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Understanding the resource curse: A large-scale experiment on corruption in Tanzania[☆]

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ABSTRACT

Corruption is considered an important driver of the resource curse in developing countries. Based on a large-scale field experiment in Tanzania, this paper studies how the salience of future natural resource revenues shapes beliefs, attitudes, and behavior. We find some evidence that information about the discovery of natural gas causes people to expect more corruption in the future, but no evidence of the information making people at present more willing to engage in corruption and dishonest behavior or less trusting. The findings do not support the idea of self-fulfilling expectations about future corruption. The paper provides a rich set of results on the determinants of corruption and trust in a development context, which may contribute to a better understanding of the micro-foundations of the resource curse.

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1. Introduction

A comprehensive economic and political economy literature has shown that resource-rich countries often perform poorly in terms of social and economic development compared to countries that are less abundant in natural resources (Ross, 2015; Venables, 2016). Natural resource wealth is associated with less democracy (Andersen and Aslaksen, 2013; Ramsay, 2011; Aslaksen, 2007), more corruption (Andersen et al., 2017; Arezki and Brückner, 2011; Brollo et al., 2013; Caselli and Michaels, 2013; Leite and Weidmann, 2002; Olken and Pande, 2012; Sala-i-Martin and Subramanian, 2013; Vicente, 2010), a higher likelihood of violent conflicts (Collier and Hoeffler, 1998; Ross, 2004), exchange rate appreciation, damage to other tradable sectors, as well as less economic diversification and increased macroeconomic volatility (Venables, 2016). These phenomena are commonly referred to as the *the resource curse*, a term first proposed by Auty (1993). Although there seems to be a consensus that a resource curse often exists (with the notable exceptions of Brunnschweiler and Bulte (2008) and van der Ploeg and Poelhekke (2010)), the empirical literature faces greater challenges in establishing *why* natural resource wealth is often associated with undesirable outcomes, because cross-country comparisons are plagued with endogeneity issues (Cust and Poelhekke, 2015).

In this paper, we use a controlled field experiment to study a micro-founded, citizen-based, corruption mechanism that may contribute to trigger a resource curse. The mechanism we have in mind is that salience of future natural resource rents in a country may cause people to expect an increase in future corruption, which in turn may increase their current willingness to engage in and accept corrupt activities. As a result, there may be self-fulfilling expectations about future corruption contributing to a resource curse.

Both theoretical and empirical work suggest that people's willingness to engage in corruption may be shaped by the prevalence of such behavior in society. As shown by Andvig and Moene (1990) and Fisman and Golden (2017), if the expected costs of engaging in corruption (likelihood of being caught and reputation or moral costs) depend on your beliefs about the willingness of others to be corrupt, then there may be multiple societal equilibria. A shock in expectations about the prevalence of corruption in society may thus move a society from a low-corruption equilibrium to a high-corruption equilibrium. Several empirical studies have provided evidence consistent with this theoretical framework, showing a robust association between the likelihood of engaging in corruption and dishonest behavior (which is a key feature of any corrupt activity), and the prevalence of such behavior in society (Drupp et al., 2019; Gächter and Schulz, 2016; Hübler et al., 2019). In particular, Gächter and Schulz (2016) present extensive cross-country evidence from experiments conducted in 23 countries showing that people are more dishonest in societies where rule violations such as tax fraud and corruption are more prevalent.¹

In the present paper, we provide evidence on whether salience of future gas revenues affects people's expectations about the prevalence of future corruption and whether this, in turn, shapes people's views on corruption and willingness to engage in dishonest behavior. Research has shown that expectations about the future behavior of others affect people's current behavior. For instance, experiments show that behavior in trust games is affected by beliefs about others' behavior (Costa-Gomes et al., 2014; Sapienza et al., 2013). Furthermore, many participants in laboratory public goods experiments are "conditional cooperators" whose contributions to the public good are positively correlated with their expectations about how much others will contribute (Chaudhuri, 2011). To investigate the suggested mechanism, we take advantage of Tanzania's recent discovery of large reservoirs of offshore natural gas, but has not yet commenced production or revenue generation. Revenue estimates are highly sensitive to prices. Scurfield and Mihalyi (2019, p. 60) estimate that government gas revenues are likely to account at 1.2% of GDP a year on average over the project period, and 2.2% of GDP at their peak, assuming a price equal to the average over the last 15 years. In this context, we implement a controlled field experiment in which respondents are randomized to watch different versions of an *informational* video to create exogenous variations in the salience of future gas revenues, and afterwards respond to survey questions and take part in a behavioral experiment to measure dishonesty and trust. This design allows us to causally identify how salience of future natural resource wealth affects expected future corruption, a corruption norm, corruption beliefs, and dishonest behavior. In the analysis, we also explore whether salience of future gas revenues impacts trust in society, which has been shown to be of great importance for economic growth and development (Algan and Cahuc, 2013; 2014; Falk et al., 2018; Knack and Keefer, 1997; Nunn and Wantchekon, 2011). The large-scale pre-registered study, involving about 3000 respondents, was conducted in the commercial capital of Tanzania,

¹ There is a related literature on social norms studying the relationship between social and individual behavior (Bicchieri, 2016), including a growing literature on self-serving biases in social preferences (Dana et al., 2007; Di Tella et al., 2015).

Dar es Salaam, and in the two regions closest to the gas discoveries in the south-eastern part of the country, Mtwara and Lindi.

We find some support for the hypothesis that salience of future natural resource rents increases expectations about future corruption. The effect is not large, about 0.07 standard deviations, but it is present in almost all sub-groups in our sample and is robust to the inclusion of a large set of controls. Given that our experimental manipulation is subtle, and identifies the effect of providing more information about the resource rents (where possible confounds are removed by the fact that the control group watched almost the same video), we believe the result shows how salience about future natural resource rent may shape people's expectations about future corruption in society.² However, we do not find that the information has an effect on a person's normative view of corruption, their willingness to engage in dishonest behavior, or their level of trust. In particular, our findings do not support the idea of self-fulfilling expectations about future corruption.

Our study relates to a growing literature on political and institutional explanations of the resource curse. A central theme in this literature is that natural resource booms affect the incentives and behavior of both the political elite and ordinary citizens (Andersen and Aslaksen, 2013; Brollo et al., 2013; Caselli and Michaels, 2013; Cust and Poelhekke, 2015; Kolstad and Wiig, 2009; Leite and Weidmann, 2002; Paler, 2013; Treisman, 2000) and that the extent to which agents can act on bad incentives depends on the quality of institutions (Bhattacharyya and Hodler, 2010; Mehlum et al., 2006; Serra, 2006). The main focus of this literature has been on behavior of the political elite. In particular, it has been argued that because natural resource revenues give ruling politicians direct access to large rents, it increases the value of them staying in power. At the same time, these petroleum rents provide an opportunity for the elite to spend money on activities that aim to increase their chances of staying in power. Examples of such activities are increased patronage spending (for instance, increased employment in the public sector), vote buying and reduced non-resource taxation (Andersen and Aslaksen, 2013; Robinson et al., 2006; Ross, 2008, 2012). However, the opportunities for the political elite are constrained by citizens' demand for accountability and willingness to engage in vote buying (Armand et al., 2020; Busse and Gröning, 2013; Mehlum et al., 2006). When large rents are available for grabbing, it also becomes more profitable for ordinary citizens to engage in corrupt activities and political lobbying to appropriate a share of the wealth (Kolstad and Søreide, 2009; Mehlum et al., 2006; Torvik, 2002).

We contribute to the literature on the resource curse by providing novel causal evidence on how salience of future natural resource rents shape ordinary citizens' beliefs, behavior, and attitudes in a society with weak institutions and a history of extensive corruption (Lange, 2011; Gray, 2015).³ It is most closely related to Vicente (2010) and Armand et al. (2020). Vicente (2010) finds that the announcement of oil discoveries increased perceived corruption in public services using a natural experiment comparing Sao Tome and Principe to Cabo Verde. We identify a causal effect of exogenously varying salience of future resource revenues on expected future corruption. Armand et al. (2020) report from a large field experiment in Mozambique that studies whether it is possible to strengthen local political accountability by providing ordinary citizens with information about a major resource discovery that will materialize as a future resource windfall. They find evidence of a reduction in elite-capture when both leaders and citizens are informed compared to a situation where only leaders are informed. However, they do not find that information in itself increases corruption activities compared to a situation where no information is provided, in line with our findings. More broadly, our paper contributes to a growing body of studies that use variation in information provided to respondents in surveys to identify causal effects on beliefs and preferences (Jensen, 2010; Card et al., 2012; Cruces et al., 2013; Kuziemko et al., 2015).

This paper also relates to a large experimental literature studying dishonesty.⁴ In a meta-analysis of 90 studies of dishonest behavior in non-strategic settings, involving more than 44,000 respondents from 47 countries, Abeler et al. (2019) find that on average, people are willing to forgo 75% of a potential monetary pay-off to avoid being dishonest. The majority of these studies are conducted on students, or other specific population groups, in Europe and the US, although with some notable exceptions (Banerjee et al., 2018; Heldring, 2020; Lowes et al., 2017). The behavioral experiment on dishonesty reported in this paper represents, to our knowledge, the largest study of dishonest behavior in a developing country context. We observe that our respondents are slightly less honest than the average respondent in Abeler et al. (2019); in our sample, the respondents forgo approximately 67% of a potential monetary pay-off to avoid lying. However, comparing our results to existing studies from Tanzania, our sample is more honest (Abeler et al., 2019; Di Falco et al., 2016). We also find large heterogeneities in dishonest behavior between sub-groups of the sample, which highlights the importance of moving beyond student samples in studies of dishonest behavior. Finally, the paper contributes to the experimental literature on trust (Berg et al., 1995), by reporting from a large-scale trust experiment on a general population in a development context. We find less trusting behavior than what has been established in previous studies in Africa (Johnson and Mislin, 2011), including previous studies in Tanzania (Danielson and Holm, 2007; Holm and Danielson, 2005).

² An explorative part of our analysis, which was not pre-specified, is that we find a particularly strong effect of the information on expectations about future corruption for older respondents in Dar es Salaam. This finding is consistent with the learning mechanism identified in Malmendier and Nagel (2016) and the effect of past institutions found in Kamm et al. (2017): older respondents are more likely to have experienced the mining boom and the associated increase in corruption in Tanzania in the 1990s (Lange, 2011), and therefore, they update their beliefs about future corruption based on this personal experience.

³ Tanzania ranked in the lowest 21st–40th percentile of all six dimensions of the World Governance Indicators in 2018 (World Bank, 2018).

⁴ The terms dishonesty, lying and cheating are used interchangeably in the experimental literature.

The rest of the paper is structured as follows. [Section 2](#) describes the experimental design and provides an overview of the sample and the data. In [Section 3](#) the empirical strategy is explained. [Section 4](#) provides a descriptive analysis of the key outcomes of interest and reports on the main analysis regarding the effect of providing information about gas revenues on expected corruption. Finally, [Section 5](#) discusses the results and their policy implications, and concludes the paper.

2. Sample and experimental design

In this section, we provide a discussion of the sample and the experimental design of the survey.⁵

2.1. Gas discoveries in Tanzania

Since 2010, large reservoirs of natural gas have been discovered offshore the southern coast of Tanzania ([United Republic of Tanzania URoT, 2013a; Fjeldstad et al., 2019](#)). The size of the total confirmed gas reserves is currently standing at more than 57 trillion cubic feet of which more than 80% had been discovered before our survey took place in 2015 ([Norton Rose Fullbright, 2014; Must, 2018](#)). Yet, active extraction is estimated to be at least a decade away, and the exact amount of revenues generated will depend on petroleum prices, the legislative framework, technology, and other factors. Nevertheless, the deep-sea gas discoveries have received considerable attention among policy makers and the general public. Stories about potential revenues and other benefits from the extractive sector have appeared frequently in the media since the first discoveries a decade ago. Public expectations for development are particularly high in the two regions that are home to the discoveries: Mtwara and Lindi ([Must, 2018](#)). However, revenues from the extractives sector are collected by the national government agencies. Regional governments do not have any own sources and are fully funded by the national government, and local government authorities (LGAs) are largely funded by transfers from the national governments (less than 5% come from own sources in rural LGAs).

