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Chongwoo Choe ^a, Ratbek Dzhumashev ^a, Asadul Islam ^a & Zakir H. Khan ^b

^a Department of Economics, Monash University, Australia

^b Transparency International Bangladesh

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The Effect of Informal Networks on Corruption in Education: Evidence from the Household Survey Data in Bangladesh

CHONGWOO CHOE*, RATBEK DZHUMASHEV*, ASADUL ISLAM* & ZAKIR H. KHAN**

*Department of Economics, Monash University, Australia, **Transparency International Bangladesh

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ABSTRACT *Using the 2007 household survey data collected by Transparency International Bangladesh, we examine corruption in the education sector in Bangladesh. Our main findings are (i) the incidence of corruption and the amount of bribe increase with the level of red tape, (ii) poorer households, households with a 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 use informal networks to bypass the red tape or pay less amount of a bribe and, as a result, (iv) corruption is likely to be regressive.*

I. Introduction

Much of the existing research on corruption has been on understanding the causes and consequences of corruption at the aggregate level based on macro-level perception-based measures of corruption.¹ Such measures can be prone to shortcomings as discussed in, for example, Sik (2002) and Galtung (2006). Although there are some studies on corruption at the firm level, relatively less work has been on micro-level corruption that befalls households.² Investigating the latter 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 in tackling corruption.

This article 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 normally to be provided free of charge. Our main interest is in whether or how corruption has

Correspondence Address: Asadul Islam, Department of Economics, Monash University, Caulfield Campus, VIC 3145, Australia. Email: asadul.islam@monash.edu

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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. Our dataset 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. 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 summarised 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 a less educated household head, and households with girls in school are more likely to be victims of corruption. Third, network is positively correlated with the household's social status which is proxied by the household head's education level. 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.

Putting the above results together, we are led to a clear picture of corruption in the education sector in Bangladesh. 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. Thus 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 article complements the existing literature on corruption based on micro data in two ways. First, we show that corruption in the education sector can be regressive. The existing studies on the relation between corruption and inequality report mixed results. Although 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 mechanisms of how corruption works in different sectors. Second, our article explicitly shows that informal networks matter in corruption. The effect of network on corruption has not been incorporated explicitly in the existing empirical studies. 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.⁵

The rest of the article is structured as follows. In Section II we discuss the context of the study and the data used in the estimation. Section III outlines our empirical strategy while the estimation results are presented in Section IV. Section V concludes the article.

II. Study Context, Data, and Descriptive Statistics

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 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 per cent of these firms stated corruption as the most serious constraint.

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 programmes 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 dropout rates especially for girls, the government also provides scholarships (*upabritti*) and financial assistance for girls in secondary school.⁷ A large part of the country's national budget is set aside to help put these programmes into action and to make education more accessible.

Despite government efforts, there have been some setbacks in recent years. Over the period 2003–2009, total primary school enrolment fell from 94 per cent to 79 per cent for boys and 91 per cent to 81 per cent for girls.⁸ According to a report by the Bangladesh Bureau of Educational Information and Statistics (BANBEIS, 2008), nearly 50 per cent of primary school students drop out before they complete grade five, and the grade 10 completion rate is less than 20 per cent. In addition, only about 2 per cent of the children enrolled in school can achieve all the prescribed competencies by the end of grade five. As a result, the literacy rate in Bangladesh is significantly lower than that of other developing countries, hovering around 50 per cent, and much of the emerging labour force continues to lack basic education skills.⁹

One possible reason for the deteriorating enrolment and high dropout rates could be corruption.¹⁰ According to TIB's Corruption Database Report 2005 (TIB, 2006), education was ranked the most corrupt sector.¹¹ Corruption in the education sector in Bangladesh takes various forms. It is often the case that examination papers are sold in advance to students or to favour particular students. Manipulation of examination results is also common. 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 them to pay for private tuition for their children, which is mostly provided by teachers 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 tuition. In addition, absent or abusive teachers often demand illegal fees.¹² Although nearly half of the poor students in rural areas are entitled to receive stipends from the government, many do not receive the right amount or face frequent problems in receiving them on time. According to TIB (2006), 40 per cent of households reported having paid 'donations' or bribes to enrol their children in primary schools. Teachers beating students or mistreating them are also reported to be quite common.¹³

Part of the reasons for corruption in the education sector in Bangladesh can be found in lack of resources and dysfunctional monitoring mechanisms. First, although the government adopted in 1990 a compulsory primary education law for all children up to grade five, it was not implemented with sufficient vigour and was not backed up with adequate resources. According to USAID, government expenditure on education in Bangladesh is 2.4 per cent of GNP, which is the lowest in the region.¹⁴ The management of the primary education system is also subject to lack of effective oversight. At the school level, a school management committee (SMC) is

responsible for the overall management and development of the school. The SMC consists of teachers, parents, representatives of local government, and various other individuals interested in the education in the area. Although membership of the SMC is through election, it is renewed without election in some schools. In addition, some SMCs are very inactive in practice and, in some cases, detrimental to the interest of the school (Carron et al., 1998: 35).

