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Can bribery buy health?
Evidence from post-communist countries[†]

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ABSTRACT. Corruption is pervasive, but we know little about its effects on individual lives. This paper examines whether living in a corrupt society has deleterious effects on health. Using individual-level data from 28 post-communist countries, we demonstrate that bribing for public services worsens self-assessed health. Unlike other studies, we account for endogeneity of bribery and show that bribing for any type of public service, not just for health services, has an adverse impact. We also find that bribery lowers the quality of services received. Moreover, there are potentially high indirect costs of bribery since, as we show, it comes at the expense of cutting food consumption. These findings suggest that corruption is a potentially important source behind the poor health outcomes in many developing countries.

JEL classification: I15; K42; D73; H11.

Keywords: Bribery; Corruption; Health; Post-Communist Countries.

1. INTRODUCTION

A growing body of literature recognizes corruption as an obstacle to political, economic and social development across countries (see, for example, Svensson, 2005; Dimant and Tosato, 2018 for reviews). Yet there is limited evidence on the consequences of living in a corrupt environment where "people frequently face situations of bribery and extortion, rely on basic services that have been undermined by the misappropriation of funds, and confront official indifference when seeking redress from authorities that are on the take" (Transparency International, 2016, p.3). This paper contributes to the emerging literature on this subject by considering a relevant yet novel outcome: health.

Why might corruption affect the health outcomes of individuals? In poor institutional settings, bribing may be a pathway to better treatment, and thus to better health for those who bribe. On the other hand, as suggested by Maestad and Mwisongo (2011) and Hunt and Laszlo (2012), rent-seeking activities in fact may create incentives for providers to lower the quality of services. Furthermore, by imposing social and economic costs on individuals (e.g., Rotondi and Stanca, 2015; Peiffer and Rose, 2018), bribing may lead to negative health consequences. In spite of the importance of the issue, empirical evidence to reconcile these scenarios of the effects that bribery may have on health is largely missing.

We fill this gap in knowledge by examining the individual-level health consequences of bribing behavior in a specific group of countries: those in transition from communism. In those countries, the prevalence of corruption is the second highest in the world after Sub-Saharan Africa, based on Transparency International's Corruption Perception Index that measures the perceived levels of public sector corruption worldwide (Transparency International, 2016).[1] Temple and Petrov (2004) refer to a systemic corruption that is part of a culture of corruption in the former Soviet Union. The high levels of corruption in this part of the world are often seen as a consequence of the structural incentives created by the communist regime that have persisted in transition countries (Sandholtz and Taagepera, 2005; Ivlevs and Hinks, 2018). On the other hand, the deteriorating health outcomes, indeed the 'health crisis' as seen by some scholars (Field, 1995), have also been associated with the process of transition (also see Shkolnikov et al., 1998). Nikolova (2016) establishes a link between the institutions in transition and the low levels of subjective well-being in transition countries. By exploring whether and how the presence of corruption may feed into individual health outcomes, we offer an important insight to the ongoing discourse on this subject.

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[1]On the scale of 0 (highly corrupt) to 100 (very clean), the average corruption score for Eastern Europe and Central Asia was 34, well below the global average score of 43, in 2016 (Transparency International, 2016).

Using nationally-representative survey data from 28 post-communist countries, we show that the experiences of bribery adversely affect the self-reported health of individuals even after controlling for a wide range of individual, household and location characteristics and addressing the issue of potential endogeneity based on conventional instrumental variable-based approaches. The estimates from our baseline specification suggest that an additional incidence of bribery reduces an individual's probability of reporting a 'good' health state by 1.8 percentage points.

Our exploratory analysis of some of the underlying mechanisms focused on the case of health sector bribery results in two findings. First, bribers, compared to non-bribers, are more likely to encounter problems in health service delivery - a finding that suggests the possibility that extra service provided in exchange for a bribe does not make up for shirking while angling for a bribe (e.g., Maestad and Mwisongo, 2011; Hunt and Laszlo, 2012). Second, bribery is associated with a decrease in the probability of being able to afford consumption of meat, chicken or fish (or vegetarian equivalent) on a regular basis. This finding highlights the significance of indirect costs associated with bribery and indicates the possibility that bribes constitute a catastrophic expenditure as suggested by Habibov (2009, 2016). Our findings are economically significant and robust to a battery of tests, and point out at potentially highly damaging consequences of corruption in many developing settings.

This study offers three distinct contributions to the literature. First, it contributes to the literature on the link between institutions and well-being, by considering a relatively under-studied outcome: health. Most of the existing studies in this literature have, in contrast, focused on life satisfaction across countries (e.g., Welsch, 2008; Bjørnskov et al., 2010; Helliwell et al., 2018). Only a few have touched upon the health-related consequences of bribery. These include cross-country studies by Knowles and Owen (2010) who demonstrate that there is a positive association between institutional quality and life expectancy at birth, and by Hanf et al. (2011), who establish a link between corruption and child mortality. As a second contribution, we offer a study on the individual-level consequences of bribery to a literature that is predominantly at an aggregate level. The vast majority of studies concerned with the welfare consequences of corruption or institutions more broadly have been conducted at the level of countries (e.g., Helliwell et al., 2018) or regions (e.g., Luechinger et al., 2013). While there is an emerging literature on individual-level consequences of bribery, its focus so far has been limited to employment outcomes (Mavisakalyan and Meinecke, 2016) of individuals. Third, this paper contributes to the empirical health literature, which has

shown that informal payments in health services sector may have implications for the delivery of health services (Habibov and Cheung, 2017; Rönnerstrand and Lapuente, 2017) as well as affect the trust in and satisfaction with such services (Radin, 2013; Habibov, 2016). This literature, however, has not considered the effects of bribing for health services on individuals' health outcomes nor has it looked at indirect health-related costs of bribery as we do. Moreover, unlike other studies, we account for endogeneity of bribery and show that bribing for any type of public service, not just for health services, has an adverse impact on health.

In the next section we provide background on bribery/informal payments in post-communist countries and motivate the relationship between bribery and health in more detail. Section 3 discusses our data and empirical strategy. Then, in Section 4 we present the results on the link between bribery and health outcomes and demonstrate that these are robust to a number of checks. Moreover, we explore the mechanisms underlying the reduced form relationship between bribery and health. Section 5 concludes the paper, providing a discussion of its implications and limitations.

