Closing the Education Gender Gap: Estimating the Impact of Girls' Scholarship Program in The Gambia

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Abstract

This paper estimates the enrollment impact of a nation-wide scholarship program for female secondary students in The Gambia implemented to reduce gender disparity in education. In the regions where the scholarship program was implemented, all girls attending public middle and high schools were exempted from paying school fees, which used to be mandatory. The gradual implementation of the project provided a unique opportunity to rigorously assess the enrollment impact of the scholarship program. I use two nationally representative household surveys carried out in 1998 and 2002/03. By 2002/03, about half of the districts in the country had benefited from the project. I found that the program increased enrollment for middle and high school female students by 9 percentage points, and increased the years of schooling attained by 0.3 to 0.4. The program had no significant impact on enrollment or years of schooling attained for male students at any level. In addition, I found that school quality may have declined as the regions experienced increases in student-teacher ratios.

Key Words: Gender; Education; Enrollment; School fees.
JEL Codes: I20, I22, O12.

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I. Introduction

Universal primary education and the elimination of gender gap in enrollment rates are two of the targets in the Millennium Development Goals (MDGs). Achieving these goals has been a high development priority for sub-Saharan African countries over the past decade. The challenges in this sector remain significant. Approximately 32% of primary school age children do not attend school and 34% of all youths do not attend secondary school in sub-Saharan Africa (UNESCO 2012). In addition, the adult literacy rate in Africa is 62%, which is far lower than the global average (84%). The ratio of female to male enrollment at secondary level is 79%.

The reality in The Gambia is a microcosm of situation in the region as a whole. While enrollment rates have risen recently in The Gambia, they have been historically low. Average net enrollment rates in the country between 1999 and 2007 for primary, middle and high school levels were 61%, 30% and 16% respectively. These low enrollment rates have persisted despite the high rate of returns to education in the country (Foltz and Gajigo 2012). The reason for this low enrollment in the face of high returns is the significant direct and indirect cost of schooling. The direct costs to school attendance such as schools in The Gambia fees are significant. Schools fees are mandatory at middle and high school levels. For private schools, fee payments start naturally at primary school. While the payments of these fees are essential to help meet the funding requirements for running schools, they disadvantage poor families that are cash or liquidity constrained. Opportunity cost of sending children to school also feature as a significant indirect cost since many poor families depend on the children's labor supply either at home or outside.

The Gambia has made significant progress in eliminating the gender gap in school enrollment. The country achieved gender parity in primary school enrollment in 2004 – the

current ratio of female to male enrollment at primary school level is 102%. A decade earlier, the ratio of female to male enrollment had been 87%. At secondary school level, the female to male ratio is currently 95%, and had been 74% a decade before in 2001.

This paper estimates the schooling impact of a nation-wide scholarship program for female students. The program is funded jointly by the Gambian government, UNICEF, World Bank and the IMF (though the HIPC program) to help the country reach the MDG targets in reducing gender disparity in secondary school enrollment. In the regions where the scholarship program was implemented, all girls attending public (government-run) middle and high schools were exempted from paying school fees, which used to be mandatory. The program started in 2000 in few districts of the country, and expanded across the country geographically (from east to west). This gradual expansion of the program in the initial implementation phases provides a unique opportunity to rigorously assess the causal impact of the scholarship program on educational outcomes. I use two nationally representative household surveys that were carried out in 1998 and 2002/03. In 1998, the program had not been implemented while in 2002, about half of the districts in the country had benefited from the project. This makes it possible to analyze the schooling impact of the program using difference-in-difference strategy – an impact evaluation strategy that is almost ideal to this setting.

I analyze the program's impact for female students of different student age cohorts. The results show that the program had a significant enrollment effect for female students of all student-age groups. Specifically, the program led to approximately 8 to 9 percentage point enrollment increase for middle and high school female students. In addition, the enrollment effect of the program for girls at primary level is significantly positive (about 9 percentage points), suggesting that the removal of school fees caused households to further increase female

primary school enrollment in anticipation of lower future costs. And years of schooling attained increased by 0.3 to 0.4 for female students. I found no significant schooling effect (enrollment and years of schooling attained) of the program on male students at any level (primary, middle or high school). The estimated results are robust to controlling for other policy changes that occurred in the country during the period of the scholarship program implementation that could have affected student enrollment. For example, there was a significant expansion in school construction in parts of the country. This possibly confounding effect is addressed by controlling for the number of schools at the district level. The results also show that student-teacher ratio increased at the same time as the program increased enrollment suggesting that the program was accompanied by decline in school quality. However, data limitation prevents this latter effect from being rigorously assessed.

The rest of the paper is structured as follows. The next section (II) briefly examines the experience of other African countries in abolishing school fees, and analyses of their effects on schooling outcomes. Section III describes the scholarship program in The Gambia and its implementation. Section IV provides a description of the data. The estimation strategy and results of the program's impact on enrollment are presented in section V. Section VI concludes the paper.

II. Literature on Abolishing School Fees in Africa and Scholarship Programs

Abolishing school fees to increase enrollment is not a new policy initiative in Africa. Nigeria implemented a universal primary education initiative in 1976, where all fees payments were removed for primary school students. The program was ended in 1981 because it was not financially sustainable (Osili and Long 2008). Other African countries that implemented similar short-lived universal primary education programs characterized by the abolition of school fees are Ghana, Kenya and Tanzania (World Bank and UNICEF 2009; Oketch and Rolleston 2007). With the setting of the MDG targets, more African countries have started to abolish school fees to increase their chances of meeting the various education targets. Sub-Saharan African countries that have recently abolished school fees at the primary school level are Ethiopia, Ghana, Kenya, Malawi, Mozambique and Tanzania.

While the fee reduction initiatives may produce the intended outcomes, it is not clear how many of the countries that have implemented them have rigorously assessed their impact. Al-Samarrai and Zaman (2007) found a positive effect of school fees removal on enrollment in Malawi. While there is little doubt that the abolition of the school fees increased enrollment, it is difficult to attribute the estimated effect to that specific policy since the paper essentially carries out a before-and-after comparison of enrollment rates. In Ghana and Mozambique, enrollments increase of 14% and 12% respectively have been attributed to the abolishing of school fees (World Bank 2009). In these latter cases as well, the estimated effects were derived from before-and-after comparison. The problem with this type of analysis is that it does not control for exiting trends in enrollment and the effects of other policy changes. If trends in enrollments are significantly positive, a before-and-after comparison will overstate the impact of the school fees removal.

