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The political economy of energy access: Survey evidence from India on state intervention and public opinion[☆]



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ABSTRACT

In India, where energy access is limited, how does the public react to the government's inability to provide citizens with basic energy services, such as electricity and clean cooking fuel? We answer this question using a survey conducted in two rural villages of Uttar Pradesh. First, we examine the association between a respondent's opinion on state intervention and policy failure. Specifically, we focus on whether people who believe in state intervention are likely to have lower levels of satisfaction with the government's energy access policies. Second, we examine the link between policy failure and the likelihood that people consider a political candidate's energy views in voting. We find that people's preference for government intervention has a negative effect on satisfaction levels with government policies, and that people who blame the government for policy failures are less likely to take a political candidate's energy policies into account when voting.

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1. Introduction

India's energy situation is highly problematic; nowhere is the problem as severe as in the large states of North India such as Uttar Pradesh. About 304 million people do not have any access to electricity in the country, and 815 million Indians rely on traditional biomass and do not have access to modern cooking fuels [26]. One particularly striking aspect about India's energy woes is that they exist, especially in rural areas. As Palit et al. (2014: 238) [39] put it, "[d]espite conscious efforts of the central and provincial governments since the start of the planning process in 1951, past efforts in terms of both policies and programmes have achieved only marginal success."¹ So how do Indians interpret such policy failure? Do they blame the government for the poor situation?

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¹ These caveats may not apply to the advances made in the use of solar photovoltaic lighting systems, solar energy programs, and off-grid rural electrification in the country. Borah, Palit, and Mahapatra [11], Palit [37], Palit and Chaurey [38] provide excellent discussions on these programs.

Answering these questions is important for scholarship on energy policy. Given the major role of the Indian government in providing electricity to rural India, it is important to identify the determinants of public opinion in the field of energy policy. In other words, we want to know how the public reacts to the Indian government's efforts to provide the citizens with basic energy services.

We answer the above questions using a survey conducted in two villages in the state of Uttar Pradesh in February–March 2013. The main aim of the survey was to examine the preferences of Indian villagers about different energy sources. For the purposes of this paper, we focus on the respondents' reaction to policy failure. Specifically, we proxy the respondents' reaction to policy breakdown with satisfaction levels about the government's provision of different types of energy. The survey was carried out in rural villages where residents typically face severe electricity shortages, and we use the sample only to test our hypotheses and do not claim representativeness with the larger population of the country.

First, we stress the respondent's pre-existing beliefs about the state's intervention in the free market to explain the variation in these satisfaction levels. In the Indian context, policy debates often revolve around the role of the state in promoting development, and there is a sharp ideological cleavage between supporters and opponents of aggressive state policy [18,9]. We claim that people who prefer the state to provide energy access blame the government for not doing enough. Unlike their counterparts who favor the free

market, they do not blame infrastructure problems or exogenous market factors in the event of policy failure. They expect the government to correct market failures and blame it when they have unreliable energy access.

Second, we argue that people who blame the government for failures to provide energy access are more likely not to take a candidate's proposals on energy into account when voting. They treat such information as cheap talk and feel that policy failures by the government are likely to continue, regardless of the candidate's promises [14].² We investigate this issue because, in a democratic setting, voting is the most important channel through which ordinary citizens can influence policy and promote the provision of public goods [1]. Our goal is to understand what types of voters are the most likely to express their preference and care about energy policy as a development issue.

Our empirical results support both hypotheses. A person who prefers state intervention has 5.8% lower satisfaction levels with the government's energy policy, even after controlling for overall satisfaction with energy access, than someone who does not prefer state intervention. We also find that people who blame the government for policy failures are less likely to consider a political candidate's proposals on energy during an election. Specifically, when a person's dissatisfaction with the government for policy failures moves from the first quartile (25th percentile) to the third quartile (75th percentile), then the probability that she/he will consider a candidate's energy proposals decreases by 8 percentage points (holding his/her satisfaction with energy access, belief in the market and trust in politics at mean levels).

The small sample size notwithstanding, the study suggests potential policy implications. To the extent that a government implements failing energy policies, our evidence suggests, people simply tune out of the issue and ignore any electoral promises and campaigning on the subject. This negative reaction may in turn reduce political competition on policies and programs for improved energy access, encouraging politicians to continue making empty promises, such as the provision of free and reliable electricity for everyone. Indeed, when we did our fieldwork in the study villages and other areas of rural Uttar Pradesh, several villagers told us that they have little interest in electoral promises of improved electricity supply because of their apparent non-credibility. As a result, we may need a change in the nature of mass opinion to improve energy access for rural households. Our study is focused on the testing of hypotheses related to state intervention and policy failure, and policy failure and voting. The extension and interpretation of these findings to the state of Uttar Pradesh or India more generally will require further research.

