Impact of private tutoring for university admission and subsequently on students’ academic results

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Abstract
Purpose – Education can be classified into formal and informal sectors—the first category as a regular schooling system and the latter category as private tutoring. After completing secondary education, students in many countries receive education from private tutoring to get admission into the university. This study examines the effect of private tutoring on university admission and subsequent students’ academic achievement at the university level.
Design/methodology/approach – Using survey data from Bangladesh as a case study, this study employs a two-stage least squares (2SLS) methodology.
Findings – Considering that coaching centers offer services such as private tutoring, this study finds that an informal education for admission greatly helps academic achievement. Students who benefit from informal schooling are more likely to achieve higher grades in subsequent programs.
Originality/value – This study strongly suggests that formal education at the secondary school level is unable to meet the academic expectations that are demanded at the tertiary level. This forces the development of private tutoring, which supports the students from more financially well-off families to perform well at the cost of educational disparity.

Keywords Private tutoring, University admission, Formal education, Instrument variable, Two-stage least squares, Academic achievement, Tertiary education

Paper type Research paper

Introduction
Private tutoring has in recent decades become a very popular teaching-instructional strategy (Dang and Rogers, 2008; Jung and Lee, 2010). Bray (2014) refers to such a tutoring system as a shadow education system because it runs in tandem with the formal education system. Many students, especially in developing countries, take on private tutoring as the same time as formal school instruction (Dang, 2007; Dang and Rogers, 2008; Kim and Lee, 2010; Pallegedara and Mottaleb, 2018). For example, more than 40% of primary school students in Bangladesh and 75% of Sri Lankan students go to private tutoring sessions (Jayachandran, 2014).

Such informal education is also widespread in countries as diverse economically and geographically as Bangladesh, Canada, Cambodia, Egypt, Greece, India, Japan, Kenya, Morocco, Nepal, Russia, Singapore, Taiwan, the United Kingdom, the United States and Zimbabwe. However, the nature and extent of such tutoring might differ from country to country. Most students and their parents believe that private tutoring does improve students’ academic performance and overall grades (Choi and Choi, 2016; Nath, 2008; Tse, 2014; Silova, 2010). As a result, students and their parents spend significant money on private tutoring. For
example, in South Korea, Kim and Lee (2010) find that private tutoring for primary and secondary students is approximately equal to 2.90% of its national income.

This amount is also equivalent to 80% of the total government expenditure at primary and secondary school levels. Students in many countries also want private tutoring so that they can be admitted into a better school at the next academic level. This study examines whether private admission tutoring guides academic results subsequently. There are different forms of private tutoring: one-to-one correspondence provided by an individual; and multiple correspondence provided by regular school premises or private organizations (Berberoğlu and Tansel, 2014; Tansel and Bircan, 2006; Tansel, 2013).

The one-to-one correspondence is either accomplished with students studying in prestigious universities or conducted by retired or currently active teachers. Another category is provided at the regular school premises by a volunteer or mainstream teacher for a nominal fee outside of formal schooling hours, especially secondary provision. Commercial tutoring centers also offer education similar to the latter category, and it is considered the most prevalent form in many countries. Commercial tutoring centers are organizations with professional instructors and other school-type teaching-related logistics. They usually operate in such a way to make profits and are sometimes referred to as coaching centers in many countries.

Students who graduated from the secondary level in many developing countries might go to a university admission coaching center to enroll in a well-reputed university. In such a case, two forms of tutoring are available for preparing the admission test: one-to-one and multiple correspondence. Despite the fact that they may go to a formal school, Jayachandran (2014) pointed out why students usually take up informal schooling as well. First, teachers in regular schools may have less opportunity cost in most developing countries because generally, their wages are lower. If teachers take up private tutoring as a source of additional income, then this becomes their main motivation. Therefore, the supply of private tutoring by an active teacher increases. Second, parents and students might believe that regular school hours or instructions may not be sufficient to cover the formal test’s required topics, insisting on perceived advantages offered by private tutoring. They might also believe that private tutoring would offer advantages for students. Third, less opportunity for part-time work in most developing countries provides an employment opportunity for students or educated individuals with available time to take up private tutoring.

Some studies, such as Berberoğlu and Tansel (2014) and Ryu and Kang (2013), find that the private tutoring system helps students achieve higher grades in competitive academic tests. Education through private tutoring gives a student more time and opportunity to obtain more instructional resources without imposing an additional monetary cost on other students in the same class.

Several studies, such as Briggs (2001), Banerjee et al. (2007), Byun (2014), Berberoğlu and Tansel (2014), Gurun and Millimet (2008), Bray (2006), Liu and Bray (2017), Zhang, et al. (2013), Zhang and Liu (2016), Thapa (2013) and Liu (2012), argue that private tutoring improves students’ academic grades when measured by grade point average (GPA). Other research contends that private coaching centers could in fact worsen socioeconomic inequality and outcomes. For example, Bray and Kwok (2003) and Damayanthi (2018) find that private tutoring is related to higher costs, and families who are at higher socioeconomic levels can afford this system of learning more regularly unlike their lower-income counterparts. This advantage leads to unequal access to educational opportunities and creates socioeconomic inequalities. Other studies – Suryadarma et al. (2006), Zhang (2013), Cole (2017) and Cheo and Quah (2005) – also document the negative impact of private tutoring on academic performance.

