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Corruption and Network in Education:
Evidence from the Household Survey Data in Bangladesh*

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Abstract
We examine the causes and consequences of corruption in the provision of education service in Bangladesh. Our empirical analysis is based on the 2007 household survey data collected by Transparency International Bangladesh (TIB), which measure actual corruption. Our main findings are (i) both the incidence of corruption and the amount of bribe increase in the level of red tape, (ii) poorer households, households with less educated household head, and households with girls studying in school are more likely to be victims of corruption, (iii) households with higher social status are more likely to rely on informal network to bypass the red tape or pay less amount of bribe and, as a result, (iv) corruption in the education sector is likely to be regressive.

JEL Codes: K4, O1

Key words: education, corruption, bribery, Bangladesh

1. Introduction

Corruption is often defined as an incident where a public official breaks a rule or sells government property for private gain (Shleifer and Vishny, 1993; Banerjee et al. 2011). A large body of existing literature has shown that corruption can hamper economic growth by creating inefficiencies in public spending or lowering the private sector's investment incentives. Studies based on macro data and perception-based indices of corruption report a negative correlation between corruption indices and various measures of economic growth, and those based on micro data document how corruption causes inefficiencies and imposes unnecessary burden on firms.[1]

The bulk of existing research has been on understanding the causes and consequences of corruption at the aggregate level based on macro-level perception-based measures of corruption. Although there are some studies on the effect of corruption at the firm level, relatively less effort has been directed towards understanding micro-level corruption that befalls households.[2] Investigating the microeconomic aspect of the relationship between the burden of corruption and characteristics of households is important for several reasons. First, corruption can directly affect the welfare of households, which is more relevant than conventionally used GDP growth per capita for measures of economic development.[3] Second, to the extent that the burden of corruption may be unevenly distributed among households, corruption may affect inequality, which in turn can affect economic growth. For example, if corruption in poor countries exacerbates inequality, then Barro's (2000) evidence suggests that corruption may further hamper economic growth in those countries. Finally, understanding the detailed mechanism of how corruption affects the delivery of public service will help formulate effective policy formulation in tackling corruption.

This paper adds to the growing literature on corruption in the provision of public service experienced by households.[4] Specifically, we examine the incidence and amount of bribe households pay for their children's primary and secondary education in Bangladesh, which is

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[1] Banerjee et al. (2011) provides a comprehensive review of the related literature. For a review of the empirical literature based on macro or micro data, see also Aidt (2009). The related theoretical studies are surveyed in Aidt (2003).

[2] Among the studies based on micro-level data, Swamy et al. (2001), Hunt (2004, 2007a, 2007b), Hunt and Laszlo (2005), Deininger and Mpuga (2005), and Mocan (2008) are focused on corruption at the individual level. Kaufmann and Wei (1999), Svensson (2003), Fisman and Svensson (2007) rely on firm-level data to study the corrupt interactions between firms and public officials.

[3] See Aidt (2009) for a discussion on using genuine wealth per capita as a measure of economic development.

[4] Corruption in our setting refers to various types of illegal payments that the provider of public service demands from individual households, even though the service is to be provided free of charge. In this sense, it corresponds to what Shleifer and Vishny (1993) called 'corruption without theft', which may be also called 'non-collusive corruption' (Foellmi and Oechslin, 2007).

normally to be provided free of charge. We are mainly interested to see whether or how corruption has different effects on households with different socio-economic status, which will provide indirect evidence on the relation between corruption and inequality.

Our empirical analysis is based on the 2007 household survey data on school education collected by Transparency International Bangladesh (TIB). Our survey measures actual corruption and is representative of the entire population of the country. The information we have covers various demographic and socio-economic characteristics of a household, the mechanisms that corrupt teachers (or schools) use in obstructing households' access to their children's education entitlements which we call the red tape, and outcome variables on whether and how much bribe a household actually paid. The red tape variables capture whether teachers held regular class during the school period, whether they forced students to take paid extra tuition, and whether they influenced exam results. The outcome variables measure the incidence and the amount of bribe a household paid to have their child admitted to school and to receive the stipend for their child. They also include other extra fees a household paid to school without receipt. Given the free and universal primary education in Bangladesh, none of the above payments is a necessary cost for the household for their child's education. In addition, the survey has an explicit measure of whether a household has used an influential connection in dealing with corrupt teachers, which we call network.

Our primary findings can be summarized as follows. First, both the incidence of corruption and the amount of bribe increase in the level of red tape. Second, poorer households, households with less educated household head, and households with girls studying in school are more likely to be victims of corruption. Third, the network variable is positively correlated with the household's social status which is proxied by the household head's education level or the household's expenditure. Fourth, households with network are able to either bypass the red tape or pay less amount of bribe whether the network variable is used directly or instrumented by the household's expenditure.