Recently, more rigorously assessments of policy changes on enrollment have been carried out on implemented programs, though mostly in other regions of the world. Behrman and Todd (2009) estimated the impact of the conditional cash transfer program in Mexico on schooling attained to be significant. The authors were able to estimate the causal impact of the program due to the random assignment of households to control and treatment groups. Barrera-Osorio et al. 2007) found that a fee-reduction program in Bogota, Colombia increased enrollment by 3% to 6%. The authors use regression discontinuity strategy, taking advantage of program eligibility requirements to isolate the causal impact of the project on enrollment. Deininger (2003) evaluates the impact of the universal primary education (UPE) program implemented in Uganda in 1997 where the government removes all school fees at the primary school level. By using two repeated cross-sectional households surveys collection in 1992 and 1999, he found that the program increased enrollment, reduced enrollment inequality, but led to a fall in school quality. In addition, the program did not have an enrollment effect at the secondary school level. However, the attribution of a precise causal impact of the program is complicated by the fact that the UPE program took effect nationwide at the same point in time (January 1, 1997). The estimation strategy used in Deininger (2003) essentially assumes that differential enrollment by income, gender and regions between 1992 and 1999 can be attributed to the UPE program effects. In other words, without the program, there should not have been any differences in growth trends by gender, region or income. While this assumption is not unreasonable, the nature of the implementation does not allow for the existence of a control region to assess whether in the absence of the UPE, pre-program trends would continue.

Not all school fee reductions or removals have worked as intended. The initial increase in enrollments rates following Kenya's removal of schools fees at primary school level in 2003 did

not last (Bold et al. 2010). There appeared to have been a significant flight towards private schools, possibly in response to declining fall in public school quality. This outcome seems hardly surprising given that the program in Kenya was announced in the middle of the fiscal year, with neither preparation nor budgetary allocation to fund it (World Bank and UNICEF 2009).

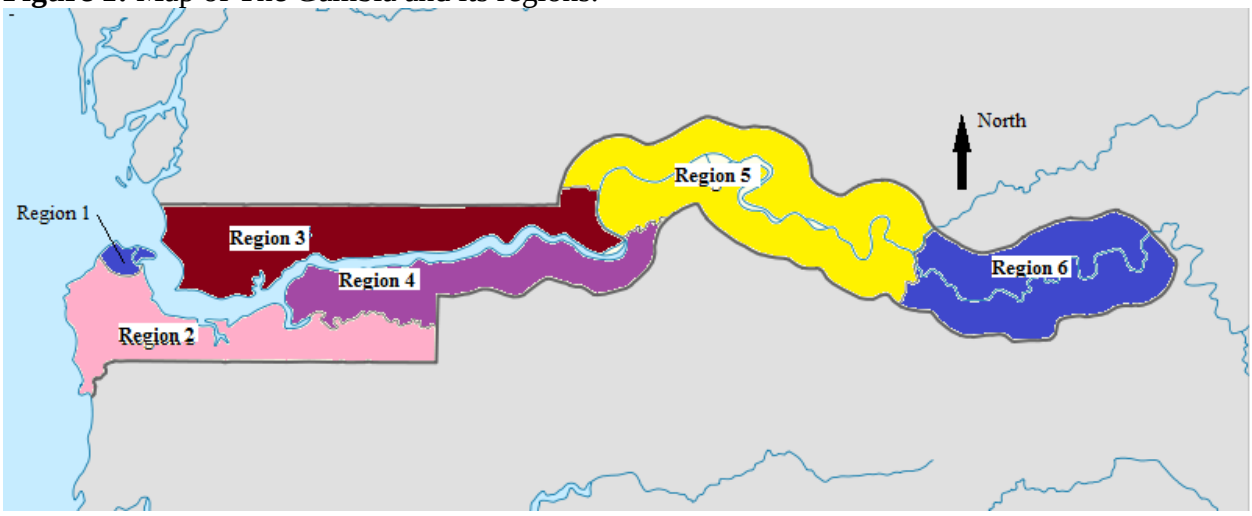
There are few rigorous studies of scholarship program, especially those designed specifically for female students. One of the few is Filmer and Schady (2008) that evaluated the impact of a scholarship program for girls in Cambodia. The scholarship program was given to girls starting grade 7, which is the first year of secondary school in that country. The authors used both propensity score matching and regression discontinuity to estimate the causal impact on enrollment and attendance, which they found to be highly positive. Furthermore, the program had a positive distributional impact in that the enrollment impact was higher for girls from poorer households.

This paper contributes to the literature on the impact of abolishing school fees on enrollment and schooling attainment in Africa. The scholarship program in The Gambia removed school fees for female students attending public secondary schools in the regions it was implemented (unlike many African countries, the Gambia does not have school fees for public schools at the primary level). By taking advantage of the phase roll-out of the program over time, the impact of the program on enrollment and schooling attainment was rigorously estimated using difference-in-difference strategy. To my knowledge, this is the first impact evaluation of enrollment of an almost nation-wide female scholarship program in Africa. More precise estimate of the impact of reducing schools is importance since it will enable governments to better assess the trade-offs involved with implementing similar policies.

III. Education in The Gambia and Girls' Scholarship Program

The net enrollment rate at the primary[2] school level is currently 65% in The Gambia. This has been growing at the rate of 1% per annum over the past two decades. At this rate, country will not meet the MDG target of at least 95% net enrollment rate by 2015. Secondary school level net enrollment rates, which usually lags behind primary school rate, are currently at 40% for middle school and 25% for high school. On the other hand, the country has made a great deal of progress towards gender equality in education. Currently, the ratio of female to male enrollment at primary school level is 102% - the 100% parity level had been reached since 2004. In 1990, this ratio had been only 63%. For the secondary school level, the ratio of female to male enrollment is currently at 95%, and had been 47% in 1990 (World Bank 2012). The closing of the gender gap in school enrollment naturally leads to the question of what policies were implemented to achieve this development target.

Figure 1: Map of The Gambia and its regions.



[2] The current formal school system in The Gambia is based on the following: 6 years of primary school, 3 years of middle school, known locally as upper basic and 3 years of high school, known locally as senior secondary school. Primary school is intended for students between the ages of 7-12, middle school for students between 13-15, and high school for students between the ages of 16-18. Due to the presence of repeaters, there are students at levels that are below their age-appropriate level.

