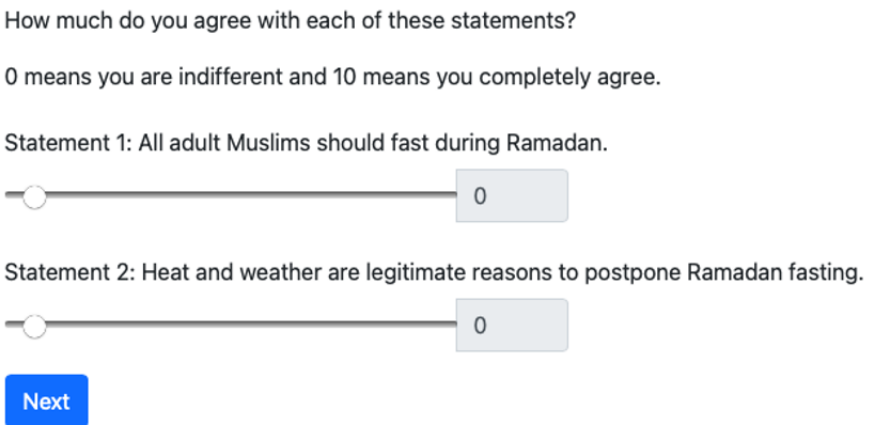
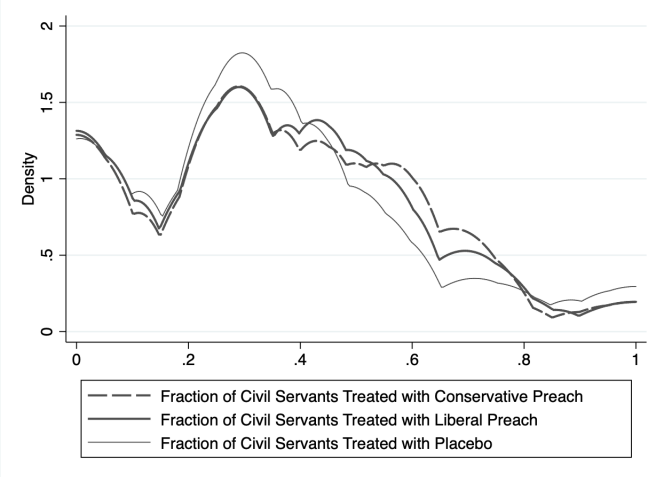


Figure A.3: Distributions of Fraction of Civil Servants Treated



The figure plots the fraction of treated teachers within a school by the liberal, conservative and placebo speech group.

Table A.1: Impact of the Religious Speeches on Attitudes

	(1) q_1^0	(2) q_2^0	(3) y_1	(4) y_2	(5) x_1	(6) x_2	(7) x_1	(8) x_2
Conservative	1.810***	-0.817***	-0.531***	0.547***	1.150***	-0.474		
	(0.219)	(0.279)	(0.158)	(0.199)	(0.210)	(0.318)		
liberal	-2.016***	1.736***	-3.960***	4.550***			-1.124***	1.220***
	(0.221)	(0.281)	(0.159)	(0.200)			(0.313)	(0.362)
Observations	598	598	598	598	400	400	395	395

The 17 rounds of the PSM are considered. Robust standard errors in parentheses. Columns (1) and (2) correspond to the estimation of regression (4). Columns (3) and (4) to regression (5), and columns (5), (6), (7), and (8) to regression (6). Columns (1), (2), (3), and (4) use the full sample. Since x_s $s \in \{1, 2\}$ differ in the two treatment groups, columns (5) and (6) use only respondents in the conservative and control group, while columns (7) and (8) use respondents in the liberal and control group. Controls include Years of Education, Marital status, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.2: Impact of Religious Speeches and Spillover Effects

	(1) q_1^0	(2) q_2^0	(3) y_1	(4) y_2	(5) x_1	(6) x_2	(7) x_1	(8) x_2
Conservative	1.953***	-0.951	-0.447	0.609	1.401***	-0.911		
	(0.482)	(0.619)	(0.456)	(0.510)	(0.514)	(0.858)		
Frac. Conservative	-0.942*	0.156	-0.830	0.672	-0.973*	0.953		
	(0.564)	(0.724)	(0.533)	(0.596)	(0.553)	(0.922)		
Frac. Conservative	0.365	0.231	1.016	-1.138	0.566	-0.291		
x Conservative	(0.913)	(1.172)	(0.863)	(0.966)	(0.821)	(1.370)		
Liberal	-2.070***	1.554**	-5.791***	6.265***			1.738**	1.637**
	(0.474)	(0.608)	(0.447)	(0.501)			(0.791)	(0.783)
Frac. Liberal	0.090	0.565	0.341	0.209			1.759**	0.947
	(0.574)	(0.736)	(0.542)	(0.606)			(0.894)	(0.886)
Frac. Liberal	0.145	-0.017	0.551	-1.339			-1.705	-0.960
x Liberal	(0.910)	(1.167)	(0.859)	(0.962)			(1.296)	(1.285)
Observations	594	594	594	594	396	396	391	391