2. BACKGROUND

What do we exactly mean by "bribery"? The literature also refers to this as informal payments, under-the-counter payments, under-the-table payments or envelope payments.[2] Lewis (2007) provides a definition in the context of informal payments in the health services sector. These, according to Lewis (2007), are "payments to individual and institutional providers, in-kind or cash, that are made outside official payment channel, or are purchases that are meant to be covered by the health care system" (p. 985). These payments can be made in cash or in-kind supplements, commodities, and/or materials (Lewis, 2000; Belli, 2002; Gaal et al., 2006a,b). Furthermore, informal payments may also take the form of gratitude or gifts (Stepurko et al., 2015).

Informal payments are highly prevalent particularly within the health care systems of post-communist countries. Such payments impose tremendous burden to the society, reaching, according to one assessment, half of the total out-of-pocket payments and depriving vulnerable economic groups from the opportunity to utilize healthcare services in the countries of Central and Eastern Europe (Belli, 2002). Stepurko et al. (2015) explore the attitudes regarding informal payments of patients from Lithuania, Poland, and Ukraine in the health

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[2]For an extensive literature review on the definition of informal payments, see Chereches et al., 2013.

care sector. They find that only 26.6% of patients in Ukraine, 35.1% of patients in Lithuania, and 57.8% of patients in Poland refused to provide informal payments, including gifting.

Some scholars argue that patients provide informal payments in order to raise the (low) quality of health services (Stepurko et al., 2015). Habibov and Cheung (2017) lend further support to this point by showing that the low quality of healthcare is associated with a higher likelihood of informal payments in post-communist countries. Hunt and Laszlo (2012) present a theoretical framework of the mechanisms of bribery where the public official and the client interact in a two-stage game. If the official does not angle for a bribe, she does not shirk and carries out the job conscientiously in both stages. If she does angle for a bribe, however, she shirks in the first stage to create ground for a bribe being offered or asked for. This is consistent with evidence provided by Maestad and Mwisongo (2011) on Tanzania where health workers create artificial shortages and deliberately lower the quality of service in order to extract extra payments from patients. In the second stage, the official may then offer a service to the client in return for a bribe. According to Hunt and Laszlo (2012), 'only empirical work can determine which of these bundles is more valuable to the client' (p. 357). Their analysis of Peru and Uganda shows that the services received by bribers are worse than those received by individuals who did not encounter a situation of bribery. What this potentially suggests, according to Hunt and Laszlo (2012), is that the extra service in exchange for a bribe, if provided, does not make up for the initial shirking. These considerations are broadly consistent with observations in the existing body of work that suggest that experiences of bribery may undermine trust in public health care sector and reduce satisfaction with health care system in post-communist countries (Radin, 2013; Habibov, 2016).

So, individuals, often those who are vulnerable in some respects, may be paying bribes to ensure a certain quality of services which may not be met, given the above considerations. Indeed, the literature demonstrates that vulnerable individuals are more likely to pay bribes. For example, Habibov and Cheung (2017) show that it is individuals with poor health conditions who are more likely to pay bribes since they frequently use medical services. Hunt (2007) demonstrates that victims of misfortune more generally are more likely than non-victims to bribe. Furthermore, the socioeconomic gradient in bribing appears to be to the disadvantage of the poor. In a study of 33 African countries, Kankeu and Ventelou (2016) find that demands for bribes and the actual payment of bribes to access health care services are disproportionally concentrated among the poorest. But what is more, indirect costs of

bribery may impose further pressure on individuals' health. One such cost is the opportunity cost of the resources that bribery consumes. Especially in poor developing settings, it is not entirely unlikely that bribes are paid at the cost of compromising basic needs such as adequate nutrition. Indeed, Habibov (2009, 2016) propose the possibility that bribes constitute a catastrophic expenditure - one that is "likely to force households to cut their consumption of other minimum needs" (Russell, 2004, p.147). If so, this can in turn adversely affect health in its own right, especially if not compensated with improved services in return to paying a bribe.

Our empirical analysis explores these possibilities in detail. First, we study the reduced form relationship between bribery and health. Second, we explore the mechanisms underlying this relationship by studying two further relationships, the one between bribery and quality of services received; and the one between bribery and ability to afford consumption of nutritious food on a regular basis.

3. Data and Empirical Strategy

3.1. **Data.**

Our analysis is based on cross-sectional data drawn from the Life in Transition (LiTS) survey carried out by the European Bank for Reconstruction and Development in collaboration with the World Bank. LiTS is a unique collection of nationally-representative household surveys conducted based on a stratified two-stage sampling. It contains rich individual-level information on a variety of attitudes, preferences and behaviors alongside socioeconomic and demographic characteristics collected through face-to-face interviews.

We use the latest 2016 wave which surveyed around 51,000 individuals in 34 mainly post-communist countries. We limit the sample to the 28 post-communist countries of Central and Eastern Europe and the former Soviet Union for the purposes of this analysis, given the similarities in historical and institutional background and the nature and prevalence of the problems around corruption and health in these countries (the list of countries is provided in Table A1 of the Appendix). This effectively implies excluding Cyprus, Germany, Greece, Italy, Mongolia and Turkey (around 9,000 observations in total) from the sample. The final size of the sample used in the baseline analysis, once observations with missing data are dropped, is around 19,000 observations. When we account for missing observations, the results do not change (see column (3) in Tables 2 and 3).

The measure of outcome of our interest, health, is based on the self-assessed health status of individuals ranging from 1 (very bad) to 5 (very good) with the average of this variable in the sample at 3.47 (Table 1). The lowest averages of *Self-assessed health* are found in the South

Caucasus countries of Georgia and Armenia, while some of the countries in the Balkans, including Albania, Montenegro, Bosnia and Herzegovina, Kosovo and FYR Macedonia, are among the countries with the highest averages of self-assessed health in the sample.

What makes LiTS particularly suitable for the current analysis is the richness of its information on the experiences of bribery. Individuals are asked to report whether they (or a member of their household) made an unofficial payment or a gift when using each of the following services in the preceding 12 months: (i) interacting with the road police; (ii) requesting official documents (e.g. passport, visa, birth or marriage certificate, land register, etc.) from authorities; (iii) going to courts for a civil matter; (iv) receiving public education (primary or secondary); (v) receiving public education (vocation); (vi) receiving medical treatment in the public health system; (vii) requesting unemployment benefits; and (xiii) requesting other social security benefits.