The scholarship program for female middle and high school students started as an initiative funded jointly by UNICEF, the World Bank, the IMF through the Highly Indebted Poor Countries (HIPC) and the Gambian government. The goal of the program is to increase the overall student enrollment but with a specific focus of reducing the gender gap in education. The program planned to achieve this goal by paying for the mandatory schools fees for all girls in the regions (figure 1) in which it is implemented. The program covers students attending only public schools. This latter condition is not too restrictive since most schools outside of the major urban areas are public schools.

The scholarship program was implemented geographically from east to west over time to cover most of the country. It was first implemented in regions 5 and 6 (figure 2) in the 2000/01 academic year. In 2000, these two regions represented 28% of Gambia's population and cover 14 of the 39 districts in the country. In 2001/02, the program was extended to regions 3 and 4. These latter regions comprise about 19% of the country's population, and additional 12 districts. The program was further extended to region 2 in 2003/04. This latter region accounts for about 27% of the Gambian population and 9 districts. The scholarship program has not been extended to Region 1, which is the urban area of the Gambia. Region 1, which covers 4 districts and comprises about 26% of the country's population, is the most developed and urbanized part of the country.

The program is administered by directly remitting the value of the school fees from the program's account into the regional offices of the Ministry of Education. A Fund Administrator was set-up at the Ministry of Education that controlled the disbursement between the program and schools. The regional education offices verify the enrollment figures provided by the individual schools. In other words, students or households were not given the scholarship amount

of the money. It was in effect a voucher system that was redeemed by the schools rather than households. The average cost of the program per student was US$ 48, US$ 43, US$ 42 and US$ 43 in 2000/01, 2001/02, 2002/03 and 2003/04 respectively[3] (Ministry of Education 2004). The program was widely publicized on the local media, as well as through several workshops in various regions of the country.

It should be pointed out that various school-related interventions of many kinds are continually implemented through several local community initiatives, charitable and non-government organizations. Some of these include limited support to particular villages or individual schools, as well as direct student support. However, none of these effects are close to the scale of the scholarship program being assessed. Furthermore, the implementations of these programs are independent undertakings, and are uncoordinated among themselves or with the central government. Therefore, it is unlikely that these smaller programs would be large enough or correlated enough with the scholarship program to bias the estimation strategy employed in this paper.

[3] These differences overtime reflect not varying exchange rates (exchange rate (the average US dollar per Gambian Dalasi was approximately 13, 15, 20, 27 between 2000 and 2003) but different composition of middle and secondary school students over time as different regions are covered.

Figure 2: The roll-out of the scholarship program for middle and high school female students. The light green areas represent the scholarship regions.

Panel A: Scholarship Coverage between 1998 and 2000.

Panel B: Scholarship Coverage in 2000/01

Panel C: Scholarship Coverage in 2001/02

Panel D: Scholarship Coverage in 2003/04

IV. Data

The paper uses two cross-sectional, nationally-representative household surveys conducted in 1998 and in 2002/03. These surveys cover all the districts in the country and have detailed modules on current school attendance and educational attainment. In the 1998 survey, 1923 households were covered including 4493 school-aged children[4]. In the 2002/03 survey, approximately 4672 households were covered with 12,160 school-aged children. Summary statistics of key variables are presented in table 1.

Given the roll-out of the program geographically, the implementation provides an almost ideal setting to estimate its impact through difference-in-difference strategy. The validity of the difference-in-difference estimation hinges on the assumption that roll-out of the project is not correlated with changes in the main outcome of interest, which are enrollment and educational attainment. Table 2 shows some regional statistics in 1998 (prior to the implementation of the scholarship program). Regions 5 and 6 have the lowest enrollment rates, but not far lower than the other regions on average. There is a lot of variation in school density. Both primary and secondary school densities are highest in region 1 and lowest in region 4.

Region 1 is the most relatively developed part of the country. For instance, the poverty rate (head count) in 1998 was lowest in Region 1 and highest in Region 4. The main economic activity in almost all regions of the Gambian is agriculture (region 1 is the exception). And given that Gambian agriculture is rain-fed, rainfall is among the most significant determinants of yields, and consequently agricultural income (Gajigo and Saine 2012). Therefore, average rainfall level in region is a good indicator of the economic potential of the regions. However, the average rainfall levels and variability are similar across regions.

[4] I define school age here as age 7 to 18, inclusive.

Table 1: Summary Statistics of key variables for school-aged individuals.

	Age 7 to 12				Age 13 to 18			
	1998		2002/03		1998		2002/03	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Age	2496	9.344 (1.71)	6261	9.36 (1.73)	1997	15.61 (1.76)	5899	15.51 (1.73)
Currently Enrolled	2496	0.58 (0.49)	6261	0.68 (0.47)	1997	0.48 (0.50)	5899	0.62 (0.49)
% Female	2496	0.49 (0.50)	6261	0.48 (0.50)	1997	0.49 (0.50)	5899	0.51 (0.50)
% Rural	2496	0.63 (0.48)	6261	0.64 (0.48)	1997	0.54 (0.50)	5899	0.60 (0.49)
Ever Attended School	2496	0.63 (0.48)	6261	0.72 (0.45)	1997	0.59 (0.49)	5899	0.73 (0.45)
Years of Schooling Attained	2398	1.638 (1.744)	5332	1.901 (3.043)	1924	3.420 (3.375)	5448	4.594 (3.732)

Table 2: The comparison of regions prior to the implementation of the project. The household level data is from only 1998.