The problem of ineffective management at the school level is not properly addressed by the authority further up the hierarchy, or is even aggravated. The Assistant *Thana* Education Officer (ATEO) is supposed to visit and monitor 15 to 20 schools at least once a month, and his immediate supervisor, the *Thana* Education Officer (TEO), about 10 schools. The ATEO's main role is to provide academic supervision and administrative support while the TEO's responsibility is for monitoring and information gathering. In practice, however, TEOs rely on the ATEOs for the collection of information, who further rely on headteachers without visiting schools (Carron et al., 1998). Additional evidence suggests that these officers often produce a favourable report in return for 'entertainment fees' and it is not uncommon that they need to be bribed by head teachers to provide services that are their duty and responsibility (Karim et al., 2004).

Data and Summary Statistics

The survey was conducted by TIB in 2007 with a view to identifying the sectors where households experience corruption and assessing the nature and extent of corruption and harassment in selected public and private sectors. The survey measures actual corruption and is representative of the entire population of the country. 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.

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.¹⁵ A total of 5000 households were interviewed from 87 sub-districts (*thana*),¹⁶ 3000 from rural areas and 2000 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. In the first stage, PSUs were selected randomly from each of the 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*¹⁷ were added to those PSUs. The PSUs covered 62 out of 64 districts in Bangladesh with divisional and rural-urban population representations. Our final sample consists of about 72.2 per cent or 3636 households, out of which about 60 per cent are from rural areas. The sample size differs significantly depending on our outcome variables. For example, in case of corruption that households experience in having their children admitted to schools, the sample is confined to only those households whose children were admitted to schools in the year preceding the survey.

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 Online Appendix. There is not much difference between the characteristics of rural and urban households, except that the 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

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	0.11		0.05	
Bribe for admission				
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	

Notes: 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.

entitled to. On average about 14 (12, resp.) per cent of rural (urban, resp.) students reported that their educational institutions did not hold regular classes, 32 (31, resp.) per cent reported engaging teachers as private tutors, and seven (11, resp.) per cent reported teachers' influence on exam results.

Our outcome variables of interests are: the incidence of corruption and the amount of bribe paid for a child's admission into school; the incidence of corruption and the amount of bribe paid to receive the stipend for the child; the incidence of corruption and the amount of extra fees and donations paid to school without receipt; and the amount of total bribe paid for a child's education which, for the purpose of this study, is defined as all the above illegal payments plus any other informal payments to school. The summary information on these outcome variables shows that about 11 per cent of households in rural areas and five per cent in urban areas paid bribes in getting their children's admission to schools. 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. The average bribe an urban household paid for their child's admission to school is almost five times that of a rural household. A similar pattern is observed in other types of corruption: rural households are more likely to be subjected to corruption although the amount paid is larger in urban areas.

III. Empirical Strategy

We examine the factors that determine both the incidence of corruption and the amount of bribe paid, and in particular, the role of network. Our basic estimating equation is as follows:

$$\text{corruption}_{ij} = \gamma_j + x_{1ij}\delta + \theta * \text{network}_{ij} + \varepsilon_{ij} \quad (1)$$

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 if $\text{corruption}_{ij} = 1$ the household paid a bribe. In the latter case, corruption_{ij} is the amount of bribe a household actually paid, which includes the money paid to others for any help in getting the service delivered. Since there are also households that did not pay bribes, we use a Tobit model in this case. In Equation (1), network is a dummy variable that equals one 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). In the survey, households were asked if they have any relationship with these people and have sought their help to solve any problem in the past one year. X_1 is a vector of demographic and socio-economic characteristics of the household, and three red-tape variables at the school and teacher level.¹⁸ These variables are based on the responses given by the households to the following questions: whether regular class and timely exams take place in schools; whether school teachers do not behave properly if child does not have (paid) private tuition from any teacher; and whether school teachers influence exam results. To the extent that these variables are affected by network and other socio-economic variables at the household level, we estimate Equation (1) both including the red-tape variables and excluding them. The coefficients are economically more significant without including them in the regression, but the statistical significance remains unchanged. Therefore we report in this paper only the results that include the three red-tape variables, which give us conservative estimates.