Our interest in the first instance is to capture the effect of all experiences of involvement in bribery on individuals' health outcomes. Therefore, as our baseline independent variable of interest, we generate a *Bribery index* which represents the count of the number of domains where a bribe was paid, ranging from 0 to 8. As seen from Table 1, this number is above zero in the sample. Individuals in Tajikistan report the largest instances of bribery with an average at 0.82, while in Slovenia the average of Bribery index is the lowest among the countries in the sample (Table A1).

While our baseline analysis focuses on the consequences of experiences of bribery across all public domains, we also look at bribery limited to the health sector separately as the mechanisms through which the health outcomes are affected might have unique features in this case and the consequences for health may be more immediate. By disentangling the experiences of bribery in the health sector from those in other sectors, we are also able to relate our findings with those of other studies that have looked at bribery in the health sector exclusively (e.g., Habibov, 2016; Habibov and Cheung, 2017). The *Bribery index health sector* is a binary variable generated from the responses to item (vi) above. Seventeen percent of individuals in the sample report paying bribes when receiving medical treatment in the public health system. The country means of this variable are presented in Table A1.

Our baseline analysis of the link between the *Bribery index* and *Self-assessed health* controls for a range of important background characteristics of individuals. These include gender, age (and its squared term), employment status and income, educational attainment, marital status and household size, minority background, and the characteristics of the residential location distinguishing between urban locations and others (as well as directly controlling

for the latitude and longitude of the precise residential location). The descriptive statistics on the baseline control variables is provided in Table 1. Next, we describe our estimation strategy.

[Table 1 about here.]

3.2. **Baseline econometric model.**

The relationship between bribery and health can be characterized as follows:

$$Health^*_{ic} = \beta_0 + \beta_1 BriberyIndex_{ic} + \mathbf{X_{ic}}'\gamma + \delta_c + \varepsilon_{ic} \tag{1}$$

where for an individual i in a country c, *Health** is the unobserved individual health condition. *BriberyIndex* represents the count of the number of domains (ranging from 0 to 8) where a bribe was paid by an individual (detailed in the data description above). **X** is a vector of background characteristics describing the demographic, socioeconomic and residential locality features of individuals. δ is a vector of country fixed effects, and ε is a stochastic disturbance.

Instead of *Health**, however, we can only observe categories of responses as follows:

$$Health_{ic} = \begin{cases} 1 & if & Health^*_{ic} \leqslant \tau_1 \\ 2 & if & \tau_1 < Health^*_{ic} \leqslant \tau_2 \\ 3 & if & \tau_2 < Health^*_{ic} \leqslant \tau_3 \\ 4 & if & \tau_3 < Health^*_{ic} \leqslant \tau_4 \\ 5 & if & Health^*_{ic} > \tau_4, \end{cases} \tag{2}$$

where for an individual i in a country c, *Health* is a categorically ordered self-assessed health status that takes values on a scale from 1 (very bad) to 5 (very good). τ_j represents the threshold of switching from category j to category $j+1$, for $j=\overline{1,4}$. Hence, we apply an ordered probit model using observations in (2) to fit the parameter vector in equation (1) and calculate marginal effects to interpret the results. We calculate heteroskedasticity-robust standard errors clustered at a primary sampling unit (PSU) level.

We check the robustness of our baseline results to a number of changes, including changes in the definition of the key variables and in the estimation methods used. These are discussed in detail in subsection 4.2. Most importantly, we attempt to address the potential endogeneity concerns in estimating the relationship between bribery and health. Such endogeneity may arise due to a number of possible reasons, at the first instance because bribers may differ in unobserved ways from non-bribers. If bribers would tend to report worse health outcomes even if they hadn't bribed, then our estimates of the effect of *Bribery index* could be spurious. It is also possible that health outcomes dictate individuals' engagement

with bribery. Potential measurement error in *Bribery index* is another possible source of bias in estimates.

A conventional approach to mitigate these problems is through an instrumental variable. Such variable must be an important factor in accounting for variation in bribery experiences across individuals but have no direct effect on their health outcomes. We employ two alternative external instrumental variables to address the issue of endogeneity.

LiTS has elicited individuals' views on the scale from 1 to 10 ranging from whether 'People should obey the law without exception' (1) to 'There are times when people have good reasons to break the law' (10). We exploit this variable, *Particularism*, as our first instrument under the assumption that it affects self-assessed health only through its effect on *Bribery index* (exclusion restriction). That particularism affects bribery has been shown in a paper by Rotondi and Stanca (2015) who argue that the psychological cost associated with bribery is lower for particularistic individuals since they are less sensitive to the burden imposed by corruption on society.

As our second instrument, we utilize the responses to the following question asked in LiTS: 'In your opinion, how often do people like you have to make unofficial payments or gifts' with reference to 8 situations.[3] We generate our second instrument, *People like you*, as the count of the number of domains where, according to the respondent, people like herself have to make unofficial payments or gifts. Here we assume that one's opinion on the intensity of bribery situations encountered by others affects their own propensity to be involved in bribery but does not bear any direct effect on their health outcomes otherwise.

Admittedly, the assumptions underlying the exclusion restrictions in these instrumental-variable-based approaches may not appear to be entirely convincing. We thus complement these external instruments with an internal instrument following an approach proposed by Lewbel (2012).[4] Lewbel (2012) shows that when there are some exogenous variables in the model, $\mathbf{Z}$, and errors are heteroskedastic, identification can be achieved without imposing the standard exclusion restrictions (see Lewbel (2012) for a detailed discussion). $\mathbf{Z}$ can be a subset of of the exogenous $\mathbf{X}$ vector included in the regression, or, as is in our application, $\mathbf{Z} = \mathbf{X}$. The internal instrument is constructed in three steps. First, the residual $\hat{\mu}$ from the regression of the endogenous variable, *BriberyIndex*, on $\mathbf{Z}$, is retrieved. Second, in-sample

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[3]The 8 situations with reference to which this questions is asked include: (i) interacting with the road police; (ii) requesting official documents (e.g. passport, visa, birth or marriage certificate, land register, etc.) from authorities; (iii) going to courts for a civil matter; (iv) receiving public education (primary or secondary); (v) receiving public education (vocation); (vi) receiving medical treatment in the public health system; (vii) requesting unemployment benefits; and (xiii) requesting other social security benefits.

