Quantity vs. quality of education: Exam difficulty and labor market performance in Bangladesh*

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Abstract

Substantial increases in access to education in the last few decades have been one of the major achievements in human development for many developing countries. With this success in increasing the quantity of education, its quality has emerged as a major challenge for most of these countries. Despite its intuitive appeal, improving standards in curriculum-based external exit examinations has received relatively little attention as a possible means of improving the quality of education, especially in developing countries. Using a "natural experiment" in the secondary school exit exam in Bangladesh, this paper evaluates the labor market effects of lowering exam difficulty. When exam standards are high, passing the exit exam increases the likelihood of attaining formal employment by 12-13 percentage points (compared to those who completed similar number of years of education but did not pass the exam) for the male sample, and by about 7 percentage points for female. When exam standards are low, these labor market gains disappear. Further evidence shows that this decline in labor market gains is driven by lower human capital accumulation during the experimental period and/or by the general equilibrium effect of greater supply of secondary school graduates. The results indicate the need for greater emphasis on exam standard to improve labor market performance of the graduates.

Keywords: Exam standard, education, labor market.
JEL classification: I23; J24.

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1. Introduction

Education is considered as one of the mainstays of development, both for its intrinsic value as well as the instrumental role it plays in expanding other opportunities. Celebrating 20 years of human development reports, UNDP (2010) denotes that progress in education has been more extensive than progresses in health and income.[1] It is also commonly noted that years of schooling does not necessarily measure learning or cognitive abilities: the quality of that education also counts. There are claims that the quality, rather than the quantity, of education plays a more important role in determining income of an individual and economic growth of a country (Hanushek and Woessmann, 2007).[2] One of the potentially effective policy mechanisms for improving the quality of education in developing countries is the standardized exit exam. The level of difficulty set in these exams can have a strong influence both on the learning of students and on their success in the labor market.

Despite its potential importance in influencing the quality of education, the standards of curriculum-based external exit examinations (CBEEE) have received relatively little attention in policy discussion compared to increasing educational inputs. A review piece by Glewwe and Kremer (2006) takes stock of the evaluations of policy interventions for improving education quality and the academic performance of students in developing countries. The policies discussed in this review are primarily concerned with inputs and their delivery mechanisms, such as more teachers, textbooks, other educational materials, remedial education, computer-aided instructions, or radio instructions, amongst others. In essence, these policies only consider the educational production function. Becker and Rosen (1992), Costrell (1994) and Betts (1998) have used incentives of learning to model the influence of standardized exams and grading standards on competency, graduation, school drop-out and performance in labor market. Assuming that passing a standardized exam signals the ability of graduates to employers, these models have shown that higher standards in exit exams can induce students to exert greater efforts to learn. Using a natural experiment from Bangladesh, this paper estimates the effect of lowering the difficulty in secondary school exit exams on the labor market performance of graduates.

During 1992 to 1995, the introduction of a new assessment system led to a reform in the structure of secondary school exit exam in Bangladesh. Previously, examinees were assessed on their descriptive answers to exam questions. In 1992, multiple choice questions (MCQ) were introduced in a new assessment system. As part of this reform, the students also received 'question banks', a set of 500 MCQ for each subject. While these question banks were meant to be used as guides in exam preparation, all of the actual MCQ questions in the exam were drawn from this set of questions. This meant that many students could easily pass the exam by studying only the MCQs in the question banks. After realizing that the introduction of question banks had led to a drastic fall in the standard of the exam, the exam structure was again changed in 1996. This paper compares the cohort exposed to this "experiment" with

[1] Average years of schooling of adults (aged 15 or older) in developing countries have increased from a mere 2.55 years in 1960 to 7.09 years in 2010 (Barro and Lee, 2010).

[2] Hanushek and Zhang (2009) indicate that typical estimates of returns to education are about 30% lower than quality adjusted return to schooling.

both their older and younger cohorts in order to assess the impact of the lowering of exam standards on their labor market performance.

The results reveal that easier exams reduced the probability of getting formal employment and wage rates for the secondary school graduates. During the periods of the 'conventional standard' – before and after the use of question banks – the students who passed the exit exam were 12 to 13 percentage points more likely to get salaried employment and earned about 10% higher wage in comparison with students who completed similar number of years of schooling but either did not take the exam or failed in the exam. However, we do not observe any statistically significant labor market gain for those students who passed the same exam during the question bank period. The effect of a lower exam standard is more evident for male students than female, which is most likely due to the limited labor market participation of female graduates. However, the estimates are consistent across different specifications for the male sample, and are causal effects of the exam policy.

Two mechanisms might underlay the results. Firstly, lower exam standard may have reduced the incentives to exert efforts to learn, which lead to a lower level of human capital acquisition by the graduates. Secondly, greater number of students passing during the experimental period may have reduced the likelihood of acquiring formal employment. Despite a lack of evidence on the relative importance of human capital and general equilibrium effects, the results call for greater attention to the standards of exit exams as a possible means of improving the quality of education and its economic return in developing countries.

The paper is organized as follows: Section 2 gives a brief review of relevant literature on the relationship between exam standards and labor market performance. Section 3 gives an overview of Bangladesh's education sector, along with a description of the structure of secondary schooling and the natural experiment. Section 4 describes the data and specifications used. Main results are presented in Section 5. Section 6 examines the possible mechanisms underlying the effects of the exam experiment. Additional robustness checks have been done in Section 7, and Section 8 concludes the paper.

2. Literature review

The standard of exit exams has received relatively little attention compared to educational inputs in the literature on improving the quality of education in developing countries. However, a number of theoretical arguments are often put forward in favor of both introducing standardized exams and setting a high standard in these exams in order to improve the quality of and the return to education. According to commonly cited arguments, these policies a) signal the accomplishment of students to potential employers, thus inducing them to compete and exert more efforts towards learning (Becker and Rosen, 1992), b) can increase efforts and inputs from teachers, school management and parents (Bishop, 1997), c) reduce peer denigration of more studious students and their tolerance of disruptive behavior (Bishop et al 2000); and d) reduce the marginal cost of higher standards for schools under

pooling[3] (Costrel, 1994). Though the importance of education in these above-mentioned models is derived from the role it plays in signalling the ability of graduates' to potential employers, higher standard in education can also increase workers' productivity through human capital accumulation.[4]

The main concern, however, against setting higher exam standards is primarily distributional. While higher standards can increase the efforts of more able students, less able students may cease to exert any effort at all. Based on this reasoning, Crostell (1994) argues that an egalitarian policy maker may choose a lower exam standard compared to a standard that maximizes students' future income. Betts (1998) makes a counter-argument showing that an egalitarian planner may set higher standards than an income-maximizing planner *if* the employers cannot fully distinguish the productivity of an individual worker. He makes the case that with an increase in grading standards, the pool of less-able workers starts including some of the higher ability workers who would have otherwise graduated. Eventually, firms identify an increase in the average productivity of less-able workers and make an upward adjustment in their wage, which benefit the least-able workers. Andrade and Castro (2008) present a different case for possible counter-productive outcomes of higher exam standards. Their argument relies on the assumption that exams do not evaluate non-cognitive skills, which along with cognitive skills, are factors in determining labor productivity. By raising standards, tests may influence students to emphasize more on the skills assessed in exams and give less attention to their non-cognitive skills. This can, in turn, reduce their average productivity when they enter the labor market. Despite these possible concerns, exam standards in theoretical literature are expected to improve quality of education.

Empirical studies on this subject are almost entirely based on data from developed countries. Bishop et al (2000) compare students from New York with other states in the United States (US), to assess whether the state-wide requirement of CBEEE affects students' learning aptitudes, dropout and performance in the labor market. They find the 8th graders from New York perform significantly better than the rest in mathematics tests, but observe no difference in school dropout rates. A similar cross-state comparison in Canada also shows significant association between provincial CBEEEs and student performance in aptitude tests (Bishop, 1997). However, both these papers suffer from possible omitted variable bias since the states and/or provinces adopting these policies are likely to differ in many other important aspects.

A cross-country study by Woessmann (2003) uses a large dataset covering 39 OECD and middle-income countries. Controlling for a large set of variables, he finds a significant association between central

[3] In a decentralized system where each school sets their own standards, raising standard can be costly for schools as more students will decide not to meet it since they cannot reap the full payoff because of pooling in the labor market.

[4] Following the seminal works of Spence (1973) and Stiglitz (1975), there has been a long literature debating human capital and sorting hypotheses of returns to education. From human capital perspective, the most careful and influential approaches on estimating return to education used effects of birth date on schooling (Angrist and Krueger, 1991), schooling differences of identical twins (Ashenfelter and Krueger, 1994) and policies affecting access to education (Dufflo, 2001). Riley (1979), Lang and Kropp (1986), Bedard (2001), among others, try to disentangle the two effects. However, the difficulty in empirically distinguishing between these two competing roles of education arises due to their almost identical predictions, and Weiss (1995) explains the reasons for doubting existing evidence on this debate.

examinations and students' performance in mathematics tests, but a relatively weak correlation with science tests. Statistical significance of these results depends on the unit of clustering. Constructing a measure of teacher-level grading standard from a panel dataset in Florida, Figlio and Lucas (2004) find that higher grading standards adopted by teachers is associated with greater learning of their students in elementary schools. A similar approach for 12^{th} graders in the US shows a strong influence of grading standards on test performance, but not on graduation (Betts and Grogger, 2003).