Other studies conducted by Ha and Harpham (2005) and Choi et al. (2012), argue that private tutoring’s impacts might depend on academic disciplines. For example, Ha and Harpham (2005) find that private tutoring has a positive and significant effect on reading but an insignificant effect on writing and numeracy. Similarly, Choi et al. (2012) report that
private tutoring improves academic achievement in Mathematics but diminishes reading scores. They also document an insignificant impact on natural sciences. Hof (2014) argues that the effects of private tutoring on academic achievement are mixed.

Such inconsistent findings might be partly observed because of the methodological differences and the great variations that exist generally in countries’ respective cultural and institutional contexts, histories and circumstances (Berberoğlu and Tansel, 2014). These findings may also reflect sampling issues, measurement of demand for private tutoring, a measure of academic achievement depending on one subject or multiple subjects, modes of tutoring and teaching instruction quality. Most studies examine the effect of private tutoring, a parallel instructional approach, on academic achievement in competitive exams at the same level as formal schooling. For example, they examine the effect of private tutoring in secondary schools on that level of education’s grade point average (GPA).

This outcome strongly suggests that private tutoring at the primary school level has ramifications for academic outcomes in secondary schools. However, none of these studies examine the effect of university-admission private tutoring on academic achievement at that level. For example, students who have graduated from secondary school in many countries must take an admission test to enroll at the tertiary level. Considering the multiple-correspondence tutoring as the coaching center in Bangladesh, we examine university-admission coaching’s effect on students’ academic results at the university level.

The reasons for choosing Bangladesh in this research are as follows. First, approximately 85% of primary school students in the capital city, Dhaka, receive supplementary education through private tuition (Mahmud and Bray, 2017; Mahmud and Kenayathulla, 2018). Parents and students may well perceive that private tutoring supplements the formal education system in developing countries, and benefits them (Kim and Lee, 2010; Glewwe and Kremer, 2006; Mitlin et al., 2007). They believe that the education system in regular schooling fails to satisfy what students need (Nath et al., 1999; Nath, 2008).

When parents and students believe that passing exams determines the gateway towards further education, good career outcomes and social status or advancement, they usually enroll in private tutoring (Choi and Choi, 2016; Tse, 2014; Silova, 2010). Second, individuals who do not have a full-time job or whose salary is insufficient for a living might consider taking up private tutoring as a supplementary income (Bray, 1999). Bangladesh has a high unemployment rate and a relatively lower teaching professional salary. Also, a full-time student could find private tutoring as a suitable part-time employment opportunity in Bangladesh. As this study examines the effect of admission-coaching centers on academic performance at the university level and most instructors in the admission-coaching centers are full-time students in well-reputed universities or job-seeking graduates, Bangladesh would be a representative case. Third, a significant ratio of students admitted to the university received education from the university admission coaching center.

Using a primary survey on a well-reputed university, this study finds that the admission-coaching center’s effect on the subsequent academic level is positive, implying that the coaching center helps students to improve their academic results measured in GPA. The findings are significant for countries with a large market for private tutoring outside the public education system. With this in mind, students who believe they need more help beyond formal schooling to get admission at subsequent levels usually take up private tutoring. This tutoring allows them to prepare for the admission process and introduce the expectations in the admission test. The findings are what students and their guardians or parents perceive. In other words, they believe that the formal education instructions at the secondary school level help them get admission and improve their academic results at the university level.

This result supplements the findings of previous studies which contended that private tutoring improves academic achievement. Also, the findings indicate that students who only rely on formal education at the secondary level receive poorer grades than their counterparts.
in the academic exams at the tertiary level. Policymakers and educators should consider policies to improve the secondary-level curricula aligned with the tertiary level’s expectations. The rest of this study is organized as follows. The next section reviews the background of the education system in Bangladesh. We then outline the empirical strategy and data sources. We will report and discuss the empirical results and robustness checks, and finally, we conclude the study.

**Education system in Bangladesh**

The mainstream education system in Bangladesh is divided into primary, secondary and tertiary levels. The primary school group consists of Grades one to Grade five, the secondary school level consists of Grade six to Grade ten or Grade six to Grade twelve, and the tertiary or university level consists of undergraduate and postgraduate programs. Four major national examinations in Bangladesh are the Primary School Certificate (PSC), Junior School Certificate (JSC), Secondary School Certificate (SSC) and Higher Secondary Certificate (HSC). In order to complete Grade Five, students have to take the PSC, completed Grade eight has to take the JSC, completed Grade Ten has to take the SSC and completed Grade Twelve has to take the HSC exams. The purpose of these formal tests is to evaluate students’ credentials. Furthermore students usually enroll in private tutoring schemes beyond formal schooling to prepare for each test.