The problem of poor energy access is not confined to India. Energy infrastructures are largely inefficient across many developing countries [6,50]. Our study sheds light on the demand side for policy intervention in a developing country with democratic institutions. This is particularly important because electoral pressure is a source of potential policy change [29]. Of course, India may be different in other fundamental ways from other developing countries, but we believe that the importance of people's expectations from the state is at the heart of policymaking across borders.

2. Energy access in India and Uttar Pradesh

Access to reliable and good quality energy sources remains a problem in many developing countries. This is especially true in

India, where one-third of the population remains without access to electricity [22] and three-fourths of the population use firewood as their main fuel for cooking [36]. The situation is particularly dire in Uttar Pradesh, where less than 24% of the rural households have been electrified [22]. For the year 2014–15, the Central Electricity Authority identified a gap of nearly 15% between electricity capacity and projected demand in the state [13]. In rural Uttar Pradesh, firewood and dung account for almost 90% of the cooking fuels, and Liquefied Petroleum Gas (LPG) for cooking has not yet made inroads in Uttar Pradesh villages [15].

There are some government programs in India that have attempted to improve electricity access in rural parts of the country, most prominently the Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), which aims to build rural electricity infrastructure across the country. However, earlier policies have failed to provide adequate and reliable electricity to rural households [41,46], and even the more recent RGGVY, which only focuses on grid extension, does not address the reliability of electricity supply or constitute the complete electrification of villages.³

There are a number of reasons why many of the earlier government policies have not delivered on their promises. As several authors point out, many of the policies were not focused on rural expansion,⁴ did not possess an institutional facet, were not effective with their delivery, faced infrastructure problems, or had inadequate distribution mechanisms [25,4,44,5]. In the case of Uttar Pradesh, the State Electricity Board has historically faced problems related to the high costs in buying electricity from neighboring states, large subsidies to the agricultural sector in the region [3], and poor maintenance of the infrastructure [23]. Politicians routinely make tall promises about the provision of electricity (especially during election periods), and there is considerable patronage politics surrounding the power sector in Uttar Pradesh and India at large [27,17,34].

While programs like RGGVY have focused on electricity, the National Biomass Cookstoves Initiative and the National Rural LPG Distribution Scheme have revolved around providing reliable access to cooking fuel [39, pp. 245–246]. These initiatives were introduced in 2009 and plan to distribute improved cookstoves to more than two million households by 2017 [32]. The achievement of these goals faces some hurdles, however, since past programs have lacked focus and effectiveness [5]. Also, subsidies provided for LPG and kerosene use have mainly benefited higher income households that live in urban areas [48,43]. An earlier initiative in 1993 that allowed private companies to supply LPG to rural households in the country was not successful because of state subsidies [2]. Access to clean cooking energy has also suffered from infrastructure problems and weak distribution mechanisms.

To summarize, energy access in rural India, with respect to both electricity and cooking, is poor and these policy failures can be traced back to challenges faced by the government. These policy failures may be due to the limited attention paid to energy access issues in rural areas by the different governments, both federal and state. While the focus on the reasons for policy failure is useful, an important aspect missed by studies on energy access in India is the impact these policy failures have had on the rural population, especially their attitudes regarding the government and their vote choice.

² Our fieldwork in the area has suggested that rural voters in the area saw the candidate's talk as such. Many longer open-ended interviews suggested that people were frustrated with politicians and dissatisfied with their efforts to improve energy access.

³ For data on the RGGVY's achievements, see state-wise reports on the official website at <http://rggvvy.gov.in/rggvvy/rggvvyportal/statewisesummary.jsp> (accessed 28.04.15).

⁴ RGGVY, which does focus on rural electrification, is an important exception.

3. Theory

What shapes the opinion of Indian villagers about the government's energy policy? Given the Indian government's stated responsibility to provide reliable energy to the public in the world's largest democracy [42], it is important to examine the determinants of public opinion in the domain of energy policy. Specifically, we aim to understand the reactions of the public in the event of a policy failure, and who blames the Indian government when it does not provide satisfactory access to energy sources.

3.1. Foundations

The arguments we advance are based on political economy theories of energy poverty. From the political perspective, energy access can be thought of as an accountability issue. Theories of regulatory capture suggest that issue areas such as energy policy are frequently captured by special interests [49,40,28,16]. While energy planners and regulators are supposed to serve the interests of the people, in practice vested interests often exert a significant influence on their decisions. According to these theories, policy formulation often fails to reflect the interests of marginalized and politically weak groups. Indeed, according to Bazilian et al. [7], governance is a key obstacle to eradicating energy poverty, and Sovacool [47] lists regulatory governance as a key research question for social scientists in the field of energy.