	Age 7 to 18, 1998 Only											
	Region 1		Region 2		Region 3		Region 4		Region 5		Region 6	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Age	1004	12.63 (3.58)	1168	12.06 (3.47)	845	12.17 (3.61)	212	11.69 (3.38)	659	11.63 (3.54)	605	12.04 (3.63)
Currently Enrolled	1004	0.67 (0.47)	1168	0.66 (0.47)	845	0.43 (0.50)	212	0.54 (0.50)	659	0.38 (0.49)	605	0.38 (0.48)
% Female	1004	0.50 (0.50)	1168	0.48 (0.50)	845	0.49 (0.50)	212	0.50 (0.50)	659	0.47 (0.50)	605	0.50 (0.50)
% Rural	1004	0.00 (0.00)	1168	0.55 (0.50)	845	0.80 (0.40)	212	0.78 (0.41)	659	0.95 (0.21)	605	0.89 (0.32)
Ever Attended School	1004	0.81 (0.39)	1168	0.74 (0.44)	845	0.50 (0.50)	212	0.61 (0.49)	659	0.44 (0.50)	605	0.41 (0.49)
Years of Schooling Attained	956	3.98 (3.14)	1142	2.79 (2.60)	823	1.96 (2.57)	194	1.94 (2.14)	638	1.30 (1.95	569	1.23 (2.06)
# Primary schools in districts per 10,000 people.	1004	23.31 (6.42)	1168	10.08 (2.51)	845	11.91 (4.73)	212	8.42 (5.12)	659	10.10 ()4.63	605	18.28 (7.87)
# Secondary schools in districts per 10,000 people.	1004	23.31 (6.42)	1168	4.02 (1.80)	845	1.83 (0.83)	212	0.75 (0.97)	659	0.73 (0.93)	605	1.53 (0.71)
Average years of schooling of adults*	1964	5.08 (4.94)	1719	2.53 (4.05)	1249	1.12 (2.93)	289	1.07 (2.73)	1051	0.73 (2.35)	908	0.63 (2.20)
Average millimeters of rainfall 1980-97		731.3 (234.8)		785.1 (181)		694.4 (154.2)		781.2 (216.4)		669.4 (166.8)		714.1 (129.7)

*Adults defined as anyone above the age of 18.

V. Estimation and Results

a. Main Results

Due to the manner of its implementation, the scholarship program lends itself quite well to the use of difference-in-difference (DID) strategy to estimate its impact on its main outcome, which is female student enrollment. Two repeated cross-sectional household surveys conducted in 1998 and 2002/03 were used to estimate the following equation:

$$\boldsymbol{Y}_{irt} = \gamma + \theta \boldsymbol{Year}_t + \varphi \boldsymbol{Program}_r + \beta(\boldsymbol{Program}_r * \boldsymbol{Year}_t) + \boldsymbol{\varepsilon}_{irt} \quad (1)$$

Where $\boldsymbol{Y}_{irt}$ represents schooling outcome (enrollment or educational attainment) of individual *i* in region *r* at year *t*, $\boldsymbol{\gamma}$ is the constant term, $\boldsymbol{Year}_t$ is the dummy for year 2002/03 (post treatment year), $\boldsymbol{Program}_r$ is a dummy variable for regions where the scholarship program was implemented, $\boldsymbol{Program}_r * \boldsymbol{Year}_t$ is the interaction of the program placement and year 2002/03, while $\boldsymbol{\varepsilon}_{irt}$ is the error term. The parameter $\boldsymbol{\varphi}$ captures the average permanent difference between program and non-program regions, $\boldsymbol{\theta}$ represents the trend effects in schooling outcomes common to all regions. The key parameter of interest is $\boldsymbol{\beta}$.

Let:

$$\bar{Y}_T(1) \equiv E[\boldsymbol{Y}_{irt} | Program_r = 1, \boldsymbol{Year}_t = 1\ ] = \boldsymbol{\gamma} + \boldsymbol{\theta} + \boldsymbol{\varphi} + \boldsymbol{\beta} \quad (2)$$

$$\bar{Y}_T(0) \equiv E[\boldsymbol{Y}_{irt} | Program_r = 1, \boldsymbol{Year}_t = 0] = \boldsymbol{\gamma} + \boldsymbol{\varphi} \quad (3)$$

$$\bar{Y}_C(1) \equiv E[\boldsymbol{Y}_{irt} | Program_r = 0, \boldsymbol{Year}_t = 1] = \boldsymbol{\gamma} + \boldsymbol{\theta} \quad (4)$$

$$\bar{Y}_C(0) \equiv E[\boldsymbol{Y}_{irt} | Program_r = 0, \boldsymbol{Year}_t = 0] = \boldsymbol{\gamma} \quad (5)$$

The difference in difference estimate of the program impact is:

$$DID = \{\bar{Y}_T(1) - \bar{Y}_T(0)\} - \{\bar{Y}_C(1) - \bar{Y}_C(0)\} = \boldsymbol{\beta} \quad (6)$$

In other words, $\boldsymbol{\beta}$ captures the average impact of the scholarship program on student outcomes such as enrollment and educational attainment. By 2002/2003 (the implementation of the second

round survey), regions 3, 4, 5 and 6 had been part of the scholarship program while regions 1 and 2 were not. In effect, the control regions are regions 1 and 2, against which the impact of the scholarship program in regions 3, 4, 5 and 6 are being compared. The unbiased estimation of $\boldsymbol{\beta}$ in equation (1) also assumes the absence of other policy changes that occurred in the same time period and could have affected student enrollment one way or another. It also assumes the presence of a common trend in all the regions in the absence of the program. These possible confounding effects that could bias the estimate of the program impact are examined later.

The estimation results of equation 1 are presented in Tables 3 and 4. Both tables estimate the program effect by various age groups, as well as by gender. The results clearly show that the program's effects differ significantly by gender. For girls, the enrollment effect of the scholarship program is significant. It led to 8 to 9 percentage point increase in enrollment (Table 3). The magnitude of this effect is similar for all female age cohorts. Similarly, the program led to an increase in years of schooling of 0.3 to 0.4 for all school age girls (Table 4). For both enrollment and years of schooling attained, the program has no significant effect on school-aged male students.

It is worth recalling that the scholarship is targeted at female student attending secondary school (from age 13 to 18) since fee payments start at middle school level in The Gambia for public schools. Therefore, the fact that the scholarship program has an effect on younger girls at primary school level is note-worthy. This particular result is consistent with Lavy (1996) who also found some elasticity between school outcomes at the primary level and cost at the secondary school level.

The negative sign on the coefficients of the female dummy in tables 3 and 4 is expected since it captures the-then existing average difference in schooling outcomes between male and

female students when the household surveys were implemented. A similar argument applies to the negative coefficient for the rural dummy.

Table 3: The results from estimating equation (1), but with the addition of a female dummy interaction term to decouple program effect by gender. The dependent variable is enrollment rate (*marginal probit*). Clustered standard errors are in parentheses.

	Aged 7 to 18	**Aged 7 to 12**	**Aged 13 to 18**
	1	**2**	**3**
Female Dummy	-0.093*** (0.008)	-0.058*** (0.011)	-0.128*** (0.017)
Year 2003	0.080*** (0.021)	0.067*** (0.017)	0.100*** (0.033)
Program*Year2003	0.017 (0.024)	0.001 (0.030)	0.049 (0.048)
Program*Year2003*Female	0.088*** (0.018)	0.090** (0.034)	0.084*** (0.017)
Program Dummy	-0.245*** (0.022)	-0.232*** (0.016)	-0.276*** (0.037)
Observations	16653	8757	7896

***significant at 1%; **significant 5%; *significant at 10%.

Table 4: The results from estimating equation (1), but with the addition of a female dummy interaction term to decouple program effect by gender. The dependent variable is years of schooling attained (*OLS*). Clustered standard errors are in parentheses.

