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Corruption as a Self-Fulfilling Prophecy: Evidence from a Survey Experiment in Costa Rica

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Abstract¹

An influential body of scholarship argues that corruption behaves as a self-fulfilling prophecy. The idea of this work is that levels of corruption emerge endogenously as a result of a society-wide coordination game in which the individual returns to corrupt behavior are a function of how disposed towards corruption the other members of society are perceived as being. An empirical implication of this logic is that if one were to exogenously perturb beliefs about societal levels of corruption upward, willingness to engage in corruption should increase as a consequence. The current paper evaluates this claim by utilizing an information experiment embedded in a large-scale household survey conducted in the Gran Área Metropolitana (GAM) of Costa Rica from October 2013 to April 2014 (n=4200). Changes in beliefs about corruption were induced via the random assignment of an informational display depicting the increasing percentage of Costa Ricans who have experienced or directly observed an act of corruption (from 2006 to 2011). The paper finds that, on average, assignment to this display (relative to the control condition) increased the probability that a respondent would be willing to pay a bribe to a police officer by approximately 0.04 to 0.08, thereby providing supporting evidence for the self-fulfilling prophecy hypothesis.

JEL Classification: D73, D84, C83, C90

Keywords: Corruption, Spillover effects, Survey experiments, Sensitive question techniques

¹ This paper was prepared when Ana Corbacho was Sector Economic Advisor in the Institutions for Development Sector at the Inter-American Development Bank. Correspondence should be directed to Daniel W. Gingerich (dwg4c@virginia.

1 Introduction

Scholarship on corruption has long emphasized the notion that corruption may corrupt. In particular, a number of scholars have developed the argument that levels of corruption may emerge endogenously as a result of a society-wide coordination game in which the individual returns to corrupt behavior are a function of the inclination towards corruption of the other members of society (Andvig and Moene, 1990; Mishra, 2006; Persson, Rothstein and Teorell, 2013). This view of corruption as a coordination game has some relatively straightforward empirical implications. One of these is the expectation that the higher the level of perceived corruption in a society, the more likely it is that individual members of that society would be willing to engage in corrupt behavior. In other words, corruption behaves as a self-fulfilling prophecy.

Much is at stake in empirically assessing whether or not corruption corrupts. Evidence in favor of this hypothesis would support theoretical claims that corruption is an endeavor characterized by strategic complementarities among economic agents. As is well known, the presence of such complementarities lends itself to the existence of multiple equilibria (e.g., Milgrom and Roberts, 1990). In the context studied here, this means that a given polity might find itself locked into a relatively high or relatively low equilibrium level of corruption depending on the precise manner in which citizens resolve their coordination dilemma. Thus, accepting the view that corruption corrupts implies that long-run variation in corruption encountered across polities must be understood as a consequence of two factors: first, the set of institutions that determine the costs and benefits that accrue to corrupt behavior (thereby affecting the incidence of corruption in *any* feasible equilibrium) and, second, the mix of cultural norms and beliefs that determine which of the potential corruption equilibria will prevail at a given time. For social scientists, this means that a comprehensive account of long-run differences across space and time in the quality of governance would necessarily consider both the organization of the formal rules of the game, so to speak, as well as the informal beliefs that determine how nation-states and other collectivities come to think about themselves.

Does corruption corrupt? Does the level of perceived corruption in a society affect an individual's willingness to engage in corrupt behavior? In this paper, we provide evidence that an individual's willingness to engage in corrupt behavior is indeed affected by her perception of the level of corruption in society. Using data from an original survey experiment in Costa Rica, we show that learning about increasing levels of corruption increases the likelihood that citizens would be willing to bribe a police officer in order to avoid paying a traffic ticket.

Costa Rica provides a propitious environment for studying the questions that concern us here. Although corruption in Costa Rica is relatively low by regional standards, the country has experienced a substantial increase in perceived corruption in recent years. According to the 2013 Corruption Perception Index by Transparency International, Costa Rica is ranked 49 among 177

countries, considerably above Honduras (140), Nicaragua (127), Guatemala (123), Mexico (106), and Panama (102). In fact, the only two Latin American countries that perform better than Costa Rica on this metric are Uruguay (19) and Chile (22). However, according to a nationally representative survey conducted by *Latinobarómetro*, the number of people who have witnessed an act of corruption has increased from 16 percent in 2006 to 24 percent in 2011.² At the elite level, the country has seen repeated political corruption scandals over the last decade, including the indictment of three different past presidents for bribery (and the conviction of two of them) as well as a number of forced resignations among cabinet officials. Corruption scandals of that magnitude have no precedent in earlier periods of the modern history of the country. Moreover, the growth of corruption in Costa Rica also appears to have been accompanied by an increase in other forms of societal disorder, in particular, a rise in violent crime and the use of the country as a transshipment point in the international narcotics trade.³ Given these abrupt changes occurring in a country once characterized as the “Switzerland of Central America,” beliefs about how deeply embedded corruption is in Costa Rica society are likely to be in flux for many individuals. For this reason, the country is a natural setting for exploring how information about the scope of corruption may drive corrupt behavior.

2 Corruption as a Self-Fulfilling Prophecy: Theory and Evidence

Theoretical approaches to the study of corruption have long emphasized that the phenomenon is subject to coordination dilemmas and herd behavior, and, as a consequence, that high (or low) levels of corruption tend to feed upon themselves and persist over time. The specific mechanisms adduced to explain why corruption tends to operate as a self-fulfilling prophecy are many and varied.

Some accounts concentrate on how the existence of corruption undermines sanctioning mechanisms, thereby furthering the incidence of corruption in the first place. Such a dynamic may be operative if the probability of detection is inversely related to the frequency of corrupt behavior (Lui, 1986) or if the costs of detection are mitigated by the fact that supervisors responsible for monitoring corruption are also subject to bribery (Cadot, 1987; Andvig and Moene, 1990). Moreover, in a regulatory setting, corruption can undermine sanctioning (thereby fomenting greater corruption) if the frequency of illicit behavior by firms reduces the returns to skill formation by regulators (Mishra, 2006).

Another perspective holds that corruption can corrupt by affecting search costs. The idea here is that the more inclined towards corruption are members of the private sector and government,

² This perception of increasing corruption was corroborated by the focus groups we conducted in Costa Rica prior to the survey. See the Appendix for further details on the focus groups.

³ Although relatively safe by regional standards, the country’s homicide rate nearly doubled from 2001 to 2010, growing from 6.4 per 100,000 to 11.5 per 100,000 (Departamento de Planificación, Anuario Policial 2010).

or, equivalently, the more certain each set of actors is about the corruptibility of the other, the less costly it is to find a partner willing to consummate a corrupt bargain and the more attractive initiating a corrupt transaction will be (Ryvkin and Serra, 2012; see also Andvig and Moene, 1990).

Recent work from a psychological perspective emphasizes the role of guilt aversion in generating corruption spillovers. In this view, the moral cost public officials associate with engaging in corruption is a function of how corrupt they think the public perceives them (the officials) to be. Greater corruption by officials pushes citizens' beliefs about public probity downwards, thereby reducing moral costs among officials and instigating a corruption spiral (Huang and Wu, 1994; Balafoutas, 2011).