Our analysis engages this line of research by focusing on public reactions. Ultimately, regulatory capture and other related governance failures reflect a lack of political accountability [21,20,1,10,45]. If people believe that they are unable to influence politicians through voting and public protest, then the accountability mechanism is broken. Therefore, the legitimacy of political institutions is an essential component of accountability for avoiding regulatory capture. In the case of energy poverty, we can test hypotheses about the relationship between people's fundamental beliefs and their views of government performance, along with the role of energy access in voting behavior.

3.2. Hypotheses

India has a long history of state intervention [33], and basic energy services are no exception [44,43]. To explain variation in people's satisfaction of the Indian government's energy policy, we emphasize pre-existing beliefs about the relationship between the state and markets. If people have a preference for free markets compared to strong state intervention, they are less likely to blame a government for weak policies to promote energy access. Instead, they could attribute the problem to the high price of energy and the difficulty of delivering it to their village. They might not expect high levels of efficiency from government policy and we expect such people not to attribute India's energy access problems to the government. If many rural communities and social groups do not have access to basic energy services, this reflects fundamental market forces such as the cost of energy, the difficulty of supplying such energy to remote localities, and rural customers' weak ability to pay.

However, if people support state intervention, they expect their government to implement effective policies that guarantee energy access to rural dwellers and an effective delivery mechanism at an affordable price, and they blame the government when they do not gain access to sufficient energy for their basic needs. When such people live in rural India, they do not tend to blame cost of energy or the difficulty of supplying it to remote areas. For them, the Indian government may favor urban over rural localities, or prefer providing energy to other rural areas in the country based on political considerations [8].

Hypothesis 1. [State intervention and policy failure] In rural India, people who believe in the merits of state intervention are more likely to blame the government for policy failure than their counterparts who support free markets.

We next investigate the effect of dissatisfaction with government energy policy on voting behavior. We argue that dissatisfaction with government energy policy reduces people's interest in energy access as an electoral issue, further deteriorating the status quo. Specifically, we expect people who blame the government for policy failures to influence their voting preferences. In general, people who both blame and do not blame the government for policy failures are actively involved in the voting process. In fact, more than 95% of the respondents in our sample reported voting in the last state's election in 2012.⁵ This high number partly reflects the fact that we only interviewed household heads, but it may also reflect some social desirability bias in the responses: some people may be reporting voting even if they actually did not. In any case, for the purposes of hypothesis testing for social science, a sample that has many people voting is useful. At the same time, only 63% of the respondents in our sample take a candidate's proposals on energy into account.

Our theoretical prediction is built on the following argument. When people blame the government for policy failures and have little trust in the ability of the elites to improve energy access, they do not expect the policies of the government to change depending on the specific party in power. This kind of deep distrust does not depend on the identity of the party, as the people believe that politicians and government officials are not trustworthy. Hence, they do not see the need to pay attention to a candidate's energy proposal during an election. Such proposals may be seen as part of the campaign process and such people do not expect the government to deliver on its electoral promises. Hence in an environment characterized by persistent policy failure, citizens have little reason to consider a candidate's energy policy preferences. Since they believe the government to be ineffective and incapable of solving energy access problems, a political candidate's policy views are but cheap talk.

Hypothesis 2. [Policy failure and voting] In rural India, people who blame the government for policy failures are less likely to consider a political candidate's energy views in voting.

This line of argument is rooted in the literature on issue specific voting [35], which contrasts with the Columbia and Michigan schools that emphasize groups and party identification, respectively [30,12]. The issue at hand is a political candidate's proposed policy on energy if he or she comes into power. However, we show that there is significant variation in people who pay attention to a candidate's proposals, and argue that those who are dissatisfied with the government tend to place lower emphasis on such future policy claims.

4. Research design

We test the above hypotheses with a survey conducted in the Indian villages of Toni and Chitte in Shahjahanpur district in the state of Uttar Pradesh in India. By our count, the number of households in the survey area was approximately 700 during the time of the survey. This setting is useful since Uttar Pradesh is the most populous state in the country with a population of nearly 200 million [22], and it is politically the most important state in the country

⁵ Overall, voter turnout in Shahjahanpur district in the 2012 State Assembly elections were 66%, well in excess of the state average of 60% [19, pp. 80–81]. The discrepancy results partly from our focus on household heads and possibly partly from over-reporting of voting by the respondents.

[51]. In addition, this is a fitting venue to study energy preferences of rural Indian residents since Uttar Pradesh faces acute electricity shortages with many areas still unconnected to the national electricity grid. However, we do not claim representativeness to the larger Indian population. Instead, we use this survey to test hypotheses on state intervention and policy failure, and on policy failure and voting behavior.