	Aged 7 to 18	**Aged 7 to 12**	**Aged 13 to 18**
	1	**2**	**3**
Female Dummy	-0.495*** (0.034)	-0.146*** (0.038)	-0.916*** (0.060)
Year 2003	0.604** (0.213)	0.183*** (0.035)	0.678** (0.339)
Program*Year2003	0.175 (0.274)	-0.022 (0.140)	0.747* (0.429)
Program*Year2003*Female	0.373*** (0.111)	0.284** (0.098)	0.365** (0.171)
Program Dummy	-1.751*** (0.505)	-0.780*** (0.206)	-2.758*** (0.722)
Constant	3.573*** (0.455)	2.127*** (0.122)	5.215*** (0.668)
Observations	15102	7730	7372
R squared	0.06	0.02	0.12

***significant at 1%; **significant 5%; *significant at 10%.

b. Controlling for other variables

The information in Table 2 shows that the regions are not identical in the level of development or educational outcomes at the time the scholarship program was introduced. For instance, the geographical phasing of the program is correlated with the average educational attainment in regions. These differences suggest that the regions could have different trends in educational outcomes that could bias the preceding results. To control for some of these pre-existing regional differences, equation (1) is augmented:

$$\boldsymbol{Y}_{irt} = \gamma + \theta \boldsymbol{Year}_t + \alpha \boldsymbol{X}_{irt} + \varphi \boldsymbol{Program}_r + \beta(\boldsymbol{Program}_r * \boldsymbol{Year}_t) + \boldsymbol{\varepsilon}_{irt} \qquad (7)$$

Where $\boldsymbol{X}_{irt}$ is a vector of variables such as age, gender, rural residence, household size, mean years of schooling of adults in households, age of household head and the number of schools (at district level). Pre-existing differences in the distributions of individual and household level variables between program and non-program area could lead to biased results if not controlled for. For instance, rural and urban differences can help control for pre-existing differences in income or types of livelihood activities. The validity of the program impact from equation (1) also rests on the assumption that other policies or programs were not put in place in regions 3, 4, 5 and 6 between 1998 and 2003 at the time that could result in higher enrollment rates. This is a non-trivial possibility in The Gambia. The country has witnessed a significant number of school constructions. Specifically, the number of primary and secondary schools increased at annual rates of 4% and 10% respectively between 1998 and 2003[5]. So the inclusion of the number schools at the district levels can help to control for the possible bias that could be introduced

[5] In 1998, the number of primary and secondary schools in the country were 324 and 85 respectively. In 2003, primary and secondary schools are 387 and 134 respectively.

through enrollment increase caused by school construction as opposed to the scholarship program.

The estimation results of equation (7) are presented in Table 5 (for enrollment) and Table 6 (for years of schooling attained). The enrollment impact of the program is still 8 to 9 percentage points for female students, and zero for male students. And the years of schooling impact of the scholarship program for school-age female students is 0.3 to 0.4. Furthermore, estimates of the program impact on enrollment and years of schooling in tables 3 and 4 are not significantly different from the estimates in tables 5 and 6.

Table 5: The estimation of program impact with further controls (equation 7). The dependent variable is enrollment (*marginal probit*). Clustered standard errors are in parentheses.

	Aged 7 to 18	**Age 7 to 12**	**Age 13 to18**
	1	**2**	**3**
Age	-0.015*** (-0.015)	0.036*** (0.004)	-0.065*** (0.004)
Household Size	-0.005*** (0.002)	-0.005** (0.002)	-0.006*** (0.002)
Average schooling of Adults in household	0.043*** (0.007)	0.041*** (0.007)	0.050*** (0.010)
Age of Household Head	0.001*** (0.0004)	0.001 (0.001)	0.002*** (0.0004)
Rural Dummy	-0.024 (0.054)	-0.017 (0.045)	-0.033 (0.067)
Number of Schools	-0.002*** (0.001)	-0.002*** (0.001)	-0.002** (0.001)
Female	-0.097*** (0.010)	-0.063*** (0.009)	-0.136*** (0.023)
Year 2003	0.120*** (0.019)	0.102*** (0.015)	0.143*** (0.028)
Program*Year 2003	-0.028 (0.031)	-0.039 (0.041)	-0.011 (0.050)
Program*Year 2003*Female	0.090*** (0.018)	0.092** (0.030)	0.083*** (0.022)
Program Dummy	-0.172*** (0.027)	-0.160*** (0.019)	-0.184*** (0.040)
Observations	16399	8625	7774

***significant at 1%; **significant 5%; *significant at 10%.

Table 6: The estimation of program impact with further controls (equation 7). The dependent variable is years of schooling attained (OLS). Clustered standard errors are in parentheses.

	Aged 7 to 18	**Age 7 to 12**	**Age 13 to18**
	1	**2**	**3**
Age	0.342***	0.399***	0.149**
	(0.060)	(0.051)	(0.065)
Household Size	-0.037***	-0.025***	-0.046**
	(0.007)	(0.007)	(0.011)
Average schooling of Adults in household	0.321***	0.164***	0.468***
	(0.025)	(0.022)	(0.047)
Age of Household Head	0.013**	0.008	0.017***
	(0.004)	(0.005)	(0.004)
Rural Dummy	-0.406	-0.086	-0.749
	(0.339)	(0.178)	(0.492)
Number of Schools	-0.003	0.001	-0.009
	(0.004)	(0.003)	(0.006)
Female	-0.554***	-0.171***	-0.917***
	(0.054)	(0.043)	(0.078)
Year 2003	0.557***	0.130	0.926***
	(0.114)	(0.088)	(0.176)
Program*Year 2003	-0.041	-0.042	0.176
	(0.208)	(0.201)	(0.294)
Program*Year 2003*Female	0.357***	0.313***	0.385**
	(0.117)	(0.098)	(0.153)
Program Dummy	-0.642***	-0.281	-1.187***
	(0.196)	(0.192)	(0.292)
Constant	-1.757*	-2.317***	1.247
	(0.949)	(0.642)	(1.280)
Observations	14930	7638	7292
R squared	0.29	0.12	0.29