Accounts focusing explicitly on long-run dynamics tend to emphasize the consequences of reputational lock-in for collectivities or the intergenerational transmission of cultural values. In an influential paper, Tirole, 1996 noted that due to imperfect observability of past individual behavior, economic agents may condition trading decisions on the reputation of the collectivity to which their partner belongs. As such, agents in organizations whose founding members have acted corruptly have little incentive to behave honestly, since potential trading partners will anticipate corrupt dealing on their part. In a related contribution, Hauk and Sáez-Martí, 2002 argue that in the long run corruption corrupts due to educational decisions made in the home. If parents anticipate that future public policy will favor the dishonest, they will invest in transmitting their cultural values to their children only if they themselves are dishonest, and abstain from doing so otherwise. Consistent with these ideas is work that advances the notion of corruption spirals being driven by imitative behavior in which agents act corruptly if doing so has been a successful strategy in the past for their neighbors (e.g., Accinelli and Carrera, 2012).⁴

Political economy treatments of corruption note that externalities generated by political exchange can also give birth to corruption spirals. Two contributions argue that corruption can corrupt by affecting the selection mechanism determining who holds public office. One such account claims that, since the value of holding office (i.e., ego rents) is a function of the ability cum honesty of existing officeholders, once the current political elite has been corrupted, it will typically be only dishonest citizens who will be willing to stand for public office in the future (Caselli and Morelli, 2004). The other claims that, since the capacity of interest groups to smear or threaten politicians is greater the lower the overall ability/honesty of the political elite, the less attractive public office will be for honest would-be politicians when the current political elite is corrupt (Dal Bó and Di Tella, 2006). A third political economy treatment of how corruption corrupts focuses on the organization of party patronage networks in the bureaucracy (Gingerich, 2009). It claims that since the value of the rewards offered by a party leader to rank-and-file militants in the bureaucracy

⁴ For other examples of imitation (or “learning by observing”) see Bikhchandani, Hirshleifer and Welch, 1998.

is greater the stronger the party in electoral terms, said militants will be more inclined to engage in state plunder at the behest of their party if they anticipate their copartisans are doing so as well.

Relative to the extensive theoretical work on the topic, the empirical literature examining the degree to which corruption corrupts is still at a very early stage. Several papers have used aggregate data to show that corruption might be contagious. For example, Dong and Torgler, 2012 use province-level data for China from 1998 to 2007 to show that social interaction has a significant positive effect on corruption. Using state-level U.S. data from 1995 to 2004, Goel and Nelson, 2007 also find evidence of neighboring corruption: a 10 percent increase in corruption in neighboring states increases corruption in a state by about 4 to 11 percent. López-Valcarcel, Jiménez and Perdiguero, 2014 similarly find evidence that corruption is contagious using a dataset of local Spanish municipalities from 2001-2010. Studies by Becker, Egger and Seidel, 2009 and Goel and Saunoris, 2014 utilize cross-national data and spatial econometric techniques to estimate the degree to which corruption in one country affects its neighbors. In both cases, the authors find evidence of spillover effects. However, contrary to the findings of these studies, Márquez, Salinas-Jiménez and Salinas-Jiménez, 2011 also use a spatial econometric approach applied to a cross-section of countries and find no evidence of corruption spillovers.

Articles that explore the contagiousness or self-fulfilling hypothesis using individual-level data, as we do in this paper, are few and far between. To the best of our knowledge, the only article that directly studies the relationship between perceived corruption in a society and individual behavior using individual-level data is an article by Dong, Dulleck and Torgler, 2012. Using data from the European Values Survey, they show that the more respondents perceive others as being corrupt, the more tolerant they are towards someone accepting a bribe in the course of their duties. Recent work by Simpser, 2013 provides individual-level evidence on one mechanism by which corruption can corrupt, namely, the intergenerational transmission of attitudes towards corruption. Using data from the U.S. and European General Social Surveys, he finds that, holding current institutional context constant, attitudes towards corruption in a respondent's ancestral country of origin strongly predict current attitudes towards the same. In laboratory experiments conducted with undergraduates in the United States and India, Innes and Mitra, 2013 find that information treatments indicating a peer propensity towards dishonesty in a game setting increased the likelihood of dishonest play, a finding that they interpret as evidence for the contagiousness of corruption hypothesis.

In a broader reading, our paper can be seen as a contribution to the large empirical literature on how social context affects individuals' willingness to engage in crime. In a seminal paper, Kahan, 1997 outlined the logic behind these findings. He argues that individuals are much more likely to commit crimes when crime is widespread in their communities because they are likely to assume that both the probability of being caught and the potential cost of stigmatization are

low. Empirical evidence has shown that the decision to commit a crime is in fact affected by the behavior of others. For instance, using data from U.S. cities and New York City neighborhoods, Glaeser, Sacerdote and Scheinkman, 1996 show that individuals are more likely to commit crimes when crime around them is widespread, especially less serious crimes such as larceny and auto theft. Using survey data from the United States, Sheffrin and Treist, 1992 find that perceiving other taxpayers as dishonest increases the likelihood that an individual will evade taxes. Other studies have shown that neighborhood and peer effects are similarly important in explaining related behaviors such as academic cheating (Carrell, Malmstrom and West, 2008), fraud in emissions testing (Pierce and Snyder, 2008), and shirking on the job (Ichino and Maggi, 2000).

Finally, our paper is part of a growing literature that uses experimental and quasi-experimental methods in order to understand how information about corruption shapes the behavior of citizens. Most of this work has concentrated on how information about corruption affects vote choice and political participation. For example, taking advantage of a natural experiment generated in Brazil by the randomized federal auditing of local governments, Ferraz and Finan, 2008 show that mayors revealed to be corrupt lose electoral support. Focusing on the case of Mexico, Chong, De La O, Karlan et al., 2011 found that distributing information about a corrupt incumbent decreases incumbent support as well as turnout. Using an information experiment conducted in Brazil, Winters and Weitz-Shapiro, 2013 present findings that indicate that information about corruption decreases support for an hypothetical corrupt politician, even when that politician performs well in office. The current study extends upon this work by explicitly considering the role that citizens—as opposed to politicians or other officeholders—may play in actively propagating corruption throughout their societies.

3 Measuring Citizens' Willingness to Engage in Corruption: The Joint Response Model

Accurately measuring whether a citizen would be willing to bribe (or has, in fact, done so in the past) has long been recognized as one of the great challenges of empirical scholarship on corruption (e.g., Treisman, 2007). Recognizing both the potential of social surveys to study corruption as well as the biases they invite when applied in standard form to sensitive issues, a number of scholars have begun to employ sensitive survey techniques (SSTs) in studies of this topic (Gingerich, 2010; Gingerich, 2013; Malesky, Gueorguiev and Jensen, 2014). Following this lead, we utilize an SST-based approach in the current paper. However, we do so in a novel way, by utilizing individual responses about corruption based on *both* a specific SST and direct questioning. We refer to the statistical framework we utilize to analyze the joint protected and direct responses as the joint response model. In a companion paper (Gingerich, 2014), we show that utilizing a joint response

Figure 1. The crosswise survey item on willingness to bribe

| How many of the following statements are true? |
|--|
| <p>- My mother was born in OCTOBER, NOVEMBER, OR DECEMBER</p> <p>- In order to avoid paying a traffic ticket, I would be willing to pay a bribe to a police officer</p> <p style="text-align: center;"><u>please indicate your answer below</u></p> <p>A. <u>both</u> statements are true OR <u>neither</u> statement is true</p> <p>B. <u>one</u> of the two statements is true</p> |

Remember. Your mother's birthdate is unknown to anyone involved in the collection, administration, or analysis of this survey. As such, your confidentiality is guaranteed.

approach provides all of the bias reducing advantages of pure SST questioning while at the same time greatly enhancing the precision of parameter estimates.