This study considers the secondary level from Grade six to Grade twelve. Students passing primary school can enroll into a secondary school, and students graduating from secondary education can either work find a job or seek enrolment in a university. Primary school is formally expected to prepare their graduates for the secondary sector. Sometimes, students must appear for a highly competitive admission test to enroll in their subsequent academic classes. To overcome this stage, students sometimes accept extra help from private tutoring companies or individuals to supplement their formal schooling. For example, students who graduated from the secondary level must appear on an admission test enrolling in a university program. As the government mostly subsidizes higher education in most public universities in Bangladesh, the admission test is highly competitive if someone wants to enroll in a public university. Students usually go to a private tutoring center to get extra help to prepare them for the admission test. However, the government has periodically announced the prohibition of such private tutoring, but it has not been enforced (Mahmud and Kenayathulla, 2018).

Additionally, the admission process for enrollment at the tertiary level is not centralized [1]. Each university has its admission process, which might differ across disciplines, even within the university. As the total number of graduates from the secondary level increases with limited enrollment capacity in each program, getting admission is highly competitive. For example, according to the Dhaka University Admissions Office, one of the leading public higher education institutions in the country, the Faculty of Science received 88,970 applications to admit only 1,795 students in the 2018–2019 academic year. Moreover, 276,391 applicants have applied against 7,128 seats for admission into Dhaka University.

The same scenario is also observed in other public universities. These statistics imply how competitive the admission process in a public university is. The potential reasons are that public university students usually pay a minimum fee, such as an average of 100 US dollars equivalent to local currency, offering better career prospects. Also, private universities exist in the country but are also more expensive, and the higher-ranked institutions’ admission process is also competitive. Access to a prestigious university program is a primary concern of students and their guardians. They believe that getting an education from a well-reputed institution at the tertiary level would ensure a promising professional career opportunity.

To prepare for the admission process at the tertiary level, students usually take up private tutoring to learn some learning techniques to pass the university’s admission procedure successfully. They believe the private tutoring system creates further opportunities to train
for the entrance examinations. For example, Beier et al. (2010) and Mercer et al. (2013) argue that private tutoring might help students prepare for the admission procedure. Additionally, Bereroğlu and Tansel (2014) and Gök (2010) find that teaching in private tutoring is sometimes better than regular school, indicating that students getting extra and better help from private tutoring and so they are more likely to gain admission than typical students.

Additionally, this private tutoring would help students understand the topics better covered at the secondary level. Previous studies have been inconclusive in their findings on the impact of private tutoring on academic performance at the same level. However, a few studies are examining the effect of private tutoring on academic performance at subsequent levels. A hierarchical education system might require a clear concept to help succeed in the next academic level. Students receiving help from private tutoring believe that the admission process contents are more heavily covered in the coaching center than in regular school.

Having more clarity on the secondary school content would help students to perform better at the tertiary level. Students getting help from private tutoring would perform well at the university level. In this study, we only focus on coaching centers’ impact on academic performance in students’ subsequent education courses/subjects/programs in Bangladesh.

Data and methodology

Data
Like many countries in Asia and Europe, a university student in Bangladesh usually enrolls in a specific field of study, such as English or Economics, at the undergraduate level. After completing the higher secondary level, equivalent to Grade XII in many countries, students must appear for an admission test in each university faculty, such as the Faculty of Business. Some programs, like Economics at the Jahangirnagar University, Dhaka, implement a separate admission test. Students are usually admitted into a coaching center to obtain extra help with the admission process.

These institutions introduce university applicants to the admission test procedures and their questions, and they teach some techniques to pass the admission test successfully. These institutions usually prepare students in two ways. First, they teach the basic concepts covered in the syllabus at the secondary level and their application to solving the admission test questions. Second, students admitted to these institutions must appear in some practiced tests as a part of their preparation. However, a separate arrangement is also available for students not admitted to the coaching center for regular services. These students go to the coaching center to take the mock test for admission.

We conduct a survey featuring information on students enrolled at one of the country’s largest and highly competitive public universities. Concerning confidentiality, we do not reveal the institution’s name. This university has more than 30,000 students enrolled in undergraduate programs, and most of these are four-year Bachelor programs [2]. We have collected the data from students in their second year of study in the 2018–2019 academic year. Since most public universities offer the introductory courses initially, students in this university usually take the same classes together until the third year.

Some of them might take specialized courses in their third and fourth years. As students admitted to this university come from different backgrounds, we restrict newly admitted students to becoming peers in the first year, as peer effects are an essential determinant of students’ academic results. The potential reasons for not considering the third and fourth-year students as peers are that their academic concentrations are more specialized and dependent on their previous years.

We select Faculties of Arts, Business, Science and Social Science students. In the 2018–2019 academic year, approximately 38 applicants appeared on the admission test for each seat, indicating that the process is highly competitive. Such competition could also encourage students
to receive help from informal sources. We collect data on students’ GPAs, demographics and other relevant information such as parental education and income. The questionnaire asked whether a student had private tutoring for the purpose of university admission.

