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Peaceful Coexistence? The Role of Religious Schools and NGOs in the Growth of Female Secondary Schooling in Bangladesh

Mohammad Niaz Asadullah
Nazmul Chaudhury

Research and Evaluation Division, BRAC

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Research and Evaluation Division (RED), BRAC, 75 Mohakhali, Dhaka 1212, Bangladesh
Telephone: 88-02-9881265, 8824180-7 (PABX) Fax: 88-02-8823542
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ABSTRACT

BRAC, one of the largest development organizations in the world runs a large number of non-formal primary schools in Bangladesh which target out-of-school children from poor families. These schools are well-known for their effectiveness in closing gender gap in primary school enrolment. On the other hand, registered non-government secondary madrasas (or Islamic schools) today enrol one girl against every boy student. In this paper, we document a positive spillover effect of BRAC schools on female secondary enrolment in registered madrasas. Drawing upon school enrolment data aggregated at the region level, we first show that regions that had more registered madrasas experienced greater secondary female enrolment growth during 1999-2003, holding the number of secular secondary schools constant. In this context we test the impact of BRAC-run primary schools on female enrolment in registered madrasas. We deal with the potential endogeneity of placement of BRAC schools using instrumental variable approach. Controlling for factors such as local-level poverty, road access and distance from major cities, we show that regions with a greater presence of BRAC schools have higher female enrolment growth in secondary madrasas. The effect is much bigger when compared to that on secondary schools.

I. INTRODUCTION

Despite the need to provide public services in hard to reach poor areas, governments in many parts of the developing world are stymied by fiscal and institutional constraints (World Bank 2003). Even if it is possible to find the public funds to hire and post public sector teachers and doctors in poor rural villages and urban slums, the efficacy of such public provision is often severely compromised. For example, absenteeism of service providers is a major problem in many rural areas (Chaudhury *et al.* 2006). Even if the providers bother to show up, the quality of their services in terms of impact on schooling and health outcomes is often weak. One possible way of circumventing bureaucratic inertia and government capacity constraints is by contracting-out services to non-governmental organizations (NGOs) and private providers. Cambodia has had some success with this approach (Chaudhury *et al.* 2006). For example, despite considerable international donor funding in Cambodia to resurrect the public healthcare system in the aftermath of the murderous reign of the Khmer Rouge, delivery of health services by the public system continued to suffer from severe institutional failures (e.g., high levels of doctor absenteeism, widespread pilfering of medicines). Recognizing that these structural problems would be difficult to address within the bureaucratic confines of the public sector, the Health Ministry took a pragmatic decision to hand over health system management in several districts to NGOs backed by public financing. Rigorous evaluation has shown that districts managed by the NGOs are much more successful in improving health services (and health outcomes) than districts run by the government. The NGO-run clinics charge lower fees compared to private alternatives in those districts. Also the NGOs have managed to signal a strong sense of trust and credibility.

There has been a proliferation of non-state providers of education services in Bangladesh. Some providers have emerged with the fiscal backing of the state. For instance, large number of madrasa high-schools in Bangladesh is operated by non-state providers. But the overwhelming majority of them is officially registered and receives public financing, include a state-sanctioned modern curriculum alongside traditional religious subjects, and are coeducational[1]. This sets Bangladesh apart from most madrasas elsewhere in the Indian Sub-continent which are mostly traditional all-male enclaves that shun co-education and modern subjects (e.g., math, science).

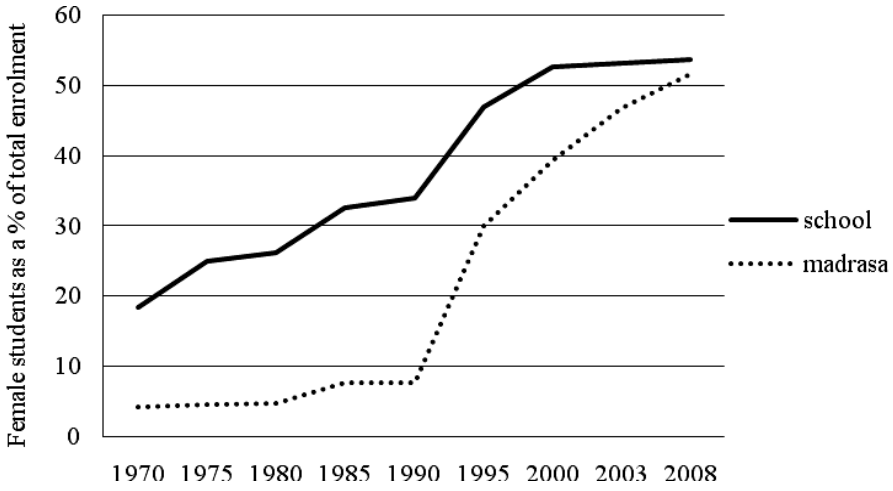
At the same time, domestic NGOs have also taken the lead in providing services in underserved sectors. Bangladesh has some of the largest and most dynamic education and health NGOs in the developing world. Some have evolved to multi-service entities, such as BRAC, that successfully runs specialized schools for out-of-school children, has an extensive system of health clinics, and provides micro-credit to the poor (besides running chicken cooperatives, handicraft boutiques, commercial

lending operations, etc). BRAC runs thousands of non-formal schools which target out-of-school children from poor families. The broad-based public support for NGO activities in Bangladesh is because of their commitment towards pro-poor service delivery. NGOs like BRAC not only perform the traditional role of providing the rural poor access to credit, they are heavily involved in the provision of various public goods such as health and education. While the government has not contracted-out the services of these major NGOs, they have allowed them to operate without too much interference as long as they refrain from explicit political activity. In fact, the major NGOs have resisted any explicit contractual arrangements with the government for various reasons (e.g., to maintain autonomy, to avoid negative association related to non-transparency and corruption in government contracting). They are, however, to some extent contracted-out by the international donor communities (particularly bilateral donors) which provide considerable funding directly to major NGOs.

There are very few rigorous studies on the performance of NGO schools[2]. A notable exception is Sukontamarn and Pataporn (2005) who uses data on BRAC schools from Bangladesh and examines the impact of the entry of NGOs on female enrolment in primary school[3]. Sukontamarn finds that the entry of BRAC schools significantly increases girls' enrolment as compared to boys. Cohorts that are exposed to BRAC schools have higher probability of primary school enrolment and the effect operates mainly through female students. However, there is no study that has examined the potential spillover effects of NGO primary schools on other outcomes such as overall female enrolment rate in secondary schools.

Since the 1990's Bangladesh has made remarkable progress in improving gender parity, having already achieved its Millennium Development Goal (MDG) goal of gender parity in primary and secondary schooling well before 2015. Understanding the causes of female enrolment growth in secondary education is therefore, an important research question. Bangladesh provides a unique setting to study the impact of NGO-run primary schools on female enrolment in secondary schools for another reason. There are a large number of madrasas for whom, like NGO schools, altruistic motivations are arguably the principal determinants of locational decisions. On one hand, both serve children from socially underprivileged families. On the other hand, they impart different sets of skills and are known to target different gender groups. For instance, registered madrasas in Bangladesh during the 1980s were predominantly boys-only with only 7% of the total enrolled students being female. However, this has changed in over just one decade. Figure 1 reports data on % of female enrolment in registered schools and madrasas for the period 1970-2008. Clearly, there was a boom in female enrolment during the 1990s. However, the growth was more pronounced for madrasas. The relative share of females in madrasas jumped from 7.7% in 1990 to 52% in the year 2008. On the other hand, the share of female students in registered secondary schools in the country rose from 34% to 54% during the same period[4]. Registered non-government secondary madrasas and schools today enrol one girl against every boy student.