We selected the two villages both for substantive and practical reasons. Substantively, we requested that our survey team identify villages that have approximately the same level of energy access as other areas of rural India. These two villages had a 70% electrification rate, most villagers relied on firewood but LPG was in principle available, and most households spent at least some money on kerosene on a monthly basis. We also made sure that the two chosen villages were nearby to avoid any issues with splitting the enumerator team into two. This allowed one of us to be present for many of the interviews during the beginning of the project, enhancing our ability to verify data quality and proper conduct of the survey. While we did not participate in all of the surveys, we spent enough time in the field to verify that the enumerators were properly trained and capable of conducting the survey research according to our instructions.

To be sure, we have to emphasize that these two villages do not allow us to offer representative descriptions of rural Uttar Pradesh. In this state, rural electrification rates are generally much lower. According to the 2011 Census of India [22], for example, only 24% of rural households were electrified. While the situation continues to improve, if perhaps slowly, thanks to RGGVY, we recognize that our study villages have higher electrification rates than most villages in the state. Therefore, future studies along our lines should study both more and less electrified areas to offer a more comprehensive description of the realities of energy access in Uttar Pradesh and rural areas of other states.

The survey involved asking respondents about their preferences about different energy sources, their satisfaction levels with the government in providing them, and collecting demographic information about the individual and household. We focus on the energy preferences of the respondents and examine the role of the state, policy failure and voting behavior in the realm of energy provision. The survey was conducted by MORSEL, a company that specializes in social science survey research in India, and especially in rural Uttar Pradesh. This company has extensive experience with social science research, including several successful large rural energy surveys. Our enumerators had previous experience with rural energy surveys and we verified in the training that they were capable of posing the questions properly. This survey was conducted in February–March 2013, and included a total of 401 respondents across the two villages. The respondents were randomly chosen from a list of all the households constructed by the survey team. Each household was chosen with the same probability and we deliberately avoided purposive sampling because we wanted to interview a typical cross-section of the village population without conditioning on household characteristics.

There is considerable variation in age, education, caste, and religion among the respondents. The mean age of the respondents was around 41 years, had nearly 5 years of schooling on average, and around 85% of the respondents were married. In addition, the 401 respondents were distributed among 53 castes and 4 major religions. About 70% of the households were already electrified at the time of the survey, and the average monthly household income was in the range of 2000–3000 rupees. The majority of the respondents were satisfied to some extent with the availability of LPG, kerosene, firewood and dung, but were very dissatisfied with the availability of biogas and charcoal. There is not much variation in the gender of the respondents and only around 7% of the respondents were women. This is because it is hard to interview female respondents

without the presence of a male household member in India, who may influence the respondent's choices to questions on the survey.

The estimation equation for Hypothesis 1 on state intervention and policy failure is:

$$Y1_{ij} = \beta_0 + \beta_1 \cdot \text{GovernmentIntervention}_{ij} + \beta_2 \cdot X_{ij} + \alpha_j + \epsilon_{ij}, \quad (1)$$

where $Y1_{ij}$ is a measure of respondent i 's satisfaction level with the government in providing energy access and who resides in village j , $\text{GovernmentIntervention}_{ij}$ is a binary indicator variable about respondent i 's preference for government intervention in the free market, and X_{ij} is a vector of control variables including education levels, trust in politics, monthly income, and satisfaction with access to different types of energy sources. These variables are discussed in greater depth in the following section. Lastly, α_j denotes village fixed effects and ϵ_{ij} is the error term. To verify that the linearity assumptions do not cause bias, we also replicated the analysis with an ordered logistic regression. The results remain unchanged.

The estimation equation for Hypothesis 2 on policy failure and voting is:

$$\text{Prob}(Y2_{ij}) = \gamma_0 + \gamma_1 \cdot \text{DissatisfactionLevel}_{ij} + \gamma_2 \cdot Z_{ij} + \psi_j + \delta_{ij}, \quad (2)$$

where $Y2_{ij}$ is an indicator of whether respondent i from village j takes into account a candidate's proposals on household energy when voting. $\text{DissatisfactionLevel}_{ij}$ is a measure of the respondent i 's level of dissatisfaction with the government in providing energy access who lives in village j , and Z_{ij} is a vector of control variables including energy access satisfaction, belief in the free market and trust in politics. Lastly, ψ_j are village fixed effects and δ_{ij} is the error term. We estimate the first equation with standard ordinary least squares (OLS), while the second equation is estimated with a probit model using robust standard errors in all regressions.⁶

4.1. Dependent variables

The dependent variable for Hypothesis 1 is a measure of the level of government satisfaction in providing different sources of energy to households. The specific fuel sources are LPG, kerosene, biogas, charcoal, firewood, and dung. The level of satisfaction of government efforts to provide each energy source is measured on a scale of 0–4 from 'Very Unsatisfied' to 'Very Satisfied.' The use of a 0–4 scale is useful since there is considerable variation in the levels of satisfaction with the government in its provision of the different energy sources.