[4]For recent applications of this approach see Mallick (2012); Emran and Hou (2013); Arcand et al. (2015).

deviation from the mean $\overline{\mathbf{Z}}$ for each exogenous variable, $\mathbf{Z} - \overline{\mathbf{Z}}$, is calculated. Third, the product of the terms from the first two steps is obtained $(\mathbf{Z} - \overline{\mathbf{Z}})\hat{\mu}$. This is then used as the instrument in the second stage.

Although objections can be raised to any of the above identification approaches, if they all happen to point to the same result, we may be able to qualify it as robust evidence.

3.3. Extended analyses.

In addition to estimating the reduced form relationship between bribery and self-assessed health, we explore the underlying mechanisms, focusing on the case of the bribery within the health sector. To do so, we first check whether bribery pays off: does paying bribes resolve some of the problems associated with health service delivery? In the dataset we observe whether, conditional on receiving a medical treatment, the respondent has encountered: (i) frequent and unjustified absence of doctors; (ii) disrespectful treatment by staff; (iii) unavailability of drugs; (iv) long waiting times, and (v) not clean facilities. Hence, we present the propensity to encounter a problem with health service delivery for an individual i in a country c as follows:

$$HealthServiceProblem^*_{ic} = \zeta_0 + \zeta_1 BriberyHealth_{ic} + \mathbf{X_{ic}}'\eta + \delta_c + \omega_{ic} \qquad (3)$$

The observed state of health services, $HealthServiceProblem_{ic}$, is assumed to relate to latent propensity through the criterion $HealthServiceProblem_{ic} = 1(HealthServiceProblem^*_i \geq 0)$, so that the probability of encountering a health service delivery problem under an assumption of normality for ω_{ic} can be described as a probit model. To aid with interpretation, we calculate marginal effects.

As a second step in unpacking the mechanisms underlying the relationship between bribery and self-assessed health, we look at food consumption patterns of individuals and ask whether these differ between bribers and non-bribers. LiTS provides information on whether an individual is able to afford consumption of meat, chicken, or fish (or a vegetarian equivalent) each second day. Is the ability to afford consumption of such food affected by payment of bribes? The propensity to afford consumption of food for an individual i in a country c can be presented as:

$$FoodConsumption^*_{ic} = \theta_0 + \theta_1 BriberyHealth_{ic} + \mathbf{X_{ic}}'\lambda + \delta_c + v_{ic} \qquad (4)$$

Assuming $FoodConsumption_{ic} = 1(FoodConsumption^*_i \geq 0)$ (where $FoodConsumption_{ic}$ presents the observed state of affordability of food consumption) and normality of the error term, the

probability of being able to afford consumption of food can be described as a probit model (with marginal effects used for interpretation).

In the following section we present and discuss the results.

4. RESULTS

4.1. **Baseline results.**

Our analysis of the data starts with the reduced form relationship between *Bribery index* and *Self-assessed health* presented in equation 1. In Table 2 we present the estimation results for the coefficients from the ordered probit model, starting with the parsimonious specification in column (1), adding the control variables in column (2), and controlling for missing observations in income and employment status in column (3). As seen in column (1), in the parsimonious specification we estimate a negative coefficient on *Bribery index*. This suggests that more extensive experiences of bribery are associated with inferior health outcomes, as captured by our measure of self-assessed health.

Next, in column (2) we add the baseline controls introduced in sub-section 3.1 to the estimation. According to these estimates, males assess higher levels of health - a result that is consistent with previous studies (e.g. Lindeboom and van Doorslaer, 2004; Johnston et al., 2009). We also find an indication of a U-shaped relationship between age and self-assessed health (for similar findings see Johnston et al., 2009; Baji and Bíró, 2018). Employed individuals and those with higher income report better health as do those with secondary and higher education (relative to individuals with no education). These results are similar to the findings in the literature on the positive association between socioeconomic status and health outcomes (e.g., Marmot et al., 1991; Smith, 2004). Consistent with previous studies (e.g., Hu and Goldman, 1990; Goldman et al., 1995), married individuals report better health as do those living in larger households. Minority status, on the other hand, is associated with inferior health - another finding that is consistent with the literature that often links this finding to the discrimination experienced by minorities (e.g., McKenzie, 2003; Johnston and Lordan, 2012). The estimated coefficients on the remaining controls are not statistically different from zero. The inclusion of these controls does not alter the estimated significant negative coefficient on the *Bribery index*. The inclusion of dummies for missing observations in income and employment status in column (3) does not change the results.

[Table 2 about here.]

To aid with the interpretation of these results, in Table 3 we report the marginal effects of the *Bribery index* on the *Self-assessed health* for an average individual in the sample. By

construction, the marginal effect on the lowest outcome (very bad health) always has the opposite sign to that of the highest outcome (very good health). The estimates from the baseline specification reported in column (2) suggest, for example, that an additional incidence of bribery reduces an individual's probability of reporting a good health state (4) by 1.8 percentage points and increases their probability of reporting a bad health state (2) by 1.5 percentage points.

[Table 3 about here.]

Below we test the robustness of these results to changes in estimation methods and definition of the key variables .

4.2. **Robustness checks.**

Our analysis is based on the sub-sample of public service users since it is the individuals in this group who could have encountered the situations of bribery, given the way it is defined in the survey. It thus excludes the non-users of services. However, if there is a non-random selection into service use based on individuals' unobservable characteristics, our baseline approach is likely to lead to an issue of potential sample selection bias. To correct for such bias, we use a variant of Heckman's selection model adapted to non-linear estimations (Heckman, 1979). As identification variables, we exploit the information on car and house ownership in the dataset, assuming that the ownership of such assets would affect the probability of using public services (Ivlevs and Hinks, 2015). The results from the second stage of the Heckman model reported in column (1) of Table 4 confirm the negative significant association between the *Bribery index* and our self-assessed measure of health.