3.1 Survey Questioning Format

The questioning strategy we utilized is easy to describe. First, respondents were presented with a question about willingness to bribe a police officer in order to avoid a traffic ticket using a particular SST format called the crosswise model (Yu, Tian and Tang, 2008; Tan, Tian and Tang, 2009). This technique provides anonymity to respondents via the commingling of responses about a sensitive issue (corruption) with responses about an innocuous question. (The crosswise model is mathematically identical to the Warner version of the well-known randomized response technique, but it is administered without the use of a randomizing device). Next, at a later stage of the survey respondents were queried directly about willingness to bribe a police officer (in the exact same context), with the explicit option of "choose not to respond directly" provided to them in case they deemed a direct response to be uncomfortable or inappropriate. Observed responses about willingness to bribe were thus a discrete combination of responses under the protection afforded by the SST and the absence of protection under direct questioning.

Figure 1 presents the question about willingness to bribe based on the crosswise model. The respondent was presented with two statements and asked how many were true. The first statement simply states that the respondent's mother was born in October, November, or December. One can conceptualize affirmative responses to this statement as indicating membership in a non-sensitive

group. The second statement, the one of primary interest, denotes a willingness to pay a bribe. The privacy of the respondent was protected by constraining the manner in which she was allowed to respond. In particular, there are only two potential responses: one response (A) indicating that either both statements are true OR neither statement is true and another response (B) indicating that only one of the two statements is true (but not specifying which is true). Since neither of the two responses necessarily indicates willingness or unwillingness to bribe, the respondent's anonymity is guaranteed. For this reason, the respondent may be liberated from social desirability concerns that might otherwise prevent her from giving an honest answer about corruption.

In using the crosswise model, it is important to note that membership in the non-sensitive group (i.e., an unobserved, affirmative response to the first statement) is special in that it: i) must be known to each respondent but unknown to survey administrators (and known by each respondent to be unknown to administrators); ii) must be statistically independent of the sensitive trait of interest (willingness to bribe); iii) must have a proportion in the population of interest that is known in advance by investigators; and iv) must have proportion which is different from 1/2. Using the birth month of one's mother, as we did for this question, helps ensure that nearly all respondents would know their own group assignment and that they would also be aware that the survey enumerator did not know their group assignment (thereby ensuring privacy). Moreover, there is no realistic mechanism by the birth month of one's mother should be systematically tied to willingness to bribe, so the group indicator and the sensitive item are surely independent of one another. Finally, the population proportion of individuals belonging to the non-sensitive group is verifiable based on census records, meaning that such a group can be easily chosen such that the probability of membership differs arbitrarily from 1/2. Although the crosswise model is relatively new, the empirical evidence that does exist on its effectiveness is favorable to its use (Jann, Jerke and Krumpal, 2012).

The direct question about willingness to bribe, presented to respondents at the very end of the survey, asked them to respond only to the second statement presented in Figure 1. In this case, response options were "True," "False," and "I prefer not to respond." Detailed information about the enumerator scripts used for questioning about willingness to bribe is provided in the Appendix.

In order to calculate the probability of having one's mother born in the indicated interval of months, we conducted a nationally representative telephone survey of 1,200 Costa Ricans during July 15-20, 2013. The survey asked respondents directly about the birthday of their mother and father. Since there should be no systematic differences in month and day of birth across sex of child, the probability that a mother's birthday fell within the indicated interval of months was calculated by pooling the responses for mothers and fathers. To check the veracity of the survey reports, they were checked against data from Costa Rica's National Institute for Statistics and

Censuses (INEC) on month of birth for newborns for the 2000-2011 period.⁵ These numbers were for all intents and purposes identical, differing only at the third decimal place or thereafter, suggesting that there was no recall bias or similar problems that might threaten the use of birthdays in the manner employed in this paper.

3.2 Statistical Framework

Following the discussion above, we consider a setting in which each respondent i in a randomly selected sample of size n is first queried about her (unobservable) willingness to bribe $\theta_i \in \{0$ (“unwilling”), 1 (“willing”)} using the crosswise method then later asked if she would be willing to respond directly to a question about the same topic. If the respondent responds affirmatively to the latter question, she is then prompted to respond directly to the statement about bribery. The (observable) combined response of respondent i to the two questions is denoted by the vector $Y_i = (y_i^D, y_i^A)$, where $y_i^D = \{0$ (“False”), 1 (“True”), \emptyset (“unwilling to respond directly”)} is the observed response when i is asked to respond directly and $y_i^A \in \{0$ (“B”), 1 (“A”)} is the observed (“anonymous”) response when i is queried about bribery using the crosswise model. The observed response set is thus an array with six distinct elements, $\mathcal{Y} = \{(0, 0), (0, 1), (1, 0), (1, 1), (\emptyset, 0), (\emptyset, 1)\}$, with $k \in \mathcal{Y}$ representing an arbitrary element in this set. In the interest of notational compactness, we will henceforth use the simplification $Y_i \in \mathcal{Y} = \{1, 2, \dots, 6\}$, where each natural number $1, \dots, 6$ represents one of the six distinct response combinations. For the responses using the crosswise technique, let $p \neq 1/2$ denote the probability that the first statement is true (e.g., the probability that the respondent’s mother was born in the indicated interval of months). This quantity is known by the researcher prior to collecting the data. (For the question displayed in Figure 1, $p = 0.264$.)

Our primary interest in this paper resides in estimating the parameters of a model of the conditional probability of being willing to bribe given a respondent’s experiences and observed characteristics. Let $\pi_i = \mathbb{P}(\theta_i = 1 | \mathbf{X}_i) = f(\mathbf{X}_i; \boldsymbol{\beta})$ where \mathbf{X}_i is a vector of background characteristics and/or treatment assignments recorded in the social survey along with a constant, $\boldsymbol{\beta}$ is the parameter vector, and $f : \mathbb{R} \mapsto [0, 1]$. The choice we utilize for f is the inverse logit specification, $\pi_i = (1 + \exp(-\mathbf{X}_i^\top \boldsymbol{\beta}))^{-1}$. Since the parameter vector $\boldsymbol{\beta}$ reflects the influence of the experiences or characteristics of a respondent on her willingness to bribe, we refer to the elements of this vector as the explanatory parameters of our statistical model.

Our statistical framework rests on two key assumptions. The first is called *honesty given protection*: given the protection afforded by the crosswise model, all respondents are assumed to respond as prompted by the technique (cf. Gingerich, 2010; Blair and Imai, 2012). Thus, if lying occurs in the survey responses, it is assumed to occur *only* when respondents are prompted to

⁵ Appendix Table 3 compares the proportion of birthdays falling into the indicated months from the survey self-reports to the actual proportions for newborn births produced by INEC.