2.2. Sample

The study was conducted in July and August 2015, in three regions in Tanzania: Dar es Salaam, Lindi and Mtwara. Dar es Salaam was chosen because it is the commercial capital. Mtwara and Lindi were chosen because they are the regions closest to the offshore gas reservoirs, and they are also the regions where a planned liquefied natural gas processing plant will be located. In the analysis, we refer to Dar es Salaam as the “non-gas region” and Mtwara and Lindi as the “gas regions”, even though it should be recognized that these regions also differ in important respects, in particular because Dar es Salaam is the main urban center in Tanzania and Mtwara and Lindi are poor rural regions.⁶

In each region, three districts/municipalities were selected. Dar es Salaam contains just three municipalities so all were included. For Lindi and Mtwara, which contain more than three districts, we undertook a sampling. In Lindi, we selected the only urban district in the region to ensure urban representation, and randomly selected two of the rural districts. In Mtwara, we selected the urban district situated along the coast because it is the closest to the gas reservoirs, and randomly selected two rural districts.⁷ Within each of the nine districts, three wards were randomly selected using data from the 2012 Population and Household Census ([United Republic of Tanzania URoT, 2016a; 2016c; 2016b](#)). In the field, three villages/streets within each of the 27 wards were randomly selected and within each of the approximately 81 villages/streets, between 35 and 40 households were randomly interviewed. In total, we surveyed 3004 households. From each household, we randomly selected one person above 18 years of age and alternated between interviewing a man and a woman.

[Table 1](#) provides an overview of the respondents’ background variables for the sample as a whole, as well as for each of the three regions, together with comparable statistics from the 2012 Population and Household Census ([United Republic of Tanzania URoT, 2013b; 2015; 2016a; 2016c; 2016b](#)). A direct comparison with the national census data on age, education and marital status is difficult because our sample covers only those aged 18 years and above, whereas in the national census, the education level is measured for all individuals above five years old, and marital status is recorded for individuals above 15 years old. We observe, however, that our data is comparable to the national census in terms of occupation and gender. In the comparison between the non-gas region and the gas regions, we note that the main differences relate to education levels and occupations: respondents in the non-gas region are much more likely than those in the gas regions to have completed higher education and to be self-employed, and less likely to be farmers.

⁵ The pre-analysis plan is registered with the American Economic Association’s registry for randomized controlled trials: AEARCTR-0000768. We note the following deviations from the pre-analysis plan. First, we also pre-specified attitude towards taxation in the years to come as a main outcome variable for our analysis. As taxation introduces a very different set of mechanisms for resource curse (see for instance [Bräutigam et al., 2008; Paler, 2013; Weigel, 2020](#)), we have decided to focus on expected corruption and trust in the government in the present paper. We report descriptive results and the pre-registered analysis in [Fig. A.2](#), and [Tables A.18 and A.19](#) in [Appendix A](#), where we do not find any effect of salience of future gas revenues affecting tax attitudes. Second, the heterogeneity analysis of younger vs. older respondents was not pre-specified, but we included it because we found some interesting patterns that fit well with the findings of related literature.

⁶ The geographical locations of the three regions are shown in [Fig. A.1](#) in [Appendix A](#).

⁷ The Dar es Salaam municipalities at the time of the study were Ilala, Temeke and Kinondoni. The Mtwara districts selected were Masasi Vijijini, Mtwara Manispaa and Newala, and the Lindi districts were Lindi, Lindi Manispaa and Nachingwea.

Table 1
Background characteristics by region for sample and census data.

	Total		Non-gas region		Gas regions	
	Sample	Census	Sample	Census	Sample	Census
Median age	34		32		36	
Higher education	0.26 (0.01)	0.19	0.53 (0.02)	0.34	0.13 (0.01)	0.10
Male	0.52 (0.01)	0.49	0.49 (0.02)	0.48	0.53 (0.01)	0.53
Self-employed	0.27 (0.01)	0.19	0.49 (0.02)	0.48	0.16 (0.01)	0.09
Farmer	0.46 (0.01)	0.62	0.01 (0.00)	0.04	0.69 (0.01)	0.88
Married	0.64 (0.01)	0.51	0.53 (0.02)	0.44	0.69 (0.01)	0.53
Observations	3004		1001		2003	

Mean coefficients; standard error of the mean in parentheses.

Sample definitions: “Median age” is the median age in the sample, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Male” is an indicator variable taking a value of one if the respondent is a male, “Self-employed” is an indicator variable taking a value of one for respondents who are employed and are self-employed in the non-agricultural sector, “Farmer” is an indicator variable taking a value of one for respondents whose primary occupation is farmer, “Married” is an indicator variable taking a value of one if the respondent is married and zero otherwise. *Census definitions:* “Male” is the share of males in all age groups, “Lower sec or more” is the share of the population above five years of age who have completed lower secondary school or more, “Self-employed” is the share of individuals who are 10 years or older and self-employed in the non-agricultural sector, “Farmer” is the share of individuals 10 years or older occupied in agriculture, “Married” is the share of individuals 15 years or older who are married. The median age in Tanzania is 17.7 years.

2.3. Survey and experimental design

First, we provide an overview of the structure of the survey, before turning to a more detailed discussion of the treatment variation and the main outcome variables.

General structure. The survey was conducted in Swahili, the official language of Tanzania.⁸ It lasted approximately 15 min and consisted of five parts (see Appendix B.1 for the English wording of the survey). In the first part, respondents answered background questions about their age, marital status, region of origin, region they visit most frequently, education and occupation. The second part entailed the experimental part of our research design: respondents were randomly assigned to watch one of two versions of an informational video on the enumerator’s tablet, where one version contained information about gas discoveries and revenue estimates for Tanzania, whereas the other did not mention gas revenues at all. In the third part, we asked our pre-specified main outcome questions on future corruption and trust in the government, and additional questions that could provide a greater understanding of the mechanisms driving the responses to these questions. In the fourth part, respondents were randomized to take part in one of two incentivized experiments, intended to measure behaviorally their dishonesty and trust in others. The respondents were paid upon completion of the experimental task, and the interview was then terminated. At the end, the enumerator recorded information about the gender of the respondent, the region, district, ward and village where the interview was conducted. The data were collected using tablets and the Qualtrics Offline Surveys app, allowing us to randomize the treatment at the respondent level.⁹ A schematic representation of the research design is provided in Fig. 1.

The treatment. The respondents were randomly assigned to watch an informational video with or without gas information (see Figsures B.1 - B.14 in Appendix B.2 for screenshots). The no gas information group was shown a shortened version of the video providing gas information.¹⁰

The no gas information sequence contains only general information about Tanzania. It describes the size of the population (49 million), the number of regions (30) and the gross national income (81 trillion Tanzanian shillings (TZS)/USD 41 billion) of the country. Importantly, this general information features components displayed in the gas information sequence that could affect expectations about corruption, such as a map of Tanzania and its regions, the Tanzanian flag, a picture of a TZS 10,000 note and the mention of a large sum of money. Because these components are shown to respondents in both the gas and the no gas information groups, we assume that they do not explain any observed treatment differences.

The gas information video additionally contains a sequence explaining that natural gas has been discovered in Tanzania and indicating the location of the offshore reservoirs, off the coast of Mtwara and Lindi. Further, it describes that the gas can be extracted and sold, and that it can yield an estimated TZS 106 trillion in total revenue (International Monetary Fund [IMF], 2014). As a robustness check, we introduce four variations of this video in which we randomly varied how we

⁸ Swahili is spoken and understood by nearly the entire population (Petzell, 2012).

⁹ As shown in Table A.1, the sample is balanced both for all respondents and within the gas region and non-gas regions.

¹⁰ As a consequence of this design choice, the gas information video is slightly longer than the no gas information video, but we find it uncontroversial to assume that the length of the video does not influence the responses.

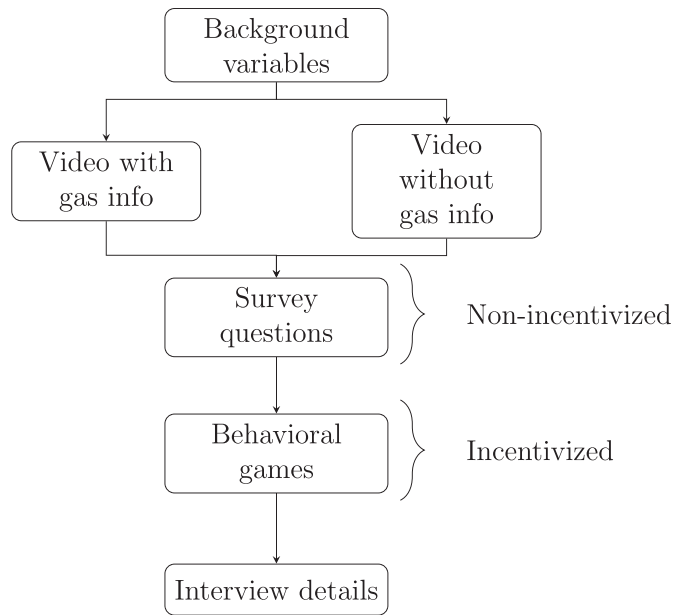


Fig. 1. Research design Note: The figure illustrates the sequence of the survey.

illustrated the size of the revenue estimates. Specifically, we varied whether the revenue estimates were presented in terms of total value/annual real return and in terms of all Tanzanians/per capita.¹¹

The videos were made in collaboration with DJPA Tanzania and contained simple animations, written text and a voice-over in Swahili. The respondents watched the video on the enumerator's tablet, with a headset to hear the voice-over. Before the main data collection, the videos were tested in focus group discussions with residents of Dar es Salaam to ensure that they were clear and understandable.

Overall, the experimental design creates exogenous variation between respondents regarding whether they were informed about the gas revenues before they provide answers on the main outcome variables. The presence of a control video ensures that there is no variation in other components. Thus, the present design provides for identification of the effect of being informed about the possibility of natural resources yielding large revenues to Tanzania in the future. It is worth noting that the information provided captures two features of future revenues. The video conveys information about the *size* of the revenue, showing that they will represent a large income shock, and about the *source* of the revenue, that it is natural gas. Both features could potentially affect the respondent's expectations about future corruption. However, since all the respondents receive information that highlight both of these features, we cannot disentangle their effects with our design.

Even though our treatment design is subtle, and one should not expect it to generate large effects, we believe that it may trigger two mechanisms that could affect how the respondents answer the questions that follow. First, for all respondents, the information about gas revenues increases the salience of this revenue. Second, for respondents who are aware of the potential gas revenues, the information may cause them to update the value of these resource rents. To shed some light on the extent to which the latter mechanism shapes their responses, immediately after the video we asked all respondents whether the information was new to them:

- *Novelty of information:* How much of this information was new to you? (All of it - most of it - some of it - almost none of it - none of it)

In addition, for the treated respondents, we asked whether the estimated total gas revenues were larger than they had expected.

Corruption - survey measures. We were interested in whether information about future gas revenues would cause people to expect more future corruption in society and consider corruption more acceptable.¹² We thus asked the respondents three questions about corruption after they had seen the informational video (where the first was pre-specified as a main outcome variable):

¹¹ We aimed to allocate an equal share of the respondents to each of the five versions of the video, but a software problem created some deviations. Overall, as shown in Table A.2, around 23% of the respondents were in the control group with no gas information and about 77% of the respondents were in the treatment group with gas information.

¹² As pointed out by Olken (2009), people's perceptions about corruption may not be accurate measures of actual corruption.

- *Expected future corruption*: In the years to come, I expect the extent of corrupt activities to: Decrease a lot - decrease - stay the same - increase - increase a lot.
- *Corruption norm*: People should never engage in corrupt activities: Strongly disagree - disagree - neither agree nor disagree - agree - strongly agree.
- *Corruption beliefs*: I believe that my fellow citizens would engage in corrupt activities if they could benefit from it: Strongly disagree - disagree - neither agree nor disagree - agree - strongly agree.

Our prior expectation was that information about future gas revenues would cause individuals to expect more corruption, both by causing them to increase their estimates of the resource rents that can be grabbed through corrupt activities and by reminding them of the extensive corruption involved in historical cases of national resource rents extraction in Tanzania (Lange, 2011). We also expected that when citizens expect more corruption in the future, it would shift their corruption norm in direction of corruption being more acceptable, and their beliefs in direction of others being more corrupt today.

Dishonesty - behavioral measure. We focus on dishonest behavior, since it is a key feature of any corrupt activity (Gächter and Schulz, 2016; Gneezy et al., 2019). To measure dishonesty, we conducted a standard flip-of-a-coin experiment (Fischbacher and Föllmi-Heusi, 2013), where the respondent was asked to flip a coin six times without the enumerator observing the outcomes. Then, the respondent was asked to report how many heads he/she obtained, with a payment of 1000 TZS per tail reported. The payment scheme was announced before the respondent flipped the coin. The idea behind this experimental task is that the enumerator entrusts power to the respondent to report the correct outcomes, but the respondent can, without any fear of detection, abuse this power to benefit economically by misreporting the number of heads and tails. Our experimental design allows us to identify whether information about future gas revenues makes it more likely that the respondent abuses their power and report dishonestly for a private gain. We take the number of tails reported as a group level measure of dishonesty in our study. This measure has previously been used by other researchers as a proxy for tolerance to engage in corruption (Hanna and Wang, 2017). It is in accordance with Transparency International (2019)'s definition of corrupt behavior, but it does not capture misuse of public office, which is a central aspect of the definition of corruption used by the World Bank and IMF (U4 Anti-corruption Resource Centre [U4], 2020).