Figure 1. Trends in the share of female students in post-primary schools and madrasas in Bangladesh, 1970-2008



Data source: Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education, Government of the Peoples Republic of Bangladesh

Such dramatic feminization of enrolment in registered secondary madrasas has been attributed to introduction of a conditional cash transfer scheme that target female students in secondary schools and madrasas (Asadullah and Chaudhury, 2009). Female enrolment has increased more than five-folds since 1994 when the conditional cash transfer scheme was introduced. However, the last two decades also saw a phenomenal rise in NGO run primary schools in the country (see Appendix Figure 1). The number of NGO schools has increased four times since the early 1990s and today account for a significant proportion of primary schools enrolled children in the country. Given the current controversy over madrasa reform in South Asia, knowledge of any externalities arising from NGO schools on the performance of madrasas is important from policy point of view. In this study, by way of documenting the process of feminization of madrasa enrolment, we examine the impact of BRAC schools on the recent rise in female enrolment in government recognized secondary madrasas.

To test for the presence of such externalities, we study the impact of NGO schools on secondary female enrolment growth in the union (henceforth referred to as 'region'), an administrative unit bigger than a village but smaller than a sub-district[5]. First, we show that the number of madrasas in a region is positively associated with growth rate of female secondary (grades 6-10) enrolment even after controlling for sub-district level poverty, initial enrolment level and various characteristics of registered secondary educational institutions. Next, we test how female enrolment in secondary madrasas is affected by the presence of BRAC schools. We find that madrasas located in regions with greater the number of BRAC schools have higher

growth in female enrolment. This finding is robust to correcting for endogeneity of the number of BRAC schools in the region.

The rest of the paper is organized as follows. Section 2 provides a comparison between the current government system of education and the system used by BRAC. Section 3 discusses the data and methodology. Section 4 presents the main results whilst section 5 is conclusion.

II. BACKGROUND

The Bangladeshi education sector is characterized by the presence of different types of schools that vary significantly across primary and secondary level. At the primary level, there are 11 types of schools. In the primary school sector (currently includes grades 1 through 5), almost 80% of the enrolment share is in the government and state aided non-government schools. In parallel there is a significant presence of NGOs who specialize in the operation of non-formal schools catering to marginalized groups (e.g., out-of-school children, children from urban slums). There are over 400 NGOs in Bangladesh involved with providing basic education.

BRAC is the largest NGO in the country working on primary education and account for 76% of all NGO primary schools. The Non-Formal Primary Education Program of BRAC started in 1984 with only 22 pilot schools. BRAC's education program began in rural areas where there were no alternative education options[6]. By late 1990s, there were nearly 35,000 BRAC schools covering 50,000 out of 84,000 Bangladeshi villages. This further increased to 38,000 schools by 2008 enrolling more than one million children (see Appendix Figure 1).

BRAC schools have a number of distinguishing characteristics. First, they cater to children who have never attended school as well as those who have dropped out of government or other schools. Similar to madrasas, BRAC (instead of the child's family) bears most of the educational expenses[7]. A majority of the students in BRAC primary schools are from the poorest 20% of the population (Lovell and Fatema, 1989). Second, 70 percent of children attending BRAC schools are female. Third, 97% of teachers in BRAC schools are women who come from the same village where the school is located.

Today, BRAC schools are regarded by many as a success story. The dominant public opinion is that these schools are more effective and better governed compared to government schools (Lovell and Fatema, 1989; Nath *et al.*1999; Chowdhury, Choudhury, and Nath, 1999; DeStefano *et al.* 2007). First, BRAC students are found to have higher test score when compared to students from government primary schools (Sukontamarn, 2005). Second, more than 90% of students who complete their primary schooling through BRAC continue into secondary education (Nath, 2002). Third, BRAC schools have been instrumental in retaining female students from poorer families in primary school (Sukontamarn, 2005).

At the secondary level, on the other hand, there is no significant presence of NGO schools. Rather, secondary education is provided by government schools, state aided schools and madrasas. According to government census records for the year 2003, there were 8406 institutions at post-primary level against 17,389 secondary

schools constituting approximately 26% of all post-primary education and 32.5% of all secondary educational institutions respectively. Madrasa enrolment accounts for 15% of total post-primary enrolment[8]. Most madrasas are located in rural areas and rural learners account for 90.9% of secondary madrasa enrolment, compared with around 77% in mainstream education.

There is an important stylized fact about the secondary madrasa sector in Bangladesh. More than 90% of the registered secondary madrasas in Bangladesh today admit girls and half of the students enrolled in these schools are girls (Asadullah and Chaudhury, 2009). This 'feminization' of the secondary madrasa system in Bangladesh is a recent phenomenon. Female enrolment boom in religious schools has been driven by the conversion of formerly all-male, un/registered madrasas into registered centres for co-education. This reflects the confluence of two hybrid (supply and demand side) conditional cash incentive schemes. First, the government took over responsibility over teacher pay in madrasas conditional upon formal registration and introduction of modern subjects (such as math and science). Then the government introduced a conditional cash transfer program in the secondary education sector in rural Bangladesh that paid a small stipend to rural households (regardless of income level) to send their daughters to any registered high-school (public, private, religious) of their choice (conditional upon enrolling in school, regular attendance, and maintaining passing grades). Furthermore, any type of school participating in this project received government funding depending upon the number of females enrolled in the school. This additional incentive induced many formally all-male madrasas to open their gates to female students.

The curriculum reform scheme originally initiated in the early 1980s has succeeded in converting a large pool of traditional, all-male madrasas that previously operated with own funds and eschewed teaching of modern subjects. Secondary madrasas therefore grew in numbers in Bangladesh in two distinct phases. The reform scheme of 1980s saw a surge in numbers between 1980 and 1994. In post-1994 years, growth was driven mostly via enrolment of female students and allegedly by transforming formerly all-boys madrasas into centers for co-education. This is evident from Appendix Table 6 which describes the relative contribution of secular and religious schools in the expansion of female secondary education in Bangladesh. Between 1990 and 2008, female enrolment in the madrasa sector accounted for 35% of the overall growth in female enrolment in the secondary education sector. Female enrolment growth was also many times higher in the madrasas compared to the secular school sector.

This feminization of registered madrasa enrolment in Bangladesh dispels the common view that the rise of the religious education sector is explained away only by a lack of public provision. This scenario is at stark contrast with other countries in South Asia with large Muslim populations (and elsewhere), where most religious seminaries are of traditional types, predominantly single-sex (boys only), and still untouched by any significant changes in curriculum. Therefore, understanding the nature and process of female enrolment growth in madrasas is important to correctly

inform the current debate over madrasa reform in other South Asian countries such as India and Pakistan.

In case of Bangladesh, the success of non-formal NGO schools may have served as the social basis for expansion of registered religious secondary schools and opening up to girl students.Table 1 presents data on the type of primary school attended by grade 8 students in a sample of 221 secondary schools and 94 madrasas drawn from rural Bangladesh. 9% of the female secondary students attended NGO schools for primary education which is consistent with the fact that BRAC schools predominantly educate girls. More importantly, madrasa and school girls are equally likely to have attended NGO schools for primary education[9].

