

Bribing Behaviour and Sample Selection:  
Evidence from Post-Socialist countries and Western Europe

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**Abstract**

*We study the individual-level determinants of bribing public officials. Particular attention is paid to the issue of respondents' non-random selection into contact with public officials, which may result in biased estimates. Data come from the 2010 Life in Transition Survey, covering 30 post-socialist and five Western European countries. The results suggest that the elderly tend to be less likely to bribe public officials, while people with higher income and, especially, low trust in public institutions are more likely to bribe. Several determinants of bribery – ethnic minority status, the degree of urbanisation, social trust - are context specific, i.e. they change signs or are statistically significant according to the geographical region or the type of public official. The results show that not accounting for sample selection effects may produce a bias in estimated coefficients.*

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## 1. Introduction

There is a general agreement among academics and policymakers that corruption leads to inferior socio-economic outcomes. A large and well-established body of literature suggests that, at country level, higher corruption is associated with lower economic growth (Mauro, 1995; Everhart et al., 2009; Johnson et al., 2011), lower productivity (Lambsdorff, 2003), higher inequality and poverty (Gupta et al., 2002; Jong-sun and Khagram, 2005), and lower international trade and foreign investment (Wei, 2000; Cuervo-Cazurra, 2006; Egger and Winner, 2006; Jong and Bogmans, 2011). In this context, fighting corruption has become a major preoccupation for governments in many developing, transition and, in certain cases, developed countries across the world.<sup>3</sup>

To deal with corruption, one must know its causes. These causes are likely to be both ‘external’ and ‘internal’ to individuals involved in corrupt exchanges. ‘External’ factors associated with corruption<sup>4</sup> include a slower pace of structural reforms (Iwasaki and Suzuki, 2012), less freedom of the press (Brunetti and Weder, 2003), a lower ratio of government to manufacturing wages (Van Rijckeghem and Weder, 2001), a lower share of women in the labour force (Swamy et al., 2001), a lower share of Protestants in the population (Treisman, 2000) and higher levels of official development aid (Ali and Isse, 2003).

‘Internal’ causes of corruption are also of interest, as they help the policymakers understand why, within a particular country, some people are more likely to engage in corrupt acts than others. The availability of large-scale survey data has recently led to a number of empirical papers on the individual-level determinants of corruption behaviour and corruption attitudes (Swamy et al., 2001; Gatti et al., 2003; Mocan, 2008; Guerrero and Rodriguez-Oreggia, 2008; Hunt, 2007; Hunt and Laszlo, 2012; Tavits, 2011; Truex, 2011). This literature suggests, for example, that wealthier people are more prone to paying bribes (Guerrero and Rodriguez-Oreggia, 2008; Hunt

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<sup>3</sup> For a survey of literature on the causes and consequences of corruption, see Lambsdorff (2006) and Kis-Katos and Schulze (2013).

<sup>4</sup> Note that because of reverse causality and omitted variables it is often difficult to prove causal effects of particular variables on corruption. Most results in corruption literature report conditional correlations rather than causalities.

and Laszlo, 2012), being asked for bribes by public officials (Mocan, 2008) and find corrupt behaviour justifiable (Gatti et al., 2003).

This paper continues the exploration of corruption using survey data and makes several contributions to the literature. First, it addresses a methodological gap in the empirical literature – an issue of potential sample selection bias which arises from a non-random selection, based on respondents’ unobservable characteristics, into contact with public officials. Previous work by Hunt (2007), Guerrero and Rodriguez-Oreggia (2008), Tavits (2011) and Hunt and Laszlo (2012) does not explicitly consider this issue. Secondly, this paper uses the largely unexplored ‘Life in Transition-2’ survey, administered in 2010 in thirty economies of Central and Eastern Europe and Central Asia and five Western European countries. An important advantage of the data used is that respondents are asked about their actual corruption experience – paying a bribe to a public official. Much of the previous literature on the micro-determinants of corruption has concentrated on attitudes towards corruption (Soot and Rootalu, 2012; Gatti et al., 2003; Truex, 2011) and the probability of being asked for a bribe (Mocan, 2008). Several studies (Tavits, 2010; Hunt and Laszlo, 2012; Hunt, 2007; Guerrero and Rodriguez-Oreggia, 2008) have addressed the actual bribing experience, but only in the context of one or two countries (Estonia, Peru, Uganda, Mexico). Our study analyses the determinants of actual corruption experience (completed corrupt exchanges) in a multi-country context.

The paper primarily focuses on transition economies as corruption remains a widespread phenomenon there (Transparency International, 2011; Iwasaki and Suzuki, 2012). The high levels of corruption in the region can be attributed to several factors: high corruption could be a legacy of the Communist regime where it was considered “institutionalized, socially necessary evil for achieving goals and maintaining the national economy” (Iwasaki and Suzuki, 2012, p. 54); it could have resulted from the plan-to-market transition process itself, which, in the absence of strong rule of law, created ample opportunities for corrupt exchange (Tavits, 2011; Iwasaki and Suzuki 2012); and, finally, it could be linked to mentality, culture and considered a norm in a particular society. Our analysis initially pools all of the countries and reveals common determinants of bribery in the post-socialist world. However, we are also interested in cultural and context-specific determinants of

bribery, which is why we estimate our model for different geo-political regions and different types of public officials.

The remainder of the paper is structured as follows. Section 2 presents the data and discusses the corruption variables used. Section 3 presents the method of estimation. Section 4 reports and analyses the results. A conclusion follows.

## **2. Data and variables.**

### **2.1. Data.**

To test for possible sample selection bias and find the determinants of bribery, we use data from the “Life in Transition 2” survey (LITS-2), conducted by the EBRD and the World Bank in autumn 2010. Thirty post-socialist economies of Central and Eastern Europe and Central Asia, as well as five Western European countries (France, Germany, Italy, Sweden and the UK), participated in the survey. The nationally representative samples consist of 1,000 respondents per country (1,500 respondents in the case of Russia, Ukraine, Uzbekistan, Serbia, Poland and the UK). In each country, the households were selected according to a two-stage clustered stratified sampling procedure. In the first stage, the frame of primary sampling units was established using information on local electoral territorial units. In the second stage, a random walk fieldwork procedure was used to select households within primary sampling units. Steves (2011) provides the survey summary, including detailed information on survey design and implementation methodology.

Our main analytical focus will be on the broad region (30 countries) of Eastern Europe and Central Asia. We exclude the five Western European countries – the UK, Germany, France, Italy and Sweden – from the main sample, as they are likely to represent a qualitatively different group compared with the post-socialist region. Western countries have longer histories of functioning democracy and more transparent institutions, which would make petty corruption a less widespread phenomenon.

The debate about whether corruption can be objectively measured requires consideration before proceeding further. Country-level measures of corruption,

notably Transparency International's Corruption Perception Index and the World Bank's World-wide Governance Indicators, have raised the profile of corruption and been important in calls for greater transparency of governments. However, since these indicators are largely based on perceptions of experts from outside of the countries involved, they are open to a number of criticisms raised by the authors themselves, e.g. Lambsdorff (2005), and by a number of other researchers. These include a lack of conceptual underpinning (Arndt and Oman, 2006; Anderson and Heywood, 2009) and questionable primary data sources and methods, used to compile the indicators (Knack, 2007). Olken (2009) finds that actual corruption is not correlated with peoples' perceptions of corruption. Razafindrakoto and Roubaud (2010) find compelling evidence that experts over-estimate corruption in low-income countries compared to household level surveys, because they are biased towards a free market ideology. These findings raise questions about whether corruption and bribery can ever be measured accurately.

Finding objective measures of corruption is conceptually hard but there are numerous examples in the literature. Reinikka and Svensson (2004) measure embezzlement as the gap between an independent estimate of government spending and what governments claim to spend. Di Tella and Schargrodsky (2003) and Hsieh and Moretti (2005) compare government prices to the market prices to measure price-mark-ups or 'kickbacks'. Gorodnichenko and Peter (2007) estimate the level and scale of bribery within the public sector by analysing consumption-income gaps of public and private sector workers. Reinikka and Svensson (2006) use public expenditure tracking surveys (PETS) and quantitative service delivery surveys (QSDS) to find that most public spending on education in Sub-Saharan Africa leaks from the system.<sup>5</sup> However, this type of information is costly to gather and requires the help of those officials who may have a vested interest in hiding corruption in the first place (principal-agent problem).

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<sup>5</sup> Monitoring institutional features of fiscal procedures in the public sector has been targeted by the Public Expenditure and Financial Accountability (PEFA) initiative established in 2001, [www.pefa.org](http://www.pefa.org). In the 1980s and 1990s empirical work looking at how aid was spent and the impact it had on government spending was inconclusive, e.g. Pack and Pack (1990, 1993) with monitoring of aid an issue as was reliable country-level data.