We also control for subjective assessments of the teacher and their socioeconomic status. Using the Yamane (1967) sample size determination, we have collected samples of 324, 342, 303 and 320 for the Faculties of Science, Arts, Business and Social Science, respectively [3]. Therefore the total sample size is 1,289. We then randomly collect the data from students admitted to each faculty with a questionnaire containing information about individual characteristics: gender, education achievements, education backgrounds, parents’ academic achievements, their incomes and students’ peer group characteristics.

This study considers the grade point average (GPA) as an indicator of students’ academic performance [4]. In doing so, we assume that their individual characteristics determine grades, the schooling system and its characteristics and their peer group performance. Students considered in this study usually receive formal schooling to get their education. Some may go to informal schooling such as private tutors or coaching centers to better understand how to achieve good grades. In Table 1, we report the descriptive statistics of the variables used in this study. Out of 1,289 students in the second year, approximately 54% were enrolled in the admission coaching center. The average GPA of students in the second year is 3.01 on a scale of 4.00, with a standard deviation of 0.92, where the highest and lowest CGPAs are 3.89 and 2.50 on the scale of 4.00, respectively. The average GPA at the 1st year university is 3.15 on a scale of 4.00; its standard deviation is 1.01. Since there is no uniform definition of ability, we assume that the ability is an average GPA in their previous academic levels. For example, the ability while enrolled in the university is the average GPA in the SSC and HSC exams.

The reason for considering ability is that individuals’ abilities differ and guide their academic performance. Approximately 46% of these students are working in part-time jobs. This type of employment situation is not similar to opportunities for students in the world’s developed economies. Students in Bangladesh mostly work part-time jobs such as those offered by private tutoring interests at coaching centers or their respective students’ houses (Mahmud and Kenayathulla, 2018). Approximately 29% of students are male, and 66% graduated from colleges located in urban areas.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. dev.</th>
<th>Min.</th>
<th>Max.</th>
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<td>2.501</td>
<td>3.890</td>
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<td>0.298</td>
<td>2.311</td>
<td>3.910</td>
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<td>0.000</td>
<td>1.000</td>
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<tr>
<td>Male</td>
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<td>0.453</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>GPA in SSC</td>
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<td>0.296</td>
<td>2.417</td>
<td>3.960</td>
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<tr>
<td>GPA in HSC</td>
<td>3.171</td>
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<td>2.457</td>
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<td>First generation</td>
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<td>0.500</td>
<td>0.000</td>
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<tr>
<td>Student-teacher</td>
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<td>7.123</td>
<td>10</td>
<td>38</td>
</tr>
<tr>
<td>Part-time</td>
<td>0.465</td>
<td>0.499</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Urban</td>
<td>0.668</td>
<td>0.471</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>No. of observations</td>
<td>1,289</td>
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</tr>
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</table>

Table 1. Summary statistics for a sample of students enrolled in the second year

Note(s): The GPA is the second year’s grade point average (GPA). The grades are measured on a scale of 4.00. Admission coaching is a binary indicator for students who have received education from the coaching center. The student-teacher variable indicates the ratio between the number of students and the number of teachers in each department. Part-time is a binary indicator for students who work on a part-time basis. Urban is a binary indicator for students coming from colleges located in urban areas

Source(s): Authors’ own creation/calculation
Methodology

Following Betts and Morell (1999), Birch and Miller (2006) and De Paola and Scoppa (2010), we assume that students’ grades depend on their individuals’ characteristics and the influence of their peers. To examine the effects of coaching center on GPA in subsequent levels, we first start with a simple regression model as follows:

\[
y_i = \beta_0 + \beta_1 s_i + \beta_2 x_i + \beta_3 x_j + \beta_4 y_j + z_{ij} + e_i,
\]

where: \(y_i\) is the GPA of student \(i\) in the second year; \(s_i\) denotes a binary indicator for the student who received informal education for the admission process, otherwise 0; \(x_i\) stands for the individuals’ characteristics: ability, parental education and parental income; \(x_j\) represents the individuals’ peer characteristics, who belongs to the same peer group of student \(i\); \(y_j\) is the GPA of peer group \(j\) of student \(i\); \(z_{ij}\) is the unobserved, but common characteristics between student \(i\) and peer group \(j\); and \(e_i\) is the error term.