Table 1. ProbabilityTable for Observed Data under Assumption of Honesty Given Protection and One-Sided Lying

| Y_i | Outcome | Probability |
|-------|----------------------------------|---|
| 1 | $(y_i^D = 0, y_i^A = 0)$ | $p\lambda_0^T(1 - \pi_i) + (1 - p)\lambda_1^L\pi_i$ |
| 2 | $(y_i^D = 0, y_i^A = 1)$ | $(1 - p)\lambda_0^T(1 - \pi_i) + p\lambda_1^L\pi_i$ |
| 3 | $(y_i^D = 1, y_i^A = 0)$ | $(1 - p)\lambda_1^T\pi_i$ |
| 4 | $(y_i^D = 1, y_i^A = 1)$ | $p\lambda_1^T\pi_i$ |
| 5 | $(y_i^D = \emptyset, y_i^A = 0)$ | $p(1 - \lambda_0^T)(1 - \pi_i) + (1 - p)(1 - \lambda_1^T - \lambda_1^L)\pi_i$ |
| 6 | $(y_i^D = \emptyset, y_i^A = 1)$ | $(1 - p)(1 - \lambda_0^T)(1 - \pi_i) + p(1 - \lambda_1^T - \lambda_1^L)\pi_i$ |

respond directly about their willingness to bribe. This assumption is made by the vast majority of studies that employ sensitive question survey techniques. Our second assumption is called *one-sided lying*: individuals who are willing to bribe may either lie about this fact or refuse to respond when queried directly, but those who are not willing to bribe always either tell the truth or refuse to respond, never falsely claiming to be willing when that is in fact not true.

Let λ_θ^T , λ_θ^L , and $1 - \lambda_\theta^T - \lambda_\theta^L$ denote the probability that, when queried directly, a respondent whose status is θ tells the truth about her willingness to bribe, lies about her willingness, or refuses to answer the question, respectively. Formally, one-sided lying implies the parameter restriction $\lambda_0^L = 0$. The assumption follows naturally from the presumed direction of social desirability bias in sensitive surveys. If concerns about societal disapproval make it difficult for respondents bearing a sensitive trait to openly divulge their status, those same concerns should ensure that respondents not bearing the sensitive trait have no incentive to pass themselves off as bearers of the trait. Since this second set of parameters captures potential biases in responses generated by direct questioning, we refer to these as the diagnostic parameters of our statistical model.

Given the imposition of the two aforementioned assumptions, it is straightforward to characterize the probability of each combination of responses in the observed response set. Table 1 presents the relevant probability table. The formula presented in a given cell of the table expresses the probability of observing the particular response combination represented by that cell.

Let $I(\cdot)$ be an indicator function equal to 1 if its argument is true, 0 otherwise, $\mathbb{P}_Y(k|\mathbf{X}_i)$ be the probability that respondent i 's observed joint response is in category k given her background characteristics, the model for observed responses (e.g., the probabilities presented in Table 1), and the model for the conditional probability of being willing to bribe, and let $\boldsymbol{\xi} = (\lambda_1^T, \lambda_1^L, \lambda_0^T, \boldsymbol{\beta})^\top$ be the full vector of parameters to be estimated. The log-likelihood function for the parameters given

the observed data is written:

$$\ln L(\boldsymbol{\xi}|Y, \mathbf{X}) = \sum_{i=1}^n \sum_{k=1}^6 I(Y_i = k) \ln \mathbb{P}_Y(k|\mathbf{X}_i). \quad (1)$$

Note that if one simply wishes to calculate the (unconditional) proportion of individuals willing to bribe, one can write $\pi_i = \pi = \mathbb{P}(\theta_i = 1)$. In this case, $\boldsymbol{\xi} = (\pi, \lambda_1^T, \lambda_1^L, \lambda_0^T)^\top$ and the log-likelihood function simplifies to

$$\ln L(\boldsymbol{\xi}|Y) = \sum_{k=1}^6 n_k \ln \mathbb{P}_Y(k), \quad (2)$$

where $n_k = \sum_{i=1}^n I(Y_i = k)$ is the number of respondents exhibiting response category k .

In our aforementioned companion paper, we provide aof detailed discussion of how the Expectation-Maximization (EM) algorithm can be utilized to obtain the maximum likelihood estimates (MLEs) of the parameters our statistical model. That is the approach to estimation adopted here. The EM algorithm, typically applied in incomplete-data settings, is particular apposite for the setting studied in this paper due to the (partial) unobservability of our outcome of interest.

One attractive feature of our joint response approach is that it utilizes data from direct responses in a highly commonsensical way. In particular, the approach provides an estimate of the sensitive behavior of interest that is always greater than or equal to the proportion of respondents willing to admit under direct questioning that they have engaged in that behavior. While it may seem obvious that an estimation strategy designed to calculate the prevalence of sensitive behaviors should bound its estimates in this way, extant approaches based solely upon responses generated by sensitive survey techniques do not do so.

4 The Information Experiment

To study the effects of perceived corruption in society on an individual’s willingness to engage in corrupt behavior, we combined an information experiment embedded in a household survey with the modeling framework developed above. The household survey consisted of face-to-face interviews of 4,200 residents (18 year old and older) of the Gran Área Metropolitana (GAM), which includes 30 cantons in the provinces of Alajuela, Cartago, Heredia, and San José. The GAM is the principal urban center in Costa Rica, containing approximately 2.6 million residents and accounting for 60 percent of the country’s population. The survey was administered by Borge y Asociados, the largest survey research firm in Central America, between October 2013 and April 2014.⁶

Rather than basing our analysis on the observed correlation between perceptions of corruption and willingness to engage in corrupt behavior, a strategy likely to suffer from potentially

⁶ See the Appendix for more information on survey methodology and execution.

severe problems of confounding, we induce exogenous variation in beliefs about corruption via the random assignment of respondents to distinct informational treatments. Three informational treatments were employed in our experiment: a corruption treatment, an inefficiency treatment, and a control condition. In the corruption treatment, respondents were presented with a flyer depicting the increasing percentage of Costa Ricans who have directly observed an act of corruption (covering the period from 2006 to 2011). A second treatment, the inefficiency treatment, was introduced as a “placebo” treatment in order to test whether respondents were affected by the information included in the corruption treatment or just the fact that they were given a flyer with negative information about the capacity of the Costa Rican state to deal with illicit behavior. In the inefficiency treatment, respondents were presented with a flyer presenting the (lack of) productivity of the legal system in dealing with a particular crime: assault with a deadly weapon. In the control condition, respondents were not presented with a flyer. Randomization of treatment assignment was programmed directly into the portable digital assistants (PDAs) the enumerators used to conduct the survey. Random assignment to different types of information ensured that, on average, groups of respondents were indistinguishable on both observable and unobservable characteristics. Appendix Table 4 provides evidence on balance in observable respondent characteristics across treatment groups. Excluding the treatment assignments, respondents were asked questions from otherwise identical questionnaires.

The two flyers are presented in Figure 2. The flyer on the left-hand side is the corruption treatment. In bold text, it states, “Did you know that corruption in Costa Rica has increased?” Below the statement appears a bar graph showing the increase in the percentage of Costa Ricans who had personally witnessed an act of corruption from 2006 (16 percent) to 2011 (24 percent). At the bottom right-hand side of the flyer, the source of the information, a nationally representative survey conducted by *Latinobarómetro*, is displayed. The flyer on the right hand side is the inefficiency treatment. It states, “In 2011, 6,812 cases of assault with a deadly weapon entered into the judicial system. However, only 47 individuals were sent to jail for this crime.” Below the statement appears a bar graph showing the relative magnitudes of the number of cases filed for this crime (6812), the number of judicial decisions made on cases of the crime (333), and the number of individuals actually sent to jail (47). The source of the information, National Judicial Statistics, is displayed on the bottom right corner.

After exposure to one of the three experimental conditions, respondents were later prompted to respond to the aforementioned question about willingness to bribe, first in crosswise format and then, at the end of the survey, in direct questioning format.