Because of the cost and principal-agent problems of objective measures of corruption, many researchers have instead analysed individual experiences of corruption assuming these experiences are good proxies for actual (particularly petty) corruption. Proponents of this measure (e.g. Svensson (2003), Reinikka and Svensson (2006), Seligson (2006) and Razafindrakoto and Roubaud (2010)) are aware of its weaknesses, notably that people are likely to under-report their participation and hence experiences in any corrupt or bribing activity which will bias any results. However this under-reporting is likely to vary in its degree depending on the cultural acceptance of such behaviour. Hunt (2007) suggests that the stigma associated with answering questions about bribery honestly may be lower in high-corruption countries than low-corruption countries. Given this paper is concerned with transition economics only, we expect relatively low under-reporting compared to developed countries.

## 2.2. Variables

### **Dependent variable**

Whether a bribe is made or not is subject to contact with public officials/institutions. The LITS-2 survey contains several questions relating to public official use and self-reported corruption behaviour. This paper uses two questions from it. With reference to eight types of public services (*interacting with road police; requesting official documents (visa, passport) from authorities; going to courts for a civil matter; receiving public education (primary or secondary); receiving public education (vocational); receiving medical treatment in the public health system; requesting unemployment benefits; requesting social security benefits*), the first question asks, “During the past 12 months have you or any member of your household used these (*eight*) services?” (italics added). If answered in the affirmative, then information is gathered on whether “...any member of your household (*has made*) an unofficial payment or gift when using these services over the past 12 months?” (italics added). We will use the first question to capture the selection into contact with public

officials/ institutions, and the second to capture bribery conditional on contacting public officials.<sup>6</sup>

Table 1 reports, for each type of public official/institution, 1) the number of bribery episodes, 2) the proportion of bribery episodes relative to the full sample, 3) the proportion of respondents who have used a public official relative to the full sample, and 4) the proportion of bribery episodes relative to the number of respondents who have contacted a public official. In absolute terms, the highest number of bribery episodes is observed in the public health system (17.5% of all respondents were involved in bribery), followed by the road police (5.7%) and requesting official documents (4.2%). Together, these three types of public officials account for 75% of all bribery episodes. However, if the comparison is made relative to those respondents who have used a public official, the road police emerges as the most corrupt public service (30.3% of those who have interacted with road police paid a bribe), followed by the public health system (25.5%) and the vocational public education (18.5%). Courts, unemployment and other social security services have the lowest rates both in terms of official use (4-10%) and giving a bribe conditional on official use (10-13%).<sup>7</sup>

**Table 1. Distribution of bribery and official use across official types**

	Bribery episodes (bribe was paid)	Bribery rate (relative to total sample)	Public official use rate (relative to total sample)	Bribery rate (relative to public official use)
Road police	1901	0.057	0.188	0.303
Requesting documents from authorities	1386	0.042	0.230	0.181
Courts	197	0.006	0.044	0.134
Public education (primary and secondary)	1302	0.039	0.254	0.154
Public education (vocational)	1014	0.030	0.164	0.185
Public health system	5839	0.175	0.687	0.255
Unemployment benefits	176	0.005	0.054	0.098

<sup>6</sup> Depending on the type of public official, the non-response rate for the first question ranges from 1 to 2%, and the non-response rate for the second question paying bribes ranges from 2 to 4%. These missing values have been excluded from the analysis. See also Kis-Katos and Schulze (2013) for a discussion of non-responses in corruption research.

<sup>7</sup> It is important to note that, for certain types of public institutions, it is possible to obtain the service without contacting having contact to a public official. For example, electronic and postal arrangements may be in place for requesting and obtaining official documents, as well as making payments for public services. If people have a choice to contact the public official or not, we might expect them to avoid contact if they anticipate that they will be extorted. For many types of public services, however, contact with officials will be inevitable (e.g. being stopped by a police officer, dealing with courts, hospitals or educational establishments).

Other social security benefits	320	0.010	0.095	0.101
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Source: Life on transition-2 survey (2010).

### **Explanatory variables**

Following the empirical literature on the micro-determinants of corruption behaviour and attitudes (Tavits, 2010; Guerrero and Rodriguez-Oreggia, 2008; Soot and Rootalu, 2012; Hunt and Lazslo, 2012; Hunt, 2007; Truex, 2011), our regressions will include the following respondent characteristics: dummy variables for gender, six age groups,<sup>8</sup> three education levels (primary, secondary, tertiary) and being employed; and the following household-level variables: linguistic minority status (if the main language spoken in the family is different from the official language(s) of the country), and dummy variables for three types of settlement (rural, urban, and metropolitan).

Unfortunately, the survey does not contain information on the actual household (or individual) income. Therefore, we had to consider different proxies for household income. First, the survey contains information on household monthly expenditure on different goods (food, utilities, transport, education, health, clothing and durable goods), as well as information on household monthly savings. We used this information to create a total expenditure and savings adult equivalence variable.<sup>9</sup> Closer inspection of this variable revealed a ‘don’t know’/ non-response rate of 46% and it was decided not to use this variable because of the huge loss in information this would cause.<sup>10</sup> Instead we used information on where respondents thought they were on a ten-step income ladder, where the first (tenth) step captures the poorest (richest) 10% of the country. The response rate to this question was 98.3% and is used as an income proxy, although it is likely to suffer from subjectivity bias, as there is no

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<sup>8</sup> The survey also contains information on the household heads’ gender and age. We have checked the robustness of our results to using these variables instead of the respective respondent characteristics – the results remain qualitatively unchanged. This is partly because in the 61 % of cases the respondents were the heads of households (Steves, 2011).

<sup>9</sup> This variable used the OECD income equivalence scale. We subsequently split the variable into deciles within each country to avoid comparison of expenditures in different currencies.

<sup>10</sup> The non-response rate is higher for particular countries: e.g. 66% of respondents did not provide an answer for the expenditure on durable goods in Uzbekistan.



guarantee that everyone imagines the ten-step income ladder in the same way. To add a more tangible dimension of economic wealth, we also use information on household assets (car, secondary residence, bank account, debit card, credit card, mobile phone, computer and internet access at home) to create a wealth index using principal components.<sup>11</sup>

Next, we want to include variables capturing respondents' trust in institutions and trust in people. The literature suggests that those with a high level of trust in public institutions are less likely to tolerate corruption and break the law (Soot and Roodalu, 2012; Marien and Hooghe, 2011). Therefore, we expect they will also be less likely to be involved in bribery. Institutional trust will be captured by a composite variable, ranging from 4 (complete distrust) to 20 (complete trust), formed by adding together trust in four institutions: 1) the government/ cabinet of ministers, 2) local government, 3) courts and 4) the police (trust in each institution ranges from "complete distrust" (1) to "complete trust" (5)).

We also include a variable capturing trust in people or what is termed 'social trust' in the literature. One could argue that participants involved in an illegal transaction need to trust each other in order for corruption to be sustained (Rose-Ackerman, 2001). The variable is based on the question: "Generally speaking, do you think most people can be trusted with answers range from "complete distrust" (1) to "complete trust" (5). Tavits (2011) considered trust in people as a potential determinant of the probability of paying a bribe in Estonia, but obtained a statistically insignificant coefficient. La Porta et al (1997) found social trust to have a significant negative association on corruption at the country-level. We want to test the significance of this variable in a broader sample of East European and ex-USSR countries.

The inclusion of trust measures raises the broader issue of endogeneity in our model since many of our right-hand-side variables can feasibly be caused by whether the individual pays a bribe or not. It is easy to think of paying bribes to public officials as

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<sup>11</sup> The correlation between the self-reported position on income ladder and the wealth index is 0.34. The expenditure/ savings variable, which has 46% missing values, has correlation coefficients of 26% and 36% with the self-reported position on income ladder variable and the wealth index, respectively.

having a direct impact on causing lower trust in institutions.<sup>12</sup> The quality of institutions is also important here, since lower quality means a poorer reputation and poorer experience in using these institutions. Dealing with the endogeneity of individual regressors would require either panel data or suitable instrumental variables. Unfortunately, our data do not contain suitable instruments for trust; dealing with endogeneity is therefore left for future research.

Finally, to control for all country-wide influences (historical, cultural etc.) on household corruption behaviour, all regressions will include country-fixed effects.

### 3. Estimation strategy

A typical regression, estimating the effects of socio-economic characteristics on the likelihood of bribery, would be run on a sub-sample of public official users and exclude the non-users. This results in a potential sample selection issue if the sub-sample are not drawn from a random distribution (Wooldridge, 2010).