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.¹⁹ We control for the gender of children to capture the differential effects on corruption of having a son as opposed to a daughter in school. We also control for the number of children in school since, the more children a household has in school, the more often the household has to interact with the school, hence the more likelihood of becoming the target of corruption. The term α_j captures the fixed effect specific to the police station or *thana* level. We 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 household. This assumption can be more readily justified 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 impacts 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.²⁰

Estimating Equation (1) directly using simple probit (for the incidence of corruption) or Tobit (for the amount of bribe) can be problematic 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. We use education of the household head as an instrument for network and implement the IV strategy using the control function method.²¹ We estimate the first-stage using a probit model and, in the

second stage, we use the residual from the first stage as an additional regressor.²² The first-stage of our IV regression is as follows:

$$\text{corruption}_{ij} = \alpha_j + X_{1ij}\beta + \sigma * \text{edu}_{ij} + v_{ij} \quad (2)$$

where the variable *edu* refers to the years of education of the household head.

The first stage results reported in Table A2 in the Online Appendix show that education of the household head is highly correlated with the network variable. For the exclusion restriction to be valid, however, education of the household head should have no direct influence on corruption other than through its effect on network. Although we do not think it plausible that corruption in school is influenced by any single individual's level of education, it could be that the individual's education level in a community may have some bearing upon corruption at the community level. In that case, our estimates will be biased. Indeed there is always a concern about the validity of instrument using the survey data of the type used in this analysis. Nonetheless, we believe that the correlation between informal network and corruption is sufficiently interesting to merit a careful study. Moreover, we provide a robustness check in Section IV showing that the central conclusion of our paper does not depend on the exclusion restriction.

IV. Estimation Results

Reduced-Form Estimation: The Determinants of Corruption

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

$$\text{corruption}_{ij} = \rho_j + X_{2ij}\Gamma + \mu_{ij} \quad (3)$$

Where X_2 includes all the variables included in X_1 and the excluded instrument in Equation (1), namely, education of the household head. Our objective is 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. In particular, we are interested in whether poorer households with lower socio-economic status suffer more from corruption.

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 per cent more likely to pay a bribe for their child's admission into school and 2.4 per cent more likely to pay extra fees without receipt. This is consistent with the fact that most of the stipends are directed towards girls and, hence, more interaction between teachers and the parents with girls in school. In addition, 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. The marginal effects reported in model (1) indicate that a household is 16.5 per cent more likely to pay a bribe for admission when teachers influence exam results and 44.7 per cent more when teachers force students to take private tuition outside class.

The Tobit estimation results for the amount of bribe are generally 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

Table 2. Reduced form regression results: 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 (0.000825)	-10.9+ (6.0)	0.001207 (0.000952)	-2.0** (0.6)	-0.000327 (0.000569)	-0.2 (0.5)	-10.9+ (6.0)
Sex	0.039477 (0.044034)	-104.3 (315.3)	0.010429 (0.054640)	69.0* (33.1)	0.032062 (0.027926)	27.3 (30.2)	-104.3 (315.3)
Education	-0.010713** (0.002395)	-48.0* (19.8)	0.001747 (0.003164)	-4.5+ (2.3)	-0.009713** (0.001908)	-5.2** (1.6)	-48.0* (19.8)
Expenditure	-0.035639 (0.026070)	-258.3 (186.5)	-0.111889** (0.031722)	-40.5+ (21.0)	-0.074919** (0.018794)	-47.9** (14.9)	-258.3 (186.5)
Girl	0.079256** (0.011300)	253.2** (77.3)	0.152100** (0.019783)	118.3** (19.3)	0.024469* (0.010090)	26.1* (11.7)	253.2** (77.3)
Irregular class	0.038721** (0.011540)	165.9+ (88.6)	0.033783* (0.015848)	0.8 (14.7)	0.018086+ (0.010022)	22.1* (9.2)	165.9+ (88.6)
Private tuition	0.446876** (0.025415)	560.4* (240.4)	-0.023661 (0.034268)	19.8 (26.0)	0.105069** (0.024927)	73.6** (19.3)	560.4* (240.4)
Exam influence	0.164857** (0.030371)	223.2 (138.0)	0.189331** (0.027750)	23.6 (18.6)	0.034688+ (0.018729)	33.8* (16.3)	223.2 (138.0)
No. of obs.	1942	1472	2038	1972	2886	2886	3450

Notes: 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 per cent level, respectively.

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.

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. 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 a 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.

Effects of Network on Corruption: Probit/Tobit and IV Estimates

We first estimate Equation (1) using the network variable as reported in the survey without considering the endogeneity. We report the coefficient estimates for urban and rural households

separately to see if network works differently for these households. 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.) per cent 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 previously.