Figure 2. The Two Treatments, Corruption and Judicial Inefficiency

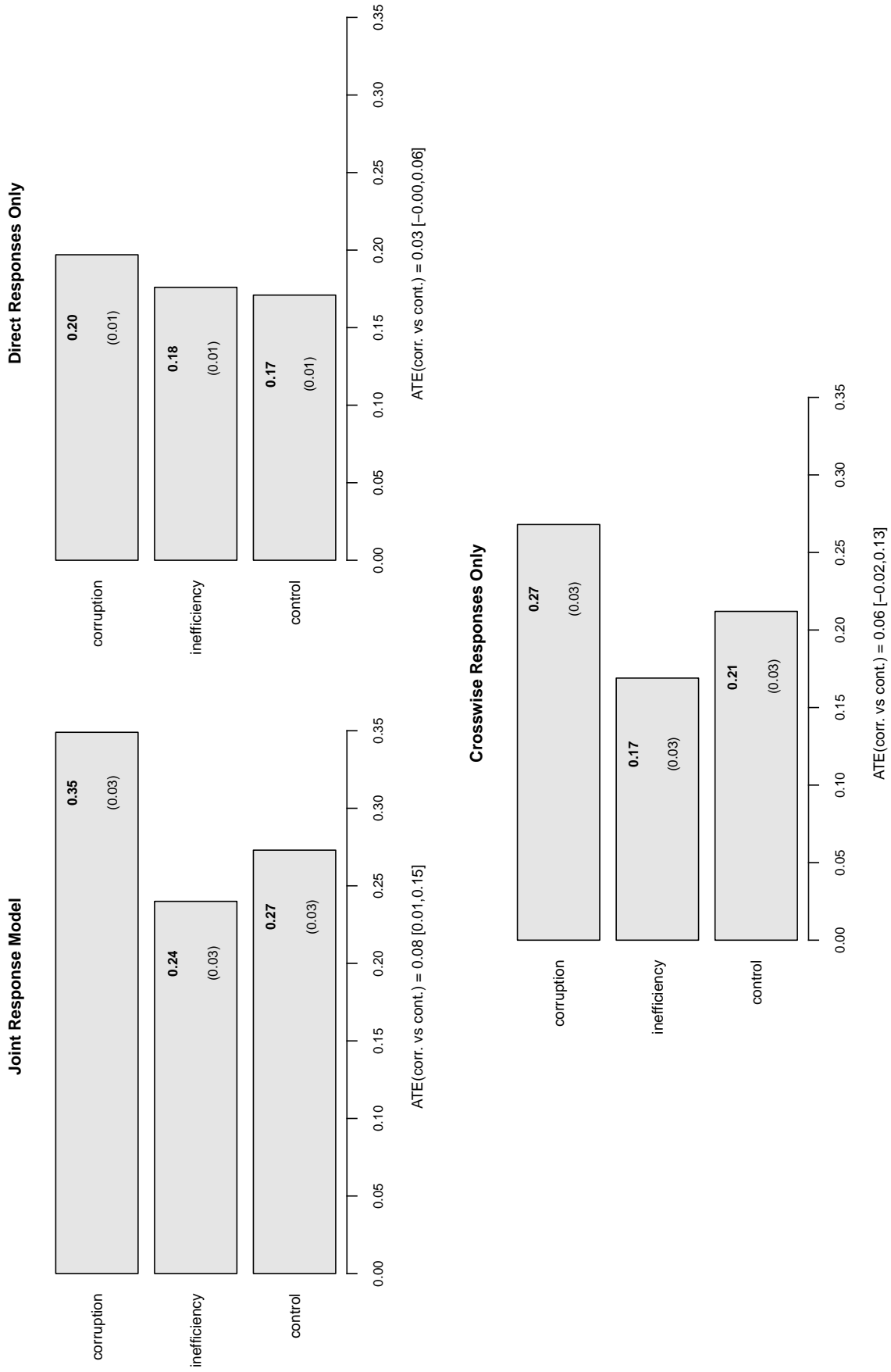


5 Corruption Does Corrupt

We begin our analysis by examining simple differences in the estimated proportion of respondents willing to bribe according to treatment condition. Results are presented utilizing our joint response approach, the direct survey responses by themselves, as well as the crosswise responses by themselves. The findings are presented in a series of barplots displayed in Figure 3.

All told, the results provide support for the self-fulfilling hypothesis that an individual's willingness to engage in corrupt behavior is affected by her perception of the level of corruption in society. According to the estimates based on the joint response model, the proportion of respondents assigned to the corruption information treatment who would be willing to bribe a police officer was 0.35, whereas the proportion of respondents assigned to the control condition willing to do the same was only 0.27. Thus, the average treatment effect of information about the increasing scope of corruption was equal to 0.08. This is a substantively large effect: exposure to the corruption treatment was estimated to increase the proportion of respondents willing to bribe by 28 percent. In addition to being large in magnitude, the average treatment effect was statistically significant by conventional standards. Our placebo treatment—information about judicial inefficiency—did not have a statistically significant impact on willingness to bribe.

Figure 3. Estimated Proportion of Respondents Willing to Bribe by Treatment Condition and Questioning Method



Note: Standard errors in parentheses. Ninety-five percent confidence intervals for the average treatment effect in square brackets.

In addition to providing evidence that corruption corrupts, the figure also clearly illustrates the virtues of using the joint response approach for asking questions about bribery. In every treatment condition, estimates of willingness to bribe based on direct responses were below those based on the joint response model and crosswise responses only. Moreover, it would appear that desirability bias substantially attenuated downward the estimate of the average treatment effect of exposure to information about corruption: the average treatment effect based only on direct responses was about half that based only on the crosswise responses and just about one third as large as the average treatment effect based on the joint responses. The use of only the crosswise responses resulted in an estimated average treatment effect equal to 0.06, below but roughly similar to that based on the joint responses. However, this estimate was not statistically significant at conventional standards, due in part to the fact that it is based on an inefficient statistical approach that failed to incorporate the potentially useful information available from the pattern of direct responses.

Table 2. Relationship between Information Treatments and Bribery of Police (joint response model)

| Parameters | Model 1 ($n = 4193$) | | | Model 2 ($n = 4192$) | | |
|-------------------------------------|------------------------|-------------|---------------------|------------------------|-------------|---------------------|
| | estimate | s.e. | 95% int. | estimate | s.e. | 95% int. |
| Diagnostic parameters | | | | | | |
| $\hat{\lambda}_1^T$ | 0.61 | 0.03 | [0.55,0.67] | 0.63 | 0.03 | [0.58,0.68] |
| $\hat{\lambda}_1^L$ | 0.36 | 0.03 | [0.30,0.41] | 0.34 | 0.03 | [0.28,0.39] |
| $\hat{\lambda}_0^T$ | 0.97 | 0.00 | [0.96,0.98] | 0.97 | 0.00 | [0.96,0.98] |
| Explanatory parameters | | | | | | |
| Constant | -0.98 | 0.09 | [-1.17,-0.80] | 2.81 | 0.46 | [1.97,3.77] |
| Corruption treatment | 0.24 | 0.10 | [0.04,0.45] | 0.23 | 0.11 | [0.01,0.43] |
| Inefficiency treatment | 0.01 | 0.11 | [-0.18,0.22] | 0.03 | 0.12 | [-0.19,0.24] |
| Male | — | — | — | 0.89 | 0.10 | [0.70,1.10] |
| Log(age) | — | — | — | -1.29 | 0.12 | [-1.54,-1.06] |
| Education (base=some college) | — | — | — | — | — | — |
| Primary or less | — | — | — | 0.12 | 0.16 | [-0.17,0.40] |
| Secondary incomplete | — | — | — | 0.40 | 0.15 | [0.13,0.68] |
| Secondary complete | — | — | — | 0.29 | 0.15 | [-0.01,0.59] |
| Some technical | — | — | — | 0.05 | 0.28 | [-0.51,0.62] |
| ATE (corruption vs. control) | 0.05 | 0.02 | [0.01,0.09] | 0.04 | 0.02 | [0.00,0.08] |