***significant at 1%; **significant 5%; *significant at 10%.

The results in tables 3, 4, 5 and 6 show that the estimates of the time trend in education outcomes are positive. In fact, the magnitude of the time trend is significantly higher than the estimated program effect in all the specifications. This positive significant coefficient suggests that even in the absence of the scholarship program, there exists a secular increase in enrollment and schooling attainment over time for both program and non-program regions. Therefore, the use of a simple before-and-after difference would have led to biased claims about the impact of the scholarship on enrollment and schooling attainment in an upward direction.

c. Further Robustness Check

It is still possible that the various regions in The Gambia have differing time trends in educational outcomes even after controlling for age, gender, rural residence, school distributions and other household variables. Since both program (regions 3, 4, 5 and 6) and non-program areas (regions 1 and 2) have multiple regions, it is possible to vary the control or treatment regions to check if the estimated program impact on educational outcomes changes significantly. Changes in the significance of the impact of the program by slightly varying the composition of control or treatment region would provide strong indication that there are significant differences in trends in educational outcomes, possibly caused by unobserved differences among regions.

Table 7 presents the estimates of β in equation (7) for enrollment for male and female students by varying both the control and treatment areas. Table 8 presents a similar set of results using years of schooling attained as the dependent variable. For example, panel B in both tables 7 and 8 includes only regions 2, 3 and 4. Region 2 is one of the 'control' regions, while regions 3 and 4 comprise the 'treatment' regions where the scholarship program was implemented. These three regions directly border each other, with far less dispersion in pre-existing educational outcomes than when regions 1, 5 and 6 are included. In both tables, the estimated impact of the program remains similar to the earlier results. Specifically, the results in the tables show that the scholarship program has a significant impact for all school age female students, and no effect on school age male students. Furthermore, the differences in the magnitudes of the estimated impacts in tables 7 and 8 are not statistically significant from the estimated outcomes in tables 5 and 6. In other words, the estimated impact of scholarship program remains robust, suggesting that the likelihood of bias caused by differential trends (possibly due to some unobserved factors) is low.

Table 7: The outputs in this table show the estimates of β in equation (7). The dependent variable is enrollment (*marginal probit*) All the controls in equation (7) were included in the regressions. In each of the panels, the set of control (non-program regions) and treatment regions (regions that the program at the time of the survey) are varied to check the robustness of the estimated program impact. Clustered standard errors are in parentheses.

		Aged 7 to 18		**Aged 7 to 12**		**Aged 13 to 18**	
		1		**2**		**3**	
Panel A: The treatment regions are 3 and 4, while control regions are 1 and 2.							
	Male	-0.024 (0.039)	Obs.= 12170	-0.036 (0.037)	Obs.= 6381	-0.008 (0.047)	Obs.= 5893
	Female	0.059*** (0.010)		0.040*** (0.009)		0.069*** (0.016)	
Panel B: The treatment regions are 3 and 4, while control region is 2.							
	Male	-0.045 (0.046)	Obs.= 8599	-0.046 (0.045)	Obs.= 4508	-0.042 (0.049)	Obs.= 4091
	Female	0.063*** (0.013)		0.038*** (0.010)		0.092*** (0.019)	
Panel C: The treatment regions are 3, 4, 5 and 6, while the control region is 2.							
	Male	-0.044 (0.034)	Obs.= 13005	-0.043 (0.042)	Obs.= 6856	-0.043 (0.053)	Obs.= 5972
	Female	-0.043*** (0.042)		0.093** (0.031)		0.113*** (0.028)	

***significant at 1%; **significant 5%; *significant at 10%.

Table 8: The outputs in this table show the estimates of β in equation (7). The dependent variable is years of schooling attained (*OLS*). All the controls in equation (7) were included in the regressions. In each of the panels, the set of control and treatment regions are varied to check the robustness of the estimated program impact. Clustered standard errors are in parentheses..

		Aged 7 to 18		**Aged 7 to 12**		**Aged 13 to 18**	
		1		**2**		**3**	
Panel A: The treatment regions are 3 and 4, while control regions are 1 and 2.							
	Male	-0.109 (0.230)	$R^2 = 0.28$ N= 10903	-0.033 (0.337)	$R^2 = 0.11$ N = 5444	0.005 (0.246)	$R^2 = 0.26$ N = 5486
	Female	0.411*** (0.074)		0.280*** (0.033)		0.538*** (0.096)	
Panel A: The treatment regions are 3 and 4, while control region is 2.							
	Male	-0.210 (0.344)	R^2=0.25 N= 7688	0.017 (0.394)	R^2=0.07 N= 3896	-0.228 (0.330)	$R^2 = 0.26$ N = 3792
	Female	0.492*** (0.074)		0.318*** (0.028)		0.645*** (0.108)	
Panel A: The treatment regions are 3, 4, 5 and 6, while the control region is 2.							
	Male	-0.139 (0.257)	$R^2 = 0.25$ N = 11800	0.002 (0.188)	$R^2 = 0.09$ N = 6090	-0.038 (0.342)	$R^2 = 0.29$ N = 5598
	Female	0.426*** (0.106)		0.360*** (0.097)		0.485*** (0.147)	

***significant at 1%; **significant 5%; *significant at 10%.

d. Falsification test

If the effect of the scholarship program estimated in the preceding estimations reflects not the impact of the scholarship program but some other regional effect, then one should observe such effects among other groups beyond school-aged female students. For example, the scholarship is clearly not intended for adult, the vast majority of whom should not be attending school anyway. As a result, one should not expect to find any effect of the program on this group. I estimated equations (1) and (7) on adults who are at least 25 years of age. The results are presented in Table 9. For this group, there is no estimated impact of the scholarship program on enrollment and years of schooling attained for either males or females, as expected.

It is worth pointing out that if the estimated positive effect of the program on educational outcomes for female students is due to some possible differences in pre-existing trends by region, this bias should occur for male students as well. However, all the preceding estimations produce no estimated positive impact of the scholarship program for male students of any age cohort. It is not obvious why there should be significant pre-existing differences among regions in educational outcomes for female students but not for male students. Therefore, this differential gender outcome for enrollment and schooling attainment, and given the fact that the scholarship program funds only female students, is a strong suggestion that the estimated gendered impact is real and attributable to the program.

Table 9: The results from estimating equation (7) for individuals aged 25 and above. The scholarship program should have no direct outcome for these individuals (male or female) as is shown. Clustered standard errors are in parentheses.