Putting the above results together, we are led to a clear picture of corruption that takes place in the education sector. A corrupt teacher (or school) creates multiple layers of red tape that obstruct a household's access to their child's education service which is otherwise free. Facing the red tape, the household can choose to pay a bribe, or use informal relationships with influential people who can influence the bribe-taker on behalf of the household. Those households that find neither of the above options available would either have their child receive sub-quality education or take their child out of school altogether. The latter households are more likely to be from economically disadvantaged groups. Overall, our

results indicate that the burden of corruption is disproportionately borne by the poor, lending support to the positive relation between corruption and inequality.

This paper complements the existing literature in three ways. First, we provide new evidence on corruption by studying comprehensive micro-level survey data that capture actual corruption. As noted earlier, the bulk of the existing empirical work on corruption is based on the macro-level perception-based measures of corruption. Such measures can be prone to shortcomings, which are discussed in, for example, Sik (2002) and Galtung (2006). Second, we show that corruption in the education sector can exacerbate inequality due primarily to informal networks to which the rich have more access than the poor. The existing studies on the relation between corruption and inequality report mixed results. While studies based on cross-country and panel data find that inequality increases with corruption (Li et al., 2000; Gupta et al., 2002; Gyimah-Brempong, 2002), those based on micro-level evidence report the opposite (Svensson, 2003; Hunt, 2004, 2007b; Mocan, 2008). The mixed evidence warrants more studies on the detailed mechanics of how corruption works in different sectors. Finally, our paper explicitly shows that informal networks matter in corruption: households with network are less likely to pay bribes and pay significantly less when they do. The effect of network in corruption has not been incorporated explicitly in the existing empirical studies.[5] Although Hunt (2004) discusses how bilateral trusts between the service provider and demander can permit the substitution of an implicit quid pro quo for a bribe, thereby reducing corruption, her empirical analysis uses only proxy variables that may facilitate the formation of bilateral trusts. In addition, network in our study is different from bilateral trusts in that it refers to the informal relationships between the service demander and the influential third party rather than the service provider, who can directly or indirectly influence the service provider on behalf of the service demander.

The rest of the paper is structured as follows. In Section 2 we discuss the context of the study and the data used in the estimation, which is followed by some descriptive statistics. Section 3 outlines our empirical strategy while the estimation results are presented in Section 4. Section 5 concludes the paper.

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[5] Network in our study is different from informal social or economic ties formalized in Kingston (2007, 2008) and Çule and Fulton (2009). In Kingston (2007) and Çule and Fulton (2009), the focus is on informal ties between bribe demander and bribe-payer: Kingston (2007) shows how informal ties can facilitate enforcement of collusive arrangement while Çule and Fulton (2009) argue how such ties can help corrupt agents to coordinate into the bad equilibrium. Thus informal ties in both of these studies are conducive to corruption. On the other hand, Kingston (2008) considers informal relationships among bribe payers that help them to enforce agreements against paying bribes.

2. Study Context, Data, and Descriptive Statistics

2.1. Corruption in the Education Sector in Bangladesh

Bangladesh was ranked the lowest for five consecutive years from 2001 to 2005 in the global Corruption Perception Index developed by Transparency International, although the position marginally improved in 2006 and 2007 (6th and 7th, respectively). Perception-based governance indicators prepared by the World Bank (2007) also show low ratings for Bangladesh on six key indicators, with a particularly poor rating for the control of corruption, regulatory quality and rule of law. In addition, an investment climate survey by the World Bank (2003) covering 1001 manufacturing firms operating in Bangladesh reports that nearly 60 percent of these firms stated corruption as the most serious constraint followed by poor infrastructure.

Over the past decades, the education sector in Bangladesh has seen some improvement in school enrolment and gender parity. This has been made possible by the government's various stipend programs for children in primary and secondary schools. The government has adopted a universal primary education system that is free for all children. Incentives to attend primary school have been introduced with the distribution of free textbooks and provision of 'food for education'—the latter was converted to a cash stipend in 2002.[6] To increase school enrolment and reduce drop-out rates especially for girls, the government also provides scholarships (*Upabritti*) and financial assistance for female students in secondary school.[7] Large part of the country's national budget is set aside to help put these programs in action and to make education more accessible.

Despite government efforts to improve the education sector, there have been some setbacks in recent years. Over the period of 2003-2009, total primary school enrolment fell from 94 percent to 79 percent for boys and 91 percent to 81 percent for girls.[8] According to a 2008 report by Bangladesh Bureau of Educational Information and Statistics (BANBEIS, 2008), nearly 50 percent of primary school students drop out before they complete grade five, and the grade-10 completion rate is less than 20 percent.

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[6] The government provides a stipend of 100 *taka* (US$1.5) for one student and 125 *taka* (US$1.9) for two or more students from the same family.

[7] Under the girls' stipend program, all girls in rural areas who enter secondary school are eligible for a monthly sum ranging from 25 *taka* in Class 6 to 60 *taka* in Class 10 (between US$0.37– $0.88 as of July 2006). They also receive additional payments for new books. The conditions to get stipend are (1) a minimum of 75 percent attendance rate, (2) at least a 45 percent score in annual school exams, and (3) staying unmarried until sitting the Secondary School Certificate or turning 18.