While the evidence points towards a favorable effect of exam/grading standards on students' incentives to acquire academic competency, there are a few studies that evaluate the labor market effects of exam standards. In this literature, it is hypothesized that better education will lead to better job opportunities for graduates by increasing their productivity (*learning*) and/or by transmitting information about their unobservable abilities (*signalling*). Bishop and Mane (2005) find that both minimum competency exams and higher course requirements for graduation in some of the states in the US are positively associated with total earnings as well as the wage rates of graduates. More importantly, these associations are stronger for medium-term labor market outcomes (eight years after graduation) than short-term outcomes (within 21 months of graduation). Though their study controls for a few socio-economic backgrounds of the students, any independent state effect could bias their estimates. Contrary to these results, Betts and Greggor (2003) do not find any association between grading standards and graduates' earning. Dee and Jacob (2006) look at the heterogeneity in the effects of exit-exams and do not find any clear evidence of higher standards exacerbating inequality in the US. While dropout rates for black students increase with the introduction of CBEEE, graduates from the black community and Hispanic females exposed to the graduation requirement perform better in the labor market.

To the best of my knowledge, there has yet not been any study that looks into the labor market effects of exam or grading standards in developing countries. This is not surprising given that increasing access to education has been the priority for the policymakers in low-income countries during the past few decades. Consequently, schooling attainment and the actual competency of students have received relatively little attention. A comparison of the quality of education shows that children in developing countries perform 20% standard deviation lower than students of the same grades in developed countries (Glewee and Kremer, 2006). This is equivalent to almost three grade difference. This study does not include least developed countries, where the difference in quality is likely to be even more pronounced. The ratio of 15 to 19 year old students who are functionally illiterate ranges between 43% and 82% in developing countries, which is in sharp contrast with the developed world (Hanushek and Woessmann, 2007). These findings of increasing cross-country inequalities clearly demonstrate the need for identifying alternative means (in addition to educational inputs) of improving the quality of education in developing countries. Setting a higher standard in CBEEE has the theoretical and intuitive appeal of being such a possible means.

3. Description of education in Bangladesh and the 'natural experiment'

3.1 Educational status in Bangladesh

Education has been one of the priority sectors in Bangladesh for the last two decades. Investment in the education sector consistently accounts for about 15% of annual government expenditure (Al-Samarrai, 2007) and this ratio was 14% in the budget for 2010-11. Through this investment, Bangladesh has achieved significant progress in increasing access to education. Net primary and secondary enrolment rates in 1990 were 56% and 28% respectively (Sen, 2005), which increased to 88% and 42% by 2009 (UNDP, 2010). In addition, adult literacy rates have increased from 34% to 55% during this period. There have also been remarkable progresses in reducing gender disparity in access to education. However, the country is still lagging behind in improving the quality of its education. Both primary and secondary education are marked by high student and teacher absenteeism, low educational attainment, frequent grade repetition and low competency achievements.

Using a specialized instrument of assessing basic competencies, Ahmed et al (2003) find that more than one-third of the students in Bangladesh remained non-literate or semi-literate after completing five years of formal primary schooling. A similar assessment of literacy and numeracy skills revealed that only 29% of the children aged between 11 and 12 years had the basic competencies associated with that level of education (Chowdhury et al, 2003). The scenario is not very different at secondary level (6^{th} to 10^{th} grade). In a subject-wise test of competency, only 30%, 27%, 16%, and 43% of 10^{th} grade students were able to correctly answer half of the questions in Bangla, English, Mathematics and Everyday Science respectively. The proportions of secondary students failing to correctly answer at least one-third of the questions of the competency tests in Bangla, English and mathematics were 36%, 40% and 53% respectively.

Estimates of financial returns to schooling for Bangladeshi school graduates are consistent with the gloomy scenario of the quality of education and students' competencies. Using the mincerian approach, Asadullah (2006) finds an annual 7% labor market return to each additional year of schooling for wage employed people. This is quite low in comparison with the experiences of most of the developing countries, where the rate of return is around 10% on average (Hanushek and Woessmann, 2007). Considering the non-linearity in returns, the estimated annual returns to education in Bangladesh are found to be 4.1%, 4.0% and 12.8% for primary, secondary and higher education respectively. This is consistent with the low cognitive achievements by students at primary and secondary levels. This could also be because the additional years of education at primary and secondary level are a weak signal of the ability of students. A different set of estimates by Shafiq (2007) finds somewhat higher rates of return at each level of education for full-time male workers engaged in wage or salaried employment.

Overall, it is acknowledged by the policy makers in Bangladesh that the quality of education needs to be considerably improved. A number of reforms have also been suggested in the National Education Commission of 2003, which are at various stages of implementation.

3.2 The Secondary School Certificate (SSC) Examination[5]

The schooling system in Bangladesh comprises of five years of primary schooling (Class 1 – 5) followed by three years of junior secondary school (Class 6 – 8), two years of secondary school (Class 9 and 10), two years of higher secondary school, and between three and four years of university education. The first curriculum-based external exit examination takes place after 10 years of schooling. Six autonomous education boards are responsible for conducting this nationwide exam. Schools are assigned to a particular board based on administrative divisions. After passing the examination, students receive an official certificate called the Secondary School Certificate (SSC). Below SSC level, there is no official credential issued by any external authority. Students can obtain certificates of 7th or 8th grade completion from the schools they attended.

To be able to sit for the SSC exam, examinees have to register with the education board at least two years prior to the year of examination (i.e. at the beginning of 9th grade). Once registered, a student can sit for the examination up to three times. After this, unsuccessful candidates can re-register five years after their last registration. After completion of the SSC exam, graduates must get admission to a different institute (colleges offering higher secondary education) in order to continue studying for the higher secondary certificate (HSC). This exam is also administered by the same education boards.

In the years relevant to the SSC – grades 9 and 10 – students study 10 courses, seven of which are predetermined and 3 of which are chosen from different sets of courses. In order to be awarded an SSC, a student must sit for exams on all the 10 courses and achieve at least 33% of the full marks in each course. Those who score at least 750 out of the maximum score of 1,000 in the 10 courses combined, earn a 'distinction' (popularly called 'star marks'). The other grades are 'first division' (score 600-749), 'second division' (score 450-599) and 'third division' (330-449).

3.3 The natural experiment: Multiple Choice Question (MCQ) with a Question Bank

Until 1992, students were evaluated on the basis of their descriptive answers to SSC exam scripts. There were concerns regarding the comparability of the evaluation of narrative answers by individual examiners. Nearly one million students taking the exam each year made it even more complicated to ensure fair assessments. To reduce examiner bias and to make the grading system more objective, Multiple Choice Questions (MCQ) method was introduced in 1992. In this new system, the evaluation weights were equally distributed between MCQ and descriptive answers for all the courses (except for mathematics, which followed the earlier structure). The structure of the descriptive answers remained the same, but this section was given half the weight within the overall evaluation. Pass marks in the new exam structure followed the previous cut-offs, but students were required to obtain at least 33% of total marks in MCQ and narrative answers combined for each course.

[5] There have been a few more recent changes in education structure. The following description, however, is valid for the period between 1985 and 1999, which is relevant to the time-span for this paper. The major changes since then have been the introduction of letter-marking grades in 2000 and an additional exit exam at junior secondary (after 8th grade) from 2010.

To help students prepare for the newly-structured MCQ exam as well as to guide teachers in preparing their students, a 'question bank' of 500 MCQs for each course was published by the education board. All six education boards used the same 'question banks'. Though the question banks were originally meant to provide only a guideline, examiners utilized the same 'question banks' to prepare exam papers: these were identical even in the ordering of the four answer choices to each question. Therefore, a student could pass the examination by studying the 500 questions for the two years before the SSC exam. This reduced the incentive for students to study the components of cognitive learning in order to pass their exams. This provided a scope for many students to pass the exam and obtain SSC certificates without achieving any additional cognitive abilities. Unsurprisingly, this caused the rate of passing the SSC examination to increase remarkably (Figure 1). The numbers in this graph have been compiled from officially published exam results for all the examinees in each exam year. The question bank period in the graph is marked by both a very high average pass rate and a surge in the number of examinees. The mean pass rate during the four years of question banks was 67 percent, which was much higher compared to mean pass rates of 49 percent during the four years prior to and following the question bank period. The pass rate in 1991, the year before the start of question bank, was also as high as the average pass rate of the next four years. Because of the changed exam structure, examinees of 1991 were not allowed to take the exam in the following year and required re-registration. There is unofficial information that examiners were guided to 'go easy' in grading the exam papers so that 'unlucky students' did not have to lose two additional years before taking the exam again. A second possible explanation of the high pass rate in 1991 is that the examinees studied harder to avoid wasting additional years.

Another important change took place during this experimental period, which is of particular relevance for interpreting the results of this paper. The switch to objective grading came with a change in anonymity of the examinees to the examiners. Prior to the 1992 exam year, the answer scripts contained the names of the examinees and the schools they attended. Since 1992, this has been made anonymous to reduce possible bias in grading or corruption by the examiners. The implications of this change will be discussed in Section 6.