To account for lighting needs, we also include a related question on lighting satisfaction, measured on the same 0–4 scale from a separate module of the questionnaire. Because the question is from a different module, we must offer two caveats: the question wording is slightly different and the question does not focus specifically on electricity. Reassuringly, however, the results are robust if we remove the lighting question or limit the analysis to electrified households only. These robustness tests show that the inclusion or exclusion of lighting satisfaction do not significantly modify the final empirical results of the study.

These energy forms cover the most common choices of rural Indian households for cooking and lighting. Firewood is the most common fuel source with 70% of rural households using it for cooking, with biomass, dung, and LPG accounting for the rest. Kerosene is also the most common fuel source for lighting with 83% of the households using it in the rural areas [36]. In our sample villages, dung was the most common cooking fuel (77%) followed by firewood (48%), and about 97% of our respondents used some kerosene for lighting. While our survey did not have a specific

⁶ The results also hold with the use of a logistic regression instead.

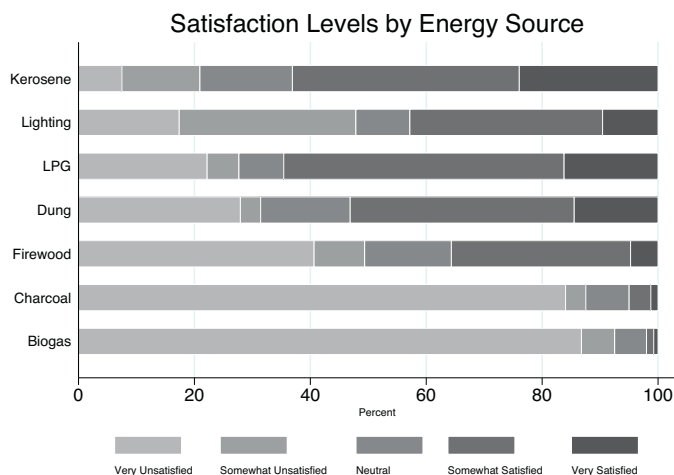


Fig. 1. Satisfaction levels by energy source. The figure shows the percentage of respondents falling under different categories on a 0–4 scale.

question about satisfaction with electricity access, about 70% of the sample was electrified, meaning that these people would consider electricity their primary lighting source.

Fig. 1 provides a distribution of these satisfaction levels by the different energy sources. Rural Indian households are most satisfied with kerosene and the least satisfied with biogas and charcoal. The majority is also satisfied with the provision of LPG and dung but are not that satisfied with the government efforts concerning access to firewood. Notably, lighting satisfaction is also generally quite high, perhaps reflecting the 70% electrification rate in the study villages.

We construct the dependent variable in two ways: (1) as the sum of each of these seven variables and (2) by constructing a satisfaction index of the different energy sources using factor analysis. As each of these two ways comes with a tradeoff, we use both to corroborate our results; in fact, we can show that our findings are qualitatively identical, independent of the exact construction of the dependent variable. Using the sum of each of the seven different energy sources has two main advantages: first, it allows for a simple measure of the satisfaction level of the respondent. Second, it takes the level of satisfaction on all seven sources of energy into account. However, it places equal weight on each of the seven components on the overall level of satisfaction. Factor analysis allows us to overcome this limitation by creating a single variable that captures the respondent's latent satisfaction level, with the weights that are placed on the different components being determined by the data. Yet, using this approach limits us from making clear substantial claims on satisfaction levels.

The dependent variable for Hypothesis 2 is a binary indicator variable of whether the respondent takes a political candidate's proposal on household energy into account when exercising his

right to vote. About 63% of the respondents in the survey state that they consider such proposals.

4.2. Explanatory and control variables

The main explanatory variable is a measure of whether the respondent thinks that the government should intervene in the free market. The actual question asked in the survey is "The government can intervene in the economy by, for example, controlling the price of food and fuel. Do you think that the government should intervene in the economy or should the market be completely free?" The enumerators were also instructed to explain the notion of free markets upon request to the respondents as a situation in which private producers sell goods and services to consumers without the government regulating the price. Respondents who opted for the choice that the government should intervene in the economy were coded as 1 for the explanatory variable. This indicator variable is intended as a measure of the extent to which the respondent believes that government intervention is necessary.

There are a number of control variables that we also use in the analysis. Since education levels could make a respondent more aware of the impact of government policies and hence affect their trust levels in government, we control for the number of school years. Similarly, wealthier households have greater access to energy and could also be more satisfied with the government in general, so we control for household's monthly income group (11 groups, with lowest being 0–999 and highest being above 10,000 rupees).