The reason for considering the second year is that the university considered in this study has a year-wise academic session similar to most public universities throughout the country. Students admitted in the first year will receive their final grades after completing the first-year exam, and they usually start their classes in the second year even though the results are not yet published. The regression in Equation (1) may suffer from two econometric issues: self-selection bias and reflection effects. First, the GPA of student \(i\) might depend on their peer group, and these peers are usually chosen as those who student \(i\) wants to associate with. This implies that \(y_j\) is not exogenous. Additionally, some characteristics of GPA are observed while others are not (De Paola and Scoppa, 2010; Hoekstra, 2009; Manski, 1993; Stanca, 2006). Manski (1993) argues that unobserved characteristics, such as attributes for peer selection, may affect the GPA of student \(i\). Manski (1993) refers to this effect as the contextual effect. Second, as a student \(i\) interacts with student \(j\) in the same peer group within the same class, their GPAs are affected. For example, when student \(i\) shares classes or school with her peer student \(j\) in the same peer group, then GPAs between student \(j\) and student \(i\) in the same peer group are simultaneously affected. Manski (1993) refers to this as endogenous effects. That is, Equation (1) suffers from the simultaneity bias.

Following Ammermueller and Pischke (2006) and Sacerdote (2001), we assume that Equation (1) is symmetrical for each student \(j\) in the peer group of student \(i\). Since we have only two types of schooling-formal and informal – for both groups of students and these two groups of students \(i\) and \(j\) – are studying in the same peer group, we can assume that \(s_i\) and \(s_j\) are the same binary indicators for students who wanted admission coaching centers.

By substituting a symmetrical equation for \(y_j\) into Equation (1), we can have the following reduced form:

\[
y_i = \frac{(1 + \beta_3)\beta_0}{(1 - \beta_4)} + \frac{(\beta_1 + \beta_4)\beta_0}{(1 - \beta_4)} s_i + \frac{(\beta_2 + \beta_3\beta_4)\beta_0}{(1 - \beta_4)} x_i + \frac{(\beta_3 + \beta_2\beta_4)\beta_0}{(1 - \beta_4)} x_j + \frac{(1 + \beta_4)z_{ij} + e_i + \beta_4 e_i}{(1 - \beta_4)}
\]

Equation (2) can be written as

\[
y_i = \alpha_0 + \alpha_1 s_i + \alpha_2 x_i + \alpha_3 x_j + v_i
\]

By estimating Equation (3), we can capture the coaching center effect and total peer effect separately. This approach implies that Equation (3) makes it possible to address the bi-directional impact between \(y_i\) and \(y_j\). As the formal schooling system is the prime education system, it is expected to successfully meet all stakeholders’ expectations. Consequently,
students should be happy in formal schools. However, whenever students or their parents are unsatisfied with the formal schooling system’s curriculum or teaching instructions, they may prefer informal schooling (Dang, 2007; Zhang, 2013). Most of these students usually go to informal schools to secure higher marks for their exams (Jayachandran, 2014; Yung, 2020). In such cases, students believe that the informal schooling system improves students’ GPA. Therefore, it is expected that $\alpha_1$ is positive and statistically significant.

Another problem is selection bias, which may estimate an inconsistent effect of $\alpha_3$ in Equation (3) if we use the Ordinary Least Squares (OLS) method. The $x_j$ might be linked to the error term $e_i$, the component that individuals typically select people with whom they want to associate. In the beginning, we assume that student $i$ chooses her peer group based only on their academic ability and on their similar choices of doing other things, such as going to the gymnasium or playing in the same sports team. We also assume that the peer group selection process does not rely on other characteristics, such as students’ socioeconomic status. In other words, given that we believe peer groups are not chosen based on other characteristics belonging to $x_j$, it indicates no correlation with the error terms.

We assume that students with greater ability and similar daily activity choices are the key determinants for selecting the peer association. Other unobserved characteristics – socioeconomic status – are associated with are captured in $v_i$. Sometimes, however, peer ability and socioeconomic status might be correlated. For example, students from higher-income families are more likely to stay together (Caner and Okten, 2013). Therefore, peer ability and socioeconomic status might be correlated. That is, Cov(peerability, $v_i$) $\neq$ 0. This scenario violates the assumption that individuals are randomly assigned to their peer group of students in Equation (1). If peers are selected by individuals’ intentions, which might be unobservable but may influence GPA, we can say that peer effect depends on individuals’ attributes. Therefore, the OLS estimate in Equation (3) may not provide an unbiased estimate.

To address this limitation, we use different measures for the ability of students $j$ in the same peer group. From a theoretical point of view, it is not clear whether students are influenced mainly by their close friends or classmates or roommates in college or people sharing the same apartments (Guryan et al., 2009; Parker, 2012). Following Arnott and Rowse (1987), we consider only the academic interaction among students in the same peer group in our simplified model. We assume peer groups as a group of students who take a given course, attend classes, and do the same academic year exam. That is, the relevant peer group is represented by people who attend classes together. As students have a continuous interaction in classrooms, education in this kind of environment becomes a public good (Lazear, 2001; McEwan, 2003; Jackson and Bruegmann, 2009). Consequently, weaker students would offer negative externalities on others by disturbing or slowing down the learning, and students with a higher academic achievement would offer positive externalities to improve the overall learning environment.