	Aged 25 Years and Above			
	The dependent variable is <u>current school attendance</u> (*Marginal Probit)*		**The dependent variable is <u>years of schooling attained</u> (*OLS*)**	
	1	**3**	**3**	**4**
Age		-0.0006*** (0.0001)		-0.050*** (0.009)
Household Size		0.0003** (0.0001)		-0.021*** (0.005)
Average schooling of Adults in household		0.0017*** (0.0002)		0.937*** (0.036)
Age of Household Head		0.0002*** (0.0001)		0.010** (0.004)
Rural Dummy		-0.0001 (0.0018)		0.219*** (0.032)
Number of Schools		0.00001 (0.00008)		0.005* (0.003)
Female	-0.011*** (0.002)	-0.008*** (0.003)	-1.688*** (0.220)	-1.475*** (0.179)
Year 2003	0.003 (0.003)	0.002 (0.004)	-0.254 (0.190)	-0.291*** (0.019)
Program*Year 2003	0.002 (0.005)	-0.0002 (0.005)	0.812** (0.264)	0.149 (0.178)
Program*Year 2003*Female	-0.004 (0.004)	-0.005 (0.003)	0.148 (0.282)	0.053 (0.266)
Program Dummy	-0.001 (0.004)	0.005 (0.004)	-2.698*** (1.093)	0.114 (0.082)
Constant			4.201*** (1.120)	2.054* (0.307)
Observations	18982	18677	17952	17897
			0.1	0.6

***significant at 1%; **significant 5%; *significant at 10%.

Even after controlling for potential endogeneity in program placement and other policies that could account for changes in the outcome of interest, difference-in-differences estimates can be invalidated by serial correlation in the error term (Bertrand et al. 2004). This serial correlation in the error terms can bias standard errors downwards leading to significant effects where none

exist. This auto-correlation usually results from multiple observations overtime. This problem is, fortunately, not an issue in this paper. Only two rounds of surveys are used, which precludes the biasing effects of serial correlation. Furthermore, the standard errors are clustered at the region level to account for possible intra-regional correlation.

e. Potential Impact of the Program on School Quality

A rapid increase in enrollment without proportionate investments in other school inputs such as qualified teachers, quality infrastructure and up-to-date textbook will likely lead to a fall in school quality. While increasing enrollment to meet the MDG target is important, maintaining quality is just as important (Filmer et al. 2006). Unfortunately, lack of disaggregated information on measures of various dimensions of school quality prevents as rigorous an assessment of the scholarship program on quality as enrollment or years of schooling attained. However, with information on student-teacher ratio by region, I provide some evidence of the effect of the program on this dimension of quality. Figure 3 presents the student-teacher ratios by program (regions 3, 4, 5 and 6) and non-program (regions 1 and 2) areas over time. At the primary school level, average student-teacher ratios start increasing in 2001/02 in both program and non-program regions. However, the gradient of the increase in program regions is slightly higher. Similarly, the average student-teacher ratios at the middle school level went up significantly in 2001/02 for both program and non-program regions, but the increase is slightly higher for the former. At the high school level, increases in student teacher ratio started earlier for both program and non-program regions in 2000/01. In addition, the higher growth in the ratio for program regions relative to non-program regions is much higher compared to primary or middle school level. These increases in student-teacher ratios as the program is rolled over time, which

seems higher in program relative to non-program regions, is suggestive of declining educational quality as enrollment responded positively to the scholarship program.

Another way in which lower quality can manifest itself due to rapid expansion in enrollment is the exodus of students away from public to private schools. This effect seems to have occurred in Kenya when school fees were abolished (Bold et al. 2010). Figure 4 shows the percentage of Gambian students attending public schools between 1999/00 and 2002/03 academic years. There does not seem to be any abrupt changes in the share of students attending public schools over this period. So while school quality likely decreased, this seems to have manifested itself through increases in average class size rather than exodus from public schools. One possible reason is that a supply constraint in private schools could limit the amount of students transferring. Or, differential exodus from public schools in some regions could be masked in the aggregated numbers presented in figure 3. Hence, the impact of the scholarship program on relative enrollment in public schools is not conclusive.

Figure 3: Average trends in student-teacher ratios by scholarship program regions (3, 4, 5 and 6) and non-program regions (1 and 2).