Formally, the bribing model with sample selection can be described as follows. We assume that an individual  $i$ 's propensity to bribe is captured by an underlying latent variable,  $y_i^*$ , which is determined by a set of the respondent's characteristics,  $X_i$ , and an independent and normally distributed error term,  $u_{1i}$ :

$$y_i^{*bribe} = X_i\beta + u_{1i}, \quad u_i \sim N(0, 1) \quad (1)$$

The actual bribing behaviour is captured by a binary variable  $y_i^{bribe}$  which is related to the latent propensity to bribe  $y_i^*$  :

$$y_i^{bribe} = 1 (X_i\beta + u_{1i} > 0) \quad (2)$$

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<sup>12</sup> The reverse causality between corruption and trust though is not so clear-cut. Uslander (2002, 2008) and Fukayama (1995) argue that trust is formed in the early years and it is unlikely that a child will have any direct dealings with corruption and paying bribes.

The bribing behaviour, however, is observed only if contact with public official has taken place. The binary variable capturing contact with public officials,  $y_i^{contact}$ , depends on the latent propensity to contact public officials,  $y_i^{*contact}$ :

$$y_i^{contact} = I(y_i^{*contact} > 0) \quad (3)$$

$$y_i^{*contact} = Z_i\gamma + u_{2i}, \quad u_i \sim N(0, I), \quad (4)$$

where  $Z_i$  is a vector of respondent characteristics determining selection into contact with public officials and  $u_2$  is an independent and normally distributed error term. Sample selection bias arises if the error terms in the outcome and selection equations are correlated:  $corr(u_1, u_2) = \rho, \rho \neq 0$ .

To correct for any sample selection bias we use extensions to Heckman's (1979) original model that allows for both equations to have discrete dependent variables (see e.g. Van der Ven and Van Praag, 1981; Baum, 2006).

To operationalise the model, we need an identification variable which would affect the probability of interaction with public officials but not necessarily the probability of making a bribe. We consider particular household/ respondent circumstances that are likely to increase contact with each type of public officials/institutions. We observe that households having a car are more likely to interact with road police; households with children are more likely to contact primary and secondary education establishments, as well as institutions in charge of social security benefits; students are more likely to contact vocational education establishments, as well as request official documents (e.g. passports); the less healthy are more likely to receive medical treatment; those who have recently lost job are more likely to contact institutions in charge of unemployment benefits; and those who rent or have inherited their house/flat are more likely to go to courts for a civil matter. We use this information to construct a binary variable (for each type of public official), which takes the value of 1 if the characteristic is observed and 0 otherwise.

Given that each respondent was asked about the actual corrupt behaviour eight times – in consideration of eight different types of public officials – we follow Hunt and Laszlo (2012) to generate a stacked dataset which contains eight observations per

household corresponding to interactions with eight institution/public official types. The unit of observation thus becomes the household-public official pair. To control for possible interdependence of responses provided by the same household and account for different types of institutions/officials, we cluster standard errors at the household level and include dummy variables for each type of public official in both the selection and outcome equations.

The socio-demographic characteristics (age, gender, education, income, minority status, employment status and the area of residence), institutional trust, social trust, as well as country fixed effects, are included in both the selection into contact and outcome equations.<sup>13</sup>

Besides comparing the results of the outcome equation in the Heckman correction model with a naïve probit regression, which does not account for sample selection, we will report the determinants of selection into contact with public officials. They are of interest, as selection into contact could be viewed as an integral part of the bribing process: e.g., Hunt (2007) and Hunt and Laszlo (2012) posit that factors increasing the need for public services increase bribery indirectly. To find out whether the determinants of bribery are context-specific, we will also run regressions for different country groups and different types of public officials.

## **4. Results**

### **Base results**

At the outset, we want to note that our results represent conditional correlations rather than causal effects, as some of our regressors are potentially endogenous. This means applying extra caution when interpreting estimated coefficients.

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<sup>13</sup> The outcome (bribery) equation would also benefit from the characteristics of public officials (which, unfortunately, are not available in the survey), since the probability of bribery is arguably affected by the interests of both the consumers of public services and public officials. However, public officials will have little influence over who contacts them in the first place – we assume that contacting public schools, hospitals, registry offices etc. is largely driven by the demands of public service consumers. Note that in some cases, e.g. when the consumers of public services are private businesses, public officials may be able to create entry requirements to target customers who are more likely to pay bribes if asked to do so.

Table 2 reports the results of the two stages – bribery once contact with public officials has taken place and selection into contact with public officials – of the Heckman probit model, as well as those of two naïve probit models of bribery not correcting for sample selectivity: one estimated on a sample of public official users (censored) and another estimated for the total sample of respondents (uncensored). All models are estimated for the broad region of Central Eastern Europe and Central Asia. To facilitate the interpretation of the results, only (average) marginal effects are reported and discussed.<sup>14</sup>

We first notice that the rho term is statistically significant ( $p=0.041$ ), meaning that sample selection bias is present and that naïve probit results would be inconsistent, and the Heckman selection procedure is appropriate. It is also negative ( $-0.073$ ), implying an omitted variable(s) which has an opposite effect on contact with public officials and bribery. One variable we can think of is the individual perception of how corrupt a particular public service is: if a person thinks a service is corrupt, she will minimise contact with it (probably preferring to deal with a private-sector provider if it is available), but if contact has taken place, the person will be more likely to bribe, driven by the perceived behavioural norm. Another variable could be the accessibility of public services, defined in a broad sense. People who, for different reasons (geographical distance, inconvenient working hours), find it difficult to access public services will have a lower likelihood of contacting public officials. However, such people may also be more likely to engage in bribery as they are keen to get the public service on the rare occasions they contact public officials. While we do include regressors potentially capturing the perceived corruptability of public officials (institutional trust) and limited access to public services (e.g. people living in rural areas, employed), many aspects of these variables are likely to remain unobserved and, therefore, uncontrolled for.

Comparing the findings of the Heckman correction model with the results of a naïve probit we observe larger (in absolute terms) marginal effects in the latter. Not controlling for selection effects thus produces an inflating bias in coefficients (and marginal effects). For instance, the naïve probit suggests that people are 3.8

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<sup>14</sup> The full econometric output is available on request.

percentage points less likely to bribe public health officials than the road police; this declines to 2.5 percentage points when the sample selection bias is corrected for.

Concerning specific determinants of bribery, column (1) of Table 2 reports the marginal effects of the Heckman correction model's outcome equation. Considering first the socio-demographic characteristics, respondents aged 45-64, 55-64 and 65+ are 1, 2.5 and 1.4 percentage points, respectively, less likely to bribe public officials, compared with individuals aged 34-45 (the reference group). This finding is consistent with Guerrero and Rodriguez-Oreggia (2008), Mocan (2008) and Soot and Rootalu (2012), who find that the elderly are less likely to pay bribes, be asked for bribes by public officials and tolerate corruption.

The Heckman correction model suggests that there is no significant difference in bribing behaviour between males and females. This is inconsistent with similar work using the World Value Surveys by Swamy et al (2001) and Gatti et al (2003) who find males to be significantly more prone to corrupt behaviour. Experimental evidence from Alatas et al. (2009) also find that females from Australia are less tolerant and less likely to engage in corruption. Guerrero and Rodriguez-Oreggia (2008) find that in Mexico males and females have the same disposition to bribe but that females do not pay bribes whereas men do.

Level of education plays no significant role in corruption behaviour in the pooled regression. This is consistent with the findings of Gatti et al (2003) but inconsistent with those of Swamy et al (2001), Mocan (2008) and Guerrero and Rodriguez-Oreggia (2008) who find the more educated are more prone to corrupt behaviour. This is likely to be explained by cultural characteristics and geo-political differences between countries around the globe. This argument is substantiated by the findings of Truex (2011) that the more educated in Nepal were less accepting of corrupt behaviour.

The linguistic minorities are 1.5 percentage points more likely to pay bribes. This finding is corroborated by the results of two studies on corruption in Estonia: Soot and Rootalu (2012) find that the ethnic minorities are more likely to tolerate corruption and have lower corruption awareness, and Tavits (2010) finds that minority public

officials are more likely to engage in hypothetical corrupt deals. Several explanations of why the minorities are more likely to engage in corruption can be provided. First, the minorities are concentrated in certain sectors of the economy (e.g., the informal sector) which are more conducive to corrupt behaviour. Second, minorities, who are often more vulnerable and less able to seek/obtain protection, could be an easy target for extortion by public officials. Third, historical factors might play a role: in many countries of our sample, today's linguistic minorities originate from the former political elites (e.g. the Russian-speakers in the successor states of the USSR). These political elites might have been particularly prone to corruption under the previous regime (Iwasaki and Suzuki, 2012), and transferred their corruption attitudes and norms to the present day.