[8] Bangladesh Economic Review, 2010

One possible reason for the deteriorating enrolment and high drop-out rates could be corruption.[9] According to Transparency International Bangladesh's Corruption Database Report 2005 (TIB, 2006), education was ranked the most corrupt sector.[10] Corruption in the education sector in Bangladesh takes various forms. It is often the case that final examination or entrance examination papers are sold in advance to high-paying candidates or to favour particular students. It is also common to manipulate oral or practical examination results. This practice is even more open to corruption as evaluations are subjective and difficult to monitor. Although primary education is free for all, it becomes prohibitively expensive for poor families as reality requires paying for private tutors in order to pass. This private tutoring is likely to exacerbate inequalities, as teachers provide paid supplementary tutoring after school hours. These teachers usually teach only part of the curriculum during school hours, and thus force students to pay for the rest during private lessons. In addition, absent or abusive teachers often demand illegal fees. While nearly half of the poor students in rural area get stipends from the government, many are deprived of getting the right amount or face frequent problems in getting the stipend on time. According to TIB (2006), 40 percent of households reported having paid 'donations' or bribes to enroll their children in primary schools. These illegal payments could be fees for admission into school, payments for textbooks which are to be provided free of charge, fees for sport and recreation purposes, subscriptions for religious activities, and fees for examinations. Teachers beating students, mistreating them or fixing final results are also reported to be quite common.[11]

The high drop-out rates and sluggishness in the improvement of school enrolment rates in recent years suggest that merely providing cash incentives would not improve the schooling outcome for the children. One potential reason for the high drop-out rates is the negligence of teachers in performing their duties.[12] Although there are officials at the *thana* (sub-district) level who monitor the activities of teachers, they seldom visit schools. There are

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[9] Islam and Choe (2011) report that access to microcredit in rural Bangladesh has a significant negative impact on school enrolment primarily because children are taken out from school to work in household enterprise that is established with microcredit.

[10] Corruption in the TIB report was measured based on the analysis of the reports from national and local newspapers in Bangladesh. Thus corruption was defined in terms of the number of victims rather than financial loss. The most corrupt sector was identified if the corruption in that particular sector exceeded 5 percent of the total reports of all sectors. In the report, education, police, health and family welfare sectors were identified as the most corrupt public sector.

[11] A survey conducted by UNICEF (2009) found that nine out of 10 children in Bangladesh were physically beaten in schools. In a major incident, a ten-year-old school pupil committed suicide in 2010 after being subject to corporal punishment. In August 2010, Bangladesh banned corporal punishment in schools after an upsurge of such incidents, warning teachers that they face legal action if they inflict 'inhuman punishments' on pupils.

[12] Teacher absence in school is one of the most serious problems in Bangladesh and many other developing countries as documented in various studies (Chaudhury et al., 2006; Kremer et al., 2005). Chaudhury et al. (2006) find 15.5 percent teacher absence rate in primary schools in Bangladesh. Sometimes teachers do not go to classroom to teach even if they are present in school. For example, Glewwe et al. (2000) report from a study in Kenya that 12 percent of teachers are absent from classroom during class hours even if they are in school.

also irregularities in class testing or official exams, where the students who use their teachers as private tutors sometimes get tips and hints on possible exam questions. Anecdotal evidence suggests there are a number of other irregularities in getting the stipend, which include persuasion through influential people, personal request to the head/class teacher or payment of bribes/commissions for the entitlement.

2.2.   Data and Summary Statistics

The survey was conducted by TIB in 2007 with a view to identifying the sectors or services where households experience corruption and assessing the nature and extent of corruption and harassment in selected public and private sectors. Our survey measures actual corruption, is representative of the entire population of the country, and primarily captures bribes paid in the course of daily life. TIB usually does year-round scanning of newspapers to identify sectors that are found to be very corrupt. Newspaper reports can be subject to bias, however. Thus TIB conducted this household survey to get a more detailed and objective assessment of corruption. The survey covered households' experience with mostly petty corruption from July 2006 to June 2007. In the survey, corruption is defined as more than bribery: it is defined as abuse of entrusted power for personal gains manifest in six common forms – bribery, negligence of duties, nepotism, embezzlement, deception and extortion. Our focus is on corruption in educational institutions that are either government or semi-government schools,[13] where it is expected that teachers provide the same services to everybody in the absence of red tape or harassment.

To select households for the survey, a three stage stratified cluster sampling method was followed. The Integrated Multipurpose Sampling (IMPS) Frame developed by the Bangladesh Bureau of Statistics was used as the sampling frame.[14] A total of 5,000 households were interviewed from 87 sub-districts (*thana*),[15] 3,000 from rural areas and 2,000 from urban areas. There were 250 Primary Sampling Units (PSU), 150 for rural areas and 100 for urban areas. Then 250 PSUs were distributed in 16 strata according to the national population weights of those strata. At the first stage, PSUs were selected randomly

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[13] Almost all primary level (grades 1-5) schools are government-managed. Secondary schools (grades 6-10) are mostly semi-government, often government-subsidized and community-managed but run according to government rules and regulation.