Trust attitudes - survey measures To investigate the broader implications of making future natural resource revenues salient for ordinary citizens, we also study how it affected people's trust in the government (pre-specified as a main outcome variable) and their fellow citizens:

- *Trust in the government*: In the years to come, I trust the government to do what is right for Tanzania: Strongly disagree - disagree - neither agree nor disagree - agree - strongly agree.
- *Trust in fellow citizens*: Generally, I trust my fellow citizens: Strongly disagree - disagree - neither agree nor disagree - agree - strongly agree.

Trust in the government and fellow citizens have been identified as both cause and consequence of corruption (Morris and Klesner, 2010). Trust in the government is a broader concept than expectations about corruption. It encompasses assessments of whether the government has the necessary competency to carry out their tasks, as well as their willingness to do so. Expected corruption is one of many factors that may influence perceptions of trust in the government.

Trust - behavioral measure. To obtain a behavioral measure of trust in others, we conducted a simplified version of the standard trust game (Berg et al., 1995). The respondent was given TZS 5,000 and chose how much, if anything, to send to another Tanzanian citizen. The amount not sent was kept by the respondent. The amount sent to the other was multiplied by three. The trustee decided how much to send back to the trustor.¹³ The share of the endowment sent is interpreted as a measure of trust in fellow citizens, because it shows the extent to which the respondent is willing to take the chance that the receiver reciprocates trusting behavior by returning money (Johnson and Mislin, 2011).

3. Empirical strategy

We study the causal effect of providing information about gas on the respondents' responses and behavior by estimating the following linear ordinary least squares regression, as specified in the pre-analysis plan:

$$y_i = \alpha + \beta_{GI}GI_i + \beta_X X_i + \epsilon_i, \quad (1)$$

where y_i is the standardized version of the relevant outcome measure for individual i , GI_i is a treatment indicator variable that takes a value of one if respondent i was exposed to the gas information version of the video and X_i is a vector of individual characteristics: age, gender, occupation, education, marital status and type of region (gas or non-gas region). We estimate Eq. (1) with robust standard errors and control for round fixed effects.¹⁴ We also report the corresponding

¹³ In practice, the amounts sent back were pre-registered by asking a selection of eleven ordinary Tanzanian citizens (one for each amount the respondents could send) how much they would send back to the respondent for a given amount received.

¹⁴ The treatment is randomized at the respondent level, and we therefore do not cluster the standard errors. The round fixed effects are included because, initially, owing to a technical problem, we allocated too many respondents to the treatment group. To address this problem and ensure that we reached the planned targets for the different groups, we divided the data collection into five rounds. In the first round, 90% of respondents were allocated to the gas information video, whereas in rounds 2–5, the corresponding share was between 69% and 72%.

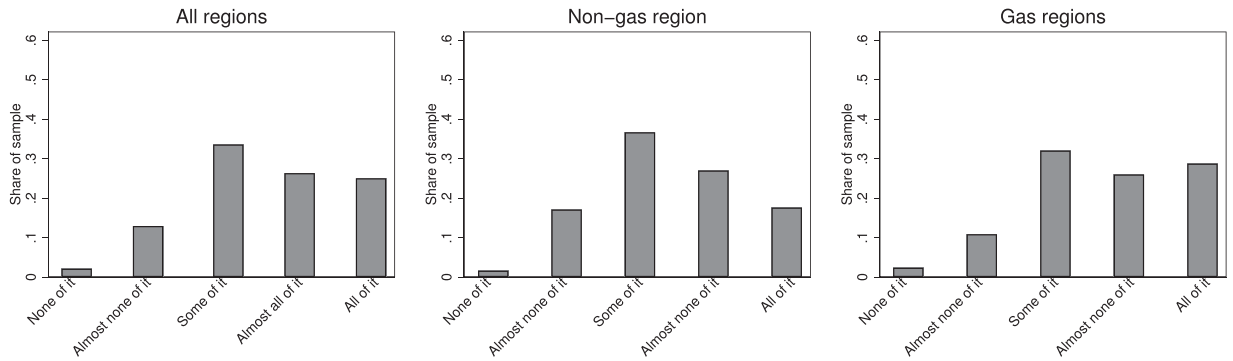


Fig. 2. Perceived novelty of information, by total, non-gas and gas regions *Note:* The figure illustrates the distribution of responses to the question “How much of this information was new to you?” for all regions (left panel), the non-gas region (middle panel) and the gas regions (right panel).

regressions without control variables. As respondents were randomly assigned to watch one of the two versions of the video, β_{GI} provides an estimate of the causal effect of providing information about gas on beliefs, attitudes, and behavior.

To investigate whether the gas information affected sub-groups of the sample differently, we also estimate regressions with interaction terms. We focus on whether the respondent lives in a region close to the gas reservoirs, age, education, gender and employment status, and estimate the following regression with indicator variables for the respective dimensions:

$$y_i = \alpha + \beta_{GI}GI_i + \beta_{Var}Var_i + \theta_{GI \times Var}GI_i \times Var_i + \beta_X X_i + \epsilon_i, \tag{2}$$

where Var_i is an indicator variable taking a value of one if respondent i lives in a region close to the gas reservoirs, is older than the median age, has completed lower secondary school or a higher level of education, is male, is self-employed or is a farmer, and $GI_i \times Var_i$ is an interaction term between GI_i and Var_i . Then, the estimated effect on respondents of providing information about gas is given by β_{GI} (living in the non-gas region, younger, less educated, females, employed in the formal sector) and $\beta_{GI} + \theta_{GI \times Var}$ (living in gas region, older, more educated, males, self-employed, farmers) and the estimated difference in causal effect between the two respective sub-groups is given by $\theta_{GI \times Var}$. In the main analysis, we focus on the comparison between living in a gas region and a non-gas region. In the more detailed heterogeneity analysis, we estimate Eq. (2) separately for the non-gas region and the gas regions.¹⁵

4. Analysis

We first provide descriptive statistics on the main variables, before we turn to the analysis of treatment effects and heterogeneous effects on sub-groups in our sample.

4.1. Descriptive statistics

Novelty of information. As shown in Fig. 2, the large majority of respondents perceived the information video to provide some new information: 85% of respondents answered that some, almost all or all information was new to them.¹⁶ The share who considered the information novel is slightly larger in the gas regions than in the non-gas region (87% versus 81%, $p = 0.000$), which is consistent with the level of education being higher in the non-gas region than in the gas regions.

To shed further light on how the gas information affected respondents in the treatment group, we asked them whether the estimated total gas revenues presented in the video were larger than expected. We find that 65% of the treated respondents believed so, which we take as evidence for the information causing the majority of treated respondents to update the natural resource rents upwards. As shown in Fig. 3, the pattern applies across all pre-specified sub-samples (with the majority in each sub-group answering “Yes” to this question). In particular, we note that the less educated are much more likely to find the estimated total gas revenues larger than expected.

Corruption and dishonesty. Fig. 4 shows the distribution of the corruption measures and dishonest behavior in the sample. We observe in the upper panel that there is large variation in the respondents’ expectations about future corruption.

¹⁵ In the appendix, we additionally report results from the following specification, which explicitly tests whether sub-group differences are significantly different between non-gas and gas regions i:

$$y_i = \alpha + \beta_{GI}GI_i + \beta_{GR}GR_i + \beta_{Var}Var_i + \theta_{GI \times GR}GI_i \times GR_i + \theta_{GI \times Var}GI_i \times Var_i + \theta_{GR \times Var}GR_i \times Var_i + \gamma_{GI \times GR \times Var}GI_i \times GR_i \times Var_i + \beta_X X_i + \epsilon_i,$$

¹⁶ To avoid priming respondents in the no gas information group on the gas discoveries, we did not measure the respondents’ knowledge about the gas discoveries and revenue estimates prior to the information treatment.

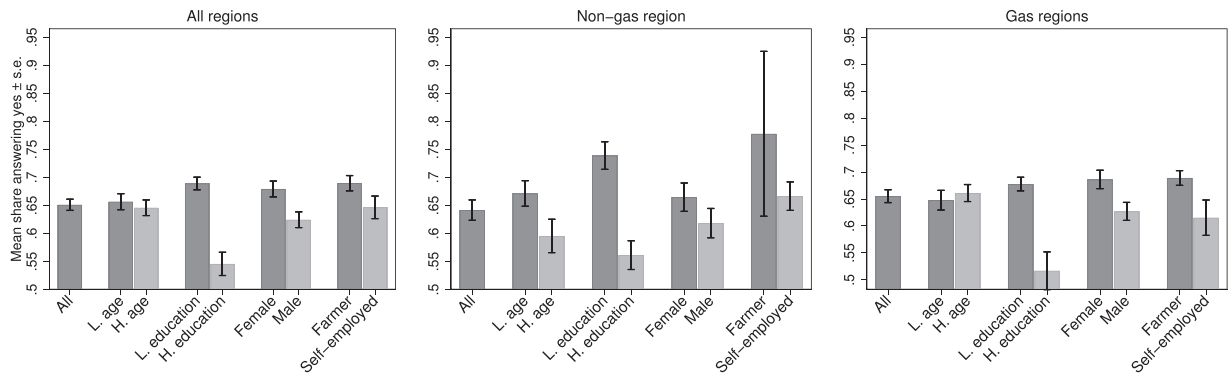


Fig. 3. Did you find the estimated total gas revenues to be larger than expected? *Note:* The figure illustrates the share of respondents answering “yes” to the question “Did you find the estimated total gas revenue larger than you had expected?” for all sub-groups, for younger vs. older respondents, for less vs. more educated respondents, for females vs. male respondents and for farmers vs. self-employed respondents. The left panel shows results for the total sample, the middle panel shows results for the non-gas region, and the right panel shows results for the gas regions.

The majority (60%) expect corruption to increase or increase a lot in the years to come, but a significant share of the respondents (30%) expect a decrease in corruption. In the second and third panel, we observe that there is a strong norm against engaging in corruption, and that people largely believe that others follow this norm. In contrast, we observe in the bottom panel that a significant share of the respondents are dishonest in the behavioral experiment. In the overall sample, the respondents report on average four tails, which is significantly larger than the benchmark of three tails that would be the expected outcome from honest reporting. We observe that dishonest reporting is more prevalent in the non-gas region than in the gas regions (4.6 tails versus 3.7 tails, $p = 0.000$). In Table A.3 in the appendix, we report the correlation matrix for the corruption measures and dishonest behavior. We observe that those who believe others to be more corrupt behave more dishonestly, and that both being more dishonest and expecting others to be more corrupt is positively correlated with expecting more corruption in the future. These correlations are in line with our suggested mechanism, though the magnitudes are quite small. We also observe that individuals who have a stronger corruption norm believe others to be less corrupt, but are, somewhat surprisingly, more dishonest themselves and expect more future corruption.

Trust. Fig. 5 shows the distribution of responses to the trust questions and behavior in the trust game, where the patterns are quite similar in the non-gas region and the gas regions. We observe from the upper panel that there is significant variation in the level of trust in the government. About 48% of the participants express trust in the government in the years to come (agree or strongly agree with the statement “In the years to come, I trust the government to do what is right for Tanzania”), while 32% have distrust in the government (disagree or strongly disagree with the statement). As shown in the middle panel, respondents express more trust in fellow citizens than in the government: the large majority of respondents (75%) trust their fellow citizens (agree or strongly disagree with the statement “Generally, I trust my fellow citizens”), while a small minority express distrust in their fellow citizens (18%). In the bottom panel, we show the distribution of the share sent in the trust game. We note that the mode is to send 40% of the endowment, with less than 30% of the respondents sending a greater share. In Table A.4 in the appendix, we report the correlation matrix for the trust measures, where, in particular, we observe that trust behavior in the experiment is strongly positively associated with trust in fellow citizens.

4.2. Treatment analysis

In this part of the paper, we first analyze how providing information about gas revenues causally affected the corruption measures and dishonest behavior. We then present the results for the trust outcomes.

Table 2 reports ordinary least squares regressions for which the dependent variable is expected future corruption (columns 1–3), corruption norm (4), corruption beliefs (5), and dishonest behavior (6). In line with our pre-specified hypothesis, we find in column (1) a positive causal effect of providing information about gas revenue on expected future corruption, equal to about 0.07 standard deviations (two-sided test, $p = 0.080$). In column (2), we observe that this effect is robust to the inclusion of control variables. In column (3), we report the results for the specification with an interaction term for gas information and gas regions. We observe the same positive effect of gas information in both non-gas and gas regions (even though the point estimates are now less precise). In terms of control variables, we observe systematically that males expect more corruption in the future than do females.¹⁷

When evaluating the size of the estimated causal effect on beliefs about future corruption, it is important to keep in mind that the experimental manipulation is subtle in order to identify the relationship between beliefs about the resource

¹⁷ As shown in Tables A.5–A.7 in Appendix A, we do not find significant differences across the different framing of the gas information videos.