The perceived income is positive and statistically significant: moving one step on the imaginary income ladder is associated with a 0.4 percentage point higher likelihood of bribery. This finding conforms to existing literature on micro-determinants of corruption: wealthier people have been found to be more likely to pay bribes conditional on contact with public officials (Hunt and Lazslo, 2011; Guerrero and Rodriguez-Oreggia, 2008), be asked for bribes by public officials (Mocan 2008) and find corrupt behaviour justifiable (Gatti et al., 2003). Typical explanations for richer individuals' higher propensity to bribe include their greater ability to pay, their higher opportunity costs of time, as well as the conjecture that rich individuals are the prime target for corruption-prone public officials.<sup>15</sup>

Institutional trust is a strong determinant of the probability of paying a bribe. A one unit increase on the institutional trust scale (4 – complete distrust, 20 – complete trust) is associated with a 0.8 percentage point lower likelihood of paying a bribe. The finding is consistent with Soot and Rootalu (2012), who find that people with more trust in institutions tolerate corruption less and have a stronger awareness of corruption. As discussed previously though, the causality could run in both directions. In particular, people who have experienced corruption-free encounters with public officials may develop a deeper trust in public institutions. If this is the case, the

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<sup>15</sup> Note, however, that a reverse causality between income and bribery may exist if people engage in bribery in order to increase their income; we would then observe an upward bias in the income variable estimates.

obtained coefficient on institutional trust is upward biased and should be interpreted with caution.<sup>16</sup>

The road police (the reference group) appears to be the most corrupt public service in our sample. These are followed by the public health services (people are 2.5 percentage points less likely to pay bribes to public health officials relative to road police), registry, courts and vocational education establishments (10-11 percentage points less likely), and primary and secondary schools (15 percentage points less likely). Among the eight public institutions/ services, those dealing with unemployment and other social security benefits appear to be the least corrupt (17.5-19.5 percentage points lower likelihood to pay bribes compared to the road police).

Controlling for individual characteristics, we observe an important heterogeneity of self-reported bribery rates at the country level. Compared to Poland (the reference country), people in Kosovo, Georgia, Slovenia and Croatia are 5-10 percentage points less likely to pay bribes to public officials. In several countries – FYR of Macedonia, the Czech Republic and Slovakia – the likelihood of being involved in bribery is the same as in Poland. However, people are 4-5 percentage points more likely, relative to Poland, to pay bribes in Bosnia and Herzegovina, Bulgaria, Serbia, Latvia, Turkey and Estonia; 10-14 percentage points more likely to pay bribes in Armenia, Montenegro, Hungary Mongolia, Belarus and Russia; 16-17 percentage points more likely to pay bribes in Kazakhstan, Romania, Moldova and Lithuania; and, finally, 27-39 percentage points more likely to pay bribes in Ukraine, Uzbekistan, Albania, Tajikistan, Kyrgyzstan and Azerbaijan. Note that the country dummies capture the aggregate effect of all possible country-level influences on conditional bribery rates; by construction, they do not allow us to isolate the effects of separate country-level factors. However, one notices some association between the GDP per capita and

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<sup>16</sup> Given a potential interdependence between institutional trust and the socio-demographic controls (see Table A2 of the appendix for a correlation matrix of regressors), we have estimated our model without the two trust variables (see Table A3 of the appendix). Some of our results remain qualitatively unchanged (in particular, the older and the ethnic majorities are less likely to bribe). However, the wealth index rather than the perceived income decile now becomes a positive and significant predictor of bribery; in addition, females and those aged 18-24 are 0.7 and 1.1 percentage points, respectively, less likely to pay bribes if trust variables are excluded. We have also estimated the model on the institutional trust variable and country fixed effects alone and obtained virtually the same negative and highly significant coefficient of institutional trust.



conditional bribery rates (bribery tends to be more widespread in poorer countries). Also, the ex-USSR Central Asian states tend to have higher conditional bribery rates than other countries in the sample.

Before we turn to the determinants of bribing behaviour and the presence of sample selection bias in different country groups, it is useful to consider the factors which affect the probability of being selected into contact with public officials (the selection equation of the Heckman correction model; column 2 of Table 2). As mentioned earlier, selection into contact can be viewed as having an indirect effect on bribery.

The results suggest that, compared to people aged 35-44 (the reference group), those aged 18-24 and 25-34 are 1 and 2 percentage points, respectively, less likely to contact public officials. Beyond the age group 35-44, the demand for public services declines with age: compared with the reference group 35-44, those aged 45-54, 55-64 and 65+ are 0.8, 3.6 and 5.5 percentage points, respectively, less likely to contact public officials. Thus, people aged 34-45 are the most active users of public services, while the elderly are the least active. This finding could be explained by lower engagement in the labour market and lower family commitments of the elderly.

The two proxies for household income – perceived income decile and wealth index – are statistically significant predictors of contact with public officials. Their coefficients, however, have different signs. The wealth index is positively associated with the probability of contacting public officials and is consistent with the findings of Hunt and Laszlo (2011). However, those who perceive themselves as having higher income are less likely to contact public officials. A possible explanation for this finding could be the willingness of people positioning themselves higher on an imaginary income ladder substitute public-sector services with private-sector alternatives.<sup>17</sup>

Considering the country fixed effects, the least intensive contact with public officials is observed in Estonia and Hungary (not significantly different compared with the

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<sup>17</sup> If only the wealth index is included in the analysis, its coefficient is positive and significant in both selection and outcome stages. If only perceived income is included, its coefficient is positive and significant in the stage, but positive and insignificant in the selection stage.

reference country of Poland), and the most intensive in Albania, Azerbaijan, Kosovo, FYR of Macedonia and Uzbekistan (13-19 percentage points more likely to contact officials compared with Poland). This heterogeneity could be explained by the way in which public services are provided in different countries (e.g., they could be provided electronically, without having to physically meet public officials), as well as the availability of privately provided alternatives to public services (e.g., private education and healthcare can be more present/accessible in some countries).

As well as controlling for omitted variable bias, the Heckman approach provides a more nuanced picture on what is likely to drive corruption at the individual and country levels, compared with studies which concentrate only on the outcome stage or ignore selection into contact altogether. For example, the elderly are both less likely to contact public officials and pay bribes, conditional on contact with public officials, pointing at a rather clear-cut negative relationship between age and the likelihood of corruption. More interesting are the cases when a characteristic has opposite signs in the selection and outcome equations. For example, the coefficients of Georgia, Croatia, Kosovo and Slovenia in the outcome equation are negative, suggesting that, conditional on contact with public officials, people in these countries are 5-10 percentage points less likely to pay bribes compared with Poland (the reference group). However, these countries are 7-19 percentage points more likely to contact public officials, which would attenuate the conditional bribery effect in evaluating average bribery in a country. Estimating the probability of bribery on the whole sample (i.e. including into analysis people who did not contact public officials), the marginal effects for which are reported in column [4] of Table 4, indeed yields a statistically insignificant marginal effect for Kosovo, and the marginal effects ranging between -1.4 and -2.1 percentage points for Georgia, Croatia and Slovenia.<sup>18</sup>

**Table 2. Determinants of bribery and contact with public officials, Heckman probit and naïve probit average marginal effects**

Heckman probit		Naïve probit (censored)	Naïve probit (uncensored)
Paid a bribe (Outcome)	Contacted official (Selection)	Paid a bribe	Paid a bribe

<sup>18</sup> This simple comparison also suggests that the total bribery effect cannot be obtained by summing the coefficients in the outcome and selection equations.