[14] The IMPS design consists of 1,000 *Mauzas* distributed in 16 strata according to rural, municipality and Statistical Metropolitan Area (SMA) throughout the country. There were 6 rural, 6 urban and 4 SMA strata. These *Mauzas* constitute the primary sampling units in this sampling frame.

[15] *Thana* is the local administrative unit where police, judiciary and the educational administration (officers who monitor the quality of education) are located.

from each of 16 strata. Then a block of 200 households was constructed randomly from each PSU. As there are some PSUs in the IMPS that have less than 200 households, households from adjacent *Mauzas* were added to those PSUs. The PSUs covered 62 out of 64 districts in Bangladesh with divisional and rural–urban population representations. In this paper, we consider only households reporting interaction with schools for their children's education. They constitute about 72.2 percent or 3,636 households, out of which about 60 percent are from rural areas.

The basic socio-economic and outcome variables at the household level are reported in Table 1 with the definition of variables provided in Table A1 in the appendix. There is not much difference between the characteristics of rural and urban households, except that household head's education level is higher in urban area and, not surprisingly, rural households tend to own more land. It also shows that urban households are more likely to use network in securing education services for their children.

Table 1 also presents information on three red tape variables: whether teachers did not hold regular classes (irregular class), whether teachers forced students to take private tuition (private tuition), and whether teachers had influence on exam results (exam influence). These variables proxy the red tape that makes it difficult for students to receive education services they are entitled to, thereby contributing to corruption. As for the red tape variables, on average about 14 (12, resp.) percent of rural (urban, resp.) students reported that their educational institutions did not hold regular classes, 32 (31, resp.) percent reported engaging class teachers as private tutors, and 7 (11, resp.) percent reported teachers' influence on exam results.

Our outcome variables of interests are (i) the incidence of corruption and the amount of bribe paid for a child's admission into school, (ii) the incidence of corruption and the amount of bribe paid to receive the stipend for the child, (iii) the incidence of corruption and the amount of extra fees and donation paid to school without receipt, and (iv) the amount of total bribe paid for a child's education which, for the purpose of this study, is defined as all illegal payments above plus any other informal payments to school. The summary information on these outcome variables shows that about 11 percent of households in rural areas and 5 percent in urban areas paid bribes in getting their children's admission to educational institutions. These figures are significant considering the fact that not all of the households have children who need to get admission to a new school in a given year. While rural households are more likely to pay bribes than their urban counterparts, urban households paid considerably more bribes than rural households. The average bribe an urban household paid

for their child's admission into school is almost five times that of a rural household. A similar pattern is observed in other types of corruption such as the extra payment to receive stipend and other payments without receipt: rural households are more likely to be subjected to corruption although the amount paid is larger in urban areas.

[Table 1 goes about here.]

3. Empirical Strategy

We first examine the factors that determine the probability that a household is subjected to various types of corruption, and the amount of bribe a household pays as a result. We run the following reduced-form regression:

$$corruption_{ij} = \alpha_j + X_{1ij}\beta + \mu_{ij} \tag{1}$$

where $corruption_{ij}$ is either the incidence a household i in area j paid a bribe to obtain given service, or the amount of bribe the household paid. In the former case, we use a probit model to estimate the probability where $corruption_{ij} = 1$ if the household paid a bribe. In the latter case, $corruption_{ij}$ is the amount of bribe a household actually paid. It includes the total amount of money spent to get service including money paid to others who might have helped to get the service. Since there are also households that did not pay bribes, we use a Tobit model in this case. X_1 is a vector of demographic and socio-economic characteristics of the household reported in Table 1. We use the household's expenditure rather than income as the former is a better proxy for the household's permanent income and socio-economic status.[16] We also control for the gender of children in school to capture the differential effects on corruption of having a son as opposed to a daughter in school. X_1 also includes three red-tape variables at the school and teacher level.[17] The term α_j captures the fixed effect specific to the police station or *thana* level. We also cluster standard errors at the *thana* level.

In specification (1) we follow Svensson (2003) and assume that both the incidence of corruption and the amount of bribe paid are determined by the same set of individual characteristics of the private service demander. This assumption can be more readily justified

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[16] Following Hunt and Laszlo (2008), we have also instrumented consumption expenditure with household income to address the possibility of measurement error in consumption. The results are similar to those reported in the paper.

[17] We do not estimate school level fixed effects because of fewer observations per school. Formal institutional mechanisms are the same within each *thana* as *thana* is the administrative unit.

than in Svensson. In his study, firms that pay bribes have heterogeneous dealings with bureaucrats. Thus the nature of the interaction between firms and bureaucrats may have different impact on the incidence of corruption and the amount of bribe. In our study, the interaction between the service supplier and demander is homogenous across agents as they deal with only one type of service.