In addition, we control for the respondent's trust in politics, as it could affect their levels of satisfaction with government policy for energy access. Specifically, we sum over answers to five questions about trust in politics (general, Prime Minister, Chief Minister, government officials, *panchayat* officials), each on a 0–4 scale with higher values indicating more trust. We also include a binary indicator for the respondent's belonging to the officially designated government castes to account for the prior political dispositions of certain castes.

We control for the objective energy access situation in two different ways. First, we include the summed value of energy access satisfaction – as opposed to satisfaction with government policy – for the fuels listed above, again on a 0–4 scale with higher values indicating more satisfaction. Second, to specifically consider electrification of the household as a key predictor of lighting quality, we include a binary indicator for household electrification.

Table 1 contains the summary statistics for the full list of variables used. Overall, rural households in the surveyed area are not satisfied with government provision of access to different energy sources with the mean satisfaction levels around eleven on a scale from 0 to 28. The majority of the respondents took a candidate's proposal on energy into account when voting but only around 35% preferred government intervention in the free market. In addition,

Table 1
Summary statistics for dependent, explanatory, and control variables. The minima and maxima are based on the actual highest and lowest values in the data. In the case of energy policy (access) satisfaction, the theoretical maximum is 28 (24). For all other variables, the maxima and minima correspond to the theoretical extreme.

	Mean	SD	Min	Max	Count
Govt energy policy satisfaction (sum)	10.96	4.01	0.0	26.0	397
Govt energy policy satisfaction (factor)	0.00	0.83	–1.2	2.8	397
Candidate proposal	0.63	0.48	0.0	1.0	401
Government intervention	0.35	0.48	0.0	1.0	401
Trust in politics	11.94	6.01	0.0	20.0	401
Energy access satisfaction	10.33	3.42	1.0	22.0	401
Schooling (years)	4.61	4.57	0.0	22.0	401
Electricity (indicator)	0.70	0.46	0.0	1.0	401
Monthly income	3.42	1.74	1.0	11.0	401
Government caste (indicator)	0.27	0.45	0.0	1.0	401
Married (indicator)	0.84	0.36	0.0	1.0	401

Table 2

Government energy policy satisfaction. The dependent variable in all models is the sum of the respondent's level of satisfaction in the government to provide LPG, kerosene, biogas, charcoal, firewood, dung, and lighting. All the models below are linear regressions that include village level fixed effects.

	(1)	(2)	(3)	(4)	(5)
Govt intervention in free market (indicator)	-1.782*** (0.415)	-1.728** (0.413)	-1.684*** (0.412)	-1.687*** (0.416)	-1.508*** (0.399)
Schooling (years)	0.079** (0.045)	0.082* (0.045)	0.096** (0.045)	0.096** (0.046)	0.063 (0.042)
Trust in politics		0.075** (0.032)	0.077** (0.032)	0.078** (0.032)	0.044 (0.029)
Electricity (indicator)			-0.669 (0.432)	-0.691 (0.456)	-0.767* (0.410)
Monthly income			-0.143 (0.112)	-0.141 (0.114)	-0.093 (0.112)
Government caste (indicator)				-0.107 (0.453)	-0.310 (0.414)
Married (Indicator)				-0.125 (0.478)	-0.458 (0.433)
Energy access satisfaction					0.446*** (0.063)
Observations	397	397	397	397	397
R ²	0.070	0.082	0.093	0.093	0.227

Robust standard errors in parentheses.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

the majority of the household heads were married and lived in an electrified household. However, average levels of education are low with average number of school years at 4.6 out of a maximum of 22.

5. Findings

We summarize the findings concerning the two hypotheses separately.

5.1. State intervention and policy failure

When the dependent variable is computed as the sum of satisfaction levels of individual energy sources, we find negative effects for the respondent's attitude towards government intervention. Table 2 provides the results of five different models with successively more control variables. Model (1) only includes our main explanatory free market indicator and the education level variable. Model (2) adds the trust in politics variable, Model (3) includes an electrification dummy and monthly household income. Models (4) and (5) extend the set of controls to include dummy variables for government caste, marital status as well as satisfaction levels with energy access. All models control for village fixed effects. With all the control variables, a respondent's positive attitude toward government intervention is, on average, associated with a decrease of 1.5 units in the satisfaction scale relative to a respondent with a negative perception.⁷ This is 38% of the standard deviation (4.01), indicating a relatively large change; relative to the maximum, the change is 5.8%.