As yet, there has not been any study that objectively verifies the effects of this weak exam standard on the actual cognitive abilities of graduates. Although no official statistics is available on this issue, a large share of the students was reported to have passed the SSC exam during that period relying on the MCQ part of the exam despite doing badly on the narrative sections. Realizing the effects of question banks on the quality of secondary education, the education boards declared several changes in 1994 that were to be made effective from 1996. The first was the abolishment of question banks for exam preparation. In addition, students were required to obtain at least 33% in both MCQ *and* narrative answers to pass the SSC. These changes led to a dramatic fall in the SSC pass rate (Figure 1). The number of students appearing in the examination also returned to the original trend after a sharp decline in 1996.

These changes in the examination structure provides a "natural experiment", where a good share of the students who acquired the certificate during 1992-1995 would have otherwise failed to do so or would

have had to study harder to gain the required competencies necessary to pass the exam. This paper exploits this variation to assess the labor market effects of an easier exam.

4. Data and methodology

Two different datasets have been used in this paper. In both datasets, the age of the individuals has been used as the exogenous determinant of their exposure to the 'question bank' scheme. The primary set of data for this paper comes from the national Household Income and Expenditure Survey of 2005 (HIES-2005) conducted by the Bangladesh Bureau of Statistics. This data has been used to assess the effects of the experiment on participation in salaried employment. This dataset contains a very small sample to evaluate any effect on wage rates. Employee records of a large non-governmental organization in Bangladesh have been used to assess the effects on salary and salary progression, which complements the findings from HIES-2005.

There are three major challenges in using age as the exogenous determinant of exposure to the experimental exam structure. Since there is no official record of age or birth registration in Bangladesh[6], the surveys collect age of household members by recalling their year of birth using event calendars.[7] This often creates measurement errors and, in fact, we observe a tendency of reporting rounded figures for age (i.e. 25 years, 30 years, 35 years, and so on) in the data. Secondly, according to the education system of Bangladesh, an individual should get enrolled in grade 1 at the age of 6 and sit for SSC at the age of 16. However, a number of surveys have shown that a large proportion of the students get enrolled for the first time at the age of 7, and sit for their SSC examination between the ages of 16 and 18 (Nath et al, 2008). Thirdly, the students who were 16 in 1991 or 1992 could also decide to sit for SSC exam during the 'question bank' period to take advantage of the less difficult exams by re-registering.

However, after learning that the grading system was going to change again, those students who were 16 in 1996 could not decide to sit for the examination in question bank period since they have to register at least two years ahead of the exam. Therefore, people aged 26 to 31 in 2005 can be considered to have been exposed to the question bank (Figure 2). Individuals aged 30 and 31 in 2005 have also been included in the exposed cohort since a) many students take the examination at the age of 17 and 18 and b) they could decide to delay sitting for the examination by two years.

There is an additional challenge in using the second dataset of employee records, which is about a graduate's 'real' versus 'certificate' age. Since age limits are often used by the government and private sector in Bangladesh as one of their recruitment criteria, there is a widespread tendency of under-reporting age. Employers use the date of birth recorded in each individual's registration with the education board, which takes place in the beginning of grade 9. Students, therefore, quite often record a date of birth that makes them six months to two years younger in the records. Sometimes, they also do it simply due to report a convenient date of birth. For example, according to the employee records, over

[6] Birth registration has been introduced in Bangladesh in early 2000, and this is yet to be made universal in the country. Moreover, national identity card has been introduced in 2008.
[7] Event calendars use major political and natural events, for example, independence, election year, or major flood.

6% of their 65,000 employees were born on the 1st January of their year of birth. This phenomenon of distinguishing between 'certificate' and 'real' date of birth is commonplace in Bangladesh, and introduces additional errors in the exposure measure in employer records since the record contains 'certificate' age. According to a national survey of adolescents and youth in Bangladesh, the majority (72%) of students who completed at least SSC, did it at the 'certificate age' of 15-17.[8] The exposure measure in the employee record, therefore, takes account of this by reducing the age for exposure by one year.

Analysis of HIES-2005 data includes the individuals who were aged between 23 and 37 at the time of the survey and had grade 9 or SSC as their highest educational achievement. Among them, the individuals aged between 26 and 31 years have been defined as the exposed cohort, and individuals aged 32 to 37 years and 23 to 25 years constitute the comparison group defined as 'older cohort' and 'younger cohort' respectively (Figure 1). Individuals younger than 23 (in 2005) have not been included as many of them were still studying. Nath et al (2008) have found that a number of SSC graduates continue their education for several years even though they keep failing the Higher Secondary Examinations (HSC). The younger cohort in HIES data, therefore, comprises of 3-years age bracket instead of 6 years. However, the analysis of employer records makes the cohorts by 6-years age brackets since the data is relatively more recent (collected in June, 2008).

In most parts of the analysis in this paper, the sample is restricted to individuals who have completed grade 9 or SSC. This is to make a neater assessment of the question bank experiment. Students who have either completed HSC and above or did not study as far as 9th grade are unlikely to be directly affected by the experiment regarding their performance in labor market. Using this sample, the basic reduced form specification is essentially a difference-in-difference estimate.

$$y_i = \alpha + \beta_1 SSC_i + \beta_2 SSC_i * EXPOSED_i + \beta_3 EXPOSED_i + \gamma_k X_{ki} + u_i \qquad (1)$$

where y_i denotes participation in salaried work, equal to 1 if observation *i* is involved in salaried employment and 0 otherwise. Salaried employment in Bangladesh is important both for its financial return and for the social prestige associated with such jobs. Limitation of salaried employment as the main outcome variable and results of alternative dependent variables will be discussed in the findings section. SSC_i is a dummy for whether individual *i* has passed SSC, which takes the value of 1 if the person has completed SSC (but not HSC) and 0 if completed 9th grade. Therefore, β_1 measures the return to SSC over grade 9 graduates for the older and younger cohorts. $EXPOSED_i$ is a dummy variable, equal to 1 if an individual is between 26 and 31 years old as of 2005, and 0 otherwise. X_i is the set of their individual characteristics and regional dummies. The key parameter of interest is β_2, which should be zero if passing SSC examination during the question bank has no effect on labor market performance. $\beta_1+\beta_2$ is the returns to holding an SSC certificate (in terms of the likelihood of having salaried employment) for the exposed cohort.

[8] See RED (2006) for details of the dataset

Given that the exposure by age is expected to contain measurement errors, this could lead to attenuation bias and erroneously give an estimate of the parameter closer to zero. Despite this problem, using age to estimate exposure has an important advantage over the actual year for sitting for the SSC exam. Students might decide in which year to take the exam once they are in grade 9, which could introduce selection bias in our model (e.g. relatively weak students deciding to take the advantage of question bank). However, age should remain exogenous to the exposure even though some of the students did not actually take the exam during this period. Using age allows controlling for omitted ability since there is no reason to believe that these underlying abilities are associated with age.

Table 1 shows descriptive statistics of the two datasets, both of which include only those who have completed grade 9 or SSC. HIES-2005 data (in Panel A) shows that the rate of passing SSC examination is higher for the exposed cohort than the other two cohorts for both male and female students. This gives some confidence in the exposure measure although the difference between older and exposed cohorts is marginal for male students (57.4% vs. 60.1%). Labor force participation of males is around 90%, which differs greatly from female (only 10%). For males, engagement in salaried employment is lower (28.6%) for the exposed cohort in comparison with both the older (35.1%) and younger (31.3%) cohorts.

From the employee records data in Panel B, about 80% of the employees are male. Average job tenure of the employees is obviously correlated with their age. The proportion of employees with an SSC certificate is higher for the exposed cohort compared to the older cohort, which is expected given the differential pass rate between the two groups. However, there is no difference between exposed and younger cohorts in this ratio, which indicate that the organization is recruiting relatively greater proportion of SSC graduates from younger cohort. More relevant comparison is the difference between the average salary of 9^{th} and SSC graduates across the different cohorts. While the average salaries of SSC graduates are higher than those of 9^{th} graders for both the older and younger cohorts, there is no such difference for exposed cohort.

5. Main results

Since information about the amount of earnings is available for only a small number of observations in the national data, participation in salaried employment has been used as the key outcome indicator. It has already been noted that salaried employment is the most desired and rewarding form of employment in Bangladesh. Osmani et al (2003) found that an individual in Bangladesh can achieve the highest amount of economic returns by making an occupational shift to non-farm salaried employment from other forms of employment. Sen et al (2007) illustrate similar scenario where they find that an occupational shift to the non-farm sector is one of the major drivers of economic mobility for the poor. They also reveal that this shift is more likely to happen through salaried employment after achieving higher education. HIES-2005 data also shows a strong correlation between salaried employment and education. The extent of salaried employment increases from 9% for those who have completed grade 9

to 61% for those with a master's degree.[9] An anthropological work on the youth who completed between 8 and 12 years of education reveals an extremely high degree of social status associated with salaried employment, and finds that many youth are willing to remain unemployed for several years trying to get a salaried job before taking any non-salaried work (Ahsan, 2008).