In Table 4, we report estimation results when network is instrumented by the education of the household head. We have conjectured earlier if the negative relation between household income (proxied by expenditure in our model) and corruption might be driven by the effect of network.

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	-0.138*** (0.0484)	-301.6 (250.1)	-0.0113 (0.0365)	1.01 (19.27)	-0.0738* (0.0355)	-20.21 (19.10)	-183.62+ (103.64)
No. of obs.	775	873	913	899	1234	1336	1448
Urban area	-0.276*** (0.0783)	-3619 (12311)	0.0485 (0.0497)	15.85** (0.84)	-0.0265 (0.0367)	-35.98 (34.95)	-88.13 (253.42)
No. of obs.	535	971	538	488	662	795	971

Notes: 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 per cent level, respectively. The number of observations differs between probit and Tobit as those who were not forced to pay bribe could also bribe willingly.

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** (0.1118)	-2,587.0 (1,622.9)	-0.0157 (0.6353)	-387.7 (376.5)	-0.6494** (0.2371)	-143.8 (278.1)	-2,076.2 (1,297.1)
Expenditure	0.055 (0.063)	-262.6 (363.7)	-0.074 (0.083)	4.6 (46.4)	-0.046 (0.067)	-29.1 (27.9)	-239.1 (264.9)
No. of obs.	775	873	913	899	1234	1336	1448
Urban:							
Network	-0.9895** (0.0468)	-16,352.1 (11,509.1)	-0.3688 (0.6138)	-517.7** (9.6265)	-0.8588** (0.1464)	-558.3 (382.2)	-9,476.8 (6,018.9)
Expenditure	0.048 (0.070)	1,337.7 (1,472.3)	0.079 (0.092)	-60.1** (0.151)	0.037 (0.060)	-15.5 (42.7)	796.8 (814.1)
No. of obs.	535	971	446	488	662	795	971

Notes: 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 per cent level, respectively. The number of observations differs between probit and tobit as those who were not forced to pay bribe could also bribe willingly.

That is, richer households may be more likely to have access to network 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.) per cent 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 2076 *taka* for a rural household and 9477 *taka* for an urban household. This is significant amount considering the fact that the average household's monthly income is 5724 *taka* in rural areas and 9838 *taka* in urban areas. Finally, network appears to be more helpful for an urban household. 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, our results show that network can be a substitute for a bribe when a household faces red tape in having access to public service.

Robustness Check: Bounding the Estimates

The IV results presented in Table 3 are based on the exclusion restriction that education of the household head itself has no direct effect on the probability of corruption, other than through its effect on network. However, parents' education could be related to other factors that affect corruption in addition to its effect on network. In order to address this concern, we follow Conley et al. (2012) who construct a valid confidence interval for the coefficient even when the exclusion restriction does not hold. Instead of imposing the exclusion restriction, Conley et al. proceed with the assumption that the instrument satisfies the exclusion restriction approximately. Under this weaker exogeneity condition, they show that one can estimate bounds on the causal effect of the endogenous variable. Following this procedure, we estimate the lower and upper bounds for the parameters of interest. The results are reported for 90 per cent confidence intervals in Table A3 in the Online Appendix. The lower bound estimates show a larger negative effect of network on corruption, indicating that the central conclusion of our paper does not depend on the exclusion restriction. However, Conley et al.'s method can be applied using the 2SLS (Stage Least Square) estimation whereas our results in Table 3 are marginal effects based on probit or Tobit estimation in the 2nd stage of IV regression. Thus the results in Table A3 are merely indicative and should be taken as such.

V. Conclusion

This article has studied the incidence and amount of bribe households pay for their children's education in Bangladesh. Our results show that the burden of corruption falls disproportionately on households from economically disadvantaged groups. This may offer a partial explanation to why school enrolment rates have been low and dropout rates have been high in Bangladesh in recent years. 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.

In view of our findings, a recent change that has been introduced to the examination system for primary school students in Bangladesh merits some discussion. In 2009, the government introduced the nation-wide examination for students completing grade five under the centralised system of question-setting and script-checking. Under the new system, students must pass the examination to advance to grade six, and the results are beyond the hands of school authority as the examination script is checked by unknown teachers from other schools. Clearly such a change should reduce one type of red tape, exam influence, and therefore reduce corruption in that regard. In addition, increased transparency and competition can encourage teachers to improve the pass rates among their students through, for example, better quality of teaching. On the other hand, one can imagine other adverse by-products. For example, teachers may rely on other means to improve the pass rates. Indeed anecdotal evidence indicates that, after the public examination system has been introduced, teachers are more likely to select those grade four students with a high likelihood of passing the public examination to advance to grade five, resulting in high dropouts among grade four students. Corrupt teachers may also demand more payment from parents in return for allowing their children to advance to grade five. There are also some recent reports in local media that schools in urban areas are charging significantly higher fees than government-determined fees for admission into school.²³ Although it is still early to have a clear picture about the effects of the new system, it seems reasonable to expect a rational response from corrupt agents: when one channel of corruption – that is, exam influence – is blocked, they can respond by adjusting other channels, be they private tuition, irregular class, or admission into school.