Table 1. Raw probability of enrolment in secondary school/madrasa by gender and primary school type

Primary school attended	Female	Male	Female (madrasa)	Female (school)	Male (madrasa)	Male (school)
Government	0.65	0.66	0.49	0.68	0.42	0.73
Private/aided	0.19	0.19	0.13	0.20	0.12	0.21
Madrasa	0.04	0.06	0.17	0.01	0.26	0.01
NGO	0.09	0.04	0.09	0.09	0.03	0.04
Secondary school attached	0.03	0.04	0.11	0.01	0.14	0.01
N	5273	3202	1057	4216	696	2506

Source: Author's calculation based on sample survey data. The survey was conducted in the year 2005 in 60 rural regions. For a detailed description, see Asadullah *et al.* (2007).

The finding that NGO school graduates make up for a significant proportion of secondary students today is an important one: it confirms that a large number of female students who studied in NGO-run primary schools continue into secondary education. But the fact that NGO school graduates today enter madrasas and secular high-schools pari passu is important considering the fact that madrasa and NGO schools pursue different ideologies, and just a decade ago secondary madrasas were seldom open to female students. As a matter of fact, greater NGO school activities could have created pressure on nearby secondary madrasas in the community that have historically catered to boys only to open up and absorb female students. Prospect for such vertical externality is high because NGOs and Islamic faith schools both serve marginalized communities where provision for state aided education may be relatively scarce. Despite similar motives, NGO schools and madrasas in Bangladesh operate in different levels of the education system. NGO schools are exclusively concentrated in the primary sector whereas the registered madrasas operate in both primary and secondary sectors[10]. Therefore, whilst BRAC schools compete with primary madrasas for students, their presence in the community can create significant externalities for secondary madrasas. Moreover, given that BRAC schools primarily cater to female students, any potential spillover effects on religious schools will have to operate through enrolment of female students in madrasas. If so, evidence of such externalities has important policy implications as promoting female education and closing gender gap in secondary enrolment is a key MDG target[11].

To formally test this proposition, we need data on enrolment in madrasas across villages with and without NGO schools along with information on when the NGO school was set-up. In the absence of such data, we examine female enrolment data (aggregated at school level) and see how this correlates with the presence of BRAC schools in the region. This is discussed in the next section.

III. DATA AND METHODOLOGY

Existing census (cross-sectional) dataset on secondary registered schools and madrasas in Bangladesh contains annual enrolment figures spanning the period 1999-2003[12]. The dataset includes information on all secondary educational institutions (25,795 in total) in the 64 districts of Bangladesh. We use the 2003 round of the Census dataset that provides information on all registered religious and non-religious post-primary educational institutions. Having sex and grade-specific data on enrolment in each secondary school for the years 1999-2003, it is possible to study the supply-side determinants of growth in the total number of girls enrolled at the regional as well as school/madrasa level. We further merge these data to two unique datasets that provide region-level information on the number of BRAC schools and thana-level information on the number of BRAC branches and female members. Both of the latter datasets provide information on all BRAC schools and branches in the country.

Our objective in this paper is to test whether (i) presence of madrasas in a region bolsters enrolment of female students and if so, (ii) whether madrasas located in regions with more BRAC schools see a higher growth in enrolment of female students[13]. Given the availability of annual data on student enrolment for four years, we analyze the determinants of enrolment growth across Bangladeshi regions (which are on average a cluster of 15 villages) in a simple cross-section regression framework. We follow the empirical income growth literature to specify the regression model of female enrolment growth. To capture convergence effect, we allow growth during 1999-2003 to depend on enrolment at the beginning of the period. Since we also want to know school type effects, our growth equation includes the level of school availability by type in 1999 and changes therein by 2003. This yields the following reduced form model of enrolment growth at the region level:

$$G_i = \beta_0 + \beta_1 E_{1999} + \beta_2 X_{1999,i} + \beta_3 \Delta X_i + \beta_4 W_i + + \beta_5 Z_i + \varpi_t + \upsilon_i \qquad (1)$$

where,

G_i = Regional growth rate of female enrolment during 1999-2003
E_{1999} =Regional enrolment in 1999
X_{1999} =Mean characteristics of educational institutions of the region in 1999
ΔX_i = change in # of schools and madrasas between 1999 and 2003
W_i = Other attributes of the region (e.g. whether an urban region; average age of school/madrasa in the region; presence of a government school in the region)
Z_i = Attributes of the sub-district (e.g. proportion of the population being poor; road access and geographic remoteness)
ϖ_i =Districts fixed-effects
υ_i= iid random error

A common problem in equation (1) is that of endogeneity of number of madrasas admitting females. Emergence of co-educational or girls-only madrasas could be driven by cultural factors: regions where there are less cultural restrictions on female mobility are more likely to see emergence/presence of "liberal" religious schools that also encourage education of girls. We address the concern over identification of religious school effect in two ways. First, we estimate the model with district fixed-effects and controls for local poverty and infrastructure development. Second, we include a full-set of sub-district fixed-effects. Both approaches require sufficient sub-district level variation in norms and/or a dataset with a large number of sub-districts. In the year 2003, there were 486 sub-districts (*upazilas*) in Bangladesh and our dataset contained all secondary schools in the country. Therefore, we study growth in enrolment at the region level controlling for region-specific unobservables in a fixed-effect framework.

For our purpose, we create a dataset aggregated at the region level. Appendix Table 1 provides a summary of key variables. On average, a region has 1.4 secondary madrasas, 3.5 secondary schools and 4.8 BRAC primary schools. The period of 1999-2003 has seen exceptional growth in total female enrolment in secondary schools. At the region level, the average growth rate is 21%. Looking at enrolment in grade 10, this figure is as high as 31%[14].

To examine the effect of BRAC schools on female enrolment in secondary grades in madrasas, we expand equation (1) by additionally including total number of BRAC schools in the region as a regressor on the RHS and estimate this equation at the madrasa level. The equation, when re-written, appears as follows:

$$G_i = \alpha_0 + \alpha_1 M_i + \alpha_2 X_i + \alpha_3 \Delta X_i + \alpha_4 (\#\text{ of BRAC schools in the region})_i + \alpha_5 W_i + \delta_i + \varepsilon_i \quad (2)$$

where,

G_i = Growth rate of female enrolment during 1999-2003 in grades 6-10 in i-th secondary madrasa
M_i = Characteristics of the i-th secondary madrasa
X_i = Educational characteristics of the i-th region
ΔX_i = Change in # of schools and madrasas between 1999 and 2003 in the region
W_i= characteristics of the i-th sub-district
δ_i Districts fixed-effects
υ_i= iid random error

Equation (2) is estimated using establishment level (i.e. secondary madrasa or school) data. The number of BRAC schools in the region in equation (2) is treated as endogenous. Madrasas that are located in poorer areas are likely to have experienced higher growth in female enrolment because of the Female Stipend Program (FSP) intervention (Asadullah and Chaudhury, 2009). Yet, these regions could have a greater concentration of BRAC schools. Therefore, presence of BRAC schools could merely proxy for local poverty and hence endogenous. We control for

this endogeneity problem in an instrumental variable framework where we use data on the number of BRAC branches and the number of BRAC female members as excluded instruments[15]. In order to ensure that the estimated effect of BRAC schools is not capturing local poverty, we additionally control for three factors: (a) fraction of the sub-district population below the poverty line, (b) % of areas under each thana within 2.5 km from major roads (national highways, regional highways and major feeder roads) and (c) travel time to 16 major cities.