Using engagement in salaried employment as the dependent variable, regression results of equation 1 for male and female samples are presented in Tables 2 and 3 respectively. Completion of SSC is positively associated with the probability of being employed in a salaried job for both males and females. This shows a significant return to the SSC (in terms of higher probability of salaried employment), which could be either because of greater human accumulation by SSC graduates over 9th graders or signalling of their higher abilities. It is important to note here that the estimated returns (12 percentage points for male and 7 percentage points for female[10]) are the returns to completion of SSC over 9th graders. These are not estimates of the return to 10 years of schooling. Although these appear to be very high estimates of the return to SSC certificate over 9th graders, it is not surprising given that there is no official credential below SSC and it is very easy to produce a fake certificate of completing grade 8 from many schools.

The coefficients for *SSC*EXPOSED*, which is the key parameter of interest for this paper, are negative and significant at less than 10 percent level. This reveals that the returns to SSC certificate, in terms of accessing salaried employment, are significantly lower for those who were exposed to the question bank method of examination. Point estimate of the effect is higher for the male sample (11 percentage points) than the female sample (5 percentage points) although this difference is not statistically significant.[11] Among the exposed cohort, the SSC graduates are not doing any better than those who completed 9th grade ($\beta_1+\beta_2$ is not statistically different from zero). These estimates are consistent across different specifications of linear probability models and logit model.[12]

Table 4 makes the same comparisons relative to the older and younger cohorts separately to investigate whether the average effects are particularly driven by the difference of the exposed cohort from either of the two non-exposed cohorts. We find that point estimates of the effects relative to the older cohort are significant for both male (13 percentage points) and female (7 percentage points) graduates. Estimated effects relative to the younger cohort are also negative (7 percentage points for male and 4

[9]For the full sample, the extents of salaried employment for different education level are 9% (with 9th grade), 18% (SSC), 27% (HSC), 46% (graduates) and 61% (masters).

[10] The difference of these point estimates is not significant (p-value 0.145).

[11] Difference of the coefficients of the two regressions was tested using Chow test.

[12] Some of the control variables in the third and sixth regression (Rural/urban location, marital status, and administration division dummies) are not 'ideal' control variables since these variables themselves are likely to be affected by the key regressor of interest, i.e. completion of SSC. For example, present location could be influenced by completion of SSC if they migrate to urban areas seeking better employment or educational opportunities. Ideally, we would require information on these variables at the time of taking the SSC exam, which may have determined their probability of passing the exam as well as securing salaried employment. However, this information is not available in this cross-sectional data. Therefore, these variables have been excluded in subsequent analysis.

percentage points for female sample) although not statistically significant. The SSC graduates of the exposed cohort appear to be performing worse than both the older and younger cohorts. The returns for the younger cohort are expected to rise, as 2005 is too early to find their real likelihood of salaried employment. As noted earlier, such SSC graduates try out different alternatives (including higher secondary study before dropping out) before settling into any employment. An important finding for this paper is the consistency in zero payoffs, in terms of the likelihood of having formal employment, to SSC certificate for the exposed cohort as shown by $\beta_1+\beta_2$ being not different from zero in all four regressions.

6. Mechanisms underlying the effect on labor market performance

In terms of linking the effect of question bank policy on labor market performance, there are four possible explanations. Two of these mechanisms, lower human capital accumulation through reduced incentive to learning and noisy signal of abilities, have already been discussed in Section 2. A third possible explanation arises from the general equilibrium effects of increased supply of SSC graduates, which could reduce the probability of getting formal employment of the exposed graduates when they entered labor market for the first time.[13] In fact, as Figure 1 demonstrates, there were increases not only in pass rates but also in the number of examinees during the experimental period. Therefore, there is possibility of them facing a relatively 'slack' labor market when they started looking for jobs. Although we look at the labor market outcomes almost 10 years after their graduation, there are evidences showing that initial labor market conditions can have longer term influences (Altonji, 2005; Brunner and Kuhn, 2010).

The fourth explanation relies on the change in anonymity between regimes. Prior to the change in exam standards from subjective to objective assessment in 1992, the examiners knew the name of examinees and the schools that they attended. If the examiners are biased in favor of good schools, weaker students from better schools could receive preferential treatment in grading. Moreover, students with greater family connections could potentially track their exam papers and influence the outcome of their exams. This would create a positive correlation between passing the exam and getting a good job. With the introduction of anonymity, this link is broken.

This section examines these alternative interpretations of the main results, and focuses on the male sample, for which the previous effects could be precisely estimated. The same analyses were conducted for female sample, but not presented in this paper. The directions of the estimates were found to be similar between the male and female samples.

6.1 Alternative definition of exposure

We can use different age cut-offs for exposure to reflect on the four interpretations. Among the exposed cohorts, students who took the exam in later years were more aware about the 'usefulness' of

[13] Duflo (2001) discusses the general equilibrium effects of greater supply of educated laborers in the context of Indonesian labor market.

question banks. Even though all the examinees between 1992 and 1995 took the SSC examination under the question bank regime, by 1994 it was obvious that question banks were the sole source of questions for the MCQ part of the exam. There was also an official circular from the Education Boards of this fact, which was not available in the earlier two years. Therefore, the late exposed group had to study the least amount to pass the exam while both groups earned the same signal. In order to test these two explanations, the exposed group has been sub-divided into early exposed (26-28 years old) and late exposed (29-31 years old) categories. Table 6 presents the estimates of the following equation using HIES-2005 data.

$$y_i = \alpha + \beta_1 SSC_i + \beta_2 SSC_i * EXPOSED\_EARLY_i + \beta_3 EXPOSED\_EARLY_i + \beta_4 SSC_i * EXPOSED\_LATE_i + \beta_5 EXPOSED\_LATE_i + \gamma_k X_{ki} + u_i \quad (2)$$

In this equation, y_i is a dummy for salaried employment. β_2 and β_4 estimate the effects of the question bank experiment on early exposed and late exposed groups respectively. The effects appear to be much stronger and more significant for the late exposed group (Table 5). The differences between β_2 and β_4 in regression 1-6 are significant at 12-13 percent level. The early and late exposed cohorts obtained similar signal by taking exam within question bank structure. They also took the exam under the same anonymity system. The results of Table 5, therefore, are relatively more consistent with both human capital and general equilibrium hypotheses compared to signalling or social connection interpretations. The arguments have been elaborated below.

If greater awareness about the question bank regime is the major driver of the differential effects, the results can be interpreted as supporting the human capital hypothesis. Since both the early and late exposed group had the same signal but different level of incentives to learn, the difference in labor market performance could be due to lower amount of human capital accumulation. General equilibrium effects can also explain the results equally well. The effect of the experiment may have been stronger for the late exposed cohort since both the pass rates and the number of examinees were higher in the later years of the experiment. Cumulative oversupply of SSC graduates may have also created a stronger effect on the late exposed cohort.

The effects on the late exposed cohort relative to their younger cohort are of particular relevance to the social connection explanation. Although the estimates are not significant at conventional levels, the high estimates (14 percentage points significant at 12 percent level) caste doubt over the social connection hypothesis. The change to anonymity in exam papers occurred in 1992, and the younger cohort took their exams under the same anonymous condition. If social connection is the primary driver of the results, we should not observe such large estimates of the exam experiment effect relative to the younger cohort.

There are possible other explanation of these differential effects on the early and late exposed groups. It can be argued that the employers use the specific years of passing the SSC, in addition to using the question bank period, for sorting candidates. However, it is difficult to imagine that the employers keep track of each year's exam standard while SSC graduates comprise of a relatively small share in the total

pool of people with salaried employment. Another possible reason of the different results could be disparity in measurement errors of exposure between the two groups. We have used age as the exogenous proxy for actual exposure. If there are higher amount of measurement errors among the early exposed group than the late exposed, then they will have higher amount of attenuation bias (i.e. the coefficient being biased towards zero). As it has described, there is a strong tendency in reporting rounded figures for age in the sample. Since the late exposed group contains those individuals who are 30 years old (as of 2005), this group (rather than the early exposed group) is likely to have higher measurement errors. The possibility of different levels of attenuation bias, therefore, is unlikely to explain the results.

6.2 Effects on HSC graduates

The base analysis of this paper uses difference-in-difference estimates between 9th graders and SSC graduates across different cohorts. We excluded those who completed HSC (higher secondary level - the next qualification after SSC) and above with an underlying assumption that there was no change in the ability of this pool of students since there was no change in the HSC exam structure.

According to the screening argument, however, there should be a change in the return to HSC graduates for the exposed cohort. As additional low ability students acquire SSC certificates due to easier exams, this should make employers readjust the salaries for SSC graduates downward. This, in turn, will induce the relatively higher ability students to exert additional effort in achieving HSC, who would otherwise have been satisfied with only SSC certificates (Bedard, 2001). Moreover, obtaining the SSC certificate may have had motivational effects on the students to continue their education. It is possible that such motivational effects are stronger for relatively better students among those who would have failed to obtain the SSC under conventional standards, but passed the exam due to its lower standard. Therefore, it is possible that the final pool of both SSC and HSC graduates in exposed cohort contains individuals with relatively lower inherent abilities compared to the other two cohorts. In such a scenario, we should observe similar negative effects on the HSC graduates from the exposed cohorts.