We conclude the article with some discussions on policy implications. Given the rational response from corrupt agents to any policy change, the effect of policy that aims to tackle only one area is likely to be limited, as we have argued above in regards to the newly introduced public examination system. Since a large proportion of corruption in the education sector is harassment-type, against which households have little or no recourse, a more effective policy can be to provide the victims of corruption with better ways to handle the harassment. For example, the Whistle-blowers Bill has been recently passed in India, and its more expanded version, the Jan Lokpal Bill, is currently under proposal. The essential features of these policies are to set up a mechanism to encourage people to disclose information on corruption or wilful misuse of power by public servants, and to provide them with adequate protection for reporting such information. Although we are not aware of any rigorous empirical analysis on the effect of such a policy, we believe it is a better way to fight harassment-type corruption than a policy that tackles limited areas of corruption. If properly implemented, such a policy can change the nature of the game between bribe-takers and bribe-givers and implement socially optimal equilibrium.²⁴

Notes

1. Banerjee et al. (2011) provides a comprehensive review of the literature.
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 on corruption at the individual level. Kaufmann and Wei (1999), Svensson (2003), Fisman and Svensson (2007) rely on firm-level data to study 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 for the service that a household is entitled to. In this sense, it corresponds to what Shleifer and Vishny (1993) called 'corruption without theft'.
5. Network in our study is different from informal social or economic ties formalised in Kingston (2007) and Çule and Fulton (2009). In these studies, the focus is on informal ties between bribe-takers and bribe-givers that can either facilitate enforcement of collusive arrangement or help corrupt agents to coordinate into the bad equilibrium. Thus informal ties in both of these studies are conducive to corruption.
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 grade six to 60 *taka* in grade 10. The conditions to get a stipend are a minimum of 75 per cent

- attendance rate, at least a 45 per cent score in annual school exams, and staying unmarried until sitting the Secondary School Certificate or turning 18.
8. *Bangladesh Economic Review* (2010), p. 173.
 9. <http://www.usaid.gov/bd/programs/education.html>, accessed 30 January 2012.
 10. Islam and Choe (2012) 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 the household enterprise that is established with microcredit.
 11. Corruption in the TIB report was measured based on the analysis of the reports from national and local newspapers in Bangladesh. In the report, education, police, health and family welfare sectors were identified as the most corrupt public services.
 12. Teacher absence from school is one of the most serious problems in Bangladesh and many other developing countries. Chaudhury et al. (2006) find a 15.5 per cent teacher absence rate in primary schools in Bangladesh. Glewwe et al. (2009) report from a study in Kenya that 12 per cent of teachers are absent from classroom during class hours even if they are in school.
 13. 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 10-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.
 14. <http://www.usaid.gov/bd/programmes/education.html>, accessed 30 January 2012.
 15. The IMPS design consists of 1000 *mauzas* distributed in 16 strata according to rural, municipality and Statistical Metropolitan Area (SMA) throughout the country. There were six rural, six urban and four SMA strata. These *mauzas* constitute the primary sampling units.
 16. *Thana* is the local administrative unit where police, judiciary and the educational administration are located.
 17. A *mauza* is an administrative district, corresponding to a specific land area within which there may be one or more settlements.
 18. We do not estimate school-level fixed effects because of fewer observations per school. Formal institutional mechanisms are the same within each *thana*.
 19. 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.
 20. We have also used a hurdle model that allows for differing effects of the same set of characteristics on corruption. The results are similar to what we report here.
 21. We have also tried income as the instrument. Although the first-stage result is not statistically significant for the urban sub-sample, our general findings are similar for the rural sub-sample.
 22. We have also estimated a Heckman-type selection model where the dependent variable is the amount of bribe. 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.
 23. See, for example, *The Daily ProthomAlo* (leading Bangladeshi newspaper), 3 Jan. 2012.
 24. See *The Economist*, 'A novel way to combat corruption: who to punish', 5 May 2011, for arguments in favour of such a policy put forward by Kaushik Basu, and counter-arguments.

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