As students enrolled in a program might have taken a wide range of courses or come from different academic and socioeconomic backgrounds, we may not observe students’ direct compositions on each course. We infer this information from exams taken by students who studied together in a given year. For each exam $k$ taken by student $i$, we first consider an average ability. In this simplified version, we consider the GPA from their school levels. Following De Paola and Scoppa (2010), we calculate the peer group ability of students taking the same course as below:

$$PG_i = \frac{1}{N_i} \sum_{k} \left( \frac{1}{J_k} \sum_{j=1}^{J_k} GPA_j \right)$$

(4)

where $PG_i$ stands for the ability of $i$’s peer group, $GPA_j$ is the GPA of student $j$, $J_k$ denotes the number of peers in the exam $k$ and $N_i$ represents the exams taken by student $i$. In this way, we capture individuals’ peer ability effects, which implies the peer effects. Therefore,
Equation (3) satisfies the OLS assumptions and the estimates are unbiased. The coefficient of interest, \( \alpha_3 \), is expected to be positive and statistically significant, meaning that peer effects are positive on student \( i \).

We have assumed that student \( i \) chooses her peer group based on only academic ability and similar choice of daily activities. However, they may not be the only criterion for selecting the peer member. Other characteristics, for instance people who tend to be similar or goal-oriented, might affect the peer group. Peer group measures in Equation (4) depend on students taking common courses and exams; students with similar characteristics are likely to choose the same courses or study together for a particular exam in the same session.

We can address this section issue by using an instrumental variable (IV) for peer group quality. We randomly assign students in the same group which influences peer group selection but is not correlated to the error term \( v_i \). We first estimated Equation (3) assuming that peer group quality is exogenous to \( v \). However, the peer group is the error terms may not be exogenous. That is, \( x_j \) and \( v_i \) in Equation (3) are endogenous. Therefore, we can estimate a two-stage least squares (2SLS) approach in estimating an unbiased estimate for grade disease.

We now need to find an appropriate instrument, such as \( z \), for determining peer group quality. This instrument variable is correlated with the peer group but is exogenous to \( v \). That is, \( \text{Cov}(PG_i, z) \neq 0 \), and \( \text{Cov}(z, v_i) = 0 \). We believe that the peer group GPA, referred to as peer first degree (PFD), would be a good instrument. The probable reasons are as follows. First, peer first degree is based on the classes attended by students in the first year, which influences students’ grades in the second or following years. This is how the relevance condition is satisfied. We also assign students who have taken at least three compulsory courses in the first year; we choose them following their initial letter’s alphabetic order for the surname. As it is randomly assigned, it is not correlated with the \( v_i \).

The PFD is likely to determine students’ GPAs in the second year (PSD) as they have repeatedly taken courses in the upper classes. As a result, they are more likely to define their peer group composition. Students typically choose their friends from a continuously stable group of students taking similar courses in the next years. This is why a peer first- and second-level degree courses are likely to be related, that is, \( \text{Cov}(PFD_i, PSD_i) \neq 0 \).

We have randomly assigned teaching classes in the first year following the alphabetic order of students’ surname. Students are required to attend the lectures in their designed teaching classes. For each course, we consider that peers taking the same course in the first year will take similar courses in the future as they become friends and comfortable with each other. As well, we calculate the peer group quality as the average ability of the peers. Since we have randomly assigned the group of students they belong to, the peer group quality would be exogenous. Peer ability is not correlated to the error term, indicating that \( \text{Cov}(z, v_i) = 0 \).

**Result analysis**

In Table 2, by using Equation (1), we report the estimated results of the effects of informal education on the GPA. The dependent variable is the GPA in the second year. The standard errors (SE) are shown in the underneath parentheses values of each estimate and corrected for heteroscedasticity. In Column (1), we show the estimated effect of informal education on the GPA, where the control variables are individual students’ ability and their peers’ GPA. We then extend this model incorporating more control variables and estimates, and results are shown in other columns. In Column (1), the estimate of informal education on grade is 0.191, which is positive and statistically significant.

This indicates that students who received an informal education in a coaching center earn higher grades at the university level than those who only receive a formal education. This study considers that the average GPA of secondary and higher secondary levels measures
students’ ability. We also find that students’ ability and peer academic performance would positively influence their academic achievement. For example, the estimated effect of ability on GPA is 0.620 is positive and statistically significant.

From theoretical and empirical points of view, as discussed earlier, it is not clear about the measure of peer ability. In this case, we first assume that the peer GPA would indicate peer ability. There might be other indicators such as high school GPA, college GPA and the average GPA for previous academic levels. Using Equation (4), we calculate the peer group ability. Studies, such as Lazear (2001), argue that learning in the same classroom would be a public good, where a higher ratio of weaker students might offer a negative externality in learning.

We consider the GPA of students in the second or higher years. These students might come from different schools, regions and socioeconomic backgrounds. As a consequence, we do not observe a direct composition of these students. We infer the composition of their peer learning by considering the exams taken in the same year to address this. The probable reason to take the same year is to be consistent with their academic rules because most secondary and higher secondary institutions in different regions of the country follow similar rules for the test.