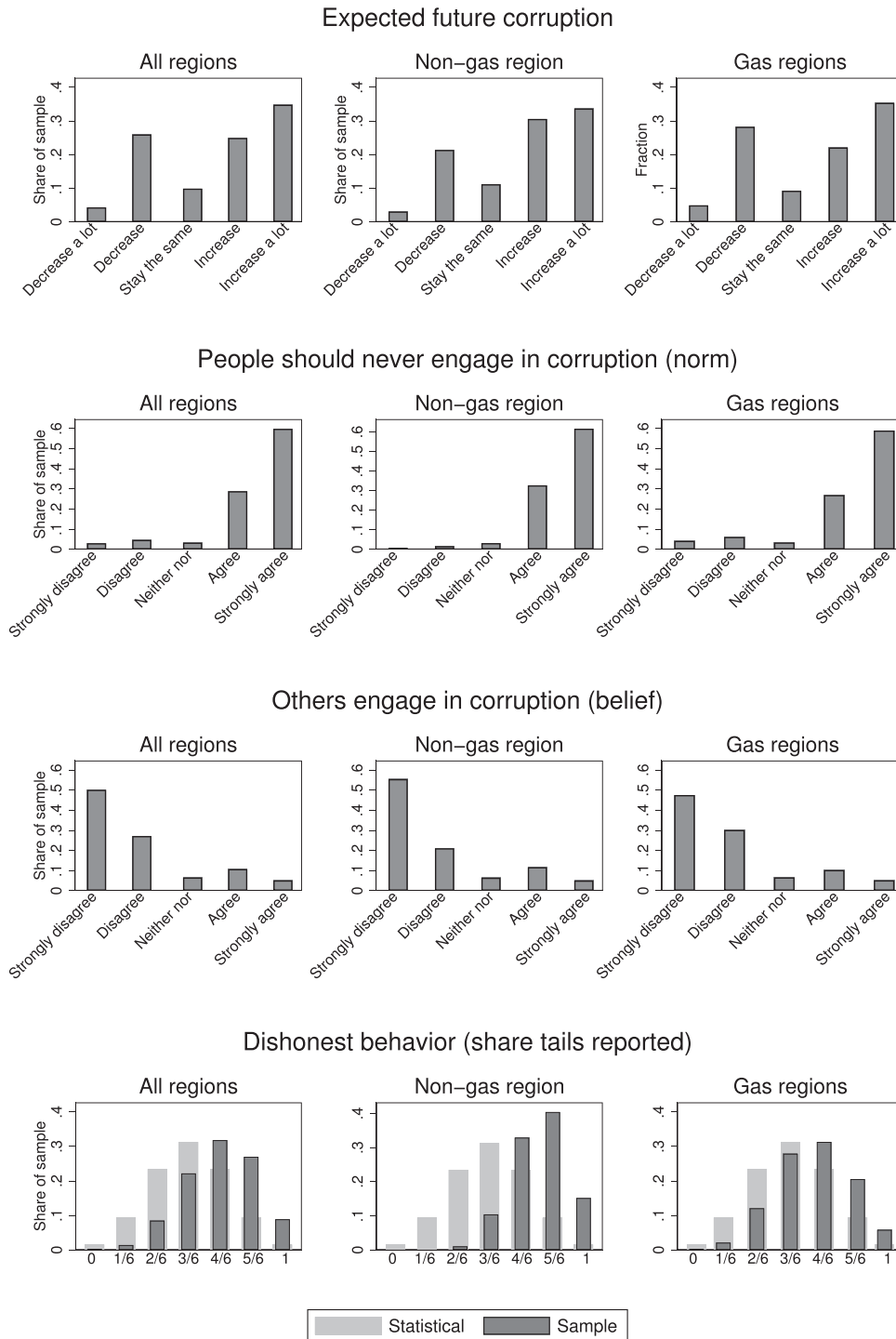


Fig. 4. Distribution of corruption measures and dishonesty *Note:* The figure illustrates the distribution of responses to the corruption questions and behavior in the dishonesty game for the total sample (left panels), the non-gas region (middle panels) and the gas regions (right panels). **Upper panel:** Expected future corruption = “In the years to come, I expect the extent of corrupt activities to: decrease a lot - decrease - stay the same - increase - increase a lot”. **Upper middle panel:** Corruption norm = “People should never engage in corrupt activities: Strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”. **Lower middle panel:** Corruption belief = “I believe that my fellow citizens would engage in corrupt activities if they could benefit from it: strongly disagree - agree - neither nor - agree - strongly agree”. **Lower panel:** Dishonest behavior: share of tails reported in the coin flipping task (dark grey) and the statistically expected distribution for the share of tails flipped in the task (light grey).

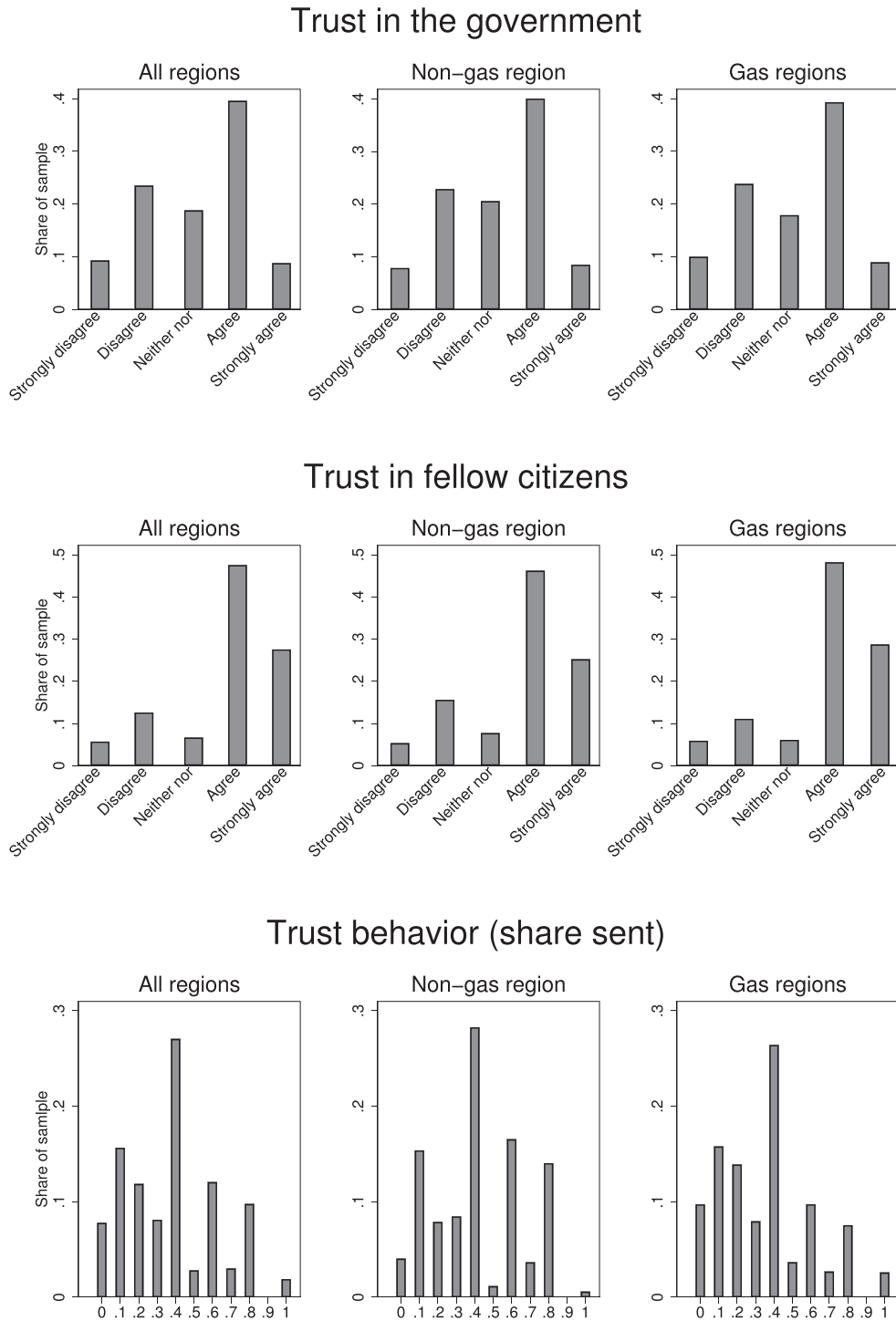


Fig. 5. Distribution of trust measures *Note:* The figure illustrates the distribution of responses to the trust measures for the total sample (left panels), the non-gas region (middle panels) and the gas regions (right panels). **Upper panel:** Trust in the government = “In the years to come, I trust the government to do what is right for Tanzania: Strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”. **Middle panel:** Trust in fellow citizens = “Generally, I trust my fellow citizens: Strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”. **Lower panel:** Trust behavior = Share of the endowment sent to another Tanzanian in the trust game.

Table 2
Effect of providing gas information on corruption measures and dishonesty.

	Expected corruption			Norm	Belief	Dishonesty
	(1)	(2)	(3)			
Gas info	0.077* (0.044)	0.070* (0.041)	0.083 (0.059)	0.015 (0.047)	0.014 (0.053)	0.053 (0.071)
Gas regions		0.016 (0.075)	0.000 (0.095)	0.162** (0.078)	0.069 (0.073)	0.164 (0.108)
Gas info X Gas regions			0.023 (0.081)	0.058 (0.071)	0.011 (0.069)	0.033 (0.095)
Above median age		0.024 (0.037)	0.024 (0.037)	0.051 (0.034)	0.081*** (0.029)	0.588*** (0.045)
Lower sec or more		0.021 (0.046)	0.021 (0.046)	0.062 (0.041)	0.006 (0.039)	0.011 (0.056)
Male		0.113*** (0.033)	0.113*** (0.033)	0.022 (0.031)	0.035 (0.027)	0.480*** (0.043)
Self employed		0.128* (0.067)	0.128* (0.067)	0.085 (0.053)	0.055 (0.056)	0.081 (0.082)
Farmer		0.013 (0.077)	0.013 (0.077)	0.187*** (0.065)	0.057 (0.062)	0.004 (0.095)
Married		0.079** (0.038)	0.079** (0.038)	0.091** (0.036)	0.041 (0.031)	0.020 (0.047)
Gas info (Gas regions)			0.060 (0.056)	0.044 (0.053)	0.003 (0.045)	0.021 (0.064)
Enumerator FE	No	Yes	Yes	Yes	Yes	Yes
Observations	2998	2984	2984	2984	2981	1469
R ²	0.010	0.180	0.180	0.288	0.477	0.371

Robust standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variables: **Expected corruption:** “In the years to come, I expect the extent of corrupt activities to: decrease a lot - decrease - stay the same - increase - increase a lot”, standardization of five-point scale. **Norm:** “People should never engage in corrupt activities: strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”, standardization of five-point scale. **Belief:** “I believe that my fellow citizens would engage in corrupt activities if they could benefit economically from it strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”, standardization of five-point scale. **Dishonesty (incentivized measure):** share of tails reported in the coin flipping game (0, 1/6, 2/6, 3/6, 4/6, 5/6, or 1), standardized values. **Treatment variable & background variables:** “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (where the reference category is Dar es Salaam), “Gas info X Gas regions” is an interaction term between “Gas info” and “Gas regions”, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34 years, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise. “Gas info (Gas regions)” is the sum of estimated parameters for “Gas info” and “Gas info X Gas regions”. **Enumerator fixed effects (FE):** indicator variables for each of the 10 enumerators. Six respondents refused to answer the question about expected future corruption and, therefore, the number of observations in column (1) in the table is 2998.

rents and beliefs about corruption.¹⁸ In the informational video shown to the treatment group, we only added information about the estimated total gas revenues. Our first main finding is that this information caused the respondents to expect more corruption in the future.

Result 1: We find a significant causal effect of providing information about future gas revenues on beliefs about corruption in the future.

In column (4) in Table 2, we observe that the gas information does not affect the corruption norm. This null effect may reflect that the acceptance of corrupt activities is shaped more by the present level of corruption in society than expectations about future corruption, but it could also reflect that social norms are sticky and cannot easily be changed (Plateau, 2000). We note that the corruption norm is significantly stronger in the gas regions than in the non-gas region. In column (5), we report the effect on corruption beliefs. The gas information does not make people consider it more likely that others engage in corruption. From the background variables, we note that older people are less likely to believe that others engage in corruption. Finally, in column (6), we show that there is no effect of gas information on dishonest behavior. It is striking, however, to observe the strong effects of age and gender, where younger people and males are significantly more likely to engage in dishonest behavior.