The next step of our analysis consisted of the use of the joint response-modified logistic regression framework described earlier. (Unlike the joint response estimates presented in Figure 3, this approach pools the estimation of the diagnostic parameters across all three treatment conditions.) Table 2 depicts coefficient estimates showing the impact of the two information treatments

on a respondent's willingness to offer a bribe to a police officer to avoid paying a traffic ticket. Two regression models were estimated: one in which the informational treatments entered as the sole explanatory variables and one in which we included the age, gender, and education of the respondent. Previous findings in the literature suggest that these covariates might relate to willingness to bribe in a number of ways. There is some empirical evidence that women and older individuals might be less involved in corruption and/or less likely to condone corruption than men (Swamy, Knack, Y Lee et al., 2003; Torgler and Valev, 2006; Torgler and Valev, 2010). With respect to education, some scholars have found that the more educated (or richer, variables that are often used as proxies) are more tolerant of corruption (Winters and Weitz-Shapiro, 2013), while others have presented results that imply the opposite (cf. Manzetti and Wilson, 2007). Moreover, there is evidence that more informed citizens (presumably, the more educated) are less likely to be receptive to new information (Lupu, 2013). If that is the case, the more educated might oppose corruption equally or more than the less educated, but the effect of our information experiment would show a smaller effect for the more educated.

Both estimated models told a very similar story: exposing respondents to information about the growing scope of corruption in society made them significantly more likely to indicate a willingness to bribe a police officer to avoid paying a traffic ticket. Again, it thus appears that, as predicted by theory, corruption really does corrupt. As shown in the table, the average treatment effect of exposure to information about the growing scope of corruption was estimated to be 0.05 in the baseline model and 0.04 in the model with additional covariates. In both cases, the average treatment effects were statistically significant by conventional standards. As above, in neither of the estimations did the judicial inefficiency treatment have any discernible impact on willingness to bribe, suggesting that the effect of the corruption treatment was caused by the specific information contained in it and not by just the fact that respondents were exposed to some negative information about the capacity of the Costa Rican state to deal with illicit activity.

In terms of background characteristics, men appeared to be substantially more inclined to bribe than women, younger respondents more inclined to bribe than older respondents, and individuals with incomplete secondary school educations more inclined to bribe than individuals with some exposure to college (the baseline education category).

The estimated values of the diagnostic parameters point to the importance of using sensitive survey techniques for asking questions about bribery. According to the estimated models, the probability that an individual inclined to bribe would admit as much under direct questioning was 0.61-0.63, whereas the probability that such an individual would lie under direct questioning was 0.34-0.36. Thus, our results indicated that there was a fairly substantial degree of respondent evasiveness under direct questioning.

6 Conclusion

This paper provides new evidence in favor of the proposition that corruption corrupts. Utilizing data from a large-scale social survey conducted in the Gran Área Metropolitana of Costa Rica, one that combined both a survey experiment and a novel format for asking sensitive questions, we find that exposing citizens to information about the growing scope of corruption in their society made them individually more disposed to engage in corruption. In this way, our paper offers empirical support to a large theoretical literature on corruption that has long claimed that the phenomenon is characterized by strategic complementarities between economic agents, a state of affairs that implies that multiple, stable corruption regimes may be feasible for a given polity at a given time.

For students of governance, the import of our findings is that if one accepts that corruption operates as a self-fulfilling prophecy, then one also must accept that a comprehensive understanding of the determinants of the quality of government cannot be attained without properly integrating all three of the traditional paradigms of comparative politics: rationality, culture and identity, and structure (read: institutions), per Lichbach and Zuckerman, 1997. Rational decision-making under the constraints imposed by institutions defines the realm of the possible, i.e., just how corrupt any of the feasible corruption regimes in a polity would end up being. On the other hand, culture and identity help determine whether a vicious or virtuous circle of corruption/probity takes hold in a polity, thereby determining which of the potential corruption regimes is actualized. Future research on corruption would do well to begin the hard work of systematically integrating these often competing analytical traditions into a coherent general theory of governance.

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Appendix – Survey Methodology

1 Organization

The household survey consisted of face-to-face interviews of 4,200 residents (18 year old and older) of the Gran Area Metropolitana (GAM), which includes 30 cantons in the provinces of Alajuela, Cartago, Heredia, and San José. The GAM is the principal urban center in Costa Rica. It contains approximately 2.6 million residents and accounts for 60 percent of the country's population. The survey was administered by Borge y Asociados, the most prominent survey research firm in Central America, between October 2013 and April 2014. On average, interviews lasted 25 minutes.

A two-stage clustered random sample based on the 2000 national census was generated (with fixed proportions for age and gender). Three hundred and fifty primary sampling units (PSUs), the smallest geographic unit in the census, were selected from the total contained within the GAM, with 12 interviews conducted in each PSU. Interviewers began from the northernmost point of the PSU and proceed in a clockwise direction. Within each household, interviewers were selected based on quotas by gender and age, so that half of the surveys are obtained from each gender, and one third fall into each of the categories of 18-29 years old, 30-45 years old, and 45 or more years of age. In cases of refusals or when no one responded, the household was replaced with the adjacent household.

The survey was preceded by a pilot consisting of 48 cases, administered in October 15 and 16. The goal of the pilot was for enumerators to familiarize themselves with the questionnaire on the field, and to test their skills in administering the questionnaire, especially the different experimental treatments and the crosswise questions.

All survey enumerators utilized PDAs (personal digital assistants) to conduct the survey. An initial set of questions in the survey asked respondents about their personal experiences with crime and corruption, and perceptions of efficiency and corruption within the police and judicial authorities. After these questions, the experimental component of the survey began. The randomization of treatment conditions was programmed directly into the PDA. The PDA indicated to the enumerator which informational flyer, if any, should be given to the respondent. If one of the two informational flyers was selected, the enumerator gave a laminated sheet containing the display to the respondent and asked that she read the information contained therein. After the respondent had read the sheet, she returned it to the enumerator. Subsequent questions contained in the survey queried respondents about the perceived credibility of the informational display (if one was assigned), beliefs about the police and judicial authorities, overall sense of security, willingness to report crime and collaborate with the criminal justice system, tolerance for police violence, toler-

ance of corruption, beliefs about the scope of corruption, and the socio-demographic characteristics of the respondent herself.

Survey enumerators were recruited by Borge y Asociados and were mostly experienced with the administration of surveys. They went through extensive training on the details and administration of the survey instrument, especially on the execution of the crosswise questions and the administration of the different treatments. The training for the crosswise component of the survey consisted of a thorough explanation of the logic and functioning of the technique, as well as live practice sessions in which each enumerator practiced her delivery of this section of the survey both in front of members of the research team and administrators from Borge y Asociados. By contract, only enumerators that had gone through these training sessions participated in the administration of the survey. Any potential enumerator demonstrating insufficient mastery in the delivery of this component of the survey—the most challenging—in the training sessions was removed from the team of enumerators. An important feature of the delivery of this component of the survey consisted of a script describing to respondents how a hypothetical individual with a particular value on a sensitive item and a mother born in a particular month would respond to a given crosswise item. This script was given to all respondents prior to the commencement of the sensitive questions of interest.