Next, we test the robustness of the results to the definition of bribery. Our baseline measure of bribery is defined as a count of incidences of bribery across 8 different settings (described in sub-section 3.1). Instead of using this as a continuous measure, we generate a set of dummy variables for one incidence of bribery, two incidences, and three and more incidences, and use these in the model reported in column (2) of Table 4 (with those who did not encounter any situation of bribery used as the reference group).[5] We estimate significant negative coefficients on all three dummies, which lends support to our baseline result on the negative link between the extent of involvement in bribery and health.

We additionally ask whether our results might be driven by the bribery experiences within the health care system. Some studies focus on the bribery within the health sector in making inferences on its implications for individual health outcomes (e.g., Habibov, 2016; Habibov

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[5]Only 0.5% of respondents report more than 3 cases of bribery. Therefore, we have merged 3 and more cases into a single dummy. The results with 8 dummies are available on request.

and Cheung, 2017). While bribing for services other than health may not directly affect the health treatment received by individuals, it may potentially induce economic and psychological costs adversely affecting health. To explore this, we re-define our index of bribery, excluding the incidences of bribes paid for 'medical treatment in the public health system' from the count of the bribery contexts we observe. As such, this new index ranges from 0 (never paid a bribe) to 7 (paid a bribe in 7 different contexts). The estimated coefficient on this index, as reported in column (3) of Table 4, is negative and highly significant. To confirm that the health sector bribery does indeed affect individuals' health, in column (4) we report the results of the regression of *Self-assessed health* on *Bribery index health sector* - a binary measure that takes 1 if a bribe payment for receiving medical treatment in the public health system was made by an individual and 0 otherwise. The estimated coefficient on this variable is negative and significant. However, when we include the two measures of bribery, *Bribery index excl. health sector* and *Bribery index health sector*, jointly in the regression of *Self-assessed health*, the estimated coefficient on *Bribery index excl. health sector* is no longer significant (column 5).

We assess the robustness of the results to the definition of the dependent variable in the analysis presented in column (6) of Table 4 which employs an individual's Body Mass Index (BMI) as the dependent variable and estimates an OLS model. The estimated relationship between health sector bribery and BMI is positive. To get a sense on the magnitude, according to these results, an individual with a height of 1.75 meters who faced a health sector bribery is on average heavier by 0.7 kg ($= 0.229 * 1.75^2$). Thus, when we use this alternative measure of individual health status, we still arrive at the finding that the bribery has negative consequences for health.

Unobserved heterogeneity is potentially important source of endogeneity in our analysis and we formally address this issue through an instrumental variable estimation in the next section. Here we provide an exploratory assessment on how important selection on unobservables might be by looking at the nature of circumstances under which the bribe payment was made distinguishing between those who were (i) asked to pay; (ii) thought informal payment was expected; (iii) were not asked to pay but wanted to express their gratitude; and (iv) offered to pay to get things done quicker or better (individuals who did not pay a bribe are the omitted category). Arguably, selection into bribery is likely to be more important for the case when bribe payment is made voluntarily compared to the case when it's done in response to being asked to pay. If such selection is important in driving the results then we may not see an effect of bribery under circumstances where involvement in

bribery is relatively more exogenous, such as when a bribe is paid in response to being asked to pay. Yet, as we see in column (7) of Table 4, bribery is consistently negatively associated with health regardless of the type of the circumstances under which it is paid.

Another approach to address the issue of unobserved heterogeneity is to be able to control for it, at least to some extent. Risk preference is likely to be an omitted variable in our context since it may affect the propensity to bribe as well as being related to individual health outcomes, directly or indirectly. And it is something that we observe in the data through individual reports on willingness to take risks, on a scale from 1 to 10. We control for *Risk preference* in the model reported in the final column of Table 4. Risk preference appears to be positively correlated with health but its inclusion does not affect the statistically significant negative relationship we estimate between *Bribery index* and self-reported health.

In sum, we establish that bribery has adverse effects on individuals' health - a result that is robust to a number of checks. In what follows, we focus on specifically addressing the endogeneity of bribery in evaluating its effect on health.

[Table 4 about here.]

4.3. **Addressing endogeneity.**

We find that bribery is negatively associated with health. But is this relationship causal? The results presented so far do not provide the basis for us to claim this. Here we interrogate the data further with the view of assessing the robustness of our baseline result to different approaches to addressing the issue of endogeneity as discussed in sub-section 3.2. In this analysis we treat *Self-assessed health* as continuous and estimate OLS models for simplicity.

To provide a basis for comparisons, we first present the results of an OLS estimation of the link between *Bribery index* and *Self-assessed health* (column 1, Table 5). We then proceed with instrumental variable estimations starting with those based on the use of external instruments. As discussed in sub-section 3.2, we have been able to identify two such instruments. The first of these is *Particularism* - a measure on the scale from 1 to 10 capturing individuals' views on whether 'People should obey the law without exception' (1) to 'There are times when people have good reasons to break the law' (10). The second-stage results of a 2SLS regression based on the use of this instrument are reported in column (2) of Table 5. The estimated coefficient on *Bribery index* is negative and highly significant. That *Particularism* significantly correlates with the *Bribery index* can be seen from the F-statistics from the 1st stage regression reported at the bottom of column (2).[6]

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[6]In addition to estimating a 2SLS model using *Particularism* as an instrument, as a robustness check we also estimated a two-stage residual inclusion model. This is similar to 2SLS model except that in the second stage regression, the endogenous variable is not replaced by the first-stage predictor; instead the first-stage residual

We next turn to the use of our second external instrument, *People like you* - a variable that represents the count of the number of domains where, according to the respondent, people like herself have to make unofficial payments or gifts. The results of this estimation, presented in column (3), extend further support for the existence of a negative significant relationship between *Bribery index* and *Self-assessed health*. The first-stage F-statistics confirms the strength of the first-stage results. Moreover, when the two instruments, *Particularism* and *People like you*, are exploited jointly to identify the relationship between bribery and health, the second stage results confirm our finding that the two are negatively associated (column (4) of Table 5). In addition to being able to confirm the strength of the first stage relationship between the instruments and the endogenous variable, we are able to carry out an over-identification test to formally validate the exclusion restriction given that the number of instruments exceeds the number of endogenous variables in this case. The p-value from this test, reported at the bottom of column (4), suggests that there is no evidence of a direct effect of instruments on health.