Similar prediction can be made for social connection and general equilibrium effects. Since 1994, anonymity of examinees has been introduced at the HSC exam as well. If our main results are driven by social connections, we should observe lower return for HSC graduates relative to 9th graders. Greater competition from SSC graduates for jobs can also reduce the likelihood of getting salaried employment by the HSC graduates.

On the other hand, if competencies achieved during SSC study are associated with later performance in the HSC exam, some of the higher ability students will fail to acquire HSC. According to the national aggregate figures, annual average pass rate in HSC (which happens two years following the SSC) during 1994-1997 was 37% compared to 46% in the previous 9 years and 52% in the subsequent 10 years. It is, therefore, quite likely that a good portion of the SSC graduates taking advantage of the lower exam standards may have failed to make it beyond SSC. These national statistics are not enough to make a

clear case of whether there were changes in inherent abilities among the different pools of SSC graduates.

Moreover, any other educational policy that is correlated with the exposed group can also influence our main results. If the age cohorts are orthogonal to ability distributions and other important educational policies, there should be no effects of exposure to question banks on the labor market performance of HSC graduates. Table 6 presents double difference estimates of the likelihood of salaried employment by HSC graduates (the same as equation 1, but replacing SSC_i with HSC_i).

$$y_i = \alpha + \beta_1 HSC_i + \beta_2 HSC_i * EXPOSED_i + \beta_3 EXPOSED_i + \gamma_k X_{ki} + u_i \qquad (3)$$

Here HSC_i is a dummy variable, equal to 1 if individual i has completed HSC, and equal to 0 for those who completed 9th grade. We do not observe any effect on the students from exposed cohort who have completed HSC. The coefficients for HSC_i*$EXPOSED_i$ are not significantly different from zero. Therefore, HSC graduates from exposed cohort are likely to obtain equal amount of return to HSC, in terms of salaried employment, compared to the other cohorts. These results caste serious doubts on the social connection story of the correlation between labor market performance and passing SSC during the exposed period. If social connection hypothesis is the key underlying mechanism, this would indicate that social connection is used by SSC graduates and not by the HSC graduates in securing formal employment. It is difficult to argue in favor of such a case.

While the same results are also contrary to the predictions of signalling and general equilibrium hypotheses, both the arguments rely on the spillover effects of the exam experiment on HSC. If the spillover effects are weak, we may not be able to capture that from our data. Nonetheless, the lack of any impact on the HSC graduates builds confidence on the causal effect of the exam experiment on the labor market performance of the SSC graduates.

6.3 Sectors of employment

Distribution of employment in different sectors can potentially shed light on the relative importance of the four possible mechanisms. About 40% of the formal sector employment is concentrated in the public sector and the rest 60% in private sector. Between public and private sectors, there are reasons to expect that social network could be relatively more important in public sector due to corruption in recruitment. There is widespread inefficiency in public sector of Bangladesh due to lack (or complete absence) of promoting and firing based on performance than connections (Mukharjee et al, 2001). On the other hand, private sector employers are more likely to be sensitive to human capital and productivity of their employees. Therefore, we should observe the effects of exam experiment to be concentrated more in public sector if social network or signalling are relatively more forceful mechanisms, and reduced human capital accumulation should reveal greater effects in the private sector.

Table 7 gives the estimates of equation 1, where the dependent variables are engagement in salaried employment in public and private sector (regression 1 and 2 respectively), non-farm self employment (regression 3) and informal day labor (regression 4). We find that completion of SSC is positively associated with salaried employment in both government and private sector for the non-exposed sample, albeit the point estimate for private sector is significant at less than 11 percent level. More importantly, the exam experiment reduced employment for SSC graduates in private sector and there is no significant effect in government sector employment. This indicates that social connection and signalling are not necessarily the main drivers of the results. Regression 3 shows that greater proportion of the SSC graduates of the exposed cohort took up employment in non-farm businesses. Finally, day labor is a sector that requires the least amount of human capital and we do not observe any significant effect on this form of employment.

The results could also be explained through general equilibrium effect of greater competition for employment in private sector due to increased supply of SSC graduates. However, we should observe similar general equilibrium effects in the government sector as well. In fact, growth in employment in public sector in Bangladesh has stagnated since 1992 (Mukherjee et al, 2001), and private sector has been the main provider of salaried employment in Bangladesh (Rahman, 2005). In this scenario, greater supply of graduates should reduce possibility of getting salaried employment in the government sector than in the private sector. Nonetheless, it is difficult to make accurate prediction of the general equilibrium effects.

7. Discussion on the robustness of the results

While the mechanisms of the effects are not conclusive, the main results of the negative effect of lowered exam standards on labor market performance are quite consistent. The possibility of omitted policy variables is a common concern in assessing the causal effects of a particular policy in quasi-experimental settings. It is essential to review whether our estimates of the effects of lower exam standard are picking up any other effects, which are correlated with the question bank experiment. Amin (2007) lists the major policies that took place in Bangladesh since independence. The major policy during the question bank period is the stipend programme for female students at secondary level. However, this national programme was introduced in 1994 and its influence on SSC pass rate could have happened only in 1999 or later. Moreover, this programme is for female and their labor force participation is very low for all three cohorts. In this section we discuss the robustness of the main results with additional data and analysis, and the limitations.

7.1 Effects on salary and salary progression

Our base analysis uses obtaining formal employment as the outcome variable. As discussed earlier, wage information from HIES-2005 could not be used because of the very small sample of individuals in the data who completed 9^{th} grade or SSC and were earning a salary. Moreover, descriptive statistics of HIES-2005 sample revealed quite a few outliers, which could otherwise influence the results, especially given the small sample size. To complement the main findings, employee records of an NGO have been used, which contain information on salary and its progression. The employee records that have been

analyzed were being used by the organization to pay these employees, which avoids possible measurement errors in reporting. Moreover, employer records allow assessment of different outcomes (including initial salary, salary progression and current salary) to shed light on the relative importance of learning and sorting mechanisms.[14] Table 8 (regression 1, 2 and 4) presents estimates of the following of equation.

$$y_i = \alpha + \beta_1 SSC_i + \beta_2 SSC_i * EXPOSED_i + \beta_3 EXPOSED_i + \gamma_k X_{ki} + u_i \qquad (4)$$

This is the same difference-in-difference as equation 1, except the dependent variables are different. The dependent variables are the log of initial salary, salary growth and current salary. Since the organization started keeping digital records of employees in 2003, we do not have the data of initial salary for those employees who joined the organization prior to this. Since a neater comparison can be made amongst those who joined in 2003 or after, observations included in the first three regressions are restricted to those employees. The fourth regression includes all current employees who have completed either 9th grade or SSC.

In the first regression, the log of initial monthly salary is the dependent variable. Among non-exposed cohorts, those who have the SSC joined the organization at a 10% higher salary compared to those who completed grade 9. This is a relatively high return for achieving the certificate. For exposed cohorts, however, the premium for having an SSC is 11% lower than that of the other two cohorts. This evidence shows that having SSC certificate had no significant return in terms of starting salary for the exposed cohort working in the organization. Evidence from this data reveals that the lower exam standard has significantly reduced labor market gains for the SSC graduates, which is consistent with the findings from HIES-2005.

Results from the first regression do not explain whether the SSC graduates and 9th graders of the exposed cohort were being paid the same salary due to acquiring similar level of human capital from schools or because of the question bank itself being used as a signal by the employers. The lack of difference in initial salary between SSC and 9th graders of the exposed cohort could also be explained by the greater supply of SSC graduates during this period. Growth in salary can potentially differentiate between human capital and signalling mechanisms. Since the employers get to know the 'true' ability and productivity of employees, they adjust salary over time. If those employees with and without an SSC certificate had, on average, different levels of human capital, and the initial lack of difference was due to screening by the employers, SSC graduates will display a higher salary progression. On the other hand, if these two groups have the same level of human capital, there will be no such divergence in salary over time.

[14] There is a caveat in interpreting the result from this data. The employees of this organization do not necessarily represent the cohorts who are engaged in salaried employment since there could be selection biases by the organization or among employees interested to work for this organization.

In the second regression, the dependent variable is the difference between the log of current (as of June, 2008) and the log of initial salary, which measures growth in salary. For the non-exposed cohorts, we observe a divergence in salary between employees with and without SSC certificate. The SSC graduates of non-exposed cohorts have experienced around 5% higher growth over 5 years in their salary compared to those who had only completed 9th grade from the same cohort. However, there is no divergence visible for the exposed cohort. This indicates that the SSC graduates of exposed cohort did not acquire any human capital to attain any labor market gain. Interestingly, among those employees who completed grade 9, the exposed cohort had a higher salary progression than the other two cohorts. A plausible explanation of these results is that both the SSC and non-SSC groups of the exposed cohorts were being offered lower initial salaries, and both groups are catching up with the non-SSC group of other cohorts. If the SSC graduates of exposed cohort did not acquire any additional cognitive ability (unlike SSC graduates of other two cohorts), they are not likely to be doing any better than 9th graders of the same cohort.