For the purpose of survey verification, enumerators recorded the first name only and phone number of each respondent. Verification was conducted on a randomly selected subgroup of the sample (30 percent of the total) by phone, after which this information was destroyed. Team leaders also conducted verification in the field by randomly selecting households for verification the same day that the interview was conducted. If mistakes were found using either method, interviews were replaced by new ones.

The contact rate for the survey was 87 percent, the response rate was 29 percent, the cooperation rate 39 percent, and the refusal rate 44 percent.⁷

2 Focus Groups

Focus groups were conducted in San José with residents of varied backgrounds on August 6, 7, and 8, 2013, prior to fielding the household survey. The goal of these focus groups was threefold. First, the purpose was to get a general sense of individuals' perceptions of the main topics covered in the survey: corruption and inefficiency in different areas of the government, crime and issues of citizen security, and reporting of crime. Second, we tested different versions of the treatments to be used in the household survey. Finally, we evaluated each group's understanding of the logic of the crosswise questions.

⁷ Rates calculated according to the American Association of Public Opinion Research.

3 Phone Survey

Prior to conducting the household survey and the focus groups sessions, a nationally representative telephone survey of 1200 Costa Rica residents (older than 18) was conducted by Borge y Asociados between July 15 and July 20, 2013. The goal of this survey was twofold. First, we used the survey to evaluate our questions, the questions' wording, and the order of questions for the household survey. Second, we wanted to collect information about respondents' recollections of their parents' birthdays in order to be able to use that information for the crosswise questions in the household survey. We did so by asking respondents directly about the day of birth of their mother and father in the telephone survey. To check the veracity of these self-reports, these were checked against statistical tables produced by Costa Rica's National Institute for Statistics and Censuses (INEC) on month of birth for newborns for the 2000-2011 period (the period for which the data were available). Since there should be no systematic differences in month and day of birth across sex of child, responses for mothers and fathers were pooled together. The comparison in Appendix Table 3 shows that self-reported parent's birthdays were almost identical to the actual information obtained from INEC.

Appendix Table 3. Telephone Self-Reports vs. Census Data of births occurring in October, November, or December

| Year | Proportion |
|-------------|-------------------|
| 2000 | 0.268 |
| 2001 | 0.262 |
| 2002 | 0.268 |
| 2003 | 0.260 |
| 2004 | 0.264 |
| 2005 | 0.265 |
| 2006 | 0.268 |
| 2007 | 0.270 |
| 2008 | 0.266 |
| 2009 | 0.261 |
| 2010 | 0.262 |
| 2011 | 0.265 |
| avg. | 0.265 |

Note: Proportion of mother's and father's birthdays occurring in indicated months according to telephone survey self-reports: 0.264.

4 Enumerator Scripts

4.1 Main Outcome Variable: Crosswise Format

Interviewers explained first the logic of the crosswise format with the following script:

“Now I am going to ask you a series of questions with a special format. These are questions especially design to protect the privacy of your answers. To be able to answer them you will have to remember (and do not tell me) the birthday of some of your relatives. The technique is based precisely on the fact that neither me, nor any of the people involved on the survey know the birthday of your relatives. This is what guarantees that we cannot not know exactly what your answer was. “Let me show you an example. . . ” (Ahora le voy a hacer una serie de preguntas que tienen un formato especial. Son preguntas diseñadas especialmente para proteger la privacidad de sus respuestas. Para poder contestarlas usted va a tener que recordar (y no decirme) el día del cumpleaños de algunos de sus parientes. La técnica se basa justamente en que ni yo, ni ninguna de las personas involucradas en la encuesta, conocen el cumpleaños de sus parientes. Esto es lo garantiza que no podamos saber cual fue exactamente su respuesta. Le muestro con un ejemplo. . .).

Interviewers then showed respondents the example card shown in Appendix Figure 4.

Appendix Figure 4. The Practice Crosswise Survey Item

| How many of the following statements are true? (¿Cuántas de las siguientes afirmaciones son ciertas?) |
|--|
| <p>- My mother was born in OCTOBER, NOVEMBER, or DECEMBER. (<i>El cumpleaños de mi madre es en octubre, noviembre o diciembre</i>)</p> <p>- In order to avoid a family conflict, I would be willing to tell a lie. (<i>Para evitar un conflicto familiar, estaría dispuesto/a a decir una mentira</i>)</p> <p style="text-align: center;">Mark the appropriate answer (Indique la respuesta correcta):</p> <p>A. <u>BOTH OR NEITHER</u> of the statements are true. (<i>LAS DOS O NINGUNA</i> de las afirmaciones son ciertas)</p> <p>B. <u>ONLY ONE</u> of the statements is true. (<i>UNA SOLA</i> de las afirmaciones es cierta)</p> |

Remember: No one from the research team knows your mother’s birthday. This guarantees the anonymity of your response. (*Recuerde: Nadie en el grupo de investigación sabe cuándo es el cumpleaños de su pariente. Esto garantiza la privacidad de su respuesta*)

Continuation of the script:

“In my case, my mother’s birthday is in the month of December and I WOULD be willing to tell a lie to avoid a family conflict. So, my answer to the question: ‘How many of the following statements are true?’ is ‘A’ (“Both or neither of the statements are true”). Now let’s suppose that my mother’s birthday was in January and I’ve already told you that I would be willing to tell a lie, so my answer in this case would be ‘B’ (“Only one of the statements is true”). Finally, if my mother’s birthday was in January and I would NOT be willing to tell a lie, then my answer would be ‘A’ because neither of the statements would be true. Since nobody knows the date of my mother’s birthday, it is not possible to identify my answer to the specific statement about lying. Did I explain myself clearly? Would you like me to repeat the example? (En mi caso, mi madre cumple años en el mes de diciembre y yo SI estaría dispuesto a decir una mentira para evitar un conflicto familiar. Por lo tanto, mi respuesta a la pregunta “¿Cuántas de las siguientes afirmaciones son ciertas?” es la “A” (“Las dos o ninguna de las dos afirmaciones son ciertas”). Ahora supongamos que mi madre cumpliera años en enero, y ya le dije que yo estaría dispuesto a decir una mentira, entonces mi respuesta sería la “B” (“Una sola de las afirmaciones es cierta”). Por último, si mi madre cumpliera años en enero y yo NO estuviera dispuesto a decir una mentira, mi respuesta sería la “A” porque ninguna de las afirmaciones es cierta. Como nadie sabe cuándo es el cumpleaños de mi madre, no es posible saber realmente cual es mi respuesta a la pregunta sobre mentiras. ¿Me explico? ¿Le gustaría que le repita el ejemplo?)

Enumerators were instructed to explain the technique and repeat the example as many times as was necessary for the respondents to understand the technique. Once this was achieved, enumerators handed out the card shown in Appendix Figure 5.