	[1]	[2]	[3]	[4]
Female	-0.005	-0.001	-0.006	-0.003***
Age group				
18-24	-0.010	-0.010***	-0.011	-0.003*
25-34	0.002	-0.020***	0.003	-0.003**
35-44	Ref.	Ref.	Ref.	Ref.
45-54	-0.010*	-0.008***	-0.012*	-0.006***
55-64	-0.028***	-0.036***	-0.032***	-0.015***
65+	-0.016**	-0.055***	-0.018**	-0.014***
Linguistic minority	0.015***	-0.003	0.017***	0.002
Income ladder	0.004***	-0.002***	0.005***	0.001***
Wealth index	0.002	0.016***	0.003	0.006***
Education				
Primary	-0.000	-0.003	-0.000	-0.001
Secondary	Ref.	Ref.	Ref.	Ref.
Tertiary	-0.000	0.001	-0.000	0.001
Employed	-0.004	-0.000	-0.005	-0.001
Type of settlement				
Rural	0.001	0.002	0.002	0.002*
Urban	Ref.	Ref.	Ref.	Ref.
Metropolitan	-0.003	0.004	-0.004	-0.000
Institutional trust	-0.008***	-0.000	-0.009***	-0.002***
Social trust	0.003	0.001	0.003	0.001
Type of public official				
Road police	Ref.	Ref.	Ref.	Ref.
Registry	-0.100***	0.105***	-0.122***	-0.014***
Courts	-0.110***	-0.163***	-0.132***	-0.079***
Education (primary and secondary)	-0.149***	0.063***	-0.172***	-0.017***
Education (vocational)	-0.100***	0.046***	-0.120***	-0.026***
Public health	-0.025***	0.376***	-0.038***	0.056***
Requesting unemployment benefits	-0.175***	-0.079***	-0.209***	-0.083***
Requesting other social security benefits	-0.195***	-0.079***	-0.227***	-0.065***
Country				
Albania	0.300***	0.126***	0.343***	0.098***
Armenia	0.089***	0.019***	0.101***	0.031***
Azerbaijan	0.393***	0.151***	0.451***	0.128***
Belarus	0.132***	0.088***	0.152***	0.055***
Bosnia and Herzegovina	0.036**	0.046***	0.040**	0.021**
Bulgaria	0.040***	0.055***	0.046***	0.021***
Croatia	-0.098***	0.069***	-0.114***	-0.021***
Czech Republic	0.016	0.073***	0.017	0.016***
Estonia	0.050**	0.001	0.058***	0.012**
Georgia	-0.073***	0.075***	-0.084***	-0.014**
Hungary	0.107***	0.006	0.123***	0.027***
Kazakhstan	0.159***	0.107***	0.182***	0.069***
Kosovo	-0.046***	0.185***	-0.055***	0.008
Kyrgyzstan	0.385***	0.126***	0.442***	0.120***
Latvia	0.040**	0.062***	0.045***	0.020***
Lithuania	0.174***	0.051***	0.200***	0.057***
Macedonia, FYR	-0.007	0.129***	-0.009	0.019***
Moldova	0.170***	0.102***	0.195***	0.069***
Mongolia	0.120***	0.066***	0.137***	0.044***
Montenegro	0.100***	0.048***	0.115***	0.038***
Poland	Ref.	Ref.	Ref.	Ref.
Romania	0.169***	0.027***	0.195***	0.049***
Russia	0.139***	0.081***	0.160***	0.056***
Serbia	0.042**	0.057***	0.048***	0.024***
Slovakia	0.021	0.068***	0.024	0.017***
Slovenia	-0.086***	0.073***	-0.100***	-0.019***
Tajikistan	0.311***	0.100***	0.356***	0.103***
Turkey	0.053***	0.011	0.060***	0.016***
Ukraine	0.270***	0.090***	0.309***	0.086***
Uzbekistan	0.283***	0.132***	0.325***	0.106***

Selection into contact	-	0.160***	-	-
Number of household-official pairs	255624	54155	255624	
Number of households	32556	25852	32556	
Censored observations	201469	-	-	
Prob> Chi <sup>2</sup>	0.000	0.000	0.000	
Pseudo R <sup>2</sup>	-	0.204	0.250	
<i>Rho</i>	-0.073	-	-	
Prob> Chi <sup>2</sup> ( <i>Rho</i> =0)	0.041	-	-	

Notes: \* denotes significance at 10% level, \*\* - 5%, \*\*\* - 1%. The unit of observation is household-official pair. Standard errors (not reported to save space) clustered at household level.

### **Results for different country groups**

The post-socialist world is far from being a group of homogenous countries. Important country level variations in the degree of democracy, rule of law and, indeed, control of corruption exist. In this subsection, we look at the determinants of bribery and the presence of sample selection bias in different parts of the Central Eastern European and Central Asian region, and contrast them with the five Western European countries. We create, along geo-political lines, the following country groups: the Balkans (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, FYR of Macedonia, Montenegro, Romania, Serbia), the Baltics (Estonia, Latvia, Lithuania), the Caucasus (Armenia, Azerbaijan, Georgia), Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan), Central Europe (Czech Republic, Hungary, Poland, Slovakia, Slovenia), Slav ex-USSR (Belarus, Russia, Ukraine), and Western Europe (Germany, France, Italy, Sweden, the UK).<sup>19</sup>

Table 3 reports the marginal effects of the Heckman correction model outcome equation (probability of bribery once the contact with public officials has taken place),<sup>20</sup> as well as the estimated coefficient of correlation between the error terms in the selection and outcome equations (*rho*). The sample selection bias is present in the Caucasus, Slav ex-USSR and the Central Europe subsamples: when statistically significant the estimated *rho* term is always negative (as for the pooled results in Table 2), meaning that unobservable variables in these country groups are

<sup>19</sup> Moldova, Mongolia and Turkey are excluded from the analysis, as it is difficult to assign them to a particular country groups.

<sup>20</sup> The results of the selection stage are available in the appendix to this paper.

systematically increasing the likelihood of engaging with officials but are then reducing the likelihood of paying a bribe (or vice versa).

The results reveal considerable variation in the determinants of the bribery decision at country group level. Gender is statistically insignificant in all country groups but Central Asia, where women are 3.1 percentage points less likely to pay bribes than men. The negative association between bribery and age is observed in Central Asia, and Slav ex-USSR; the relationship in other country groups is less clear-cut or the coefficients are insignificant. Linguistic minorities are more likely to pay bribes in the Baltics and, especially, the Western European group, while the coefficient for other country groups is statistically insignificant.

Perceived income is positive and significant only in the Balkans and the Western Europe. In Western Europe, moving from the lowest to the highest step on the ten-step income ladder is associated with 4 percentage point higher likelihood of bribing public officials. In the Balkans, the association is stronger both in size and significance: moving from the bottom to top on the relative income ladder is associated with an 8 percentage point increase in the likelihood of bribing public officials, which is significant at the 99 per cent level. The wealth index is also positively correlated with paying a bribe in the Slav ex-USSR, but negatively correlated in Western European countries.

Higher levels of education tend to be associated with lower probability of paying bribes to public officials. In Central Asia and Western Europe, people with primary education are 3.8 and 1.2 percentage points, respectively, more likely to pay bribes compared with those with secondary education (the reference group). At the same time, in the Balkans and Western Europe, people with tertiary education are 2.5 and 1.5 percentage points, respectively, less likely to pay bribes relative to the reference group. The exception is Central Europe, where the tertiary educated are 1.5 percentage points more likely to bribe public officials.

For several regressors, the sign of the estimated coefficient depends on the country group. For example, the employed are 1.8 percentage points less likely to pay bribes in Central Europe, while regressor is insignificant in other country groups. We also

observe an important variation in the relationship between bribery and type of settlement. For several country groups, bribery is more likely to be committed in urban areas: compared with people living in urban-non-metropolitan areas (the reference group), those from rural areas in the Caucasus and Central Europe are less likely to report bribing public officials. Similarly, those living in metropolitan areas in the Slav ex-USSR region are 8.3 percentage points more likely to pay bribes compared with the reference group. An opposite association is observed in Central Asia, where bribery is more widespread in rural areas: compared with the reference group, the village dwellers there are 6.1 percentage points more likely, and the metropolitan dwellers are 14.2 percentage points less likely, to bribe public officials. A less clear-cut relationship between the degree of urbanisation and the probability of bribery is observed in the Baltics, where both rural and metropolitan dwellers are less likely to bribe than people living in urban-non-metropolitan areas.

Institutional trust is negatively associated with the probability of bribing public officials in all country groups, except the Baltics. The marginal effect is particularly high in Central Asia, where a one unit increase on the institutional trust scale (4 – complete distrust, 20 – complete trust) is associated with a 2.4 percentage point lower probability of bribery. Contrary to consistent nature of the institutional trust variable, the relationship between bribery and social trust differs across country groups. In particular, the conjecture that in order to bribe one needs to trust people is supported in the Caucasus, Central Asian and Western European sub-samples. In these three country groups, an extra step on the 1 (no trust) -5 (complete trust) social trust scale is associated with 1.1, 3 and 1 percentage point increase in the probability of bribing public officials, respectively. However, in the Balkans, people with more social trust are less likely to engage in bribery, an extra step on the 1-5 interpersonal trust scale being associated with a decrease of 0.6 percentage points in the probability of bribing.

Considering conditional bribery rates for different types of public officials, the road police are the most corrupt public service in the Balkans, Central Asia and Slav ex-USSR, while public health is the most corrupt in the Caucasus and Central Europe. In the Baltics, the road police and public health are equally corrupt and have the highest bribery rates among the eight types of public officials. In Western Europe, there is no statistically significant difference in the conditional bribery rates for the road police,

registry, public health and services dealing with unemployment benefits, and there is 2.2-3.2 percentage point decrease in the likelihood of observing a corrupt exchange in vocational education and services dealing with social security benefits other than unemployment. Overall, in most country groups, services dealing with the unemployment and other social security benefits, as well as education, tend to be the least corrupt.