IV. RESULTS

Table 2 reports OLS regression estimates of enrolment growth models using growth rate in total female secondary enrolment (grades 6-10). Four regression specifications are used in total. Specifications (1) and (2) control for district fixed-effects and sub-district level poverty and infrastructure development. Specification (3) controls for sub-district level fixed-effects. Specification (4) additionally replaces the variables - total number of schools in 1999 and total number of madrasas in 1999 – by gender-disaggregated versions (e.g. coeducation, boys-only, girls-only).

Table 2. OLS estimates of determinants of regional enrolment growth (1999-2003) [Dependent variable: Regional growth rate of total female enrolment, grades 6-10]

	Model 1	Model 2	Model 3	Model 4
total female enrolment in 1999 in the region, grade 6-10 (in logs)	-0.276	-0.275	-0.292	-0.296
	(39.54)**	(37.95)**	(40.53)**	(40.70)**
# of madrasas in the region, 1999	0.019	0.019	0.025	
	(5.65)**	(5.63)**	(7.19)**	
# of schools in the region, 1999	0.054	0.052	0.061	
	(20.94)**	(19.19)**	(22.36)**	
# of new madrasas in the region during 1999-2003	0.058	0.063	0.075	0.074
	(2.82)**	(3.07)**	(3.52)**	(3.49)**
# of new schools in the region during 1999-2003	0.086	0.087	0.093	0.096
	(7.13)**	(7.28)**	(7.49)**	(7.69)**
Mean age of schools	-0.001	-0.002	-0.001	-0.001
	(4.36)**	(5.04)**	(4.12)**	(3.38)**
Mean age of madrasas	0.002	0.002	0.001	0.002
	(2.81)**	(2.79)**	(2.32)*	(2.95)**
Region has a govt. secondary school	0.038	0.033	0.04	0.058
	(2.15)*	(1.72)+	(2.28)*	(3.15)**
# of co-educational madrasas in the region, 1999				0.022
				(5.25)**
# of girls-only madrasas in the region, 1999				0.045
				(5.61)**
# of boys-only madrasas in the region, 1999				-0.015
				(0.68)
# of co-educational schools in the region, 1999				0.062
				(20.32)**
# of girls-only school in the region, 1999				0.071
				(13.28)**
# of boys-only schools in the region, 1999				0.019
				(1.69)+

(Table 2 continued...)

(...continued Table 2)

Urban region	-0.01	-0.008	-0.016	-0.011
	(0.72)	(0.56)	(1.05)	(0.71)
Sub-district characteristics				
Population below poverty line (in 2001)	-0.12	-0.086		
	(1.82)+	(1.17)		
Access to major roads		0.029		
		(1.56)		
Travel time to major cities		-0.005		
		(3.27)**		
Constant	1.837	1.845	1.873	1.888
	(40.28)**	(36.47)**	(46.67)**	(46.45)**
N	4784	4784	4784	4784
R-squared	0.29	0.30	0.32	0.32
Fixed-effects	District	District	Thana	Thana

Note: (a) Unit of analysis is region (b) Absolute value of t statistics in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. (c) Data source: BANBEIS Secondary School Annual Census, Ministry of Education, Government of the Peoples Republic of Bangladesh.

A number of findings emerge from results presented in Table 2. First, there is clear evidence of convergence: regions with higher initial enrolment (in 1999) experienced slower enrolment growth. Second, between 1999 and 2003, regions with more schools had a higher growth rate in enrolment. But more importantly, regions with more madrasas experienced higher growth although the rate was less than that owing to the presence of schools. Third, increase in the number of madrasas in the region during 2000-2003 had a positive and significant effect. Fourth, region with older madrasas had higher enrolment growth. We conjecture that older madrasas that previously educated only boys and have now become co-educational are driving this result. As a direct test of this hypothesis, we replace the age variable by "proportion of madrasas in the region that are converts (i.e. set up before the reform of 1980)" (see Appendix Table 2). Indeed the variable has a positive, significant impact on enrolment growth. This finding suggests that orthodox madrasas that chose to convert into modern religious schools went beyond curriculum reform by withdrawing restrictions on admission of female students. The positive influence of madrasas prevails even for the sample of older, pre-existing religious schools (see Appendix Table 3). This corroborates the hypothesis that madrasas have encouraged greater female participation in secondary education rather than selectively emerging in regions where households have responded to the stipend scheme by sending daughters to schools.

It could be argued that our finding of the positive effect of number of madrasas captures region-specific unobservables. Should this be the case, we would even observe a positive correlation between presence of madrasas that do not admit girls and female enrolment. Disaggregating the stock variables (# of schools and madrasas) by type (coeducation, boys-only, girls-only) yield a consistent pattern, however (see specification 4, Table 2). The number of all-boys madrasas in 1999 never has an impact on female enrolment growth. This serves as a placebo test and implies that the observed effect of presence of madrasas is unlikely to be capturing

region-specific variables that are absent in our model[16]. Whilst a positive correlation is reported between the number of all-boys madrasas and female enrolment growth in the region, this association lacks in statistical significance.

Another concern over the estimates reported in Table 2 relates to the problem of reverse causality. Many madrasas were set up as a response to the FSP scheme immediately after 1994. As a matter of fact, between 1995 and 2003, a total of 3798 secondary educational institutions were set up throughout Bangladesh of which 23.88% (or 907) were madrasas. If there is a correlation between female enrolment and madrasas that existed before introduction of the stipend reform, that can be taken as a cleaner test of the impact of madrasas on female enrolment. To this end, we restricted data to schools/madrasas established before 1994 and repeated our analysis. However, even for this sub-sample, there is a robust relationship between # of madrasas in the region and female enrolment growth (Appendix Tables 3).

From the results presented in Tables 2 and Appendix Tables 2 and 3, positive impact of madrasas on female enrolment growth is evident. In a companion paper (Asadullah and Chaudhury, 2009), We further examine the impact such feminization had on achieving gender parity across Bangladeshi regions. We ran regressions using specifications similar to those in Appendix Table 2 but used an indicator variable "whether the region achieved gender parity in 2003" as the outcome variable. Reassuringly, regions with greater number of madrasas in 1999 were found to be more likely to achieve gender parity by 2003. In sum, it is evident that reformed madrasas in Bangladesh have gone beyond adopting modern curriculum by altering age-old practice of educating predominantly male students and embracing girls.

As argued earlier, feminization of madrasa enrolment is a recent phenomenon and from policy point of view, a clear understanding of the association between growth in female secondary enrolment and madrasas is extremely important. In this context, a potentially important explanation could be the rise of NGO schools such as BRAC's non-formal primary schools which increased the number of girls completing primary education in the community. This in turn may create an upward pressure on local madrasas to open up to admitting female students. To test for the presence of such externalities, we report 2SLS regression estimates of equation (2) at the madrasa *level* in Table 3 (equivalent OLS estimates are reported in Appendix Table 5). Each regression treats "the number of BRAC schools in the region" as an endogenous variable which is instrumented using data on "the number of BRAC branches" and "the number of BRAC female members". The number of BRAC schools in the region is highly correlated with "the number of BRAC branches" in the first stage models. The validity of the instruments is tested using Sargan's test for over-identifying restrictions and, as seen from the bottom of Table 3, the null hypothesis of valid instruments cannot be rejected. Durbin-Wu-Hausman chi-square test confirmed endogeneity of BRAC schools in all specifications.