In the final column of Table 5 we present the results based on the use of an internal instrument following the approach by Lewbel (2012) discussed in sub-section 3.2. The results of these estimation are consistent with the rest: there is a negative significant association between *Bribery index* and *Self-assessed health*. For identification purposes, the error term in the first stage regression needs to be heteroskedastic. The Breusch-Pagan test rejects the null of homoskedasticity at the 1% level.

[Table 5 about here.]

Bribery is negatively related to self-assessed health, and at least some of this effect may well be causal based on the above robustness checks. Next, we focus our attention on the bribery in the health sector and explore some of the mechanisms underlying the link between bribery and health.

4.4. **Mechanisms: the case of health sector bribery.**

Bribery in the health sector is of special interest in the context of this study since not only it might affect health by imposing social, economic and psychological costs on individuals like bribery in other public services might do; it also affects the health services received by individuals, thereby uniquely imposing an additional effect on their health. As we confirmed in column (4) of Table 4, the relationship between *Bribery index health sector* and *Self-assessed health* is negative and highly significant. To get a sense on how large this effect is, we present

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is included as an additional regressor. The results of this estimation - available on request- were virtually identical to those from the 2SLS model.

the marginal effects from this regression in Table 6. According to these estimates, an incidence of health sector bribery reduces an average individual's probability of reporting a good (4) health state by 3.6 percentage points and increases their probability of reporting a bad health state (1) by 3 percentage points. These are economically highly significant effects.

[Table 6 about here.]

Why do the bribers end up with inferior health outcomes? At the first instance we explore whether bribery pays off. Do bribers actually get better services? To that end, we focus on a set of binary variables that capture the quality of health services, limiting the sample to those who have received medical treatment in the public health system in the preceding 12 months and thus are able to provide a quality assessment. These are measured based on the responses to questions on whether, conditional on receiving a medical treatment, the respondent has encountered: (i) frequent and unjustified absence of doctors; (ii) disrespectful treatment by staff; (iii) unavailability of drugs; (iv) long waiting times, and (v) not clean facilities. We analyze the link between *Bribery index health sector* and these measures as presented in equation 3. Since we are dealing with a binary outcome variable and a binary endogenous explanatory variable (*Bribery index health sector*), the conventional approach is to estimate a bivariate probit. We do this, using *Particularism* and *People like you* as instruments. The results of these estimations are summarized in Table 7.

What we find is that not only bribery does not mitigate the problems of absence of doctors, disrespectful treatment by staff, unavailability of drugs, long waiting times or not clean facilities; in fact it makes them worse. The estimated marginal effects on *Bribery index health sector* in all 5 regressions are positive and significant. These results are similar to those reported by Hunt and Laszlo (2012) and suggest that extra service provided in exchange for a bribe does not compensate for the initial shirking by providers while angling for a bribe (e.g., Maestad and Mwisongo, 2011; Hunt and Laszlo, 2012).

[Table 7 about here.]

The literature suggests that bribery is often concentrated among the vulnerable individuals, those for example, with poor health (Habibov and Cheung, 2017) or of poor socioeconomic status (Kankeu and Ventelou, 2016). It is possible therefore that bribes are paid at the cost of compromising basic needs which may have implications for health, especially in the case of economically vulnerable individuals. Consistent with this possibility, Habibov (2009, 2016) propose that bribes may constitute a catastrophic expenditure that forces households to cut their consumption of minimum needs. Here we explore this possibility utilizing the information in the survey on whether an individual is able to afford consumption of meat,

chicken, or fish (or a vegetarian equivalent) each second day. We analyze whether the probability that an individual is able to do so varies by whether they have paid a bribe or not, following the equation 4 and estimating a bivariate probit model utilizing *Particularism* and *People like you* for identification.

The results presented in Table 8 are broadly consistent with the above intuition. In the entire sample, we estimate a negative marginal effect on *Bribery index health sector* on the probability of being able to afford consumption of nutritious food each second day. We then re-estimate this relationship for sub-samples of individuals grouped based on the total monthly household expenditures, using quartiles to set the cut points (from the lowest expenditures, the first quartile, to the highest expenditures, the fourth quartile). The results across all four quartiles confirm the significant negative relationship between bribery in health sector and the probability to be able to afford food. Bribes do appear to be paid at the expense of compromising the nutritional intake. We discuss the implications of these results in the next final section.

[Table 8 about here.]

5. CONCLUSION

This study provides an in-depth contribution towards understanding the sources of poor health outcomes in post-communist countries. Using data on 28 post-communist countries, we assess the individual-level health consequences of deficient institutional settings in those countries. The findings suggest that experience in providing bribes for public services in such settings has a deteriorating effect on self-assessed health. We explore two mechanisms underlying this result and show firstly, that bribery in the health sector does not pay off: there is a deterioration of service quality associated with payment of bribes; and secondly, bribery in the health sector appears to come at the expense of compromising nutritional intake therefore likely to constitute a catastrophic health expenditure.

Our results call for more effective evidence-based policy interventions targeting the issues of health and well-being in deficient institutional settings observed in developing and transition countries. In particular, our findings imply that better law enforcement may improve the health outcomes in those countries. Our results also extend support for anti-corruption efforts in post-communist countries. The lack of corruption control mechanisms and integrity campaigns, among other things, is part of the challenge in addressing the high levels of corruption in post-communist countries (Aleksanyan, 2012). Low salaries of public servants is another important driver of the demand for bribes in these countries (e.g. Borcan

et al., 2014). Our results therefore highlight that better corruption control mechanisms, integrity campaigns and reforms in employment terms and conditions may have far-reaching effects.

This study can be extended in several ways. We assess the impact of bribery on self-assessed health and also consider individual BMI in a robustness check. Even though the health literature suggests that these measures evaluate the overall health condition of individuals well, it might be interesting to study other health-related outcomes too, subject to data availability. Furthermore, while we explore some of the mechanisms underlying the relationship between bribery and health, there is scope for future research to dwell further into this. For instance, experimental studies may assess individual biological and psychological reactions to providing or asking for informal payments. We demonstrate that our results are robust to applying a number of approaches to addressing the endogeneity of bribery in studying its effect on health. However in order to handle this task more convincingly, a source of truly random variation in bribing behavior would need to be identified.