Comparing the individual-level determinants of bribery in Western Europe (West) with those in the broad Central Eastern European/ Central Asian region (East), one notable similarity is that people with lower institutional trust are more likely to bribe public officials in both parts of the world. However, important differences also exist. Higher values of the wealth index are negatively associated with bribery in the West and positively in the East (Slav ex-USSR). Higher levels of education and lower levels of interpersonal trust are associated with lower bribery rates in the West, while the relationship in the East is more opaque. Older respondents are less likely to bribe in the East, while the estimated coefficients of age groups in the West sub-sample are statistically insignificant. Finally, linguistic minority status is a significant predictor of bribery in the West and only in one part of the East (the Baltics), and insignificant elsewhere.<sup>21</sup>

***Table 3. Determinants of bribery, conditional on contact with public officials, in different country groups; Heckman probit outcome equation average marginal effects.***

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<sup>21</sup> We have also compared the average bribery rates, conditional on the observed socio-demographic characteristics, of all countries participating in the survey. Our expectation was that the bribery rates in the West would be lower than those in the East. Running a regression which includes both Western and Eastern European/ Central Asian countries, we found that the public services users in Sweden, Italy, France and the UK are 18.4, 14.3, 9.6 and 7.2 percentage points, respectively, less likely to bribe public officials, compared with the public official users in Poland (the reference group). However, unexpectedly, we found that the probability of bribing, condition on public official use, was 5.6 percentage points higher in Germany than in Poland. This is a puzzling result. One explanation could be that people in Germany tend to be more honest about their involvement in corrupt exchanges, while people in other countries underreport it. Another reconciling factor is that, according to our model, the probability of contacting public officials is lower in Germany than in any other country in the sample (the average marginal effect is -6 percentage points). This has an indirect negative effect on bribery, especially if one wants to calculate the bribery rate for whole population of the country (the users and the non-users of public services). The full set of results (the outcome and selection equations) for the whole sample is available on request.

	Balkans	Baltics	Caucasus	Central Asia	Central Europe	Slav ex-USSR	Western Europe
Female	-0.002	-0.000	0.012	-0.031**	-0.001	0.004	0.000
Age group							
18-24	0.006	-0.034	-0.019	-0.027	-0.013	-0.001	0.011
25-34	0.025***	-0.010	-0.003	-0.020	-0.015	-0.014	0.007
35-44	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
45-54	0.017*	0.009	-0.016	-0.040**	-0.008	-0.043**	0.001
55-64	-0.012	-0.011	-0.014	-0.105***	-0.009	-0.037*	-0.006
65+	-0.018	0.000	-0.031	-0.005	0.016	-0.089***	-0.005
Linguistic minority	-0.003	0.029**	0.021	0.017	-0.003	0.009	0.034***
Income ladder	0.008***	0.004	0.003	0.004	0.002	-0.001	0.004**
Wealth index	-0.002	0.005	0.002	-0.006	-0.000	0.017***	-0.007***
Education							
Primary	-0.006	-0.008	0.009	0.038*	0.003	-0.010	0.012*
Secondary	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Tertiary	-0.025***	-0.019	0.003	0.026	0.015*	-0.000	-0.015*
Employed	-0.005	-0.003	-0.005	-0.003	-0.018**	0.021	-0.001
Type of settlement							
Rural	0.007	-0.034**	-0.039***	0.061***	-0.021***	0.005	-0.010
Urban	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Metropolitan	0.002	-0.050***	-0.004	-0.142***	0.006	0.083***	-0.002
Institutional trust	-0.006***	-0.003	-0.005***	-0.024***	-0.004***	-0.006***	-0.002**
Social trust	-0.007**	0.003	0.011**	0.030***	-0.000	0.001	0.010***
Type of public official							
Road police	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Registry	-0.094***	-0.162***	-0.048***	-0.178***	-0.005	-0.222***	0.007
Courts	-0.095***	-0.131***	-0.028	-0.276***	0.012	-0.223***	0.011
Education (prim./sec.)	-0.151***	-0.149***	-0.133***	-0.389***	-0.016	-0.123***	-0.013
Education (vocat.)	-0.113***	-0.131***	-0.086***	-0.210***	-0.004	-0.108***	-0.032**
Public health	-0.018*	-0.007	0.032*	-0.206***	0.075***	-0.031*	0.006
Unemployment benefits	-0.135***	-0.126***	-0.213***	-0.309***	-0.013	-0.281***	-0.018
Other benefits	-0.140***	-0.114***	-0.233***	-0.358***	-0.002	-0.332***	-0.022**
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of household-official pairs	75973	23112	23561	34419	43683	31143	43308
Number of households	9758	2951	2966	4385	5520	3991	5425
Censored observations	58824	18864	18640	26038	35295	24614	36260
Prob> Chi <sup>2</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rho	0.056	0.090	-0.309	-0.056	-0.342	-0.184	-0.078
Prob> Chi <sup>2</sup> (Rho=0)	0.427	0.443	0.002	0.504	0.000	0.014	0.678

Notes: \* denotes significance at 10% level, \*\* - 5%, \*\*\* - 1%. The unit of observation is household-official pair. Standard errors, clustered at household level, and country fixed effects are not reported to save space. The Balkans: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, FYR of Macedonia, Montenegro, Romania, Serbia; the Baltics: Estonia, Latvia, Lithuania; the Caucasus: Armenia, Azerbaijan, Georgia; Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan; Central Europe: Czech Republic, Hungary, Poland, Slovakia, Slovenia; Slav ex-USSR: Belarus, Russia, Ukraine; Western Europe: Germany, France, Italy, Sweden, the UK. The results of the selection equation are reported in the appendix.

### **Results for different types of public officials**

Individual-level determinants of bribery may change depending on the type of public official, as the circumstances under which officials and public service consumers interact (frequency of contact, duration of contact, time allowed to take the bribery decision etc.) will differ from one type of public official to another. Table 4 reports



the results of the Heckman probit outcome equation for different types of public officials (the results of the selection equation can be found in the appendix). Again, we notice some variation in the determinants of bribery across official types. Conditional on contact, women are 4.7 percentage points less likely to bribe road police; the gender coefficient in other specifications is insignificant. This finding corroborates Guerrero and Rodriguez-Oreggia (2008) who provide qualitative evidence that police in Mexico officials tend to be more lenient on females relative to males. Linguistic minorities are 2-5.4 percentage points more likely to bribe officials dealing with official documents, primary and secondary education and social security benefits. Perceived income and wealth index variables are statistically insignificant in the courts, education, unemployment and social security specifications, but are positive and significant predictors of bribery for the police and public health officials. In the registry specification, income ladder is positive, and the wealth index negative, predictor of bribery. Compared to urban dwellers, rural residents are percentage 1.8 points more likely to bribe registry officials, but 2.5 percentage points less likely to bribe primary and secondary education officials. Similarly, people living in metropolitan areas are 2.2 percentage points less likely to bribe public health officials, but 3-7.3 percentage points more likely to bribe the police and public officials dealing with unemployment benefits. Finally, those who trust others more are more likely to pay bribes to officials in vocational education only.

The variables with a consistent association with paying bribes are the older age categories and trust in institutions. The elderly tend to be less likely to pay a bribe across the spectrum of public officials. Institutional trust is also negative and highly significant in all official type specifications. In conjunction with the results from the regional and whole sample specifications, institutional trust emerges as the most consistent predictor of bribery.

Regarding the presence of selection bias, the correlation of the error terms in the selection and outcome equations is negative and statistically significant in three – the official documents, the public health and the social security benefits – specifications. The Heckman correction procedure should, therefore, be used here to obtain unbiased results. Overall, we observe that, while the selection bias is present in the whole (stacked) sample, it is driven by particular country groups (the Caucasus, Central

Europe, Slav ex-USSR) and particular types of public officials (requesting official documents, public health, social security benefits).