We next examine how network plays a role in the incidence of corruption and the amount of bribe paid. Our basic estimating equation is as follows:

$$corruption_{ij} = \gamma_j + X_{2ij}\delta + \theta(network_{ij}) + \varepsilon_{ij} \tag{2}$$

where $network$ is a dummy variable which indicates if a household had an established relationship with or took any help from a political leader, an elected local government representative, or other influential people (e.g., school headmaster). We are mainly interested in examining whether such informal networks help overcome the red tape and reduce the incidence of bribery. X_2 includes the same demographic and socio-economic variables and red tape variables as in X_1. As in (1), we use a probit model to estimate the probability where $corruption_{ij} = 1$ if the household paid a bribe and a Tobit model when $corruption_{ij}$ is the amount of bribe or extra fees a household actually paid.

Estimating Eq. (2) directly can be problematic, however, since the network variable is potentially endogenous. People with access to informal networks are likely to be different from those who do not have any. Therefore, unobservables that affect the network could also affect our outcome variables. In order to tackle the endogeneity problem, we need an instrument that is correlated with network but not with corruption. It should also satisfy the exclusion restriction, i.e., it is orthogonal to the unobservables. We use education of the household head as an instrument for network. The first stage results reported in Table A2 in the appendix show that the instrument is highly correlated with the network variable. However, for the exclusion restriction to be valid, education of the household head should have no direct influence on corruption other than through its effect on network. We include variables that are likely determinants of corruption such as income as well as household and individual demographic and other socio-economic characteristics (excluding education) as independent controls in the econometric model. Our exclusion restriction is then the following: conditional on income, demographic variables and geographic fixed effects; education of the household head itself has no direct effect on the probability of corruption at school level, other than its influence through network. Since we have a single instrument for

the network, the F-test for the significance of the excluded instrument is just the square of its t-statistic in the first-stage. The conventional tests for the validity of instrument also do not apply here as we have a single instrument.[18] We implement the IV strategy using the control function method. This involves estimating the first-stage using a probit model and, in the second stage of IV, we use the residual from the first stage as an additional regressor.[19]

4. Estimation Results

4.1. Determinants of Corruption

We first estimate Eq. (1) to examine how household characteristics and red tape variables affect various types of corruption and the amount of bribe a household pays as a result. Our primary interest is to see whether poorer people with lower socio-economic characteristics suffer more from the adverse effects of corruption. Our overall findings indicate that poorer households, households with less educated household head and girls studying in school are more adversely affected and that corruption is exacerbated with red tape.

In Table 2, the probability that a household is subjected to various forms of corruption is estimated in models (1), (3) and (5). The results show that households with less educated household head and girls studying in school are more likely to be victims of corruption: the coefficients to 'education' are negative and significant in models (1) and (5), and the coefficients to 'girl' are positive and significant in all three models. For example, a household with a girl in school is 7.9 percent more likely to pay a bribe for their child's admission into school and 2.4 percent more likely to pay extra fees without receipt. This is consistent with the fact that most of the stipends are directed towards girls. Therefore, to secure the stipend, the parents with girls studying in school interact more frequently with teachers and apparently fall victim of extortion more often than those with boys in school. In addition, we find that poorer households are more likely to be subjected to corruption: the coefficients to 'expenditure' are negative and significant in models (3) and (5). Models (1), (3) and (5) also show that the three red tape variables are significant contributors to corruption in the education sector. The marginal effects reported in model (1) indicate that a

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[18] We also tried alternative variables such as income as the instrument. The first-stage result of the income variable is not statistically significant for the urban sub-sample. Thus we chose not to report these results. However, our general findings are similar when income is used as an instrument for the rural sub-sample.

[19] We also estimated a Heckman-type selection model where the dependent variable is the amount of bribe. In that case, we ran a probit model to estimate the probability of bribe and then use the resulting residual (Mills-ratio) to estimate the corruption equation. In this case, we do not exclude any variables (such as education) and assume that the model is identified solely based on distributional assumptions. The results do not differ much from those reported in this paper.

household is 16.5 percent more likely to pay a bribe for admission when teachers influence exam results and 44.7 percent more when teachers force students to take private tuition outside class.

The Tobit estimation results for the amount of bribe are more or less consistent with those from the probit models in regards to both household characteristics and red tape variables. For example, in all four models (2), (4), (6) and (7), the results show that poorer households, households with less educated household head and girls in school pay more bribe. Together with the probit estimates above, these results indicate that corruption in the education sector is more likely to hurt poorer and less educated households and households with girls studying in school, both in frequency and in the magnitude of bribe. As expected, corruption in the education sector is exacerbated when teachers create multiple layers of red tape.

[Table 2 goes about here.]