Turning to our main variable of interest, the presence of BRAC schools in the region has a positive effect on female enrolment in madrasas. The size of the effect varies depending on the regression specification. In the most detailed 2SLS model (i.e.

model 2) in Table 3, the coefficient on BRAC school variable is 0.02. When evaluated at the mean, this implies a marginal effect of 0.73. In other words, an increase in the number of BRAC schools of ten percentage points increases enrolment growth rate in madrasas by 7.3 percentage points. This is not trivial considering the fact that madrasas on average experienced an enrolment growth rate of 30% during the study period.

Table 3. 2SLS estimates of determinants of female enrolment growth in madrasas (1999-2003) [Dependent variable: growth rate of total female enrolment, grades 6-10]

	Rural sample				Rural + Urban sample			
	model 1		model 2		model 1		model 2	
	2nd stage	1 stage	2nd stage	1 stage	2nd stage	1 stage	2nd stage	1 stage
# of BRAC schools in the region	0.057		0.021		0.072		0.028	
	(2.28)*		(1.73)+		(2.16)*		(1.79)+	
Madrasa is co-ed (base cat: single-sex madrasa)	0.172	-0.464	0.142	-0.22	0.175	-0.269	0.15	-0.205
	(5.37)**	(1.77)+	(5.23)**	(0.82)	(5.46)**	(1.07)	(5.58)**	(0.79)
Age of madrasa	0.002	0.005	0.002	0.007	0.003	0.005	0.002	0.007
	(4.80)**	(1.23)	(4.96)**	(1.43)	(4.74)**	(1.22)	(5.14)**	(1.56)
Region has a govt. secondary school	-0.114	0.918	-0.055	0.651	-0.025	0.569	0.013	0.466
	(1.87)+	(1.82)+	(0.97)	(1.16)	(0.48)	(1.39)	(0.26)	(1.00)
Urban region					0.315	-2.463	0.155	-1.529
					(3.47)**	(7.60)**	(3.16)**	(3.90)**
# of boys madrasas in the region in 1999			0.032	-0.763			0.037	-0.817
			(0.87)	(2.20)*			(0.99)	(2.43)*
# of girls madrasas in the region in 1999			-0.05	0.896			-0.059	0.906
			(2.70)**	(7.63)**			(2.97)**	(7.87)**
# of co-ed madrasas in the region in 1999			-0.01	0.233			-0.009	0.264
			(1.29)	(3.63)**			(1.12)	(4.24)**
# of boys schools in the region in 1999			-0.012	0.127			-0.015	0.158
			(1.75)+	(1.92)+			(2.16)*	(2.49)*
# of girls schools in the region in 1999			-0.023	-0.11			-0.02	-0.118
			(2.38)*	(1.16)			(2.05)*	(1.28)
# of co-ed schools in the region in 1999			0.007	-0.487			0.012	-0.58
			(0.21)	(1.55)			(0.39)	(2.05)*
# of new madrasas in the region during 1999-2003			0.056	-0.453			0.059	-0.38
			(1.43)	(1.18)			(1.5)	(1.02)
# of new schools in the region during 1999-2003			-0.043	1.234			-0.048	1.124
			(1.44)	(5.39)**			(1.61)	(5.11)**

(Table 3 continued...)

(...continued Table 3)

Average age of madrasas in the region			0	0.012			0	0.014
			(0.34)	(2.08)*			(0.25)	(2.38)*
Average age of schools in the region			0.001	0.008			0	0.008
			(2.33)*	(4.27)**			(2.01)*	(4.24)**
# of BRAC branches in the region		0.274		0.355		0.211		0.334
		(4.57)**		(5.53)**		(3.61)**		(5.32)**
# of BRAC female members in the region		-3.163		5.774		-3.519		5.18
		(0.98)		(1.63)		(1.12)		(1.52)
Sub-district characteristics								
Population below poverty line (in 2001)	0.361	0.874	0.352	1.65	0.24	1.993	0.294	2.749
	(1.88)+	(0.52)	(1.90)+	(0.90)	(1.16)	(1.21)	(1.55)	(1.54)
Access to major roads	0.052	-0.952	0.013	-1.089	0.057	-0.774	0.015	-0.942
	(1.04)	(2.41)*	(0.27)	(2.54)*	(1.08)	(2.01)*	(0.33)	(2.27)*
Travel time to major cities	-0.013	-0.031	-0.014	-0.021	-0.012	-0.022	-0.013	-0.016
	(3.51)**	(0.97)	(4.03)**	(0.61)	(2.95)**	(0.71)	(3.74)**	(0.48)
Constant	-0.356	8.874	-0.084	-3.1	-0.431	8.782	-0.097	-3.071
	(1.90)+	(2.80)**	-0.83	-0.89	(1.93)+	(2.85)**	(1.00)	(0.91)
Observations	6138	6138	5171	5171	6507	6507	5408	5408
R-squared		0.01		0.05		0.01		0.05
Test of exogeneity (p-value)	0.02		0. 08		0.01		0.06	
Sargan test (p-value)	0.25		0.20		0.16		0.14	
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: (a) All-boys madrasas are excluded from the sample. (b) Test of exogeneity (of instrumented variable) is based on Durbin-Wu-Hausman chi-square test with the null that the variable is exogenous. (c) Data source: BANBEIS Secondary School Annual Census, Ministry of Education. (d) Data on # of BRAC schools was obtained from BRAC Education Program (BEP).

It should be noted that in all specifications, we extensively control for local poverty effects. All the regressions include controls for proportion of the population in poverty, infrastructure development (measured in terms of access to major roads) and remoteness (measured in terms of travel time to major cities). The poverty variable is always positively correlated with madrasa enrolment although it is insignificant in most cases. Travel time to major cities however always has a negative, significant effect on madrasa enrolment. Altogether this implies that our finding of a positive effect of primary NGO schools in the sub-district is not driven by the fact that NGO schools and madrasas also tend to concentrate in under-provided and poor areas.

We also estimated equation (2) using data on secondary schools (see Appendix Table 4). On the basis of 2SLS estimates, “number of BRAC schools in the region” had no impact on female enrolment growth in secondary schools. Durbin-Wu-Hausman chi-square test however returns large p-values indicating that endogeneity is not a problem and OLS estimates are appropriate. The OLS results on the other hand suggest significant effect of BRAC schools on female enrolment in secondary

schools (see Appendix Table 5). Nonetheless, when compared to the effect on madrasa sample (see Table 3), the effect is rather modest. This confirms that the externality effect of BRAC schools is stronger for secondary madrasas.

Even if NGO schools casually affect secondary enrolment, interpreting this as a distinct externality on madrasas may be misleading if in fact any secondary school that is located in poor/marginalized areas would experience greater enrolment. In other words it may be that most madrasas are located in areas where NGO schools generate a large supply shock, while schools are in a lot more areas, many where NGO schools are less active/influential. One way to address this is to estimate the non-religious secondary school enrolment results on samples where regions are similar to those for the madrasa sample. To this end, we restricted our analysis to schools in regions where there is at least one secondary madrasa (results not reported but available upon request). It's reassuring that our results remain unchanged. In no case the coefficient on the number of BRAC schools in the region is significant.

Lastly, the effect of BRAC school remains even when we use an alternative measure where we replace "the number of BRAC schools" by "the number of female students enrolled in BRAC schools" (results not reported but available from the authors upon request). We find that the number of female students enrolled in BRAC schools positively affects enrolment growth in madrasas.