Interpretation of regression 2 is based on the assumption that employers become aware about the actual productivity of the employees. It is difficult to make an assumption about the amount of time required by the employers to get full information about productivity. Therefore, regression 3 looks at heterogeneity in salary growth by job tenure.

$$y_i = \alpha + \beta_1 SSC_i + \beta_2 SSC_i * EXPOSED_i + \beta_3 EXPOSED_i + \beta_4 TENURE_i + \beta_5 TENURE_i * SSC_i + \beta_6 TENURE_i * EXPOSED_i + \beta_6 TENURE_i * SSC_i * EXPOSED_i + \gamma_k X_{ki} + u_i \quad (5)$$

Here $TENURE_i$ is the number of completed years that employee i is working in the same organization. While an additional year of job tenure is associated with around 9 percent higher growth in salary, none of the interaction terms of $TENURE$ is significant (regression 3 in Table 5). This indicates that the employer made the salary adjustments relatively fast.

The last regression (regression 4 in Table 8) reports results of equation 1 with log of current salary as the dependent variable. This regression includes employees who joined before 2003, majority of whom belong to the older cohort. Although the measure of return to SSC certificate becomes insignificant, the main result of lower returns for SSC graduates of the exposed cohort persists.

7.2 Linear returns to schooling

So far the analyses include the individuals who have completed 9th grade as the base category to estimate payoffs from the SSC certificate and excludes all other observations. Here we do an alternative estimate of linear returns to additional grades completed. The specification is

$$y_i = \alpha + \beta_0 EDU_i + \beta_1 SSC_i + \beta_2 SSC_i * EXPOSED_i + \beta_3 EXPOSED_i + \gamma_k X_{ki} + u_i \quad (6)$$

where y_i is whether individual i is engaged in salaried employment or not, and EDU_i is years of education completed. Therefore, β_0 is the returns to an additional year of schooling. β_1 and β_2 are the

deviation from linear returns for completing SSC for the non-exposed cohorts and the differential deviation for the exposed cohort. Table 9 (regression 1 – 3) shows the results of this specification using HIES-2005 data. Completing an additional year of education is associated with around a 3.5 percentage point increase in the probability of salaried employment. While the other cohorts do not show any significant deviation from this linear return for achieving SSC, there are significantly lower returns for the exposed cohort.

In regression 4 to 6, we add dummies for Grade 9 and HSC, and their interactions with exposed cohort. The results show that the exposed cohort is performing worse than the other two cohorts only if they completed SSC. The likelihoods of obtaining salaried employment by Grade 9 or HSC graduates are not different between the exposed and non-exposed cohorts. Since we observe the effect of exposure to the exam experiment only among the SSC graduates, this builds confidence in interpreting the results of poorer labor market performance as a causal effect of the policy.

7.3 Exam performance beyond pass-fail

We find that students of the exposed cohort are more likely to pass the SSC exam (Figure 1 and Table 1) and perform poorly in labor market, but we do not explore any intermediary outcome variable. There are two major intermediary outcomes, namely students' learning (which could be measured by tests of cognitive abilities) and their exam performance beyond pass-fail classification, in terms of division/grade achieved.[15] Although we do not have data on these outcomes, their implications on labor market performance deserve some reflections.

The division achieved in SSC is often used as an entry requirement and an explicit screening device by employers. It can be argued that while the experimental examination system may have made it easier to pass, it could also have made it more difficult to achieve better grades. In such a scenario, the exposed cohort is put into a disadvantaged position relative to the other cohorts, and the estimated effects may reflect this disadvantage rather than lower standard in passing. However, the reality is quite the opposite. The graduates in the exposed cohort had an advantage over the other two cohorts in terms of division because of the question banks. For example, 50% of those who passed SSC in 1994 got 1st division compared to 34% in 1997 and 13% in 1991. Only 1.4% of the students passed with 3rd division in 1994 compared to 46% in 1991.

Besides this advantage in grades, SSC graduates of the exposed cohort had more time to find salaried employment than their younger cohorts. As noted earlier, graduates do not necessarily enter the labor market immediately after passing the SSC exam. Since we are looking at employment status in 2005, the

[15] It could be argued that human capital accumulation or academic performance is determined by students' fixed effects and not affected by changes in exam standards. However, Stinebrickner and Stinebrickner (2008) find that academic performance is not predetermined by student characteristics, and they find influence of roommate characteristics influencing study time and exam performance. Though their result may not be generalizable, it is difficult to imagine that study effort and exam performance are fully predetermined.

exposed graduates had more time to find a job. Despite the grade and time advantage, they are performing worse than their younger cohorts.

7.4 Limitations

Overall, the main finding of a lower exam standard leading to worse labor market performance, in terms of the probability of attaining salaried employment and lower salary, by the graduates is robust for the male sample. The results of lower return to SSC are not as consistent for the female sample as it is for male. In terms of the underlying mechanism(s), both lower human capital accumulation and general equilibrium effects due to greater supply of SSC graduates seem plausible, which could not be disentangled.

A second limitation of this paper is not exploring the intermediary outcomes (e.g. cognitive ability or learning) due to lack of data. Moreover, we primarily focus on engagement in formal employment as the measure of labor market performance, except for the analysis of employee records data. Although this is a useful indicator of labor market performance, effects on actual earning need to be assessed for more efficient policy suggestion.

Finally, we could not assess the distributional aspects of a lower exam standard. Lower standards are sometimes rationalized by policy makers on the grounds that higher standards can cause the weaker students, especially the ones from poorer socio-economic backgrounds with limited family supports for their education, to dropout. We could not measure heterogeneity of the effects across different socio-economic groups because of lack of adequate data. Further study can potentially exploit this experiment to look into the distributional issue by collecting richer data.

8. Conclusion

Using a natural experiment in the structure of the secondary education final exam in Bangladesh, this paper shows that lower academic standards have a negative effect on the labor market performance of the graduates. We find that acquiring a SSC certificate under conventional standards is associated with 12-13 percentage points increase in the likelihood of getting salaried employment for male and about 7 percentage points for female. However, lower standards during the experimental period eliminated these labor market gains of successfully passing the exit exam. We also find that greater supply of SSC graduates and lower human capital accumulation during lower standard period are potential drivers of their poorer labor market performance.

In recent years, education has become a major area of investment in developing countries. Similar emphasis on education has enabled Bangladesh to achieve substantial increases in access to education. However, the quality of both primary and secondary education has repeatedly been raised as a cause of concern. Given the size of investments in the education sector, these concerns are of utmost importance for policy makers. Discussions on improving the quality of education in developing countries are primarily concerned with inputs and delivery mechanisms. While standards in curriculum based exit examination are widely discussed in developed countries, this is yet to receive any noteworthy academic

attention for developing countries. Consequently, the policies on academic standards in developing countries often suffer from decisions based on hunches rather than evidence. Such decisions are also prone to political considerations. For example, a high pass rate in public examination is considered as a success by the education ministry. In recent years, the government of Bangladesh has been considering a number of drastic measures to reform the structure of education. Maintaining a high standard in exit exams should be given priority in this attempt.

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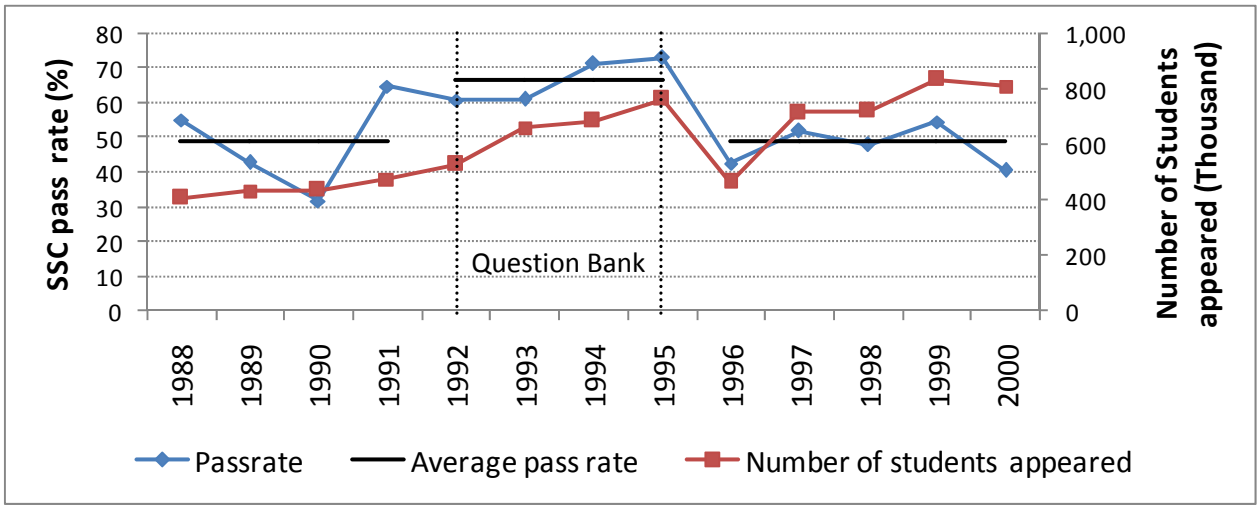
Figure 1. Trend in pass rate and number of student appeared in SSC exam



Source: Compiled from annual reports of BANBIES

Figure 2. Measure of Exposure

	← Older		Exposed						Younger →		
Age in 2005	33	32	31	30	29	28	27	26	25	24	23
Year of SSC at age 16	’88	’89	’90	’91	’92	’93	’94	’95	’96	’97	’98
					Question Bank						