4.2 Main Outcome Variable: Direct Questioning Format

Interviewers explained first why we were asking the same question twice with the following script:

“I’ve just asked you a series of questions about topics that were a little sensitive by using a technique that protects the privacy of the responses. Thanks to that technique, as I was explaining before, there is no way for us to identify your precise answer to those questions. However, we know that not everyone thinks that these topics are especially sensitive. Thus, in finishing with the survey we would like to ask you directly about these same topics. Of course, if you prefer not to answer any of these questions, please just let me know. For each of these questions, please tell me if the statement is true, false, or if you would rather not answer.” (Hace un rato le hice una serie de preguntas sobre temas un poco sensibles utilizando una técnica que protege la privacidad de las respuestas. Gracias a esa técnica, como le explicaba antes, no tenemos forma de saber exactamente qué es lo que Ud. nos contestó. Sin embargo, sabemos que no todo el mundo considera esos temas tan sensibles así que para finalizar la encuesta nos gustaría preguntarle nuevamente en forma directa sobre esos mismos temas. Por supuesto, si Ud. prefiere no contestar a alguna de estas preguntas,

Appendix Figure 5. The Actual Crosswise Survey Item

| |
|---|
| <p>How many of the following statements are true? (¿Cuántas de las siguientes afirmaciones son ciertas?)</p> |
| <p>- My mother was born in OCTOBER, NOVEMBER, or DECEMBER. (<i>El cumpleaños de mi madre es en octubre, noviembre o diciembre</i>)</p> <p>- In order to avoid paying a traffic ticket, I would be willing to pay a bribe to a police officer. (<i>Para evitar pagar una multa de tránsito, estaría dispuesto/a a pagar un soborno a un policía</i>)</p> <p style="text-align: center;">Mark the appropriate answer (Indique la respuesta correcta):</p> <p>A. <u>BOTH OR NEITHER</u> of the statements are true. (<i>LAS DOS O NINGUNA</i> de las afirmaciones son ciertas)</p> <p>B. <u>ONLY ONE</u> of the statements is true. (<i>UNA SOLA</i> de las afirmaciones es cierta)</p> |

Remember: No one from the research team knows your mother's birthday. This guarantees the anonymity of your response. (*Recuerde: Nadie en el grupo de investigación sabe cuándo es el cumpleaños de su pariente. Esto garantiza la privacidad de su respuesta*)

simplemente me dice. En cada caso, dígame por favor si la afirmación es verdadera, falsa o prefiere no responder.)

After the enumerators provided this explanation they asked respondents: "In order to avoid paying a traffic ticket, I would be willing to pay a bribe to a police officer." (Para evitar pagar una multa de tránsito, estaría dispuesto/a a pagar un soborno a un policía.) Response options were: "True," "False," and "I prefer not to respond" (Prefiero no contestar).

Appendix Table 4. Balance in Respondent Characteristics across Treatment Assignments

| Covariates | Treatment groups | | | | | | p.value |
|--|------------------|------|--------------|------|---------|------|---------|
| | corruption | | inefficiency | | control | | |
| | mean | s.e. | mean | s.e. | mean | s.e. | |
| <i>Demographics</i> | | | | | | | |
| Male | 0.52 | 0.01 | 0.48 | 0.01 | 0.50 | 0.01 | 0.19 |
| Age | 38.1 | 0.42 | 38.6 | 0.42 | 38.3 | 0.42 | 0.72 |
| Education | | | | | | | 0.23 |
| without study | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | |
| primary incomplete | 0.07 | 0.01 | 0.06 | 0.01 | 0.07 | 0.01 | |
| primary complete | 0.19 | 0.01 | 0.20 | 0.01 | 0.22 | 0.01 | |
| secondary incomplete | 0.27 | 0.01 | 0.28 | 0.01 | 0.28 | 0.01 | |
| secondary complete | 0.24 | 0.01 | 0.24 | 0.01 | 0.23 | 0.01 | |
| technical studies incomplete | 0.02 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | |
| technical studies complete | 0.03 | 0.00 | 0.02 | 0.00 | 0.03 | 0.00 | |
| university incomplete | 0.09 | 0.01 | 0.09 | 0.01 | 0.07 | 0.01 | |
| university complete | 0.08 | 0.01 | 0.09 | 0.01 | 0.07 | 0.01 | |
| post-graduate | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | |
| Head of household | 0.49 | 0.01 | 0.46 | 0.01 | 0.48 | 0.01 | 0.32 |
| Cellphone | 0.94 | 0.01 | 0.93 | 0.01 | 0.94 | 0.01 | 0.38 |
| Laptop | 0.43 | 0.01 | 0.41 | 0.01 | 0.42 | 0.01 | 0.60 |
| Tablet | 0.26 | 0.01 | 0.26 | 0.01 | 0.24 | 0.01 | 0.31 |
| Car | 0.39 | 0.01 | 0.37 | 0.01 | 0.39 | 0.01 | 0.34 |
| Motorcycle | 0.14 | 0.01 | 0.14 | 0.01 | 0.13 | 0.01 | 0.41 |
| Plasma, LCD, or LED TV | 0.56 | 0.01 | 0.53 | 0.01 | 0.55 | 0.01 | 0.26 |
| Cable or Satellite TV | 0.70 | 0.01 | 0.71 | 0.01 | 0.72 | 0.01 | 0.73 |
| Internet | 0.56 | 0.01 | 0.54 | 0.01 | 0.54 | 0.01 | 0.59 |
| Costa Rican national | 0.91 | 0.01 | 0.90 | 0.01 | 0.90 | 0.01 | 0.68 |
| <i>Prior beliefs</i> | | | | | | | |
| In recent years, insecurity in the GAM has: | | | | | | | 0.96 |
| increased | 0.72 | 0.01 | 0.71 | 0.01 | 0.73 | 0.01 | |
| decreased | 0.05 | 0.01 | 0.05 | 0.01 | 0.05 | 0.01 | |
| stayed the same | 0.23 | 0.01 | 0.24 | 0.01 | 0.22 | 0.01 | |
| In recent years, corruption in Costa Rica has: | | | | | | | 0.45 |
| increased | 0.83 | 0.01 | 0.84 | 0.01 | 0.83 | 0.01 | |
| decreased | 0.01 | 0.00 | 0.02 | 0.00 | 0.02 | 0.00 | |
| stayed the same | 0.16 | 0.01 | 0.14 | 0.01 | 0.16 | 0.01 | |
| Of all the cases that enter the legal system, how many do You think are resolved? | | | | | | | 0.38 |
| the majority | 0.08 | 0.01 | 0.08 | 0.01 | 0.07 | 0.01 | |
| many | 0.09 | 0.01 | 0.08 | 0.01 | 0.08 | 0.01 | |
| few | 0.37 | 0.01 | 0.41 | 0.01 | 0.38 | 0.01 | |
| very few | 0.41 | 0.01 | 0.38 | 0.01 | 0.41 | 0.01 | |
| none | 0.05 | 0.01 | 0.05 | 0.01 | 0.05 | 0.01 | |
| <i>Prior experiences</i> | | | | | | | |
| Direct contact with police or transit officer in previous year | 0.25 | 0.01 | 0.26 | 0.01 | 0.26 | 0.01 | 0.54 |
| Knows personally a police officer | 0.42 | 0.01 | 0.41 | 0.01 | 0.41 | 0.01 | 0.87 |
| Bribe solicited by police officer in previous year | 0.03 | 0.00 | 0.03 | 0.00 | 0.03 | 0.00 | 0.81 |
| Knows personally someone accused, prosecuted, or Sentenced by the criminal justice system | 0.42 | 0.01 | 0.40 | 0.01 | 0.41 | 0.01 | 0.74 |

Note: P-values based on chi-square test of homogeneity for categorical covariates and an ANOVA test for equality of group means for continuous covariates (e.g., age).