Although not reported in Table 2, we also find that the household's religious status plays no role in all specifications. Thus our results differ from Dincer (2008) who finds a positive and linear relationship between ethnic/religious polarization and corruption, and an inverse-U-shaped relationship between ethnic/religious fractionalization and corruption. More importantly, our results are in contrast to the findings of Svensson (2003), Hunt (2004, 2007b), Hunt and Laszlo (2005), and Mocan (2008). These authors report that the burden of corruption increases with the income of the private agent dealing with public officials. For example, based on cross-country data, Mocan (2008) finds that high-income individuals have higher exposure to being asked for a bribe by a government official. Hunt (2004) reports similar findings in relation to bribery and income although she also finds that other factors that are conducive to forming informal networks have a larger effect on bribery than income. The positive relation between bribery and income continues to appear in Hunt (2007b) in a study of public health care in Peru and Uganda, in Hunt and Laszlo (2005) in a study on bribes paid by households in Peru, and in Svensson (2003) in a study of firms paying bribes in Uganda.

The negative relation we find between corruption and income is in line with Hunt (2008) who finds that, among crime victims who use the police, poorer people are more likely to pay bribe. It also lends some support to Hunt (2007a), albeit in a different context, that corruption can be regressive by affecting the victims of misfortune more adversely. One

possible explanation for the negative relation is the effect of network on corruption. For example, if richer households are more likely to have established networks with influential people than poorer households, which they can use to bypass the red tape, then we would expect these households to be less likely to be victims of corruption. We examine this issue next.

4.2. Effects of Network on Corruption

In this section, we estimate Eq. (2) to examine whether informal network connections decrease the probability of corruption and the amount of bribe. We run separate regressions for urban and rural households to see if network works differently for these households. We first estimate Eq. (2) using the network variable as reported in the survey. The results are reported in Table 3, where we only report the coefficient estimates for network. The results suggest that network generally matters: it tends to reduce the probability a household pays bribe for their child's education, as well as the amount of bribe the household pays. As for the probability, the estimates in model (1) show that rural (urban, resp.) households with network are 18.8 (24.9, resp.) percent less likely to pay a bribe for their child's admission into school, although the coefficient estimates in other models are not significant except that for extra fees without receipt. However, these results may not portray an accurate picture because of the possible endogeneity of network, which was discussed in Section 3.

[Table 3 goes about here.]

In Table 4, we report estimation results when network is instrumented by education of the household head. The validity of this instrument was discussed previously. We have conjectured in Section 4.1 that the negative relation between household income (proxied by expenditure in our model) and corruption might be driven by the effect of network. That is, richer households may be more likely to have access to network connections than poorer households, which may enable them to bypass the red tape. To examine this, we report the coefficient estimates for network and expenditure in Table 4. The results indeed support our conjecture. The coefficients in the IV estimation indicate that a household with network is almost certain to avoid paying a bribe for their child's admission into school as shown in model (1). In addition, a rural (urban, resp.) household with network is 65 (86, resp.) percent

13

less likely to pay extra fees without receipt as shown in model (5), although the coefficient estimates in model (3) are not significant as in Table 2. More importantly, the negative relation between expenditure and corruption reported in Table 2 all but disappears in the IV estimation, as reflected in the near-insignificant coefficients for expenditure.

Network helps households to pay reduced amount of bribe as well, although not all the coefficient estimates are significant. The IV estimates in model (4) show that an urban household with network pays 518 *taka* less to receive their child's stipend. Although statistically not significant, network reduces the amount of total bribe a household pays for their child's education by 2,076 *taka* for a rural household and 9,477 *taka* for an urban household. This is significant amount considering the fact that the average household's monthly income is 5,724 *taka* in rural areas and 9,838 *taka* in urban areas. Finally, network appears to be more helpful for an urban household in reducing the probability a household is subjected to various forms of corruption and the amount of bribe a household actually pays. This is consistent with anecdotal evidence that urban households face stiffer competition in getting their children admitted to a school of their choice. Alternatively one may argue that other forms of bilateral informal networks are more likely to form in rural areas (Hunt, 2004), which may render the effect of 'network through third party' as we focus on in our study less pronounced than in urban areas. In sum, out results show that network can be a substitute for a bribe when a household faces red tape in having access to public service: those without established network have no choice but to pay a bribe; those with network can bypass the red tape or pay a smaller amount of bribe.

[Table 4 goes about here.]

5. Conclusion

This paper has studied the incidence and amount of bribe households pay for their children's education in Bangladesh. Our empirical analysis is based on the 2007 household survey data collected by Transparency International Bangladesh (TIB), which measure actual corruption. Our main findings are (i) both the incidence of corruption and the amount of bribe increase in the level of red tape, (ii) poorer households, households with less educated household head, and households with girls studying in school are more likely to be victims of corruption, (iii) households with higher social status proxied by the household head's

education level or the household's expenditure are more likely to rely on informal network to bypass the red tape or pay less amount of bribe and, as a result, (iv) corruption in the education sector is likely to be regressive.