We investigate whether the gas information has broader effects on trust in society in Table 3. In columns (1)–(3), we find that there is no evidence of the gas information undermining trust in the government, which may suggest that the respondents do not expect an increase in political corruption. They may rather have in mind that future gas revenues provide ample opportunities for petty corruption for businesses and public officials. In column (4), we observe that the gas infor-

¹⁸ Our manipulation was subtle to capture the mechanism, and we therefore implemented a large-scale study to be able to study small treatment effects. The minimal detectable effect size in our study is 0.12 standard deviations with 80% power and 5% significance level.

Table 3
Effect of providing information on trust.

	Government			Citizens	Trust game
	(1)	(2)	(3)		
Gas info	0.051 (0.044)	0.047 (0.042)	0.066 (0.062)	0.039 (0.063)	0.020 (0.082)
Gas regions		0.053 (0.080)	0.076 (0.099)	0.305*** (0.096)	0.034 (0.136)
Gas info X Gas regions			0.034 (0.084)	0.069 (0.083)	0.003 (0.117)
Above median age		0.181*** (0.038)	0.181*** (0.038)	0.156*** (0.038)	0.079 (0.054)
Lower sec or more		0.150*** (0.049)	0.150*** (0.049)	0.133*** (0.048)	0.107 (0.069)
Male		0.136*** (0.035)	0.136*** (0.035)	0.007 (0.034)	0.293*** (0.049)
Self employed		0.073 (0.071)	0.073 (0.071)	0.119* (0.069)	0.111 (0.102)
Farmer		0.009 (0.081)	0.009 (0.081)	0.087 (0.077)	0.107 (0.115)
Married		0.012 (0.040)	0.012 (0.040)	0.091** (0.039)	0.125** (0.055)
Gas info (Gas regions)			0.033 (0.057)	0.030 (0.054)	0.017 (0.083)
Enumerator FE	No	Yes	Yes	Yes	Yes
Observations	2999	2985	2985	2988	1517
R ²	0.007	0.092	0.093	0.147	0.139

Robust standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variables: **Government:** “In the years to come, I trust the government to do what is right for Tanzania: strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”, standardized values. **Citizens:** “Generally, I trust my fellow citizens: strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”, standardized values. **Trust game** (incentivized measure): share of endowment sent to another Tanzanian in trust game (0, 0.1, 0.2, ..., 1), standardized values. *Treatment variable & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (where the reference category is Dar es Salaam), “Gas info X Gas regions” is an interaction term between “Gas info” and “Gas regions”, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise. “Gas info (Gas regions)” is the sum of estimated parameters for “Gas info” and “Gas info X Gas regions”. *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

mation does not make them trust other citizens less, and in column (5) we find no effect on behavior in the trust game. We find some interesting patterns in the correlates of trust. In particular, men are significantly less trusting than women in the trust game, even though they report the same level of trust in other citizens. We also observe that males trust the government less, while older and less educated people are more likely to trust the government.

Taken together, we can summarize our second main result as follows:

Result 2: We do not find a causal effect of providing information about future gas revenues on the corruption views, dishonest behavior, and trust.

4.3. Mechanisms and heterogeneity

In this part, we first analyze the mechanisms driving the causal effect of gas information on expected corruption, before we study whether sub-groups of the population are affected differently by the gas information. As a robustness check for the heterogeneity analysis, we compute conservative p-values adjusted for multiple hypothesis testing for all the interaction effects we estimate, using the procedure suggested by Romano and Wolf (2016).¹⁹

In Table 4, we study whether providing information about gas revenues affects the perceived novelty of the informational video. As shown in columns (1)–(2), we do not find a treatment effect on novelty for the whole sample, but this null effect hides two opposing patterns in the non-gas region and in the gas regions, as shown in column (3). In the non-gas region, we find the expected strong positive effect of providing information on perceived novelty, whereas we find a significant negative effect in the gas regions. The effect of providing information on perceived novelty of the gas information is significantly different between the non-gas region and the gas regions.

¹⁹ Tables A.8–A.13 report heterogenous treatment effects on the other variables in the analysis.

Table 4
Effect of providing gas information on perceived novelty of information.

	(1)	(2)	(3)
Gas info	0.049 (0.046)	0.028 (0.042)	0.229*** (0.059)
Gas regions		0.096 (0.068)	0.337*** (0.092)
Gas info X Gas regions			0.347*** (0.083)
Above median age		0.069* (0.037)	0.071* (0.036)
Lower sec or more		0.437*** (0.043)	0.435*** (0.043)
Male		0.094*** (0.034)	0.095*** (0.033)
Self employed		0.226*** (0.063)	0.224*** (0.063)
Farmer		0.276*** (0.075)	0.284*** (0.075)
Married		0.027 (0.038)	0.030 (0.038)
Gas info (Gas regions)			0.118** (0.058)
Enumerator FE	No	Yes	Yes
Observations	3000	2986	2986
R ²	0.014	0.189	0.194

Robust standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable: “How much of this information was new to you? None of it - almost none of it - some of it - almost all of it - all of it”, standardized five-point scale. *Treatment variable & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (where the reference category is Dar es Salaam), “Gas info X Gas regions” is an interaction term between “Gas info” and “Gas regions” “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise and “Gas info (Gas regions)” is the sum of estimated parameters for “Gas info” and “Gas info X Gas regions”. *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

In Table 5, we report further heterogeneity analysis for how gas information affects the perceived novelty of information in different sub-groups of the sample.²⁰ We observe that there are opposite patterns in the non-gas region and the gas regions across sub-groups. The gas information has a strong positive causal effect on perceived novelty in almost all sub-groups in the non-gas region, whereas it has a strong negative effect in almost all sub-groups in the gas regions (although not always statistically significant).

A possible interpretation of the negative effect on novelty of gas information in the gas regions is that the local population in this area is better informed about the possible revenues from the gas fields, given their location closer to the fields and the prominence of this issue in the local debates.²¹ As a result, the informational video may have appeared less novel when this sequence was added to the video. In contrast, the potential for revenues from gas-field production has figured less prominently in the non-gas region and, thus, the sequence with information about expected total revenues may appear more novel to this population.

The different patterns we observe for novelty of information in the non-gas regions and the gas region suggest that there are several mechanisms driving the estimated causal effect of gas information on expected corruption. The estimated effect for the non-gas regions is consistent with gas information operating through updating the respondents’ beliefs about the natural resource rents, while the estimated effect in the gas regions is more likely to reflect that the information made gas production a salient issue before they answered the question on future corruption in the survey.

In Table 6, we provide the heterogeneity analysis for how the gas information affected future corruption in the non-gas region and the gas regions.²² We observe that for almost all sub-groups, the estimated causal effect is positive, even though the point estimates are not always precisely measured and, for many of the sub-groups, they are not statistically

²⁰ Table A.14 reports results from regressions testing whether estimated heterogeneities in this analysis are significantly different between the non-gas and the gas regions.

²¹ The government has used regional commissioners and staff from the district offices in Mtwara and Lindi, as well as village and religious leaders, to inform citizens and raise awareness about the prospects of the petroleum sector (authors’ conversations with regional and district staff in May 2016).

²² Table A.15 reports results from regressions testing whether estimated heterogeneities are significantly different between the non-gas and the gas regions. It shows that difference in effect of providing information to younger and older respondents is significantly larger in the non-gas regions (p -value = 0.084).

Table 5
Heterogeneity in the effect of gas information on novelty, for non-gas and gas regions.

	Non-gas region					Gas regions				
	(1) H. age	(2) H. educ	(3) Male	(4) Self-empl	(5) Farmer	(6) H. age	(7) H. educ	(8) Male	(9) Self-empl	(10) Farmer
Gas info	0.162** (0.068)	0.128 (0.084)	0.333*** (0.079)	0.194** (0.082)	0.211*** (0.057)	-0.112 (0.082)	-0.170*** (0.064)	-0.169** (0.085)	-0.046 (0.068)	-0.157* (0.084)
var	-0.288** (0.113)	-0.587*** (0.100)	0.116 (0.100)	0.189* (0.113)	-0.448 (0.397)	-0.030 (0.106)	-0.704*** (0.134)	-0.205* (0.105)	0.460*** (0.151)	0.258* (0.154)
Gas info x var	0.171 (0.120)	0.175 (0.113)	-0.224** (0.113)	0.060 (0.114)	0.984** (0.422)	-0.001 (0.115)	0.356** (0.144)	0.107 (0.114)	-0.312** (0.124)	0.074 (0.115)
Gas info (var)	0.333*** (0.099)	0.303*** (0.075)	0.109 (0.080)	0.254*** (0.078)	1.195*** (0.417)	-0.113 (0.082)	0.186 (0.130)	-0.062 (0.079)	-0.358*** (0.103)	-0.083 (0.079)
Enumerator FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	995	995	995	995	995	1991	1991	1991	1991	1991
R ²	0.361	0.361	0.362	0.359	0.362	0.142	0.145	0.143	0.145	0.143

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable: “How much of this information was new to you? None of it - almost none of it - some of it - almost all of it - all of it”, standardized five-point scale. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas info x var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer”, respectively, “Gas info (var)” is the sum of estimated parameters for “Gas info” and the four respective indicator variables, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise and “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table 6
Heterogeneity in effect of gas information on expected future corruption, for non-gas and gas regions.

	Non-gas region					Gas regions				
	(1) H. age	(2) H. educ	(3) Male	(4) Self-empl	(5) Farmer	(6) H. age	(7) H. educ	(8) Male	(9) Self-empl	(10) Farmer
Gas info	-0.031 (0.074)	0.159* (0.094)	0.119 (0.086)	0.109 (0.079)	0.087 (0.059)	0.030 (0.079)	0.041 (0.061)	-0.029 (0.077)	0.057 (0.064)	0.182** (0.086)
var	-0.214** (0.109)	0.080 (0.105)	0.158 (0.100)	0.126 (0.115)	-0.059 (0.358)	-0.081 (0.098)	-0.096 (0.137)	-0.023 (0.096)	0.178 (0.134)	0.207 (0.162)
Gas info x var	0.325*** (0.121)	-0.133 (0.121)	-0.067 (0.118)	-0.045 (0.118)	-0.044 (0.464)	0.052 (0.108)	0.103 (0.151)	0.164 (0.107)	0.001 (0.128)	-0.211* (0.112)
Gas info (var)	0.294*** (0.096)	0.026 (0.075)	0.052 (0.080)	0.063 (0.088)	0.043 (0.461)	0.081 (0.077)	0.144 (0.140)	0.135* (0.078)	0.058 (0.113)	-0.028 (0.073)
Enumerator FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	995	995	995	995	995	1989	1989	1989	1989	1989
R ²	0.206	0.202	0.201	0.201	0.201	0.175	0.176	0.176	0.175	0.177

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable: “In the years to come, I expect the extent of corrupt activities to: decrease a lot - decrease - stay the same - increase - increase a lot”, standardization of five-point scale. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas info x var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer” respectively, “Gas info (var)” is the sum of estimated parameters for “Gas info” and the four respective indicator variables, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Lower sec or more” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise and “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

significant. However, we find a strong and highly significant effect among the older respondents in the non-gas region: the gas information causes an increase in their expectations of future corruption by about 0.3 standard deviations ($p = 0.002$).

Older respondents are more likely to have experienced the mining boom and the associated increase in corruption in the 1990s in Tanzania (Lange, 2011). This personal experience may have influenced how older respondents updated their beliefs about future corruption, in line with the learning mechanism observed in the context of expectations about future inflation in Malmendier and Nagel (2016), and the effect of past institutions on subsequent tax compliance in Kamm et al. (2017).

We consider the finding for the older respondents to be explorative because we did not pre-specify this hypothesis, and we note that it is less strong among the older respondents in the gas regions. [Table A.16](#) shows that the adjusted for multiple hypothesis testing p-value for the treatment effect in older respondents is 0.104, and [Table A.17](#) shows that the adjusted p-value for the interaction is 0.149. The age effect should thus be interpreted with care, but we find it worthy of further investigation because it may shed light on the persistence of corruption in many developing countries.

5. Conclusions

It is important to gain a better understanding of the underlying mechanisms of the resource curse. In this paper, we report from a large-scale field experiment in Tanzania that offers causal evidence on how information about a natural resource rents shapes people's beliefs about future corruption. We introduce an experimental design that controls for a host of potential confounds by minimally manipulating an informational video also shown to the control group. We find that our information manipulation significantly affects the respondents' beliefs about future corruption, particularly among the older respondents. However, we do not find any effect on people's corruption norm, beliefs or behaviour. We thus only find limited evidence for the specific mechanism that motivated our study, namely that the presence of natural resource rents would create self-fulfilling corruption expectations ([Andvig and Moene, 1990](#)). We also do not find any evidence of the gas information having any broader effects on trust in society.