The 11 first rounds of the PSM are considered for all subjects. Robust standard errors in parentheses. Columns (1) and (2) correspond to the estimation of regression (4). Columns (3) and (4) to regression (5), and columns (5) and (6) to regression (6). Controls include Years of Education, Marital status, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, and Age. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.3: Regression Results with Marlowe-Crowne controls

	(1) q_1^0	(2) q_2^0	(3) y_1	(4) y_2	(5) x_1	(6) x_2	(7) x_1	(8) x_2
conservative	1.847***	-0.765***	-0.155	0.207	1.372***	-0.689**		
	(0.220)	(0.281)	(0.208)	(0.233)	(0.203)	(0.337)		
liberal	-1.979***	1.730***	-5.398***	5.619***			1.295***	1.368***
	(0.221)	(0.283)	(0.210)	(0.234)			(0.323)	(0.319)
Constant	6.417***	7.630***	6.649***	4.408***	7.864***	7.038***	3.975	10.809***
	(1.513)	(1.934)	(1.433)	(1.602)	(1.606)	(2.672)	(2.892)	(2.856)
Observations	598	598	598	598	400	400	395	395

The 11 first rounds of the PSM are considered for all subjects. Robust standard errors in parentheses. Columns (1) and (2) correspond to the estimation of regression (4). Columns (3) and (4) to regression (5), and columns (5), (6), (7), and (8) to regression (6). Controls include Years of Education, Marital status, Specialization in Languages, Specialization in Sciences, Specialization in Social Sciences, Specialization in Teaching, Teaching Experience, Teaching Hours (average), Class size, Gender, Age, and three dummy variables that are equal to 1 when the subject answers "yes" to the corresponding question from Crowne and Marlowe (1960): Do you agree with this statement about yourself? I am never jealous of another person's good fortune (Yes/No); (b) I am always a good listener (Yes/No); (c) I am never angry, or I have never been angry. (Yes/No). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

B Follow-Up: Survey Instrument and Experimental Details

B.1 Ehtram-e-Ramazan Ordinance (Law Imprisoning for Public Eating in the month of Ramadan)

The "Ehtram-e-Ramazan Ordinance" was enacted in 1981 and it is as follows: "Prohibition of eating in public places. —

1. No person who, according to the tenets of Islam, is under an obligation to fast shall eat, drink or smoke in a public place during fasting hours in the month of Ramazan.

2. Whoever contravenes the provisions of sub-section (1) shall be punishable with simple imprisonment for a term which may extend to three months, or with fine or with both."

Would you sign a petition with your name that we **WILL** send to the Parliament of Pakistan to repeal this ordinance baring public eating in the month of Ramadan in Pakistan?

☐ Yes

☐ No

If, Yes, Please sign attached petition.

B.2 Petition Template Presented to all civil servants

Please fill this in a separate room individually. Please also note that we will actually send this petition to the National Assembly of Pakistan, so feel free to leave one or both petitions blank if you wish not to send one or both of these petitions.

B.3 Ramadan Petition (without shredding message)

I, ———— (enter full name), daughter/son of ———, am signing this petition to request repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to make dowry a criminal offense pertaining imprisonment for up to three years.

Yours Truly,

————-

CNIC:

Your Full Name:

B.4 With shredding petitions

Tell Parliament: "Ehtram-e-Ramazan Ordinance"

I, ———— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisonment for public eating in the month of Ramadan.

Yours Truly,

This petition has **1% probability of being shredded after you sign it** and hence 99% probability it will be sent to the parliament for consideration

B.5 With shredding petitions

Tell Parliament: Abolish the "Ehtram-e-Ramazan Ordinance (Law Imprisoning for Public Eating in the month of Ramadan)

I, ———— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisonment for public eating in the month of Ramadan.

Yours Truly,

————- This petition has **5% probability of being shredded after you sign it** and hence 95% probability it will be sent to the parliament for consideration.

B.6 With shredding petitions

Tell Parliament: "Ehtram-e-Ramazan Ordinance"

I, ———— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisonment for public eating in the month of Ramadan.

Yours Truly,

This petition has **33% probability of being shredded after you sign it** and hence 67% probability it will be sent to the parliament for consideration

B.7 With shredding petitions

Tell Parliament: "Ehtram-e-Ramazan Ordinance"

I, ———— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisonment for public eating in the month of Ramadan.

Yours Truly,

This petition has **66% probability of being shredded after you sign it** and hence 34% probability it will be sent to the parliament for consideration.

B.8 With shredding petitions

Tell Parliament: "Ehtram-e-Ramazan Ordinance"

I, ———— (enter full name), daughter of ———, am signing this petition to request the repeal of "Ehtram-e-Ramazan Ordinance".

I hereby grant permission to send this petition to demand from the National Assembly and Senate of Pakistan to repeal the above law pertaining imprisonment for public eating in the month of Ramadan.

Yours Truly,

This petition has **100% probability of being shredded after you sign it** and hence 0% probability it will be sent to the parliament for consideration.

B.9 Marlowe-Crowne (too-good-to-be-true-statements)

Do you agree with this statement about yourself?

(a) I am never jealous of another person's good fortune Yes/No

(b) I am always a good listener Yes/No

(c) I am never angry, or I have never been angry. Yes/No