Overall, our results show that corruption at the school level creates unequal access to education and imposes unnecessary costs on households in educating their children. The burden falls disproportionately on households from economically disadvantaged groups. This may offer a partial explanation to why school enrolment rates have been low and drop-out rates have been high in Bangladesh in recent years despite government efforts to improve the education sector. This, along with the regressive nature of corruption in the education sector, points to worsening inequality and investment in human capital, which may hamper sustainable growth and create long-term poverty. Needless to say, any policy aimed at improving the education sector should go hand in hand with the measures to fight corruption in the education sector.

Table 1: Basic Descriptive Statistics

Variables	Rural		Urban	
	Mean	S.D	Mean	S.D
Household characteristics				
Age	47.39	14.39	46.5	13.48
Sex	0.94		0.91	
Education	4.73	3.99	7.63	4.91
Expenditure	8.48	0.56	8.96	0.66
Religion	0.9		0.9	
Sex of the Respondent	0.87	0.34	0.73	0.45
Female adults	2.67	1.43	2.65	1.45
Male adults	3.03	1.6	2.92	1.58
Land	154.73	309.13	114.46	354.57
Girl	0.92	0.82	0.94	0.85
Boy	0.98	0.86	1	0.85
Network	0.38		0.45	
Red-tape				
Irregular class	0.14		0.12	
Private tuition	0.32		0.31	
Exam influence	0.07		0.11	
Outcome Variables				
Bribe for admission	0.11		0.05	
Bribe for admission (tk)^	211.44	1616.90	1039.81	4189.50
Bribe for stipend (%)	0.45		0.24	
Bribe for stipend (tk)^	85.80	120.32	115.38	174.40
Extra fees without receipt (%)	0.22		0.13	
Extra fees (tk)^	67.13	149.82	84.09	165.07
Total bribe (tk)^	156.65	1189.5	498.89	2774.8
Number of Observations	2154		1482	

Note: Number of observations varies depending on the outcome variables. ^ indicates the average amount for only those who paid. The mean of total bribe is not equal to the sum of the means of all other bribes since the number of households that paid each type of bribe is not the same.

Table 2: Reduced Form Regression Results for the Determinants of Corruption in School

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Bribe for admission (Probit ME)	Bribe for admission (tk) (Tobit)	Bribe for stipend (Probit ME)	Bribe for stipend (tk) (Tobit)	Extra fees without receipt (Probit ME)	Extra fees (tk) (Tobit)	Total bribe (tk) (Tobit)
Age	-0.000649	-10.9+	0.001207	-2.0**	-0.000327	-0.2	-10.9+
	(0.000825)	(6.0)	(0.000952)	(0.6)	(0.000569)	(0.5)	(6.0)
Sex	0.039477	-104.3	0.010429	69.0*	0.032062	27.3	-104.3
	(0.044034)	(315.3)	(0.054640)	(33.1)	(0.027926)	(30.2)	(315.3)
Education	-0.010713**	-48.0*	0.001747	-4.5+	-0.009713**	-5.2**	-48.0*
	(0.002395)	(19.8)	(0.003164)	(2.3)	(0.001908)	(1.6)	(19.8)
Expenditure	-0.035639	-258.3	-0.111889**	-40.5+	-0.074919**	-47.9**	-258.3
	(0.026070)	(186.5)	(0.031722)	(21.0)	(0.018794)	(14.9)	(186.5)
Girl	0.079256**	253.2**	0.152100**	118.3**	0.024469*	26.1*	253.2**
	(0.011300)	(77.3)	(0.019783)	(19.3)	(0.010090)	(11.7)	(77.3)
Irregular class	0.038721**	165.9+	0.033783*	0.8	0.018086+	22.1*	165.9+
	(0.011540)	(88.6)	(0.015848)	(14.7)	(0.010022)	(9.2)	(88.6)
Private tuition	0.446876**	560.4*	-0.023661	19.8	0.105069**	73.6**	560.4*
	(0.025415)	(240.4)	(0.034268)	(26.0)	(0.024927)	(19.3)	(240.4)
Exam influence	0.164857**	223.2	0.189331**	23.6	0.034688+	33.8*	223.2
	(0.030371)	(138.0)	(0.027750)	(18.6)	(0.018729)	(16.3)	(138.0)

Note: Probit ME stands for probit marginal effect. Each regression also includes *thana* fixed effects and other covariates reported in Table 1. Standard errors are reported in parentheses and are clustered at the police station level. **, *, + denote significant at the 1, 5, 10 percent level, respectively.