Our paper contributes to a growing literature on the micro-foundations of the resource curse. It is particularly interesting to compare our results to the study of [Armand et al. \(2020\)](#) in Mozambique, a neighboring country to Tanzania. They find that providing citizens with information about gas discovery, plans for exploration, implications for provincial government revenues and job creation does not cause more rent seeking by citizens in a lab experiment (auction measuring willingness to engage in rent-seeking), but actually enhances desirable outcomes such as voice, trust and demand for accountability. We do not find these positive effects, which may reflect an important experimental design difference between the two studies. We kept the framing as neutral as possible, only explaining how much revenue the gas discoveries could potentially generate for the government, while [Armand et al. \(2020\)](#) highlight positive implications of the revenues.

We believe that several interesting research avenues arise from the present study. First, more research is needed to understand the mechanisms driving corrupt behavior, and particularly how it relates to people's beliefs about corruption in society. We do not find evidence that beliefs about future corruption shape people's normative views on corruption or their behavior, which is suggestive of corrupt behavior instead being driven by people's beliefs about the existing level of corruption in a society. In light of the findings in [Armand et al. \(2020\)](#), it is also important to understand better how different framings of the information shape norms, beliefs, and behavior. Second, the strong effect of the information manipulation on older respondents in our study is intriguing. We interpret this finding in the learning framework of [Malmendier and Nagel \(2016\)](#), who show that belief updating is shaped by personal experiences, which may suggest that the effect on the older respondents is driven by their knowledge about the extensive corruption in the mining sector in Tanzania. This hypothesis was not pre-specified and, thus, more research is needed to understand how personal experiences of this kind may shape people's beliefs about corruption. Finally, we believe that our experimental design offers a new approach to the study of the resource curse that can be used in a variety of settings.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Additional figure and tables



Fig. A.1. Selected regions.

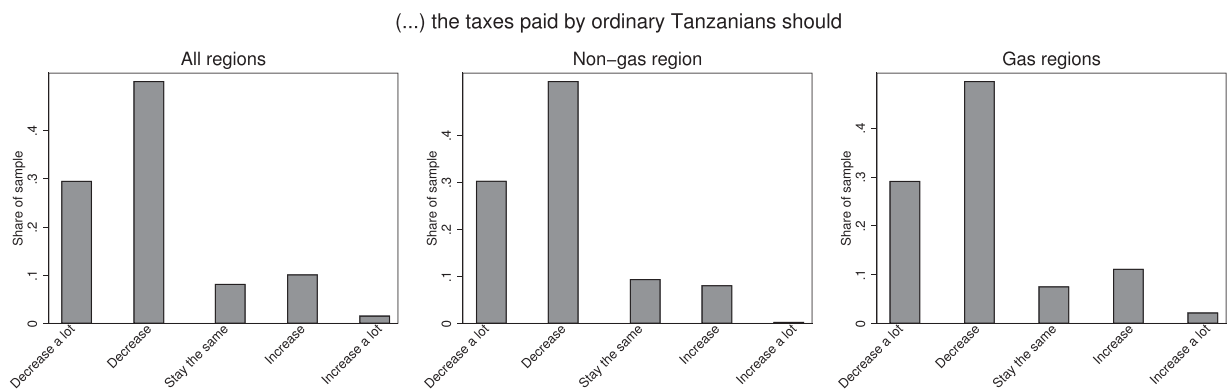


Fig. A.2. Support for increased taxation. Note: The figure illustrates the distribution of responses to the question “In order for Tanzania to achieve social and economic development in the years to come, the taxes paid by ordinary Tanzanians should: Decrease a lot - decrease - stay the same - increase - increase a lot”, for the total sample (left panel), the non-gas region (middle panel) and the gas regions (right panel).

Table A.1
Balance regressions.

	(1) All	(2) Non-gas region	(3) Gas regions
Above median age	0.004 (0.016)	0.023 (0.034)	-0.005 (0.018)
Higher education	-0.003 (0.022)	-0.011 (0.033)	0.006 (0.030)
Male	0.003 (0.015)	0.021 (0.030)	-0.002 (0.017)
Self-employed	-0.014 (0.034)	0.002 (0.042)	-0.049 (0.057)
Farmer	0.033 (0.037)	-0.019 (0.133)	0.013 (0.054)
Married	0.025 (0.017)	0.048 (0.034)	0.013 (0.020)
Gas regions	-0.025 (0.039)		
Enumerator FE	Yes	Yes	Yes
Observations	2990	996	1994
R ²	0.054	0.007	0.064

Robust standard errors are in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Notes: Regressions performed with “Gas info”, an indicator variable taking a value of one for individuals who were exposed to the gas information version of the video, as the dependent variable. *Background variables*: “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator variable taking a value of one if the respondent is married and zero otherwise and “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE)*: indicator variables for each of the 10 enumerators.

Table A.2
Observations by treatment.

Treatment	Frequency	Per cent
No gas information	687	22.87
Yearly returns/per capita	714	23.77
Yearly return/population	671	22.34
Total value/per capita	519	17.28
Total value/population	413	13.75
Total	3004	100

Notes: The table illustrates the number of observations by treatment. The total/per capita and total value/population treatments have fewer observations because of challenges in undertaking the randomization using the app.

Table A.3
Correlations, dishonest behavior and corruption measures.

	Dishonesty	Expected corruption	Corruption norm	Corruption beliefs
Dishonesty	1.000			
Expected corruption	0.095***	1.000		
Corruption norm	0.078***	0.094***	1.000	
Corruption beliefs	0.011	0.130***	-0.165***	1.000

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table reports correlations between the corruption measures and dishonest behavior. Dishonesty: share of tails reported in the coin flipping task. Expected corruption = “In the years to come, I expect the extent of corrupt activities to: decrease a lot - decrease - stay the same - increase - increase a lot”. Corruption norm = “People should never engage in corrupt activities: Strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”. Corruption beliefs = “I believe that my fellow citizens would engage in corrupt activities if they could benefit from it: strongly disagree - agree - neither nor - agree - strongly agree”.

Table A.4
Correlations, trust measures.

	Trust behavior	Trust government	Trust citizens
Trust behavior	1.000		
Trust in government	0.117***	1.000	
Trust citizen	0.208***	0.285***	1.000

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$

Notes: The table reports correlations between the trust measures. Trust behavior = Share of the endowment sent to another Tanzanian in the trust game. Trust in the government = "In the years to come, I trust the government to do what is right for Tanzania: Strongly disagree - disagree - neither disagree nor agree - agree - strongly agree". Trust in fellow citizens = "Generally, I trust my fellow citizens: Strongly disagree - disagree - neither disagree nor agree - agree - strongly agree".

Table A.5
Effect on corruption measures and dishonesty, robustness check.

	Expected corruption			Norm	Belief	Dishonesty
	(1)	(2)	(3)			
Yearly returns/capita (T1)	0.097* (0.055)	0.097* (0.051)	0.060 (0.089)	0.054 (0.070)	0.045 (0.098)	0.045 (0.102)
Yearly return/population (T2)	0.026 (0.056)	0.018 (0.051)	0.099 (0.088)	0.016 (0.068)	0.067 (0.093)	0.052 (0.094)
Total value/capita (T3)	0.035 (0.058)	0.034 (0.053)	0.054 (0.093)	0.009 (0.073)	0.053 (0.102)	0.083 (0.104)
Total value/population (T4)	0.166*** (0.062)	0.142** (0.057)	0.159* (0.091)	0.048 (0.068)	0.104 (0.101)	0.078 (0.097)
Gas regions		0.011 (0.076)	0.029 (0.106)	0.167** (0.084)	0.177* (0.107)	0.152 (0.115)
T1 X Gas info			0.065 (0.114)	0.026 (0.102)	0.026 (0.120)	0.061 (0.131)
T2 X Gas info			0.084 (0.114)	0.012 (0.102)	0.064 (0.117)	0.025 (0.128)
T3 X Gas info			0.012 (0.120)	0.056 (0.107)	0.101 (0.125)	0.035 (0.136)
T4 X Gas info			0.023 (0.124)	0.051 (0.109)	0.172 (0.131)	0.212 (0.137)
T1 (Gas regions)			0.125* (0.071)	0.079 (0.075)	0.019 (0.069)	0.016 (0.082)
T2 (Gas regions)			0.015 (0.073)	0.028 (0.076)	0.004 (0.070)	0.077 (0.086)
T3 (Gas regions)			0.041 (0.075)	0.046 (0.078)	0.048 (0.072)	0.047 (0.088)
T4 (Gas regions)			0.183** (0.085)	0.003 (0.086)	0.068 (0.084)	0.134 (0.097)
Enumerator FE	No	Yes	Yes	Yes	Yes	Yes
Background vars.	No	Yes	Yes	Yes	Yes	Yes
Observations	0.012	0.182	0.020	0.045	0.023	0.329
R ²	2998	2984	2984	2984	2981	1469

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variables: **Expected corruption**: "In the years to come, I expect the extent of corrupt activities to: decrease a lot decrease - stay the same - increase - increase a lot", standardization of five-point scale. **Norm**: "People should never engage in corrupt activities: strongly disagree - disagree - neither disagree nor agree - agree - strongly agree", standardization of five-point scale. **Belief**: "I believe that my fellow citizens would engage in corrupt activities if they could benefit economically from it strongly disagree - disagree - neither disagree nor agree - agree - strongly agree", standardization of five-point scale. **Dishonesty (incentivized measure)**: share of tails reported in the coin flipping game (0, 1/6, 2/6, 3/6, 4/6, 5/6, or 1), standardized values.

Treatment, interaction & background variables: "Annual returns/per capita (T1)" is an indicator variable taking a value of one for respondents exposed to the annual returns/per capita formulation, "Annual returns/population (T2)" is an indicator variable taking a value of one for respondents exposed to the annual returns/population formulation, "Total value/per capita (T3)" is an indicator variable taking a value of one for respondents exposed to the total value/per capita formulation, "Total value/population (T4)" is an indicator variable taking a value of one for respondents exposed to the total value/population formulation, "T1 X Gas regions", "T2 X Gas regions", "T3 X Gas regions" and "T4 X Gas regions" are interaction terms between the four respective treatment variables and "Gas regions", and "T1 (Gas regions)", "T2 (Gas regions)", "T3 (Gas regions)", "T4 (Gas regions)" are the sum of estimated parameters of "T1" and "T1 X Gas regions", "T2" and "T2 X Gas regions", "T3" and "T3 X Gas regions" and "T4" and "T4 X Gas regions", respectively. Background variables: See definitions in tablenotes of Table 2. Enumerator fixed effects (FE): indicator variables for each of the 10 enumerators.

Table A.6
Effect on perceived novelty of providing information, robustness check.

	(1)	(2)	(3)
Yearly returns/capita (T1)	0.049 (0.056)	0.050 (0.051)	0.290*** (0.089)
Yearly return/population (T2)	0.128** (0.056)	0.073 (0.052)	0.300*** (0.083)
Total value/capita (T3)	0.011 (0.061)	0.020 (0.055)	0.212** (0.096)
Total value/population (T4)	0.022 (0.064)	0.013 (0.056)	0.165* (0.090)
Gas regions		0.095 (0.068)	0.333*** (0.104)
T1 X Gas info			0.393*** (0.114)
T2 X Gas info			0.330*** (0.111)
T3 X Gas info			0.375*** (0.123)
T4 X Gas info			0.333*** (0.123)
T1 (Gas regions)			0.103 (0.071)
T2 (Gas regions)			0.030 (0.073)
T3 (Gas regions)			0.163** (0.076)
T4 (Gas regions)			0.168** (0.084)
Enumerator FE	No	Yes	Yes
Background vars.	No	Yes	Yes
Observations	0.016	0.190	0.066
R ²	3000	2986	2986

Robust standard errors are in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable: How much of this information was new to you? None of it - almost none of it - some of it - almost all of it - all of it", standardized five-point scale. *Treatment, interaction & background variables:* "Annual returns/per capita (T1)" is an indicator variable taking a value of one for respondents exposed to the annual returns/per capita formulation, "Annual returns/population (T2)" is an indicator variable taking a value of one for respondents exposed to the annual returns/population formulation, "Total value/per capita (T3)" is an indicator variable taking a value of one for respondents exposed to the total value/per capita formulation, "Total value/population (T4)" is an indicator variable taking a value of one for respondents exposed to the total value/population formulation, "T1 X Gas regions", "T2 X Gas regions", "T3 X Gas regions" and "T4 X Gas regions" are interaction terms between the four respective treatment variables and "Gas regions", and "T1 (Gas regions)", "T2 (Gas regions)", "T3 (Gas regions)", "T4 (Gas regions)" are the sum of estimated parameters of "T1" and "T1 X Gas regions", "T2" and "T2 X Gas regions", "T3" and "T3 X Gas regions" and "T4" and "T4 X Gas regions", respectively. *Background variables:* "Male" is an indicator variable taking a value of one if the respondent is a male, "Above median age" is an indicator variable taking a value of one for respondents who are older than 34, "Lower sec or more" is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, "Self-employed" is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), "Farmer" is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), "Married" is an indicator taking a value of one if the respondent is married and zero otherwise. *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.7
Effect on trust measures, robustness check.