Table 1. Descriptive statistics

	Older cohort	Exposed cohort	Younger cohort
	Mean (SD)	Mean (SD)	Mean (SD)
Panel A. National Household Income Expenditure Survey (HIES-2005)			
Male (Male=1, Female=0)	0.545 (0.498)	0.465 (0.499)	0.492 (0.500)
Passed SSC exam (among male)	0.574 (0.495)	0.601 (0.491)	0.488 (0.501)
Age in years (in 2005 for male)	34.41 (1.612)	28.25 (1.691)	24.25 (0.824)
Labor force participant (male)	0.951 (0.217)	0.929 (0.258)	0.858 (0.350)
Salaried employment (male)	0.351 (0.478)	0.286 (0.452)	0.313 (0.465)
Day laborer (male)	0.102 (0.303)	0.091 (0.288)	0.073 (0.261)
Non-agri self employment (male)	0.308 (0.463)	0.321 (0.468)	0.252 (0.435)
Passed SSC exam (among female)	0.486 (0.501)	0.610 (0.488)	0.492 (0.501)
Age in years (in 2005 for female)	34.20 (1.677)	28.13 (1.654)	24.11 (0.860)
Labor force participant (female)	0.122 (0.327)	0.076 (0.266)	0.055 (0.229)
Salaried employment (female)	0.063 (0.243)	0.051 (0.220)	0.055 (0.229)
Day laborer (female)	0.008 (0.088)	0.008 (0.092)	0.008 (0.089)
Non-agri self employment (female)	0.027 (0.164)	0.025 (0.158)	0.016 (0.125)
Number of observations	560	662	500
Panel B. Employer's records of 2008			
Male	0.831 (0.376)	0.790 (0.408)	0.776 (0.419)
Years worked in the organization	9.254 (4.827)	6.662 (3.278)	3.784 (2.085)
Passed SSC exam	0.415 (0.494)	0.621 (0.486)	0.632 (0.484)
Age in years (2008)	36.76 (1.751)	30.52 (1.572)	24.55 (1.583)
Monthly salary	6,864 (1740)	5,945 (1612)	4,552 (1022)
Monthly salary of 9^{th} graders	6,572 (1546)	5,953 (1519)	4,177 (860)
Monthly salary of SSC graduates	7,390 (1948)	5,939 (1684)	4,787 (1051)
Number of observations	248	219	125

Table 2. Difference-in-difference estimate of participation in salaried employment (male)

	Linear probability model			Marginal effect of logit		
	(1)	(2)	(3)	(4)	(5)	(6)
SSC (1=Yes, 0=Grade 9)	0.128*** (0.0397)	0.126*** (0.0398)	0.119*** (0.0396)	0.124*** (0.0383)	0.122*** (0.0384)	0.118*** (0.0389)
SSC X Exposed	**-0.112* (0.0658)**	**-0.110* (0.0661)**	**-0.115* (0.0654)**	**-0.103* (0.0602)**	**-0.101* (0.0604)**	**-0.106* (0.0602)**
Exposed	0.011 (0.0490)	0.002 (0.0606)	0.004 (0.0595)	0.011 (0.0534)	0.003 (0.0636)	0.004 (0.0635)
Age (in years)	-	0.032 (0.0852)	0.008 (0.0841)		0.031 (0.0839)	0.008 (0.0849)
Age-square	-	-0.001 (0.0014)	-0.000 (0.0014)		-0.0004 (0.0014)	-0.0001 (0.0014)
Rural (1=Yes, 0=No)	-	-	-0.057* (0.0320)			-0.059* (0.0329)
Married (1=Yes, 0=No)	-	-	0.049 (0.0383)			0.051 (0.0391)
Religion (1=Islam, 0=Else)	-	-	0.009 (0.0413)			0.011 (0.0424)
Division dummies	No	No	Yes	No	No	Yes
Constant	0.266*** (0.0277)	-0.219 (1.2231)	0.173 (1.2103)	-	-	-
Observations	859	859	859	859	859	859
R-squared	0.015	0.015	0.052	0.012	0.012	0.043
F-statistics for $\beta_1 + \beta_2 = 0$ (p-value)	0.09 (0.768)	0.09 (0.879)	0.01 (0.933)	0.09 (0.879)	0.09 (0.879)	0.01 (0.904)

Note: Robust standard error in parenthesis; * significant at 10%; ** significant at 5%; *** significant at 1%
Dependent variable is whether engaged in salaried employment. Estimates use HIES-2005 data.

Table 3. Difference-in-difference estimate of participation in salaried employment (female)

	Linear probability model			Marginal effect of logit		
	(1)	(2)	(3)	(4)	(5)	(6)
SSC (1=Yes, 0=Grade 9)	0.065*** (0.0210)	0.065*** (0.0210)	0.067*** (0.0212)	0.062*** (0.0202)	0.061*** (0.0201)	0.060*** (0.0200)
SSC X Exposed	**-0.053* (0.0314)**	**-0.053* (0.0316)**	**-0.055* (0.0311)**	**-0.041* (0.0213)**	**-0.041* (0.0214)**	**-0.040* (0.0200)**
Exposed	0.017 (0.0201)	0.028 (0.0247)	0.033 (0.0242)	0.025 (0.0294)	0.036 (0.0331)	0.040 (0.0327)
Age (in years)	-	-0.026 (0.0439)	-0.024 (0.0430)	-	-0.020 (0.0353)	-0.022 (0.0328)
Age-square	-	0.000 (0.0007)	0.000 (0.0007)	-	0.000 (0.0005)	0.000 0.0006
Rural (1=Yes, 0=No)	-	-	-0.010 (0.0160)	-	-	-0.011 (0.0142)
Married (1=Yes, 0=No)	-	-	-0.146** (0.0602)	-	-	-0.156*** (0.0707)
Religion (1=Islam, 0=Else)	-	-	-0.029 (0.0230)	-	-	-0.032* (0.0231)
Division dummies	No	No	Yes	No	No	Yes
Constant	0.027*** (0.0101)	0.381 (0.6264)	0.502 (0.6155)	-	-	-
Observations	863	863	863	863	863	822
(Pseudo) R-squared	0.013	0.014	0.040	0.029	0.031	0.076
F-statistics for $\beta_1 + \beta_2 = 0$ (p-value)	0.27 (0.606)	0.27 (0.604)	0.24 (0.624)	0.25 (0.615)	0.25 (0.614)	0.16 (0.686)

Note: Robust standard error in parenthesis; * significant at 10%; ** significant at 5%; *** significant at 1%
Dependent variable is whether engaged in salaried employment. Estimates use HIES-2005 data.

Table 4. Effect on participation in salaried employment relative to older and younger cohorts

	Relative to older cohort		Relative to younger cohort	
	(1)	(2)	(3)	(4)
Panel A: Male sample				
SSC (1=Yes, 0=Grade 9)	0.156***	0.152***	0.088	0.088
	(0.0538)	(0.0540)	(0.0592)	(0.0594)
SSC X Exposed	**-0.140***	**-0.133***	**-0.073**	**-0.072**
	(0.0752)	**(0.0753)**	**(0.0792)**	**(0.0795)**
Exposed	0.015	-0.027	0.007	0.029
	(0.0560)	(0.0886)	(0.0567)	(0.0826)
Age	-	-0.006	-	-0.006
		(0.0113)		(0.0142)
Religion	-	0.057	-	0.001
(1=Islam, 0=else)		(0.0479)		(0.0508)
Constant	0.262***	0.430	0.270***	0.408
	(0.0387)	(0.3945)	(0.0397)	(0.3498)
Observations	613	613	554	554
R-squared	0.019	0.021	0.005	0.005
F-statistics for $\beta_1 + \beta_2 = 0$	0.09	0.13	0.09	0.09
(p-value)	(0.769)	(0.714)	(0.769)	(0.768)
Panel B: Female sample				
SSC (1=Yes, 0=Grade 9)	0.082***	0.081***	0.049*	0.051*
	(0.0306)	(0.0307)	(0.0288)	(0.0287)
SSC X Exposed	**-0.070***	**-0.072***	**-0.037**	**-0.043**
	(0.0385)	**(0.0380)**	**(0.0371)**	**(0.0368)**
Exposed	0.021	0.063	0.012	0.001
	(0.0218)	(0.0420)	(0.0232)	(0.0315)
Age	-	0.007	-	0.004
		(0.0056)		(0.0070)
Religion	-	-0.016	-	-0.058*
(1=Islam, 0=else)		(0.0283)		(0.0315)
Constant	0.023*	-0.195	0.031**	-0.022
	(0.0131)	(0.1953)	(0.0153)	(0.1767)
Observations	609	609	608	608
R-squared	0.014	0.017	0.006	0.015
F-statistics for $\beta_1 + \beta_2 = 0$	0.09	0.13	0.09	0.09
(p-value)	(0.769)	(0.714)	(0.769)	(0.768)

Note: Robust standard error in parenthesis; * significant at 10%; ** significant at 5%; *** significant at 1%
Dependent variable is whether engaged in salaried employment. OLS estimates using HIES-2005 data.