V. CONCLUSION

NGOs play an increasingly important role in the delivery of services in developing countries. Whilst this role is well acknowledged in the development literature, relatively less known is the potential externalities that arise from independent NGO interventions on the formal, conventional providers of public services such as state and state-aided private bodies. In this paper, we test for the presence of such externalities in Bangladesh where different types of service providers are present in the education sector but at different levels. Alongside for-profit schools, there exist BRAC schools madrasas and that arguably serve economically marginalized children and isolated communities. Given that BRAC schools operate exclusively in the primary sector as opposed to madrasas (that have a greater presence in the secondary sector), any effect of BRAC schools on secondary madrasas would be taken as an evidence of a spill-over effect on the latter. The externality effect of NGO intervention is studied in the context of the recent feminization of registered secondary madrasa enrolment where a previously predominantly all-boys religious education system opened up to girls.

We find that Bangladeshi regions that had more registered madrasas saw a higher growth in enrolment of girls in secondary grades during 1999-2003. Regions that had more "converted" madrasas (i.e., switching from all male to coed) also experienced higher enrolment growth. This correlation holds even for the sample of older, pre-existing religious schools and hence corroborates the hypothesis that madrasas have encouraged greater female participation in secondary education. These findings highlight the previously undocumented role played by religious schools in reducing gender disparity in rural Bangladesh.

Next, we explored the extent to which feminization of secondary madasa enrolment was influenced by the presence of BRAC schools in the region. We found that registered madrasas located in regions with larger number of BRAC schools saw a higher growth in female enrolment. The effect was particularly large when compared to that on enrolment growth in secondary schools. The effect of BRAC schools remains even when we use an alternative measure where we replace the number of BRAC schools by the number of female students enrolled in BRAC schools. The findings are robust to controls for sub-district level poverty, road access and geographic remoteness.

Such externality effect on registered madrasas is unusual but not surprising given that both BRAC primary schools and secondary madrasas target relatively poorer regions[17]. The reason why we find a stronger effect on madrasas also lies in difference in capacity constraints across school and madrasa sector. Registered schools in rural areas have historically educated both boys and girls whilst most of the students in registered madrasas have up to early 1990s educated only boys.

Unsurprisingly, the total enrolment of students per madrasa was and still is lower than that in school[18]which supports the hypothesis of differential capacity constraints. As more girls began to graduate from primary schools, along with fiscal incentives for institutions to attract girls to secondary institutions (i.e. FSP program), registered madrasas were in a relatively more advantageous position to absorb female students. Total student size per institution was and is still lower on average in madrasas compared to schools, due to the fact that madrasas were previously only for males.

In conclusion, our finding not only provides a new explanation for the rise in female enrolment in secondary religious schools in Bangladesh, it also highlights yet another policy rationale to support and promote the type of targeted services delivered by NGOs in the rural areas. That said, future research should look into other possibilities for the observed growth in female students in registered madrasas. Enrolment could rise in response to deteriorating law and order situation. Parents may perceive secondary madrasas to provide better physical security to girls than in case of secular schools and hence the (poor) girls (or their parents) may prefer to go to the religious schools. Such research will help design effective policies to improve access to secondary education for girls in Muslim communities.

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APPENDIX

Appendix Table 1. Descriptive statistics

Variable	Additional description	Mean	Std. Dev.
Growth rate of female enrolment (grades 6-10) in the region[(1)]	Ln(enrolment in 2003) - Ln(enrolment in 1999)	0.21	0.29
Growth rate of female enrolment (grade 6) in the region	Ln(enrolment in 2003) - Ln(enrolment in 1999)	0.11	0.35
Growth rate of female enrolment (grade 10) in the region	Ln(enrolment in 2003) - Ln(enrolment in 1999)	0.31	0.45
Total female enrolment in 1999 in the region	in natural logs	6.56	0.78
Total female enrolment in grade 6 in 1999 in the region	in natural logs	5.27	0.76
Total female enrolment in grade 10 in 1999 in the region	in natural logs	4.53	0.83
# of co-educational madrasas in the region, 1999		1.73	1.66
# of girls-only madrasas in the region, 1999		3.54	2.17
# of boys-only madrasas in the region, 1999		1.50	1.40
# of co-educational schools in the region, 1999		0.19	0.49
# of girls-only school in the region, 1999		0.03	0.17
# of boys-only schools in the region, 1999		2.74	1.70
Δ in # of madrasa (1999-2003)	Change in # of madrasas in the region, 1999-2003	0.70	0.89
Δ in # of school (1999-2003)	Change in # of schools in the region, 1999-2003	0.10	0.37
Mean age of schools		0.03	0.17
Mean age of madrasas		0.08	0.31
Proportion of madrasas in the region (in 1999) who are converts	Converts are madrasas established before 1980	0.39	0.41
Urban region		0.13	0.31
Region has a govt. secondary school		0.05	0.22
Number of BRAC schools in the region		4.86	6.25
Sub-districtcharacteristics			
Local poverty in 2001	Proportion of population below poverty line	0.29	0.09
Access to major roads	% of areas under each thana within 2.5 km from major roads (national highway, regional highway, feeder road A & feeder road B).	0.46	0.24
Travel time to nearest major city in hours	Based on distance to 16 major cities	4.88	0.03
#of BRACbranches in the region		3.22	1.57
N		4784	

Note: (a) Region refers to “union”, an administrative unit which is smaller than sub-district (*Upazila*) but bigger than village (usually comprising of 10-15 villages). (b) Data source: BANBEIS Secondary School Annual Census, Ministry of Education. (c) Data on road access and travel time are from Local Government Engineering Department (LGED), Government of Bangladesh and correspond to the year 2000.

Appendix Table 2. OLS estimates of determinants of regional enrolment growth (1999-2003) – alternative specification

Total female enrolment in 1999 in the region, grade 6-10 (in logs)	-0.293
	(40.54)**
# of madrasas in the region, 1999	0.028
	(8.81)**
# of schools in the region, 1999	0.060
	(22.82)**
Δ in # of madrasa (1999-2003)	0.075
	(3.53)**
Δ in # of school (1999-2003)	0.092
	(7.37)**
Mean age of schools	-0.001
	(4.29)**
Proportion of madrasas in the region being "converts" (established pre-1980)	0.024
	(2.68)**
Urban region	-0.016
	(1.03)
Region has a govt. secondary school	0.041
	(2.32)*
Constant	1.882
	(47.01)**
N	4784
R-squared	0.32
Fixed-effects	Thana

Note: (a) Absolute value of t statistics in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. (b)Data source: BANBEIS Secondary School Annual Census, Ministry of Education.

Appendix Table 3. OLS estimate of determinants of regional enrolment growth (1999-2003) -- Sample of older schools and madrasas

	Model 1	Model 2	Model 3	Model 4
Total female enrolment in 1999 in the region, grade 6-10 (in logs)	-0.223	-0.214	-0.23	-0.233
	(32.13)**	(29.57)**	(32.14)**	(32.16)**
# of madrasas in the region, 1999	0.017	0.016	0.022	
	(4.98)**	(4.59)**	(5.95)**	
# of schools in the region, 1999	0.051	0.049	0.058	
	(17.73)**	(15.98)**	(19.31)**	
Mean age of schools	0	0	0	0
	(0.56)	(1.22)	(1.43)	(0.82)
Mean age of madrasas	0.002	0.002	0.002	0.002
	(4.21)**	(4.16)**	(3.67)**	(4.08)**
Region has a govt. secondary school	0.02	0.012	0.019	0.038
	(1.14)	(0.62)	(1.12)	(2.10)*
# of co-educational madrasas in the region, 1999				0.02
				(4.70)**
# of girls-only madrasas in the region, 1999				0.036
				(4.02)**
# of boys-only madrasas in the region, 1999				-0.002
				(0.14)
# of co-educational schools in the region, 1999				0.06
				(18.13)**
# of girls-only school in the region, 1999				0.064
				(10.91)**
# of boys-only schools in the region, 1999				0.019
				(1.68)+
Urban region	0.008	0.001	-0.009	-0.001
	(0.57)	(0.04)	(0.61)	(0.07)
Sub-district characteristics				
Population below poverty line (in 2001)	-0.101	0.022		
	(1.56)	(0.3)		
Access to major roads		0.029		
		(1.63)		
Travel time to major cities		-0.006		
		(3.78)**		
Constant	1.417	1.349	1.417	1.427
	(31.56)**	(27.01)**	(35.40)**	(35.01)**
Observations	4737	4737	4737	4737
R-squared	0.20	0.19	0.22	0.22
Fixed-effects	District	District	Thana	Thana

Note: (a) Absolute value of t statistics in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. (b) Data source: BANBEIS Secondary School Annual Census, Ministry of Education.(c) Regression sample excludes schools and madrasas set up after 1994.