	Government			Citizens	Trust game
	(1)	(2)	(3)	(4)	(5)
Yearly returns/capita (T1)	0.029 (0.056)	0.005 (0.053)	0.031 (0.121)	0.106 (0.096)	0.031 (0.121)
Yearly return/population (T2)	0.081 (0.055)	0.075 (0.052)	0.012 (0.127)	0.100 (0.088)	0.012 (0.127)
Total value/capita (T3)	0.045 (0.059)	0.053 (0.057)	0.038 (0.129)	0.079 (0.113)	0.038 (0.129)
Total value/population (T4)	0.047 (0.063)	0.063 (0.060)	0.021 (0.129)	0.004 (0.100)	0.021 (0.129)
Gas regions		0.053 (0.080)	0.023 (0.143)	0.262** (0.108)	0.023 (0.143)
T1 X Gas info			0.109 (0.157)	0.159 (0.117)	0.109 (0.157)
T2 X Gas info			0.035 (0.165)	0.144 (0.113)	0.035 (0.165)
T3 X Gas info			0.113 (0.165)	0.011 (0.134)	0.113 (0.165)
T4 X Gas info			0.127 (0.177)	0.057 (0.129)	0.127 (0.177)
T1 (Gas regions)			0.140 (0.101)	0.053 (0.068)	0.140 (0.101)
T2 (Gas regions)			0.047 (0.105)	0.044 (0.070)	0.047 (0.105)
T3 (Gas regions)			0.074 (0.103)	0.068 (0.073)	0.074 (0.103)
T4 (Gas regions)			0.148 (0.122)	0.061 (0.082)	0.148 (0.122)
Enumerator FE	No	No	Yes	Yes	Yes
Background vars.	No	No	Yes	Yes	Yes
Observations	0.008	0.093	0.054	0.013	0.054
R ²	2999	2985	1517	2988	1517

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variables: **Government:** “In the years to come, I trust the government to do what is right for Tanzania: strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”, standardized values. **Citizens:** “Generally, I trust my fellow citizens: strongly disagree - disagree - neither disagree nor agree - agree - strongly agree”, standardized values. **Trust game** (incentivized measure): share of endowment sent to another Tanzanian in trust game (0, 0.1, 0.2, ..., 1), standardized values. *Treatment, interaction & background variables:* “Annual returns/per capita (T1)” is an indicator variable taking a value of one for respondents exposed to the annual returns/per capita formulation, “Annual returns/population (T2)” is an indicator variable taking a value of one for respondents exposed to the annual returns/population formulation, “Total value/per capita (T3)” is an indicator variable taking a value of one for respondents exposed to the total value/per capita formulation, “Total value/population (T4)” is an indicator variable taking a value of one for respondents exposed to the total value/population formulation, “T1 X Gas regions”, “T2 X Gas regions”, “T3 X Gas regions” and “T4 X Gas regions” are interaction terms between the four respective treatment variables and “Gas regions”, and “T1 (Gas regions)”, “T2 (Gas regions)”, “T3 (Gas regions)”, “T4 (Gas regions)” are the sum of estimated parameters of “T1” and “T1 X Gas regions”, “T2” and “T2 X Gas regions”, “T3” and “T3 X Gas regions” and “T4” and “T4 X Gas regions”, respectively. *Background variables:* See definitions in tablenotes of Table 2. *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.8
Heterogeneity in effect of gas info on corruption norm, for non-gas and gas regions.

	Non-gas region					Gas regions				
	(1) Age	(2) H. educ	(3) Male	(4) Self-empl	(5) Farmer	(6) Age	(7) H. educ	(8) Male	(9) Self-empl	(10) Farmer
Gas info	-0.059 (0.056)	0.071 (0.069)	0.060 (0.060)	-0.069 (0.062)	0.008 (0.045)	-0.027 (0.077)	-0.057 (0.058)	-0.026 (0.071)	-0.012 (0.062)	-0.077 (0.068)
var	-0.044 (0.095)	0.123 (0.080)	0.038 (0.077)	-0.191** (0.087)	-0.933* (0.481)	0.057 (0.091)	-0.006 (0.070)	0.002 (0.090)	0.065 (0.140)	-0.183 (0.143)
Gas info x var	0.211** (0.098)	-0.100 (0.091)	-0.089 (0.090)	0.173* (0.090)	0.635 (0.588)	-0.031 (0.100)	0.082 (0.115)	-0.032 (0.100)	-0.144 (0.108)	0.056 (0.100)
Gas info (var)	0.152* (0.079)	-0.029 (0.060)	-0.029 (0.067)	0.105 (0.065)	0.644 (0.586)	-0.058 (0.069)	0.026 (0.123)	-0.059 (0.075)	-0.156* (0.090)	-0.020 (0.075)
Enumerator FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	994	994	994	994	994	1990	1990	1990	1990	1990
R ²	0.235	0.232	0.232	0.234	0.233	0.321	0.321	0.321	0.321	0.321

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable: “People should never engage in corrupt activities: strongly disagree - agree - neither nor - agree - strongly agree”, standardization of five-point scale. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas info x var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer”, respectively, “Gas info (var)” is the sum of estimated parameters for “Gas info” and the four respective indicator variables, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Lower sec or more” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator variable taking a value of one if the respondent is married and zero otherwise and “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.9
Heterogeneity in effect of gas info on corruption beliefs, for non-gas and gas regions.

	Non-gas region					Gas-regions				
	Age	Education	Gender	Self_employed	Farmer	Age	Education	Gender	Self_employed	Farmer
Gas info	0.036 (0.067)	0.014 (0.078)	0.095 (0.069)	0.000 (0.073)	0.001 (0.052)	0.015 (0.064)	0.011 (0.048)	0.125** (0.062)	0.031 (0.051)	0.133** (0.063)
Gas info X var	0.081 (0.105)	0.039 (0.104)	0.181* (0.104)	0.015 (0.103)	0.478** (0.232)	0.027 (0.084)	0.068 (0.117)	0.239*** (0.083)	0.146 (0.098)	0.224*** (0.085)
var	0.056 (0.101)	0.035 (0.094)	0.236*** (0.089)	0.054 (0.096)	0.378* (0.198)	0.091 (0.076)	0.063 (0.103)	0.294*** (0.075)	0.128 (0.128)	0.202 (0.127)
Gas info (var)	0.044 (0.081)	0.025 (0.069)	0.086 (0.077)	0.015 (0.073)	0.479* (0.226)	0.012 (0.059)	0.057 (0.108)	0.114 (0.059)	0.115* (0.084)	0.091 (0.059)
Enumerator FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	993	993	993	993	993	1988	1988	1988	1988	1988
R ²	0.514	0.514	0.515	0.514	0.514	0.473	0.473	0.475	0.473	0.475

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: “I believe my fellow citizens would engage in corrupt activities if they could benefit economically from it: strongly disagree - agree - neither nor - agree - strongly agree”, standardization of five-point scale. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas info x var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer”, respectively, “Gas info (var)” is the sum of estimated parameters for “Gas info” and the four respective indicator variables, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Lower sec or more” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator variable taking a value of one if the respondent is married and zero otherwise and “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.10
Heterogeneity in the effect of gas information on dishonesty, for non-gas and gas regions.

	Non-gas region					Gas regions				
	(1) Age	(2) H. educ	(3) Male	(4) Self-empl	(5) Farmer	(6) Age	(7) H. educ	(8) Male	(9) Self-empl	(10) Farmer
Gas info	-0.055 (0.089)	-0.041 (0.116)	-0.112 (0.113)	-0.008 (0.099)	-0.043 (0.071)	-0.022 (0.086)	0.002 (0.070)	-0.029 (0.095)	-0.037 (0.073)	0.012 (0.092)
var	-0.441*** (0.125)	0.040 (0.129)	0.394*** (0.125)	0.138 (0.137)	0.357 (0.463)	-0.681*** (0.105)	0.079 (0.144)	0.478*** (0.107)	0.056 (0.176)	0.071 (0.173)
Gas info x var	0.014 (0.146)	-0.016 (0.144)	0.111 (0.142)	-0.080 (0.140)	-0.306 (0.507)	0.013 (0.122)	-0.105 (0.167)	0.024 (0.125)	0.099 (0.141)	-0.047 (0.125)
Gas info (var)	-0.041 (0.114)	-0.057 (0.084)	-0.001 (0.087)	-0.087 (0.098)	-0.350 (0.501)	-0.009 (0.089)	-0.103 (0.152)	-0.004 (0.083)	0.062 (0.121)	-0.035 (0.086)
Enumerator FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	479	479	479	479	479	990	990	990	990	990
R ²	0.296	0.296	0.297	0.296	0.296	0.305	0.305	0.305	0.305	0.305

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable: Share of tails reported in the coin flipping game, standardized measure. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas info x var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer”, respectively, “Gas info (var)” is the sum of estimated parameters for “Gas info” and the four respective indicator variables, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise and “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.11
Heterogeneity in the effect of gas information on trust in government, for non-gas and gas regions.

	Non-gas region					Gas-regions				
	Age	Education	Gender	Self-empl	Farmer	Age	Education	Gender	Self-empl	Farmer
Gas info	0.002 (0.076)	0.023 (0.097)	0.018 (0.087)	0.004 (0.084)	0.064 (0.062)	0.038 (0.086)	0.086 (0.062)	0.022 (0.081)	0.014 (0.064)	0.095 (0.089)
Gas info X var	0.174 (0.132)	0.070 (0.126)	0.089 (0.123)	0.115 (0.124)	0.227 (0.588)	0.010 (0.112)	0.330** (0.151)	0.020 (0.110)	0.086 (0.140)	0.105 (0.114)
var	0.027 (0.117)	0.180* (0.107)	0.236** (0.102)	0.095 (0.120)	0.057 (0.469)	0.194* (0.101)	0.294** (0.134)	0.133 (0.099)	0.197 (0.170)	0.010 (0.161)
Gas info (var)	0.172 (0.107)	0.093 (0.080)	0.106 (0.087)	0.120 (0.091)	0.163 (0.585)	0.028 (0.074)	0.245* (0.140)	0.042 (0.078)	0.100 (0.125)	0.011 (0.073)
Enumerator FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	995	995	995	995	995	1990	1990	1990	1990	1990
R ²	0.139	0.138	0.138	0.139	0.138	0.086	0.088	0.086	0.086	0.086

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable: “In the years to come, I trust the government to do what is right for Tanzania” (Strongly disagree (1), disagree (2), neither disagree nor agree (3), agree (4), strongly agree (5)), standardized values. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas info x var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer”, respectively, “Gas info (var)” is the sum of estimated parameters for “Gas info” and the four respective indicator variables, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise and “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.12
Heterogeneity in the effect of gas information on trust in fellow citizens, for non-gas and gas regions.

	Non-gas region					Gas-regions				
	Age	Education	Gender	Self empl	Farmer	Age	Education	Gender	Self empl	Farmer
Gas info	0.001 (0.078)	0.009 (0.096)	0.051 (0.092)	0.058 (0.088)	0.030 (0.063)	0.100 (0.079)	0.035 (0.060)	0.027 (0.074)	0.037 (0.060)	0.054 (0.086)
Gas info X var	0.094 (0.133)	0.077 (0.126)	0.037 (0.125)	0.052 (0.125)	0.228 (0.460)	0.134 (0.106)	0.041 (0.131)	0.003 (0.105)	0.042 (0.130)	0.043 (0.109)
var	0.021 (0.122)	0.081 (0.111)	0.031 (0.105)	0.039 (0.123)	0.359 (0.406)	0.072 (0.095)	0.116 (0.116)	0.013 (0.094)	0.199 (0.152)	0.156 (0.141)
Gas info (var)	0.093 (0.108)	0.068 (0.083)	0.014 (0.085)	0.007 (0.089)	0.258 (0.456)	0.033 (0.072)	0.006 (0.117)	0.030 (0.075)	0.005 (0.116)	0.011 (0.069)
Enumerator FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	995	995	995	995	995	1993	1993	1993	1993	1993
R ²	0.225	0.225	0.225	0.225	0.225	0.121	0.120	0.120	0.120	0.120

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable: “Generally, I trust my fellow citizens” (Strongly disagree (1), disagree (2), neither disagree nor agree (3), agree (4), strongly agree (5)), standardized values. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas info x var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer”, respectively, “Gas info (var)” is the sum of estimated parameters for “Gas info” and the four respective indicator variables, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise and “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.13
Heterogeneity in the effect of gas information on trust behavior, for non-gas and gas regions.