Table 5. Effects on participation in salaried employment with different age brackets (Male Sample)

	Full sample		Relative to older cohort		Relative to younger cohort	
	(1)	(2)	(3)	(4)	(5)	(6)
SSC (1=Yes, 0=Grade 9)	0.128***	0.126***	0.156***	0.153***	0.088	0.089
	(0.0398)	(0.0398)	(0.0539)	(0.0542)	(0.0593)	(0.0595)
SSC X Early Exposed	**-0.020**	**-0.017**	**-0.048**	**-0.043**	**0.019**	**0.019**
	(0.0861)	**(0.0862)**	**(0.0935)**	**(0.0937)**	**(0.0968)**	**(0.0972)**
Early Exposed	-0.062	-0.063	-0.058	-0.074	-0.066	-0.091
	(0.0616)	(0.0616)	(0.0673)	(0.0968)	(0.0680)	(0.1572)
SSC X Late exposed	**-0.183****	**-0.181****	**-0.211****	**-0.204****	**-0.144**	**-0.145**
	(0.0818)	**(0.0822)**	**(0.0896)**	**(0.0901)**	**(0.0930)**	**(0.0937)**
Late exposed	0.068	0.074	0.072	0.042	0.063	0.052
	(0.0633)	(0.0643)	(0.0689)	(0.1339)	(0.0695)	(0.0969)
Age	-	0.003	-	-0.003	-	0.004
		(0.0038)		(0.0150)		(0.0249)
Religion	-	0.009	-	0.055	-	-0.002
(1=Islam, 0=else)		(0.0412)		(0.0478)		(0.0507)
Constant	0.266***	0.183	0.262***	0.332	0.270***	0.163
	(0.0277)	(0.1205)	(0.0387)	(0.5206)	(0.0398)	(0.6064)
Observations	859	859	613	613	554	554
R-squared	0.018	0.018	0.023	0.025	0.010	0.010

Note: Robust standard error in parenthesis; * significant at 10%; ** significant at 5%; *** significant at 1%
Dependent variable is whether engaged in salaried employment. OLS estimates using HIES-2005 data.
Early exposed are those who are 29 to 30 years old, and late exposed are 26 to 28 years old.

Table 6. Difference-in-difference estimates for return to HSC (relative to grade 9) for male sample

	(1)	(2)
HSC (1=Yes, 0=Grade 9)	0.141***	0.142***
	(0.0484)	(0.0488)
HSC X Exposed	**-0.003**	**-0.002**
	(0.0786)	**(0.0790)**
Exposed	0.008	0.010
	(0.0492)	(0.0496)
Age		-0.001
		(0.0043)
Religion		-0.069
(1=Islam, 0=else)		(0.0492)
Constant	0.269***	0.359***
	(0.0280)	(0.1370)
Observations	643	643
R-squared	0.022	0.025
F-statistics for $\beta_1 + \beta_2 = 0$	4.96**	5.06**
(p-value)	(0.026)	(0.025)

Note: Robust standard error in parenthesis; * significant at 10%; ** significant at 5%; *** significant at 1%
Dependent variable is whether engaged in salaried employment. OLS estimates using HIES-2005 data.

Table 7. Effects on participation in different types of employment for male sample

	Salaried Government	Salaried Private	Non-farm Self-employment	Day labor
	(1)	(2)	(3)	(4)
SSC (1=Yes, 0=Grade 9)	0.067***	0.058	-0.074*	-0.069***
	(0.0220)	(0.0363)	(0.0386)	(0.0247)
SSC X Exposed	**0.019**	**-0.102***	**0.163****	**-0.009**
	(0.0363)	**(0.0588)**	**(0.0658)**	**(0.0435)**
Exposed	-0.003	-0.014	-0.067	0.035
	(0.0277)	(0.0555)	(0.0595)	(0.0417)
Age	0.004	0.027	0.063	-0.038
	(0.0483)	(0.0752)	(0.0855)	(0.0513)
Age-square	-0.000	-0.000	-0.001	0.001
	(0.0008)	(0.0013)	(0.0014)	(0.0009)
Constant	-0.072	-0.128	-0.675	0.604
	(0.6899)	(1.0808)	(1.2247)	(0.7344)
Observations	859	859	859	859
R-squared	0.022	0.009	0.012	0.020

Note: Robust standard error in parenthesis; * significant at 10%; ** significant at 5%; *** significant at 1%
Dependent variable is whether engaged in different type of employment. OLS estimates using HIES-2005 data.

Table 8. Determinants of initial salary and salary progression from employee records

	Initial salary	Salary progression		Current salary
	(1)	(2)	(3)	(4)
Completed SSC (1=Yes, 0=Grade 9)	0.103**	0.049*	0.035	0.042
	(0.0415)	(0.0271)	(0.0793)	(0.0334)
SSC X Exposed	**-0.113***	**-0.075****	**-0.187***	**-0.088***
	(0.0616)	**(0.0354)**	**(0.0999)**	**(0.0516)**
Exposed	-0.096	0.096***	0.203**	0.103**
	(0.0598)	(0.0301)	(0.0970)	(0.0462)
Tenure (years worked in the organization)	-	0.091***	0.085***	0.012***
		(0.0222)	(0.0291)	(0.0032)
Tenure X SSC	-	-	0.005	-
			(0.0182)	
Tenure X exposed	-	-	-0.025	-
			(0.0202)	
Tenure X SSC X exposed	**-**	-	0.027	**-**
			(0.0234)	
Age	0.047	-0.067**	-0.070**	0.019
	(0.0530)	(0.0273)	(0.0291)	(0.0424)
Age-squared	-0.000	0.001**	0.001**	0.000
	(0.0009)	(0.0004)	(0.0005)	(0.0007)
Joining year	0.128***	-0.010	-0.013	-
	(0.0090)	(0.0184)	(0.0191)	
Female (1=Yes, 0=No)	-0.109*	-0.079***	-0.082***	0.101**
	(0.0584)	(0.0272)	(0.0294)	(0.0396)
Log of initial salary	-	-0.209***	-0.226***	-
		(0.0430)	(0.0449)	
Constant	-249.443***	21.960	29.384	7.729***
	(18.1659)	(37.1378)	(38.5261)	(0.6296)
Observations	245	195	195	408
R-squared	0.484	0.750	0.754	0.377
F-statistics for $\beta_1 + \beta_2 = 0$	0.05	1.02	NA	1.07
(p-value)	(0. 832)	(0.314)		(0.301)

Note: Robust standard errors in parenthesis; * significant at 10%; ** significant at 5%; *** significant at 1%
OLS estimates using employee records. Observations in the first three regressions include those who have joined the organization in 2003 or later. Dependent variable of the first regression is log of salary in 2003. For the 2nd and 3rd regression, the dependent variable is the difference between log of current salary (i.e. in 2008) and log of initial salary.

Table 9. Return to years of schooling (male sample)

	Full sample	Relative to older cohort	Relative to younger cohort	Full sample	Relative to older cohort	Relative to younger cohort
	(1)	(2)	(3)			
Education (Years of schooling completed)	0.036***	0.038***	0.034***	0.039***	0.040***	0.036***
	(0.0017)	(0.0019)	(0.0023)	(0.0020)	(0.0021)	(0.0026)
SSC (1=Yes, 0=Else)	0.025	0.015	0.040	-0.003	-0.013	0.015
	(0.0320)	(0.0405)	(0.0508)	(0.0332)	(0.0416)	(0.0526)
SSC X Exposed	**-0.114****	**-0.108****	**-0.122****	**-0.106****	**-0.101***	**-0.114***
	(0.0474)	**(0.0533)**	**(0.0615)**	**(0.0478)**	**(0.0537)**	**(0.0623)**
Exposed	0.007	0.018	-0.007	-0.002	0.012	-0.014
	(0.0164)	(0.0343)	(0.0345)	(0.0177)	(0.0350)	(0.0358)
HSC (1=Yes, 0=Else)	-	-	-	-0.047	-0.043	-0.060
				(0.0429)	(0.0510)	(0.0759)
HSC X Exposed	**-**	**-**	**-**	**0.018**	**0.008**	**0.044**
				(0.0634)	**(0.0689)**	**(0.0886)**
Grade 9 (1=Yes, 0=Else)	-	-	-	-0.103***	-0.133***	-0.068
				(0.0314)	(0.0420)	(0.0462)
Grade 9 X Exposed	**-**	**-**	**-**	**0.015**	**0.041**	**-0.012**
				(0.0521)	**(0.0588)**	**(0.0618)**
Age (in years)	0.004**	0.006	0.007	0.003*	0.006	0.007
	(0.0018)	(0.0048)	(0.0067)	(0.0018)	(0.0048)	(0.0067)
Religion (1=Islam, 0=else)	-0.017	-0.018	-0.020	-0.018	-0.019	-0.021
	(0.0203)	(0.0230)	(0.0264)	(0.0202)	(0.0229)	(0.0264)
Constant	-0.082	-0.161	-0.148	-0.063	-0.158	-0.137
	(0.0597)	(0.1679)	(0.1649)	(0.0600)	(0.1676)	(0.1648)
Observations	3,448	2,733	2,040	3,448	2,733	2,040
R-squared	0.112	0.124	0.092	0.116	0.129	0.094

Note: Robust standard error in parenthesis; * significant at 10%; ** significant at 5%; *** significant at 1%
Dependent variable is whether engaged in salaried employment. OLS estimates using HIES-2005 data.