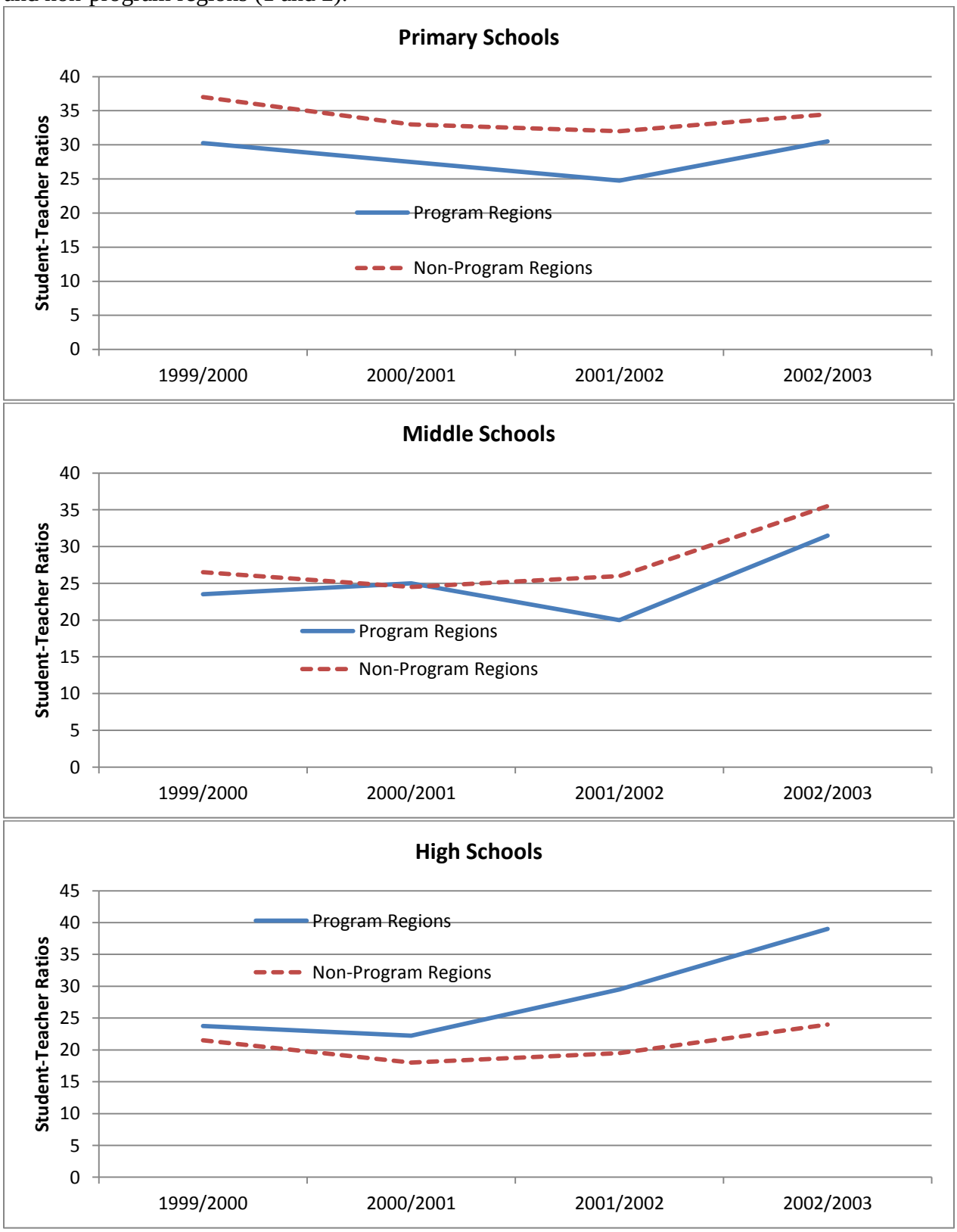
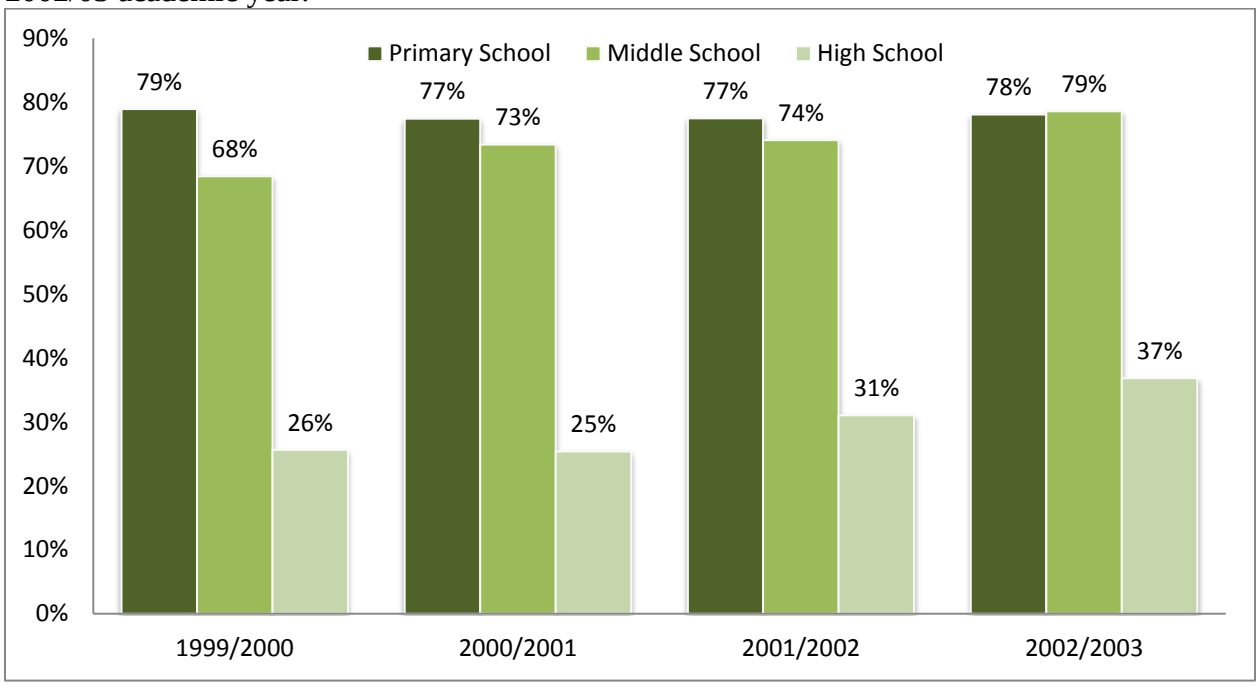


Figure 4: The percentage of Gambian students attending public schools between 1999/00 and 2002/03 academic year.



VI. Conclusion

Both private and public returns to education are high. And education is important not only for those instrumental reasons but for individual empowerment as well. There is global recognition of this importance in the prominence of education-related targets in the Millennium Development Goals. To reach these targets, many African countries have recently implemented policies in the form of abolishing school fees to both increase student enrollment and help reduce the gender gap in education.

This paper assesses the schooling impact of a scholarship program for girls implemented in Gambian regions, beginning in 2000. The program was funded by government of The Gambia, UNICEF, the World Bank and the HIPC program. The scholarship program pays for the school fees of female students attending public schools in all the areas where it is implemented

(there are no school fees for public primary schools in The Gambia). It was phased in the country over time from the east to the west, enabling an assessment of its impact on enrollment rates and years of schooling attained. I took advantage of the phased implementation by using a difference in difference estimation strategy. I found that the program led to 9 percentage point increase in enrollment rates, and 0.3 to 0.4 increase in years of schooling attained for female school-aged students. No significant effects in enrollment rates and schooling attained, positive or negative, were found for school-aged male students. The estimated impact remains after several robustness checks.

The success of the scholarship program suggests that barriers to education in the form of direct costs are still significant in The Gambia. While school fees do bring in needed funds to finance current expenditures, both the individual and societal returns to education later in life significantly outweigh the current direct cost of education (Bruns et al. 2003). Consequently, programs that reduce the barriers to enrollment are worthwhile investments.

Due to data limitation, the impact of the scholarship program on school quality is not rigorously assessed in this paper. However, the rise in student-teacher ratio suggests that educational quality may have fallen as the program was expanded. Lower quality due to rapid increase in enrollment is a real concern if the scholarship is not accompanied by corresponding investments in school inputs. Therefore, this is an important area for future research to arrive at a fuller picture of the program's impact.

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