	Non-gas region					Gas-regions				
	Age	Education	Gender	Self empl	Farmer	Age	Education	Gender	Self empl	Farmer
Gas info	0.030 (0.099)	0.058 (0.114)	0.075 (0.112)	0.021 (0.115)	0.014 (0.082)	0.158 (0.132)	0.042 (0.088)	0.044 (0.115)	0.068 (0.094)	0.121 (0.126)
Gas info X var	0.127 (0.176)	0.083 (0.165)	0.211 (0.166)	0.071 (0.164)	0.313 (0.564)	0.241 (0.167)	0.129 (0.249)	0.132 (0.162)	0.416** (0.188)	0.166 (0.166)
var	0.191 (0.160)	0.153 (0.137)	0.247* (0.133)	0.091 (0.163)	0.591*** (0.195)	0.115 (0.153)	0.078 (0.232)	0.161 (0.147)	0.275 (0.233)	0.147 (0.229)
Gas info (var)	0.097 (0.145)	0.025 (0.117)	0.136 (0.119)	0.050 (0.117)	0.299 (0.558)	0.082 (0.104)	0.087 (0.234)	0.087 (0.116)	0.348** (0.164)	0.045 (0.109)
Enumerator FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	516	516	516	516	516	1001	1001	1001	1001	1001
R ²	0.226	0.226	0.228	0.226	0.225	0.116	0.114	0.114	0.118	0.115

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable: Share of endowment sent to another Tanzanian in trust game (0, 0.1, 0.2, ..., 1), standardized values. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas info x var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer”, respectively, “Gas info (var)” is the sum of estimated parameters for “Gas info” and the four respective indicator variables, “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Higher education” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise and “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.14
Heterogeneity in effect of gas information on novelty, with interaction.

	(1) H. age	(2) H. educ	(3) Male	(4) Self-empl	(5) Farmer
Gas info	0.162** (0.073)	0.103 (0.089)	0.328*** (0.082)	0.179** (0.086)	0.215*** (0.059)
Gas regions	0.236** (0.109)	0.318*** (0.114)	0.497*** (0.120)	0.258** (0.118)	0.354*** (0.103)
Var	0.307*** (0.112)	0.573*** (0.106)	0.105 (0.104)	0.153 (0.114)	0.608 (0.450)
Gas info X Gas regions	0.282*** (0.109)	0.274** (0.110)	0.501*** (0.119)	0.232** (0.110)	0.373*** (0.101)
Gas info X Var	0.196 (0.124)	0.231* (0.119)	0.203* (0.118)	0.103 (0.119)	1.128** (0.494)
Gas regions X Var	0.274* (0.152)	0.142 (0.165)	0.314** (0.148)	0.288* (0.153)	0.844* (0.459)
Gas info X Gas regions X Var	0.193 (0.168)	0.095 (0.185)	0.308* (0.164)	0.405** (0.170)	1.060** (0.507)
Enumerator FE	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes
Observations	2986	2986	2986	2986	2986
R ²	0.196	0.197	0.196	0.196	0.196

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: “How much of this information was new to you? None of it - almost none of it - some of it - almost all of it - all of it”, standardized five-point scale. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas regions” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (where the reference category is Dar es Salaam), “Gas info x Gas regions” is an interaction between “Gas info” and “Gas region”, “Gas info x var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer” respectively, “Gas region x var” is an interaction between “Gas region” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer” respectively. “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Lower sec or more” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise. *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.15
Heterogeneity in effect of gas information on expected future corruption, with interaction.

	(1) H. age	(2) H. educ	(3) Male	(4) Self-empl	(5) Farmer
Gas info	0.036 (0.075)	0.157* (0.094)	0.125 (0.086)	0.098 (0.079)	0.085 (0.059)
Gas regions	0.041 (0.110)	0.059 (0.119)	0.095 (0.119)	0.022 (0.111)	0.095 (0.106)
Var	0.217** (0.106)	0.067 (0.104)	0.170* (0.100)	0.128 (0.111)	0.023 (0.356)
Gas info X Gas regions	0.072 (0.108)	0.114 (0.112)	0.151 (0.116)	0.041 (0.102)	0.106 (0.104)
Gas info X Var	0.327*** (0.122)	0.135 (0.120)	0.086 (0.118)	0.029 (0.119)	0.107 (0.464)
Gas regions X Var	0.138 (0.142)	0.164 (0.169)	0.187 (0.139)	0.031 (0.153)	0.165 (0.366)
Gas info X Gas regions X Var	0.281* (0.162)	0.243 (0.192)	0.250 (0.159)	0.047 (0.174)	0.114 (0.477)
Enumerator FE	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes
Observations	2984	2984	2984	2984	2984
R ²	0.182	0.181	0.181	0.181	0.182

Robust standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: “In the years to come, I expect the extent of corrupt activities to: decrease a lot - decrease - stay the same - increase - increase a lot”, standardization of five-point scale. *Treatment variable, interaction & background variables:* “Gas info” is an indicator variable taking a value of one for respondents who were exposed to gas information, “Gas region” is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (where the reference category is Dar es Salaam), “Gas info x Gas regions” is an interaction between “Gas info” and “Gas regions”, “Gas info x Var” is an interaction between “Gas info” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer” respectively, “Gas regions x Var” is an interaction between “Gas region” and “Above median age” (H. age), “Lower sec or more” (H. educ), “Male”, “Self-employed” (Self-empl) and “Farmer” respectively. “Male” is an indicator variable taking a value of one if the respondent is a male, “Above median age” is an indicator variable taking a value of one for respondents who are older than 34, “Lower sec or more” is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, “Self-employed” is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), “Farmer” is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), “Married” is an indicator taking a value of one if the respondent is married and zero otherwise. *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.16
Heterogeneity in effect of gas information in expected future corruption: multiple hypothesis adjusted p -values.

	Non-gas region			Gas regions		
	Difference	Unadjusted p -values	Romano-Wolf p -values	Difference	Unadjusted p -values	Romano-Wolf p -values
Below median age	0.031	0.643	0.998	0.030	0.750	0.998
Above median age	0.294	0.003	0.104	0.081	0.337	0.980
Less educated	0.159	0.114	0.759	0.041	0.588	0.998
More educated	0.026	0.784	0.998	0.144	0.396	0.991
Female	0.119	0.246	0.949	0.029	0.098	0.730
Male	0.052	0.559	0.998	0.135	0.573	0.998
Self-employed	0.063	0.480	0.996	0.058	0.668	0.998
Not self-employed	0.109	0.265	0.955	0.057	0.381	0.990
Farmer	0.043	0.988	0.998	0.028	0.728	0.998
Not Farmer	0.087	0.192	0.906	0.182	0.050	0.515

The table reports unadjusted and adjusted p -values of individual hypothesis tests, for the “Gas info” and “Gas info(var)” coefficients. “Differences” refers to the estimates in the corresponding columns in Table 6. The adjusted p -values are calculated using the Romano and Wolf (2016) procedure. The bootstrapping is done with 10,000 repetitions.

Table A.17
Heterogeneity in effect of gas information in expected future corruption, interactions: multiple hypothesis adjusted p -values.

	Non-gas region			Gas regions		
	Difference	Unadjusted p -values	Romano-Wolf p -values	Difference	Unadjusted p -values	Romano-Wolf p -values
Below vs. above median age	0.325	0.009	0.149	0.052	0.655	0.994
Less vs. more educated	0.133	0.282	0.913	0.103	0.559	0.993
Female vs. male	0.067	0.636	0.994	0.164	0.110	0.652
Not self-employed vs. self-employed	0.045	0.831	0.994	0.001	0.961	0.994
Not farmer vs. farmer	0.044	0.881	0.994	0.211	0.079	0.564

The table reports unadjusted and adjusted p -values of individual hypothesis tests, for the “Gas info x var” coefficient. “Differences” refers to the estimates in the corresponding columns in Table 6. The adjusted p -values are calculated using the Romano and Wolf (2016) procedure. The bootstrapping is done with 10,000 repetitions.

Table A.18
Effect on tax attitude of providing gas information.

	(1)	(2)	(3)
Gas info	0.021 (0.043)	0.036 (0.042)	0.052 (0.058)
Gas regions		0.242*** (0.078)	0.260*** (0.098)
Gas info X Gas regions			0.027 (0.082)
Above median age		0.071* (0.039)	0.071* (0.039)
Lower sec or more		0.224*** (0.048)	0.224*** (0.048)
Male		0.031 (0.035)	0.031 (0.035)
Self employed		0.055 (0.069)	0.055 (0.069)
Farmer		0.075 (0.082)	0.074 (0.082)
Married		0.046 (0.040)	0.046 (0.040)
Gas info (Gas regions)			0.025 (0.058)
Enumerator FE	Yes	Yes	Yes
Observations	3004	2990	2990
R ²	0.006	0.103	0.103

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: "In order for Tanzania to achieve a desired social and economic development in the years to come, the taxes paid by ordinary Tanzanians, like the VAT, should: decrease a lot - decrease - stay the same - increase - increase a lot", standardization of five-point scale. *Treatment variable & background variables:* "Gas info" is an indicator variable taking a value of one for respondents who were exposed to gas information, "Gas region" is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (where the reference category is Dar es Salaam), "Gas info X Gas regions" is an interaction term between "Gas info" and "Gas region", "Male" is an indicator variable taking a value of one if the respondent is a male, "Above median age" is an indicator variable taking a value of one for respondents who are older than 34 years, "Higher education" is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, "Self-employed" is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), "Farmer" is an indicator variable taking a value of one for respondents who are farmers (the reference category is formal sector employee), "Married" is an indicator taking a value of one if the respondent is married and zero otherwise. "Gas info (Gas regions)" is the sum of estimated parameters for "Gas info" and "Gas info X Gas regions". *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Table A.19
Heterogeneity in effect of gas information on tax attitude, for non-gas and gas regions.

	Non-gas region					Gas region				
	H. age	H. educ	Male	Self-empl	Farmer	H. age	H. educ	Male	Self-empl	Farmer
Gas info	0.132* (0.068)	0.126 (0.082)	0.045 (0.078)	0.075 (0.082)	0.060 (0.057)	0.022 (0.087)	0.027 (0.064)	0.167** (0.084)	0.063 (0.066)	0.023 (0.090)
Gas info X var	0.229* (0.124)	0.139 (0.115)	0.194* (0.113)	0.051 (0.115)	0.846 (0.717)	0.022 (0.115)	0.039 (0.151)	0.254** (0.114)	0.137 (0.135)	0.018 (0.116)
var	0.314*** (0.112)	0.395*** (0.098)	0.081 (0.092)	0.076 (0.111)	0.801 (0.623)	0.005 (0.105)	0.099 (0.137)	0.136 (0.102)	0.127 (0.164)	0.000 (0.157)
Gas Info (var)	0.097 (0.103)	0.014 (0.080)	0.149* (0.082)	0.024 (0.080)	0.785 (0.714)	0.044 (0.076)	0.066 (0.137)	0.087 (0.078)	0.074 (0.118)	0.041 (0.075)
Enumerator FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Background variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	996	996	996	996	996	1994	1994	1994	1994	1994
R ²	0.157	0.155	0.156	0.154	0.156	0.111	0.111	0.113	0.111	0.111

Dependent variable: "In order for Tanzania to achieve a desired social and economic development in the years to come, the taxes paid by ordinary Tanzanians, like the VAT, should: decrease a lot - decrease - stay the same - increase - increase a lot", standardization of five-point scale. *Treatment variable, interaction & background variables:* "Gas info" is an indicator variable taking a value of one for respondents who were exposed to gas information, "Gas info x var" is an interaction between "Gas info" and "Above median age" (H. age), "Lower sec or more" (H. educ), "Male", "Self-employed" (Self-empl) and "Farmer" respectively, "Gas info (var)" is the sum of estimated parameters for "Gas info" and the four respective indicator variables, "Male" is an indicator variable taking a value of one if the respondent is a male, "Above median age" is an indicator variable taking a value of one for respondents who are older than 34, "Lower sec or more" is an indicator taking a value of one if the respondent has completed lower secondary school or a higher level of education, "Self-employed" is a dummy taking a value of one for respondents who are self-employed in the non-agricultural sector (the reference category is a formal sector employee), "Farmer" is an indicator variable taking a value of one for respondents who are farmers (the reference category is a formal sector employee), "Married" is an indicator taking a value of one if the respondent is married and zero otherwise and "Gas regions" is an indicator variable taking a value of one for respondents residing in Mtwara and Lindi (the reference category is Dar es Salaam). *Enumerator fixed effects (FE):* indicator variables for each of the 10 enumerators.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.jebo.2020.12.027](https://doi.org/10.1016/j.jebo.2020.12.027).

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