Table 3: Simple Probit/Tobit Estimates: The Role of Network in Corruption

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Bribe for admission	Bribe for admission (tk)	Bribe for stipend	Bribe for stipend (tk)	Extra fees without receipt	Extra fees (tk)	Total bribe (tk)
Rural area	-0.1882**	-95.16	-0.0113	1.01	-0.0738*	-20.21	-183.62+
	(0.0428)	(138.32)	(0.0365)	(19.27)	(0.0355)	(19.10)	(103.64)
Urban area	-0.2485**	-137.72	0.0485	15.85**	-0.0265	-35.98	-88.13
	(0.0534)	(720.50)	(0.0497)	(0.84)	(0.0367)	(34.95)	(253.42)

Note: The number of observations varies slightly between regressions. Each regression also includes *thana* fixed effects and the full set of covariates reported in Table 1. Standard errors are reported in parentheses and are clustered at the police station level. **, *, + denote significant at the 1, 5, 10 percent level, respectively.

Table 4: IV Estimates for the Role of Network in Corruption

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Bribe for admission	Bribe for admission (tk)	Bribe for stipend	Bribe for stipend (tk)	Extra fees without receipt	Extra fees (tk)	Total bribe (tk)
Rural:							
Network	-0.9233***	-2,587.0	-0.0157	-387.7	-0.6494***	-143.8	-2,076.2
	(0.1118)	(1,622.9)	(0.6353)	(376.5)	(0.2371)	(278.1)	(1,297.1)
Expenditure	0.055	-262.6	-0.074	4.6	-0.046	-29.1	-239.1
	(0.063)	(363.7)	(0.083)	(46.4)	(0.067)	(27.9)	(264.9)
No. of Obs.	1430	1448	913	899	1234	1336	1448
Urban:							
Network	-0.9895***	-16,352.1	-0.3688	-517.7***	-0.8588***	-558.3	-9,476.8
	(0.0468)	(11,509.1)	(0.6138)	(9.6265)	(0.1464)	(382.2)	(6,018.9)
Expenditure	0.048	1,337.7	0.079	-60.1***	0.037	-15.5	796.8
	(0.070)	(1,472.3)	(0.092)	(0.151)	(0.060)	(42.7)	(814.1)
No. of Obs.	971	971	446	488	662	795	971

Note: The number of observations varies slightly between regressions. Each regression also includes *thana* fixed effects and the full set of covariates reported in Table 1. Standard errors are reported in parentheses and are clustered at the police station level. **, *, + denote significant at the 1, 5, 10 percent level, respectively.

Appendix

Table A1: Variable Definition

Variables	Description
Household Characteristics	
Age	Age of household head
Sex	Sex of household head (male = 1; female = 0)
Education	Years of education attained by household head
Expenditure	Log of household's monthly expenditure in *taka*
Religion	Household's main religion (Muslim = 1; others = 0)
Female adults	Number of female adults in the household
Male adults	Number of male adults in the household
Sex of the respondent	Male = 1, female = 0
Girl	Number of girls studying in school
Boy	Number of boys studying in school
Land	Amount of land owned by the household
Network	If the household used network with influential people to get help in receiving education for children or any other service for their own purpose (yes = 1; no = 0)
Red-tape variables	
Irregular class	If the school did not hold regular class during the school period (yes = 1; no = 0)
Private tuition	If teachers forced students to take private tuition (yes = 1; no = 0)
Exam influence	If teachers influenced exam results (yes = 1; no = 0)
Outcome Variables	
Bribe for admission	If the household paid bribe for their child's admission into school (yes = 1; no = 0)
Bribe for admission (tk)	The amount of bribe in *taka* paid for child's admission into school
Bribe for stipend	If the household paid bribe to receive the stipend for their child (yes = 1; no = 0)
Bribe for stipend (tk)	The amount of bribe in *taka* paid to receive the stipend
Extra fees without receipt	If the household made any donation or paid extra fees to school without receipt (yes = 1; no = 0)
Extra fees (tk)	The amount of money in *taka* paid for donation and other extra fees
Total bribe (tk)	The total amount in *taka* paid for admission, stipend, extra fees, and other purposes

Table A2: First-Stage – Determinants of Informal Network

Variables	Rural	Urban
Age	0.0010	0.0011
	(0.0012)	(0.0016)
Sex	0.0192	0.0089
	(0.0705)	(0.0705)
Education	0.0098**	0.0082**
	(0.0047)	(0.0039)
Religion	0.1016	-0.0317
	(0.0682)	(0.0762)
Sex of the respondent	0.0269	-0.0637
	(0.0587)	(0.0478)
Household size*	-0.0034	-0.0046
	(0.0074)	(0.0103)
Expenditure	0.0876**	0.0334
	(0.0414)	(0.0481)
Boy	-0.0214	0.0256
	(0.0176)	(0.0277)
Girl	-0.0152	0.0568**
	(0.0195)	(0.0222)
Regular class	-0.0700*	-0.0492
	(0.0399)	(0.0436)
Private tuition	0.0120	-0.1354***
	(0.0304)	(0.0379)
Exam influence	-0.0092	0.0677
	(0.0471)	(0.0572)
Observations	1423	971

*Household size = Total number of male and female adults, boys and girls in the household

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