Furthermore, the same academic year would allow consistency in the same university. Using Equation (4), we calculate the peer ability as a proxy for peer GPA. Therefore, Column 2 in Table 2 highlights the exact specification in Column 1. We still find a similar result in that peer groups positively influence academic performance. We incorporate more control variables in Column 3 and other columns.

<table>
<thead>
<tr>
<th>(1) GPA_univ</th>
<th>(2) GPA_univ</th>
<th>(3) GPA_univ</th>
<th>(4) GPA_univ</th>
<th>(5) GPA_univ</th>
<th>(6) GPA_univ</th>
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<td>0.005</td>
<td>0.005</td>
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</tr>
<tr>
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<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.001</td>
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<tr>
<td>Stu_teacher</td>
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<td>-0.010***</td>
<td>-0.010***</td>
<td>-0.010***</td>
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<tr>
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<td>0.019***</td>
<td>0.019***</td>
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<td>1,289</td>
<td>1,289</td>
<td>1,289</td>
</tr>
</tbody>
</table>

**Note(s):** Standard errors in parentheses

* * * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The GPA_univ is the second year’s grade point average (GPA). The grades are measured on a scale of 4.00. Coaching is a binary indicator for students who have received education from the coaching center. Stu-teacher indicates the ratio between the number of students and the number of teachers in each department. Job is a binary indicator for students who work as a part-time basis. Urban is a binary indicator for students coming from colleges located in urban areas.

**Source(s):** Authors’ own creation/calculation
We use the logarithm of parental income as a control variable. We also find that the estimates of parental income on the CGPA are not statistically significant. This implies that parental income does not influence academic performance. Similarly, students’ gender does not have any effect on GPA. Studies, such as Häkkinen et al. (2003) and De Hoyos et al. (2019), argue that a high school’s location might influence academic performance. In Bangladesh, students who studied in urban schools are more likely to receive a higher ratio of the highest GPA than schools located in rural areas. We also control the location of students’ previous higher schools or colleges. We use a binary indicator of whether their previous academic institution is in urban areas. We find that a student’s high school location does not significantly impact that person’s academic performance at the university level.

In Table 2, Columns (6) and (7) also show the estimated effects of student-teacher ratio in the university have a significant and negative impact on students’ GPA. This indicates that more students compared to a teacher would undermine students’ academic performance. Studies such as Meeuwisse et al. (2017) and Parker et al. (2016) have asserted that students studying at the university level might work part-time. We also control their part-time work status, and the result is shown in Column (7). We report that the estimate is negative and statistically significant, indicating that students who work part-time hurt their GPA.

Table 2 shows the estimates in Equation (3), where we assume that peer group quality is exogenous. Individuals usually choose someone with whom they are comfortable. That is, there might be other characteristics that may influence peer quality. Therefore, peer quality is not exogenous. As there is an endogeneity problem, the estimates in Table 2 will be biased and inconsistent. To address the endogeneity issue, we use an instrument for peer quality related to the peer quality but uncorrelated to the error terms. We assume that students’ GPA in the first year satisfies these two criteria. Following De Paola and Scoppa (2010), we define the first degree in the classes students attend in the university’s first year. We randomly assigned students with their last names for three courses taken in the first year. Using Equation (4), we calculate their peer group quality in the first year. We will call this Peer First Degree (PFD). This PFD implies students’ ability and something that would influence students’ academic performance in the second year. Therefore, the relevance condition for selecting the instrument is satisfied. As we randomly select the students by alphabetic order of the last name, it is not correlated to the error terms.

In the following section, we will estimate the two-stage least squares model. Before using an instrumental variable estimator, we first check whether it is necessary to use it in this regard. We employ the Durbin–Wu–Hausman test to verify the endogeneity of the Peer Course. In doing so, we first take the residuals from the first-stage regression. We then insert these residuals as explanatory variables into an augmented structural equation. In most specifications, this variable is significantly different from zero, indicating that the simple OLS estimate in the reduced form is inconsistent. This outcome suggests that endogeneity exists, and we use an instrumental variable to address the problem. Our instrument satisfies both the assumptions of relevance and exclusion.

In Table 3, we show the estimates from the 2SLS estimation. In this case, the dependent variable is the GPA in the second year. We employ the first-year GPA as our instrument variable for peer group ability. Column (1) shows the admission coaching center estimates on the GPA, which is positive and statistically significant. We also find similar effects.

In other specifications in Table 2. This implies that informal education has a greater and more positive impact on the GPA at the university level. We also find that peer ability positively impacts the students’ GPA. These results indicate that students admitted into admission coaching centers are more likely to achieve higher grades at the university level. The results are consistent with previous studies that private tutoring positively influences academic achievement. We also check the robustness of our results. Instead of using the PFD,
we use peers’ higher secondary-level GPAs as an instrument. Table 4 shows that the coaching center positively impacts students’ results at their subsequent levels.

In summary, our results indicate that the coaching center positively impacts academic achievement at the subsequent level. This study contributes to the literature using a 2SLS method to overcome selection bias and bidirectional causality. Suggest by our findings is that the university admission coaching center would make a difference in academic achievement at the subsequent levels.