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APPENDIX

[Table A1 about here.]

LIST OF TABLES

Table 1: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Self-assessed health	3.47	0.93	1	5
Bribery index	0.27	0.65	0	8
Bribery index health sector	0.17	0.38	0	1
Male	0.43	0.50	0	1
Age	48.65	17.48	18	95
Employed	0.62	0.49	0	1
ln(Income)	5.69	2.13	0	20.87
No education	0.01	0.11	0	1
Primary education	0.10	0.29	0	1
Secondary and higher education	0.89	0.31	0	1
Married	0.58	0.49	0	1
Household size	2.86	1.67	1	10
Minority	0.12	0.33	0	1
Urban	0.55	0.50	0	1

Note. Bribery index is the count of the number of domains where a bribe was paid in the preceding 12 months. The domains are: (i) interacting with the road police; (ii) requesting official documents (e.g. passport, visa, birth or marriage certificate, land register, etc.) from authorities; (iii) going to courts for a civil matter; (iv) receiving public education (primary or secondary); (v) receiving public education (vocation); (vi) receiving medical treatment in the public health system; (vii) requesting unemployment benefits; and (xiii) requesting other social security benefits. Bribery index health sector is a binary variable generated from the responses to item (vi).

Table 2: Bribery and self-assessed health — ordered probit coefficients

Control variables	(1)	(2)	(3)
Bribery Index	-0.028*	-0.113***	-0.077***
	(0.016)	(0.018)	(0.014)
Male		0.057***	0.043***
		(0.017)	(0.014)
Age		-0.050***	-0.056***
		(0.003)	(0.003)
Age squared/100		0.022***	0.027***
		(0.003)	(0.003)
Employed		0.459***	0.477***
		(0.024)	(0.020)
ln(Income)		0.175***	0.063***
		(0.019)	(0.009)
Primary education		0.241*	0.256***
		(0.138)	(0.077)
Secondary and higher education		0.473***	0.554***
		(0.135)	(0.077)
Married		0.050***	0.084***
		(0.019)	(0.016)
Household size		0.028***	0.023***
		(0.007)	(0.006)
Minority		-0.149***	-0.133***
		(0.030)	(0.027)
Urban		0.011	0.031
		(0.025)	(0.021)
Latitude		-0.001	-0.007
		(0.008)	(0.005)
Longitude		-0.002	-0.004**
		(0.002)	(0.002)
Constant cut 1	-2.859***	-3.532***	-4.778***
	(0.091)	(0.392)	(0.243)
Constant cut 2	-1.918***	-2.422***	-3.674***
	(0.090)	(0.391)	(0.243)
Constant cut 3	-0.762***	-0.990**	-2.283***
	(0.089)	(0.391)	(0.242)
Constant cut 4	0.481***	0.508	-0.811***
	(0.088)	(0.391)	(0.241)
Country fixed effects	Yes	Yes	Yes
Missing observations' controls	No	No	Yes
N	18,926	18,926	28,645
Pseudo R^2	0.040	0.164	0.153

Note. Dependent variable is Self-assessed health. Column (3) includes controls for missing observations in income and employment status. Robust standard errors clustered at a primary sampling unit provided in LiTS are in parentheses. *Denotes significance at 10 percent; **at 5 percent; ***at 1 percent levels.

Table 3: Bribery and self-assessed health — ordered probit marginal effects

	(1)	(2)	(3)
Pr(Self-assessed health=1)	0.002*	0.006***	0.004***
	(0.001)	(0.001)	(0.001)
Pr(Self-assessed health=2)	0.005*	0.015***	0.010***
	(0.002)	(0.002)	(0.005)
Pr(Self-assessed health=3)	0.004*	0.014***	0.010***
	(0.002)	(0.002)	(0.002)
Pr(Self-assessed health=4)	-0.006*	-0.018***	-0.012***
	(0.003)	(0.003)	(0.002)
Pr(Self-assessed health=5)	-0.005*	-0.017***	-0.012***
	(0.002)	(0.003)	(0.002)
Individual controls	No	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Missing observations' controls	No	No	Yes
N	18,926	18,926	28,645
Pseudo R^2	0.040	0.164	0.153

Note. Marginal effects of Bribery index on the probability of selecting a particular alternative in Self-assessed health are presented. Robust standard errors clustered at a primary sampling unit provided in LiTS are in parentheses. *Denotes significance at 10 percent; **at 5 percent; ***at 1 percent levels. Columns (1), (2), and (3) correspond to model specifications presented in Table 2.

Table 4: Bribery and self-assessed health — robustness checks

Control variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bribery index	-0.081***							-0.121***
	(0.0156)							(0.018)
Bribery index = 1		-0.169***						
		(0.024)						
Bribery index = 2		-0.203***						
		(0.055)						
Bribery index $\geq$3		-0.325***						
		(0.093)						
Bribery index excl. health sector			-0.082***		-0.007			
			(0.027)		(0.031)			
Bribery index health sector				-0.216***	-0.235***	0.229**		
				(0.026)	(0.035)	(0.107)		
Asked to pay							-0.287***	
							(0.062)	
Expected to pay							-0.289***	
							(0.046)	
Offered to pay							-0.380***	
							(0.054)	
Gratitude							-0.155***	
							(0.037)	
Risk preference								0.039***
								(0.004)
Mill's lambda	-1.680***							
	(0.382)							
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	26,007	18,926	12,063	15,849	8,986	14,437	17,804	18,561
Pseudo R^2 / R^2		0.164	0.146	0.170	0.162	0.11	0.167	0.166

Note. Dependent variable is Self-assessed health in columns (1)-(5), (7) and (8) and BMI in column (6). Estimated coefficients are based on Heckman selection model in column (1), ordered probit regressions in columns (2)-(5), (7) and (8) and an OLS regression in column (6). Robust standard errors clustered at a primary sampling unit provided in LiTS are in parentheses. *Denotes significance at 10 percent; **at 5 percent; ***at 1 percent levels.