**Table 4. Determinants of bribing different types of public officials conditional on contact with public officials; Heckman probit outcome equation average marginal effects.**

	Police	Requesting official documents	Courts	Education (primary and secondary)	Education (vocational)	Health	Unemployment benefits	Social security benefits
Female	-0.040***	-0.005	0.009	0.003	-0.009	-0.001	-0.005	0.003
Age group								
18-24	-0.011	0.008	0.007	-0.001	-0.001	-0.025**	0.032	-0.016
25-34	0.020	0.010	-0.022	-0.001	0.019	0.004	-0.008	-0.017
35-44	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
45-54	-0.020	0.003	-0.011	-0.023**	-0.030**	-0.000	-0.008	-0.026
55-64	-0.046**	-0.021	-0.023	-0.044***	-0.073***	-0.022**	0.003	-0.045**
65+	-0.037	-0.017	-0.113***	-0.031*	-0.003	-0.018*	-0.009	-0.016
Linguistic minority	-0.027	0.020*	0.030	0.034***	0.020	0.004	0.001	0.054***
Income ladder	0.010***	0.012***	0.010	0.001	0.001	0.003*	0.004	0.000
Wealth index	0.012**	-0.007**	-0.001	0.002	-0.002	0.009***	-0.004	0.004
Education								
Primary	0.007	0.012	0.005	-0.001	0.010	-0.011	-0.009	0.002
Secondary	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Tertiary	-0.019	-0.008	-0.026	0.008	0.007	0.000	0.013	0.010
Employed	-0.014	-0.001	-0.020	0.010	-0.006	-0.006	-0.000	-0.006
Type of settlement								
Rural	0.017	0.018**	0.003	-0.025***	0.016	-0.005	0.008	0.003
Urban	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Metropolitan	0.030*	-0.010	-0.032	-0.008	0.004	-0.022**	0.073***	0.014
Institutional trust	-0.013***	-0.009***	-0.010***	-0.008***	-0.006***	-0.008***	-0.009***	-0.006***
Social trust	-0.000	0.006	-0.007	0.001	0.009*	0.003	0.002	0.003
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	31839	31925	31090	31969	30001	31715	32053	31993
Censored observations	25883	24651	29751	23927	25074	9896	30385	29024
Prob> Chi <sup>2</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rho	-0.000	-0.927	0.292	0.100	-0.243	-0.556	0.447	-0.428
Prob> Chi <sup>2</sup> (Rho=0)	0.997	0.000	0.610	0.117	0.795	0.000	0.181	0.075

Notes: \* denotes significance at 10% level, \*\* - 5%, \*\*\* - 1%. All regressions are based on the broad Central Eastern Europe and Central Asia sample and include country-fixed effects (not reported to save space). The results of the selection equation are reported in the appendix.

#### 4. Conclusion

This paper has sought to explore the individual-level determinants of bribing different types of public officials in the post-socialist countries of Central and Eastern Europe and Central Asia. We used the Heckman correction probit model to detect and control

for a possible sample selection bias arising when people self-select into contact with public officials on the basis of unobservable characteristics.

Our results reveal some common determinants of bribery across different country groups and types of officials. Higher age, lower perceived income and wealth and, in particular, higher institutional trust all tend to be associated with a lower probability of bribery. However, important variations in the determinants of bribery across country groups and public institutions are also observed. For instance, rural dwellers are more prone to corruption in Central Asia and Slav ex-USSR, as well as when dealing with public health and registry officials, but less prone to corruption in the Caucasus and Central Europe, and when dealing with public officials in charge of education and unemployment benefits. Social trust is negatively correlated with bribery in the Balkans, but positively in the Caucasus and Central Asia. These findings highlight the region- and context-specific nature of corruption.

The use of the Heckman correction procedure suggests that, for particular country groups and types of public officials, as well as for the whole sample of post-socialist countries, a sample selection due to a non-random selection of people into contact with public officials is present. In cases where we obtained significant correlations between error terms in the selection and outcome equations, it was negative, suggesting that there must be unobservables that are negatively correlated with contacting public officials, but positively correlated with the probability of paying bribes once the contact with public officials has been made (or vice versa). One can only hypothesise what such variables could be; two candidates are the perceived corruptibility of public officials and the accessibility (in a broad sense) of public services.

Regardless of what drives the correlation between the error terms, if such a correlation is present the uncorrected estimates are likely to be biased. In our case, the absolute values of the estimated marginal effects in the Heckman-corrected were lower than if the sample selection bias is not corrected for. There is, however, no guarantee that similar coefficient inflation, if selection bias is not accounted for, will be present in other studies of corruption experience, or that the correlation of error terms in the selection and outcome equations will always be negative. As our study has shown,

the determinants of corruption are highly specific to different country and public official type settings and the direction of potential biases may well change from one setting to another. Our general recommendation is that researchers studying bribing behaviour control for sample selection effects where possible or at least be aware of potential biases when interpreting results. Obtaining, in a unified framework, the determinants of contact with public officials, which has an indirect effect on the incidence of bribery, and the determinants of bribing once the contact with public officials has taken place is another argument in favour of using the Heckman correction model in corruption research.

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Appendix.

**Table A1. Summary statistics of variables included in the analysis.**

	Central Eastern Europe and Central Asia			Western Europe				
	N	Mean	St.dev.	N	Mean	St. dev.	Min	Max
Female	33316	0.611	0.487	5504	0.558	0.497	0	1
Age 18-24	33340	0.127	0.333	5503	0.061	0.239	0	1
Age 25-34	33340	0.203	0.402	5503	0.135	0.341	0	1
Age 35-44	33340	0.185	0.388	5503	0.202	0.401	0	1
Age 45-54	33340	0.172	0.378	5503	0.195	0.396	0	1
Age 55-64	33340	0.148	0.355	5503	0.186	0.389	0	1
Age 65+	33340	0.164	0.371	5503	0.222	0.416	0	1
Linguistic minority	33360	0.133	0.339	5504	0.075	0.263	0	1
Perceived position on 1-10 income ladder	32789	4.324	1.674	5446	4.933	1.699	1	10
Wealth index	33360	-0.277	1.704	5504	1.680	1.361	-2.711	3.328
Primary education	33351	0.302	0.459	5503	0.351	0.477	0	1
Secondary education	33351	0.505	0.500	5503	0.394	0.489	0	1
Tertiary education	33351	0.193	0.395	5503	0.256	0.436	0	1
Employed	33360	0.480	0.500	5504	0.582	0.493	0	1
Rural	33360	0.417	0.493	5504	0.299	0.458	0	1
Urban	33360	0.462	0.499	5504	0.509	0.500	0	1
Metropolitan	33360	0.121	0.327	5504	0.193	0.394	0	1
Institutional trust	33360	11.596	3.992	5504	12.550	3.261	4	20
Social trust	33360	2.939	1.030	5504	3.070	1.001	1	5
Selection into contact <sup>a</sup>	266880	0.247	0.431	44032	0.264	0.441	0	1
Contacted public officials <sup>a</sup>	260390	0.212	0.409	43783	0.162	0.369	0	1
Paid bribe once contact with public officials has taken place <sup>a</sup>	55149	0.220	0.414	7106	0.033	0.178	0	1

<sup>a</sup> Based on stacked (household-official pairs) data

**Table A2. Correlation matrix of the regressors.**

	Female	Age 18-24	Age 25-34	Age 35-44	Age 45-54	Age 55-64	Age 65+	Linguistic minority	Perceived position on 1-10 income ladder	Wealth index	Primary education	Secondary education	Tertiary education	Employed	Rural	Urban	Metropolitan	Institutional trust
Age 18-24	-0.034	1.000																
Age 25-34	-0.015	-0.192	1.000															
Age 35-44	0.002	-0.182	-0.241	1.000														
Age 45-54	0.010	-0.174	-0.230	-0.218	1.000													
Age 55-64	0.002	-0.159	-0.211	-0.200	-0.191	1.000												
Age 65+	0.032	-0.168	-0.223	-0.211	-0.202	-0.185	1.000											
Linguistic minority	0.012	-0.015	-0.011	-0.003	0.009	0.008	0.012	1.000										
Perceived position on 1-10 income ladder	-0.034	0.077	0.101	0.043	0.002	-0.078	-0.152	-0.060	1.000									
Wealth index	-0.056	0.069	0.117	0.089	0.046	-0.059	-0.273	-0.079	0.328	1.000								
Primary education	0.007	-0.066	-0.101	-0.055	-0.033	0.038	0.223	-0.023	-0.138	-0.189	1.000							
Secondary education	-0.015	0.091	0.005	0.038	0.035	-0.016	-0.147	0.005	0.025	0.031	-0.663	1.000						
Tertiary education	0.011	-0.038	0.111	0.015	-0.006	-0.024	-0.073	0.019	0.130	0.180	-0.321	-0.495	1.000					
Employed	-0.139	-0.051	0.139	0.177	0.143	-0.089	-0.353	-0.008	0.149	0.291	-0.240	0.063	0.200	1.000				
Rural	-0.036	-0.010	-0.016	-0.004	0.012	0.003	0.015	-0.012	-0.023	-0.179	0.123	-0.013	-0.127	-0.062	1.000			
Urban	0.028	0.009	0.023	0.013	-0.008	-0.004	-0.035	-0.012	0.028	0.152	-0.102	0.040	0.068	0.052	-0.784	1.000		
Metropolitan	0.012	0.002	-0.012	-0.015	-0.007	0.003	0.031	0.036	-0.009	0.038	-0.030	-0.042	0.088	0.015	-0.314	-0.343	1.000	
Institutional trust	0.029	0.031	0.023	0.007	-0.028	-0.039	0.006	-0.029	0.163	-0.075	-0.034	0.035	-0.005	-0.034	0.078	-0.064	-0.021	1.000
Social trust	-0.001	0.011	-0.006	-0.005	0.000	0.004	-0.002	0.031	0.153	0.032	-0.083	0.030	0.059	0.037	0.029	0.000	-0.045	0.225