Usually, students who graduated from the higher secondary level go to a university coaching center, which implies that they believe that educational training at that level may not be sufficient to pass the highly competitive admission test. They believe that failing it would hinder a promising career opportunity in the future. Our study finds that this private tutoring method helps to improve grades at the subsequent level. Therefore, it can be argued that formal schooling at secondary school offers limited confidence for students to meet the entry requirements at university level. This is why students or parents tend to rely on private tutoring.

The findings also imply that secondary schooling and its practices are not making enough effort or have the logistics to provide a good quality education in a competitive system which motivates richer people in society to use private tutoring. On the other hand, it might be a fact that since the local elites could use private tutoring as an alternative form of learning, both policy and governance as well as monitoring lack to make the public education to be an effective mode of delivery. Since private tutoring is linked to having the financial means to afford it, students from higher socioeconomic backgrounds are more likely to use it compared to their lower-income counterparts. Findings imply that students from higher socioeconomic

**Table 3.**  
2SLS regression estimates of academic achievement

<table>
<thead>
<tr>
<th></th>
<th>(1) GPA_univ</th>
<th>(2) GPA_univ</th>
<th>(3) GPA_univ</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Coaching</td>
<td>0.159***</td>
<td>0.159***</td>
<td>0.158***</td>
<td>0.158***</td>
<td>0.137***</td>
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<td>Ability</td>
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<td>-0.002</td>
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</tr>
</tbody>
</table>

**Note(s):** Standard errors are in parentheses

*p < 0.05, **p < 0.01, ***p < 0.001

The GPA_univ is the grade point average (GPA) in the second year. The grades are measured on a scale of 4.00.

Coaching is a binary indicator for students who have received education from the coaching center. Stu-teacher indicates the ratio between the number of students and the number of teachers in each department. Job is a binary indicator for students who work on a part-time basis. Urban is a binary indicator for students coming from colleges located in urban areas.

**Source(s):** Authors’ own creation/calculation.
backgrounds will benefit from receiving additional instructive support through private tutoring which accelerates their academic performance and future career prospects. This additional support thus benefits them privately despite public schooling opportunities being available for them. Another implication of these findings is that private tutoring could lead to discrimination between students from higher and lower socioeconomic standings, one where the former benefit at the expense of the latter. In addition, market-based private tutoring could compromise the desire quality of education and philosophy of equity in learning. As secondary school education is mostly public in Bangladesh and deemed to be a public good, disparity and discrimination despite the objective of public policy are unexpected. The findings of this study suggest that secondary education should be designed and practiced as a public good, ultimately benefiting every citizen within the country equally.

Conclusion
This study examines whether the informal education sector guides student academic performance at the secondary schooling and subsequent – university – level. Considering private tutoring as a type of informal schooling, we find that students who received education from the admission coaching center would earn a higher GPA at the university. Students who rely only on the country’s formal education system will receive a lower academic grade once they are studying at the university level. What this means is that the formal secondary education system fails to prepare students for learning at university. In other words, teaching instruction at the secondary level may not be good enough to meet the requirements for tertiary education.

Table 4. Robustness check with the peer higher secondary GPA

![Table 4](image-url)
Policymakers should consider how academic curricula and instruction methodologies can improve students’ ability to meet the challenges in higher education programs.

In this study, we attempt to explain a significant issue about the quality of education at the secondary schooling level. However, there are several limitations to this study. First, it uses data from some selected disciplines in a university, which may extend to a more significant number of universities in the country. This country-wide replication will offer an improved result in general. Second, the research only considers whether a student received benefits from private tutoring but does not consider the quality of this kind of education.

Third, the instrument used in this study can control only student-level endogeneity, not school-level endogeneity because the outcomes of private tutoring and formal school learning are difficult to differentiate. Fourth, we do not consider cultural factors which may shape academic achievement. Fifth, this paper only assesses the impact of private tutoring on academic achievement. It is evident that families from lower socioeconomic backgrounds generally have limited – if any – means to afford private tutoring and this fact of life will increase socioeconomic inequality. Future studies should examine such circumstances in more detail. Sixth, this study does not consider the quality of the private tutoring coaching center because quality measurement data is not available. Similarly, the education philosophies of market-driven tutoring centers is not discussed. Seventh and finally, the peer selection approach only covers students’ academic ability and similar choices of daily activities. In reality, students might choose their peers based on different attributes.

Notes
1. However, taking a uniform university admission test is still under consideration.
2. Most public universities in Bangladesh usually offer a four-year program. Only a few universities or some programs are run by two semesters in an academic year.
3. The sample size, \( n = \frac{N}{1 + \frac{\alpha^2}{N}} \), where \( N \) is the population size, \( \alpha \) is the level of precision. We assume that the level of precision is 5%.
4. However, there may be arguments for and against this assumption. Compared to other indicators, the GPA is a widely used measure for academic achievements in the standard literature, and it is relatively consistent.

References


**Corresponding author**

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