Table 5: Bribery and self-assessed health — addressing endogeneity

	(1)	(2)	(3)	(4)	(5)
Bribery index	-0.077***	-0.560**	-0.280***	-0.287***	-0.085***
	(0.012)	(0.249)	(0.065)	(0.065)	(0.017)
Individual controls	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Ho: IV(s) is(are) weak; F-statistics		25.121	189.534	95.352	
Ho: Bribery index is exogenous; P-value		0.011	0.000	0.000	
Ho: IVs are valid; P-value				0.113	
N	18,926	18,567	18,397	18,085	18,926
R^2	0.356	0.268	0.335	0.332	0.356

Note. Dependent variable is Self-assessed health. Column (1) reports OLS estimates. Column (2) reports 2SLS estimates based on using *Particularism* as an instrument. Column (3) presents 2SLS estimates based on using *People like you* as an instrument. Column (4) reports 2SLS estimates based on using *Particularism* and *People like you* jointly as instruments. Column (5) presents estimates by heteroskedasticity-based identification (Lewbel, 2012). The details on instrument definitions and estimation methods are presented in subsection 3.2. Robust standard errors clustered at a primary sampling unit provided in LiTS are in parentheses. *Denotes significance at 10 percent; **at 5 percent; ***at 1 percent levels.

Table 6: Bribery in health sector
and self-assessed health — or-
dered probit marginal effects

	(1)
Pr(Self-assessed health=1)	0.012***
	(0.002)
Pr(Self-assessed health=2)	0.030***
	(0.004)
Pr(Self-assessed health=3)	0.022***
	(0.003)
Pr(Self-assessed health=4)	-0.036***
	(0.004)
Pr(Self-assessed health=5)	-0.028***
	(0.004)
Individual controls	Yes
Country fixed effects	Yes
N	15,849
Pseudo R^2	0.169

Note. Marginal effects of Bribery
index health sector on the proba-
bility of selecting a particular al-
ternative in Self-assessed health are
presented. Robust standard errors
clustered at a primary sampling
unit provided in LiTS are in paren-
theses. *Denotes significance at 10
percent; **at 5 percent; ***at 1 per-
cent levels.

Table 7: Bribery in health sector and quality of health services received — bivariate probit marginal effects

	(1)	(2)	(3)	(4)	(5)
	Pr(Absence of doctors=1)	Pr(Disrespectful treatment=1)	Pr(No drugs available=1)	Pr(Long waiting times=1)	Pr(Facilities not clean=1)
Bribery index health sector	0.176***	0.288***	0.149***	0.245***	0.133***
	(0.030)	(0.024)	(0.037)	(0.052)	(0.021)
Individual controls	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
N	15,175	15,175	15,175	15,175	15,175
			1st stage estimates for instruments		
Particularism	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
People like you	0.010***	0.010***	0.009***	0.009***	0.010***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

Note. Marginal effects of Bribery index health sector on the probability of experiencing absence of doctors (column 1), disrespectful treatment (column 2), no drugs available (column 3), long waiting times (column 4), and facilities not clean (column 5). *Particularism* and *People like you*, defined in subsection 3.2, are used to identify the effect of Bribery index health sector in the second stage. Robust standard errors clustered at a primary sampling unit provided in LiTS are in parentheses. *Denotes significance at 10 percent; **at 5 percent; ***at 1 percent levels.

Table 8: Bribery in health sector and food affordability - bivariate probit marginal effects

	(1)	(2)	(3)	(4)	(5)
	All sample	1st quartile	2nd quartile	3rd quartile	4th quartile
Bribery index health sector	-0.164***	-0.311***	-0.131**	-0.233***	-0.069***
	(0.038)	(0.090)	(0.074)	(0.052)	(0.051)
Individual controls	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
N	12,062	2,758	2,910	3,119	3,275
	1st stage estimates for instruments				
Particularism	0.003**	0.005***	0.007***	0.001	0.001
	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
People like you	0.010***	0.005***	0.011***	0.010***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

Note. Marginal effects of Bribery index health sector on the probability of being able to afford consumption of meat, chicken, or fish (or vegetarian equivalent) each second day. *Particularism* and *People like you*, defined in subsection 3.2, are used to identify the effect of Bribery index health sector in the second stage. Robust standard errors clustered at a primary sampling unit provided in LiTS are in parentheses. *Denotes significance at 10 percent; **at 5 percent; ***at 1 percent levels. Quartiles are based on total monthly household expenditures (in log).

Table A1: Descriptive statistics - means by country

Country	Self-assessed health	Bribery index	Bribery index health sector
Albania	3.96	0.46	0.31
Armenia	2.96	0.24	0.19
Azerbaijan	3.42	0.62	0.34
Belarus	3.22	0.25	0.18
Bosnia and Herz.	3.79	0.34	0.19
Bulgaria	3.64	0.20	0.16
Croatia	3.62	0.11	0.09
Czech Rep.	3.61	0.11	0.10
Estonia	3.16	0.06	0.05
FYR Macedonia	3.73	0.15	0.10
Georgia	2.95	0.10	0.03
Hungary	3.41	0.26	0.25
Kazakhstan	3.51	0.51	0.19
Kosovo	3.77	0.12	0.07
Kyrgyz Rep.	3.63	0.59	0.25
Latvia	3.19	0.14	0.12
Lithuania	3.20	0.25	0.24
Moldova	2.97	0.65	0.42
Montenegro	3.92	0.21	0.14
Poland	3.65	0.09	0.07
Romania	3.40	0.31	0.30
Russia	3.30	0.39	0.22
Serbia	3.62	0.27	0.13
Slovak Rep.	3.45	0.16	0.13
Slovenia	3.52	0.03	0.02
Tajikistan	3.60	0.82	0.46
Ukraine	3.27	0.50	0.34
Uzbekistan	3.58	0.27	0.16

Note. Self-assessed health of individuals ranges from 1 (very bad) to 5 (very good). Bribery index is the count of the number of domains where a bribe was paid in the preceding 12 months, ranging from 0 to 8. The domains are: (i) interacting with the road police; (ii) requesting official documents (e.g. passport, visa, birth or marriage certificate, land register, etc.) from authorities; (iii) going to courts for a civil matter; (iv) receiving public education (primary or secondary); (v) receiving public education (vocation); (vi) receiving medical treatment in the public health system; (vii) requesting unemployment benefits; and (xiii) requesting other social security benefits. Bribery index health sector is a binary variable generated from the responses to item (vi) above.

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