Appendix Table 4. 2SLS estimates of determinants of female enrolment growth in secondary schools (1999-2003) [Dependent variable: growth rate of total female enrolment, grades 6-10]

	Rural sample				Rural + Urban sample			
	model 1		model 2		model 1		model 2	
	2nd stage	1 stage	2nd stage	1 stage	2nd stage	1 stage	2nd stage	1 stage
# of BRAC schools in the region	0.013		0.015		0.004		0.018	
	(0.95)		(1.14)		(0.21)		(1.01)	
School is co-ed (base cat: single-sex school)	0.084	-0.043	0.086	-0.18	0.1	0.065	0.105	-0.171
	(9.38)**	(0.30)	(8.66)**	(1.19)	(12.00)**	(0.49)	(10.80)**	(1.21)
Age of school	-0.003	0	-0.003	0	-0.002	-0.002	-0.003	0.001
	(15.95)**	(0.02)	(16.39)**	(0.17)	(15.24)**	(1.03)	(15.96)**	(0.45)
Urban region					0.05	-3.084	0.075	-2.749
					-0.84	(16.15)**	-1.48	(14.29)**
Region has a govt. secondary school	0.011	0.893	0.021	0.288	0.029	-0.104	0.035	-0.371
	(0.48)	(2.76)**	(0.98)	(0.86)	(1.90)+	(0.43)	(1.91)+	(1.45)
# of boys madrasas in the region in 1999			0.041	-0.739			0.033	-0.522
			(1.98)*	(2.52)*			(1.68)+	(1.90)+
# of girls madrasas in the region in 1999			-0.015	0.714			-0.017	0.626
			(1.37)	(7.13)**			(1.28)	(6.47)**
# of co-ed madrasas in the region in 1999			-0.007	0.273			-0.01	0.332
			(1.46)	(5.20)**			(1.49)	(6.50)**
# of boys schools in the region in 1999			0.001	0.139			-0.01	0.146
			(0.09)	(0.68)			(0.92)	(0.86)
# of girls schools in the region in 1999			-0.008	-0.062			-0.003	-0.089
			(1.87)+	(0.99)			(0.81)	(1.47)
# of co-ed schools in the region in 1999			-0.006	0.39			-0.008	0.379
			(1.04)	(10.31)**			(1.06)	(11.32)**
# of new madrasas in the region during 1999-2003			0.005	-0.287			0.006	-0.337
			(0.31)	(1.15)			(0.37)	(1.38)
# of new schools in the region during 1999-2003			-0.016	0.569			-0.022	0.486
			(1.39)	(3.79)**			(1.76)+	(3.33)**
Average age of madrasas in the region			-0.001	0.036			-0.001	0.027
			(0.72)	(3.26)**			(0.74)	(2.57)*
Average age of schools in the region			0.002	0.021			0.002	0.003
			(3.87)**	(3.19)**			(4.59)**	(0.57)

(Appendix Table 4 continued...)

(...continued Appendix Table 4)

# of BRAC branches in the region		0.171		0.208		0.083		0.141
		(4.08)**		(4.99)**		(2.05)*		(3.50)**
# of BRAC female members in the region		-5.492		-1.72		-5.998		-2.145
		(2.39)*		(0.76)		(2.68)**		(0.97)
Sub-district characteristics								
Population below poverty line (in 2001)	0.037	-1.383	0.062	-1.624	0.04	-0.799	0.071	-1.042
	(0.71)	(1.78)+	(1.17)	(2.11)*	(0.81)	(1.07)	(1.39)	(1.41)
Access to major roads	0.015	-0.332	0.016	-0.314	0.013	-0.071	0.017	-0.161
	(0.86)	(1.22)	(0.91)	(1.17)	(0.81)	(0.27)	(1.04)	(0.63)
Travel time to major cities	-0.007	-0.047	-0.007	-0.052	-0.008	-0.033	-0.007	-0.041
	(4.72)**	(2.04)*	(4.28)**	(2.28)*	(5.35)**	(1.46)	(4.34)**	(1.86)+
Constant	0.053	11.598	0.057	5.179	0.092	12.033	0.025	5.897
	(0.55)	(5.14)**	(0.98)	(2.29)*	(0.74)	(5.46)**	(0.31)	(2.68)**
Observations	12354	12354	12443	12443	10511	10511	10570	10570
Test of exogeneity (p-value)	0.43		0.34		0.93		0.37	
Sargan Test	0.20	0.19	0.17	0.09	0.20	0.21	0.13	0.10
District fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: (a) All-boys schools are excluded from the sample. (b) Test of exogeneity (of instrumented variable) is based on Durbin-Wu-Hausman chi-square test with the null that the variable is exogenous. (c) Data source: BANBEIS Secondary School Annual Census, Ministry of Education. (d) Data on # of BRAC schools was obtained from BRAC Education Program (BEP).

Appendix Table 5. OLS estimates of determinants of female enrolment growth in secondary madrasas and schools (1999-2003) [Dependent variable: growth rate of total female enrolment, grades 6-10]

	Madrasa sample				School sample			
	Rural sample		Rural + Urban sample		Rural sample		Rural + Urban sample	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
# of BRAC schools in the region	0.001	0.002	0.001	0.001	0.002	0.003	0.002	0.003
	(1.61)	(0.45)	(1.57)	(0.61)	(4.31)**	(1.89)+	(4.21)**	(1.70)+
Co-ed (base cat: single-sex)	0.141	0.117	0.15	0.121	0.085	0.086	0.102	0.104
	(5.48)**	(4.11)**	(6.09)**	(4.38)**	(9.74)**	(9.15)**	(12.40)**	(11.72)**
Age (years in operation)	0.003	0.002	0.003	0.003	-0.003	-0.003	-0.002	-0.003
	(6.45)**	(4.85)**	(7.08)**	(5.67)**	(16.18)**	(16.72)**	(15.91)**	(16.41)**
Region has a govt. secondary school	-0.077	-0.11	0.001	-0.023	0.023	0.026	0.032	0.032
	(1.66)+	(2.25)*	(0.03)	(0.56)	(1.19)	(1.3)	(2.20)*	(2.05)*
Urban region			0.136	0.1			0.045	0.033
			(4.35)**	(3.13)**			(3.75)**	(2.69)**
# of boys madrasas in the region in 1999		0.031		0.028		0.034		0.026
		(0.87)		(0.82)		(1.83)+		(1.51)
# of girls madrasas in the region in 1999		-0.024		-0.027		-0.007		-0.007
		(2.04)*		(2.33)*		(1.04)		(1.11)
# of co-ed madrasas in the region in 1999		-0.008		-0.004		-0.004		-0.005
		(1.16)		(0.61)		(1.2)		(1.62)
# of boys schools in the region in 1999		0.054		0.027		0.004		-0.008
		(1.89)+		(1.08)		(0.29)		(0.75)
# of girls schools in the region in 1999		-0.013		-0.01		-0.008		-0.004
		(1.52)		(1.16)		(2.00)*		(1.13)
# of co-ed schools in the region in 1999		0.002		-0.003		-0.001		-0.002
		(0.36)		(0.59)		(0.52)		(0.85)
# of new madrasas in the region during 1999-2003		0.024		0.028		0.003		0.002
		(0.67)		(0.78)		(0.17)		(0.15)
# of new schools in the region during 1999-2003		-0.006		-0.005		-0.011		-0.016
		(0.25)		(0.22)		(1.21)		(1.78)+
Average age of madrasas in the region		0.001		0		0		0
		(0.43)		(0.12)		(0.21)		(0.28)
Average age of schools in the region		0.006		0.005		0.002		0.002
		(5.11)**		(4.92)**		(5.35)**		(4.94)**