The same holds when we compute the dependent variable as an index using factor analysis. Table 3 provides the results. The models are similar, except we replace the sum with the principal factor in the dependent variable. The negative effect of the respondent's attitude towards government intervention holds across all models. A respondent's positive attitude toward government intervention is, on average, associated with a decrease of 0.36 units relative to a

respondent with a negative attitude. On the index latent scale, this is equivalent to an 8.8% percentage point decrease in satisfaction levels relative to the maximum.

Thus far, we have examined the effect of the respondent's attitude towards government intervention on government satisfaction levels towards all energy sources. This opens the question of whether there are any effects on the satisfaction levels on any of the individual energy sources. Table 4 provides correlations between the respondent's attitude towards government intervention and each individual energy source. We find that the negative effects hold for LPG, charcoal, firewood and dung, but not for kerosene and biogas. They also do not hold for lighting. Since there is very little access to LPG in rural India in general (only about 15% of respondents in our sample use LPG), the negative effect reflects its poor availability and relatively high cost. Firewood and dung are used extensively in the villages of Uttar Pradesh (69% of respondents in our sample use firewood and 88% use dung), and the negative effect reflects a dissatisfaction with government policy about access to these two fuels. Charcoal and biogas are not used widely (less than 3% in our sample use charcoal and nobody uses biogas) and the negative effect could just reflect unavailability of the fuel. On the other hand, kerosene is widely used (nearly 97% of the respondents in our sample use kerosene), and the non-effect could indicate that government efforts to provide kerosene subsidies may have helped a little – though such subsidies help the wealthier urban population more than they do rural Indian villagers [2]. The non-finding on lighting may reflect the relatively high electrification rate of 70% in the local context.

5.2. Policy failure and voting behavior

We now examine whether dissatisfaction levels of the government's provision of energy access has an effect on voting behavior. For ease of interpretation, we invert our original variable – satisfaction with government energy policy – so that higher values indicate more dissatisfaction. Table 5 provides results on the association between the respondent's dissatisfaction levels and likelihood that he takes a political candidate's energy policies into account when voting. We estimate probit regressions with village fixed effects.

From the results, we can see that higher levels of dissatisfaction with the government's policies of providing energy access is

⁷ The results are similar if we conduct the regressions separately for the two villages. In both cases, the coefficient for support for government intervention is negative and statistically significant at the $p < 0.05$ level.

Table 3
Government energy policy satisfaction. The dependent variable in all models is the result of a factor analysis of the respondent's level of satisfaction in the government to provide LPG, kerosene, biogas, charcoal, firewood, dung, and lighting. All the models below are linear regressions that include village level fixed effects.

	(1)	(2)	(3)	(4)	(5)
Govt intervention in free market (indicator)	−0.378*** (0.086)	−0.381*** (0.086)	−0.377*** (0.085)	−0.372*** (0.085)	−0.364*** (0.086)
Schooling (years)	0.009 (0.010)	0.009 (0.010)	0.013 (0.010)	0.012 (0.010)	0.011 (0.010)
Trust in politics		−0.004 (0.007)	−0.004 (0.007)	−0.004 (0.007)	−0.005 (0.007)
Electricity (indicator)			−0.221** (0.090)	−0.235** (0.097)	−0.239** (0.096)
Monthly income			−0.006 (0.023)	−0.009 (0.023)	−0.007 (0.023)
Government caste (indicator)				−0.040 (0.100)	−0.049 (0.099)
Married (indicator)				0.101 (0.104)	0.086 (0.105)
Energy access satisfaction					0.021 (0.013)
Observations	397	397	397	397	397
R ²	0.052	0.053	0.067	0.070	0.076

Robust standard errors in parentheses.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

Table 4
The dependent variable is the respondent's level of satisfaction in the government to provide LPG, kerosene, gobar gas, charcoal, firewood, dung, and lighting. All the models below are linear regressions. Robust standard errors are in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Govt intervention in free market (indicator)	−0.697*** (0.150)	0.128 (0.120)	−0.090 (0.067)	−0.199** (0.083)	−0.660*** (0.139)	−0.520*** (0.155)	0.209 (0.133)
Constant	2.556*** (0.080)	2.541*** (0.078)	0.266*** (0.044)	0.417*** (0.059)	1.737*** (0.088)	2.266*** (0.086)	1.798*** (0.084)
Observations	401	401	401	401	401	401	397

Robust standard errors in parentheses.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

negatively associated with the likelihood that a respondent pays attention to a candidate's energy proposals during an election. While this effect is statistically significant at the 0.01 level in the first two models, it dips to the 0.1 level once the respondent's belief in the market and level of trust in politics are included in the specifications. In turn, Fig. 2 presents the marginal effects of dissatisfaction with government policies on the probability that a respondent takes a political candidate's positions on energy into account when casting his vote. These estimations are based on the most comprehensive model. Substantively, this means that when

a person's dissatisfaction with the government for policy failures moves from the 25th percentile to the 75th percentile, then the probability that he/she will consider a candidate's energy proposals decreases by 8 percentage points (holding his/her satisfaction with energy access, belief in the market and trust in politics at mean levels).