**Table A3. Determinants of bribery and contact with public officials excluding the trust variables, Heckman probit outcome and selection average marginal effects**

	Heckman probit	
	Paid a bribe (Outcome)	Contacted official (Selection)
Female	-0.007*	-0.001
Age group		
18-24	-0.011*	-0.010***
25-34	0.003	-0.017***
35-44	Ref.	Ref.
45-54	-0.008	-0.008***
55-64	-0.028***	-0.036***
65+	-0.021***	-0.055***
Linguistic minority	0.017***	-0.003
Income ladder	0.002	-0.002***
Wealth index	0.003**	0.016***
Education		
Primary	-0.000	-0.003
Secondary	Ref.	Ref.
Tertiary	0.001	0.001
Employed	-0.004	-0.000
Type of settlement		
Rural	-0.001	0.002
Urban	Ref.	Ref.
Metropolitan	0.002	0.004
Type of public official		
Road police	Ref.	Ref.
Registry	-0.102***	0.105***
Courts	-0.108***	-0.163***
Education (primary and secondary)	-0.153***	0.063***
Education (vocational)	-0.102***	0.046***
Public health	-0.028***	0.376***
Requesting unemployment benefits	-0.172***	-0.079***
Requesting other social security benefits	-0.197***	-0.079***
Country		
Albania	0.316***	0.126***
Armenia	0.100***	0.018**
Azerbaijan	0.388***	0.151***
Belarus	0.132***	0.088***
Bosnia and Herzegovina	0.056***	0.046***
Bulgaria	0.057***	0.054***
Croatia	-0.077***	0.068***
Czech Republic	0.023	0.073***
Estonia	0.039**	0.001
Georgia	-0.080***	0.075***
Hungary	0.106***	0.006
Kazakhstan	0.160***	0.107***
Kosovo	-0.044***	0.185***
Kyrgyzstan	0.405***	0.126***
Latvia	0.045***	0.061***
Lithuania	0.190***	0.051***
Macedonia, FYR	0.009	0.129***
Moldova	0.192***	0.102***
Mongolia	0.126***	0.066***
Montenegro	0.098***	0.048***
Poland		
Romania	0.196***	0.027***
Russia	0.149***	0.081***
Serbia	0.063***	0.057***
Slovakia	0.032**	0.068***
Slovenia	-0.074***	0.073***

<i>Tajikistan</i>	0.293***	0.100***
<i>Turkey</i>	0.037**	0.010
<i>Ukraine</i>	0.294***	0.090***
<i>Uzbekistan</i>	0.260***	0.132***
Selection into contact	-	0.160***
<hr/>		
Number of household-official pairs	255624	
Number of households	32556	
Censored observations	201469	
Prob> Chi <sup>2</sup>	0.000	
Pseudo R <sup>2</sup>	-	
<i>Rho</i>	-0.072	
Prob> Chi <sup>2</sup> ( <i>Rho</i> =0)	0.042	

Notes: \* denotes significance at 10% level, \*\* - 5%, \*\*\* - 1%. The unit of observation is household-official pair. Standard errors (not reported to save space) clustered at household level.

**Table A4. Determinants of contacting public official in different country groups; Heckman probit selection equation average marginal effects.**

	Balkans	Baltics	Caucasus	Central Asia	Central Europe	Slav ex-USSR	Western Europe
Selection into contact	0.155***	0.132***	0.176***	0.203***	0.136***	0.169***	0.134***
Female	-0.006	0.009*	0.006	-0.008	0.000	0.013**	-0.008**
Age group							
18-24	-0.014**	0.009	-0.026***	-0.042***	0.022**	-0.005	-0.007
25-34	-0.011**	-0.009	-0.019**	-0.043***	-0.010	-0.016**	-0.012*
35-44	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
45-54	-0.007	-0.022**	-0.013	-0.021***	0.008	-0.008	-0.005
55-64	-0.035***	-0.042***	-0.030***	-0.030***	-0.034***	-0.035***	-0.053***
65+	-0.053***	-0.058***	-0.064***	-0.046***	-0.055***	-0.044***	-0.090***
Linguistic minority	0.008	0.003	-0.001	-0.005	0.008	-0.008	0.025***
Income ladder	-0.001	-0.003	-0.000	0.001	-0.012***	-0.004**	-0.006***
Wealth index	0.017***	0.011***	0.015***	0.021***	0.019***	0.018***	0.005***
Education							
Primary	0.001	0.015**	-0.014*	-0.026***	-0.005	-0.011	-0.007
Secondary	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Tertiary	-0.017***	0.006	0.007	-0.002	0.020***	0.004	0.026***
Employed	-0.001	0.004	0.006	0.009*	-0.008	-0.010*	-0.021***
Type of settlement							
Rural	-0.005	-0.007	-0.014**	0.007	0.011**	0.006	-0.009**
Urban	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Metropolitan	0.026**	0.011	-0.001	-0.029***	0.010	0.017**	0.000
Institutional trust	0.003***	0.000	-0.001**	-0.004***	-0.001	-0.002**	-0.001
Social trust	0.003	-0.005*	0.001	0.002	0.001	0.000	0.005**
Type of public official							
Road police	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Registry	0.173***	0.051***	0.131***	0.125***	0.046***	0.000	0.168***
Courts	-0.137***	-0.150***	-0.183***	-0.227***	-0.166***	-0.175***	-0.098***
Education (prim./sec.)	0.082***	0.000	0.080***	0.120***	-0.011**	-0.031***	0.078***
Education (vocat.)	0.049***	0.015*	0.036***	0.110***	-0.029***	0.007	0.052***
Public health	0.391***	0.373***	0.362***	0.428***	0.310***	0.355***	0.345***
Unemployment benefits	-0.070***	0.022***	-0.045***	-0.170***	-0.090***	-0.116***	0.022***
Other benefits	-0.103***	0.025***	-0.013	-0.173***	-0.096***	-0.057***	0.001
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

**Table A5. Determinants of contacting different types of public officials; Heckman probit selection equation average marginal effects.**

	Police	Requesting official documents	Courts	Education (primary and secondary)	Education (vocational)	Health	Unemployment benefits	Social security benefits
Female	-0.063***	0.002	-0.003	0.008**	0.005	0.040***	-0.001	0.013***
Age group								
18-24	0.013*	0.010	-0.012***	-0.048***	0.052***	-0.020**	-0.008*	0.003
25-34	0.015***	0.008	-0.003	-0.098***	-0.057***	0.007	0.005	0.017***
35-44								
45-54	-0.005	-0.006	-0.000	-0.055***	0.034***	-0.005	0.002	-0.005
55-64	-0.022***	-0.030***	-0.004	-0.124***	-0.048***	0.039***	-0.030***	-0.028***
65+	-0.067***	-0.067***	-0.014***	-0.143***	-0.083***	0.073***	-0.069***	-0.045***
Linguistic minority	-0.002	0.011	-0.011***	-0.015**	-0.013**	-0.007	-0.000	0.009*
Income ladder	0.005***	0.001	-0.000	-0.003**	0.007***	-0.009***	-0.005***	-0.014***
Wealth index	0.021***	0.034***	0.005***	0.022***	0.029***	0.022***	-0.001	-0.005***
Education								
Primary	0.003	-0.020***	-0.003	-0.002	-0.017***	-0.003	0.002	0.010**
Secondary								
Tertiary	0.018***	0.022***	0.004	-0.031***	0.011**	0.003	-0.005	-0.010**
Employed	0.038***	0.022***	0.003	0.010**	-0.001	-0.007	-0.029***	-0.030***
Type of settlement								
Rural	0.002	-0.003	-0.001	0.007*	0.005	-0.002	-0.001	0.004
Urban								
Metropolitan	0.008	0.022***	0.005	0.006	0.005	-0.007	0.011***	-0.006
Institutional trust	-0.002***	-0.001	-0.001**	0.002***	-0.000	0.003***	-0.001***	-0.000
Social trust	-0.003	-0.001	-0.001	0.003	0.003	0.007***	-0.001	0.000
Selection into contact	0.203***	0.020**	0.009***	0.294***	0.201***	0.115***	0.071***	0.053***