(Appendix Table 5 continued...)

(...continued Appendix Table 5)

Population below poverty line (in 2001)	0.287	0.334	0.259	0.295	0.041	0.062	0.055	0.073
	(2.63)**	(3.05)**	(2.43)*	(2.75)**	(0.87)	(1.3)	(1.2)	(1.58)
Access to major roads	0.004	0.006	0.006	0.01	0.014	0.014	0.014	0.016
	(0.1)	(0.16)	(0.17)	(0.26)	(0.82)	(0.82)	(0.87)	(0.98)
Travel time to major cities	-0.014	-0.013	-0.013	-0.012	-0.008	-0.008	-0.008	-0.008
	(4.58)**	(4.20)**	(4.12)**	(3.76)**	(5.79)**	(5.52)**	(6.05)**	(5.79)**
Constant	0.072	0.008	0.055	0.022	0.119	0.1	0.097	0.085
	(1.42)	(0.13)	(1.11)	(0.36)	(5.81)**	(4.03)**	(4.92)**	(3.63)**
R-squared	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix Table 6. Changes in female secondary enrolment by school type, 1990-2008

	% of females enrolled in 1990	% of females enrolled in 2008	% growth in the # of female enrolment, 1990-2008	School's % share in the incremental increase of female enrolment, between 1990-2008
Registered private/aided	92.95	73.11	162.02	64.60
Registered madrasa	7.04	26.88	1171.52	35.39
total	10,92,698	36,39,937	-	-

Data source: BANBEIS, Ministry of Education.

Appendix Figure 1. Trends in the number of BRAC primary schools, 1985-2008

Source: BRAC Education Program (BEP) database.

Endnotes

[1] Madrasas operating at primary or secondary levels in Bangladesh are classified in two broad categories: Aliyah (recognized) and Quomi (unrecognized) madrasas. The latter group accounts for a very small share of total school enrolment in rural Bangladesh (Asadullah, Chaudhury, and Al-Zayed, 2010). Besides, their students are not eligible to seek admission into recognized madrasas and schools at an equivalent grade. In this study, therefore, we focus on enrolment in registered schools and (Aliyah) madrasas only.

[2] In general, evaluation of the performance of national NGOs is rare. As pointed out by Barr and Fafchamps (2005), there have been very few quantitative evaluations of entire countries' NGO sectors so that little is known about the motivations and performance of NGOs in general. Existing published research on Bangladeshi NGOs (e.g. Gauri and Galef, 2005; Frutteroand Gauri, 2005) is largely descriptive; they do not test relative performance of NGOs with other service providers.

[3] Additional evidence on quality of BRAC schools is also provided by Asadullah, Chaudhury and Dar (2007). Studies on the relative performance NGO schools for other countries include Arif and Saqib (2003) and Khan and Kiefer (2007). Both studies utilize sample survey data from Pakistan.

[4] One could argue that registered madrasas falsely report higher female enrolment to benefit from greater allocation of public funds (e.g. towards teaching support etc.). Indeed government funding of madrasas to some extent depends on the number of girls enrolled. However, the observed boom in female enrolment in registered madrasas is not owing to bias in official enrolment statistics which is based on institutional/administrative survey/records. Analysis of primary survey data on rural educational institutions and households confirms the growth in female enrolment (e.g. see Asadullah, Chaudhury, and Al-Zayed, 2010).

[5] Administratively the nation is divided into 6 divisions, 64 districts, over 500 sub-districts (*upazilas*), over 4000 unions and cluster of households (*mouzas*). A union on average comprises of 15 villages. A mouza may or may not be greater than a village but is always smaller than a union.

[6] However, since 1992 BRAC additionally began constructing schools in urban slums.

[7] Whilst BRAC bears majority of the expenses, the cost of maintaining the classrooms are the responsibility of the community. Communities are involved in deciding locations and schedules of schools as well as providing labour and materials to build schools.

[8] In contrast, madrasas in Pakistan account for less than 1% of total school enrolment (Andrabi *et al.* 2006).

[9] A similar analysis of data on student transition from non-formal to formal education in the case of BRAC school students is provided by Nath (2002). Nath reports 4.5 per cent BRAC school graduates subsequently being enrolled in the madrasas. However, his analysis is based on sample survey data for the 1995 when the registered madrasa sector was yet to be feminized.

[10] There are about 6000 primary registered madrasas as opposed to 8404 secondary madrasas in Bangladesh.

[11] In this study, we only describe the phenomenon of the rise of feminized madrasas. What implication this has for other MDG targets (e.g. relating to women empowerment and reproductive health behavior) will depend on the consequences in terms of social behavior of female graduates of secondary madrasas. An investigation into these issues is outside the remit of the study. However, see Asadullah and Chaudhury (2010) that present some descriptive evidence on the attitudes of female graduates of secondary schools and madrasas towards labour force participation, gender inequality and so on.

[12] The Census has been conducted by the Ministry of Education, Government of Bangladesh.

[13] As many as 24% (N=1179) of the unions in Bangladesh do not have a secondary madrasa.

[14] A similar pattern is observed from gross enrolment statistics. According to BANBEIS, gross female enrolment rate at secondary level in school (total # of females enrolled in secondary school/total # of 11-15 years old in the population) has increased from 42.5% to 48.4% between 1999 and 2003.

[15] The justification for excluded instrument choice is as follows. In early years, BRAC schools were opened in areas where BRAC already had a field office. This meant that BRAC branches are relevant for the placement of BRAC schools. In addition, a school was only opened if the village had a married woman with a minimum of 9 years of education who could be recruited as a teacher. The number of

BRAC female members therefore serves as a proxy for the local stock of potential female teachers and in turn positively predict the probability of placement of a BRAC school.

[16] As an alternative placebo test, we repeated the regressions using growth rate in boys enrolment as the dependent variable (results available upon request). Once again, presence of girl's madrasa in the region had no impact on boy's enrolment.

[17] This finding is similar to that of Khwaja *et al.* (2007) who find an externality effect of public schools on the emergence of private schools in rural Pakistan. The authors find that private schools were set up in Pakistani villages that have had government schools because ample local supply of public schools graduates made it feasible for private entrepreneurs to set up low cost private schools.

[18] For evidence on differences in physical capacity in terms of teacher-student ratio, see Asadullah, Chaudhury, and Al-Zayed (2010).