The result supports the hypothesis that respondents who are dissatisfied with government policies on energy treat a candidate's campaign promises as cheap talk. They do not believe that voting for a politician who claims to bring better energy access to their

Table 5
The dependent variable whether the respondent took a candidate's energy proposals into account before voting. All the models below are probit regressions that include village level fixed effects. Robust standard errors are in parentheses.

	(1)	(2)	(3)	(4)
Govt energy policy dissatisfaction	−0.057*** (0.017)	−0.053*** (0.018)	−0.038** (0.018)	−0.036* (0.019)
Energy access satisfaction		0.013 (0.021)	0.014 (0.022)	0.007 (0.022)
Do you think that the market should be completely free?			0.538*** (0.137)	0.533*** (0.138)
Trust in politics				0.029** (0.012)
Observations	397	397	397	397

Robust standard errors in parentheses.

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

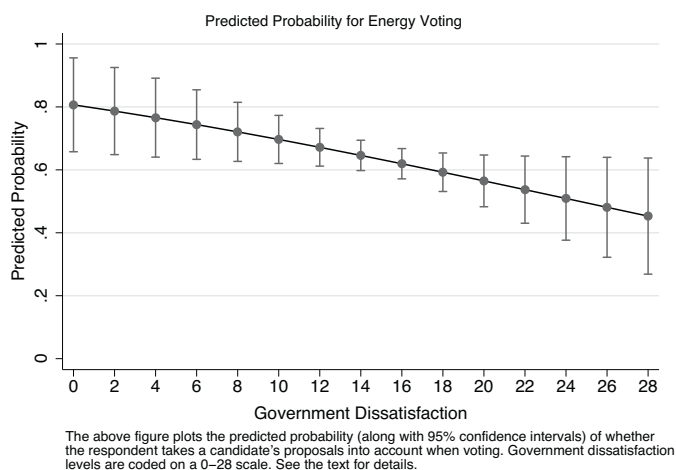


Fig. 2. Marginal effects of dissatisfaction with government on energy voting. The estimates are based on the probit regressions from the last model in Table 5.

village will actually improve their living conditions. In addition to a respondent's dissatisfaction with the government, the respondent's belief in the market and trust in politics variables are also positively associated with the respondent's likelihood of paying attention to a candidate's energy proposals. This makes sense since economic ideology and trust are known factors in the literature on voting behavior [31,24].

6. Conclusion

India's energy poverty remains high, as two-thirds of the population continue to rely on traditional biomass for cooking and one-third has no access to basic household electricity. There is a clear need for an aggressive and robust policy response. However, India's central and state governments face formidable challenges in implementing policies that would significantly reduce energy poverty. We have sought to understand the nature of this policy failure by examining the relationship between people's beliefs about the role of the government in the economy and their views of energy policy. Using survey data from two villages in rural Uttar Pradesh, we have found that people who believe the government should play an important role in energy policy are not satisfied with the government's current efforts. Moreover, these people seem to ignore the energy policy positions of candidates for office in elections. To the extent that these findings generalize beyond our sample, it could be that the government's failing energy policy is reducing public interest in this policy issue.

These findings are significant: if people dissatisfied with the government's performance reacted by demanding better policies, then politicians would have incentives to supply such policies and improve the situation. However, our evidence suggests that people who believe in government intervention respond to the government's policy failure by simply ignoring the issue. This is a counterproductive response that could induce politicians to focus their efforts on other issues. As a result, there is reason for pessimism about energy poverty at least among our survey respondents. Further research is required to ascertain whether these findings hold in the state of Uttar Pradesh or India more generally.

Energy poverty is not unique to India. Other countries in South Asia (e.g. Sri Lanka and Bangladesh), Southeast Asia (e.g. Philippines and Indonesia), and Sub-Saharan Africa (with the exception of South Africa) face similar issues in alleviating rural electrification and providing access to clean cooking fuel to its rural population. Some of these countries have implemented rural electrification programs and LPG distribution schemes, but they too

face transmission and distribution issues that reduce the efficacy of such programs. Our results suggest that, like among our survey respondents, without public pressure electoral competition alone may not provide politicians with incentives to implement decisive measures to combat energy poverty in rural areas. Whether the findings of our paper hold in these other settings would require further in-depth research in these contexts. Sovacool [47] has posed some important questions for the social science research agenda in energy scholarship, and our approach of testing hypotheses using quantitative studies in small settings could possibly contribute towards understanding good practices in regulatory governance.

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